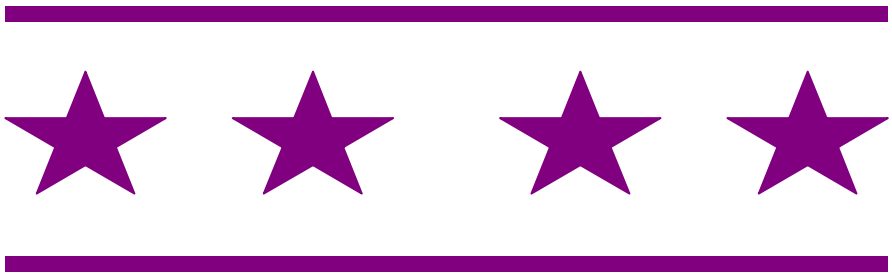
TDC



Theater Deployable Communications

Baseline Requirements Document

STE-R Module

(v1)

Nov 2003

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5 Eglin Street
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1.0 SCOPE

This requirements document establishes the performance, manufacture and test requirements for the TDC ICAP STE-R Module v1.

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
	Theater Deployable Communications Standards Document
ANSI T1.601-1992	American National Standard for Telecommunications - Minimal Set of Bearer Services for the ISDN S Interface
EIA-232	Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange (Rates to 20 kbps)
ISO/IEC 8802-3 1996 ANSI/IEEE Std. 802.3	Information Technology- Local Metropolitan Area Networks-- Part3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specification. (Documents are one in the same; from IEEE, ANSI, ISO and IEC)
ITU Q.920	ISDN User-Network Interface - Data Link Layer, General Aspect - Digital Subscriber Signaling System No.1
ITU Q.921	ISDN User-Network Interface - Data Link Layer Specification - Digital Subscriber Signaling System No.1
ITU Q.930	ISDN User-Network Interface - Layer 3, General Aspects - Digital Subscriber Signaling System No.1
ITU Q.931	ISDN User-Network Interface -Layer 3 Specification - Digital Subscriber Signaling System No.1
ITU X.25	Interface Between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Terminals Operating in the Packet Mode and Connected to Public Data Networks by Dedicated Circuit
MIL-STD-810F	Environmental Test Methods

* Delivered with module

3.0 REQUIREMENTS

3.1 Module Definition

The Secure Terminal Equipment - R Module (STE-R MODULE) houses Secure Terminal Equipment – Remotes (STE-Rs) to provide a COMSEC interface between STEs and STU-IIIs in the voice network and the ICAP Secure Voice Module (SVM). This allows the secure conferencing of STEs and/or STU-IIIs in the SVM. The STE-R Module is initially populated with six STE-Rs and has cabling to add an additional two STE-Rs for a total of eight. By using two STE-R modules with a single SVM, a secure conference with 16 subscribers is possible. See Figure 1. Two type of conferencing capabilities are provided; 1) a preset conference for up to 16 parties, and 2) a meet-me conference for up to 16 parties. In operation, subscriber lines, typically BRIs, from the BAM, LVM, or Legacy PTT/Voice module are cabled to the STE-Rs in the STE-R Module and the RED side of the STE-Rs are cabled to the REDCOM IGX in the Secure Voice Module.

