Theater Deployable Communications

Baseline Requirements Document

Initial Communications Element - Transmission Module
(v2)
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1.0 SCOPE

This requirements document establishes the performance, manufacture and test requirements for the TDC ICAP Initial Communications Element Transmission 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 2.x7.5	N.E.T. Customer Documentation CD DOCs Release 2.x7.5
	TDC Standards Document

3.0 REQUIREMENTS

3.1 Module Definition

The ICE Transmission Module provides circuit multiplexing and demultiplexing, bulk encryption and satellite multiplexing and demultiplexing of voice, data and message traffic. The multiplexing function creates bandwidth efficient connectivity between the deployed base and off-base locations.

The ICE Transmission Module also contains a primary reference source (PRS) that provides a station clock timing reference for the ICE network.

Figure 1 shows the Transmission Module internal and external interconnections. Detailed characteristics for each function may be found in Paragraph 3.2.

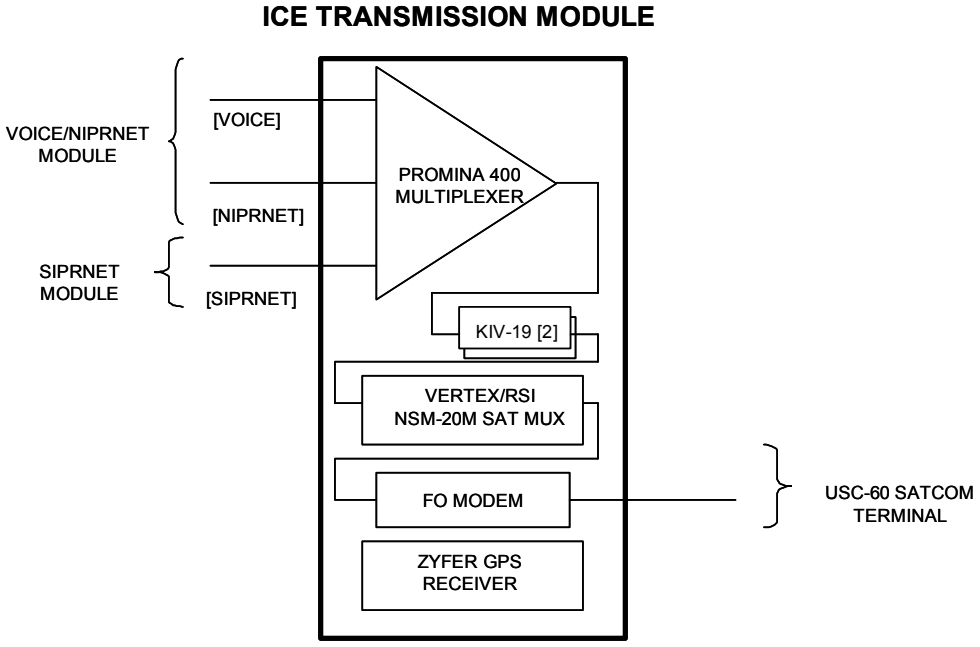


Figure 1 - Transmission Module Application in TDC-ICE Package

3.2 Performance Requirements

3.2.1 Electrical Interface Requirements (External)

The Transmission Module includes the number and type of active external interfaces presented in Table 2.

Table 2 - Transmission Module, External Interface Characteristics

Signal Name	Quantity	Connector	Primary Interface	Electrical Characteristics
Prime Power	1	IEC 320 C-20 Receptacle	AC Power	120/240 VAC ± 10%, 50/60 Hz
PRC Voice Connector	2	DB-15F	Voice Trunks/ NIPRNET Module	TBS
PVA Voice Connector	4	RJ-11F	Analog Voice	TBS
EIA-530/DCE Serial Connector	6	DB-25F	Data Circuits/ SIPRNET or NIPNET Module	EIA-530/DCE
SA-TRK (DTE) SA-EIA-530 Connector	2	DB-25F	Transmission Systems	EIA-530/DTE or Unbalanced CDI
EIA-232 Serial Connector on the Promina Logic Module Interface	2	DB-9F	Laptop Serial Port	EIA-232/DTE-Admin, EIA-232/DTE-Modem
KIV-19 Red I/O DCE	1	DB-25(F)	Promina, SA-TRK	EIA-530
KIV-19 Black I/O DTE	1	DB-25(F)	TSSP Modem, NRZ (530)	EIA-530
KIV-19 Station Clock In	1	Triax (F)	GPS	50 Ohm, EIA-422
TSSP User Port 1 DCE	1	DB-25(F)	KIV-19	EIA-530
TSSP Aggregate Port	1	DB-25(F)	FO Modem	EIA-530
TSSP KY-57 Secure Orderwire	1	DB-9(F)	KY-57	TBS
TSSP Timing Signal Input (10 MHZ)	1	BNC (F)	GPS	EIA-422
TSSP Control	1	DB-9	Laptop Serial Port	EIA-232/DTE-Admin
TSSP KY-57 24 VDC Power	1	MS3120 F14-5S	KY-57	TBS
Fiber Modem Data connector	1	DB-25(F)	Satellite Multiplexer	EIA-530
Fiber Modem Control connector	1	DB-9(F)	USC-60 Laptop	EIA-232/DTE-Admin
Fiber Backbone connector	8	ST [Fiber]	USC-60A Terminal	Fiber
GPS Antenna	1	N-type	GPS Antenna	75 Ohm, RG-59
10 MHz Clock Out	4	BNC (F)	Freq Reference Out	50 Ohm, RG-58
1 PPS TTL Clock Out	1	BNC (F)	Freq Reference Out	50 Ohm, RG-58
10 MHz TTL Clock Out	1	BNC (F)	Freq Reference Out	50 Ohm, RG-58

Table 2 - Transmission Module, External Interface Characteristics

Signal Name	Quantity	Connector	Primary Interface	Electrical Characteristics
N.8	3	Triax (F)	GPS Clock Out	50 Ohm, EIA-422
GPS Control	1	DB-9	Laptop Serial Port	EIA-232/DTE-Admin
GPS Control	1	RJ-45	Laptop E-NET	IEEE Std 802.3

3.2.1.1 Prime Power

The Transmission Module operates from 100 to 130 VAC, 200 to 240 VAC, 50 to 60 Hz, single phase, and three-wire power. The Transmission 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 Promina PRC Voice Connector

The PRC Voice connector is a female DB-15 type connector. This connector provides the interface to the DS-1 ports on the Promina PRC card. Pin assignments are shown in Table 3.

Table 3 - Promina PRC Voice Card

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	TX Tip Out	O	6	Not Used	–	11	Rx Ring In	I
2	Not Used	-	7	Not Used	–	12	Not Used	–
3	RX Tip In	I	8	Not Used	–	13	Not Used	–
4	Not Used	-	9	TX Ring Out	O	14	Not Used	–
5	Not Used	-	10	Not Used	–	15	Not Used	–

3.2.1.3 Promina PVA Voice Connector

The PVA Voice connector is an RJ-11 modular female jack female connector. This connector provides the interface to the PVA ports. Pin assignments are shown in Table 4.

Table 4 - Promina PVA Voice Connectors

Pin	Signal
3	Tip
4	Ring

3.2.1.4 Promina 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 rear cards. Pin assignments are shown in Table 5.

Table 5 - EIA Serial Connector

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	Frame Ground	–	10	Receive Line Signal Detect (B)				
2	TX Data (A)	I	11	Terminal Timing(B)	O	19	Request to Send (B)	I
3	RX Data (A)	O	12	Send Timing (B)	I	20	Data Terminal Ready (A)	I
4	Request to Send (A)	I	13	Clear to Send (B)	O	21	NC	–
5	Clear to Send (A)	O	14	TX Data (B)	O	22	Data Set Ready (B)	O
6	Data Set Ready (A)	O	15	TX Timing (A)	I	23	Data Terminal Ready (B)	I
7	Signal Ground	–	16	RX Data (B)	O	24	Terminal Timing (A)	I
8	RX Line Signal Detect (A)	O	17	RX Timing (A)	O	25	NC	–
9	RX Timing(B)	O	18	NC	O			

3.2.1.5 Promina Conditioned Diphase (CDI) Connector

The Promina CDI interface card (CDP) provides a four-wire balanced CDI interface through each female DB-25 connector and a two-wire unbalanced CDI interface through each BJ-76 Twinax connector. Pin assignments for the female DB-25 connector on the CDP interface for the USD port are shown in Table 6.

Table 6 - Promina CDI Connector on USD Card

Pin	Signal	I/O	Pin	Signal	I/O	Pin	Signal	I/O
1	Shield	–	10	Not Used	–	19	Not Used	–
2	Send Data	O	11	Not Used	–	20	Not Used	–
3	RX Data	I	12	Not Used	–	21	Not Used	–
4	Not Used	-	13	Not Used	–	22	Not Used	–
5	Not Used	-	14	Send Data	O	23	Not Used	–
6	Not Used	-	15	Not Used	–	24	Not Used	–
7	Signal Ground	–	16	RX Data	I	25	NC	–
8	Not Used	I	17	Not Used	–			
9	Not Used	I	18	Not Used	–			

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 7.

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 7 - 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	–			

3.2.1.7 Promina EIA-232 Serial Connector on the PLM 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 8.

Table 8 - 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
3	Transmit Data	O	6	Data Set Ready	I	9	NC	-

3.2.1.8 KIV-19A RED Data Interface Connector

The KIV-19A RED I/O connector is a female DB-25 type connector in accordance the EIA-530/ DTE standard. Pin assignments are shown in Table 9.

