TDC

Theater Deployable Communications

Baseline Requirements Document

Promina Multiplexer 400 Module

PMux (v2)

Nov 2003

ESC/NI4T
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1.0 SCOPE

This requirements document establishes the performance, manufacture and test requirements for the TDC ICAP P-Mux 400 Module v2.

2.0 APPLICABLE DOCUMENTS

To the extent specified herein, the following documents of latest current issue on the date of this Baseline Requirements Document form part of this BRD.

Table 1 - Standards and Applicable Documents

Document Number	Title
MIL-STD-810F	Environmental Test Methods
IEEE 802.3	Ethernet Standard
ANSI/EIA/TIA-530-A-1992	High Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating and Data Circuit-Terminating Equipment. (Mar 87) (related to RS-422-A and RS-423-A)
ANSI/EIA/TIA-232-E-1991	Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange (Rates to 20kbps)
CD DOCS Release for 2.7.5	N.E.T. Customer Documentation CD DOCs Release 2.7.5
	TDC Standards Document

3.0 REQUIREMENTS

3.1 Module Definitions

The P-MUX Module provides multiplexing and demultiplexing of voice, data and message traffic. This multiplexing function creates bandwidth efficient connectivity between the deployed base and off-base locations. The P-MUX Module is generally located at the primary hub of the deployed base. Figure 1 shows the P-MUX Module connections for interfacing voice and data traffic from local equipment to off-base locations as seen in the Context Diagram Figure 2.

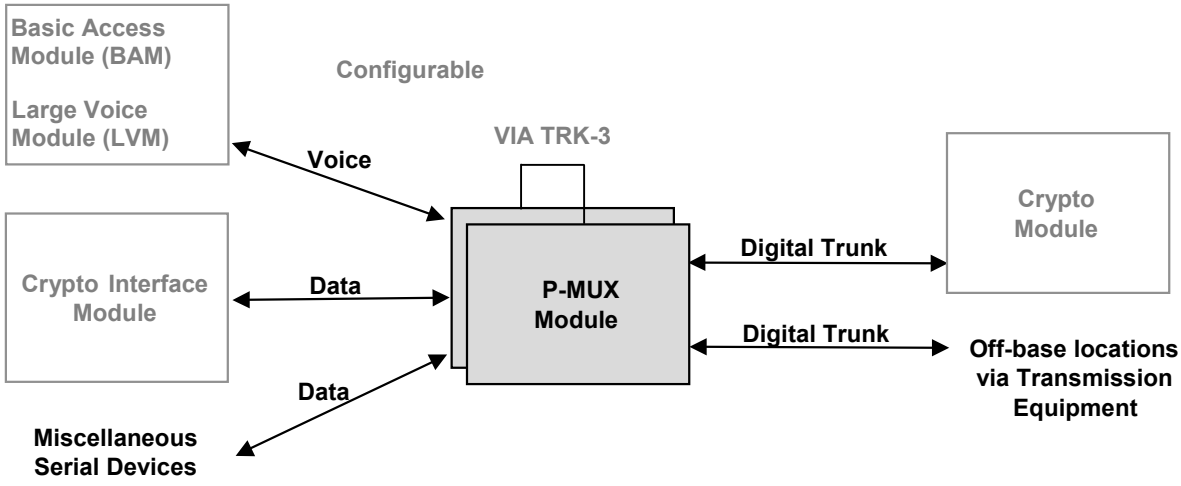


Figure 1 - P-MUX Module Application in TDC-ICAP

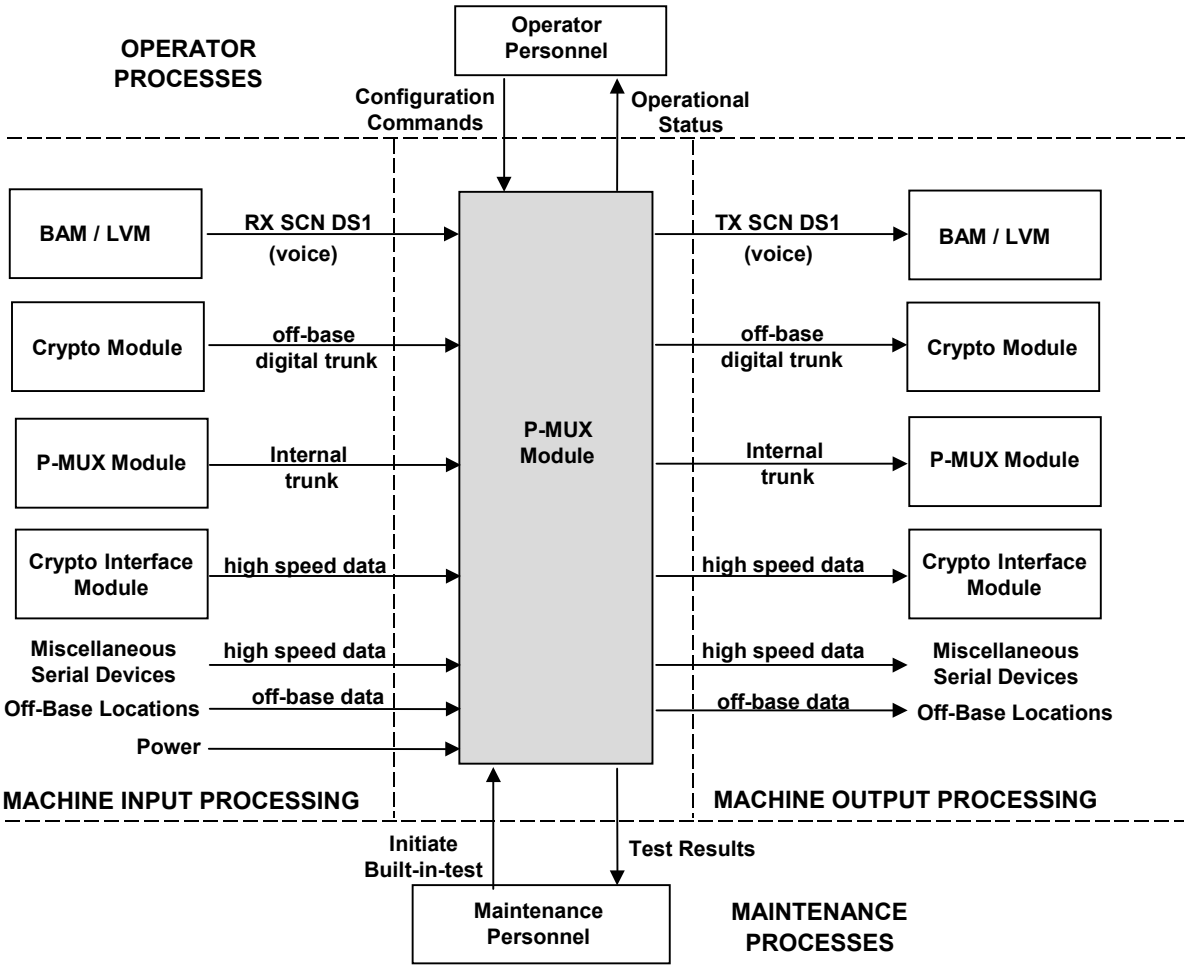


Figure 2 - P-Mux 400 Module Context Diagram Showing External Module Interfaces

3.2 Performance Requirements

3.2.1 Electrical Interface Requirements (External)

The P-MUX 400 Module includes the number and type of active external interfaces presented in Table 2.