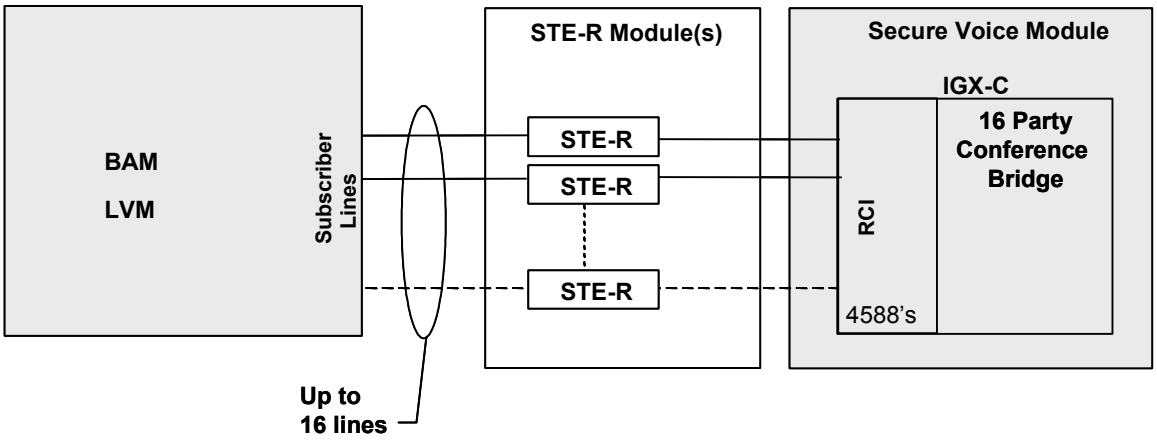


Figure 1 - STE-R Module Block Diagram

3.2 Performance Requirements

3.2.1 Electrical Interface Requirements (External)

The STE-R Module's external interface characteristics are listed in Table 2.

Table 2 - External Interface Characteristics

Signal Name	Quantity	Connector	Input/Output	Primary Interface	Electrical Characteristics
Prime Power	1	IEC-320-C20 Receptacle	I	Local power source	3-wire Single Phase 120/240 VAC ± 10%, 47/ 63 Hz

Table 2 - External Interface Characteristics

Signal Name	Quantity	Connector	Input/Output	Primary Interface	Electrical Characteristics
Console	6	RJ-11	I/O	Local administrator	RS-232
BLACK BRI	8	RJ-45	I/O	BAM, LVM, LPTT/V	ISDN
BLACK Analog	8	RJ-11	I/O	BAM, LVM, LPTT/V	RS-464
RED Serial	8	DB-25F	I/O	SVM	RS-232

3.2.1.1 Prime Power

The STE-R Module shall operate from 90 - 130 VAC or 200 - 240 VAC, 47 to 63 Hz, single phase, three wire power. The module shall include an internal power conditioner to minimize line variation and transients. The prime power connector is an IEC-320 C20 receptacle.

3.2.1.2 Console

The Console port provides the ability to set-up and configure the STE-Rs in the STE-R Module. The interface shall be an RJ-11 connector. A cable to convert the RJ-11 connector to a DB-9 connector is provided with the STE-R and packed in the pouch. Using the conversion cable, the interface has RS-232 signal characteristics and pin assignments as shown in the Table 3. The default settings for the interface are 9600 bps, no parity, 8 data bits, and 1 stop bit.

Table 3 - Secure Terminal Equipment - Console Interface

Pin	Signal	Pin	Signal	Pin	Signal
1	Not used	4	Not used	7	Not used
2	Received Data	5	Signal Ground	8	Not used
3	Transmitted Data	6	Not used	9	Not used

3.2.1.3 STE-R BLACK Interfaces

The analog PSTN telephone interface and the ISDN BRI “S” telephone interface shall be extended to the signal entry panel from each STE-R. The analog interface shall be one RJ-11 and the BRI interface shall be one RJ-45.

3.2.1.4 STE-R RED Serial Interface

The RED interface from each STE-R shall be extended to the signal entrance panel. Connectors at the panel shall be DB-25M.

3.2.1.5 Configuration Options

The following kits are available to provide additional capabilities to the manner in which the STE-R Module is used.

- **Echo Cancellation Kit** – provides voice circuit echo cancellation for T1 and E1 circuits.
- **International Kit** – provides and MSU controller, E1 trunk and support cards for the REDCOM switch preloaded with software features activated, to support interconnections to E1 circuits.
- **Local Base Interface Kit** – provides for interconnectivity with local PBX systems via LSRD/GSRD trunk board FXO Trunk and E&M trunk 4-wire.
- **Subscriber Extension Kit** – provides the capability to remotely distribute voice circuits from the voice modules.
- **Subscriber Loop Kit** – provides additional 2-wire POTS analog and ISDN-BRI U digital interface cards.
- **T1 Trunk** – provides increase T1/ISDN-PRI trunk capability for the REDCOM switch.
- **TRI-TAC Interface Kit** – provides SF Trunk circuits to interface with TRI-TAC services, such as TTC-39, SB-3865 circuit switches.
- **Circuit Extension Kit** – Contains Campus Rex T1/E1, T1/E1 Fiber line driver and CV-2048 Modem.
- **Voice/Data Cable Kit** – Contains Category 5 Twisted Pair materials to make 10/100 BaseT cables (RJ11 and RJ45) with label package.
- **Small UPS Kit** – Provides protection and backup (650VA) of prime power circuits.
- **Large UPS Kit** – Provides protection and backup (1500VA) of prime power circuits.