Table 9 - KIV-19S Red I/O Connector

Pin	Signal	I/O	Pin	Signal	I/O
1	Shield	–	14	Transmit Plain Text (-)	I
2	Transmit Plain Text (+)	I	15	Red Station Clock (+)	O
3	Receive Plain Text (+)	O	16	Receive Plain Text (-)	O
4	Resync (-)	I	17	Receive Plain Text Clock(+)	O
5	NC	–	18	NC	–
6	NC	–	19	Resync (+)	I
7	Ground	–	20	NC	–
8	NC	–	21	NC	–
9	Receive Plain Text Clock(-)	O	22	NC	–
10	NC	–	23	NC	–
11	NC	–	24	NC	–
12	Red Station Clock (-)	O	25	NC	–
13	NC	–			

3.2.1.9 KIV-19A Black Data DCE Interface Connector

The KIV-19A Black I/O connector is a female DB-25 type connector in accordance the EIA-530/ DTE standard. Pin assignments are shown in Table 10.

Table 10 - BLK I/O Data, Black Interface Panel

Pin	Signal	I/O	Pin	Signal	I/O
1	Shield	–	14	Tx Data Out (-)	O
2	Tx Data In (+)	O	15	Tx Clock Out (+)	I
3	Rx Data Out (+)	I	16	Rx Data Out (-)	I
4	NC	–	17	Rx Clock Out (+)	I
5	NC	–	18	NC	–
6	NC	–	19	NC	–
7	Signal Return	–	20	NC	–
8	NC	–	21	NC	–
9	Rx Clock Out (-)	I	22	NC	–
10	NC	–	23	NC	–
11	Tx Clock In (-)	O	24	Tx Clock In (+)	O
12	Tx Clock Out (-)	I	25	NC	–
13	NC	–			

3.2.1.10 TSSP Aggregate Port Connector

The TSSP Aggregate Port connector is a female DB–25 type connector in accordance with the EIA-530 standard. This connector provides the TSSP aggregate signal which interfaces with the fiber optic modem in the SIPRNET Module. Pin assignments are shown in Table 11.

Table 11 - AggregatePort Connector [DB-25F]

Pin	Signal	Pin	Signal	Pin	Signal
1	NC	9	RT [B]	17	RT [A]
2	SD [A]	10	NC	18	NC
3	RD [A]	11	TT [B]	19	NC
4	NC	12	ST [B]	20	NC
5	NC	13	NC	21	NC
6	NC	14	SD [B]	22	NC
7	SGND	15	ST [A]	23	NC
8	NC	16	RD [B]	24	TT [A]
				25	NC

3.2.1.11 TSSP NRZ User Port Connector

The TSSP NRZ User Port connector is a female DB–25 type connector in accordance with the EIA-530 standard. This connector provides the NRZ user port which interfaces with the KIV-19. Pin assignments are in accordance with EIA–530 as shown in Table 12.

Table 12 - TSSP NRZ User Port Connector [DB-25F]

Pin	Signal	Pin	Signal	Pin	Signal
1	NC	9	RT [B]	17	RT [A]
2	SD [A]	10	NC	18	NC
3	RD [A]	11	TT [B]	19	NC
4	NC	12	ST [B]	20	NC
5	NC	13	NC	21	NC
6	NC	14	SD [B]	22	NC
7	SGND	15	ST [A]	23	NC
8	NC	16	RD [B]	24	TT [A]
				25	NC

3.2.1.12 TSSP Control Port Connector

The TSSP Control Port connector is a serial connector is a female DB-9 type connector in accordance with the EIA-232 standard. This connector provides access for local console/terminal

connectivity for administration of the TSSP satellite multiplexer. Pin assignments are shown in Table 13.

Table 13 - TSSP NRZ User Port Connector [DB-25F]

Pin	Signal	Pin	Signal	Pin	Signal
1	CD	4	DSR	7	CTS
2	TXD	5	GND	8	RTS
3	RXD	6	DTR	9	NC

3.2.1.13 TSSP Station Clock Input Connector

The TSSP Station Clock Input connector is an isolated female BNC type connector in accordance with EIA 422. This connector provides an external clock input to the TSSP satellite multiplexer. Pin assignments are shown in Table 14.

Table 14 - TSSP Station Clock Input Connector [BNC]

Pin	Signal
1	Data +
2	Data -

3.2.1.14 TSSP KY-57 Secure Orderwire Connector

The TSSP KY-57 Secure Orderwire connector is a female DB-9 type connector. This connector interfaces with the KY-57 secure voice equipment. Pin assignments are shown in Table 15.

Table 15 - TSSP KY-57 Secure Orderwire [Combo -D(F)]

Pin	Signal	Pin	Signal	Pin	Signal
1	VIN_DVOW_IN	4	VIN_DVOW_OUT	7	NC
2	VIN_DVOW_IN_RTN	5	VIN_DVOW_PTT	8	NC
3	VIN_DVOW_OUT_RTN	6	NC	9	NC

3.2.1.15 TSSP KY-57 Power Connector

The TSSP KY-57 POwer Connector provides 24 Vdc Input Power to the KY-57 Voice Orderwire. The KY-57 Power Connector is a MS3120F14-5S Militarized connector with Pin Assignments as shown in Table 16.

Table 16 - KY-57 Power Connector MS3120F14-5S

Pin	Signal
A	+24Vdc
B	Return
C	NC
D	NC
E	NC

3.2.1.16 Fiber Optic Modem Data Connector

The Fiber Modem Data Connectors are DB–25(F) type. Pin assignments are in accordance with EIA–530 as shown in Table 17.

Table 17 - Fiber Modem Data Connector [DB-25F]

Pin	Signal	Pin	Signal	Pin	Signal
1	NC	9	RT [B]	17	RT [A]
2	SD [A]	10	NC	18	EXC [A]
3	RD [A]	11	TT [B]	19	NC
4	NC	12	ST [B]	20	NC
5	NC	13	NC	21	NC
6	NC	14	SD [B]	22	NC
7	SGND	15	ST [A]	23	NC
8	NC	16	RD [B]	24	TT [A]
				25	EXC [B]

3.2.1.17 Fiber Optic Modem Control Connector

The Fiber Modem Control Connector provides connectivity to the fiber modem administration port. The Admin connector is a DB-9F with pin assignments as shown in Table 18.

Table 18 - Fiber Modem Data Connector [DB-25F]

Pin	Signal	Pin	Signal	Pin	Signal
1	CD	4	DSR	7	CTS
2	TXD	5	GND	8	RTS

Table 18 - Fiber Modem Data Connector [DB-25F]

Pin	Signal	Pin	Signal	Pin	Signal
3	RXD	6	DTR	9	NC

3.2.1.18 Fiber Optic Modem Fiber Backbone Connectors

The fiber backbone contains 8 ST connectors. The Fiber Backbone connectors provide connectivity from the Remote Fiber Modem to the Local Fiber Modem. The fiber connector is a female ST type connector with pin assignments of 1 for TX and 2 for RX.

3.2.1.19 GPS Triax Interface Connectors

The Primary Reference Source (GPS Receiver) clocking interfaces utilize female Triax type connectors. These include Black Station Clock (BSC) and USD Clock. The N.8 clocks (A & B, and C & D) provided by an Output N.8 Clock Rate Modules also use female Triax type connectors.

3.2.1.20 GPS BNC Interface Connectors

The four 10MHz External Reference Clock Sine Wave Output connectors are female BNC type connectors. The 1PPS and 10 MHz External Reference Clock TTL Output connectors are female BNC type connectors.

3.2.1.21 GPS Antenna Connector

The GPS ANT connector is an N-type connector on a 75 Ohm, RG-59 cable. The center conductor of this connector can also be used to supply 5 VDC power to the connected antenna.

3.2.1.22 GPS Administrative Interface Connectors

The GPS Control Port connectors are a serial connector, which is a female DB-9 type connector in accordance with the EIA-232 standard and a RJ-45 type connector in accordance with IEEE Std. 802.3. The RS232 and the RJ-45 connector provides access for local console/terminal connectivity for administration of the PRS. Pin assignments for EIA RS232 are shown in Table 19.

Table 19 - GPS Control Port Connector [DB-9F]

Pin	Signal	Pin	Signal	Pin	Signal
1	CD	4	DSR	7	CTS
2	TXD	5	GND	8	RTS
3	RXD	6	DTR	9	NC

3.2.2 Electrical Interface Requirements (Internal)

The Transmission Module utilizes several types of internal interfaces. This information is found in Paragraph 6.3 and Paragraph 6.4.

3.2.3 Functional Requirements

The ICE Transmission Module accepts voice and data traffic and multiplexes it for encryption and transmission to off-base locations. Conversely, the Transmission Module demultiplexes off-base traffic onto digital voice and data lines. The Transmission Module also provides a KIV-19A for encryption and decryption, and a TSSP satellite multiplexer for compatibility with GMF satellite terminals. It also contains a fiber optic modem for remoting the Transmission Module up to 500 feet from the satellite terminal. Additionally, the Transmission Module provides a fiber optic modem and a GPS primary reference source for stratum 1 timing.