Table 2 - P-Mux 400 Module External Interface Characteristics

Signal Name	Quantity	Connector	Primary Interface	Electrical Characteristics
Prime Power	1	IEC 320 C-20 Receptacle	AC Power	100-130, 200-240, 50-60 Hz, respectively

Table 2 - P-Mux 400 Module External Interface Characteristics

Signal Name	Quantity	Connector	Primary Interface	Electrical Characteristics
EIA-232 Serial Connector on the Promina Logic Module Interface	2	DB-9F	Dumb Terminal/PC Serial Port	EIA-232/DTE-Admin, EIA-232/DTE-Modem
Promina TRK-3 Serial Trunk Interface (STI) Connector	1	DB-25F	P-MUX Module	EIA-530/DTE, Crossover cable required.
Voice Backbone Connectors (RX SCN DS-1)	2	ST	BAM or LVM	Proprietary multi-mode fiber optic signal
Voice Backbone Connectors (TX SCN DS-1)	2	ST	BAM or LVM	Proprietary multi-mode fiber optic signal
EIA-530/DCE Serial Connector (High Speed Data)	2	DB-25F	CIM	EIA-530/DCE
Promina Conditioned Diphase (CDI) Connector	2Tx & 2Rx, 2	BJ-76 Twinax DB-25F	Baseband and CDI Devices	Unbalanced Conditioned Diphase, EIA-530/Balanced CDI
Promina SA-TRK (DTE) SA-EIA-530 Connector	2	DB-25F	Transmission Systems	EIA-530/DTE or Unbalanced CDI

3.2.1.1 Prime Power

In accordance with the TDC Standards document, the P-Mux Module operates from 100-130, 200-240, 50-60 Hz, single phase, and three-wire power. The P-Mux Module includes:

- An IEC–320 C-20 male connector (or equivalent) for prime power.
- An internal line transient suppressor to minimize line variations.

3.2.1.2 EIA-232 Serial Connector on the Promina Logic Module Interface

The EIA-232/DTE serial connector is a female DB-9 type connector in accordance with the EIA-232 standard. These connectors provide access for local console/terminal and modem connectivity for administration of the Promina node. Pin assignments are shown in Table 3. In the redundant PLM configuration provided, the DTE connectors on both the PLMIs connect using a specialized Y cable (included). The RS- 232 drivers on the off-line PLM module are placed in a standby condition. In this configuration, only the on-line PLM can communicate with the DCE device.

Table 3 - EIA-232 Serial Admin Connectors J3 and J4

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	Data Carrier Detect	I	4	Data Terminal Ready	O	7	Request to Send	O
2	Receive Data	I	5	Ground	-	8	Clear to Send	I

Table 3 - EIA-232 Serial Admin Connectors J3 and J4

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
3	Transmit Data	O	6	Data Set Ready	I	9	NC	-

3.2.1.3 Promina TRK-3 Serial Trunk Interface (STI) Connector

The Promina TRK-3 connector is a female DB-25 type connector in accordance with the EIA-530/DTE standard. This connector provides the interface to the Promina TRK-3 STI rear card. Pin assignments are shown in Table 4.

Table 4 - Promina TRK-3 (DTE) STI Connector

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	Shield	–	10	RX Line Signal Sector (B)	I	19	Request to Send (B)	O
2	Send Data (A)	O	11	Terminal Timing (B)	O	20	Data Terminal Ready (A)	O
3	RX Data (A)	I	12	Send Timing (B)	I	21	Remote Loopback	O
4	Request to Send (A)	O	13	Clear to Send (B)	I	22	DCE Ready (B)	I
5	Clear to Send (A)	I	14	Send Data (B)	O	23	Data Terminal Ready (B)	O
6	DCE Ready (A)	I	15	Send Timing (A)	I	24	Terminal Timing (A)	O
7	Signal Ground	–	16	RX Data (B)	I	25	Test Mode	I
8	RX Line Signal Detector (A)	I	17	RX Timing (A)	I			
9	RX Timing (B)	I	18	Local Loopback	O			

3.2.1.4 Voice Backbone Connectors

The two Voice Backbone connectors are fiber optic ST type connectors with the DS-1 signal modulated onto multimode fiber optic carriers. The fiber optic signal format is created by a fiber optic transceiver, which interfaces with the two DS-1 ports on the Promina PRC card.

3.2.1.5 EIA-530/DCE Serial Connector

The EIA-530 Serial connector is a female DB-25 type connector in accordance with the EIA-530/DCE standard. This connector provides the interface to the Promina USD and HSD-2B rear cards. Pin assignments are shown in Table 5.

Table 5 - EIA-530 Serial Connector

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	Frame Ground	–	10	Receive Line Signal Detect (B)	O	19	Request to Send (B)	I
2	TX Data (A)	I	11	Terminal Timing(B)	I	20	Data Terminal Ready (A)	I
3	RX Data (A)	O	12	Send Timing (B)	O	21	NC	–
4	Request to Send (A)	I	13	Clear to Send (B)	O	22	Data Set Ready (B)	O

Table 5 - EIA-530 Serial Connector

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
5	Clear to Send (A)	O	14	TX Data (B)	I	23	Data Terminal Ready (B)	I
6	Data Set Ready (A)	O	15	TX Timing (A)	O	24	Terminal Timing (A)	I
7	Signal Ground	–	16	RX Data (B)	O	25	NC	–
8	Receive Line Signal Detect (A)	O	17	RX Timing (A)	O			
9	Receive Timing (B)	O	18	NC	–			

3.2.1.6 Promina SA-TRK (DTE) Connector

The Promina SA-TRK Connector is a female DB-25 type connector in accordance with the EIA-530/DTE standard. This connector provides the interface to the Promina SA-TRK (DTE). Pin assignments are shown in Table 6.

