RAD
data communications

Installation and Operation Manual

Optimux-4T1

Four T1 Multiplexer

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General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

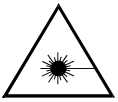|	
⚠ **Warning**	**This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.**
⚡	**Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.**
⏚	Protective earth: the marked lug or terminal should be connected to the building protective earth bus.
☀ **Warning**	**Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached. Please observe the following precautions:** • **Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.** • **Do not attempt to adjust the laser drive current.** • **Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.** • **The use of optical devices with the equipment will increase eye hazard.** • **Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.** **ATTENTION: The laser beam may be invisible!**

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 product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed form the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

Connection of Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The earthing and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution	To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention	Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good earth connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the earth bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching earth ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkströrungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Conventions

Note	*A note draws attention to a general rule for a procedure, or to exceptions to a rule.*
Caution	A caution warns of possible damage to the equipment if a procedure is not followed correctly.
⚠ *Warning*	**A warning alerts to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment. If these instructions are not followed exactly, possible bodily injury may occur.**

Quick Start Guide

If you are familiar with the Optimux-4T1, use this guide to prepare it for operation. Perform the following steps.

1. Installing Optimux-4T1

Connecting the Tributary T1 Interfaces

➤ **To connect the balanced T1 interface (RJ-45 connector)**

1. Connect the RJ-45 connector of the adapter cable to the RJ-45 port designated T1.

Connecting the Uplink

➤ **To connect a fiber optic uplink**

1. Clean the optical connectors using an approved solvent, and dry thoroughly using optical tissue.

2. Connect to the two optical connectors designated TX (transmit output) and RX (receive input) of the appropriate interface.

3. Pay attention to correct connection of the transmit and receive cables to the corresponding connectors. Avoid sharp bends and twisting of the fiber-optic cables.

Note *For WDM option, only one fiber optic cable per link should be connected.*

Connecting the Power

⚠️

Warning

Before switching ON this unit and before connecting or disconnecting any other cable, the protective earth terminals of this instrument must be connected to the protective ground conductor of the mains (AC or DC) power cord. If you are using an extension cord (power cable) make sure it is grounded as well.

Any interruption of the protective grounding conductor (inside or outside the instrument) or disconnecting the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

Connecting the AC/DC Power

The Optimux-4T1 is supplied with a Wide Range AC/DC power supply. The wide-range AC/DC power supply accepts current from both AC and DC sources. From an AC source, the power supply can receive any voltage in the range of 100 VAC to 240 VAC. From a DC source, the 48 VDC power supply can receive any voltage in the range of 36 to 72 VDC.

This unit is equipped with a standard AC-type 3-prong power input connector located on the unit rear panel. This power input connector can be used for both AC and DC voltage inputs. AC or DC power should be supplied to Optimux-4T1 through the 5-feet (1.5m) standard power cable terminated by a standard 3-prong plug.

➤ **To connect Optimux-4T1 to AC power:**

1. Connect the power cable to the connector on the Optimux-4T1 rear panel.

2. Connect the power cable to the electricity outlet.

➤ **To connect Optimux-4T1 to 48V DC power:**

• Refer to the green Supplement at the end of this manual titled:
   DC Power Supply Connection – AC/DC Adaptor (AD) Plug.

Connecting the DC Power

When connecting the DC power, the PWR pin must be connected to the ungrounded line of the central battery (either – or +). The RTN pin must be connected to the grounded line of the central battery. The GND pin must be connected to the protected earth of the building installation.

➤ **To connect Optimux-4T1 to 24V DC power:**

• Refer to the green Supplement at the end of this manual titled:
   DC Power Supply Connection – Terminal Block Connector.

Caution   ***The DC installation procedure must be performed by a qualified technician****.*

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Chapter 1

Introduction

1.1 Overview

General

Optimux-4T1 is a second-order multiplexer that combines four T1 (1.544 Mbps) tributary data streams into a single fiber optic link.

The fiber optic interface provides a secure link in hazardous or hostile environments, increases the maximum connection range, and achieves immunity against electrical interference and protection against the harmful effects of ground loops.

Features

The main features of the Optimux-4T1 multiplexer are:

- Optimux-4T1 multiplexes four T1 channels over a single fiber optic link

- A pair of Optimux-4T1 units offers simple connectivity for four T1 channels at distances of up to 120 km (74.5 miles)

- Optional redundant power supply

- Optional second fiber optic link for automatic backup

- A voice service channel for end-to-end communication between maintenance personnel

- Operates with multimode or single mode fiber; and single mode over single fiber in the standalone version (WDM)

- An optional second power supply for power redundancy and fail-safe operation

- Transmits each of the T1 channels independently, so that each T1 channel can have it's own clock source

- To facilitate system diagnostics, Optimux-4T1 features LED status indicators, AIS alarm generation, recognition and dry contact closure upon link failure.

- Setup, control and diagnostics can be performed via ASCII terminal, SNMP management station, or Ethernet link using Telnet or Web-based management interface

- Conforms to ITU G.703, G.823, G.824 and G.955

- Compact 1U high size.

Application

The following diagram illustrates a typical Optimux-4T1 configuration:
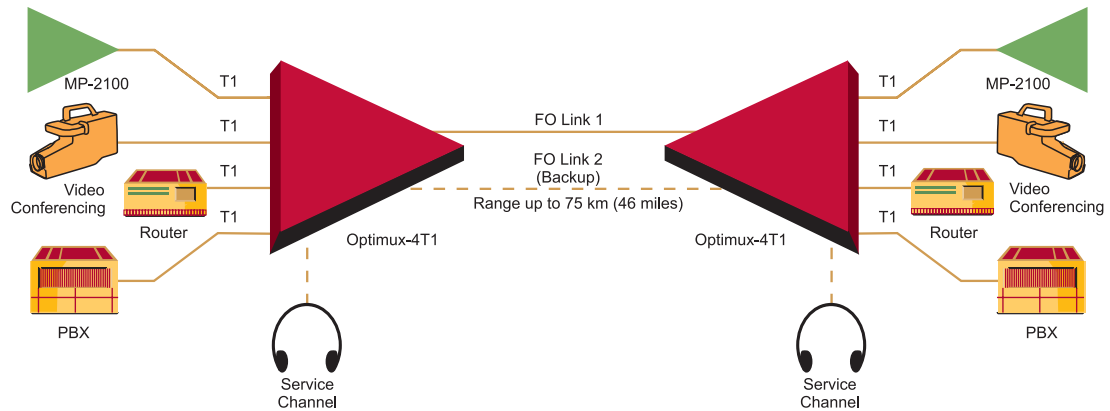
Figure 1-1 Typical Optimux-4T1 Application

1.2 Physical Description

Physical Characteristics

Optimux-4T1 is a compact unit, intended for installation on desktops or shelves. Unit height is only 1U (1.75"). An optional rack-mount adapter kit enables installation of Optimux-4T1 unit in a 19" rack.

The Optimux-4T1 front panel provides LED indicators, a control connector and a headset jack, as illustrated in *Figure 1-2*. For more information about front panel indicators and connectors, refer to *Chapter 2*.

Power connector/s, fiber optic connectors and T1 interfaces can be accessed via the Optimux-4T1 rear panel. For more information about rear panel connectors, refer to *Chapter 2*.
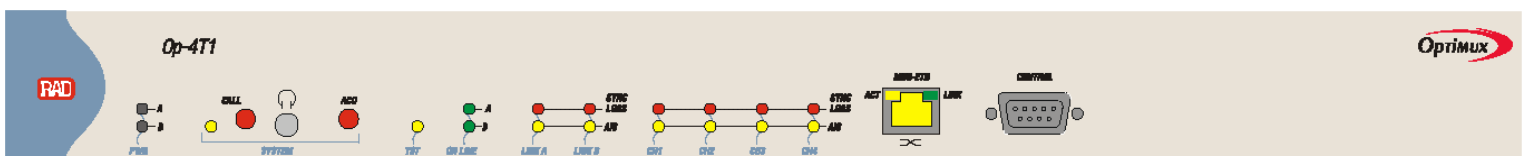
Figure 1-2 Optimux-4T1 Front Panel

1.3 Functional Description

Optimux-4T1 contains the following printed circuit boards:

- One main circuit board that includes four tributary interfaces

- One or two fiber optic interface boards (A and B)

- One or two power supplies (A and B): AC/48VDC wide-range power supply or 24VDC power supply.

Fiber Optic Link

Fiber Optic Link Interface Characteristics

The fiber optic interface can be used to provide a secure link in hazardous or hostile environments, increase the maximum connection range, and achieve immunity against electrical interference and protection against the harmful effects of ground loops.

The fiber optic interface complies with the requirements of ITU-T Rec. G.956, and uses a proprietary signaling format that ensures optimum performance. To optimally meet a wide range of system requirements, the fiber optic interface can be ordered for operation over 62.5/125 micron multi-mode fibers (typical attenuation 3.5 dB/km at 850 nm, and 1.5 dB/Km at 1310 nm), as well as over low-loss 9/125-micron single-mode fibers (typical attenuation 0.4 dB/km at 1310 nm, and 0.25 dB/km at 1550 nm). Most of the options can be ordered with ST, SC, or FC/PC connectors. In addition, 9/125-micron single mode over a single fiber is also available (with SC connectors only).

Note   *The SF3 option uses an SC/APC connector. The FO cable connected to it must therefore be of the same type.*

Table 1-1 provides information on the characteristics of the optical sub-system, including the maximum range over typical fiber optic cable. The maximum range values given in the table assume a 3 dB margin.

Table 1-1. Fiber Optic Interface Characteristics

Wavelength	Fiber Type	Transmitter Type	Typical Output Power	Receiver Sensitivity	Typical Max. Range		Connector Type
[nm]	[μm]		[dBm]	[dBm]	[km	miles]	
850	62.5/125 multimode	Laser (VCSEL)	-15	-34	4.5	2.8	ST, SC, FC/PC
1310	62.5/125 multimode	LED	-18	-32	7	4.3	ST, SC, FC/PC
1310	9/125 single mode	Laser	-12	-34	47	29.2	ST, SC, FC/PC
1310	9/125 single mode	Laser [long haul]	-2	-34	72	44.7	ST, SC, FC/PC
1310 Transmit/Receive	9/125 single mode	Laser [SF3]	-12	-27	20	12.4	SC/APC only
1310/1550 Transmit/Receive	9/125 single mode	Laser WDM [SF1]	-12	-34	47	29.2	SC
1550/1310 Transmit/Receive	9/125 single mode	Laser WDM [SF2]	-12	-34	47	29.2	SC
1550	9/125 single mode	Laser	-12	-34	76	47.2	ST, SC, FC/PC
1550	9/125 single mode	Laser [long haul]	-1	-34	120	74.5	ST, SC, FC/PC

All the fiber optic interface options offer high performance and have a wide dynamic range, which ensures that the receiver does not saturate even when using short fiber optic cables (saturation is caused when the optical power applied to the receiver exceeds its maximum allowed input power, and results in very high bit error rates).

Fiber Optic Link Redundancy Option

Optimux-4T1 can be ordered with one or two link interface options. Each interface operates independently, and can be ordered from any of the link options listed above.

In the fiber optic link redundancy option, Optimux-4T1 supports fully automatic switching between link A and link B. Link A has priority. Therefore, normally link A is selected for use, and link B is disabled. In case a failure occurs on link A, Optimux-4T1 automatically switches to link B and continues providing normal service. After link A returns to normal operation, it is automatically reselected.

Each link interface has its own set of indicators that show the current state of the link. AIS alarm will not appear for the non-active optical link.

Tributary Interface Characteristics

The Optimux-4T1 tributary interfaces meet the requirements of ITU-T Rec. G.703. Each tributary port has a 100Ω balanced line interface terminated in an RJ-45 eight-pin connector.

Line coding is B8ZS or AMI. The nominal balanced interface transmit level is ±3.0 V. The line attenuation is up to 12 dB, and each T1 signal is processed by an adaptive equalizer that compensates for various cable lengths to ensure optimal performance. Phase Locked Loops (PLL) are used to recover the clock signals, and the resulting jitter performance complies with the requirements of ITU-T Rec. G.824.

Each tributary interface has its own set of indicators that show the current state of the tributary link. The user can disable the alarm indications generated by unused interfaces (via internal switch and terminal, see *section 2.5*). AIS data streams are transmitted instead of failed or unconnected tributary data streams.

Service Channel

Optimux-4T1 provides a full-duplex voice service channel. This channel enables operators of two units connected in a link to communicate. Communication is achieved using standard headsets connected to sockets located on the Optimux-4T1 front panel. A CALL push-button is provided to alert the remote operator when the local operator wants to speak: while the push-button is pressed, a CALL indicator is lit and an internal buzzer sounds on the remote Optimux-4T1.

The proprietary modulation method used for the service channel does not affect range, and enables the service channel to operate independently of payload traffic, as long as the optical signal can be received at the remote end. This enables the operators to coordinate maintenance activities.

Test and Diagnostics Capabilities

Optimux-4T1 has comprehensive test and diagnostics capabilities that include local and remote loopbacks on the fiber optic link interface and on each tributary link. The activation is performed by sending a special test sequence through the fiber optic link. An automatic self-test on power-up further enhances maintenance.

For more information on activating loopbacks see *Chapter 4*.

Alarms and Alarm Indications

Optimux-4T1 can detect the following alarm conditions on each T1 and fiber optic interface:

- Loss of input signal

- Loss of frame synchronization

- Reception of alarm indication (AIS) signal, which consists of a continuous sequence of 1s.

Notes
- *When AIS is received, loss of frame synchronization occurs. However, in this case the alarm indicating the loss of frame synchronization is suppressed.*

- *AIS alarm will not appear for the non-active optical link.*

When not all the tributaries are in use, the user can disable the alarm indications related to the unused tributaries.

The response to alarm conditions is as follows:

- AIS is transmitted on each tributary output in the following cases:
    - Loss of fiber optic input signal is detected
    - AIS is received on the fiber optic input
    - Loss of fiber optic frame synchronization.

- For each tributary, an AIS signal is sent instead of the tributary data stream through the fiber optic link in the following cases:
    - Loss of tributary input signal is detected
    - AIS is received on the tributary input
    - Loss of tributary frame synchronization.

Front panel indicators display each alarm condition. In addition, a dedicated connector is used to provide major and minor alarm indications, by means of dry contacts.

The major alarm is activated in the following cases:

- Optimux-4T1 is not powered, or total power supply failure (e.g., when two power supplies are installed, failure of both supplies).

- Loss of fiber optic input signals, or loss of fiber optic frame synchronization.

- Loss of tributary input signals, or loss of frame synchronization

- Unable to activate redundancy.

The minor alarm is activated in the following cases:

- Reception of AIS signal on the fiber optic input.

- Reception of AIS signal on tributary inputs.

Management and Monitoring

Optimux-4T1 units are equipped with a front panel serial RS-232 management port and an Ethernet management port. The RS-232 port operates at user-selectable rates of 9.6, 19.2, 38.4, 57.6 and 115.2 kbps over a null-modem cable EYN250. The Ethernet port operates at a rate of 10 Mbps and can be set to full or half duplex.