Many of the system level and maintenance kits can be used for troubleshooting and cable repair of the STE-R Module and associated modules. These kits include:

- **Fireberd Analyzer Kit** – Contains the Fireberd 6000 and interfaces for circuit testing.
- **Cable Maintenance Kit** – Contains Fiber Optic Time Domain Reflectometer, HP Digital Average Power Meter, Cable Tester, Digital Multimeter, Oscilloscope, RS530 and Breakout Box.
- **Fiber Cable Kit** – Contains tactical 1.5 K m of fiber cable, SC/ST connectors and fiber termination tool kit.
- **Laptop Computer Kit** – Contains Laptop Computer w/ CD-ROM, Portable Ethernet Sniffer w/ software.

3.2.2 Electrical Interface (Internal

The internal electrical connections and cabling are shown in Paragraph 6.3.

3.2.3 Functional Requirements

3.2.3.1 Console

The Console port shall provide the ability to set-up locally and configure the STE-R in the STE-R Module.

3.2.3.2 Encrypted PSTN Calls

Each STE-R shall process encrypted analog calls from the BLACK voice network and provide the decrypted call to the Secure Voice Module.

3.2.3.3 Encrypted ISDN Calls

Each STE-R shall process encrypted ISDN calls from the BLACK voice network and provide the decrypted call to the Secure Voice Module.

3.2.4 Physical Characteristics

3.2.4.1 Transit Case

The module is housed in an 13 U transportable container (transit case), approximately 22.5”W. x 34.5”D. x 27”H.

The transit cases are designed to stack on top of and mechanically interlock to like cases. Transit cases with their covers in place are designed 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 weight of the STE-R Module, including all internally carried cables, does not exceed 175 pounds.

3.2.4.3 Storage Space

The module includes storage pouches 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 shall include the cables and terminators listed in Table 4, stored within the covers. Strain relief and cable management hardware are provided with the module.

Table 4 - Cables and Terminators included with STE-R Module

Function	Color Code	Quantity	Description
Power	N/R	1	IEC-320 C20 Jack to NEMA 5-15P
STE-R to SVM	N/R	8	DB-25M to DB-25M

Table 4 - Cables and Terminators included with STE-R Module

Function	Color Code	Quantity	Description
Analog	N/R	8	RJ-11Mto RJ-11M
Console	N/R	6	RJ-11 to DB-9
Harmonica	N/R	1	50 pin Telco to 12, RJ-45F's
ISDN Telco cable	N/R	1	20 ft, 50 pin Telco
ISDN RJ-45 cable	N/R	8	10 ft, RJ-45M to RJ-45M

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

Table 5 - MTBF of Major Components

Component	MTBF
STE-R	29,400 hours (estimated)

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 6.

3.2.8.1 Temperature

Temperature characteristics for the major equipment components are shown in Table 6.

Table 6 - Module Temperature Characteristics

Equipment	Temperature (degrees C)	
	Operating	Non-Operating
STE-R	0 to 40	Not Available

3.2.8.2 Relative Humidity

Relative humidity characteristics for the major equipment components are shown in Table 7.

Table 7 - Module Humidity Characteristics

Equipment	Humidity
	Non-condensing
STE-R	10 to 90%

3.2.8.3 Altitude

Altitude characteristics for the major equipment components are shown in Table 8.

Table 8 - Module Altitude Characteristics

Equipment	Altitude (feet)	
	Operating	Non-Operating
STE-R	Not Available	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 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 9. 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 9 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 9 - 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	Console				X		X
3.2.1.3	STE-R BLACK Interface				X		X
3.2.1.4	STE-R RED Interface				X		X