The EIA-530 interface on the SA-TRK is capable of performing conditioned diphase (CDI) encoding/ decoding on the clock (TT/ RT) and data (SD/ RD) signals. This function is *Enabled* via the software user interface. The default value is *Disabled.*

Table 6 - Promina SA-TRK (DTE) Connector

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	Shield	–	10	Data Carrier Detect (B)	I	19	Crypto Synch (A)	O
2	TX Data (A)	O	11	Terminal Timing (B)	O	20	Data Terminal Ready (A)	O
3	RX Data (A)	I	12	Send Timing (B)	I	21	Good Clock	O
4	Crypto Synch (B)	O	13	Auxiliary Alarm (B)	I	22	1.544 MHz Clock (B)	O
5	Auxiliary Alarm (A)	I	14	Send Data (B)	O	23	Data Terminal Ready (B)	O
6	1.544 MHz Clock (A)	O	15	Send Timing (A)	I	24	Terminal Timing (A)	O
7	Signal Ground	–	16	RX Data (B)	I	25	NC	–
8	Data Carrier Detect (A)	I	17	RX Timing (A)	I			
9	RX Timing (B)	I	18	NC	–			

3.2.2 Electrical Interface Requirements (Internal)

The P-MUX Module utilizes several types of internal interfaces. See drawings provided in Figure 6.4 for details.

3.2.3 Functional Requirements

Figure 3 provides a block diagram of the P-MUX Module functional architecture showing module functions. At the heart of the module is a digital multiplexer. The multiplexer accepts voice and data traffic and multiplexes it for transmission to off-base locations. Conversely, the multiplexer demultiplexes off-base traffic onto digital voice and data lines. Additionally the P-MUX Module provides voice compression.

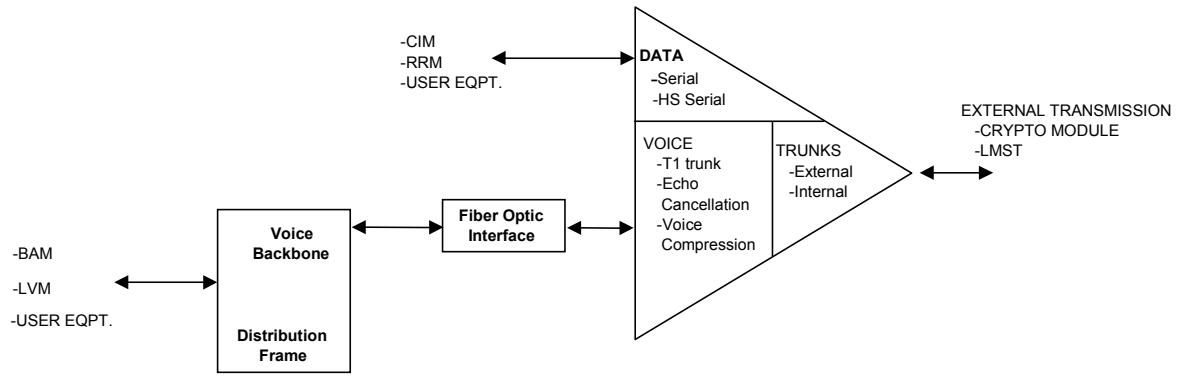


Figure 3 - P-Mux Module Block Diagram Showing Internal Module Functions

3.2.3.1 Module Equipment Details

The following subsections provide details of the functionality of the major equipment of the P-MUX module.

3.2.3.1.1 Multiplexer

The P-MUX Module includes a Promina 400-12 slot multiplexer with the card complement presented below. Table 7 lists the card type, front or rear orientation, quantity and reference describing each card's capabilities and features. The references come from the N.E.T. Customer Documentation CD DOCS in the section titled "Promina 800/400/200 Documentation".

Table 7 - Multiplexer Card Complement

Card	Position	Quantity	Reference
PLM/PLMI	Front/Rear	2	Common Equipment Modules Doc
Prime Voice Secure	Front	4	Voice Module Document
HSD-2B DCE	Front/Rear	1	Data Modules Document
USD/EIA-530	Front/Rear	1	Data Modules Document
SA-TRK/EIA-530 DTE	Front/Rear	2	Trunk Modules Document
TRK-3/EIA-530 STI DTE	Front/Rear	1	TRK-3 Module Document
PRC/DS1	Front/Rear	1	Voice Module Document

At the P-MUX Module high-speed data input interface, switched circuit network (SCN) voice, video and data enter via the RX SCN DS1 interface. The P-MUX Module compresses voice channels, and multiplexes the channels into an aggregate data stream (off-base data). Similarly, at the multiplexer aggregate input interface the data stream (off-base data) is demultiplexed into individual data channels. The P-MUX Module decompresses digital voice channels and outputs the voice, video and data via the TX SCN DS1 interface to the DTEs.

3.2.3.1.2 Network Gateway Feature

The P-MUX Module acts as a Gateway Node so that it gains access to other IDNX/Promina compatible domains.

3.2.3.1.3 Timing

The P-MUX Module is capable of deriving or accepting external timing:

- The P-MUX can provide internal timing via the timing signals generated by the on-board crystal oscillator on the PLM.
- The P-MUX Module is capable of deriving timing from SendTiming input on the SATRK or PRC rear card.
- The P-MUX accepts a Stratum-1 timing input and directs timing to the rest of the system from the USD, Port 0. Typically, the USD, Port 0 is set as the Node's REF0, while the best SATRK or PRC are set up as the Node's REF1.
- The PLM can also provide external timing by phase locking onto external clock sources (for example, digital transmission facilities, channel banks, or station clocks).

3.2.3.1.4 Memory Capabilities

This DRAM provides all normal run time code execution space, stack space, and scratch pad storage. The PLM flash memory provides the data storage of boot code, system runtime code, and configuration database. The flash memory system on a PLM stores a complete image of the boot and runtime code. The flash memory self-sufficiency supports full node restart code and does not require a download from a remote node in the network.

3.2.3.1.5 Data Interfaces

The multiplexer provides a Data Communication Equipment (DCE) interface to the DTE interface. The EIA-530/DCE port interface for the USD card is configurable by the operator to support various synchronous data rates between 1.2 kbps and 1.344 Mbps. The HSD-2B card is configurable by the operatoar to support synchronous data rates between 9.6 kbps and 2048 kbps. The P-MUX Module interfaces with other P-MUX Modules through the serial trunk interfaces (SATRK or TRK-3). The interface is configurable by the operator to support various synchronous, full duplex data rates between 64 kbps and 2.048 Mbps for the TRK-3 card. The multiplexer's STI acts as a Data Terminal Equipment (DTE) interface on the aggregate data side. The SA-TRK card interface is configurable by the operator to support various symmetric and asymmetric data rates between 16 kbps and 8.448 Mbps.