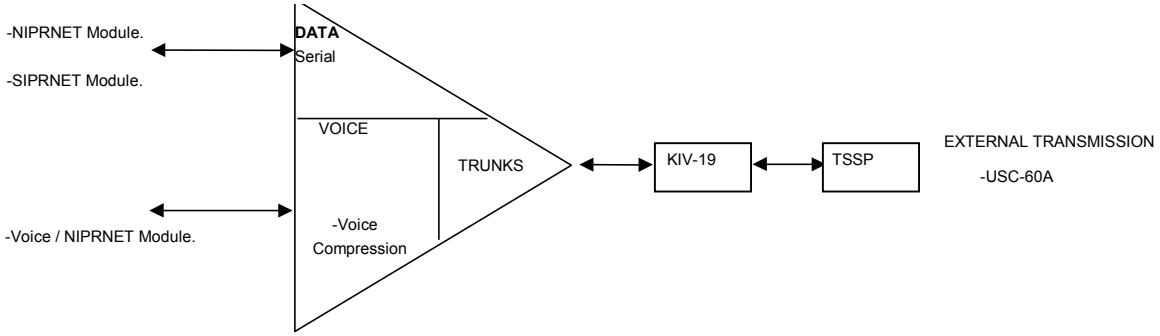


Figure 2 - Transmission Module Block Diagram Showing Internal Module Functions

3.2.3.1 Module Equipment Details

The following subsections provide details of the functionality of the major equipment of the ICE Transmission Module.

3.2.3.1.1 Promina Multiplexer

The Transmission Module includes a Promina 400-12 slot multiplexer with the card complement presented below. Table 20 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 20 - Multiplexer Card Complement

Card	Position	Quantity	Reference
PLM/PLMI	Front/Rear	2	Common Equipment Modules Doc
Prime Voice Secure	Front	2	Voice Module Document
PVA	Front	1	Voice Module Document
USD/EIA-530 DCE	Front/Rear	1	Data Modules Document

Table 20 - Multiplexer Card Complement

Card	Position	Quantity	Reference
HSD-2B /EIA-530	Front/Rear	2	Data Modules Document
EIA-530 & CDI	In Pouch	1	Data Modules Document
SA-TRK/EIA-530 DTE	Front/Rear	2	Trunk Modules Document
PRC/DS1	Front/Rear	2	Voice Module Document

At the Promina 400 high-speed data input interface, switched circuit network (SCN) voice, video and data enter via the DS1 interface. The Promina 400 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 Promina 400 compresses digital voice channels and outputs the voice, video and data via the DS1 interface to the DTEs.

3.2.3.1.1.1 Network Gateway Feature

The Promina 400 acts as a Gateway Node so that it gains access to other IDNX/Promina compatible domains.

3.2.3.1.1.2 Timing

The Promina 400 is capable of deriving or accepting external timing:

- The Promina 400 can provide internal timing via the timing signals generated by the on-board crystal oscillator on the PLM.
- The Promina 400 is capable of deriving timing from Send Timing input on the SATRK or PRC rear card.
- The Promina 400 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).

3.2.3.1.1.3 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.

3.2.3.1.1.4 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 EIA-530/DCE port interface for the HSD-2B card is configurable by the operator to support various synchronous data rates between 9.6 kbps and 8.448 Mbps. 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.

3.2.3.1.1.5 Voice Interfaces .

The multiplexer provides DS1 connections for interface to the ICE switched circuit network. The multiplexer 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.

3.2.3.1.1.6 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).

3.2.3.1.1.7 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.

3.2.3.1.2 KIV-19A

The ICE Transmission Module provides two KIV-19A (KG-94, 194 compatible) crypto devices for encryption/decryption of aggregate data channels that interface to the USC-60A satellite terminal.

3.2.3.1.2.1 Clock Phase Select

The ICE Transmission Module makes available on the KIV-19 Red/Black I/O panel the phase select switch for the KIV-19/KIV-19A. The toggle switch will invert the RSC signal at the point where TXPT data is clocked into the KIV-19A.

3.2.3.1.2.2 Crypto Fill

The KIV-19A traditional keying material is loaded into the KIV-19A. The following loading equipment can be used to load the KIV-19A - Key Loaders KYK-13, KYX-15, KOI-18 and KOK-12. The Data Transfer Device (DTD) interfaces directly to the DS-102 fill port of the KIV-19A.

3.2.3.1.3 TSSP Multiplexer

The Vertex RSI Nodal Satellite Multiplexer (NSM) is a synchronous time division multiplexer that provides both:

- Aggregate interfaces to satellite modems
- Group interfaces to ground equipment.

The NSM is interoperable with legacy TD-1337 equipment, including remote configuration and automatic frequency control. A computer provides monitoring and control of the NSM through the RS-232 port. The graphical user interface software for control and monitoring of NSM operation under Microsoft Windows 2000 and XP. The NSM uses LED's to provide operational status. The LED's are located on the front of the unit. NSM external interface connections are provided on the rear of the unit. The NSM operational system is composed of the NSM unit and a computer that facilitates configuration and control of the NSM.

3.2.3.1.3.1 Timing

Timing to the satellite multiplexer for synchronization of data can be supplied from any one of multiple sources. The multiplexer can lock its timing reference to any one of the twelve user inputs, any one of the two receive aggregate inputs, or to a high-stability external timing standard (station clock). The multiplexer can also derive timing from a remote multiplexer or TD-1337 when operated in Automatic Frequency Control (AFC) slave mode.

3.2.3.1.4 Fiber Optic Modem

The FTSAT terminal will normally be connected to the ICE package using two fiber optic modems. One fiber modem is an integral part of the FTSAT electronics case A2 while the second fiber modem is part of the Transmission Module. When the fiber modems are employed, the FTSAT terminal can be located up to 500 feet away from the baseband module. In addition, the laptop computer used to control the FTSAT terminal can either be co-located with the ICE package or it can be located with the terminal.

3.2.3.1.5 GPS GSync Time and Frequency System

The Primary Reference Source (PRS) provides a station clock timing reference for the network. The PRS Rubidium oscillator develops a STRATUM 1 timing reference when disciplined by the GPS receiver reference. The PRS contains a self-contained Frequency Discipline Machine (FDM), consisting of an ultra-stable oscillator (Rubidium), single GPS receiver and GPS antenna, and a single power supply. The user serial interface connections are made through a

DB-9F connector identified “RS-232”, using a standard RS-232 control interface or a remote control RJ-45 E-Net connector using Telnet or SNMP. Four 10 MHz output signals are available through BNC connectors “10MHz”. A 10 MHz and 1 PPS TTL level output signal is available through BNC connectors “10MHz and “1PPS’, respectively.

If the system is set to the Switch mode, GPS is the default reference source. If GPS becomes unavailable and the external reference input is present, the module will automatically switch to the external 10 MHz input (depending on the module configuration). If the external input is not present then the system switches to the Coasting or Holdover mode. When GPS becomes available again, the system automatically starts to use the GPS source again.

One N.8 option card is required to provide 2 sets of independently programmable ports. The Dual Clock Rate RS-422 Output Module version provides RS-422 output via 2+2 Triax connector configuration. A 2+2 Triax output configuration provides two sets of independently programmable ports. They have a frequency range of 8 KHz to 8192 KHz in 8 KHz increments. The clock rate can be selected through the front panel keypad and menu or commands from the I/O port.

3.2.3.2 Configuration Options

None

3.2.4 Physical Characteristics

3.2.4.1 Transit Case

The module is housed in an 16U man-transportable container (transit case), approximately 22.5”W x 34.5”D x 32.1”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 does not exceed TBS lbs.

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 21, stored within its covers or in a separate cable bag. Strain relief and cable management hardware are provided with the module.

Table 21 - Cables Included with ICE Transmission Module

Function	Color Code	Quantity	Description
Power	N/R	1	IEC-320 receptacle to NEMA5-15P
P1 Clock Cable	N/R	1	Triax to Triax clock cable [1 ft]
P2, P3 Jumper cable	N/R	2	DB25 to DB25 straight through cable [1 ft]
P4 Aggregate Cable	N/R	1	DB25 to DB25 straight through cable [3 ft]
P5 Admin Cable	N/R	1	DB9M to DB9F straight through cable [10 ft]
P6 Admin Cable	N/R	1	RJ-45 to RJ-45 straight through cable [10 ft]
P7 Timing Ref Cable	N/R	1	BNC to BNC 10 Mhz timing cable [10 ft]
P8, P9 HSD Cable	N/R	2	BJ-76 Twinax to UGC1870 adapter cable [8 ft]
P10 TSSP Cable	N/R	1	DB37 to DB25 TSSP direct connect cable [100 ft]

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 22. Where reliability data is not readily available from the vendor, this is indicated.

Table 22 - MTBF of Major Components

Component	MTBF
Promina 400 12-slot Redundant	6.96 years
KIV-19A	5000 hours
Vertex RSI Satellite Mux	Not Available
Gsync GPS Receiver	55080 hours

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 23.

3.2.8.1 Temperature

Temperature characteristics for the major equipment components are shown in Table 23.

Table 23 - Module Temperature Characteristics

Equipment	Temperature (in degrees C)	
	Operating	Non-Operating
Promina 400 12-slot Redundant	-5 to 25	0 to 70
KIV-19A	-41 to 70	-57 to 71
Vertex RSI Satellite Mux	0 to 50	-40 to 86
Gsync GPS Receiver	0-50	-40 to 85

3.2.8.2 Relative Humidity

Relative humidity characteristics for the major equipment components are shown in Table 24.

Table 24 - Module Humidity Characteristics

Equipment	Humidity
	Non-condensing
Promina 400 12-slot Redundant	20 to 95%
KIV-19A	0 to 95%
Vertex RSI Satellite Mux	5 to 95%
Gsync GPS Receiver	0 to 95%

3.2.8.3 Altitude

Altitude characteristics for the major equipment components are shown in Table 25.

Table 25 - Module Altitude Characteristics

Equipment	Altitude (feet)	
	Operating	Non-Operating
Promina 400 12-slot Redundant	10,000 ft	40,000 ft
KIV-19A	15,000 ft	40,000 ft
Vertex RSI Satellite Mux	Not Available	Not Available
Gsync GPS Receiver	4000 m	9000 m

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 516.4, 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 TDC Program Office approval.