Table 9 - Verification Cross Reference Matrix

Paragraph	Title	Verification Method					
			PQT				
		N/R	Inspect	Analysis	Demo	Test	ATP
3.2.1.5	Configuration Options	X					
3.2.2	Electrical Interface (Internal)	X					
3.2.3	Functional Requirements	X					
3.2.3.1	Console				X		X
3.2.3.2	Encrypted PSTN Calls				X		X
3.2.3.3	Encrypted ISDN Calls				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 Preventative Maintenance [MTBPM]			X			
3.2.8	Environmental Conditions	X					
3.2.8.1	Temperature					X	
3.2.8.2	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 10 - Equipment Listing

Device	Manufacturer	Part Number	Description	Quantity
STE-R	L-3	STE-R (ISDN/ PSTN)	Remote controllable secure voice/ data terminal	6
Power Conditioner	Marway	411355	Power Conditioner	2
Transit Case	ECS Composites	11245	13 U Transit Cases	1
Cable (W1-W8)	TBD	TBD	RJ11 to RJ11	8
Cable (W9-W16)	TBD	TBD	RJ45 to RJ45	8
Cable (W17-W22)	TBD	L3	DB9 to RJ11	6
Cable (W33-W38)	TBD	TBD	STE-R to STE-R Power Supply	6
Cable (W41-W48)	TBD	TBD	STE-R to Power Conditioner	8
Cable (W25-W32)	TBD	TBD	DB25F to DB25M and RJ-8	8
P1-P8	TBD	TBD	STE-R to SUM Sep 10 Foot (stored in pouch)	8

6.2 Elevation Drawings

Figure 2 shows the front elevation of the Secure Terminal Equipment - R Module. Six STE-Rs are supplied but there is wiring for 8 STE-Rs. The optional STE-Rs are shown in dashed lines in the drawing and are shown in positions 7 and 8.

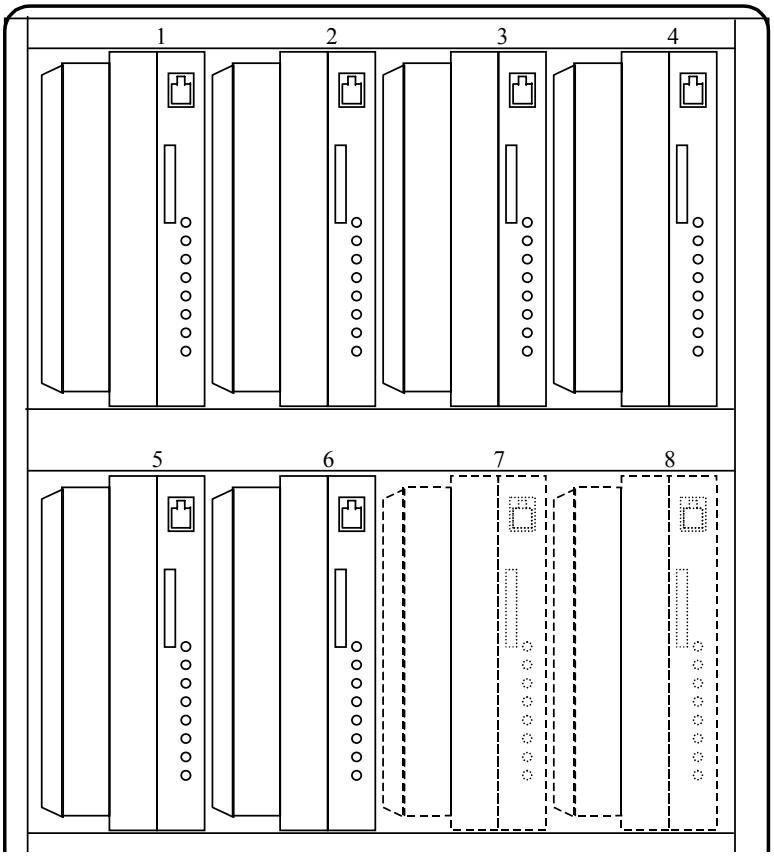


Figure 2 - Front Elevation

Figure 3 shows the rear elevation of the Secure Terminal Equipment - R Module. The PSTN connectors are RJ-11s and the ISDN connectors are RJ-45s.

