

GDC 010R340-000
Issue 16, February 1997

Installation and Operation

DataComm 10¹/₂ Inch

DC-to-DC Shelf
Model DS-5



General DataComm

Warning

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. The user is cautioned that any changes or modifications not expressly approved by General DataComm void the user's authority to operate the equipment.

This digital apparatus does not exceed Class A limits for radio noise emissions from digital apparatus described in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Warranty

General DataComm warrants that its equipment is free from defects in materials and workmanship. The warranty period is one year from the date of shipment. GDC's sole obligation under its warranty is limited to the repair or replacement of the defective equipment provided it is returned to GDC, transportation prepaid, within a reasonable period. This warranty will not extend to equipment subjected to accident, misuse, or alterations or repair not made by GDC or authorized by GDC in writing. *The foregoing warranty is exclusive and in lieu of all other warranties, express or implied, including but not limited to, warranties of merchantability and fitness for purpose.*

Trademarks and Patents

General DataComm, the General DataComm logo and the following are trademarks of General DataComm, Inc in the United States and other countries: ACCULINE, ANALOOP, AUTOFRAME, BERT 901, DATACOMM SECURE-PAK, DATALOOP, DIGIDIAL, ENmacs, FASTPRO, FIRST RESPONSE, GDC, GDC APEX, GENERAL DATACOMM X-PRESS, GEN*NET, GEN*PAC, IMAGE*TMS, KILOMUX, LAN*TMS, MEGA*BRIDGE, MEGAMUX, MEGAMUX TMS, MEGANET, MEGASPLIT, MEGASWITCH, MEGAVIEW, NETCON, NETSWITCH, NMC, QUIKSHIPPERS, SERVI-CHECK, SERVI-SNAP, WINmacs.

ANALOOP and DATALOOP respectively are protected by U.S. patents 3,655,915 and 3,769,454. All other products or services mentioned in this document are identified by the trademarks, service marks, or product names as designated by the companies who market those products. Inquiries concerning such trademarks should be made directly to those companies.

Copyright

© 1995 General DataComm, Inc. All rights reserved.
P.O. Box 1299, Middlebury, Connecticut 06762-1299 U.S.A.

This publication and the software it describes contain proprietary and confidential information. No part of this document may be copied, photocopied, reproduced, translated or reduced to any electronic or machine-readable format without prior written permission of General Datacomm, Inc.

The information in this document is subject to change without notice. General DataComm assumes no responsibility for any damages arising from the use of this document, including but not limited to, lost revenue, lost data, claims by third parties, or other damages. If you have comments or suggestions concerning this manual, please write to Technical Publications or call 1-203-758-1811.



**Errata Sheet
for
Instruction Manual
10-1/2" Shelf
DS-5 DC-to-DC
Publication 010R340-000, Issue 16**

Overview

This publication reflects changes to the Instruction manual for the 10-1/2" Shelf, DS-5 DC-to-DC.

Preface - Replace or add Canadian Warning, and add new service and support information:

Industry Canada Notification

The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operation and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Notice: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

Electromagnetic Compatibility

This Class A digital apparatus complies with Canadian ICES-003.

Avis D'industrie Canada

L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement: L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

Avis: L'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5.

La Compatibilité d'Électro-magnétique

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Service Support and Training

VITAL Network Services, a General DataComm company, is committed to providing the service support and training needed to install, manage, and maintain your GDC equipment. GDC's VITAL Network Services provides hands-on training courses through **VITAL Network Services Global Technology Training Services**. Courses range from basic data communications, modems and multiplexers, to complex network and ATM systems. Training courses are available at our centers in the US, UK, France, Singapore and Mexico, as well as at a customer's site.

For more information regarding GDC's VITAL Network Services' service programs, training courses, or for assistance with your support requirements, contact GDC's VITAL Network Services at the address or phone number listed below, or visit our website at: <http://www.vital-netsvc.com>

VITAL Network Services World Headquarters

6 Rubber Avenue
Naugatuck, Connecticut 06770 USA

North America: 1 800 243 1030
1 888 248 4825
1 203 729 2461
Training Information: 1 203 729 0271
French Speaking Canada: 1 800 361 2552
North America Fax: 1 203 723 5012
1 203 729 7611

VITAL Network Services Regional Sales and Service Offices:

Europe, Middle East, Africa

VITAL Network Services
Molly Millars Close
Molly Millars Lane
Wokingham, Berkshire RG41 2QF UK

Telephone: +44 1189 657200
Training: +44 1189 657240
Fax: +44 1189 657279

Central America, Latin America

VITAL Network Services
Periferico Sur 4225, Desp. 306
C.P. 14210, Mexico D.F., Mexico

Telephone: +52 5 645 2238
Training: +52 5 645 2238
Fax: +52 5 645 5976

Asia Pacific

VITAL Network Services
501 Orchard Road 05-05
Wheelock Place, Singapore 238880

Telephone: +65 735 2123
Training: +65 735 2123
Fax: +65 735 6889

International Calling Code (+)

When calling from outside the country of origin, use the appropriate International Calling Code where the + symbol is shown.

July 1998

Table of Contents

Preface

1 System Description

Overview.....	1-1
Description.....	1-1
Features.....	1-2
Applications.....	1-2

2 Installation

Overview.....	2-1
Unpacking and Handling.....	2-1
Modem Compatibility.....	2-1
Installation Procedures.....	2-1
Switched Network Telephone Line Connections.....	2-2
Determining Transmit Output Level and Compatible Data Jack Type.....	2-2
Switched Network Programmable-Permissive Cable Arrangements.....	2-2
Switched Network Data Auxiliary Set Connections.....	2-3
Private Line Cable Arrangements.....	2-3
Plug-In Modem Installation.....	2-11
Plug-In Power Supply Installation.....	2-11
Business Equipment Interface Connections.....	2-11
Redundant Battery Systems with Common Positive Terminals.....	2-13
External Alarm Connections.....	2-13

3 Operation

Front Panel Switches, Indicators, and Test Points.....	3-1
Rear Panel Connectors.....	3-2
Fuse Replacement.....	3-4

A Technical Characteristics

Index

Figures

2-1	Switched Network Answer-Originate Configuration (Using M13F Cable to Connect to Telephone or ACU).....	2-4
2-2	Switched Network Answer-Originate Configuration (Using Y Cable Connections to ACU and Line).....	2-5
2-3	Switched Network Configuration without Telephone.....	2-6
2-4	Programmable-Permissive Option Jumper Arrangement (In the Modems used in the Shelf).....	2-7
2-5	Shelf Terminal Strip, Modular Jack, and Harness Card Dual 8-Pin PC Card Edge-Connector Wiring Diagram.....	2-8
2-6	Private Line Connections to 828 or 829 DAS and Alternative Connection from Terminal Strip.....	2-9
2-7	Private Line Connection to 828 or 829 DAS.....	2-10
2-8	Front View of Shelf Showing Slot Locations.....	2-12
2-9	Station Battery Connections.....	2-14
2-10	Share Cable with Connectors (DPS-7).....	2-15
2-11	Share Cable without Connectors (DPS-7).....	2-15
2-12	DPS-7A Share Function Option Selection.....	2-16
2-13	Alarm Cable Assembly (Optional).....	2-17
3-1	DPS-7A Power Supply Front Panel.....	3-0
3-2	DPS-7 Power Supply Front Panel.....	3-1
3-3	Shelf Rear Panel Connections.....	3-2
3-4	DPS-7 and DPS-7A Power Supplies Rear Panel Connectors.....	3-3

Tables

1-1	DC-to-DC Shelf Equipment List.....	1-3
-----	------------------------------------	-----

Preface

Scope

This manual describes how to install

Organization

This manual has three chapters and appendix. The information is arranged as follows:

- *Chapter 1 - System Description* introduces important concepts and features of the DataComm 10¹/₂ Inch Shelf.
- *Chapter 2 - Installation Procedures* tells you how to install the DataComm 10¹/₂ Inch Shelf.
- *Chapter 3 - Operation* describes the front panel of the DataComm 10¹/₂ Inch Shelf.
- *Appendix A-* describes the technical specifications of the unit.

Document Conventions

Level 1 paragraph headers introduce major topics.

Level 2 paragraph headers introduce subsections of major topics.

Level 3 paragraph headers introduce subsections of secondary topics.

This typewriter font shows output that is displayed on the screen.

This bold font shows specific input that you type at the keyboard.

This bold italicized font shows variable input that you type at the keyboard.



Notes present special instructions, helpful hints or general rules.

GDC publication numbers (e.g., *GDC 032R163-000*) are used to track and order technical manuals. Publication numbers use the following format:

GDC NNNRnnn-000 or **GDC NNNRnnn-Vnnn**

NNN	identifies the product family (e.g. APEX)
R	denotes a technical publication
nnn	a number assigned by Technical Publications
000	identifies a hardware product and does not change
Vnnn	the software version associated with a product may be updated periodically

The Issue Number on the title page only changes when a hardware manual is revised or when a manual is reprinted for some other reason; it does not automatically change

when the software is updated. A new Software Version is always Issue 1. Other specialized publications such as Release Notes or Addenda may be available depending on the product.

Service and Support

General DataComm is committed to providing the service and support needed to install, manage, and maintain your equipment. For information about service programs or for assistance with your support requirements, contact your local Sales Representative or call General DataComm Service at the 24-hour toll free number listed below.

- *in the U.S. dial* **1-800-243-1030**
- *outside the U.S. dial* **1-203-598-7526**

Be ready with the site name and phone number and a description of the problem and the next available support representative will promptly return your call.

Hands-on training courses are provided by General DataComm Service Educational Services. Courses range from basic data communications, modems and multiplexers, to complex network and ATM systems and are taught in Connecticut or at a customer location. Call 1-800-242-1030 and follow the menu instructions to discuss educational services or to receive a course schedule.

Safety Instructions

Antistatic Precautions

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. Electrostatic discharge occurs when a person whose body contains a static buildup touches a computer component.

The equipment may contain static-sensitive devices that are easily damaged and proper handling and grounding is essential. Use ESD precautionary measures when installing parts or cards and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic floor pads and workbench pads.

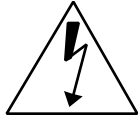
When handling components, or when setting switch options, always use an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, such as a screwdriver or a paper clip, to set switches.

Safety Guidelines

The following symbols are used when unsafe conditions exist or when potentially hazardous voltages are present:



Caution statements identify conditions or practices that can result in damage to the equipment or in loss of data.



Warning statements identify conditions or practices that can result in personal injury or loss of life.

Always use caution and common sense. *To reduce the risk of electrical shock, do not operate any equipment with the cover removed.* Repairs must be performed by qualified service personnel only.

- Never install telephone jacks in a wet location unless the jack is designed for that location.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- Use caution when installing telephone lines and never install telephone wiring during an electrical storm.

Regulatory Notices

FCC Part 68 Compliance

Connection of data communications equipment to the public telephone network is regulated by FCC Rules and Regulations. This equipment complies with Part 68 of these regulations which require all of the following:

This device cannot be used on public coin service or party lines. Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.. The device has a label that along with other information, provides the FCC Registration number and the Ringer Equivalence Number (REN) if applicable. If requested, give this information to the telephone company.

If the device connects to the switched network, the REN must not exceed 5.0 on any one line. To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local phone company.

For single or multi-line equipment that connects to the telephone network via a plug and jack, the plug and jack must comply with the FCC Part 68 rules. An FCC compliant telephone modular plug and telephone cord is provided with this equipment. This device is designed to be connected to the telephone network or premises wiring, using a compatible modular jack which is Part 68 compliant. See installation chapter for details.