The management interface supports the following management methods:

- **Supervision Terminal**–An ASCII terminal connected to the RS-232 port (or a PC running a terminal emulation program) can be used as a supervision terminal. All software required for the various management functions available through the terminal is contained in the Optimux-4T1.

- **SNMP Management**–The management interface includes an SNMP agent that enables SNMP management of the Optimux-4T1, using the UDP-over-SLIP (Serial Link Internet Protocol) protocol. The SNMP agent also enables fully graphical, user-friendly management using RADview stations offered by RAD, as well as management by other SNMP-based systems.

- **Ethernet Management**–A management terminal can be connected to the Optimux-4T1 via an Ethernet connection, using a UTP-CAT5 cable. The 10BaseT Ethernet interface supports a throughput of 10 Mbps. All software required for the various management functions available through the terminal is contained in the Optimux-4T1.

Power Requirements

Optimux-4T1 can be ordered with one or two power supplies. Two types of power supplies are available:

- AC/DC wide-range for operation on AC (100 to 240 VAC) or on DC (40-72 VDC) sources

- DC operation on 24 VDC source.

Each power supply (A and B) can be ordered as one of the above power supply types).

When two power supplies are installed, they share the load; in case one of the supplies fails or its input power is disconnected, the other power supply continues providing power to Optimux-4T1.

1.4 Technical Specifications

Fiber Optic Interface Characteristics

Applicable Standards	ITU-T Rec. G.956
Performance	Refer to Table 1-1
Connectors	ST, SC, or FC-PC, in accordance with ordered option (SF1/SF2 options only available with SC) (SF3 option only available with SC/APC)

T1 Tributary Interface Characteristics

Applicable Standards	ITU-T Rec. G.703, G.824
Nominal Line Data Rate	1.544 Mbps
Line Code	B8ZS / AMI
Line Impedance	100Ω, balanced
Signal Levels	
Transmit Levels	±3.0 V ±20%
Receive Levels	0 dB to –12 dB
Jitter Performance	Per ITU-T Rec. G.824
Connector	RJ-45

Indicators

Loss of input signal for the fiber optic link and for each tributary

Reception of AIS signal for the fiber optic link and for each tributary (loss of frame synchronization alarm suppressed)

TEST (when loopbacks are active)

Power on

Active Receiving link

CONTROL DTE
Supervisory Port
(Optional)

Interface	V.24/RS-232, asynchronous DTE interface
Connector	9-pin D-type female connector
Data Rate	9.6, 19.2, 38.4, 57.6 and 115.2 kbps

MNG-ETH

Physical Interface	10BaseT
Data Rate	10 Mbps
Transmission Mode	Full/Half Duplex
Connector	Shielded RJ-45
Cable Type	UTP-CAT5

Voice Service Channel
(fits standard headset)

Input Impedance	33 kΩ
Input Level	5 mV
Output Level	50 mW @ 8Ω
-3dB Bandwidth	3 to 3000 Hz
Call Indication	LED and internal buzzer

ALARM
Connector

Connector	9-pin D-type female connector
Contact Functions	Set of floating normally-closed/normally-open contacts for major and minor alarm indication
Contact Rating	Maximum 1A (at 30 VDC or 30 VAC) through closed contacts

Physical Characteristics

Height	44 mm / 1.75 in (1U)
Width	440 mm / 17.4 in
Depth	240 mm / 9.5 in
Weight	2 kg / 4.4 lb

Power Requirements

AC/DC Powered Units	100 to 240 VAC, 50 or 60 Hz, 13.5 VA -or- 40–72 VDC, 9.5 W
DC Powered Units	24 VDC, 7.5 W

Note: *Optimux-4T1 can support up to two (redundant) power supplies.*

Environment

Operating Temperature	0° to 50°C (32° to 122°F)
Relative Humidity	Up to 90%, non-condensing

Chapter 2

Installation and Setup

2.1 Introduction

Optimux-4T1 is delivered completely assembled. It is designed for operation as a desktop unit or for mounting in a 19-inch rack. For instructions of rack mounting, refer to the *Rack Mounting Kit for 19 inch Racks* guide that comes with the RM kit.

Mechanical and electrical installation procedures for Optimux-4T1 are provided in the following sections.

After installing the unit, refer to *Chapter 3* for operating instructions and system configuration procedures.

In case a problem is encountered, refer to *Chapter 5* for test and diagnostics instructions.

Warning

No internal settings, adjustment, maintenance, or repairs may be performed by either the operator or the user; such activities may be performed only by a skilled technician who is aware of the hazards involved.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

2.2 Site Requirements & Prerequisites

Power

AC/DC-powered Optimux-4T1 units should be installed within 1.5m (5 feet) of an easily accessible grounded AC outlet capable of furnishing a supply voltage in the range of 100 to 240 VAC or 40–72 VDC.

DC-powered Optimux-4T1 units require a 24 VDC power source.

Tributary Connections

Each Optimux-4T1 tributary interface has one RJ-45 connector. *Appendix A* provides the pin allocation for the RJ-45 connector.

The maximum allowable line attenuation between each tributary port and the user's equipment is 12 dB.

Fiber Optic Link Connections

Each fiber optic link interface is terminated in two ST, SC, or FC-PC connectors, in accordance with order. The maximum allowable attenuation depends on the interface option ordered (refer to *Table 1-1*).

When working with the WDM option, only one fiber optic cable per link should be connected. The two types – SF1 and SF2 – must work opposite each other; SF1 cannot work opposite SF1, and SF2 cannot work opposite SF2.

Front and Rear Panel Clearance

Allow at least 90 cm (36 inches) of frontal clearance for operator access. Allow at least 10 cm (4 inches) clearance at the rear of the unit for interface cable connections.

When planning the routing of fiber optic cables, avoid sharp bends.

Ambient Requirements

The ambient operating temperature of the Optimux-4T1 is 0° to 50°C (32° to 122°F), at a relative humidity of up to 90%, non-condensing.

2.3 Equipment Needed

The equipment needed to install the Optimux-4T1 is:

- ST, SC or FC/PC fiber optic interface link connector cables

- RJ-45 T1 connector cables (for tributary interface)

- Phillips screwdriver (for installation in 19 inch rack).

2.4 Package Contents

The Optimux-4T1 package contains the following:

- Optimux-4T1 multiplexer

- CBL-DB9/9-EYN250 cable

- Power supply cable (two cables when ordered with redundant power supply)

- AC/DC Adaptor (AD) plug

- Hands-free telephone headset

- *Optimux-4T1 Installation and Operation* manual

2.5 Installation and Setup

➤ **To install Optimux-4T1:**

1. Set the internal switches.

2. Connect Optimux-4T1's various interfaces in the order listed here.

⚠️ *Warning*	**This module may include Class A or Class 1 lasers. For your safety:** • **Do not look directly into the optical connectors while the module is operating. Remember that the Optimux starts operating as soon as it is powered.** • **Do not attempt to adjust the laser drive current.** **The use of optical instruments with this product will increase eye hazard. Laser power up to 1 mW at 1310 nm and 1550 nm could be collected by an optical instrument.** **Use of controls or adjustment or performing procedures other than those specified herein may result in hazardous radiation exposure.** **WARNING: The Laser beam is invisible.**

Setting the Internal Switches

Prior to Optimux-4T1 installation, check the positions of its internal switches. If necessary, change the settings in accordance with the specific requirements of your application.

Opening Optimux-4T1 Case

➤ **To open Optimux-4T1 and access reach the internal switches:**

1. Disconnect all the cables connected to Optimux-4T1.

2. Unscrew the eight screws on the top panel.

3. Unscrew the screws on both side panels.

4. Remove the top cover.

Warning

Access to the inside of the equipment is permitted only to qualified and authorized service personnel.

To avoid accidental electric shock, always disconnect the unit from the power line and from all the cables before removing the cover.

Dangerous high voltages are present inside the Optimux-4T1 when it is connected to power and/or to the links. Moreover, under external fault conditions, dangerous high voltages may appear on the lines connected to the Optimux-4T1.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, would be carried out only by a skilled technician who is aware of the hazard involved. Capacitors inside the instrument may still be charged even after the instrument has been disconnected form its source of supply.

Caution   The Optimux-4T1 contains components sensitive to electrostatic discharge (ESD). To prevent ESD damage, avoid touching the internal components, unless also touching the Optimux-4T1 frame.

There are jumpers that are not listed below. They are set by the manufacturer and should not be touched.

Setting the Internal Switches

The internal switches are located on the Optimux-4T1 main and interface boards as identified in *Figure 2-1*. The functions of the switches are described in Table 2-1.

➤ **To set the switches:**

1. Identify the switch locations, refer to *Figure 2-1*.

2. Change the settings as required (refer to the following table for settings).
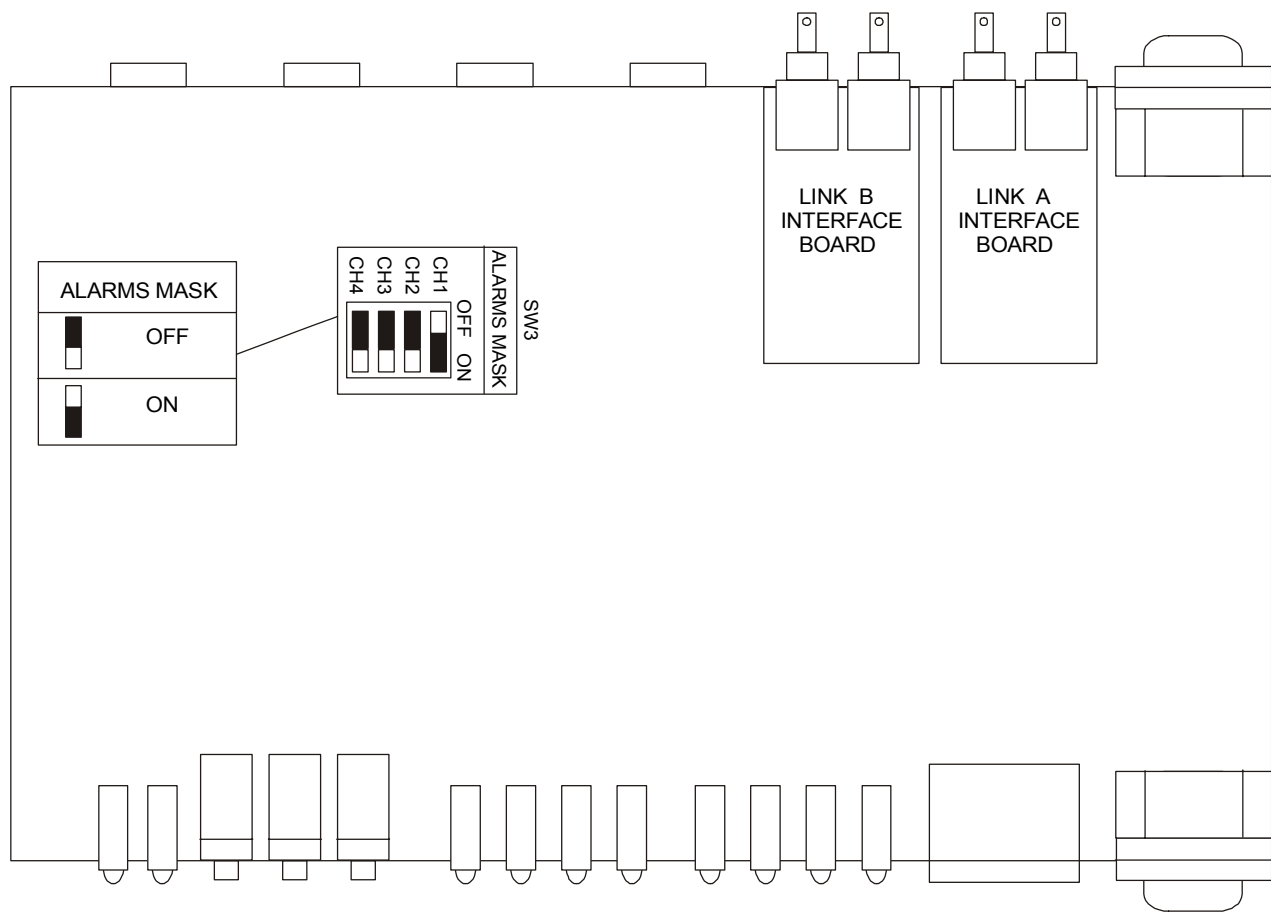
Figure 2-1 Optimux-4T1 Main Board, Internal Settings

Table 2-1. Optimux-4T1 Switch Settings

Switches	Description	Values	Factory Setting
SW3 Tributary Alarms Mask	Along with the software, controls the operation of the alarms and whether they are ignored or processed	SW3-1 sets CH 1 SW3-2 sets CH 2 SW3-3 sets CH 3 SW3-4 sets CH 4 OFF—The decision whether the alarm (of the specific channel) is masked or not is determined by the software setting. ON—Mask the channel. This channel will not request a relay activation command. The software will indicate the stattus of this channel, but the status cannot be changed via the software.	OFF

Closing the Optimux-4T1 Cover

After completing the internal settings, replace the cover on the unit.

➤ **To close the cover:**

1. Place the top cover on the unit.

2. Insert the screw on both side panels.

3. Insert the eight screws on the top panel

Note *Insert the original cover screws in their positions and tighten carefully. Do not use excessive force.*

2.6 Interfaces and Connections

Connector Location

Figure 2-2 shows a typical Optimux-4T1 rear panel, and identifies connector locations.

Connector pin allocations appear in Appendix A.
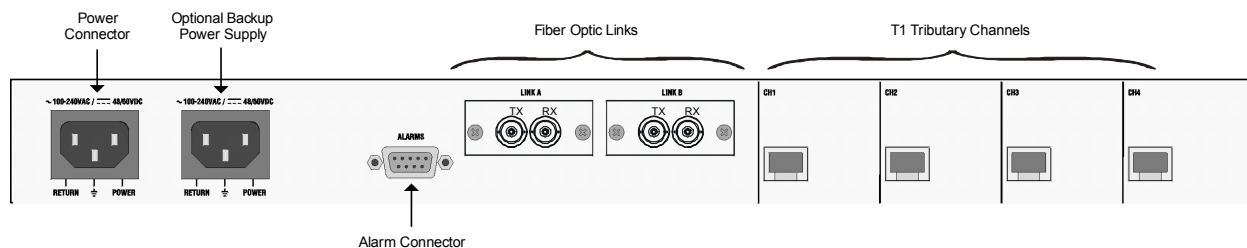
Figure 2-2 Typical Optimux-4T1 Rear Panel

Connecting the Tributary Channels

Each tributary interface includes one RJ-45 connector.

➤ **To connect the tributary channels:**

- Connect each of the tributary cables to the connector(s) corresponding to the interface in use. Connect to the RJ-45 connectors designated CH1, CH2, CH3 and CH4.