3.2.3.1.6 Voice Interfaces

The P-MUX Module provides voice compression on operator selectable channels. Voice compression cannot be single ended (i.e. both sites must be using voice compression). The Prime Voice Secure module supports 12 channels and compresses 64 kbps (μ-Law and A- Law) PCM

voice calls into LD-CELP compressed rates as low as 4.8 kbps. The PVS cannel is allocated by the PRC card/port.

3.2.3.1.7 Operator Interface

The multiplexer includes two (one main for a local console/terminal and one auxiliary for a remote modem) EIA-232 compatible terminal interfaces to enable an operator to configure, monitor the performance, and diagnose faults of the multiplexer. Capability exists for local or remote computer terminals using VT100 Emulators (9600 bps, No Parity, 8 Data Bits, 1 Stop Bit).

3.2.3.1.8 Built-In Test

The multiplexer includes continuously running diagnostics to detect and report major faults via the configuration and status ports. The multiplexer includes supplementary built-in diagnostics, which may be run off-line, to aid the operator in isolating faults to the LRU level. The multiplexer includes a local loopback function, which may be enabled by the operator.

3.2.3.2 Configuration Options

In addition to the basic functions and features the installer may customize the multiplexer by modifying the card complement to provide the additional functions and features. Some of the customize interfaces are listed below:

- P-MUX 400 Voice Kit
- P-MUX 400 Port Interface Kit
- P-MUX 400 Trunk Interface Kit
- Echo Cancellation Kit
- Fireberd Analyzer Kit
- Cable Maintenance Kit
- Fiber Cable Kit
- Circuit Extension Kit

3.2.4 Physical Characteristics

3.2.4.1 Transit Case

The module is housed in an 11U man-transportable container (transit case), approximately 22.5”W x 34.5”D x 23.4”H. The transit case is designed to stack on top of, and mechanically interlock to like cases. The frame inside the transit case is designed to slide out of the case to allow removal and replacement of Line-Replaceable-Units in the field. It is designed (with covers in place) to protect the electronic equipment inside from direct exposure to environmental conditions; e.g., rain, snow, ice, dust, etc., likely to be encountered during world wide military transit.

3.2.4.2 Weight

The module, including all internally carried cables is not to exceed the two-man (78 kg/174 lb.) lifting limits.

3.2.4.3 Storage Space

The module transit case includes a storage pouch within its covers to contain cables, manuals, etc. that must be transported and used with the module.

3.2.4.4 Marking

See TDC Standards Document for required markings.

3.2.5 Cables and Accessories

The module includes cables listed in Table 8, stored within its covers. Unique cables are marked with the modules white and purple color code as indicated. Strain relief and cable management hardware are provided with the module.

Table 8 - Cables included with P-Mux 400 Module

Function	Color Code	Quantity	Description
Power	White and Purple	1	IEC–320 receptacle to NEMA 5–15P
Port protectors	White and Purple	10	DB25 port protectors
DB25M to DB25M crossover cable	White and Purple	1	Interconnect two Promina multiplexers via the TRK-3 modules
Module Admin Cable	White and Purple	1	Configuration Cable
Fiber Cable	White and Purple	2	Backbone connection

3.2.6 Reliability

The module with its standard complement of LRUs, have a mean time between failure (MTBF) commensurate with similar commercial equipment in its class. The actual MTBF for the major system components are shown in Table 9. Where reliability data is not readily available from the vendor, this is indicated.

Table 9 - MTBF of Major Components

Component	MTBF
Promina 400 12 slot Redundant	6.96 years
SA TRK front card	84.52 years
SA TRK rear interface	29.74 years
USD front card	589.93 years
USD 530/CDP rear card	378.25 years

Table 9 - MTBF of Major Components

Component	MTBF
USD 530 rear card	312.8 years
PRC front card	170.5 years
PRC rear card	240.11 years
PVEC	199.33
QASD front card	50.33
QASD rear card	231.03
Prime Voice Secure	Not Available
PLM	50.13 years
PLMI (rear card)	705.31 years
Fiber Modem	100,000 hrs
TRK-3 front card	TBD
TRK-3 rear card	TBD
HSD-2B front cars	TBD

3.2.7 Maintainability

Maintainability characteristics will be part of the selection criteria for all hardware. Ease of maintenance, such as accessibility to Line Replaceable Units, fault detection/isolation software capability, and fault annunciation will be considered.

3.2.7.1 Mean Time Between Preventive Maintenance

The Mean Time Between Preventive Maintenance, during operation, is 30 days. The duration of preventive maintenance actions such as corrosion control, cleaning filters, etc., does not exceed 30 minutes.

3.2.8 Environmental Conditions

During storage, transport and operation the modules can withstand exposure to temperatures as shown in Table 10.

3.2.8.1 Temperature

Temperature characteristics for the major equipment components are shown in Table 10.

Table 10 - Module Temperature Characteristics

Equipment	Temperature (degrees C)	
	Operating	Non-Operating
Promina 400	5 – 25	0-70
Dual T1 Fiber Modem	0-50	-40 to 85

3.2.8.2 Relative Humidity

Relative humidity characteristics for the major equipment components are shown in Table 11.

Table 11 - Module Humidity Characteristics

Equipment	Humidity
	Non-condensing
Promina 400	20-95%
Dual T1 Fiber Modem	0-95%

3.2.8.3 Altitude

Altitude characteristics for the major equipment components are shown in Table 12.

Table 12 - Module Altitude Characteristics

Equipment	Altitude (feet)	
	Operating	Non-Operating
Promina 400	10,000	-200 to 40,000
Dual T1 Fiber Modem	15,000	Not Available

3.2.8.4 Sand and Dust

During storage and transport, the modules are protected when exposed to sand and dust in accordance with the best commercial practices for close proximity to operating aircraft. During operation with covers removed, the modules can withstand sand and dust in accordance with the best commercial practices for natural conditions.

3.2.8.5 Shock

Module equipment racks are equipped with rubber shock isolation mounts and is protected from shocks induced during handling, setup and tear down. Modules and components can operate without degradation following exposure to the non-operating shock environment described by Method 516.5, Procedure VI (Bench Handling) of MIL STD 810F.

3.2.8.6 Vibration

The modules are equipped with rubber shock isolation mounts so that the modules can withstand the vibration encountered while being transported by commercial and military airlift, sealift and vehicular (over unimproved roads) systems. MIL-STD-810F, Method 514.5, Procedure I, Categories 4, 7 and 8 applies. Alternative procedures may be substituted after approval of the TDC program office.

3.3 Design and Construction

3.3.1 Material Parts and Processes

This module is built to good commercial practices. Mechanical and electrical interchangeability exists between like systems, subsystems, assemblies, subassemblies and replaceable parts.

3.3.2 Safety

This module shall not present a safety, fire or health hazard to personnel.