If the unit causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, you will be notified as soon as possible and will be advised of your right to file a complaint with the FCC. The telephone company may change its communication facilities, equipment, operations and procedures where reasonably required for operation. If so, the telephone company will notify you in writing. You must notify the telephone company before disconnecting equipment from 1.544 Mbps digital service. All repairs or modifications to the equipment must be performed by General DataComm or listed authorized agent. Any other repair or modification by a user voids the FCC registration and the warranty.

Canada DOC Notification

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. *Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.*

Bundesrepublik Deutschland

Installations Anweisungen: Installieren Sie die Telefonleitungen nicht während eines Gewitters. Installieren Sie die Telefonleitungen nicht in einem feuchten Raum, außer die Dose entspricht den Vorschriften für Feuchträume. Berühren Sie unisolierte Telefonleitungen oder Einrichtungen nicht, außer diese sind vom Telefonnetz getrennt. Vorsicht bei der Installation oder Änderung von Telefonleitungen. Achtung: Es gibt keine durch den Benutzer zu wartende Teile im Gerät. Wartung darf nur durch qualifiziertes Personal erfolgen.

Glossary of Terms

Automatic Calling Unit (ACU)

A unit that automatically dials calls based on digits supplied by the attached business machine. It is used to implement polling techniques by using the public telephone network.

Brownout Protection

Protection of the supply and external loads from an excessive reduction in input voltage.

Current Limiting

A current overload protection mechanism that limits the maximum output current to a preset value for conditions of load resistance or short circuit.

DataCommonality

General DataComm's term to describe a unique packaging technique that provides (1) high density modular packaging, (2) a broad array of versatile data sets and accessories, (3) system flexibility and ease of expansion, (4) low power consumption, (5) heat dissipation, (6) quick and simple installation, (7) at-a-glance monitoring of system operation, (8) convenient, low-cost maintenance, and (9) high reliability.

Data Communications Equipment (DCE)

Equipment that provides the signal conversion, connection control, and coding required for communication between data terminal equipment and data circuits; may be independent (e.g., a modem) or an integral part of a computer.

Data Terminal Equipment (DTE)

Generally end-user devices, such as terminals and computers that connect to DCE, which either generate or receive the data carried by the network; in RS-232-C and EIA-232-D connections, designation as either DTE or DCE determines signaling role in handshaking; in a CCITT X.25 interface, the device or equipment that manages the interface at the user premises.

Dropout Voltage

The decreased input voltage at which the supply (or regulator) ceases to regulate the output for further decreases in input voltage.

EIA

Electronic Industries Association.

EIA-232-D

An EIA-specified physical interface, with associated electrical signaling, between data circuit-terminating equipment (DCE) and data terminal equipment (DTE); the most commonly employed interface between computers and modems.

Four-Wire Circuit

Provision of two-wire pairs (or logical equivalent) for simultaneous two-way transmission.

Ground

An electrical connection or common conductor that, at some point, connects to the earth.

Interface

A shared boundary; a physical point of demarcation between two devices, where the electrical signals, connectors, timing, and handshaking are defined; the procedure, codes, and protocols that enable two entities to interact for the meaningful exchange of information.

Line Regulation

Refers to the maximum change in output voltage (or current) resulting from changes in input (line) voltage, normally specified from minimum input voltage to maximum input voltage.

Load Regulation

Refers to the maximum change in output voltage (or current) resulting from changes in load resistance (load), normally specified from no load to full load.

Overvoltage Protection

Protection of the supply and externally connected loads against excessive output voltage, either from internal or external causes.

Permissive (PE) Arrangement

A connection arrangement used to connect FCC registered equipment to the DDD network. This arrangement utilizes the type USOC RJ11C jack. The output signal level of the communications equipment is fixed at a maximum of -9 dBm. An assumption that at least 3 dB signal loss will occur on the local loop ensures that the signal won't arrive at the central office at more than the maximum allowable level of -12 dBm.

Private Line

A leased line, an unswitched circuit.

Programmable (PR) Arrangement

A connection arrangement used to connect FCC registered equipment to the DDD network, employing either of two telephone company supplied data jacks: programmable or universal. The telephone company measures signal loss over the local loop between the subscriber's site and the central office. A "programming" resistor is selected and installed in the data jack to enable the communication equipment to transmit at a level that delivers the maximum -12 dBm signal at the central office.

Redundancy

The employment of several devices, each performing the same function, in order to improve the reliability of a particular function.

Regulated Power Supply

A unit that maintains a constant voltage or current for changes in line voltage, output load, ambient temperature, or time.

RS-232-C

An EIA-specified physical interface. *See* EIA-232-D.

Share Function

The share function forces two power supply modules to “share” equally in supplying the load.

Short Circuit Protection

Any automatic current limiting that enables the supply to continue operating, without damage, when a short circuit is applied across the output terminals.

Station Battery

A separate battery power source within a facility that provides all dc input power requirements associated with the facility. Such a capability is often centrally located.

Switched Network

Communications link for which the physical path, established by dialing, may vary with each use (e.g., a dial-up telephone circuit).

Terminal

A point in a network at which data can either enter or leave; a device, usually equipped with a keyboard, often with a display, capable of sending and receiving data over a communications link (IBM); generically the same as data terminal equipment (DTE).

Two-Wire Circuit

Usually a telephone circuit consisting of two insulated electrical conductors, typical of most local loops.

1 System Description

Overview

This manual provides instructions for the DataComm 10 1/2-Inch DC-to-DC (dc powered) Modem Shelf, Model DS-5. The shelf's power supply module(s) converts -48 V dc station battery power to +12 V dc and distributes it to each modem installed in the shelf.

The 10 1/2-Inch DC-to-DC Modem Shelf, hereafter called the Shelf, is part of the GDC DataComm product line wherein the same printed circuit (pc) card plug-in modem or device can be used interchangeably (except for possible strap changes) in the Shelf or in the Standalone Enclosure. All modems in our product family use a standard pc card size and front panel format, and have standardized edge connectors that carry the signals required for the business equipment interface, telephone line interface, auxiliary telephone set interface, and power.

All our plug-ins are compatible with the shelf power supply and can be operated completely independent of each other because the only busing between card slots is for low-voltage +12 V dc power. The same plug-in modems are also compatible with our ac-powered shelves. The shelf will accommodate up to 16 switched network and private line modems and other plug-ins in any mix or combination.

Description

The DS-5 Shelf contains the following connectors (16 of each):

- 25-pin EIA female hybrid business equipment connectors
- 25-pin male hybrid telephone/line connectors (AUX)
- 6-position switched network/private line terminal strip (SN/PL)
- 8-pin keyed modular switched network line jack which may be used in private line service (this use is not presently an industry standard).

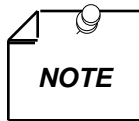
The Shelf power supply is a modular plug-in which provides isolated regulated output voltages of +12 V dc, in redundancy with a second optional and identical plug-in power supply with a separate battery input, from a nominal battery voltage of -48 V dc. The plug-in power supply module(s) pc card mounts vertically in specially provided slots in the Shelf.

See *GDC Publication No. 041R171-000, DPS-7A Instruction Manual*, for information on the DPS-7A Power Supply.

The two 25-pin hybrid connectors provide the interface between two sets of card edge-connector fingers, the business equipment, telephone set, and line connectors. The hybrid connectors accept modem pc card edge connectors on one end and provide a male or female 25-pin connector on the other end. The connectors mount in cutouts on the metal backplane of the Shelf and no intermediate harness card or wiring is required. The same hybrid connectors are also used in the Standalone Enclosure.

A third set of pc card edge fingers is used only in the Shelf. These are used for power and telephone line leads. These fingers plug into a dual nine-pin connector on the Shelf harness card. Telephone line leads go to both a six-position switched network/private line terminal block and eight-pin keyed modular switched network telephone line jack on the harness card. A protective cover is provided to cover all of the terminal blocks.

The dual 9-pin card-edge connectors have two pins (6 and 15) tied together to allow a plug-in card to sense that it is in a Shelf and not a standalone enclosure.



Modems in the GDC DataComm product family have, as applicable, an eight-pin keyed modular telephone line jack, an eight-pin keyed auxiliary telephone jack, and a six position private line terminal strip on the pc card. These are accessible only when used in the standalone configuration; they are not accessible when the modem is placed in the Shelf.

Technical characteristics of the DataComm 10 1/2-inch DC-to-DC Shelf are given in Appendix A. Table 1-1 is the equipment list for the Shelf.

Features

- Operates from –48 V dc redundant or non redundant station battery power source
- Accepts up to 16 data sets in single shelf assembly to provide high package density for central site installations
- Offers a choice of interface connections to handle a complete range of domestic and international applications
- Supports a wide variety of rackmount DataComm data set products

Applications

Provision has been made in the Shelf for either one or two power supply modules. One supply is all that is needed to power a Shelf with a full complement of 16 modems. The second supply is redundant and provides protection against power supply failure. When the second supply is connected to a separate station battery, protection is provided for either loss of battery feed or a power supply failure. When two plug-in power supplies are installed in a redundant configuration and power is turned on and off in one power supply, the output voltage is not affected.

The power supply compartment can hold one or two vertically stacked DPS-7 or DPS-7A Power Supply modules. Each module plugs in from the front of the Shelf. The front panel on each supply has a Power On/Off switch, an Alarm Norm/Disable switch, a 7-amp fuse, battery input and power supply output test points, and an LED status indicator. Directly behind the power supply compartment is the power supply harness card containing a six-position terminal strip for connecting the station battery or batteries and two 7-pin external alarm Berg headers for each power supply. The power supply harness card and the Shelf harness card are wired together to distribute the +12 V dc from the power supply to each of the 16 modem slots.

Table 1-1 DC-TO-DC Shelf Equipment List

Item No.	Item	GDC Part No.	Description
1	DC-to-DC Shelf Assembly, Redundant	010M011-001	48 V dc powered Shelf with two DPS-7A Power Supply modules.
2	DC-to-DC Shelf Assembly, Non redundant	010M011-002	48 V dc powered Shelf with one DPS-7A Power Supply module.
3	Consists of: Shelf Assembly	010B039-001	Empty Shelf assembly. Can hold up to 16 single-card modems and either one or two DPS-7A Power Supply modules.
4	DPS-7A Power Supply	041P023-002*	-48 V dc to ± 12 V dc power supply. Powers up to 16 modems. Two DPS-7A Power Supplies can be installed for redundant operation.
5	Blank card	010C040-001	Used to fill vacant slot in non-redundant configuration (Item 2).
6	Alarm cable assembly (optional)	041H003-004 (4 Foot Cable)	Used for connection to power supply alarm bus.
		041H003-010 (10 Foot Cable)	
8	Adapter Kit for 23" Equipment Rack	010D360-001	Two are required.
9	DC-to-DC Split Shelf Assembly	S-010M013-001	48 V dc powered shelf with two DPS-7A power supply modules. Configured for redundant battery operation.
*DPS-7A replaces DPS-7 power supplies, part numbers 041P021-001 and 041P022-001. All three are interchangeable.			

2 Installation

Overview

This chapter guides you through the process of installing and using the DataComm 10¹/₂-Inch DC-to-DC Modem Shelf, Model DS-5 in your communications network. If this is your first experience using these units you may wish to review *Chapter 1 — System Description* to ensure that you understand the key features and the process of installing and using the unit in your network.

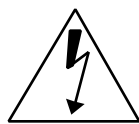
Unpacking and Handling

Inspect the shelf for damage and verify that the shipment agrees with the shipping list. Retain the shipping list for reference or reordering. If any damage or shortage is observed, notify the shipper immediately. Do not discard shipping containers or packing material. Retain for transporting or reshipping the unit.