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 26. 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 26 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 26 - Verification Cross Reference Matrix

		Verification Method					
			PQT				
Paragraph	Title	N/R	Inspect	Analysis	Demo	Test	ATP
3.	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	Prominal PRC Voice Connector				X		X
3.2.1.4	Promina PVA Voice Connector				X		X
3.2.1.4	Promina EIA/DCE Serial Connector				X		X

Table 26 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
			PQT				
		N/R	Inspect	Analysis	Demo	Test	ATP
3.2.1.5	Promina CDI Connector				X		X
3.2.1.6	Promina SA-TRK (DTE) Connector				X		X
3.2.1.7	Promina EAI Serial Connector				X		X
3.2.1.8	KIV-19A Red Data Interface Connector				X		X
3.2.1.9	KIV-19A Blk Data Interface Connector				X		X
3.2.1.10	TSSP Aggregate Port Connector				X		X
3.2.1.11	TSSP User Port Connector				X		X
3.2.1.12	TSSP Control Port Connector				X		X
3.2.1.13	TSSP Station Clock Input Connector				X		X
3.2.1.14	TSSP KY-57 Orderwire Connector				X		X
3.2.1.15	TSSP KY-57 Power Connector				X		X
3.2.1.16	Fiber Optic Modem Data Connector				X		X
3.2.1.17	Fiber Optic Modem Control Connector				X		X
3.2.1.18	Fiber Backbone (ST) Connectors				X		X
3.2.1.19	GPS Triax Interface Connectors				X		X
3.2.1.20	GPS Triax Interface Connectors				X		X
3.2.1.21	GPS Antenna Connector				X		X
3.2.1.22	GPS DB-9 and RJ45 Control Admin 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	Promina Multiplexer				X		X
3.2.3.1.1.1	Network Gateway Feature				X		X
3.2.3.1.1.2	Timing				X		X
3.2.3.1.1.3	Memory Capabilities				X		X
3.2.3.1.1.4	Data Interfaces				X		X
3.2.3.1.1.5	Voice Interfaces				X		X
3.2.3.1.1.6	Operator Interface				X		X
3.2.3.1.1.7	Built-In Test				X		X
3.2.3.1.2	KIV-19A				X		X
3.2.3.1.2.1	Crypto Fill				X		X
3.2.3.1.3	TSSP Satellite Multiplexer				X		X
3.2.3.1.3.1	TSSP Timing				X		X

Table 26 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
			PQT				
		N/R	Inspect	Analysis	Demo	Test	ATP
3.2.3.1.4	Fiber Optic Modem						
3.2.3.1.5	GPS Time & Frequency System				X		X
3.2.3.2	Configuration Options	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				
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	
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 27 - Components

Device	Manufacturer	Part Number	Description	Quantity
Shelf	Net Federal Inc	PER400AR12A	Promina 400	1
Software	Net Federal Inc	PER400SWCN-0207	Promina P400 S/W (2.x7.5)	1
Module	Net Federal Inc	2230B	SA Trunk EIA530/CD Module	2
Module	Net Federal Inc	PVAFXSONA	PVA Card	1
Module	Net Federal Inc	3030B	PRC Card Module	2
Module	Net Federal Inc	4114B	PVS Card	2
Module	Net Federal Inc	5035A	Dual EIA 530 Module	1
Module	Net Federal Inc	5771A	HSD-2B Module/EIA-530	2
Module	Net Federal Inc	9079B	CDI Rear Card (In pouch)	1
Module	Net Federal Inc	PVP-PER4-SNMP-101	LIC	1
Encryptor	Group Tech	KIV-19A	Encryptor	2
Frame	Group Tech	36025800	KIV-19A frame	1
Modem	VertexRSI	GENIINSM-20M	TSSP Modem	1
Fiber Modem	L-3 Communications	28772	Fiber Optic Modem to USC-60A	1
GPS	FEI-Zyfer	391-MC-BKD	Chassis w/Backplane, Keypad/ Display	1
GPS	FEI-Zyfer	391-C3-RBX	Standard C/A Receiver w/ Rubidium External Clock Input	1
GPS	FEI-Zyfer	391-PS-115A	115-220VAC Power Input Module (100 Watts)	1
GPS SOFTWARE	FEI-Zyfer	385-3022	GPS Firmware Ver: V1.21.00	1
GPS SOFTWARE	FEI-Zyfer	385-3011	KDC Firmware Ver: V1.18.00	1
GPS	FEI-Zyfer	385-4038-02	Ethernet I/O External Input Module	1
GPS	FEI-Zyfer	385-4007-06	5MHz Output Module	1
GPS	FEI-Zyfer	385-4069-02	N.8 Frequency Synthesizer	1
KY-57 PS	TBD	TBD	KY-57 24 VDC Power Supply	1
Conditioner	Marway	411355	Power Conditioner	1
Case	ECS	TBD	16U Transit Case	1
Protector	PolyPhaser	ISMR50LNZ+6	Lightning Protector	1
Cable (W001)	TBD	TBD	Cable Assembly	1
Cable (W002)	TBD	TBD	Cable Assembly	1
Cable (W003)	TBD	TBD	Cable Assembly	1

Table 27 - Components

Device	Manufacturer	Part Number	Description	Quantity
Cable (W004)	Pasternack Enterprises	PE3067-18	Cable Assembly	1
Cable (W005-W008, W11-12, W017)	Motorola	30-P99922A004	Cable Assembly	7
Cable (W009-W010, W026)	Trompeter	PTWY-36-78	Cable Assembly	3
Cable (W013)	TBD	TBD	Cable Assembly	1
Cable (W014)	TBD	TBD	Cable Assembly	1
Cable (W015)	TBD	TBD	Cable Assembly	1
Cable (W016)	TBD	TBD	Cable Assembly	1
Cable (W018)	TBD	TBD	Cable Assembly	1
Cable (W019)	TBD	TBD	Cable Assembly	1
Cable (W020, W022, W023)	Panel Comp	86557000	Power Cord	3
Cable (W021)	Specialized Power Cords	0201.048	Power Cable	1
Cable (W027)	TBD	TBD	Cable Assembly	1
Cable (W028)	TBD	TBD	Cable Assembly	1
Cable (W029)	TBD	TBD	Power Cord	1
Cable (W30)	TBD	TBD	24 VDC Power Cable	1
Cable (W31, W032, W033, W034)	TBD	TBD	Cable Assembly	1
Cable (W35)	TBD	TBD	Cable Assembly	1
Cable (W36)	TBD	TBD	Cable Assembly	1
Cable (P1)	TBD	TBD	Triax Clock Cable	1
Cable (P2)	TBD	TBD	Jumper Cable	1
Cable (P3)	TBD	TBD	Jumper Cable	1
Cable (P4)	TBD	TBD	Aggragate Cable	1
Cable (P5)	TBD	TBD	Admin Cable	1
Cable (P6)	TBD	TBD	Admin Cable	1
Cable (P7)	TBD	TBD	Timing Reference Cable	1
Cable (P8) (P9)	TBD	TBD	HSD Adapter Cable	1
Cable (P10)	TBD	TBD	Direct Connect Cable	1