3.3.2.1 Electrical Safety

This module is designed to eliminate the hazard to personnel of inadvertent lethal voltage contact. All electrical conductors carrying voltages in excess of 70 volts shall be insulated to prevent contact or covered by a protective barrier. All removable protective barriers shall be interlocked to automatically disconnect power behind the barrier upon removal or clearly marked with a warning label that indicates the voltage potential that will be encountered behind the barrier. All warning labels shall remain visible after the cover has been removed.

3.3.2.2 Mechanical Safety

Sharp surfaces shall have protective covers or other suitable features to minimize injury where personnel are likely to be exposed to such surfaces.

3.4 Logistics

This module accommodates a two level maintenance concept: organizational (Air Force personnel) and depot (contractor personnel). Removal and replacement of an LRU is defined at the organizational level and any needed repair of the LRU is defined at the depot level. Any special test or support equipment required to effect removal or replacement of an LRU at the organizational level can be provided as part of the module. No more than two persons shall be required to remove or replace an LRU.

An LRU is defined as the lowest element of the module which can be isolated to be faulty through inspection; built-in test; technical manuals; TDC-ICAP system performance; spares substitution; or other diagnostic aid approved by the Government for organizational level maintenance, exclusive of expendables such as fuses, lamps and LEDs. An LRU is defined at the card/module level or higher.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General

The quality assurance program includes tests and other evaluations to the extent specified herein. The quality assurance program is designed to verify the electrical, mechanical and functional characteristics of each module. The purpose is to ensure that each module complies with or performs better than the requirements specified herein.

4.2 Responsibility for Inspection

Unless otherwise specified in the contract, the contractor shall be responsible for the performance of all inspection requirements and may use his own or any other facilities suitable for the performance of the inspection requirements. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

4.3 Product Qualification Test (PQT)

Inspections, analyses, demonstrations and tests verify compliance of Section 3 of this specification on the first production unit.

4.4 Production Acceptance Test (PAT)

Each module delivered to the Government undergoes an Acceptance Test Process as identified in Table 13. The acceptance test verifies that the module interfaces are operating properly prior to delivery to the Government.

4.5 Verification Cross Reference Matrix (VCRM)

Table 13 provides a list of each Section 3 requirement and the verification method to be used. The following paragraphs define the codes employed in the VCRM. Unless otherwise noted, where more than more one verification method is shown, one method or a combination of methods may be used to show compliance.

4.5.1 Not Required (N/R)

This method indicates that verification is not required because the paragraph is a title, heading, general introductory paragraph or statement of a goal and contains no “shall” or “must” statements.

4.5.2 Inspection

Inspection is a method of verification of the module performance or characteristics by examination of the equipment or associated documentation. Inspections are conducted with the use of inspection tools, measurement devices, visual means and comparison. Most inspections apply to verification of requirements associated with physical characteristics such as size, weight,

appearance, adherence to specified standards and engineering practices, quality design, and construction supported with quality documentation. Inspections also include the auditing of manufacturer's data that verifies the performance of non-developmental items that comprise the TDC ICAP module. Inspections may occur during any assembly stage of the unit under test.

4.5.3 Analysis

Analysis is a method of verification through technical evaluation of calculations, computations, models, analytical solutions, use of studies, reduced data, and/or representative data to determine that the item conforms to the specified requirements.

4.5.4 Demonstration

Demonstration is a method of verification whereby the properties, characteristics and parameters of the item are determined by observation alone and without the use of instrumentation for quantitative measurements. This method is used when a requirement does not contain a specific numerical parameter that must be measured. Demonstrations may occur during verification of a unit under test at any assembly stage. Pass/fail criteria are simple yes/no indications of functional performance since no quantitative values are specified.

4.5.5 Test

Test is a method to verify that a specified requirement is met by thoroughly exercising the applicable item under specified conditions and by using the appropriate instrumentation in accordance with test procedures. This method requires the use of laboratory equipment, simulators, or services to verify compliance to the specified requirements. This method is used when it is practicable to make direct or indirect measurement of a specified numerical parameter to verify compliance with a requirement. Tests may occur during verification of a unit at any assembly stage. Actual measured values are recorded, and pass/fail is determined by comparing the measured value with the specified value. Measurement accuracy is precise enough to ensure that the measured value is within the specified tolerance.

Table 13 - Verification Cross Reference Matrix

		Verification Method					
			PQT				
Paragraph	Title	N/R	Inspect	Analysis	Demo	Test	ATP
3.0	Requirements	X					
3.1	Module Definition	X					
3.2	Performance Requirements	X					
3.2.1	Electrical Interface Requirements (External)	X					
3.2.1.1	Prime Power					X	X
3.2.1.2	EIA-232 Serial Connector on the Promina Logic Module Interface				X		X

Table 13 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
			PQT				
		N/R	Inspect	Analysis	Demo	Test	ATP
3.2.1.3	Promina TRK-3 Serial Trunk Interface (STI) Connector				X		X
3.2.1.4	Voice Backbone Connectors				X		X
3.2.1.5	EIA-530/DCE Serial Connector				X		X
3.2.1.6	Promina Conditioned Diphase (CDI) Connector				X		X
3.2.1.7	Promina SA-TRK (DTE) SA-EIA-530 Connector				X		X
3.2.2	Electrical Interface Requirements (Internal)	X					
3.2.3	Functional Requirements	X					
3.2.3.1	Module Equipment Details	X					
3.2.3.1.1	Multiplexer				X		X
3.2.3.1.2	Network Gateway Feature				X		X
3.2.3.1.3	Timing				X		X
3.2.3.1.4	Memory Capabilities				X		X
3.2.3.1.5	Data Interfaces				X		X
3.2.3.1.6	Voice Interfaces				X		X
3.2.3.1.7	Operator Interface				X		X
3.2.3.1.8	Built-In Test				X		X
3.2.3.2	Configuration Options	X	X				
3.2.4	Physical Characteristics	X					
3.2.4.1	Transit Case		X				
3.2.4.2	Weight					X	
3.2.4.3	Storage Space		X				
3.2.4.4	Marking		X				X
3.2.5	Cables and Accessories				X		X
3.2.6	Reliability			X			
3.2.7	Maintainability			X			
3.2.7.1	Mean Time Between Preventive Maintenance			X			
3.2.8	Environmental Conditions	X					
3.2.8.1	Temperature					X	
3.2.8.2	Relative Humidity			X			
3.2.8.3	Altitude			X			
3.2.8.4	Sand and Dust			X			
3.2.8.5	Shock					X	
3.2.8.6	Vibration					X	

Table 13 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
			PQT				
		N/R	Inspect	Analysis	Demo	Test	ATP
3.3	Design and Construction	X					
3.3.1	Materials Parts and Processes			X			
3.3.2	Safety	X					
3.3.2.1	Electrical Safety			X		X	
3.2.2.2	Mechanical Safety		X	X			
3.4	Logistics			X			

5.0 PREPARATION FOR DELIVERY

Each module is packaged for shipment and the package marked in accordance with the requirements of the contract under which the module is ordered.