Modem Compatibility

All DataComm products that can operate in ac-powered DataComm shelves can also operate in the DataComm 48-volt dc-to-dc shelf, Model DS-5, **except** the following DataComm type products: Models 201-8, 1209, FLM 2447, FLM 2447E, NMS 2020 and 2030. These products are incompatible with the DS-5 DC-to-DC shelf and cannot be modified or strapped in the field for compatibility. Use these products **only** in ac-powered shelves and standalone enclosures.

All other DataComm products that can operate in DataComm ac-powered shelves and standalone enclosures can operate in the DS-5 DC-to-DC shelf without modification or strapping changes. However, strapping changes are required on the following products before insertion in either ac-powered shelves and enclosures or the dc-powered DS-5 shelf: Models 103J, 113C, 113D, 108-3M, 201-7, 2426P, 201C, 201C w/RDL, 201C-K, 2426S, 202T, 202S/T, and 2400ASM. These products must be specifically strapped before installation for use in either ac or dc powered shelves or standalone enclosures. Strapping information will appear in the latest issues of these products' manuals.



Early versions of the above modems do not have straps (Berg jumpers) and can only be used in ac-powered shelves and standalone enclosures.

Installation Procedures

Install the Shelf in a reasonably well-ventilated location. Do not locate the unit directly above other equipment generating large quantities of heat. The ambient temperature should not exceed 131°F.

The Shelf assembly is designed to be installed in a standard 19-inch-wide equipment rack and secured with available hardware through eight slotted holes in the flanges at the front

edges of the Shelf assembly. An adapter kit (010J015-001) is also available for mounting at the center of balance on the sides, approximately halfway to the rear of the Shelf.

Each plug-in card contains an option jumper plug that connects signal ground and chassis ground together (common) or isolates them through a 100-ohm resistor (separate). If one plug-in is optioned for common signal and chassis grounds because of the common chassis ground buses on the Shelf harness card, all plug-ins will have the signal and chassis grounds tied together.

Switched Network Telephone Line Connections

Shelves containing FCC-registered modems may be directly connected to the switched network with appropriate FCC-registered cables.

Determining Transmit Output Level and Compatible Data Jack Type

The USOC-designated jacks applicable to the Shelf are the six-pin and eight-pin miniature type for individual modem-to-data jack connections. (The eight-pin data jack also accepts an otherwise conforming six-pin plug from data equipment so designed.) The jacks are available with level-setting resistors of varying value to accommodate the loss differences of premises-to-central office telephone lines. Typical modem output signal levels are:

- Set to -9 dBm (Permissive).
- Controlled by means of a resistor located in the telephone-company-provided data jack box (Programmed); set by telephone company installer within a range of 0 to -12 dBm.

Programmed Output — The Programmed output presents the optimum arrangement since it takes full advantage of the given central office connection. The value of the external “programming” resistor in the data jack box is determined by the loss of the loop facility according to a set of resistor values agreed upon by the industry. The resistor value is selected and installed at the time of installation by telephone company personnel.

It should be noted that the programming resistor terminals in telephone company data jacks (e.g., terminals 7 and 8 in standard telephone company data jacks) must be connected to the transmitter-attenuator programming terminals, PR and PE, of the associated modem. This connection is made through the appropriate cable provided with each modem or with the Shelf.

Permissive Output — The Permissive configuration may be used in any application where the output signal level cannot be optimized. In this configuration, the output of the modem is set by a resistor in the modem so as not to exceed -9 dBm. This level represents a calculated median which, for the majority of installations, will produce a usable signal below the region where distortion occurs at the central office.

Switched Network Programmable-Permissive Cable Arrangements

FCC regulations expressly prohibit the changing of modem configuration by any other than the telephone company or a duly authorized agent, as specified in Part 68 of the FCC rules.

Figures 2-1 through 2-3 identify the various recommended configurations and the Programmable and Permissive cables and Shelf connectors for interconnecting plug-in modems to the switched network and, if used, to the auxiliary telephones and ACUs. The PE position of the modem PR-PE option jumper selects the Permissive resistor on the modem pc card. *Figure 2-4* shows the option jumper arrangement on all switched network modems designed to plug into the Shelf.

For all Permissive cables without a built-in Permissive resistor, the modem PR-PE option jumper must be placed in the PE position to connect the modem's Permissive resistor to its transmit level-setting circuit. When a six-pin Permissive plug-terminated cable is used, it is centered in the eight-pin keyed modular jack.

When the Programmable arrangement is used, Programmable cables are supplied with the modems and the PR-PE option jumper must be placed in the PR position to connect the modem to the resistor in the data jack.

Figure 2-5 is a wiring diagram showing the interconnections between the harness card, the terminal strips, and the eight-pin keyed modular jacks.

Switched Network Data Auxiliary Set Connections

The Shelf assembly may be used with these telephone sets in switched network operation: 564, 565, 2565, 569, or AE-186-type telephones, as well as an 801-type automatic calling unit. Applicability of the above devices is dependent on the modem installation. Connect the auxiliary telephones to the 25-pin telephone-line connectors on the Shelf rear panel with the cables supplied, as shown in *Figure 2-1*. If an 801-type ACU is used, connect it as shown in *Figure 2-2*.

If no telephone is used, connect the Shelf connector to the switched network as shown in *Figure 2-3*.

Private Line Cable Arrangements

Three methods for connecting private line modems are shown in *Figures 2-6 and 2-7*. Connections can be made to an 828- or 829-type of DAS (Data Auxiliary Set) and/or private lines using M8K, M8KL, or D25S cables. The M8K and M8KL cables can be used only if the modem provides signals on the 25-pin telephone-line connectors. See the Operating and Installation manual supplied with the modem.

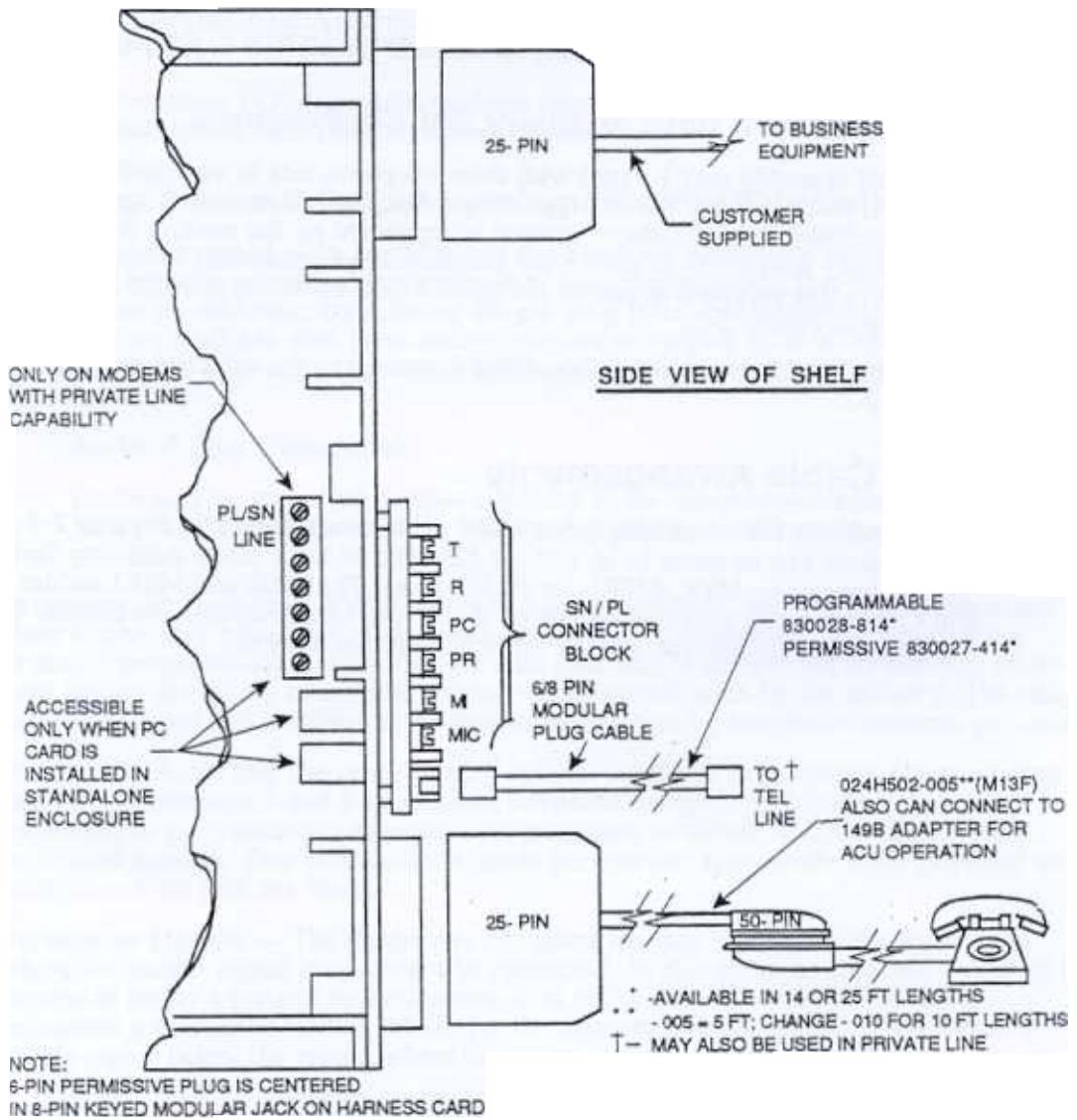


Figure 2-1 Switched Network Answer-Originate Configuration using M13F Cable to Connect to Telephone or ACU