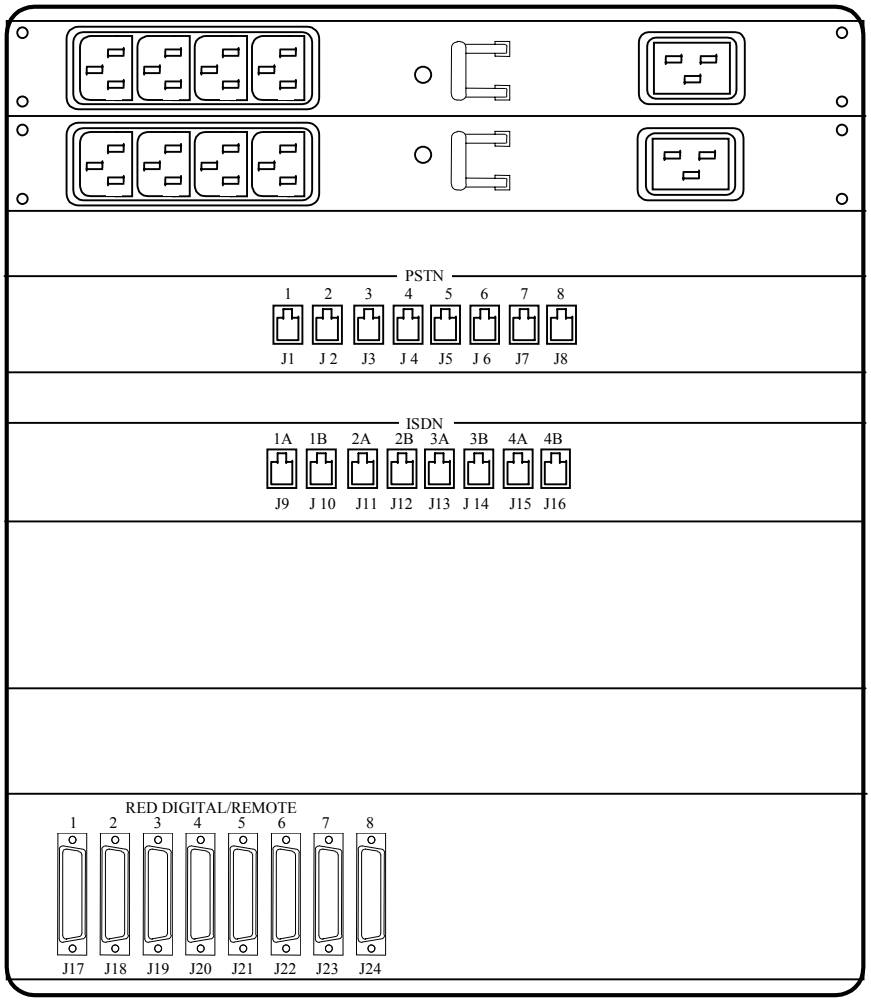


Figure 3 - Rear Elevation

6.3 Cable Drawings

Table 11 - Internal Cable Listing

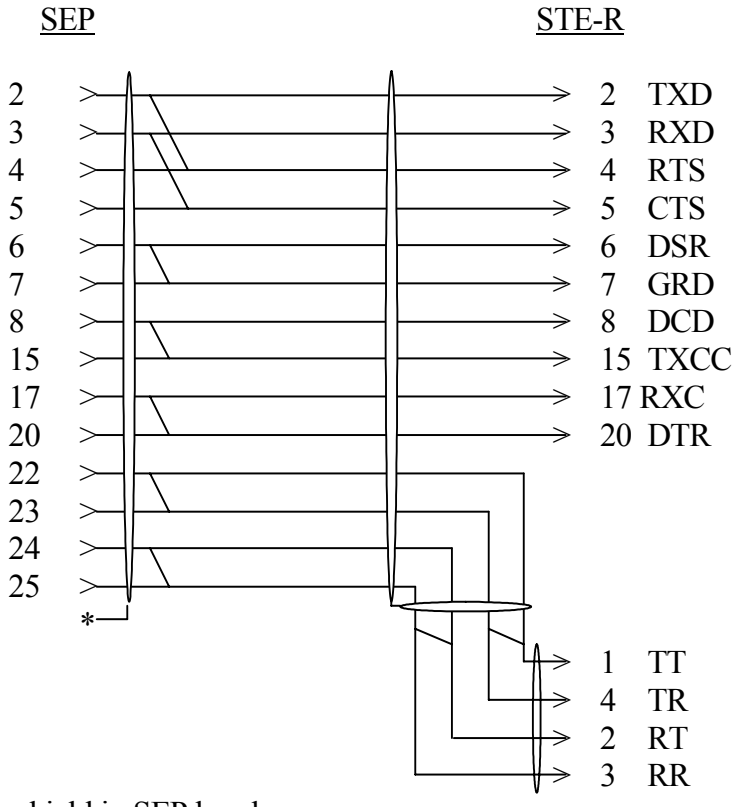
Wire Number	Part Number	Manufacturer	Description
W1 – W8	TBD	TBD	RJ-11 to RJ-11
W9 –W16	TBD	TBD	RJ-45 to RJ-45
W17 – W22			DB-9 to RJ-11 (Supplied as part of STE-R)