6.0 BASELINE CONFIGURATION

6.1 Equipment

Table 14 - P-Mux 400 Equipment List

Device	Manufacturer	Part Number	Description	Quantity
Case	ECS Composites	11721	Transit Case	1
Conditioner	Marway	MPD411130	Power Conditioner	1
Cord W3, W4	Panel Comp Corp	86557000	A3 Power Cable	2
Connector	Fiber Systems Int.	BSTA2000	Bulkhd Coup	4
Protector	Black Box	FA652	Port Protector	10
Cable W5			PRC - Top Port to T1 F.O. Modem Channel 0	1
Cable W6			PRC – Bottom Port to T1 F.O. Modem Channel 1	1
Cable W7			Console to J3	1
Cable W8			Auziliary to J4	1
Cable P6			Trunk Interface Cable (stored in Pouch) 20 ft	1
CDI Cable P4, P5			CX1120 to Trompeter	2
Cable P2, Configuration Port	Blackbox	EDN12H-0010-MF	Module Admin Cable (stored in pouch) 20 ft	1
Cable P1, P2	Fiber Systems Int.		Fiber Optic Backbone Cable(stored in Pouch) 20 ft	2
Cable W1, W2	Fiber Systems Int.		Fiber Optic Cable	2
Cable Mgmt	Polyrack	41150-019	Cable MgmtBar	2
Cable Loop	Polytie	41020-SPR	Cable Mgmt Loop	2
Shelf	NET	PER400AR12A	12 Slot Shelf	1
Module	NET	3030B	PRC Card	1
Module	NET	4114B	Prime Voice Secure	4
Module	NET	5771A	HSD-2B/EIA530	1
Module	NET	5035B	Dual EIA 530 USD	1
Module	NET	2230B	SA Trunk EIA 530 / CD	2
Module	NET	2503B	MOD Trunk 3 Front Card	1
Module	NET	2515B	STI RS530 Interface Card	1
Software	NET	PER400SWCR-0207	P400 Software Rev 2.X7.5	1
Software	NET	PVP-PER4SNMP-100	P400 SNMP Software License	1
Software	NET	004601A	Supernet License	1
Fiber Modem	S. I. TECH	2890-2R-ASP-1	Dual T-1 Fiber Optic Modem	1