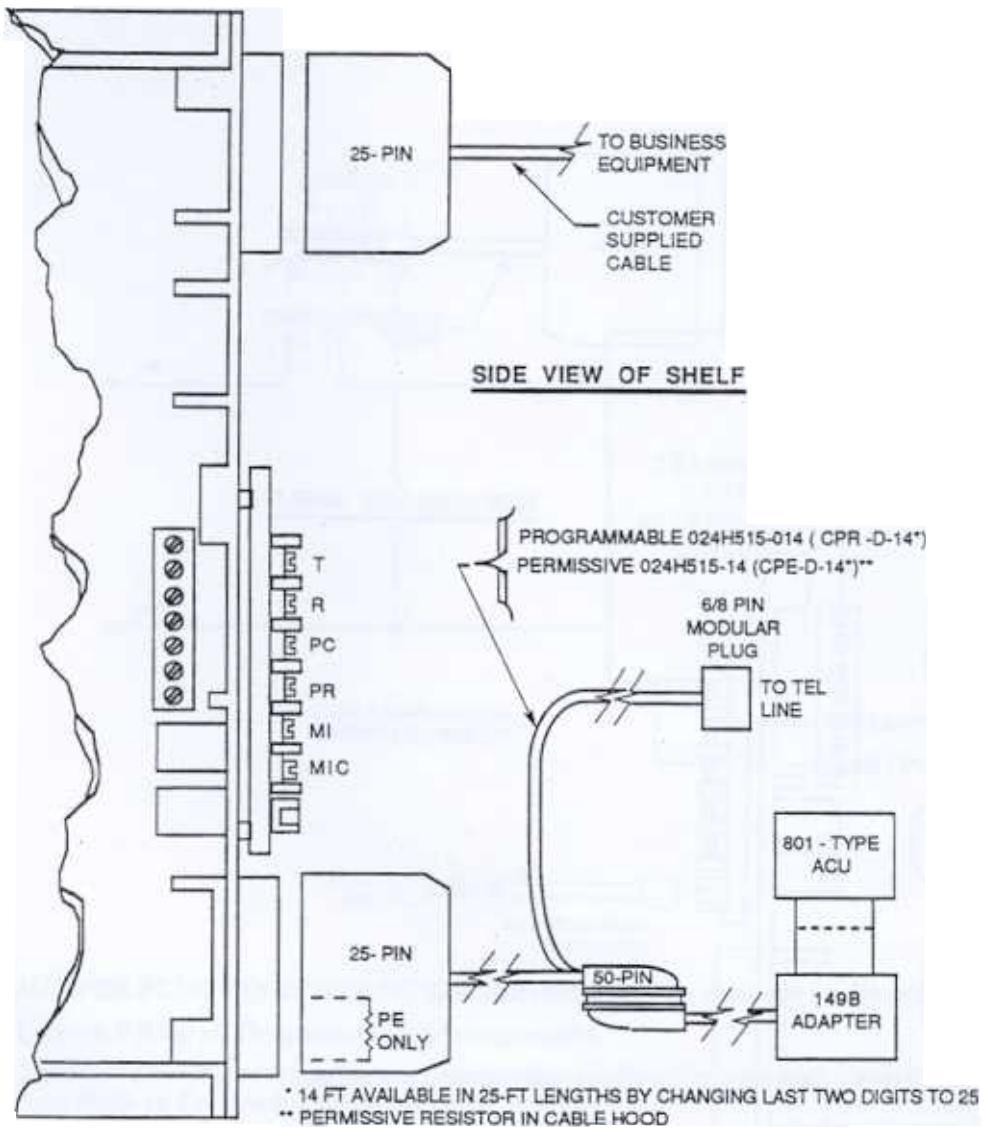


Figure 2-2 Switched Network Answer-Originate Configuration using Y Cable Connections to ACU and Line

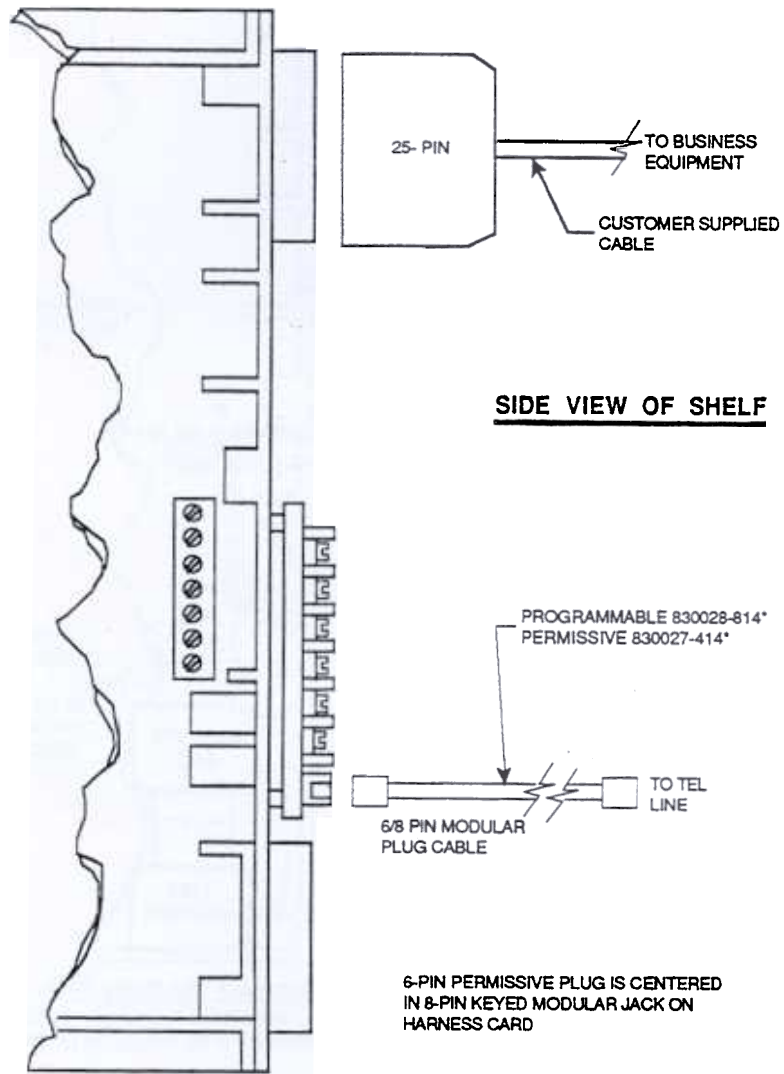
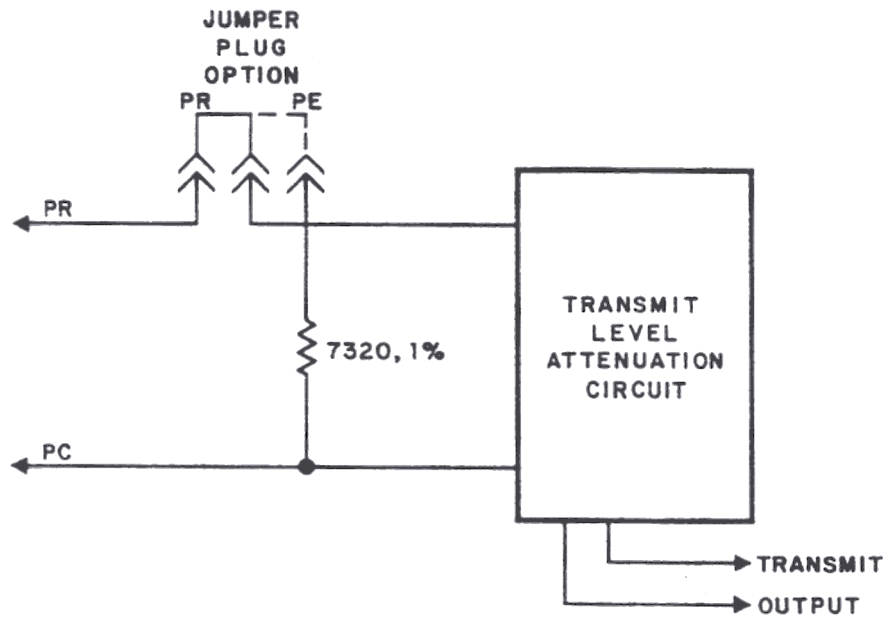


Figure 2-3 Switched Network Configuration Without Telephone



JUMPER PLUG POSITIONING (See individual modem manuals for location).

- 1. Set to PR for all Programmable Arrangements.**
- 2. Set to PE for Permissive Arrangements when Modem-To-Data-Jack Cable does *not* have Built-In Permissive Resistor.**
- 3. Set to either PR or PE for Permissive Cable with a Built-In Permissive Resistor.**

Figure 2-4 Programmable-Permissive Option Jumper Arrangement in the Modems used in the Shelf

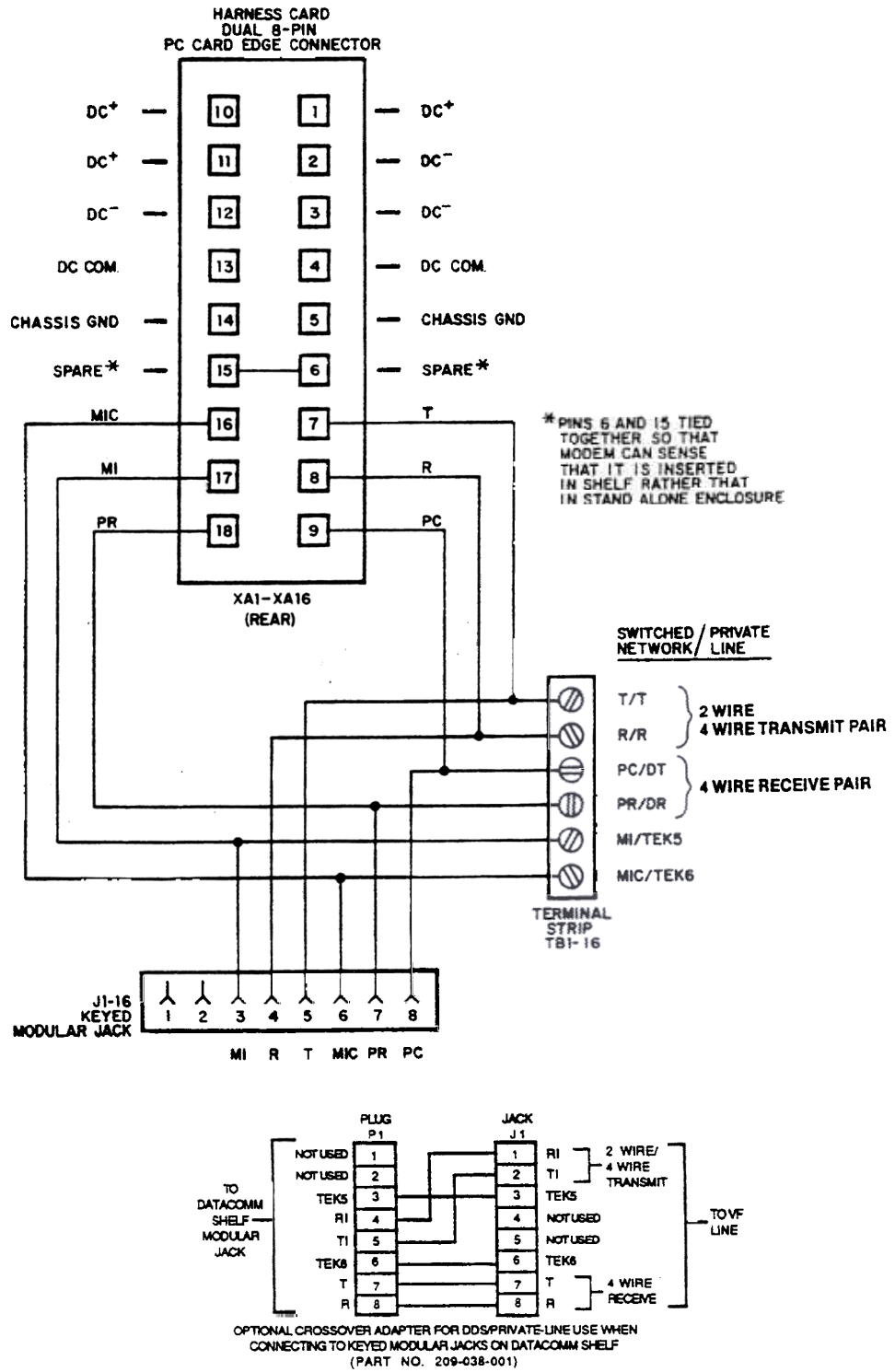


Figure 2-5 Shelf Terminal Strip, Modular Jack, and Harness Card Dual 8-Pin PC Card Edge-Connector Wiring Diagram