Connecting the Fiber Optic Links

Each fiber optic interface is terminated in two ST, FC or FC/PC connectors, in accordance with the ordered option. The connection to the fiber optic link (A and B) is made using one of two groups of connectors – one for link A and the other for the optional link B. The connector types (ST, SC, FC/PC) depend on the interface option in use.

➤ **To connect the fiber optic links:**

1. Before connecting, clean the optical connectors using an approved solvent and dry thoroughly using optical tissue.

2. For each fiber optic link interface (A and B), connect two optical cables to the two optical connectors designated TX (transmit output) and RX (receive input) of the appropriate interface. Pay attention to correct connection of the transmit and receive cables to the corresponding connectors. Avoid sharp bends and twisting of the fiber optic cables.

3. For the WDM option, only one fiber optic cable per link should be connected.

Connecting the Alarm Relays

The ALARM connector is used to connect to the changeover contacts of the major and minor alarm relays.

➤ **To connect the alarm relays:**

- Connect the cable to the ALARM connector on the rear panel.

Connecting to the Service Channel

➤ **To connect the service channel:**

- Connect the headset to the service channel socket located in the SYSTEM section of the front panel.

Grounding

The connection of the protective ground is accomplished through one of the pins of the power connector, both for the AC and DC versions.

⚠ **This instrument may become dangerous if damage to the protective (grounding) conductor (inside or outside the instrument) occurs or if disconnecting from the protective ground terminal.**

Warning

➤ **To ground Optimux-4T1:**

- Connect the protective ground terminals of the Optimux-4T1 to the protective ground conductor of the power cord.

Connecting the Power

Figure 2-2 shows a typical rear panel power for an Optimux-4T1 unit with a dual AC power supply. When only one power supply unit is installed, the rear panel includes a single power connector.

The wide-range AC/DC power supply inside the Optimux-4T1 accepts current from both AC and DC sources. From an AC source, the power supply can receive any voltage in the range of 100 to 240 VAC. From a DC source, the 48 VDC power supply can receive any voltage in the range of 40 to 72 VDC.

When connecting the DC power, the PWR pin must be connected to the ungrounded line of the central battery (either – or +). The RTN pin must be connected to the grounded line of the central battery. The GND pin must be connected to the protected earth of the building installation.

⚠️
Warning

Before switching on this instrument, the protective earth terminals of the instrument must be connected to the protective ground conductor of the power cord. The power plug may only be inserted in a power outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding).

Whenever it is likely that the protection offered by the internal fuses has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

Connecting the AC/DC Power

The Optimux-4T1 is supplied with a Wide Range AC/DC power supply. This unit is equipped with a standard AC-type 3-prong power input connector located on the unit rear panel. This power input connector can be used for both AC and DC voltage inputs. AC or DC power should be supplied to Optimux-4T1 through the 5-feet (1.5m) standard power cable terminated by a standard 3-prong plug.

➤ **To connect Optimux-4T1 to AC power:**

1. Connect the power cable to the connector on the Optimux-4T1 rear panel.

2. Connect the power cable to the electricity outlet.

➤ **To connect Optimux-4T1 to 48V DC power:**

• Refer to the green Supplement at the end of this manual titled: *DC Power Supply Connection – AC/DC Adaptor (AD) Plug*.

Connecting the DC Power

➤ **To connect Optimux-4T1 to 24V DC power:**

• Refer to the green Supplement at the end of this manual titled: *DC Power Supply Connection – Terminal Block Connector*.

Caution   **The DC installation procedure must be performed by a qualified technician.**

Chapter 3

Operation

3.1 General

In this chapter you will find detailed instructions for operating the Optimux-4T1.

The information presented in this chapter includes a description of the Optimux-4T1 front panel controls, and operating procedures (turning on, front-panel indications, and turning off).

3.2 Front Panel Indicators and Switches

Figure 3-1 shows the front panel of the Optimux-4T1. *Table 3-1* lists the functions of the Optimux-4T1 controls, connectors and indicators located on the Optimux-4T1 front panel. The index numbers in *Table 3-1* correspond to the item numbers in *Figure 3-1*.
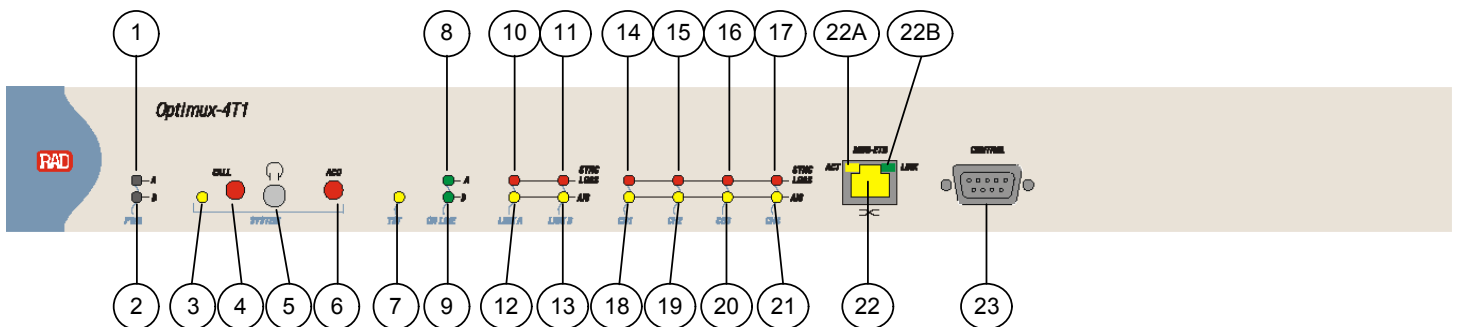

Figure 3-1 Optimux-4T1 Front Panel

Table 3-1 Optimux-4T1 Controls, Connectors and Indicators

NO	Control or Indicator	Function
1	PWR A indicator	**ON (green)** – Power supply A is turned on and is operating normally.
		ON (red) – Power supply A is turned on and a malfunction has been detected or is not been turned on. In this case, Optimux-4T1 continues to operate normally using power supply B (when installed).
2	PWR B indicator	**ON (green)** – Power supply B is turned on and is operating normally.
		ON (red) – Power supply B is turned on and a malfunction has been detected or has not been turned on. In this case, Optimux-4T1 continues to operate normally using power supply A.
		Off – Power supply B is not assembled.
3	SYSTEM CALL indicator	**ON** – A call alert is received through the service channel from the remote operator.
4	SYSTEM CALL push-button	When the service channel is enabled, pressing this button sends an alert to the remote operator, to signal that the local operator wants to speak.
5	SYSTEM headset jack	Miniature jack for connection of headset to the service channel
6	ALARM CUT OFF (ACO) push-button	When this button is pressed, the indication of current alarms is suppressed and only new alarms are indicated.
7	TST indicator	**ON** – The Optimux-4T1 is in test condition (local or remote loopback).
8	ON LINE A indicator	**ON** – Link A is active.
		OFF – Link A is not active.
9	ON LINE B indicator	**ON** – Link B is active.
		OFF – Link B is not active.
10	SYNC LOSS LINK A indicator	**ON** – Link A bit error rate exceeds 10^{-6}.
11	SYNC LOSS LINK B indicator	**ON** – Link B bit error rate exceeds 10^{-6}.
12	AIS LINK A indicator	**ON** – AIS signal is received on link A.
13	AIS LINK B indicator	**ON** – AIS signal is received on link B.
14	SYNC LOSS CH1 indicator	**ON** – The corresponding tributary interface reports loss of input signal.
15	SYNC LOSS CH2 indicator	
16	SYNC LOSS CH3 indicator	
17	SYNC LOSS CH4 indicator	

Table 3-1. Optimux-4T1 Controls, Connectors and Indicators (Cont.)

NO	Control or Indicator	Function
18	AIS CH1 indicator	**ON** – AIS signal is output by the corresponding tributary interface.
19	AIS CH2 indicator	
20	AIS CH3 indicator	
21	AIS CH4 indicator	
22	MNG-ETH connector	Connection to the optional management Ethernet interface.
22A	MNG-ETH ACT indicator	**ON** – Data is being transferred on the Ethernet link.
22B	MNG-ETH LINK indicator	**ON** – The Ethernet line is "alive".
23	CONTROL connector	Connection to the optional management interface.

3.3 Operating Instructions

Turning Optimux-4T1 On

➤ **To turn on an Optimux-4T1 unit with a single power supply:**

1. Connect the power cable to the power connector on the rear panel of the Optimux-4T1.

2. Connect the power cable to the electricity outlet.

   The PWR A indicator lights in green.

➤ **To turn on an Optimux-4T1 unit with two power supply units:**

1. Connect each power cable to a power connector on the rear panel of the Optimux-4T1.

2. Connect each power cable to the electricity outlet.

   The corresponding PWR indicator(s) light in green.

Normal Indications

During normal operation:

- The PWR indicators of the active power supply sources light in green.

- The indicator corresponding to the fiber optic link in use (A or B) is lit.

- All the SYNC LOSS, AIS, and TST front-panel indicators are not lit.

Using the Service Channel

➤ **To use the service channel:**

1. Plug a headset into the front panel jack.

2. To start a conversation, press the CALL button and wait for the answer of the remote operator.

3. After the remote operator answers, you can speak freely, as the service channel operates full duplex.

4. To answer an incoming call: When the buzzer sounds (the CALL front-panel indicator also lights while the buzzer sounds), put on the headset and answer.

Turning Optimux-4T1 Off

➤ **To turn off the Optimux-4T1:**

- Disconnect the power cable(s) from the electricity outlet.

Chapter 4

Configuration

4.1 Introduction

The use of a terminal is optional for configuration, monitoring and maintenance operations.

Terminal Management Modes

The Optimux-4T1 provides the following terminal management modes:

- **Monitor** – A supervisory ASCII ANSI terminal or a PC emulating an ASCII ANSI terminal connected directly to the Optimux-4T1 CONTROL port.

- **Ethernet** – A PC running terminal emulation software or a management workstation, connected to the Optimux-4T1 via an Ethernet cable. It must be possible to activate Telnet and Web access after setting the IP address.

Up to three users can be active simultaneously, one connected to the terminal and two via telnet or Web. When connected via Telnet or Web, the user is disconnected after 10 minutes of inactivity (no keyboard input on the client computer.)

Optimux-4T1 supports several management information bases (MIBs). Refer to *Appendix C* for details.

4.2 Setting Terminal Communication

Setting the Terminal Communication Parameters

➤ **To set the terminal communication parameters:**

1. Connect the terminal to the 9-pin CONTROL connector on the front panel of the Optimux-4T1 over a null-modem cable – CBL-DB25/9-EYN250. If a PC is used, run a terminal emulation program.

2. Set the default parameters of the terminal communication port to a baud rate of 19,200 bps, 8 bits per character, one stop bit and no parity bit.

3. Disconnect the Optimux-4T1 from the mains, and then reconnect it to the mains.

4. Wait until the Test LED starts blinking. This indicates that the device is ready to learn the baud rate of the terminal.

5. Press <Enter> or <.> at least four times.

Optimux-4T1 automatically detects and adapts itself to terminal baud rates of 9,600, 19,200, 38,400, 57,600 and 115,200 bps. After detecting the correct baud rate, the User name prompt is displayed, and the new baud rate is saved in the divide.

If the autodetection fails, the Optimux-4T1 CONTROL port uses the last baud rate that was saved in the device.

The Optimux-4T1 login screen (see Figure 4-1) is displayed.

```
                              OP-4T1

   USER NAME:
   PASSWORD:




ESC - clear; & - exit                                        1 user(s)
```

Figure 4-1. Optimux-4T1 Login Screen

6. Enter your user name. The default user name is **USER**.

7. Enter your password. The default password for the default user name is **1234**.

The Optimux-4T1 Main Menu (see Figure 4-2) is displayed.

Entering the Terminal Session

Once you have logged into the system, the Optimux-4T1 Main Menu (see Figure 4-2) is displayed.

```
                              OP-4T1

Main Menu

     System Description ... (OP-4T1 HW Version 0.0  SW Version 3.00)

 1. Configuration   >
 2. Monitoring      >
 3. Diagnostics     >
 4. File Utilities  >



>
Please select item <1 to 4>

ESC-prev.menu; !-main menu; &-exit                           1 user(s)
```

Figure 4-2 Main Menu

For the applicable operation using the terminal, refer to *Figure 4-3*.

Main Menu

1. Configuration

2. Monitoring
- 1. Total Alarms
- 2. System Monitoring
  - 1. Local System Status
  - 2. Remote System Status
  - 3. Local System Alarms
  - 4. Remote System Alarms
  - 5. System Log File
  - 6. Clear Log File
- 3. Physical Port Monitoring
  - 1. Local Physical Port Status
    - 1. Management Ethernet
    - 2. Up-Link Status
    - 3. Channels Status
  - 2. Remote Physical Port Status
    - 1. Management Ethernet
    - 2. Up-Link Status
    - 3. Channels Status
  - 3. Local Physical Port Alarms
    - 1. Up-Link Alarms
    - 2. Port Alarms
  - 4. Remote Physical Port Alarms
    - 1. Up-Link Alarms
    - 2. Port Alarms

3. Diagnostics
- 1. Loop Status
- 2. Local Device Loops
  - 1. Loops Setting
  - 2. E2 LLB Timeout
- 3. Remote Device Loops
  - 1. Loops Setting
  - 2. E2 LLB Timeout

4. File Utilities
- 1. File System
  - 1. SW Files
  - 2. SWAP SW Files
- 2. S/W & File Transfer
  - 1. Via TFTP
    - 1. TFTP File Name
    - 2. TFTP Server IP
    - 3. TFTP Command
  - 2. Via X-Modem

1. System Configuration

2. Physical Ports Configuration
- 1. Local Physical Ports Configuration
  - 1. Management Port Configuration
    - 1. Duplex Mode
    - 2. Ethernet Alarm Mask
  - 2. Up-Link Configuration
    - 1. Link A Name
    - 2. Link A Alarm Mask
    - 3. Link B Name
    - 4. Link B Alarm Mask
  - 3. Channels Configuration
    - 1. Channel Name
    - 2. Channel Alarm Mask
    - 3. Channel Line Code
    - 4. Channel Line Length
    - 5. Channel Number
- 2. Remote Physical Ports Configuration
  - 1. Management Port Configuration
    - 1. Duplex Mode
    - 2. Ethernet Alarm Mask
  - 2. Up-Link Configuration
    - 1. Link A Name
    - 2. Link A Alarm Mask
    - 3. Link B Name
    - 4. Link B Alarm Mask
  - 3. Channels Configuration
    - 1. Channel Name
    - 2. Channel Alarm Mask
    - 3. Channel Line Code
    - 4. Channel Number