6.2 Elevation Drawings

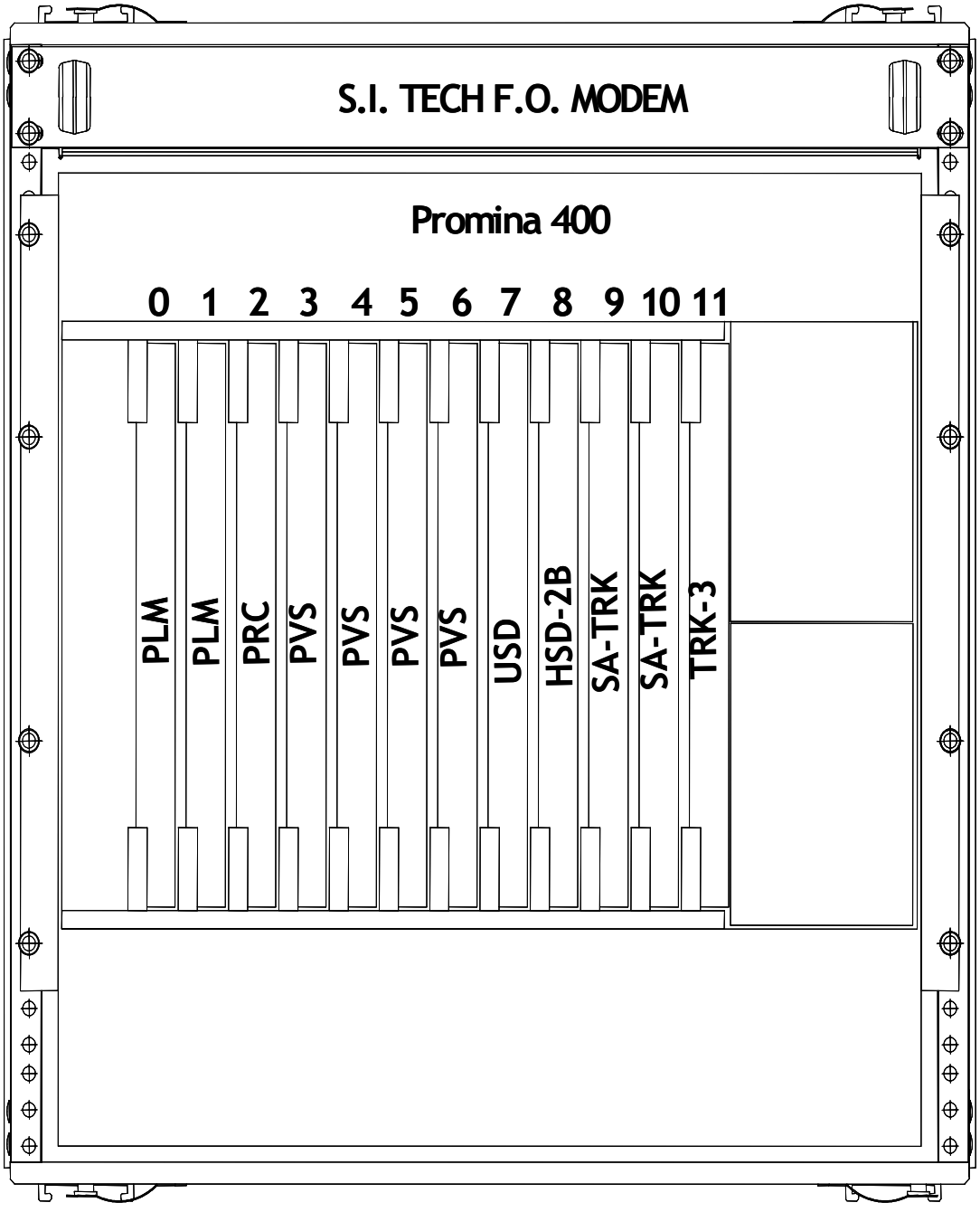


Figure 4 - Front Elevation

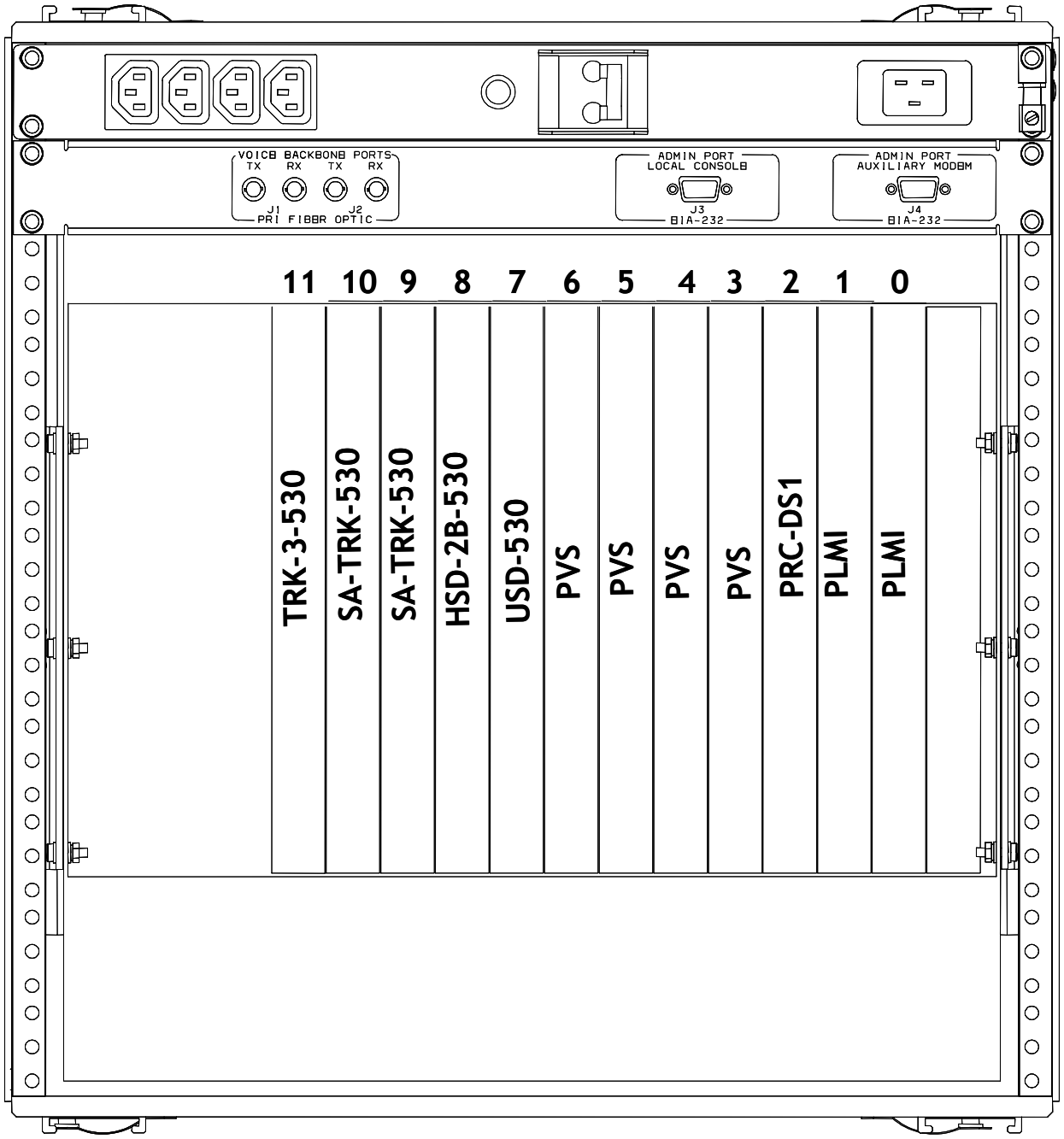


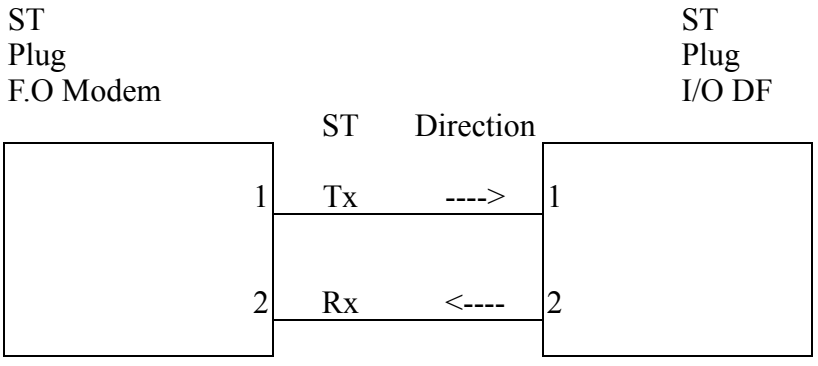
Figure 5 - Rear Elevation

6.3 Cable Diagrams

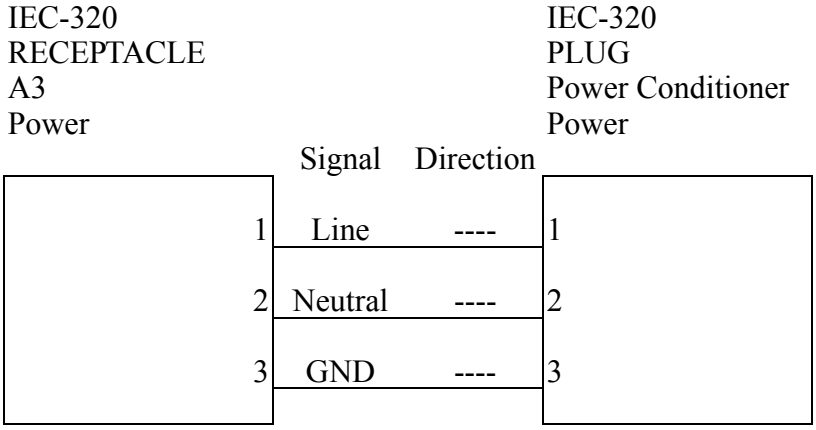
Table 15 - Cable Assemblies

Wire Number	Part Number	Manufacturer	Description
W1, W2		Fiber Systems Inc	Fiber Optic Cable
W3, W4	86557000	Panel Comp Corp	A3 Power Cable
W5			PRC - Top Port to T1 F.O. Modem Channel 0
W6			PRC – Bottom Port to T1 F.O. Modem Channel 1
W7			Console to J3
W8			Auxiliary to J4
P1, P2	TBD	Fiber Systems Inc.	Fiber Optic Backbone Cable (stored in pouch)
P3	EDN12H-0010-MF		Module Admin Cable (stored in pouch)
P6			Trunk Interface Cable (crossover) (stored in pouch)
P4, P5	TBD	TBD	8 ft IDNX-CDI Interface cable CX to Trompeter (stored in pouch)