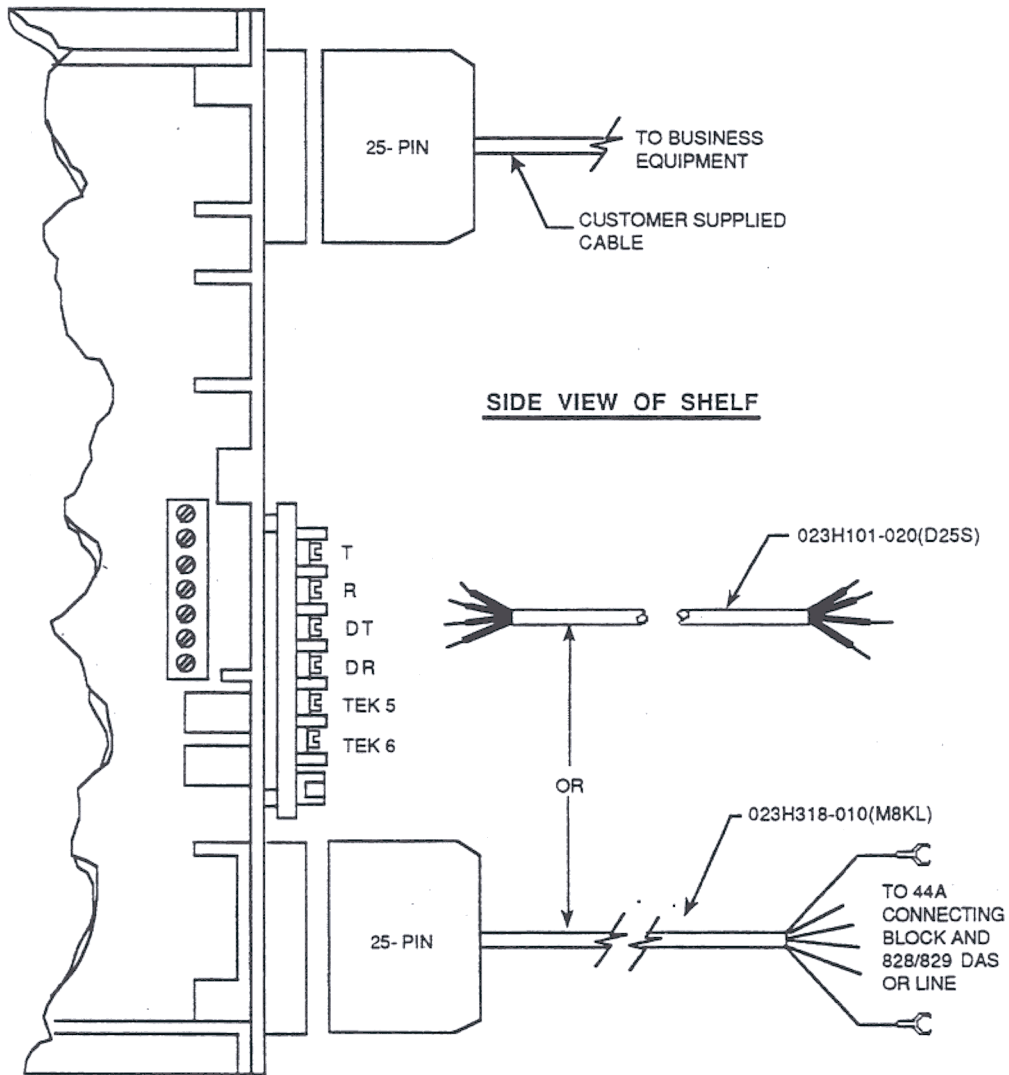


Figure 2-6 Private Line Connections to 828 or 829 DAS and Alternative Connection from Terminal Strip

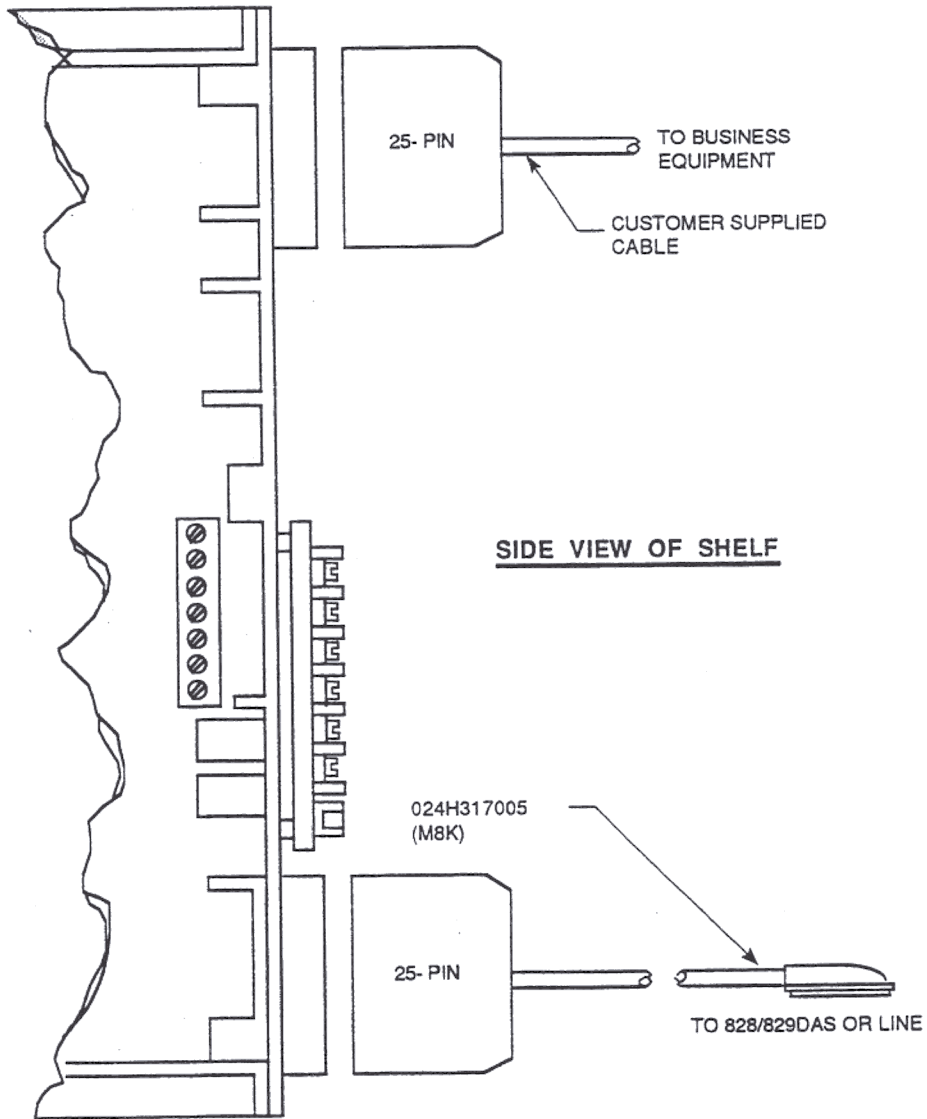
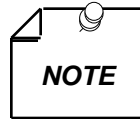


Figure 2-7 Private Line Connection to 828 or 829 DAS

Plug-In Modem Installation

Refer to the option selection tables in the plug-in modem's Operating and Installation manual to verify that factory-set options correspond to final channel requirements before inserting modems into the Shelf.



Models 103J, 108-3M, 113C, 113D, 201-7, 2426P, 201C, 201-C w/RDL, 201C-K, 2426S, 202S/T, 202T, and 2400ASM must be specifically strapped for compatibility with the DC-to-DC Shelf before installation. (Refer to the modem's "Operating and Installation Instructions" for strapping information.)

Models 201-8, 1209, FLM 2447, FLM 2447E, NMS 2020 and 2030 are incompatible with the DC-to-DC Shelf and cannot be modified in the field for compatibility.

When installing plug-in modems in the Shelf assembly, note that channel slots are designated 1 through 16 from left to right, viewing the Shelf from the front. See *Figure 2-8*. Also note that the push-button switches of the board would be always at the top of the plug-in front panel when correctly inserted in the Shelf. The plug-in cannot be inserted upside down.

With both hands on the front panel, slide the modules into the card guides and seat firmly into mating connectors. Modules can be removed by sliding out the wire finger grip at the top of the module's front panel and pulling out.

Plug-In Power Supply Installation

Power supply modules plug in from the front of the Shelf. The top slot in the power supply compartment is the "A" position; the bottom slot is the "B" position.



Each power supply module should only be inserted with the Power On/Off switch in the off position (down).

Using both hands, slide the modules into the guides and seat firmly. To remove a module, grip the gray knob on the front panel and pull out the module.

Business Equipment Interface Connections

Connections to the business equipment from the Shelf rear panel are made by means of 16 25-pin EIA interface connectors. See *Chapter 3, Figure 3-3*, for a layout of the Shelf's rear panel.

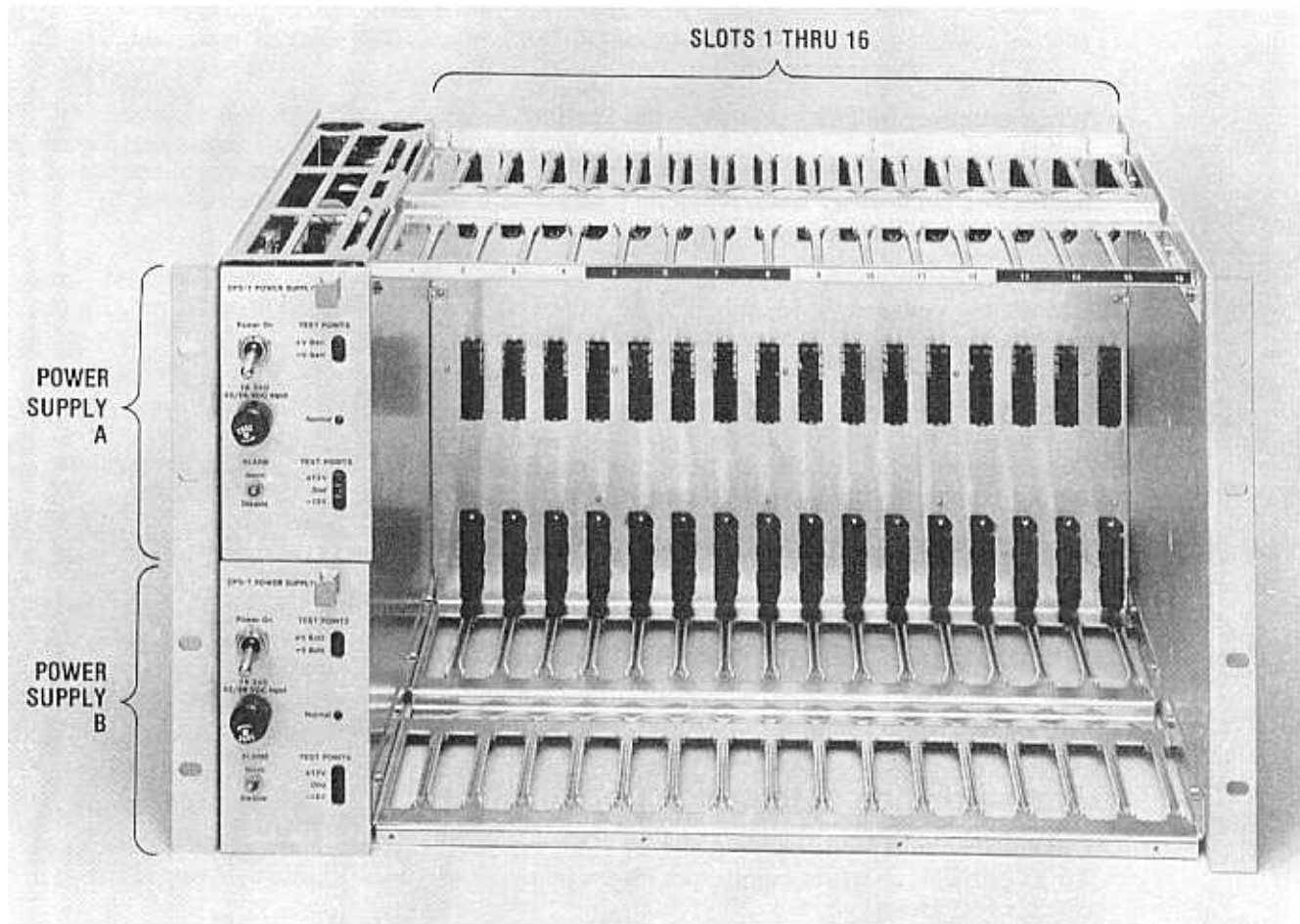
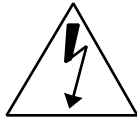


Figure 2-8 Front View of Shelf Showing Slot Locations

Redundant Battery Systems with Common Positive Terminals

Redundant battery systems with common positive terminals (refer to *Figure 2-9B*) are not compatible with the DS-5 Shelf power supply when the power supply's share function is used.