6.2 Elevation Drawings

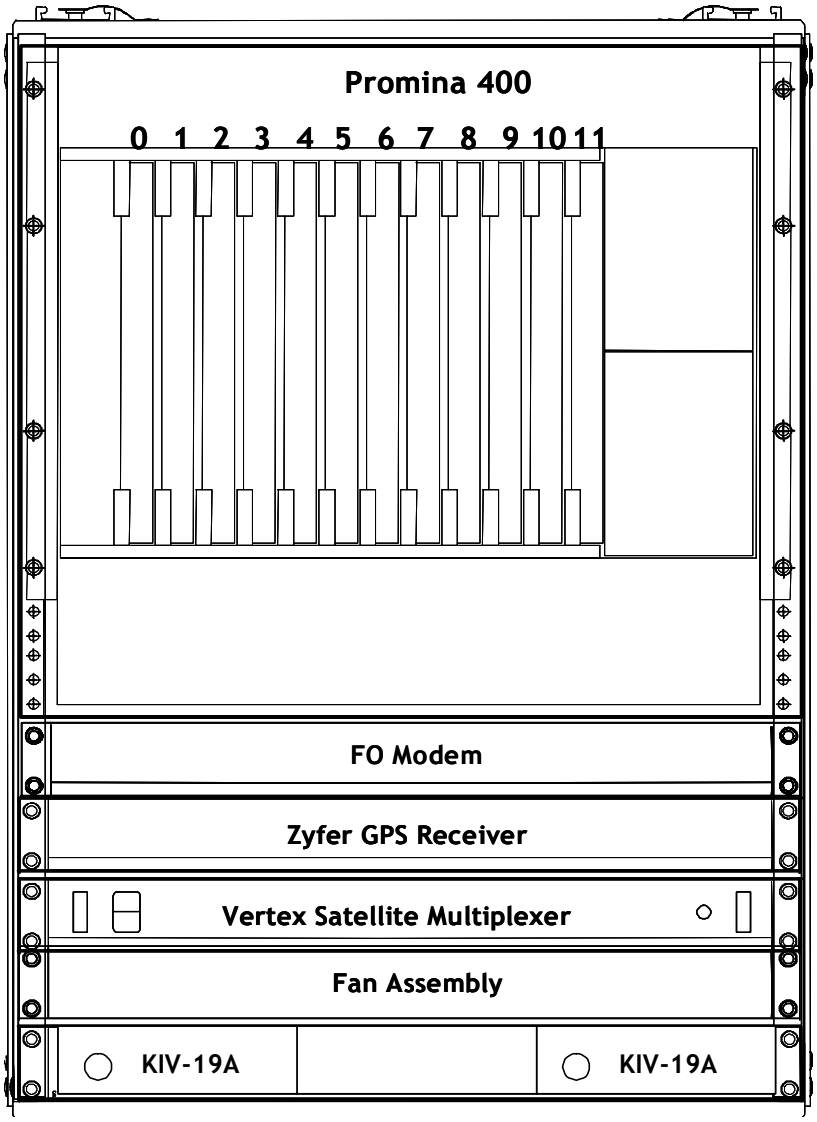


Figure 3 - Front Elevation

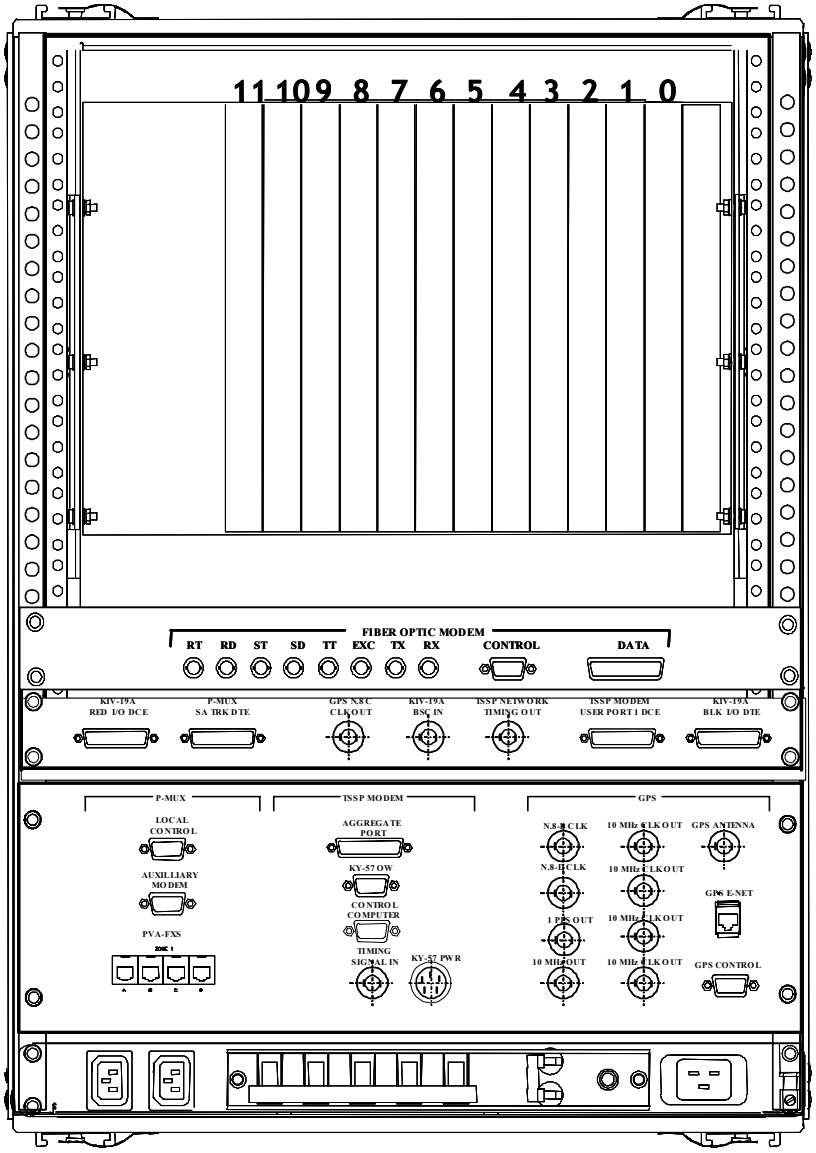


Figure 4 - Rear Elevation

6.3 Cable Diagrams

Table 28 - Cables

Wire Number	Part Number	Manufacturer	Description
W001	TBD	TBD	PMUX SA TRK
W002	TBD	TBD	PMUX Local Console
W003	TBD	TBD	PMUX Auxillary
W004	TBD	TBD	GPS Antenna
W005-W008, W011-W012, W017	TBD	TBD	Timing and Freq.
W009-W010, W026	TBD	TBD	GPS N.8B Clk
W013	TBD	TBD	GPS Control
W014	TBD	TBD	TSSP Control Computer
W015	TBD	TBD	TSSP Orderwire
W016	TBD	TBD	TSSP Aggregate Port
W018	TBD	TBD	PMUX USD
W019	TBD	TBD	KIV19 Black I/O
W020	TBD	TBD	KIV19 Power
W021	TBD	TBD	PMUX Power Y-type
W022	TBD	TBD	GPS Power
W023	TBD	TBD	TSSP Power
W024	TBD	TBD	KIV19 Red I/O
W025	TBD	TBD	TSSP Modem User Port 1
W027	TBD	TBD	P-MUX Voice
W028	TBD	TBD	GPS Ethernet
W029	TBD	TBD	KY-57 PS Power
W030	TBD	TBD	KY-57 24 VDC Power
Cable (W31, W032, W033, W034)	TBD	TBD	ST Fiber Optic Cables
Cable (W35)	TBD	TBD	FO Modem Data Cable
Cable (W36)	TBD	TBD	FO Modem Control Cable
P1	TBD	TBD	Triax Clock Jumper
P2, P3	TBD	TBD	DB25 Jumper
P4	TBD	TBD	DB25 Aggregate
P5	TBD	TBD	DB9 Admin
P6	TBD	TBD	RJ45 Admin
P7	TBD	TBD	BNC Timing
P8, P9	TBD	TBD	HSD Adapter
P10	TBD	TBD	TSSP Direct Connect

Cable W001 (TBSL) Pin Assignments
PMUX SA-TRK

DB25M Plug P-MUX SA-TRK	Signal	Direction	DB25F Receptacle Patch Panel SA-TRK (DTE)
3	RD +	<----	3
16	RD -	<----	16
17	RT +	<----	17
9	RT -	<----	9
19	TT +	---->	19
4	TT -	---->	4
2	SD +	---->	2
14	SD -	---->	14
15	ST +	<----	15
12	ST -	<----	12
7	SG	----	7

Cable W002 (TBSL) Pin Assignments
PMUX Local Console

RJ45 (STRAND) Plug AMP 5-554169-3 Console		DB09F Plug AMP 745491-2
<---- 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 W003 (TBSL) Pin Assignments
PMUX Auxillary

RJ45 (STRAND) Plug AMP 5-554169-3 Auxiliary		DB09F Plug AMP 745491-2
<---- 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 W004 (TBSL) Pin Assignments

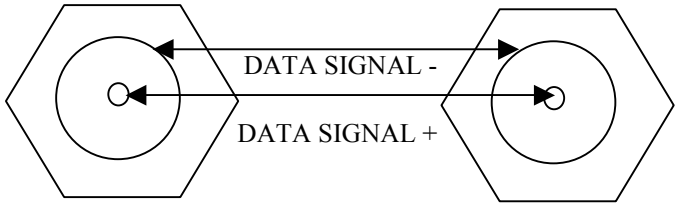
GPS Antenna

50 Ohms N			50 Ohms N
	Signal	Direction	
TIP	Tx	---->	TIP
RING	Rx	<----	RING

Cable W005-W008, W011-W012, W017 Pin (TBSL) Assignments

Timing and Freq. (1 Stored in Pouch)

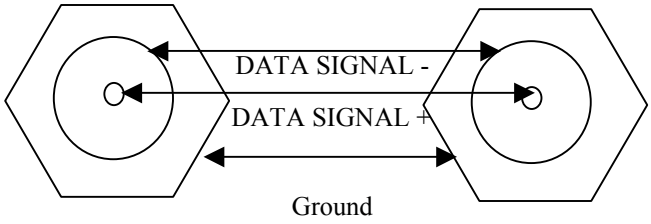
50-ohm Type BNC Straight Angle Plug		50-ohm Type BNC Straight Angle Plug
RF Out	Signal Direction	RF Out



Cable W009-W010, W026 (TBSL) Pin Assignments

GPS N.8B Clk

50-ohm Type BNC Tri-ax Straight Angle Plug	50-ohm Type BNC Tri-ax Straight Angle Plug
RF Out	RF Out



Cable W013 (TBSL) Pin Assignments
GPS Control

DB25F Receptacle AMP 747913-2 GPS Control		DB09F Receptacle AMP 745491-2 GPS CONT
----> 2	TxData	3
<---- 3	RxData	2
----- 7	Signal Ground	5
NC		NC
Shell		Shell

Cable W014 (TBSL) Pin Assignments

TSSP Control Computer

DB09F Receptacle AMP 745491-2 Control Computer			DB09F Receptacle AMP 745491-2 D.F. I/O
	Signal	Direction	
2	RXD	<----	3
3	TXD	--->	2
5	GND	---	5