1. Service Channel
- 1. Local Service Channel
- 2. Remote Service Channel

2. Redundancy
- 1. Local Redundancy
  - 1. Force Link
  - 2. Redundancy Mode
    - 1. Auto
    - 2. Manual
    - 3. Off
- 2. Remote Redundancy
  - 1. Force Link
  - 2. Redundancy Mode
    - 1. Auto
    - 2. Manual
    - 3. Off

3. Management
- 1. Device Info
  - 1. System Contact
  - 2. System Name
  - 3. System Location
- 2. Host IP
  - 1. Host IP List
    - 1. IP Address
    - 2. IP Mask
  - 2. Default Gateway
  - 3. Read Community
  - 4. Write Community
  - 5. Trap Community
- 3. Manager List
- 4. Manager Access
  - 1. SNMP
  - 2. Telnet
  - 3. Web
  - 4. Web Trace Refresh

4. Control Port
- 1. Change Access
  - 1. Change User Name
  - 2. Change Password
- 2. Baud Rate
  - 1. 9600 bps
  - 2. 19200 bps
  - 3. 38400 bps
  - 4. 57600 bps
  - 5. 115200 bps
- 3. Security Timeout
- 4. POP Alarms

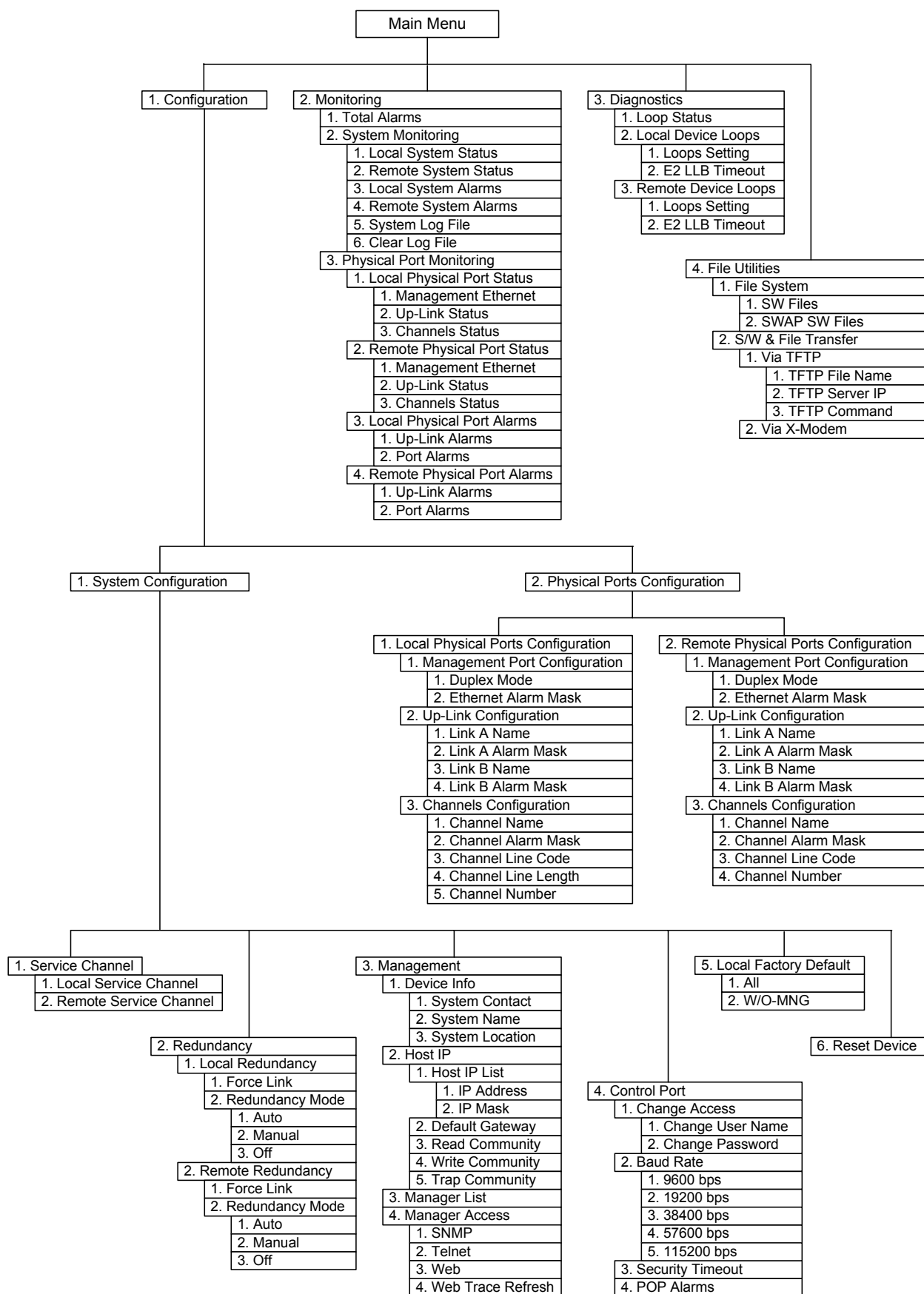5. Local Factory Default
- 1. All
- 2. W/O-MNG

6. Reset Device

Figure 4-3 Optimux-4T1 Menu Map

4.3 Monitoring the System

You can monitor the following aspects of the Optimux-4T1 system:

- Local system status

- Remote system status

➤ **To access the monitoring options:**

1. From the Main Menu, choose **Monitoring**.

    The Monitoring menu (Figure 4-4) is displayed.

    The **Total Alarms** option displays the total number of alarms that are currently activated.

```
                              OP-4T1

Monitoring

 1. Total Alarms                   [ ]
 2. System Monitoring              >
 3. Physical Port Monitoring       >

>

Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-4. Monitoring Menu

2. To monitor the system, choose **System Monitoring**.

    The System Monitoring menu (Figure 4-5) is displayed. This menu is used to monitor various aspects of the system, as described in the sections that follow.

    To monitor a physical port, choose **Physical Port Monitoring**.

    The Physical Port Monitoring menu (Figure 4-8) is displayed. This menu is used to monitor various aspects of the ports, as described in *Monitoring the Physical Ports* on page *4-7*.

```
                          OP-4T1


System Monitoring

 1. Local System Status        >
 2. Remote System Status       >
 3. Local System Alarms       [ ]
 4. Remote System Alarms      [ ]
 5. System Log File          [] >
 6. Clear Log File

>


Please select item <1 to 6>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-5. System Monitoring Menu

On the System Monitoring menu, the Remote System Status and Remote System Alarms options are available only when the Optimux-4T1 is connected to a remote device.

Monitoring the Status of the Local System

➤ **To monitor the status of the local system:**

• From the System Monitoring menu, choose **Local System Status**.

:The Local System Status screen (Figure 4-6) is displayed. The fields in the Local System Status Screen are described in Table 4-1.

```
                          OP-4T1


Local System Status

    Device Type       >  (OP-4-SA)
    Service Channel   >  (Exists)
    Active Link       >  (LINK_A)
    Force Link        >  (LINK_A)
    Redundancy status >  (Available)
    Redundancy Mode   >  (AUTO)
    SW Version           (3.00)
    HW Version           (0.00)
    BOOT Version         (1.10 Boot img: 4.76)
    PS1 Type          >  (AC)
    PS1 Status        >  (OK)
    PS2 Type          >  (AC)
    PS2 Status        >  (OK)
    MAC Address          (0020d20054dc)
    IP Address on        (172.17.154.64)
    Sys up time          (3 days 05:42:59.50)
    Alarm Indication  >  (Major)
    Test Indication   >  (Off)
>



ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-6. Local System Status Screen

Table 4-1. Local System Status Values

Field	Description
SW Version	Version number of the installed software.
HW Version	Hardware version number.
BOOT Version	The software boot version and the boot manager version installed on the device.
Active link	Identifies the currently active link.
Redundancy status	The redundancy state of the system: • AUTO • MANUAL • OFF.
PS1 Type	The type of power supply for Power Supply 1: • AC—AC power supply • 24VDC—DC power supply • DC-48V—DC power supply • NONE—No power supply is installed in this power supply slot.
PS1 Status	The status of Power Supply 1: • OK • Fault • Not mounted.
PS2 Type	The type of power supply for Power Supply 2: • AC—AC power supply • 24VDC—DC power supply • DC-48V—DC power supply • NONE—No power supply is installed in this power supply slot.
PS2 Status	The status of Power Supply 2: • OK • Fault • Not mounted.
MAC Address	The address the device holds when transmitting frames via the Ethernet port.
IP Address on	The address used when transmitting IP frames via the Ethernet port.
Sys up time	System up time.
Alarm Indication	Current system status: • Normal—System is functioning normally; no alarms activated • Major—One or more major alarms are currently activated • Minor—One or more minor alarms are currently activated.
Test Indication	Indicates whether any tests are currently active in the device: • ON—Tests are currently active in the device • OFF—No tests are currently running.

Monitoring the Status of the Remote System

➤ **To monitor the status of the remote system:**

- From the System menu, choose **Remote System Status**.

  The Remote System Status screen (Figure 4-7) is displayed. The fields in this screen have the same meaning as those in the Local System Status screen, described in Table 4-1.

```
                            OP-4T1

Remote System Status


    Device Type        >  (OP-4-SA)
    Service Channel    >  (Exists)
    Active Link        >  (LINK_A)
    Force Link         >  (LINK_A)
    Redundancy status  >  (Available)
    Redundancy Mode    >  (AUTO)
    SW Version            (1.00)
    HW Version            (0.00)
    PS1 Type           >  (AC)
    PS1 Status         >  (OK)
    PS2 Type           >  (AC)
    PS2 Status         >  (Fault)
    Alarm Indication   >  (Major)
    Test Indication    >  (Off)
>


Please select item <1 to 0>
ESC-prev.menu; !-main menu; &-exit                           1 user(s)
```

Figure 4-7. Remote System Status Screen

4.4 Monitoring the Physical Ports

You can monitor the following aspects of the physical ports on the Optimux-4T1:

- Management port status

- Up-link status

- Channel status.

➤ **To monitor the physical ports:**

1. From the Monitoring menu (Figure 4-4), choose **Physical Port Monitoring**.

    The Physical Port Monitoring menu (Figure 4-8) is displayed.

```
                               OP-4T1


Physical Port Monitoring

 1. Local Physical Port Status          >
 2. Remote Physical Port Status         >
 3. Local Physical Port Alarms       [] >
 4. Remote Physical Port Alarms      [] >




>


Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                           1 user(s)
```

Figure 4-8. Physical Port Monitoring Menu

The Remote Physical Port Status and Remote Physical Port Alarms options are available only when the Optimux-4T1 is connected to a remote device.

2. To display the status of ports on the local device, choose **Local Physical Port Status**. To display the status of ports on the remote device, choose **Remote Physical Port Status**. The Local Physical Port Status menu (Figure 4-9) or Remote Physical Port Status menu is displayed. The options in the local and remote menus are identical.

```
                               OP-4T1


Local Physical Port Status

 1. Management                          >
 2. Up-Link Status                      >
 3. Channels Status                     >




>


Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                           1 user(s)
```

Figure 4-9. Local Physical Port Status Menu

Monitoring the Status of the Ethernet Port

➤ **To monitor the status of the Ethernet port:**

• From the Local/Remote Physical Port Status menu (Figure 4-9), choose **Management Ethernet**.

The Management Ethernet Status screen (Figure 4-10) is displayed.

```
                              OP-4T1


Management Ethernet Status

      Link Integrity                 (No integrity)



>

ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-10. Ethernet Status Screen

The Link Integrity can be one of the following:

- OK—The Ethernet cable has integrity

- No integrity—The Ethernet cable is not connected or some other problem exists.

Monitoring the Status of the Up-Link

➤ **To monitor the status of the up-link:**

- From the Local/Remote Physical Port Status menu (Figure 4-9), choose **Up-Link Status**.

The Up-link Status screen (Figure 4-11) is displayed.

```
                              OP-4T1


Up-Link Status

    Link A type                 >   (Fiber optic)
    Link A status               >   (No alarm)
    Uplink A mode               >   (Multi mode)
    Transmitter type Link A     >   (Laser)
    Wave length Link A          >   (1550 nm)
    Connector type Link A       >   (ST)
    Link B type                 >   (Fiber optic)
    Link B status               >   (Signal loss)
    Uplink B mode               >   (Multi mode)
    Transmitter type Link B     >   (Laser)
    Wavelength Link B           >   (1550 nm)
    Connector type Link B       >   (ST)



>

ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-11. Up-Link Status Screen

Monitoring the Status of the Channel Port

➤ **To monitor the status of the channel port:**

- From the Local/Remote Physical Port Status menu (Figure 4-9), choose **Channels Status**.

The Channel Port Status screen *(Figure 4-12)* is displayed.

```
                            OP-4T1

Channel Port Status

    Status                  (No alarm)
    Line code               (B8ZS)
    Balance mode            (Balance)

 1. Channel Num         >   (1)


>

Please select item <1 to 1>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-12. Channel Port Status Screen

4.5 Working with the System Log File

Displaying the System Log File

➤ **To display the system log file:**

- From the System Monitoring menu (Figure 4-5), choose **System Log File**.

    The System Log File screen (Figure 4-13) is displayed.

```
                            OP-4T1

System Log File

      Source           Alarm                       Status    Time
  1   Local Main Link  Line AIS occurred           Major     2:1:13
| 2   Local Device     No connection to remote     Off       5:17:11
| 3   Local CH1        LOS                         Minor     5:19:13
v 4   Local Device     Power supply  A failure     Major     9:1:14
  5   Local Device     Redundancy is not available Major     13:34:14
  6   Remote Device    Power supply  B failure     Major     15:41:12
  7   Remote Device    Power supply  B failure     Off       16:22:14
  8   Remote CH2       LOS                         Minor     22:3:14
  9   Event            Buffer Overflow             Event     23:41:14


>

Please select item <1 to 13
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-13. System Log File Screen

Clearing the System Log File

➤ **To remove all entries from the log file:**

1. From the System Monitoring menu (Figure 4-5), choose **Clear Log File**.
   A confirmation message appears.

2. Press **Y** to erase the log file.

4.6 Alarms

Optimux-4T1 detects fault conditions and initiates alarms and events to alert the user:

- **Alarms** (major and minor) have two statuses: ON and OFF. The alarm status automatically changes to OFF when a fault condition that triggered the alarm is cleared.

- **Events** have only ON status.

Displaying System Alarms

➤ **To display the system alarms:**

- From the System Monitoring menu (Figure 4-5), choose **Local System Alarms** or **Remote System Alarms**.

  The Local System Alarms screen (Figure 4-14) or Remote System Alarms screen is displayed. The Remote System Alarms screen is similar to the Local System Alarms screen.