HAZARDOUS VOLTAGE

*The share cable located on the DPS-7 Shelf power supply PCB assembly must be disconnected at its connectors (refer to *Figure 2-10*). Early versions of the power supply do not use the connectors. In this case, the cable should be cut at its connections to the PCB assembly (refer to *Figure 2-11*).*

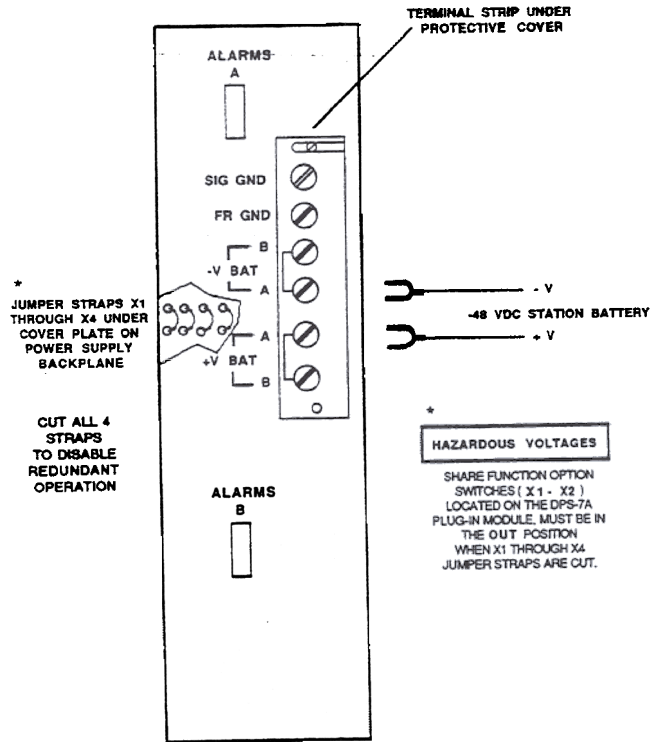
*The “share” function option jumpers, X1 and X2, located on the DPS-7A printed circuit card must be moved to the **OUT** position when X1 through X4 on the backplane are cut, otherwise hazardous voltages may be present. Refer to *Figure 2-12*.*

The power supply terminal block also provides for signal ground, **SIG GND** and frame ground, **FR GND**.

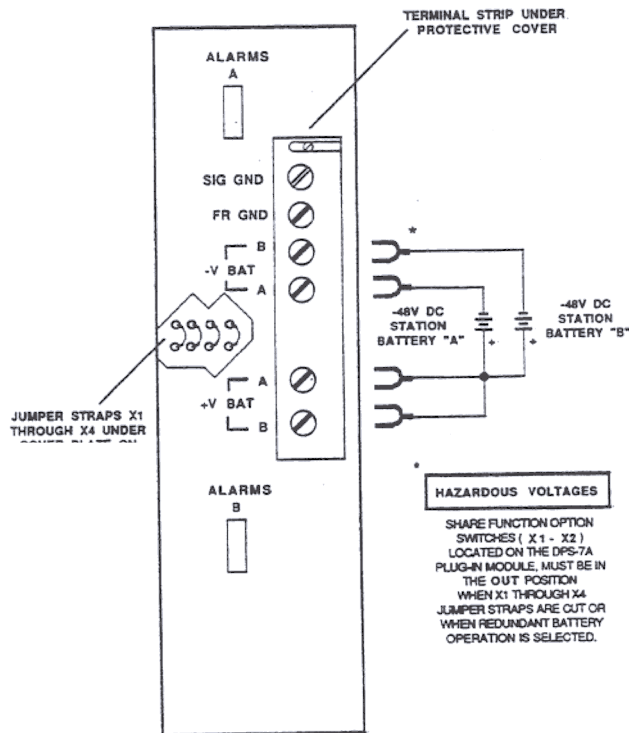
External Alarm Connections

If used, connect to the 7-pin “A” and “B” **ALARM** headers associated with each power supply using alarm cable assembly No. 041H003. *Figure 2-13* shows the alarm cable and describes the pin numbers of the headers. Cable 041H003 has P1 connector on one end and six spade lugs on the other end. The spade lugs can be connected to a customer provided terminal block and from there (using the appropriately sized wire) to a frame block if that is the routing point to the customers alarm circuitry. If the 041H003 cable wire size is adequate to fit the frame block terminals, and is long enough, simply cut off the spade lugs, strip the wire ends, and connect to the frame block. The wiring designation and wire color code for each leg of the alarm relay is shown in *Figure 2-13*.

The functions of Alarms A & B are described in *Figure 3-4*.



A. -48 V SINGLE BATTERY CONNECTION



B. REDUNDANT BATTERY SYSTEM WITH COMMON POSITIVE TERMINALS

Figure 2-9 Station Battery Connections

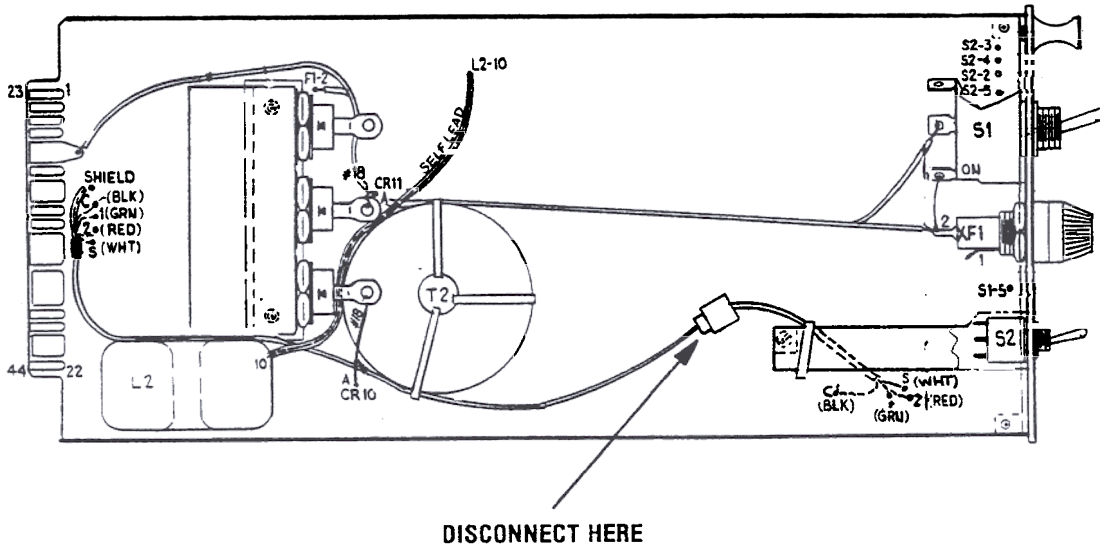


Figure 2-10 Share Cable with Connectors (DPS-7)

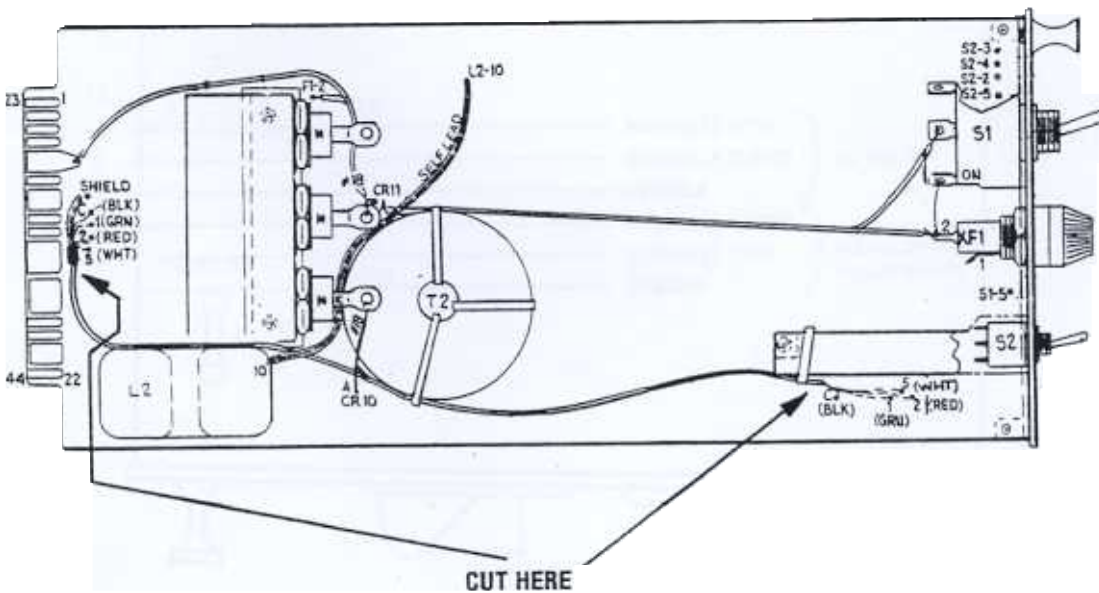


Figure 2-11 Share Cable without Connectors (DPS-7)