Table 11 - Internal Cable Listing

Wire Number	Part Number	Manufacturer	Description
W25 – W32		Many	DB-25F to DB-25M and RJ-8
W33 – W38 W39, W40 for STE's 7 and 8	TBD	L3	STE-R power supply to STE-R (supplied as part of STE-R)
W41 – W48			STE-R to Power Conditioner
P1 – P8	TBD	TBD	STE-R Sep to SVM Sep

STE-R MODULE – W25/W32 (SEP/STE-R)

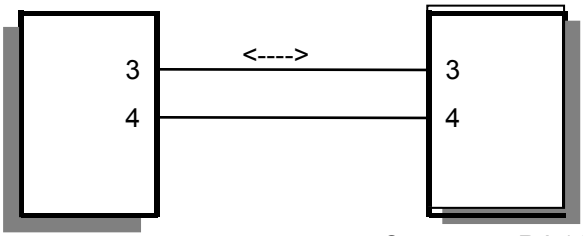
SIGNAL ENTRY PANEL	CABLE	STE-R
Connector, DB25S: DB25P:	7 pair, 28 AWG stranded,	Connector,
	2 pair, 28 AWG stranded, foil & braid shield, A/R feet	Connector, RJ-8:



* Drain shield in SEP hood

STE-R Cables W1 - W8 (STE-R / Entry Panel PSTN Cable)

Cable: 1-pair, 24 AWG

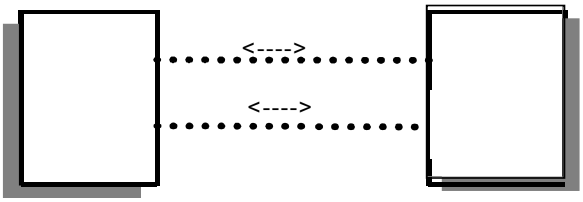


Connector: RJ-11 plug

Connector: 1 mounting space, 8 position WE2W (RJ-11)

Cable W9 - W16 (STE-R to Entry Panel ISDN Cable)

Cable: 2-pair, 24 AWG



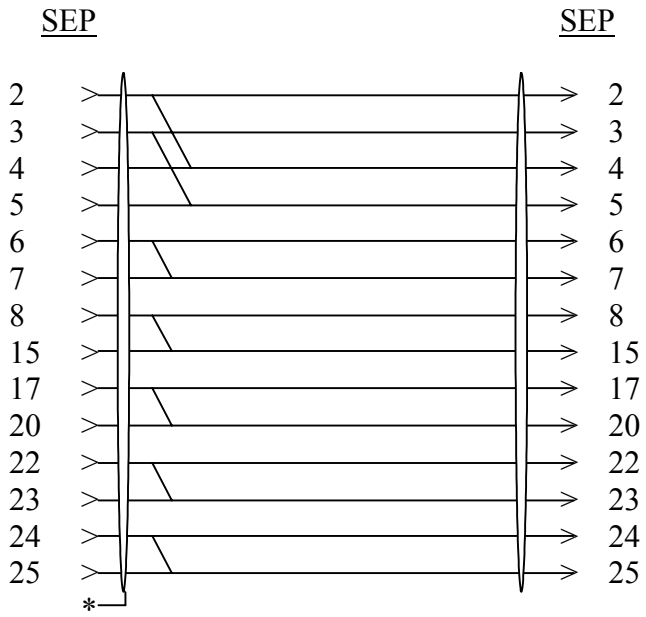
Connector: RJ-45 plug

Connector: 1 mounting space, 8 position WE4W (RJ-45)