Cable W015 (TBSL) Pin Assignments

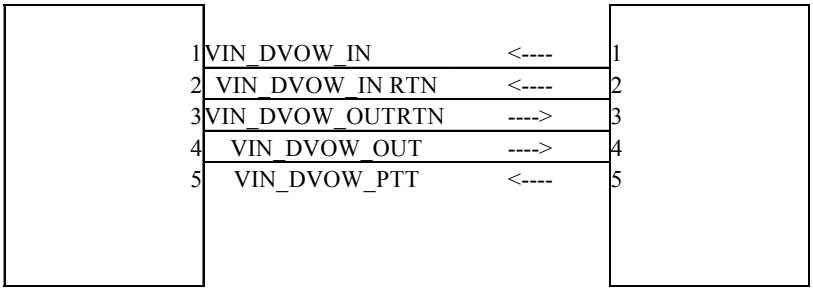
TSSP Orderwire

DB-9(M)
PLUG

DB-9(F)
Receptacle

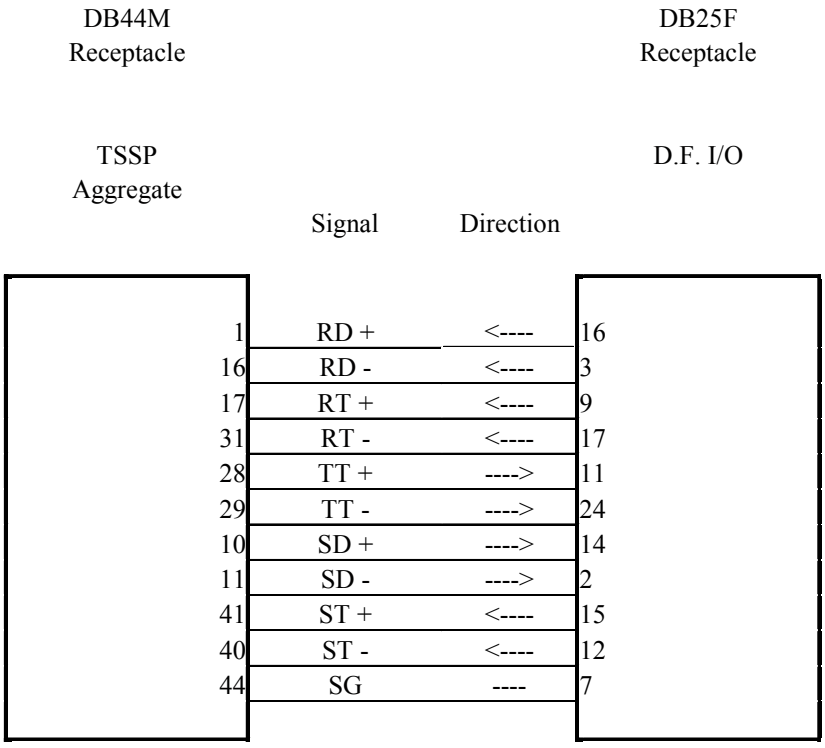
TSSP Orderwire

D. F. I/O



Cable W016 (TBSL) Pin Assignments

TSSP Aggregate Port

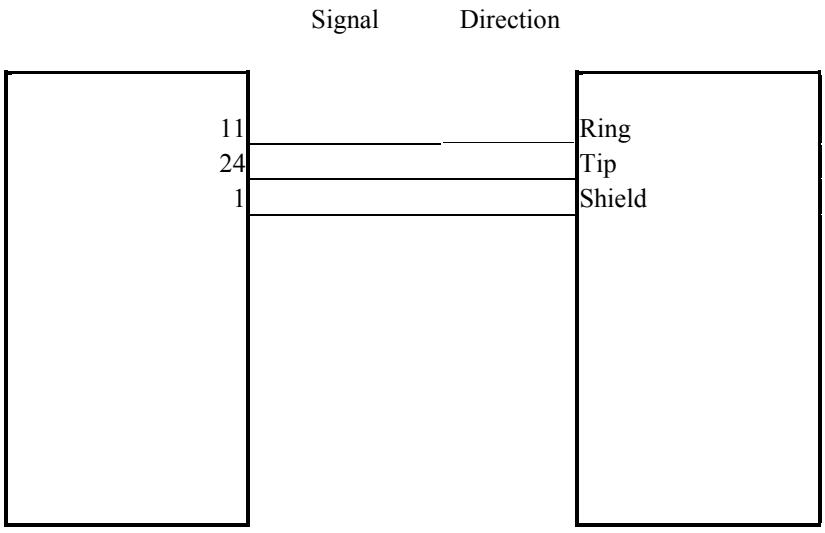


Cable W018 (TBSL) Pin Assignments

PMUX USD

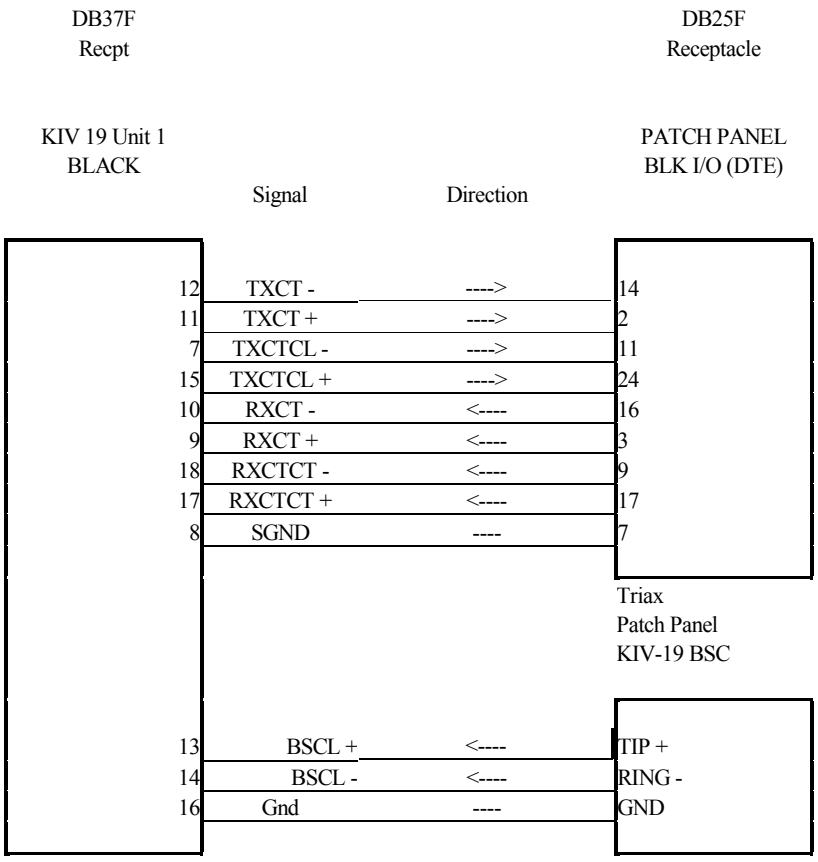
DB25M TwinAx

AMP745496-2



Cable W019 (TBSL) Pin Assignments

KIV19 Black I/O



Cable W020 (TBSL) Pin Assignments
KIV19 Power

IEC-320 RECEPTACLE KIV19 Power			IEC-320 PLUG Power Conditioner Power
	Signal	Direction	
1	Line	----	1
2	Neutral	----	2
3	GND	----	3

Cable W021 (TBSL) Pin Assignments
PMUX Power Y-type

IEC-320 C-20 RECEPTACLE PMUX Power			IEC-320 PLUG Power Conditioner Power
	Signal	Direction	
1	Line	----	1
2	Neutral	----	2
3	GND	----	3

Cable W022 (TBSL) Pin Assignments

GPS Power

IEC-320 C-20 RECEPTACLE GPS Power			IEC-320 PLUG Power Conditioner Power
	Signal	Direction	
1	Line	----	1
2	Neutral	----	2
3	GND	----	3

Cable W023 (TBSL) Pin Assignments
TSSP Power

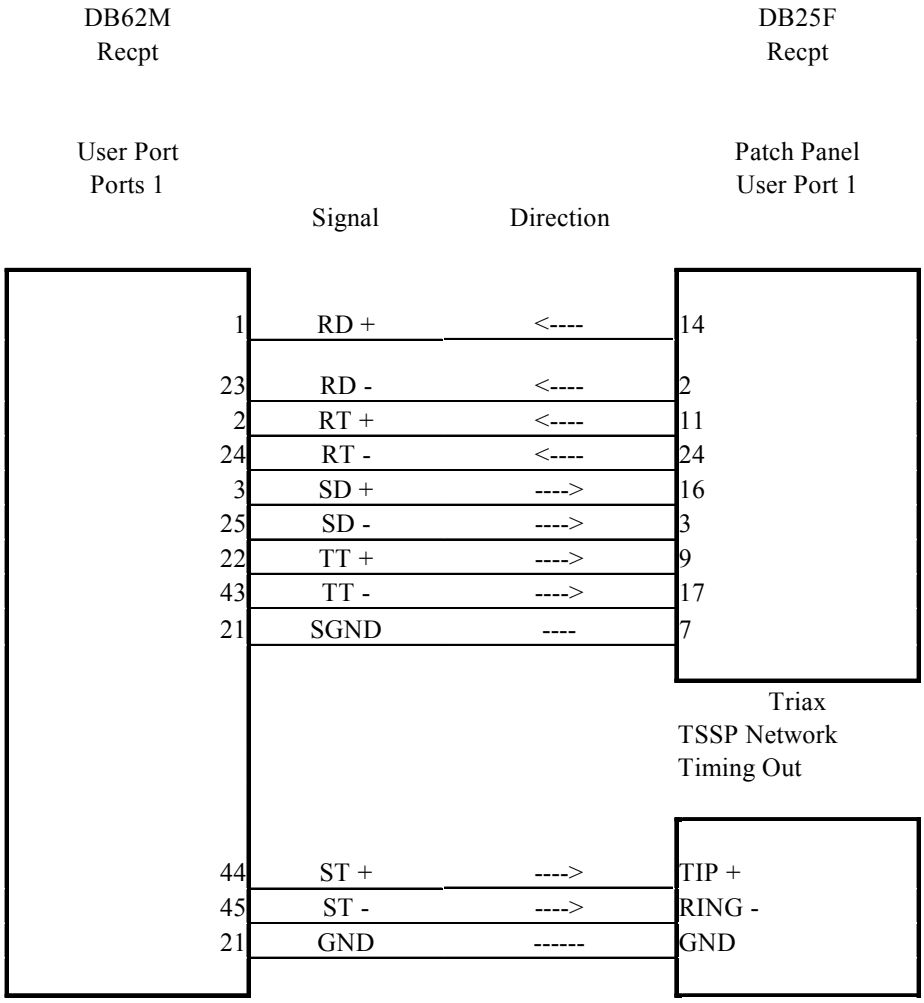
IEC-320 C-20 RECEPTACLE TSSP Power			IEC-320 PLUG Power Conditioner Power
	Signal	Direction	
1	Line	----	1
2	Neutral	----	2
3	GND	----	3