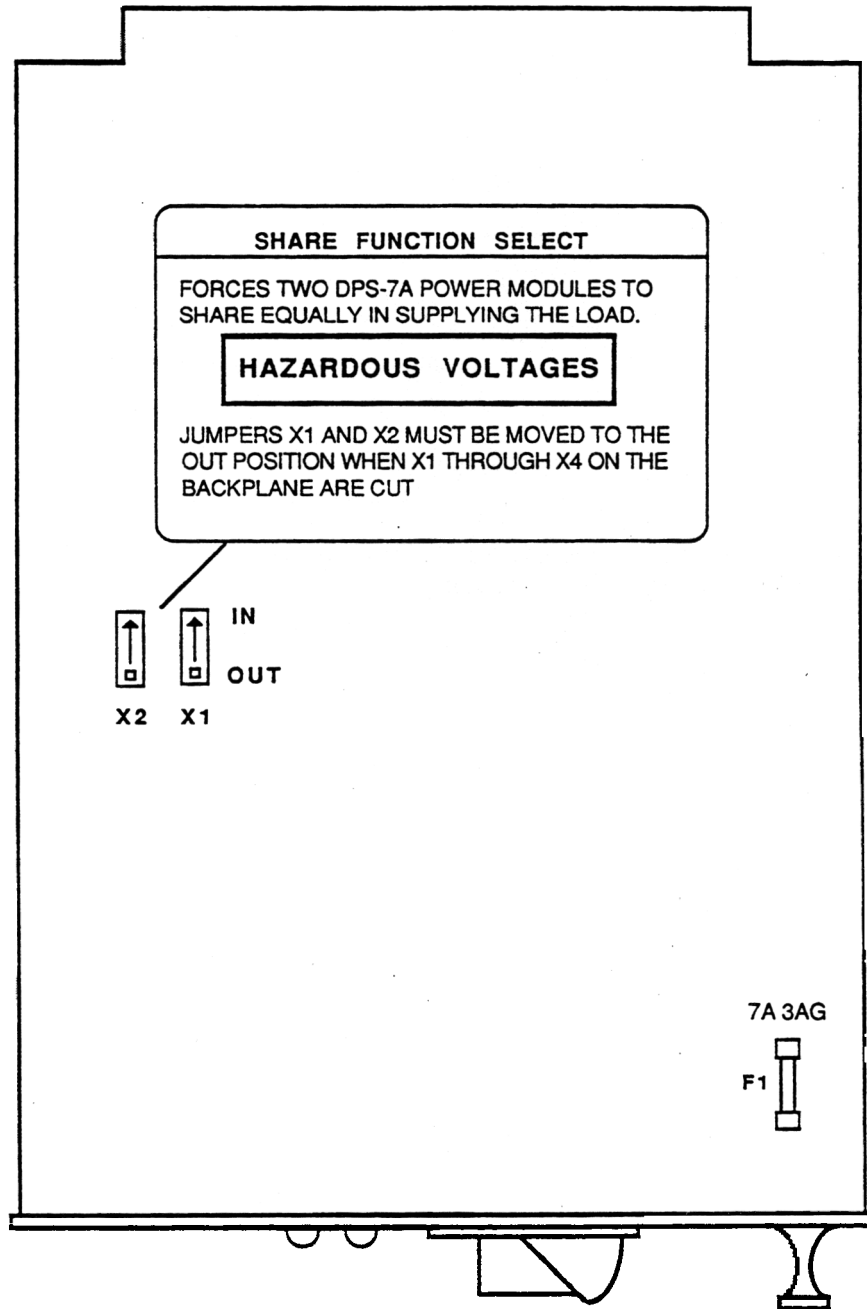
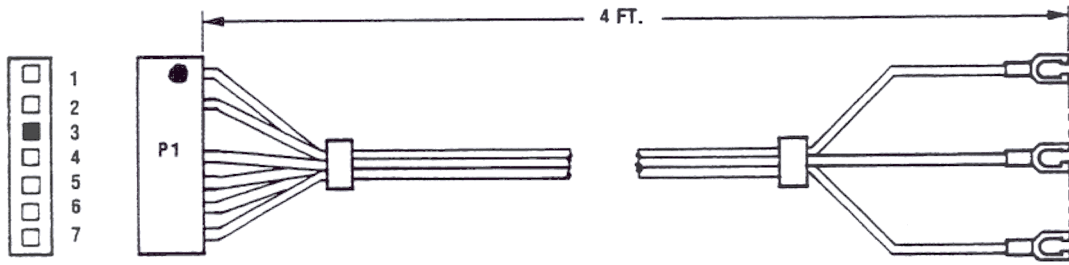


Figure 2-12 DPS-7A Share Function Option Selection



Dimension Table	
GDC Part Number	Dimension "A"
041H003-004	4 Feet
041H003-010	10 Feet

P1	BLK	NORMALLY OPEN	} NO CUT-OFF
1	BRN	NORMALLY CLOSED	
2	YEL	COMMON	
6	ORN	NORMALLY CLOSED	} WITH CUT-OFF VIA FRONT PANEL ALARM SWITCH
5	RED	NORMALLY OPEN	
4	BLUE	COMMON	
7			

Figure 2-13 Alarm Cable Assembly (Optional)
(GDC Part No. 041H003-001A)

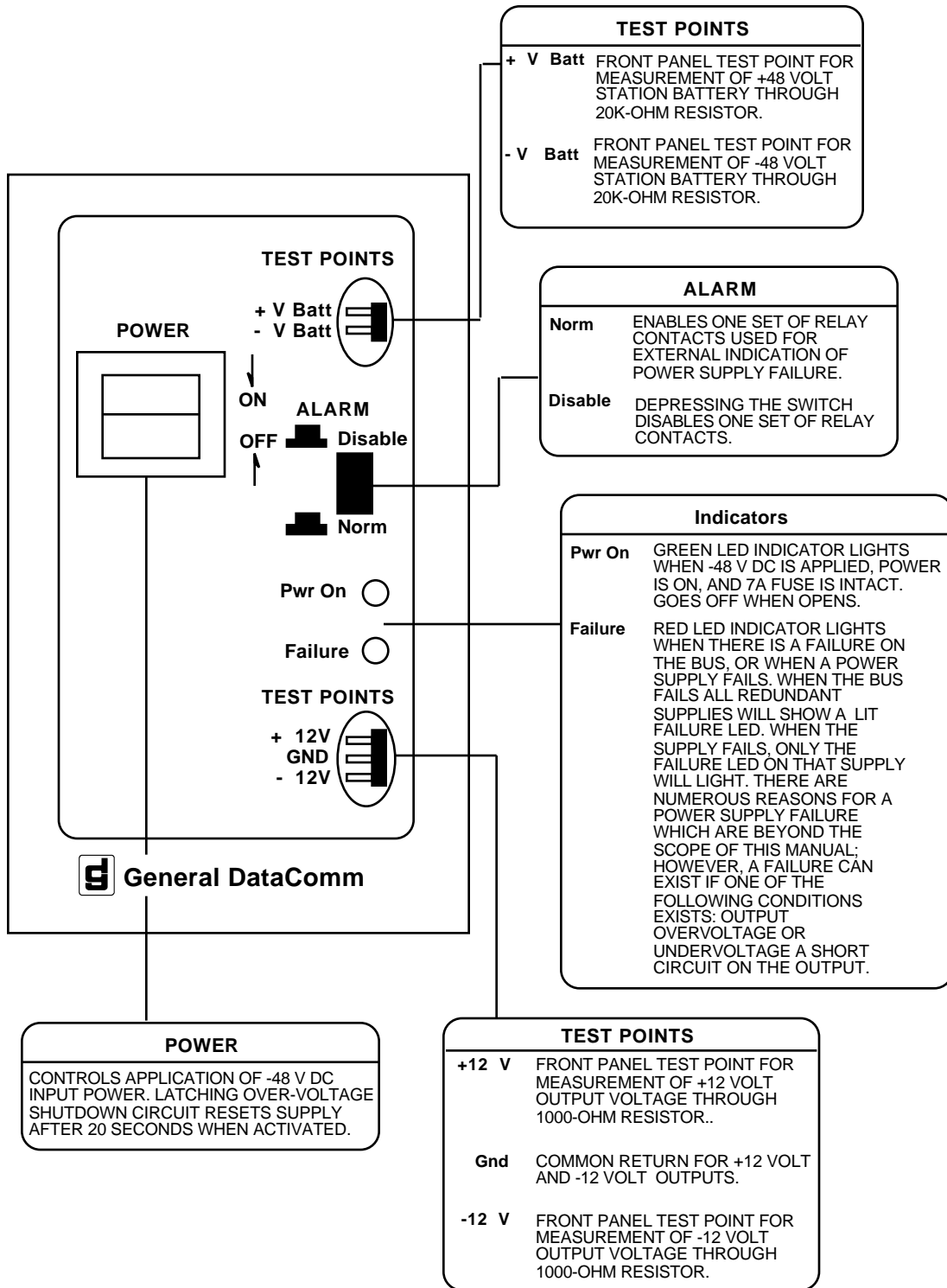


Figure 3-1 DPS-7A Power Supply Front Panel

3 Operation

Front Panel Switches, Indicators, and Test Points

The power supply front panel is shown in *Figures 3-1 (DPS-7A) and 3-2 (DPS-7)* which describe the use and function of the front panel switches, indicators, and test points. (For information on the individual modems mounted in the Shelf, refer to the manuals supplied with each modem.)

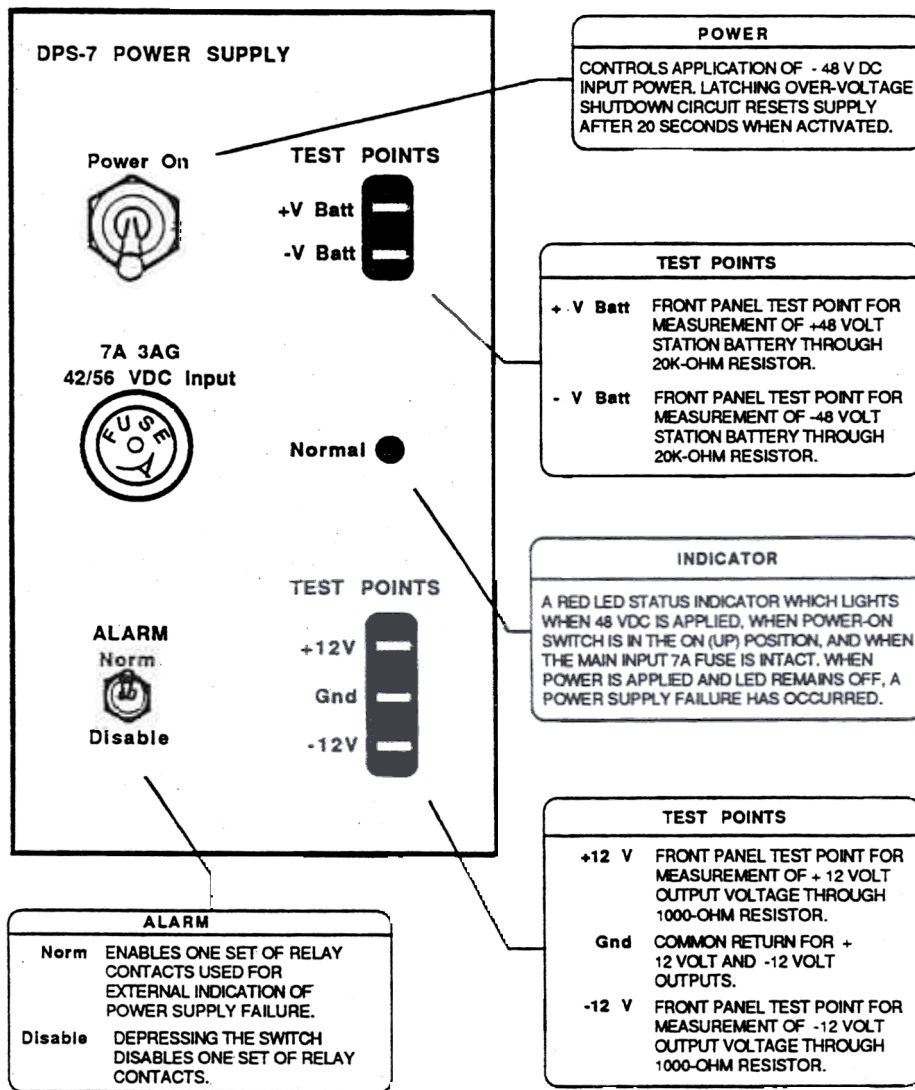


Figure 3-2 DPS-7 Power Supply Front Panel

Rear Panel Connectors

The shelf rear-panel business equipment, telephone, and switched network/private line connectors are shown in *Figure 3-3*. The power supply rear panel battery and alarm cable connectors are shown in *Figure 3-4*.