```
                              OP-4T1

Local System Alarms

    Source        Name                  Num      Severity      Status
 1. Local DEV     PS2 FAIL              2        MAJOR         ON
 2. Local DEV     Remote alarm-DAIS     6        MAJOR         ON



>


Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                              1 user(s)
```

Figure 4-14. Local System Alarms Screen

The Local/Remote System Alarms screen only displays alarms that are currently triggered. Alarms that are currently in the OFF status (not activated) are not displayed.

The Optimux-4T1 system alarms are described in *Chapter 5*.

Displaying Physical Port Alarms

➤ **To display the physical port alarms:**

1. From the Physical Port Monitoring menu (Figure 4-8), choose **Local Physical Port Alarms** or **Remote Physical Port Alarms**.

    The Physical Port Alarms menu (Figure 4-15) for the local or remote Optimux-4T1 device is displayed.

```
                            OP-4T1


Physical Port Alarms

 1. Up link alarms        [ ]
 2. Port Alarms           [ ]

>

Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                              1 user(s)
```

Figure 4-15. Physical Port Alarms Menu

2. To display the up-link alarms, choose **Up link alarms**.

    The Up Link Alarms screen *(Figure 4-16)* is displayed.

```
                            OP-4T1

Up Link Alarms

    Source          Name                 Num      Severity        Status
    Local Link B    Signal Loss          21       MAJOR           ON

>

ESC-prev.menu; !-main menu; &-exit                              1 user(s)
```

Figure 4-16. Up Link Alarms Screen

The Up Link Alarms screen only displays alarms that are currently triggered. Alarms that are currently in the OFF status (not activated) are not displayed.

The Optimux-4T1 up-link alarms are described in *Chapter 5*.

3. To display the port alarms, from the Physical Port Alarms menu, choose **Port Alarms**.

    The Port Alarms screen (Figure 4-17) is displayed.

```
                              OP-4T1

Port Alarms

     Source           Name                    Num      Severity        Status
     Local P-2        Rx AIS                  23       MINOR           ON
     Local P-3        Signal Loss             21       MAJOR           ON

>

ESC-prev.menu; !-main menu; &-exit                                     1 user(s)
```

Figure 4-17. Port Alarms Screen

The Port Alarms screen only displays alarms that are currently triggered. Alarms that are currently in the OFF status (not activated) are not displayed.

The Optimux-4T1 port alarms are described in *Chapter 5*.

4.7 Configuring the Optimux-4T1

The use of a terminal enables you to:

- View the configuration of the E1 and E2 interfaces, to identify whether the interfaces are in the normal mode or in the looped mode

- Set local loop connections in the local Optimux-4T1 at both E1 and E2 interfaces

- Set local loop connections in the remote Optimux-4T1 at both E1 and E2 interfaces

- Set the redundancy mode of the E2 interface

- Set the E1 remote loopback connection

- Reset Optimux-4T1 to the default configuration (removing loops and switching to the normal redundancy mode)

- Set the Service channel.

Configuring redundancy

➤ **To configure the redundancy between the local and remote devices:**

1.   From the Main Menu (Figure 4-2), choose **Configuration**.

The Configuration menu (Figure 4-18) is displayed.

```
                              OP-4T1

Configuration

 1. System configuration          >
 2. Physical ports configuration  >



>

Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                            1 user(s)
```

Figure 4-18 Configuration Menu

2. Choose **System Configuration**.

    The System Configuration menu (Figure 4-19) is displayed.

```
                              OP-4T1

System configuration

 1. Service Channel               >
 2. Redundancy                    >
 3. Management                    >
 4. Control Port                  >
 5. Local Factory Default         >
 6. Reset Device

>

Please select item <1 to 6>
ESC-prev.menu; !-main menu; &-exit                            1 user(s)
```

Figure 4-19 System Configuration Menu

When the local Optimux-4T1 has a service channel and the remote Optimux-4T1 is a new-look device with the service channel, the Service Channel option is shown in the menu. If the local Optimux-4T1 has a service channel and the remote device is either the old-look device or the new-look device without a service channel, .the Local Service Channel option is shown. If the local Optimux-4T1 does not have the service channel and the remote Optimux-4T1 is a new-look device with the service channel, the Remote Service Channel option is shown in the menu.

When the Optimux-4T1 is connected to a new-look remote device, the Redundancy option is shown in the menu; otherwise, the Local Redundancy option is shown instead.

3. If the Optimux-4T1 is connected to a remote device, choose **Redundancy**.

    The Redundancy menu (Figure 4-20) is displayed.

```
                              OP-4T1

Redundancy

 1. Local redundancy                      >
 2. Remote redundancy                  >

Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                            1 user(s)
```

Figure 4-20. Redundancy Menu

4.   To configure redundancy on the local Optimux-4T1, choose **Local Redundancy**.

The Local Redundancy menu (Figure 4-21) is displayed.

```
                              OP-4T1

Local Redundancy

 1. Force Link                         (Link A)
 2. Redundancy Mode               >    (Auto)

Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                            1 user(s)
```

Figure 4-21. Local Redundancy Menu

5.   Choose the link for which you want to set redundancy. Choose **Force Link** to toggle the selected Main Link between *Link A* and *Link B*.

6.   Choose **Redundancy Mode** to set the mode to use.

The Redundancy Mode menu (Figure 4-22) is displayed.

```
                              OP-4T1

Redundancy mode (Auto)

 1. Auto
 2. Manual
 3. Off

Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                            1 user(s)
```

Figure 4-22. Redundancy Mode Menu

7.   Choose the redundancy mode you want to use:

  ▪ **Auto**—When the selected Main Link (for example, Link A) fails, Optimux-4T1 will automatically switch over to the backup Main Link (for example, Link B)

  ▪ **Manual**—When the selected Force Link fails, the system switches to the backup link. The backup link remains in use, even if the Force Link returns to service.

Configuring the Optimux-4T1   4-15

- **Off**—Turns off redundancy. When the selected Main Link fails, Optimux-4T1 will not change over to the backup Main Link.

This completes the setup of redundancy for the local device.

8. To configure redundancy for the remote Optimux-4T1, from the Redundancy menu (Figure 4-20), choose **Remote Redundancy**.

The Remote Redundancy menu appears. This menu is identical to the Local Redundancy menu (Figure 4-21).

To configure the remote redundancy, refer to the above procedure describing how to configure local redundancy.

Note

You can set the mode for the remote device, which will then perform redundancy according to the status of its links.

Setting the Device Information

Each Optimux-4T1 unit can be configured to hold information about the unit, such as its location and a name to easily identify the unit on the network.

➤ **To set device information:**

1. From the System Configuration menu (Figure 4-19), choose **Management**.

The Management menu (Figure 4-23) is displayed.

```
                              OP-4T1


Management

 1. Device Info                      >
 2. Host IP                          >
 3. Manager List                 []>
 4. Manager Access                   >

>


Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-23. Management Menu

2. Choose **Device Info**.

The Device Info menu (Figure 4-24) is displayed.

```
                              OP-4T1
Device Info

    System Description    ... ( Optimux-4T1 Hw Version 0.0 SW Version 30)
 1. System Contact        ... ()
 2. System Name           ... ()
 3. System Location       ... ()

>

Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                              1 user(s)
```

Figure 4-24. Device Info Menu

The *System Description* line identifies the device, along with the current hardware and software version numbers.

3. To define a system contact person, choose **System Contact** and then enter the name, phone and/or other details you want to save in this field.

4. To specify a name to identify the Optimux-4T1 device, choose **System Name** and then enter the name. It is easier to identify the device by a name than by its IP address.

5. To specify a system location, choose **System Location** and then enter the location of the Optimux-4T1 unit.

Setting the network parameters

When you integrate the Optimux-4T1 into your network, you will need to set the network parameters of the Optimux-4T1.

➤ **To set the network parameters:**

1. From the Management menu (Figure 4-23), choose **Host IP**.

    The Host IP menu (Figure 4-25) is displayed.

```
                              OP-4T1
Host IP

 1. Host IP List   >
 2. Default Gateway  ... (172.17.161.1)
 3. Read Community   ... (public)
 4. Write Community  ... (public)
 5. Trap Community   ... (public)

>

Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                              1 user(s)
```

Figure 4-25. Host IP Menu

2. Choose **Host IP List**.

    The Host IP List menu (Figure 4-26) is displayed.

```
                              OP-4T1
Host IP List

 1. IP Address      ... (172.17.161.93)
 2. IP Mask         ... (255.255.255.0)


>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                           1 user(s)
```

Figure 4-26. Host IP List Menu

3. To set the IP address of the Optimux-4T1 unit, choose **IP Address** and then enter the IP address.

4. To set the IP Mask, choose **IP Mask** and then enter the IP mask.

5. To set the default gateway, from the Host IP menu (Figure 4-25), choose **Default Gateway** and then enter the IP address of the gateway.

6. From the Host IP menu, choose **Read Community** and then set the read community. This field is used by SNMP. Specify a string of eight characters.

7. From the Host IP menu, choose **Write Community** and then set the read community. This field is used by SNMP. Specify a string of eight characters.

8. From the Host IP menu, choose **Trap Community** and then set the read community. This field is used by SNMP. Specify a string of eight characters.

Setting up the Manager List

By default, any remote management terminal is allowed to change the configuration of the Optimux-4T1. You may enhance the security of the site by limiting remote management to specific management terminals or nodes. The Manager List lists the network nodes from which management may take place.

➤ **To define the manager list:**

1. From the Management menu (Figure 4-23), choose **Manager List**.

    The Manager List screen (Figure 4-27) is displayed.

```
                              OP-4T1
Manager List

    mngNum          mngIP           mngMask
     1              0.0.0.0            NO
|    2              0.0.0.0            NO
|    3              0.0.0.0            NO
v    4              0.0.0.0            NO
     5              0.0.0.0            NO

 1. Change cell                    ... (0.0.0.0)


>

ESC-prev.menu; !-main menu; &-exit                           1 user(s)
```

Figure 4-27. Manager List Screen

2. The list contains 10 entries. Press **D** to move down the list; press **U** to move up the list. Press **L** to select the previous field; press **R** to select the next field.

3. To change the value of a field, select the field (it will appear highlighted), then choose **Change Cell** and then enter the new value.

When the mngMask field is set to **Yes**, a trap is sent to this agent.

Setting the Management Access

➤ **To set the management access:**

1. From the Management menu (Figure 4-23), choose **Manager Access**.

The Manager Access menu (Figure 4-28) is displayed.

```
                              OP-4T1
Manager Access

 1. Telnet          >
 2. SNMP            >
 3. Web             >
 4. Web Trace Refresh (seconds)[1-255] ... (10)
>

Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-28. Manager Access Menu

2. Choose the method to use for management access:

▪ **SNMP** (the management terminal connects to the Optimux-4T1 via SNMP connection)

▪ **Telnet** (the management terminal connects to the Optimux-4T1 via Telnet connection)

▪ **Web** (the management terminal connects to the Optimux-4T1 via Web connection)

The menu shown in the following figure is displayed. The title of the menu indicates which management access option is being configured. While the Telnet menu is shown in the figure, the menu options are the same for all management access modes.

```
                              OP-4T1
Telnet

 1. Disable
 2. Enable
 3. Managers only
>

Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-29. Telnet Menu

3. Choose **Enable** to enable this access mode; choose **Disable** to disable this access mode. Choose **Managers only** to provide management access only to those users whose IP addresses appear in the Manager List.

4. When the Web management access method is selected, set the **Web Trace Refresh** (1-155 seconds) in the Manger Access menu. This option is available only when Web access is enabled.

Setting the User Name and Password

To enhance security, you can specify a user name and password to control access to the Optimux-4T1 management functions.

➤ **To set user name and password:**

1. From the System Configuration menu (Figure 4-19), choose **Control Port**.

    The Control Port menu (Figure 4-30) is displayed.

```
                                OP-4T1
Control Port

 1. Change Access         >
 2. Baud Rate             >     (19200bps)
 3. Security Timeout             (10min)
 4. POP Alarms            >     (OFF)
>


Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                              1 user(s)
```

Figure 4-30. Control Port Menu

2. Choose **Change Access**.

    The Change Access menu (Figure 4-31) is displayed.

```
                                OP-4T1
Change Access

 1. Change User Name                ... (user)
 2. Change Password                 ... ()
>
Please select item <1 to 2>

ESC-prev.menu; !-main menu; &-exit                              1 user(s)
```

Figure 4-31. Change Access Menu

3. To change the user name, choose **Change User Name** and then enter the new user name.

4. To change the password, choose **Change Password** and then enter the new password. The new password may contain up to eight characters.

Configuring the Control Port

The control port is used to connect a console terminal to the Optimux-4T1 device.

➤ **To configure the control port:**

1. From the Control Port menu (Figure 4-30), choose **Baud Rate**.

   The Baud Rate menu (Figure 4-32) is displayed.

```
                              OP-4T1

Baud Rate      (9600bps)

 1. 9600 bps
 2. 19200 bps
 3. 38400 bps
 4. 57600 bps
 5. 115200 bps

>


Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-32. Baud Rate Menu

2. Choose the baud rate that matches your management terminal device.

3. From the Control Port menu, choose **Security Timeout**, and then enter a timeout value in minutes. This value is the number of minutes of management inactivity after which the Optimux-4T1 automatically disconnects from the management session. To reconnect, press <Enter> on the management terminal and then log in again.

4. Choose **POP Alarms** to toggle POP Alarms ON or OFF. When POP Alarms is ON, new alarms appear at the bottom of the terminal screen. Regardless of the POP Alarms setting, the alarms are written to the log file.

Resetting the Factory Defaults

You can reset all of the local Optimux-4T1 configuration parameters to their default settings, or you can reset all parameters except for the management settings (IP addresses)

➤ **To reset parameters to the factory defaults:**

1. From the System Configuration menu (Figure 4-19), choose **Local Factory Default**.

   The Factory Default menu (Figure 4-33) is displayed.

```
                              OP-4T1


Factory Default
 1.    All
 2.    W/O-MNG>


>


Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-33. Factory Default Menu

2. To reset all parameters to the factory default, choose **All**.

    To reset all parameters except for the management information to the factory default, choose **W/O-MNG**.

    A confirmation message is displayed.

3. Enter **Y** (Yes) to confirm the reset operation.

Resetting the Optimux-4T1

➤ **To reset the Optimux-4T1:**

1. From the System Configuration menu (Figure 4-19), choose **Reset Device**.

    A confirmation message is displayed.

2. Enter **Y** (Yes) to reset the device.

4.8 Configuring the Physical Ports

Configuring the Ethernet Port

➤ **To configure the Ethernet port:**

1. From the Configuration menu (Figure 4-18), choose **Physical Ports Configuration**.

    The Physical Ports Configuration menu (Figure 4-34) is displayed.

```
                              OP-4T1


Physical ports configuration

 1. Local Physical Ports Configuration      >
 2. Remote Physical Ports Configuration     >



>


Please select item <1 to 2>

ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-34. Physical Ports Configuration Menu

The Remote Physical Ports Configuration option is shown only when a remote Optimux-4T1 device is connected.

2. Choose **Local Physical Ports Configuration** or **Remote Physical Ports Configuration**.

    The Local Physical Ports Configuration screen (Figure 4-35) or Remote Physical Ports Configuration screen is displayed. The Remote Physical Ports Configuration screen is identical to the Local Physical Ports Configuration screen.