Cable W024 (TBSL) Pin Assignments

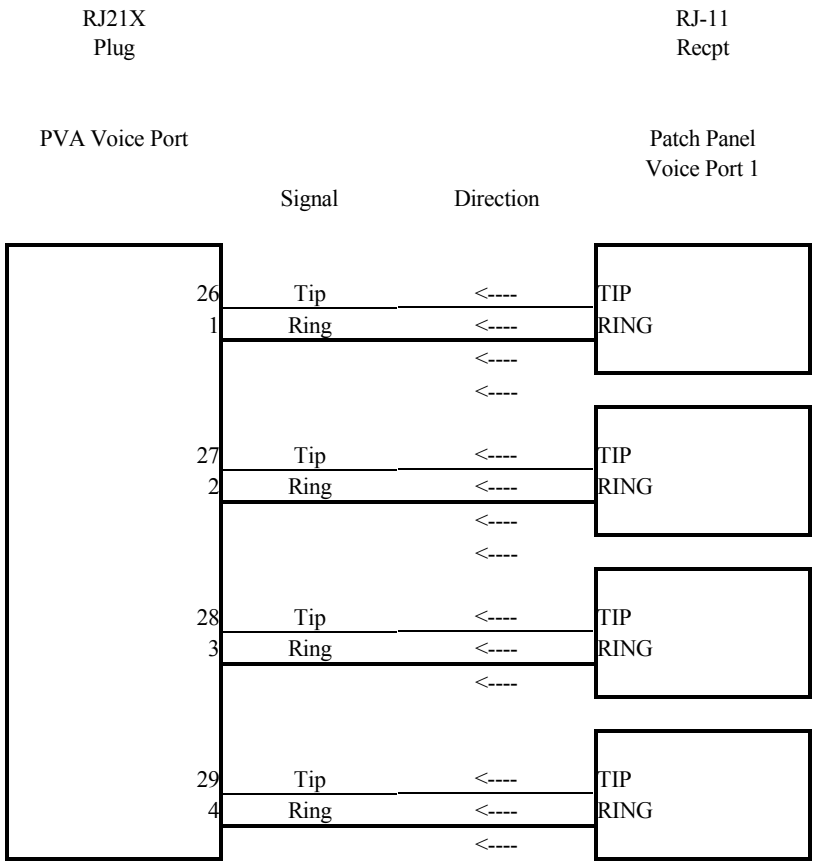
KIV19 Red I/O

DB37M Receptacle KIV19 RED	Signal	Direction	DB25F Receptacle Patch Panel
5	Shield	----	1
3	RSC +	---->	15
4	RSC -	---->	12
6	RxPT +	---->	3
7	RxPT -	---->	16
9	RxPTCL -	---->	9
10	RxPTCL +	---->	17
11	TxPT +	<----	2
12	TxPT -	<----	14
13	GND	----	7
17	Resync -	<----	4
18	Resync +	<----	19
21	Phase Select		Open
13	GND		Closed

Cable W025 (TBSL) Pin Assignments
TSSP Modem User Port 1



Cable W027 (TBSL) Pin Assignments
P-MUX PVA Voice Panel



Cable W028 (TBSL) Pin Assignments
GPS Ethernet

RJ-45 Plug			RJ-45 Plug
Gsync Ethernet			GPS ENET 1
	Signal	Direction	
1	Tx Data +	<----	3
2	Tx Data -	---->	6
3	Rx Data +	<----	1
6	Rx Data -	---->	2

Cable W029 (TBSL) Pin Assignments
KY-57 Power Supply Power

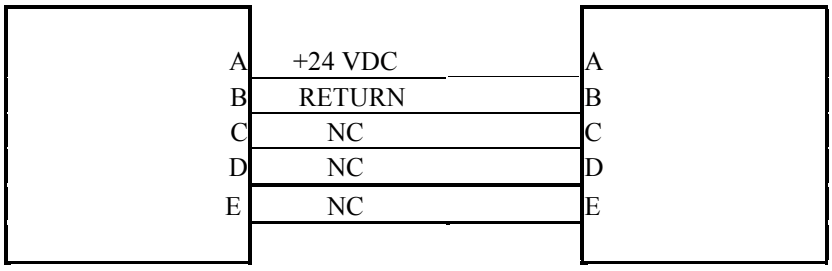
IEC-320 C-20 RECEPTACLE KY-57 Power			IEC-320 PLUG Power Conditioner Power
	Signal	Direction	
1	Line	----	1
2	Neutral	----	2
3	GND	----	3

Cable W030 (TBSL) Pin Assignments

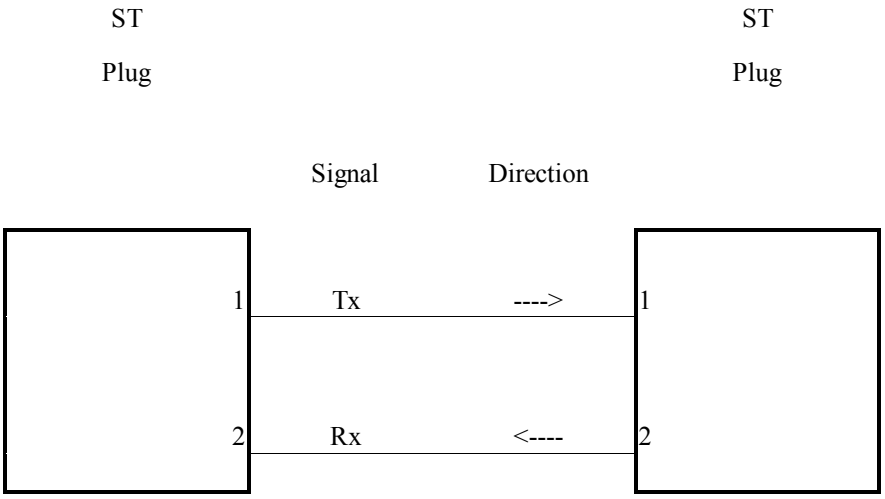
KY-57 24 VDC Power

TBD

MS3120F14-5P
Plug



Cable W031-W034 (TBSL) Pin Assignments
Fiber Optic



Cable W0035 (TBSL) Pin Assignments
Fiber Modem Data

DB37F Receptacle Fiber Modem Serial Port	Signal	Direction	DB25F Receptacle I/O DF
4	SD+	-->	2
22	SD-	-->	14
5	ST+	<--	15
23	ST-	<--	12
6	RD+	<--	3
24	RD-	<--	16
8	RT+	<--	17
26	RT -	<--	9
17	TT+	-->	24
35	TT -	-->	11
16	EXC	<--	18
34	EXC	<--	25
19	Signal Ground	--	7

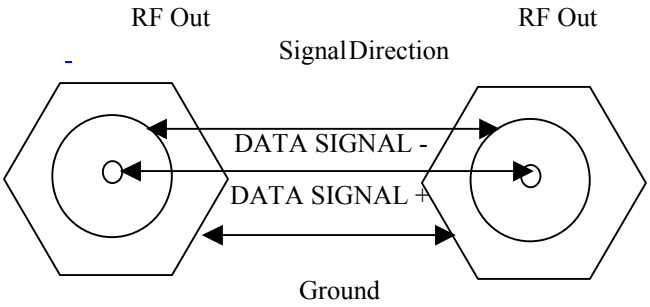
Cable W0036 (TBSL) Pin Assignments
Fiber Modem Control

DB9M Receptacle AMP 745491-2 Fiber Optic ModemPort		Signal	Direction	DB9F Plug AMP 745906-1 Admin I/O DF
	1	CD		1
	2	TXD	---->	2
	3	RXD	<----	3
	4	DSR		4
	5	GND		5
	6	DTR		6
	7	CTS		7
	8	RTS		8
	9	N/C		9

P1 Cable (TBSL) Pin Assignments

Clk (1 Foot - Stored in Pouch)

50-ohm Type BNC Tri-ax Straight Angle Plug	50-ohm Type BNC Tri-ax Straight Angle Plug



P2 & P3 Cable (TBSL) Pin Assignments

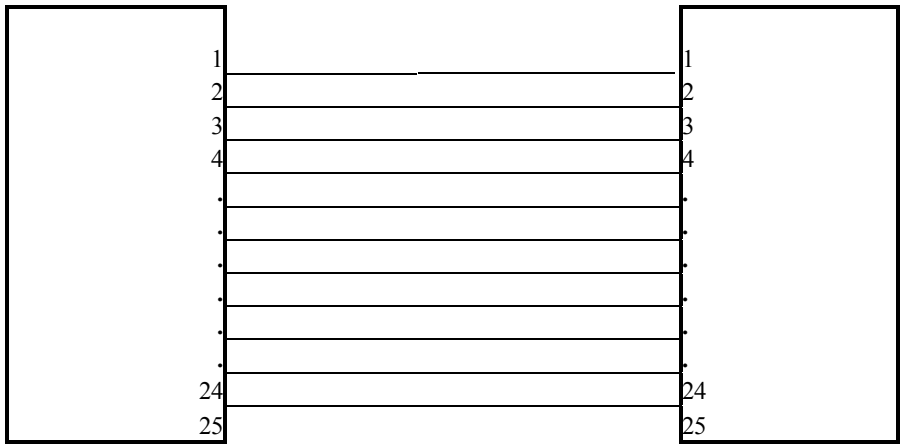
Jumper (1 Foot - Stored In Pouch)