Pinouts TBSL

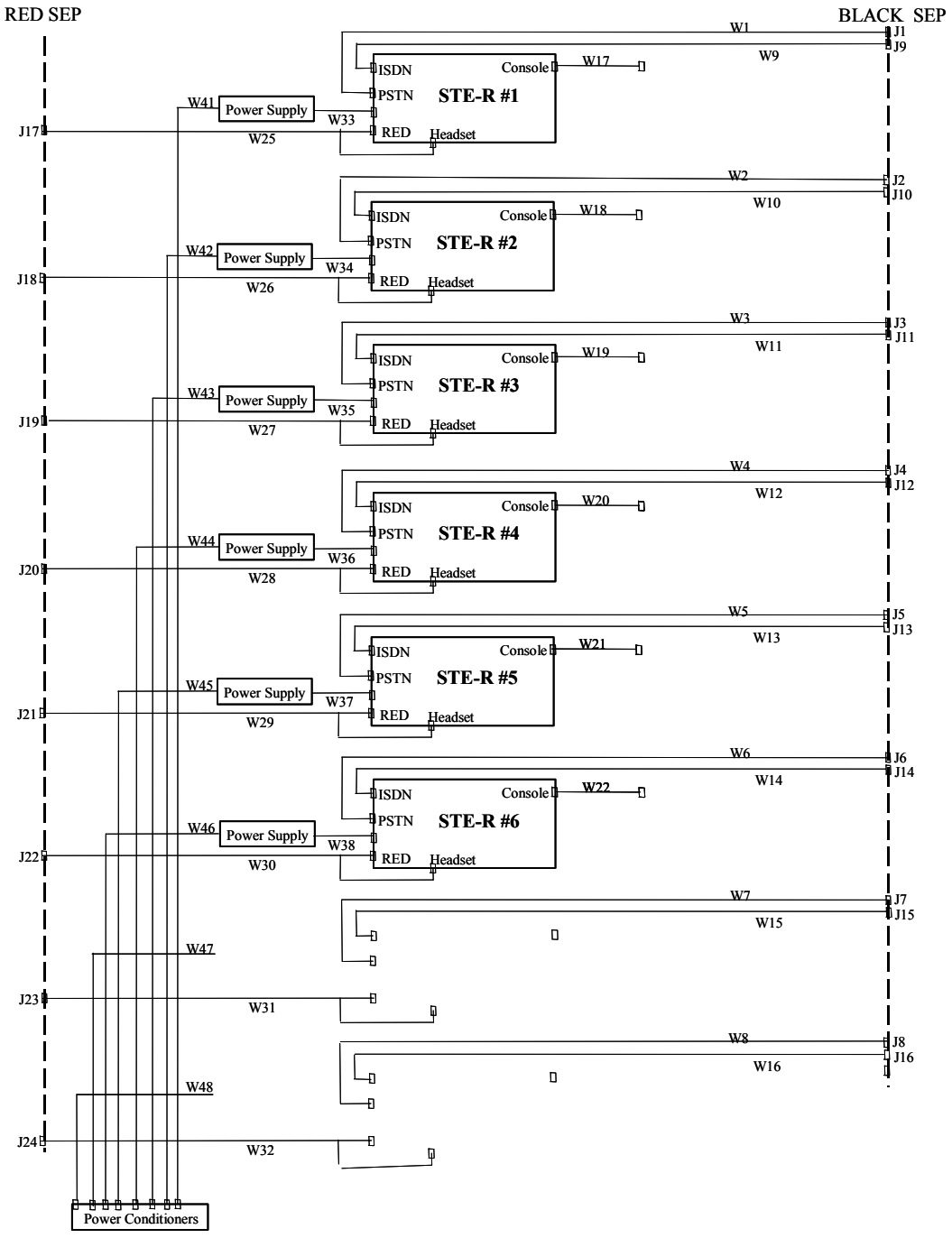
P1-P8 (STE-R SEP/SVM SEP)

SEP	CABLE	SEP
Connector, DB25P:	7 pair, 28 AWG stranded	Connector,DB25P:



* Drain shield in SEP hood.

6.4 Interconnection Diagrams



Note: STE-Rs 7 and 8 with Power Supplies are not supplied as part of the initial configuration