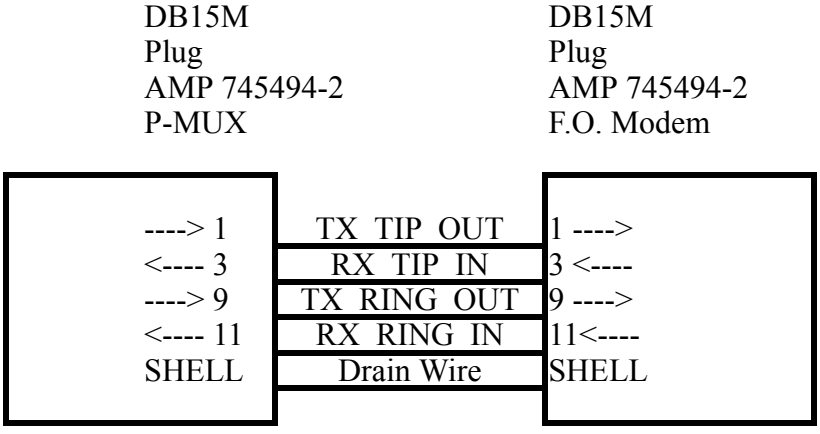
Cable W1, W2
Pin Assignments
Fiber Optic Cable



Cable W3, W4 (86557000)
Pin Assignments
A3 Power Cable



Cable W5
Pin Assignments
PRC - Top Port to T1 F.O. Modem Channel 0



Cable W6
Pin Assignments
PRC - Bottom Port to T1 F.O. Modem Channel 1

DB15M Plug AMP 745494-2 P-MUX		DB15M Plug AMP 745494-2 F.O. Modem
----> 1	TX_TIP_OUT	1 ---->
<---- 3	RX_TIP_IN	3 <----
----> 9	TX_RING_OUT	9 ---->
<---- 11	RX_RING_IN	11<----
SHELL	Drain Wire	SHELL

Cable W7
Pin Assignments
Console to J3

RJ45 (STRAND) Plug AMP 5-554169-3 Console		DB09F Plug AMP 745491-2 J3
<---- 1	RTS	8 <----
----> 8	CTS	7 ---->
<---- 2	DTR	1 <----
----> 7	DCD	4 ---->
<---- 3	TXD	2 <----
----> 6	RXD	3 ---->
---- 4	GND	5 -----
---- 5	GND	5 -----

Cable W8
Pin Assignments
Auxiliary to J4

RJ45 (STRAND) Plug AMP 5-554169-3 Auxiliary		DB09F Plug AMP 745491-2 J4
<---- 1	RTS	8 <----
----> 8	CTS	7 ---->
<---- 2	DTR	1 <----
----> 7	DCD	4 ---->
<---- 3	TXD	2 <----
----> 6	RXD	3 ---->
---- 4	GND	5 -----
---- 5	GND	5 -----

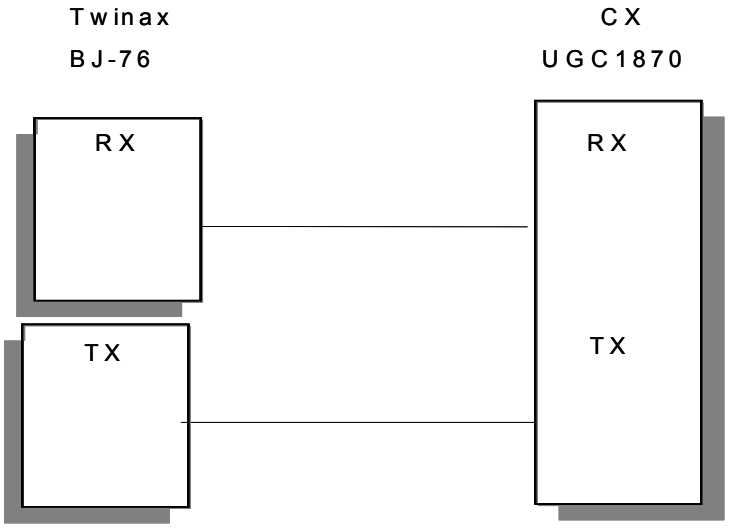
P1, P2- Cable
Pin Assignments
Fiber Optic Backbone Cable (stored in pouch)

ST Plug	**Signal**	**Direction**	ST Plug
1	Tx	→	1
2	Rx	←	2

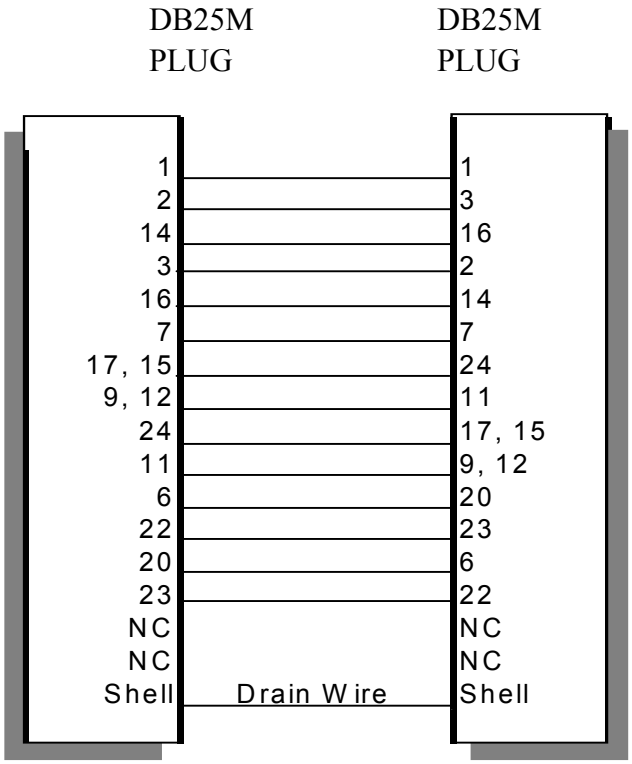
P3 Cable EDN12H-0010-MF
Pin Assignments
Module Admin Cable (stored in pouch)

DB09M Receptacle AMP 745491-2 Laptop COM port Terminal		**Signal**	**Direction**	DB09F Plug AMP 745906-1 I/O DF Various Admin
	2	RD	←	2
	3	TD	→	3
	4	DTR	→	4
	5	GND	----	5
	6	DSR	←	6
	7	RTS	→	7
	7	CTS	←	8

P4, P5 Cable
Pin Assignment
8 Foot IDNX CDI Trompeter to CX11230 (stored in pouch)



P6 Cable
Pin Assignments
Trunk Interface Cable (stored in pouch)



AMP 745496-2 AMP 745496-2

6.4 Interconnection Diagram