```
                              OP-4T1


Local Physical Ports Configuration

 1. Management Port Configuration   >
 2. Up Links Configuration          >
 3. Channels Configuration          >



>

Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-35. Local Physical Ports Configuration Menu

3. Choose **Management Port Configuration**.

    The Management Port Configuration screen (Figure 4-36) is displayed.

```
                              OP-4T1


Management Port Configuration

 1. Duplex Mode                     (Full)
 2. Ethernet alarm mask             (On)

>

Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-36. Management Port Configuration Screen

4. Choose **Duplex Mode** to toggle through the available modes:
    - **Full** (Full duplex mode)
    - **Half** (Half duplex mode).

5. Choose **Ethernet alarm mask** to toggle the Ethernet alarm on or off.

Configuring the Channels

➤ **To configure the channels:**

1. From the Local/Remote Physical Ports Configuration menu (Figure 4-35), choose **Channels Configuration**.

    The Channels Configuration screen (Figure 4-37) is displayed.

```
                            OP-4T1

Channels Configuration

 1. Channel name          ... ( )
 2. Channel alarm mask        (Off)
 3. Channel line code         (B8ZS)
 4. Channel line length       (0-133 ft)
 5. Channel Number            (1)

>

Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-37. Channels Configuration Screen

2. Choose **Channel Number** and then enter the number of the channel you want to configure.

3. If you would like to specify a name to help identify the channel, choose **Channel name** and then enter the name (a text string).

4. Choose **Channel alarm mask** to toggle the alarm for this channel on or off.

5. Choose **Channel line code** to toggle the line code. Note that changing the line coding for one channel changes it for all four channels. The following line codes are available:
   - B8ZS
   - AMI

6. To change the channel line length value, choose **Channel line length** and then choose the desired value.

Configuring the Up-Links

➤ **To configure the up-links:**

1. From the Local/Remote Physical Ports Configuration menu (Figure 4-35), choose **Up-Link Configuration**.

   The Up-Link Configuration screen (Figure 4-38) is displayed.

```
                            OP-4T1

Up-link Configuration

 1. Link A name              ... ( )
 2. Link A alarm mask            (Off)
 3. Link B name              ... ( )
 4. Link B alarm mask            (Off)

>

Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-38. Up-Link Configuration Screen

2. If you would like to specify a name to easily identify Link A, choose **Link A name** and then enter a name for the link.

3. Choose **Link A alarm mask** to toggle the alarm for Link A on or off.

4. If you would like to specify a name to easily identify Link B, choose **Link B name** and then enter a name for the link.

5. Choose **Link B alarm mask** to toggle the alarm for Link B on or off.

4.9 Diagnostics

Setting the E2 Local Loopback Timeout

The E2 local loopback (LLB) timeout can be set for the local device and the remote device.

➤ **To set the E2 LLB local loopback timeout on the local Optimux-4T1:**

1. From the Main Menu (Figure 4-2), choose **Diagnostics**.

   The Diagnostics menu (Figure 4-39) is displayed.

```
                            OP-4T1

Diagnostics

 1. Loop Status            >
 2. Local Device Loops     >
 3. Remote Device Loops    >

>

Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-39. Diagnostics Menu

The *Remote Device Loops* option is displayed only if a remote device is connected to the Optimux-4T1.

2. Choose **Local Device Loops**.

   The Local Device Loops Menu (Figure 4-40) is displayed.

```
                                 OP-4T1

Local Device Loops

 1. Loops Setting              []  >
 2. Uplink LLB timeout (min)   ... (5)

>

Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                            1 user(s)
```

Figure 4-40. Local Device Loops Menu

3. Choose **Uplink LLB Timeout** and then enter the timeout in minutes. The value you specify is the duration of the E2 LLB loopback test. Specify a value as follows:

    ▪ 0 (forever)

    ▪ 1-255 (test runs for the specified number of minutes).

➤ **To set the E1 LLB local loopback timeout on the remote Optimux-4T1:**

1. From the Diagnostics menu (Figure 4-39), choose **Remote Device Loops**.

    The Remote Device Loops menu is displayed. This menu is the same as the Local Device Loops menu (Figure 4-40). Set the loopback as described above for the setting the timeout on the local Optimux-4T1.

Setting Loopbacks in the Local Optimux-4T1

➤ **To set loopbacks in the local Optimux-4T1:**

1. From the Local Device Loops menu (Figure 4-40), choose **Loops Setting**.

    The Loops Setting screen (Figure 4-41) is displayed.

```
                                 OP-4T1

Loops Setting

    Port                Loop status
    Uplink              LLB
    Channel 1           No loop
    Channel 2           No loop
    Channel 3           No loop
    Channel 4           No loop

 1. No loop
 2. LLB
 3. RLB

>

Please select item <1 to 3>

ESC-prev.menu; !-main menu; &-exit                            1 user(s)
```

Figure 4-41. Loops Setting Screen

2.   Highlight the *Loop status* field of the channel you want to change.

3.   Enter the loopback status you want to set:
   ▪ **No loop**—No loopback on the channel
   ▪ **LLB**—Local loopback on the channel or uplink
   ▪ **RLB**—Remote loopback on the channel.

   See *Chapter 5* for definitions of local channel and uplink loopbacks in the remote Optimux-4T1.

   The loopback test begins running immediately after a loopback has been set.

Setting Loopbacks in the Remote Optimux-4T1

➤ **To set loopbacks in the remote Optimux-4T1:**

1.   From the Diagnostics menu, choose **Remote Device Loops**.
   The Remote Device Loops menu is displayed. This menu is the same as the Local Device Loops menu (Figure 4-40).

2.   From the Remote Device Loops menu, choose **Loops Setting**.
   The Loops Setting screen (Figure 4-41) is displayed.

3.   Highlight the *Loop status* field of the channel you want to change.

4.   Enter the loopback status you want to set:
   ▪ **No loop**—No loopback on the channel
   ▪ **LLB**—Local loopback on the channel or uplink
   ▪ **RLB**—Remote loopback on the channel.

   See *Chapter 5* for definitions of local channel and uplink loopbacks in the remote Optimux-4T1.

   The loopback test begins running immediately after a loopback has been set.

Caution   Setting the uplink local loopback in the remote Optimux-4T1 disconnects the link, and as such, is irreversible. To remove this loopback, connect a terminal to the remote unit or shut down the power to the remote unit. If you set the Uplink LLB timeout on the remote Optimux-4T1, the loopback test will stop after the specified timeout period.

Displaying Loop Status

➤ **To display the current status of loops you have configured in the system:**

1.   Open the Diagnostics menu (Figure 4-39).

2.   Choose **Loop Status**.
   The status of all loops currently configured on the local Optimux-4T1 is displayed.

4.10   Viewing Hardware and Software Updates

➤ **To view the last Optimux-4T1 hardware and software updates:**

1. From the Main Menu (Figure 4-2), choose **Monitoring**.

    The Monitoring menu (Figure 4-4) is displayed.

2. Choose **System Monitoring**.

    The System Monitoring menu (Figure 4-5) is displayed.

3. Choose **Local System Status** to display the status of the local Optimux-4T1, or choose **Remote System Status** to display the status of the remote Optimux-4T1.

    :The Local System Status screen (Figure 4-6) is displayed. The first line of information in the screen displays the current hardware and software version numbers.

4.11   Downloading Software

Whenever a new software release is available, you should download it onto the Optimux-4T1. The Optimux-4T1 stores up to two versions of the software – each one is a separate partition. You can choose which partition to boot from.

Software can be downloaded using the TFTP or X-Modem protocol.

Downloading Software using the TFTP Protocol

➤ **To download a new software revision via TFTP:**

1. From the Main Menu (Figure 4-2), choose **File Utilities**.

    The File Utilities menu (Figure 4-42) is displayed.

```
                              OP-4T1

File Utilities

 1. File System        >
 2. S/W &File Transfer  >

Please select item <1 to 2>

ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-42. File Utilities Menu

2. Choose **S/W & File Transfer**.

    The S/W & File Transfer menu (Figure 4-43) is displayed.

```
                              OP-4T1

S/W & File Transfer

 1. Via TFTP         >
 2. Via X-Modem

Please select item <1 to 2>

ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-43. S/W & File Transfer Menu

3. Choose **Via TFTP**.

    The Via TFTP menu (Figure 4-44) is displayed.

Note   *The Via TFTP options is available only if the local Optimux-4T1 has been assigned an IP address.*

```
                              OP-4T1

Via TFTP

   Transfer Status                    >     (No operation)
   Transfer Error                     >     (No Error)
 1. TFTP File Name                          (File Name)
 2. TFTP Server IP                          (0.0.0.0)
 3. TFTP Command

>

Please select item <1 to 3>

ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-44. Via TFTP Menu

4. Choose **TFTP Server IP** and enter the IP address of the server from which you want to download the new software file.

5. Choose **TFTP File Name** and enter the name of the file you want to download.

6. Choose **TFTP Command**.

    The download process begins.

    The Transfer Status field indicates the current status of the download:

    - No operation (no TFTP transfer is in process)

    - Connecting (initiating a TFTP connection)

    - Transferring data (TFTP data transfer is in process)

    - Ended timeout (the download was terminated because the Retry Timeout or Total Timeout was exceeded)

    - Ended OK (the file was successfully downloaded)

    - Error (the download was terminated because an error occurred).

Downloading Software using the X-Modem Protocol

➤ **To download a new software version via X-Modem:**

1. Open the S/W & File Transfer menu (Figure 4-43).

2. Choose **Via X-Modem**.

    The download process begins as soon as the remote computer starts the upload process. Note that you need to run an X-Modem application on the remote computer to invoke the upload.

4.12   Viewing file and file system information

➤ **To view information about the file system:**

1. From the File Utilities menu (Figure 4-42), choose **File System**.

    The File System menu (Figure 4-45) is displayed.

```
                          OP-4T1


File System

 1. SW Files                [] >
 2. SWAP SW Files

>

Please select item <1 to 2>

ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-45. File System Menu

2. Choose **SW Files**.

    The SW Files screen (Figure 4-46) is displayed, showing information about
    the active and backup software partitions as well as the boot version.

```
                          OP-4T1


SW Files

    Software active version                1.00
    Software active partition              0
    Code size                              190
    Date                                   01-01-02
    Software backup version                0.00n00
    Software backup partition              1
    Code size                              0
    Date                                   0-0-0
    Boot version                           2.20
    Boot mng version                       4.00

>

ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 4-46. SW Files Screen

➤ **To change the software boot partition:**

1. Open the File System menu (Figure 4-45).

2. To swap the active and backup software partitions, choose **SWAP SW Files**.

    The Optimux-4T1 reboots off the other partition.

3.   After the system has come up, display the SW Files screen to verify that the
    change took place.

4.13   Configuring the Service Channel

The Optimux-4T1 can be ordered with a voice service channel (when the fiber optic link option is installed).

➤ **To configure the voice service channel:**

1. Display the System Configuration menu (Figure 4-19).

2. If both the local device and the connected remote device have the service channel installed, choose Service Channel.

    The Service Channel menu (Figure 4-47) is displayed.

```
                              OP-4T1

Service channel

 1. Local service channel          (ENABLE)
 2. Remote service channel       (ENABLE)


Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-47. Service Channel Menu

3. To enable or disable the Local service channel, choose **Local service channel** to toggle its setting.

4. To enable or disable the Remote service channel, choose **Remote service channel** to toggle its setting.

Chapter 5
Testing and Diagnostics

5.1 Introduction

This chapter includes a description of the Optimux-4T1 diagnostic tests and troubleshooting procedures.

5.2 Diagnostic Tests

Optimux-4T1 supports the following types of loopback connections:

- Loopbacks toward the local Optimux-4T1

- Loopbacks toward the remote Optimux-4T1.

The test functions are controlled by the management software. During all loopbacks, the TST indicator lights up on the unit on which the loopback is activated.

The available loopback functions are described in the following paragraphs.

Local Loopbacks in the Optimux-4T1

You can set two types of local loopback connections in the Optimux-4T1 unit:

- T1 local, which is set for each T1 interface separately from a terminal.

- Fiber optic link local, which can be set from a terminal.

T1 Local Loopback in the Optimux-4T1

The T1 local loopback returns the T1 transmit signal to the output of the receive path. Simultaneously, an unframed all-ones signal is sent to the MUX. Figure 5-1 shows the T1 local loopback connection.

This test checks the operation of the connections to the equipment attached to the local tributary interfaces.
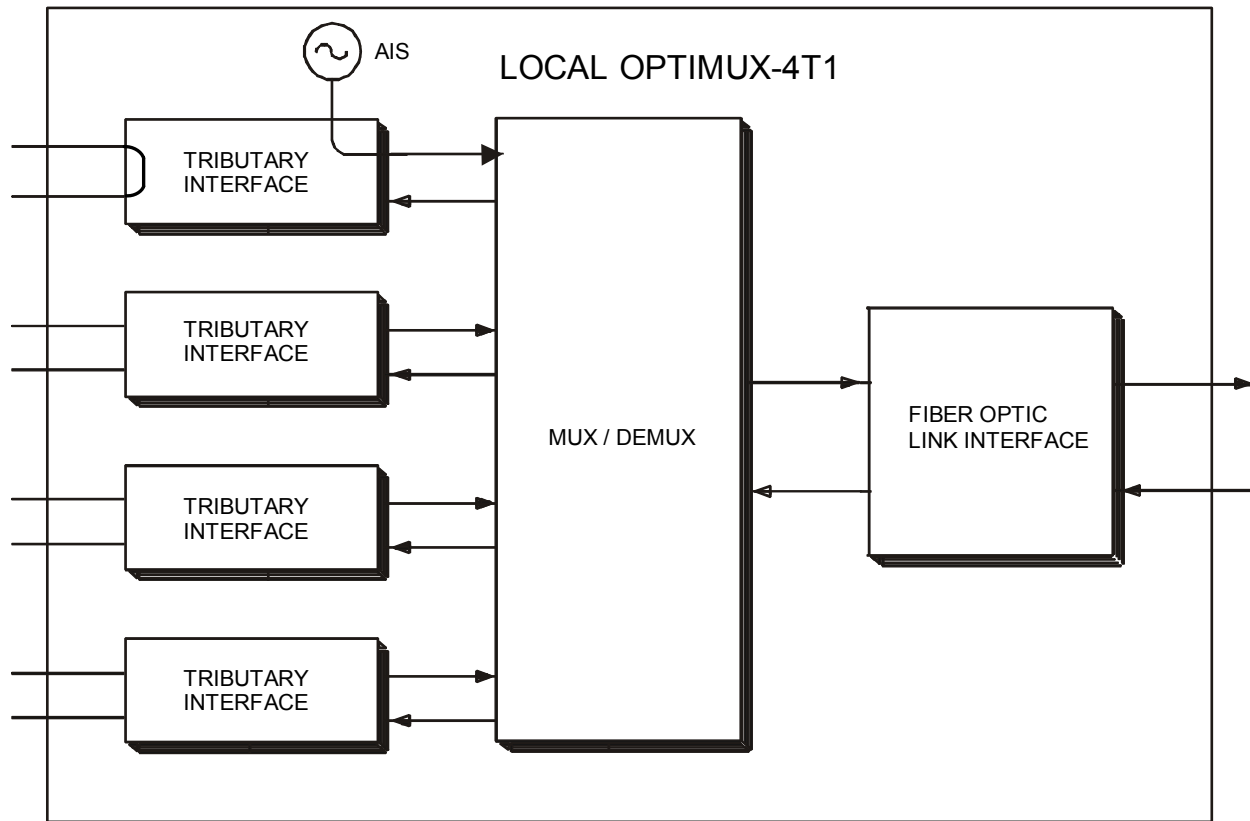
Figure 5-1 T1 Local Loopback in the Optimux-4T1

Fiber Optic Link Local Loopback in the Optimux-4T1

The fiber optic local loopback returns the transmit signal of the active fiber optic link interface to the input of the receive path. Simultaneously, the local Optimux-4T1 sends an unframed all-ones signal to the fiber optic link. Figure 5-2 shows the fiber optic link local loopback connection.