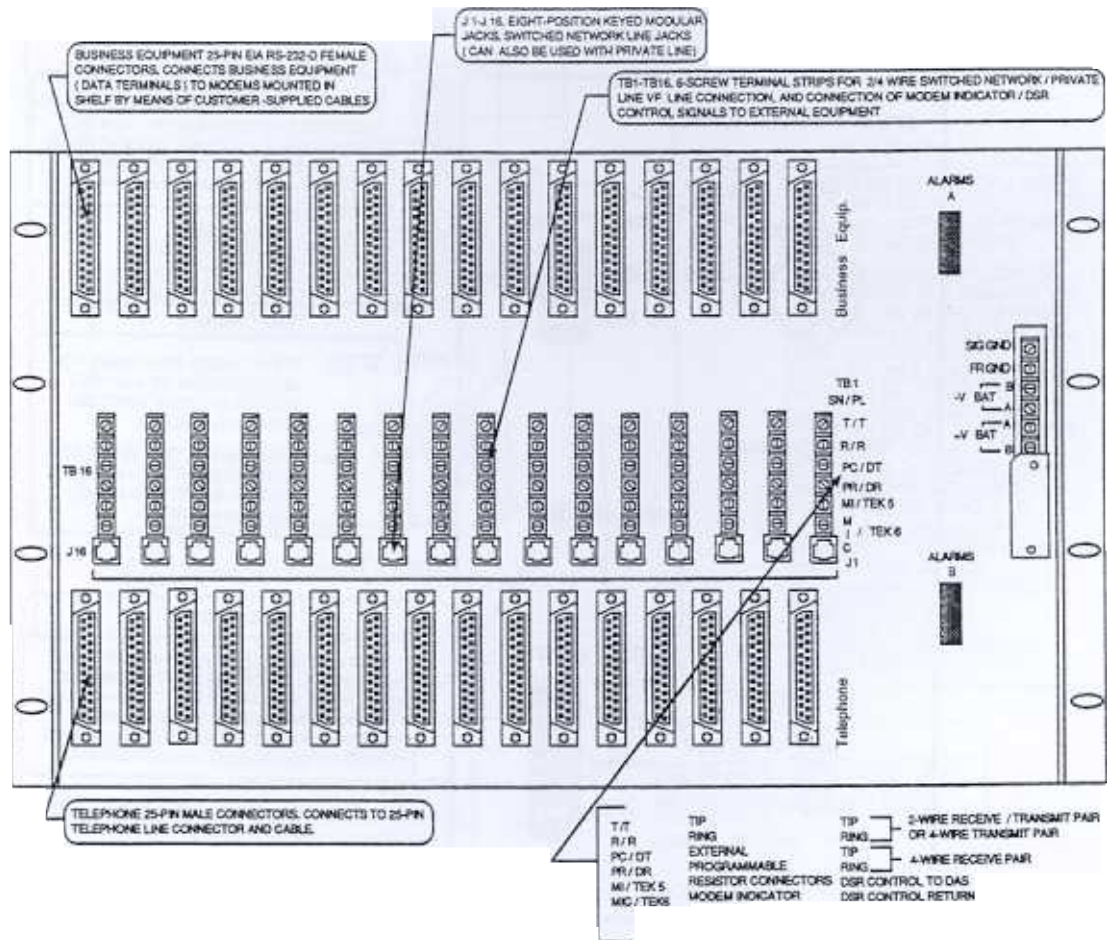


Figure 3-3 Shelf Rear Panel Connections

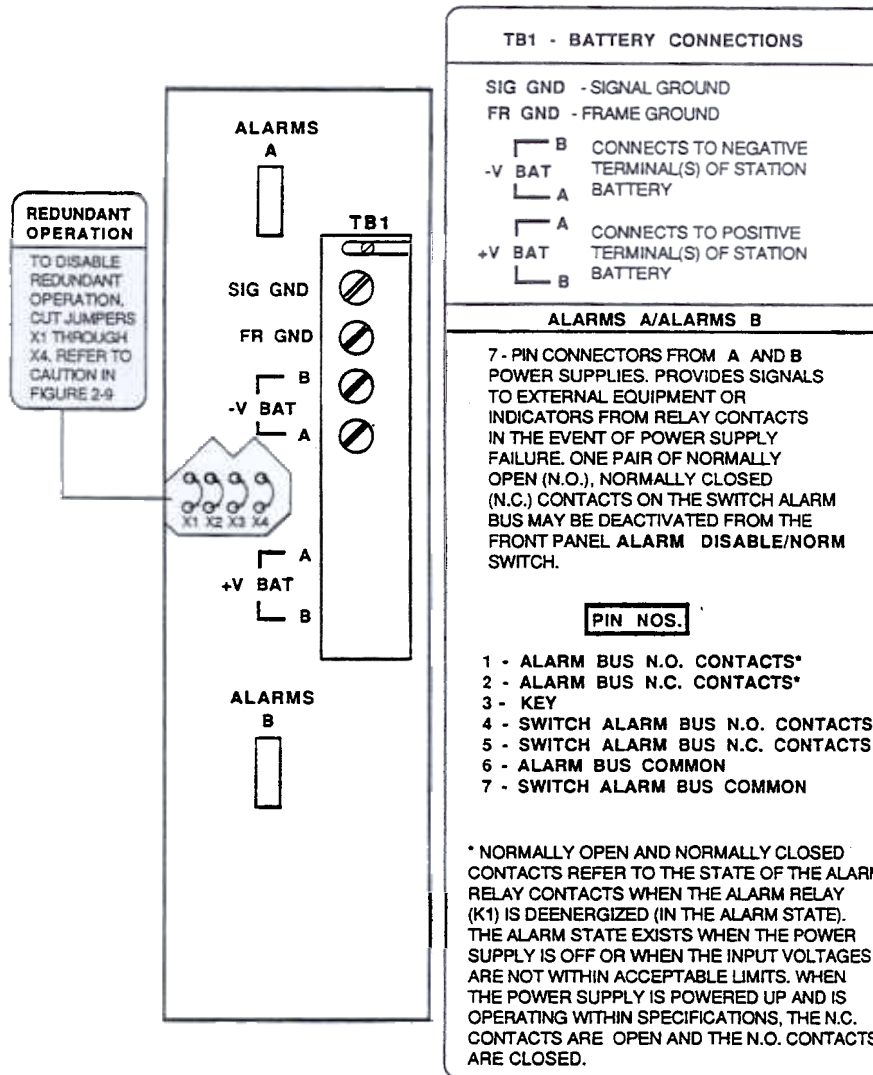
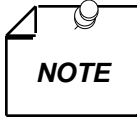


Figure 3-4 DPS-7 and DPS-7A Power Supplies, Rear Panel Connectors

Fuse Replacement

The fuse on the DPS-7A power supply is located on the pc card. It is on the front panel of the DPS-7. When a fuse burns out, the green Pwr On LED on the DPS-7A front panel (on the Normal LED on the DPS-7 front panel) will be off. Turn off the power supply and replace the 7A 3AG fuse with an identical type. If it burns out again, replace the power supply with a spare and notify your repair facility.



All GDC plug-in devices that can be used with the power supply are independently fused on the pc card. In the event of a short on a single card, the fuse(s) on the card will burn out but the power supply fuse will not be affected.

A Technical Characteristics

DC-to-DC Shelf Technical Characteristics

Item	Specification
Size	
Height	10.5 in. (265 mm)
Width	19 in. (483 mm)
Depth	13.5 in. (343 mm)
Weight	
One Shelf without power supply	17 lb 2 oz (7.8 kg)
One power supply module	2 lb 8 oz (1.1 kg)
Shipping weight (approximate)	
One Shelf without power supply	26 lb (1.2 kg) approximately
One power supply module	3 lb 8 oz (1.6 kg)
Capacity	16 plug-ins on 0.9-in. centers
	8 plug-ins on 1.8-in. centers
	5 plug-ins on 2.7 in. centers
	4 plug-ins on 3.6-in. centers
Power supply	
Input	-42 to -56 V dc from station battery.
Output	+12 V dc $\pm 4\%$ 0.25A to 7.5A and -12 V dc $\pm 4\%$ 0.25A to 6.6A.
Wattage	160 watts maximum (16 cards installed).
Power dissipation	Less than 35 watts at full load, per supply.
Fuse Size/type	7A 3AG fuse on DPS-7 power supply module front panel (P/N 215300-700); on DPS-7A fuse is on pc card.
Open fuse indication	On DPS-7, red Normal front panel LED is off when fuse is blown and Power On/Off switch is in On position.
	On DPS-7A, green Pwr On indicator is off when fuse is blown and POWER on/off switch is in "on" position.
Input under/over voltage protection	The power supply will not be damaged by any input from 0 to 56 V dc. Shutdown occurs at an input voltage of approximately 27 V dc.
Reverse input voltage protection	Protective circuitry and fusing prevent damage from reverse battery-polarity connection.
	7A fuse will blow.
Output over-voltage protection	The power supply will shut down due to an internal malfunction causing an over-voltage condition. Maximum output is ± 15 V dc.
Overload protection	The power supply will not sustain damage due to an indefinite overload or short circuit on the ± 12 V dc output lines. Maximum overload and short-circuit current are 20A on both ± 12 V dc lines.
Temperature	Operating: 0°C (+32°F) to 55°C (+131°F)
	Non operating: -40°C (-40°F) to +85°C (+185°F)
	Derate -1°C per 1000 ft. increase in elevation above sea level.
Humidity	Operating and non operating: Up to 95% without condensation.

DC-to-DC Shelf Technical Characteristics (Cont.)

Item	Specification
Shelf connectors	
Business machine	Sixteen hybrid 25-pin female EIA-232-D connectors on backplane.
Telephone set/line	Sixteen hybrid 25-pin male connectors on backplane.
	Sixteen 6-connector terminal strips on Shelf harness card.
	Sixteen 8-pin keyed modular FCC jacks on harness card.
Power supply connectors	
Battery	One 6-position screw-type barrier strip on the power supply harness card for connecting one or two station batteries. Also provides connections to signal and frame grounds.
Alarm (A and B)	Two 7-pin Berg headers which provide remote indication from each power supply in the event of power supply failure. Provided on isolated dual form-C relay contacts. One set can be activated/deactivated by front panel Alarm Enable/Disable switch. Relay contacts rated at 0.25A at 140 V, with a resistive load.

Index

- Alarm Cable Assembly (Optional), 2-17
- Business Equipment Interface Connections, 2-11
- DPS-7 Power Supply Front Panel, 3-1
- DPS-7A Power Supply Front Panel, 3-0
- DPS-7A Share Function Option Selection, 2-16
- Equipment List, 1-3
- External Alarm Connections, 2-13
- Front Panel Switches, Indicators, and Test Points, 3-1
- Front View of Shelf Showing Slot Locations, 2-12
- Fuse Replacement, 3-4
- Installation Procedures, 2-1
- Installation, 2-1
- Modem Compatibility, 2-1
- Plug-In Modem Installation, 2-11
- Plug-In Power Supply, 2-11
- Power Supplies Rear Panel Connectors, 3-3
- Private Line Cable Arrangements, 2-3
- Private Line Connection to 828 or 829 DAS, 2-9—10
- Programmable-Permissive Option Jumper Arrangement
(*In the Modems used in the Shelf*), 2-7
- Rear Panel Connectors, 3-2
- Redundant Battery Systems
 - Common Positive Terminals, 2-13
- Share Cable with Connectors (DPS-7), 2-15
- Share Cable without Connectors (DPS-7), 2-15
- Shelf Rear Panel Connections, 3-2
- Shelf Terminal Strip,
 - Modular Jack, and Harness Card, 2-8
- Station Battery Connections, 2-14
- Switched Network Answer-Originate Configuration, 2-4
- Switched Network Answer-Originate Configuration, 2-5
- Switched Network Configuration w/o Telephone, 2-6
- Switched Network Telephone Line Connections, 2-2
 - Determining Transmit Output Level and
Compatible Data Jack Type, 2-2
 - Switched Network Data Auxiliary Set
Connections, 2-3
 - Switched Network Programmable-Permissive
Cable Arrangements, 2-2
- System Description, 1-1
 - Applications, 1-2
 - Description, 1-1
 - Features, 1-2
- Technical Characteristics, A-1
- Unpacking and Handling, 2-1