DB25M
PLUG

Patch Panel

DB25M
PLUG

Patch Panel



P4 Cable (TBSL) Pin Assignments

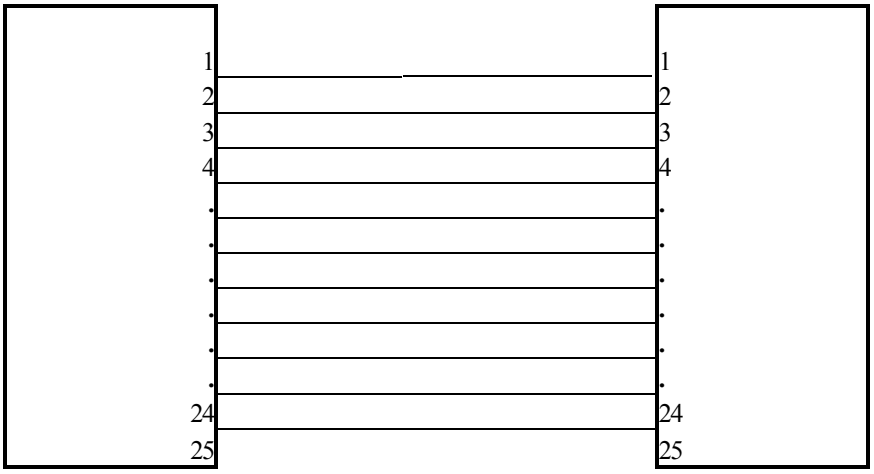
Jumper (20 Feet - Stored In Pouch)

DB25M
PLUG

Patch Panel

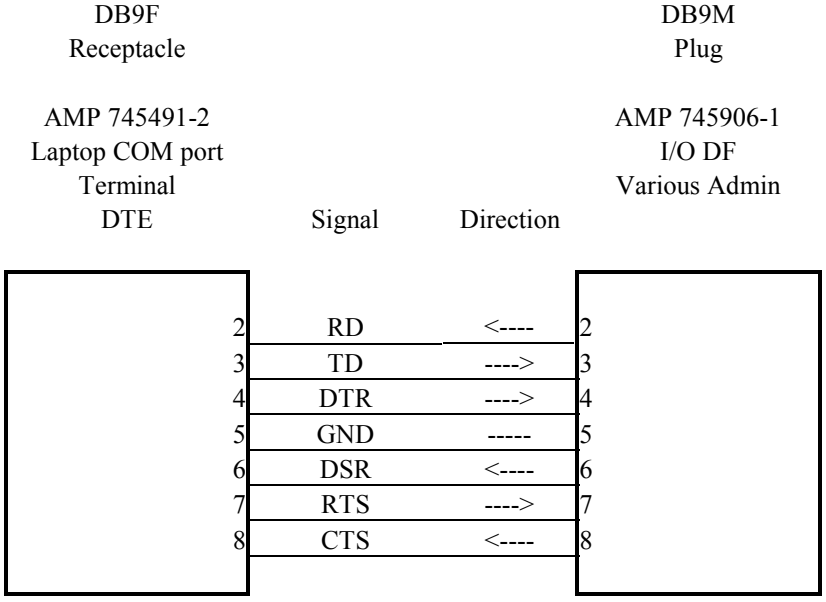
DB25M
PLUG

Patch Panel



P5 Cable (TBSL) Pin Assignments

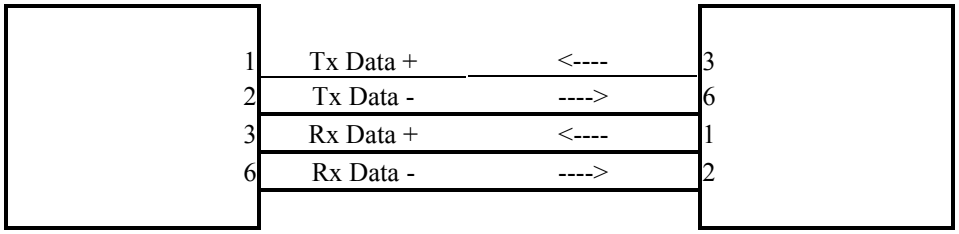
Admin (10 Feet - Stored in Pouch)



Cable P6 (TBSL) Pin Assignments
GPS Ethernet (10 Feet - Stored in Pouch)

RJ-45 Plug — Gsync Ethernet

RJ-45 Plug — GPS ENET 1

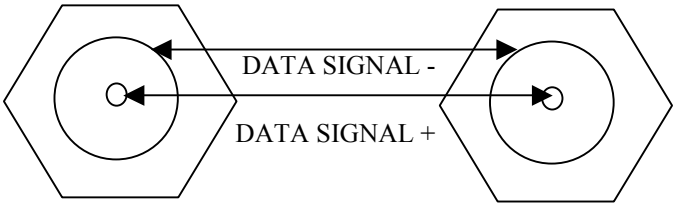


Cable P7 Pin (TBSL) Assignments

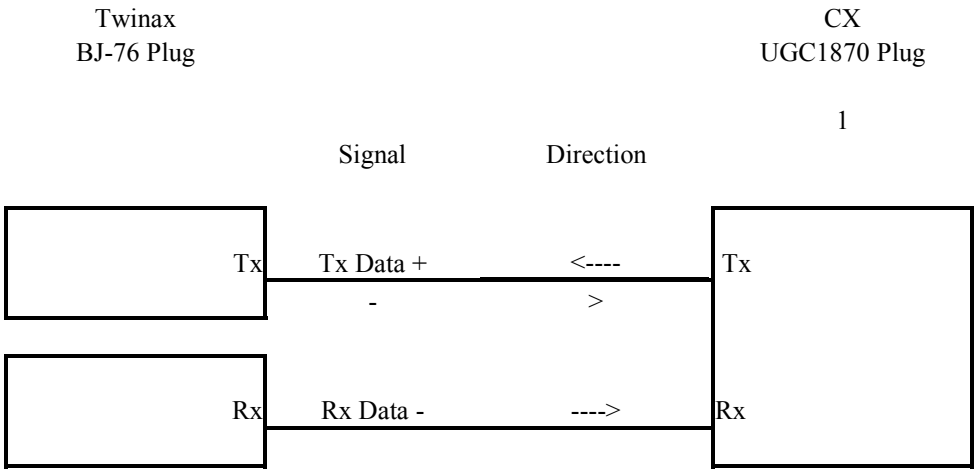
Timing and Freq. (10 Feet - Stored in Pouch)

50-ohm Type BNC Straight Angle Plug — RF Out

50-ohm Type BNC Straight Angle Plug — RF Out

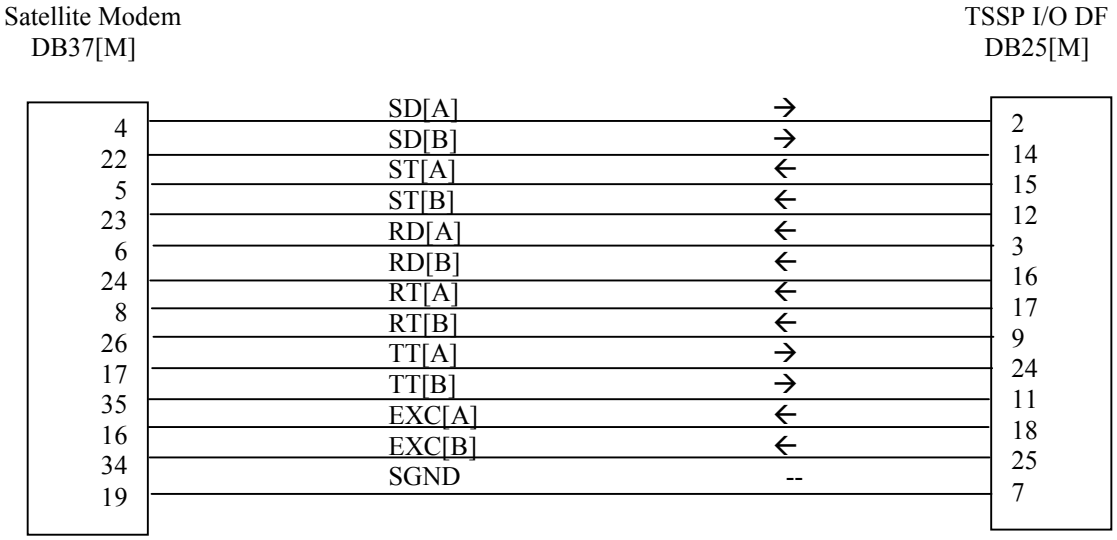


Cable P8 & P9 Pin (TBSL) Assignments
CDI to Tri Tac Interface (8 Feet – Stored in Pouch)



P10 TSSP Direct Connect Cable (TBSL) Assignments
Direct Connect Cable (100 Feet - Stored in Cable Bag)

Satellite Modem-to-TSSP Aggregate Data



6.4 Interconnection Diagram