When this loopback is activated, the equipment connected to the local Optimux-4T1 tributary must receive its own transmission.

This test checks the operation of the local Optimux-4T1, and the connections to the equipment attached to the tributary interfaces.
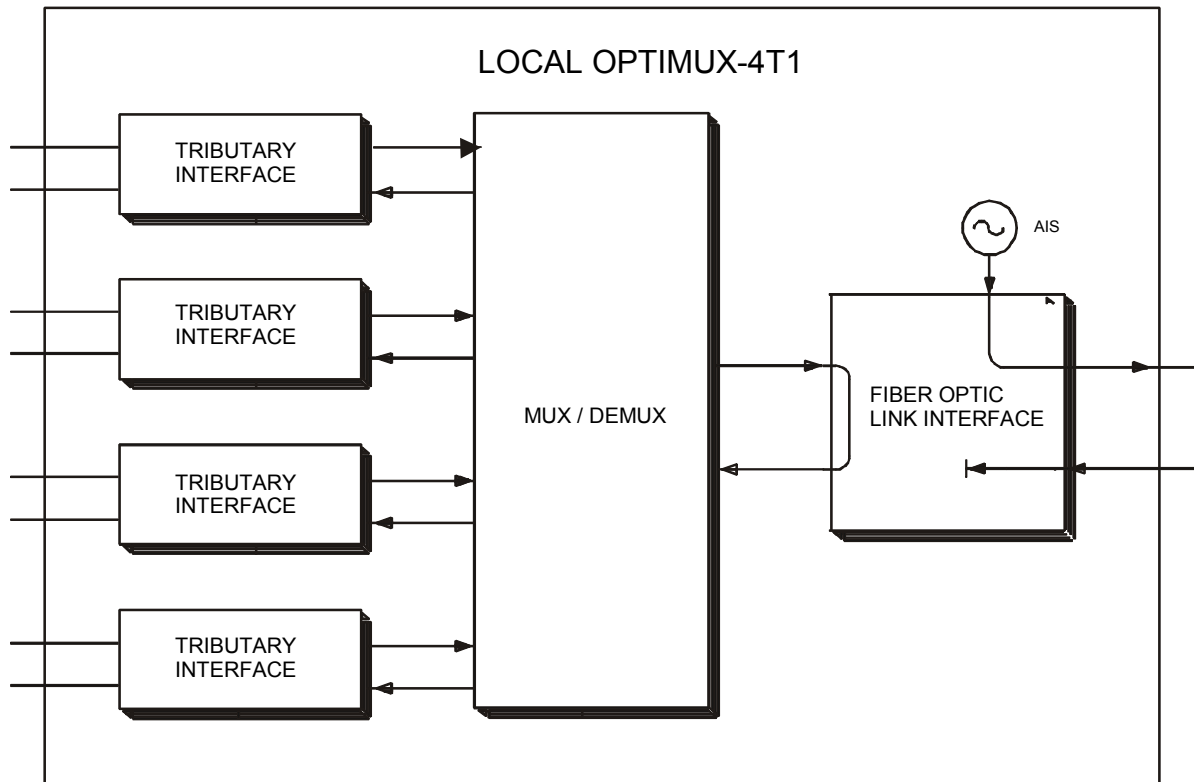
Figure 5-2 Fiber optic Link Local Loopback in the Optimux-4T1

Remote Loopbacks in the Optimux-4T1

You can set two types of remote loopback connections in the Optimux-4T1 unit:

- T1 remote, which is set for each T1 interface separately, from the terminal.

- Fiber optic link remote, which can be set from the terminal.

T1 Remote Loopback in the Optimux-4T1

The T1 remote loopback returns the transmitted Demuxed T1 to the receiver Mux. Simultaneously, the Optimux-4T1 sends an unframed all-ones signal to the T1 link.

Figure 5-3 shows the T1 remote loopback connection.

This test checks the operation of the local Optimux-4T1 and the connection to the remote Optimux-4T1 unit.
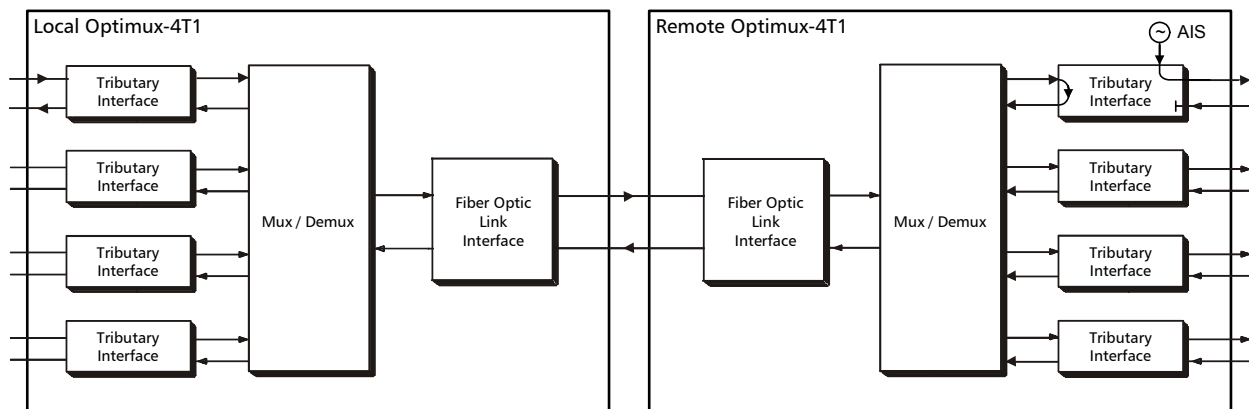
Figure 5-3 T1 Remote Loopback in the Optimux-4T1

Fiber Optic Remote Loopback in the Optimux-4T1

The fiber optic remote loopback returns the received signal of the active fiber optic link interface to the input of the transmit path. Simultaneously, the remote Optimux-4T1 sends an unframed all-ones signal to the input of the Demux.

Figure 5-4 shows the fiber optic remote loopback connection.

This test checks the operation of the local Optimux-4T1 and the connection to the remote Optimux-4T1.
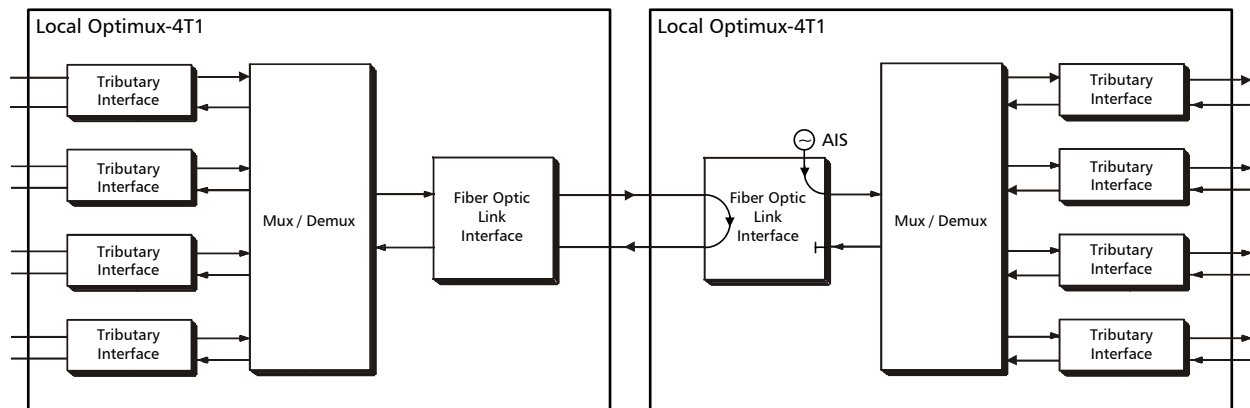
Figure 5-4 Fiber Optic Remote Loopback in the Optimux-4T1

5.3 Troubleshooting

In case a problem occurs, check the displayed indications and refer to *Section 3-2* and *Table 3-1* for their interpretation.

Identify the trouble symptoms and perform the actions listed under Corrective Measures in the order given in *Table 5-1*, until the problem is corrected.

Table 5-1 Troubleshooting Chart

Trouble Symptoms	Probable Cause	Corrective Measures
The Optimux-4T1 does not respond	No power	Check that both ends of the power cable are properly connected. If power cable is properly connected, but the power supply still does not respond, then the power supply is defective (see below).
		If the Optimux-4T1 is powered from a DC power source, check the polarity of the power connections.
	Defective Power Supply	Disconnect the power from both ends and replace with another power supply.
	Defective Optimux-4T1	Replace the Optimux-4T1.
One of the PWR indicators lights in red.	Defective power supply	Turn the respective power supply off for at least 10 minutes, and then turn it on again.
		If the PWR indicator is still red, have the Optimux-4T1 repaired as soon as possible.
The SYNC LOSS indicator of the fiber optic link lights.	External problem	Activate the local loopback on the Optimux-4T1. Check that the SYNC LOSS and AIS indicators of the fiber optic link in use turn OFF.
		If the indicators turn off, check the fiber optic interface connections, the fiber optic transmission path to the remote unit, and the remote unit.
	Defective Optimux-4T1	Replace the Optimux-4T1.
The AIS indicator of the fiber optic link lights.	1. External	The remote equipment connected to the fiber optic link of the Optimux-4T1 sends an AIS sequence. Check the remote equipment.
	2. Defective Optimux-4T1	Activate the local loopback on the Optimux-4T1. Check that the SYNC LOSS and AIS indicators of the fiber optic link in use turn OFF. If one of the indicators remains lit, replace the Optimux-4T1.

Table 5-1. Troubleshooting Chart (Cont.)

Trouble Symptoms	Probable Cause	Corrective Measures
None of the units connected to a local Optimux-4T1 receive the remote equipment.	External problem	Activate the local loopback on the Optimux-4T1. Check that all the SYNC LOSS and AIS indicators turn OFF, and that the equipment connected to the local tributaries receive their own transmissions. If the indicators turn OFF, the problem is external. Troubleshoot the remote unit, and the fiber optic transmission path.
	Defective Optimux-4T1	Replace the Optimux-4T1.
Only one of the units connected to a local Optimux-4T1 does not receive the remote equipment.	1. Equipment problem	Check the equipment connected to the local tributary, and its cable connections. Check the remote tributary equipment.
	2. Defective Optimux-4T1	Activate the fiber optic link local loopback in the local Optimux-4T1. Check that any previously lit alarm indicators related to the tributary turn OFF.
		If the indicator turns OFF, the problem is external; if the indicator remains lit, replace the Optimux-4T1.
No menus are available.	Incomplete downloading of new FLASH version	Turn the Optimux-4T1 ON and proceed to download the new FLASH version again.

List of Alarms and Events

The Optimux-4T1 alarms are described in Table 5-2.

Table 5-2. Optimux-4T1 System Alarms

Message on terminal	Description	Severity
CDP fail	A failure has occurred in the CDP.	Major
FLASH problem	A problem occurred in the device FLASH device. Could not save user configuration.	Major
PS1 FAIL	Power supply A has failed.	Major
PS2 FAIL	Power supply B has failed.	Major
Redundancy not available	Unable to activate redundancy between the uplinks. This alarm occurs only if the redundancy mode is set to AUTO or MANUAL.	Major
Remote alarm-DAIS	Received a Demux AIS.	Major
Remote connection FAIL	A managment connection could not be established with the remote device.	Major

Table 5-3. Optimux-4T1 Port and Up-Link Alarms

Message on terminal	Description	Severity
ETH Integrity fail	The managment port is not connected.	Major
Incorrect Tributary Freq	There is a problem with the tributary frequency.	Major
Looped	Loop detected on the uplinks.	Major
Loss of frame	Loss of frames on the uplinks.	Major
Rx AIS	Received AIS on the uplinks or the channels.	Minor
Signal Loss	Signal loss detected on uplinks or channels.	Major

The Optimux-4T1 events are described in Table 5-4.

Table 5-4. Optimux-4T1 Events

Event	Description
BUFFER OVERFLOW	The log file overran the last events.
LOGIN SWITCH ON	User changed access name.
PASSWORD SWITCH ON	User changes access password.
SW DOWNLOAD FAIL	Software download failed.
SW DOWNLOAD OFF	Software download process finished.
SW DOWNLOAD ON	Software download is in process.
Uplink switch A->B	Switched from uplink A to uplink B – reason unknown.
Uplink switch A->B:LOOPED	Switched from uplink A to uplink B – loop detected in uplink A.
Uplink switch A->B:LOSS	Switched from uplink A to uplink B – LOSS in uplink A.
Uplink switch A->B:OOF	Switched from uplink A to uplink B – out of frames in uplink A.
Uplink switch A->B:USER	Switched from uplink A to uplink B – user request.
Uplink switch B->A	Switched from uplink B to uplink A – reason unknown.
Uplink switch B->A:LOOPED	Switched from uplink B to uplink A – loop detected in uplink B.
Uplink switch B->A:LOSS	Switched from uplink B to uplink A – LOSS in uplink B.
Uplink switch B->A:OOF	Switched from uplink B to uplink A – out of frames in uplink B.
Uplink switch B->A:USER	Switched from uplink B to uplink A – user request.

Appendix A

Interface Specifications

A.1 Tributary Connectors

Each tributary interface has one RJ-45 eight-pin connector. Connector wiring is listed in Table A-1.

Table A-1. RJ-45 Tributary Connector, Pin Functions

Pin	Designation	Direction	Function
1	RD(R)	Input	Receive Data (ring)
2	RD(T)	Input	Receive Data (tip)
4	TD(R)	Output	Transmit Data (ring)
5	TD(T)	Output	Transmit Data (tip)
3, 6, 7, 8	-	N/A	Not connected

A.2 Alarm Connector

The Optimux-4T1 ALARM connector is a 9-pin female connector, which includes the contacts of the major and minor alarm relays. Figure A-1 shows the pin functions. The relay positions are shown in the non-energized (alarm active) state.
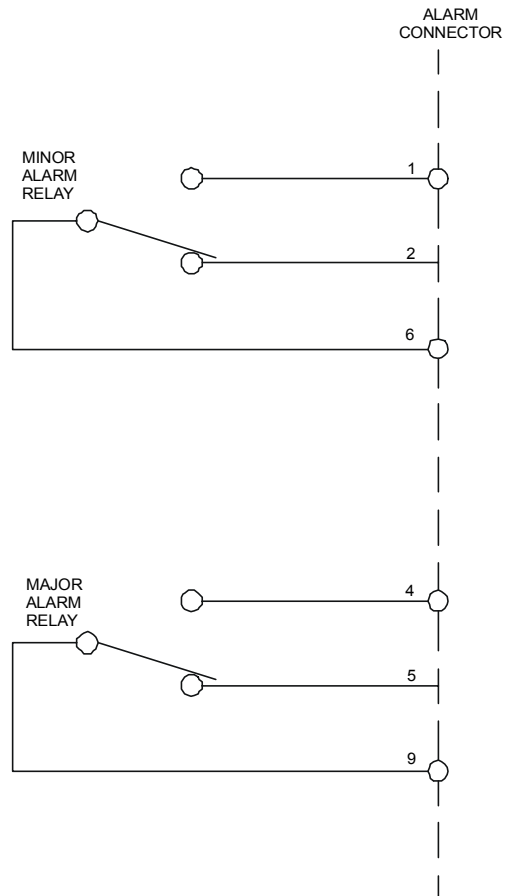
Figure A-1. ALARM Connector Wiring

A.3 Control Connector

The optional Optimux-4T1 supervisory port has a standard RS-232 DTE interface. The physical interface is a 9-pin female connector, designated CONTROL. Connector wiring is given in Table A-2.

Table A-2. CONTROL DTE Connector, Pin Functions

Pin	Line	Direction	Remarks
1	Data Carrier Detect (DCD)	To Optimux-4T1	
2	Receive Data (RD)	To Optimux-4T1	
3	Transmit Data (TD)	From Optimux-4T1	
4	Data Terminal Ready (DTR)	From Optimux-4T1	
5	Signal Ground (SIG)	Common signal reference and DC power supply ground	
6	Data Set Ready (DSR)	To Optimux-4T1	(Not used)
7	Request to Send (RTS)	From Optimux-4T1	
8	Clear to Send (CTS)	To Optimux-4T1	
9	Ring Indicator (RI)	To Optimux-4T1	(Not used)

A.4 MNG-ETH Connector

One LAN Ethernet RJ-45 connector is mounted on the MNG-ETH module. The pinout is shown in Table A-3.

Table A-3. Ethernet RJ-45 Connector Pin Assignment

Pin	Designation	Function	Direction
1	RX+	Receive – positive lead	Input
2	RX-	Receive – negative lead	Input
3	TX+	Transmit – positive lead	Output
6	TX-	Transmit – negative lead	Output
4, 5, 7, 8	-	Not connected	-

A.5 Power Connectors

The power connector used for the AC/DC power supply is a standard square 3-prong female connector.

For information on the DC power connector, refer to the two supplements at the end of this manual: ***DC Power Supply Connection - Terminal Block Connector Supplement*** and the ***DC Power Supply Connection - AC/DC Adaptor (AD) Plug Supplement.***

Appendix B

Optimux-4T1 MIBs

A MIB (Management Information Base) is a database of managed objects. The MIB contains the data regarding the network elements being controlled and monitored. Each characteristic of the element to manage is defined as an object in the MIB. The MIB is a hierarchical tree structure that acts as the repository for defined objects. Each object has an object name, a type, syntax, an access code (read-write, read-only, not-accessible, and write-only), and a status (mandatory, optional, obsolete).

Optimux-4T1 supports appropriate groups (tables) of MIB II (SNMP standard MIB), the RAD Private MIB and some other MIBs, as shown in Table B-1.

Table B-1. Optimux-4T1 MIBs

MIB	Notes	Tables
RFC1213	MIB-11	system if at ip icmp udp snmp
RFC1573	New Interface Table	–
RFC1406 NG	Partially supported	dsx1ConfigTable
RAD Private MIB	Partially supported	–
	– radGen	–
	– optimux	mngTrapIPTable agnTrapMask (object) agnLed (object) physicalConnectorTable OptMxConfigEntry

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RAD SUPPLEMENT

DC Power Supply Connection – Terminal Block Connector

Note: *Ignore this supplement if the unit is AC-powered.*

Certain DC-powered units are equipped with a plastic 3-pin *VDC-IN* power input connector, located on the unit rear panel. Different variations of the connector are shown in *Figure* 1. All are functionally identical.

Supplied with such units is a kit including a mating Terminal Block (TB) type connector plug for attaching to your power supply cable.

Connect the wires of your power supply cable to the TB plug, according to the voltage polarity and assembly instructions provided below.

Caution: *Prepare all connections to the TB plug* **before** *inserting it into the unit's VDC-IN connector.*
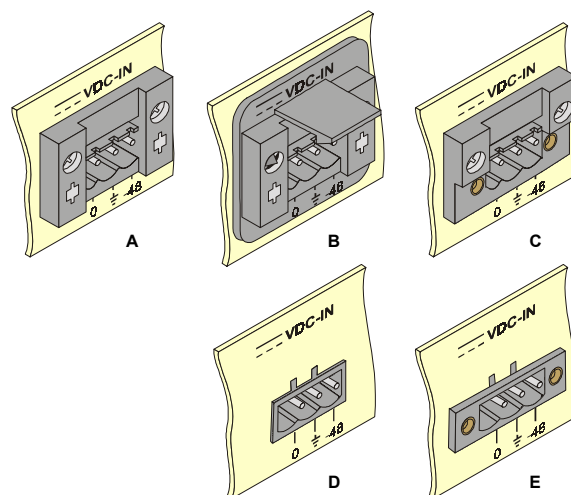

Figure 1. TB DC Input Connectors Types Appearing on Unit Panels

## Preparing and Connecting the Power Supply Cable with the TB Plug

Refer to *Figure 2* for assistance.

1. Strip the insulation of your power supply wires according to the dimensions shown.

2. Place each wire lead into the appropriate TB plug terminal according to the voltage polarity mapping shown in *Figure 4.* (If a terminal is not already open, loosen its screw). Afterwards, tighten close the three terminal screws.

3. Pull a nylon cable tie (supplied) around the power supply cable to secure it firmly to the TB plug grip, passing the tie through the holes on the grip.

4. Isolate the exposed terminal screws/wire leads using a plastic sleeve or insulating tape, to prevent the possibility of short-circuit.

5. Connect the assembled power supply cable to the unit by inserting the TB plug into the unit's *VDC-IN* connector until it snaps into place.
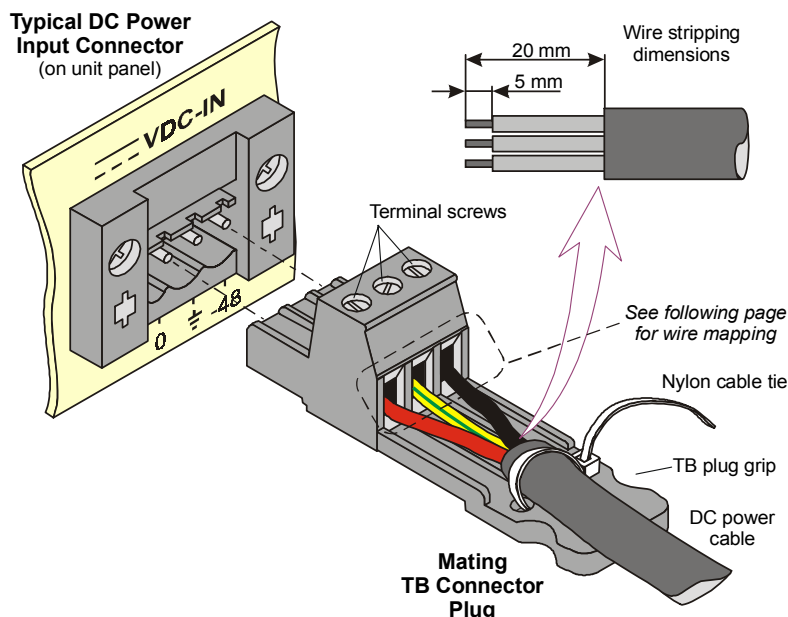
Figure 2. TB Plug Assembly

SUP-220-03/03

Note: Certain TB plugs are equipped with captive screws for securing the assembled cable's TB plug to the unit's *VDC-IN* connector (C and E types only). To secure the plug, tighten the two screws on the plug into the corresponding holes on the sides of the input connector as shown in *Figure 3*.
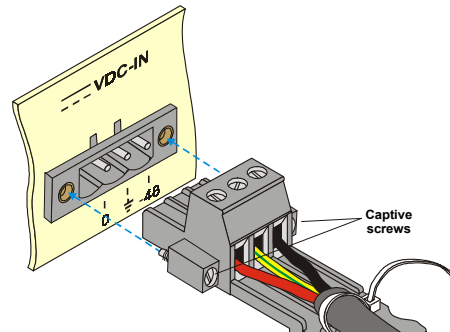
**Figure 3. TB Plug with Captive Screws (optional)**

DC Power Supply Wire Voltage Polarity

Refer to *Figure 4* for proper mapping of the power supply wire leads to the TB plug's three terminals.

⚠ *Warning:*
- *Reversing the wire voltage polarity can cause damage to the unit!*
- *Always connect a ground (earth) wire to the TB plug's Chassis (frame) Ground terminal. Connecting the unit without a protective ground, or interruption of the grounding (for example, by using an extension power cord without a grounding conductor) can cause harm to the unit or to the equipment connected to it!*
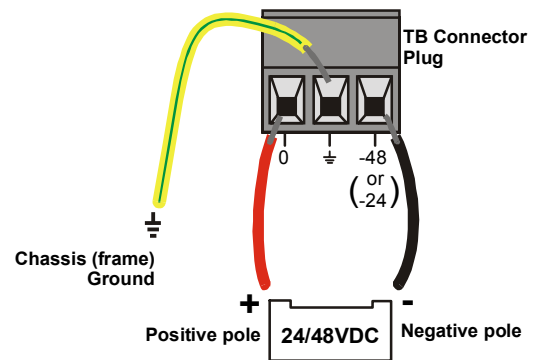
Figure 4. Power Supply Wire Mapping to TB Plug

SUPPLEMENT

DC Power Supply Connection – AC/DC Adaptor (AD) Plug

Note: Ignore this supplement if the unit is AC-powered.

Certain units are equipped with a Wide Range AC/DC power supply. These units are equipped with a standard AC-type 3-prong power input connector located on the unit rear panel. This power input connector can be used for both AC and DC voltage inputs.

For DC operation, a compatible AC/DC Adaptor (AD) plug for attaching to your DC power supply lines is used (see *Figure 1*).

Connect the wires of your DC power supply cable to the AD plug, according to the voltage polarity and assembly instructions provided below.

Figure 1

*Caution: Prepare all connections to the AD plug **before** inserting it into the unit's power connector.*

Preparing and Connecting the Power Supply Cable with the AD Plug

1. Loosen the cover screw on the bottom of the AD plug to open it (see *Figure 2*).

2. Run your DC power supply cable through the removable cable guard and through the open cable clamp.

3. Place each DC wire lead into the appropriate AD plug wire terminal according to the voltage polarity mapping shown. Afterwards, tighten the terminal screws close.

4. Fit the cable guard in its slot and then close the clamp over the cable. Tighten the clamp screws to secure the cable.

5. Reassemble the two halves of the AD plug and tighten the cover screw.

6. Connect the assembled power supply cable to the unit.

⚠ *Warning:*

- *Reversing the wire voltage polarity will **not** cause damage to the unit, but the internal protection fuse will not function.*

- *Always connect a ground (earth) wire to the AD plug's Chassis (frame) Ground terminal. Connecting the unit without a protective ground, or interruption of the grounding (for example, by using an extension power cord without a grounding conductor) can cause harm to the unit or to the equipment connected to it!*

- *The AD adaptor is not intended for field wiring.*
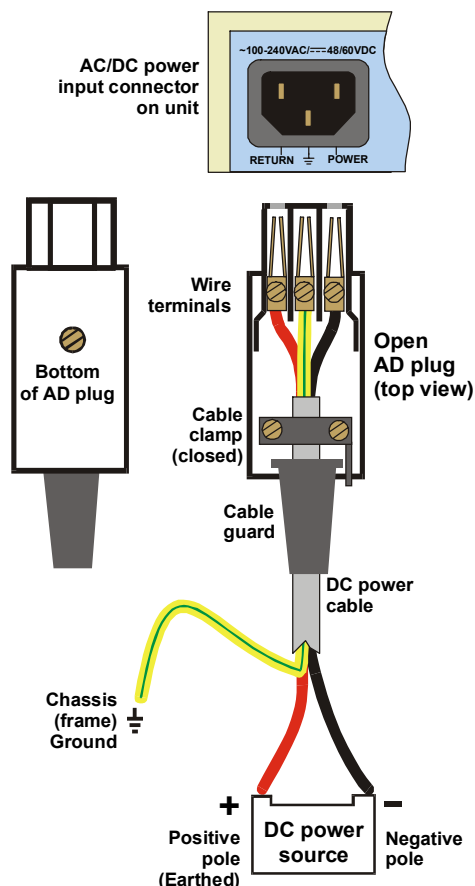

Figure 2

Customer Response Form

RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

Manual Name: Optimux-4T1

Publication Number: 325-200-03/04

Please grade the manual according to the following factors:

	Excellent	Good	Fair	Poor	Very Poor
Installation instructions	❒	❒	❒	❒	❒
Operating instructions	❒	❒	❒	❒	❒
Manual organization	❒	❒	❒	❒	❒
Illustrations	❒	❒	❒	❒	❒
The manual as a whole	❒	❒	❒	❒	❒

What did you like about the manual?

_____

_____

_____

_____

_____

Error Report

Type of Error(s)   ❒   Incompatibility with product

or Problem(s):   ❒   Difficulty in understanding text

                            ❒   Regulatory information (Safety, Compliance, Warnings, etc.)

                            ❒   Difficulty in finding needed information

                            ❒   Missing information

                            ❒   Illogical flow of information

                            ❒   Style (spelling, grammar, references, etc.)

                            ❒   Appearance

                            ❒   Other _____

Please list the exact page numbers with the error(s), detail the errors you found (information missing, unclear or inadequately explained, etc.) and attach the page to your fax, if necessary.

_____

_____

_____

_____

Please add any comments or suggestions you may have.

_____

_____

_____

You are: ❒   Distributor

                            ❒   End user

                            ❒   VAR

                            ❒   Other _____

Who is your distributor?   _____

Your name and company: _____

Job title: _____

Address: _____

Direct telephone number and extension: _____

Fax number: _____

E-mail: _____

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data communications