GDC 036R303-000
Issue 9, August 1997

Installation and Operation

TMS-3000

Transport Management System

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 CISPR 22, which is 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.

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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.*

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Table of Contents

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 floorpads 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, like 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 cause damage to the equipment or 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 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.

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.

All connections to the telephone network must be made using standard plugs and telephone company provided jacks or equivalent. Connection of this equipment to party lines and coin telephones is prohibited. A label on the back of the front panel of data communications equipment and on the underside or rear panel of other equipment provides the FCC Registration number and the Ringer Equivalence Number (REN) for the unit. If requested, give this information to the telephone company.

If the unit causes harm to the telephone network, the telephone company may discontinue your service temporarily and if possible, you will be notified in advance. 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. 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.*

Deutschland

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

Registration Status	Port ID	SOC	FIC	USOC

Preface

Scope

This manual describes how to install and configure a Transport Management System (TMS-3000) and explains how to monitor and manage network devices. This documentation is written for operators and installers, and assumes a working knowledge of data communications equipment.

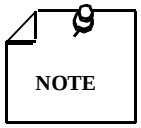
Organization

There are major organizational revisions to this issue of the manual. Overview material that was previously in Chapter 1 has been put in a new manual, *Technical Overview for TMS-3000, GDC 036R304-000*. System Initialization information, including *TMS Controller setup, XENIX loading, and GTS software loading* , which was in the 036R603-xxx series of manuals is now in *Chapter 5* of this manual.

This manual has eight chapters and five appendices. The information is arranged as follows:

- *Chapter 1 -Shelf Installation* contains diagrams and procedures for unpacking, shelf mounting, cable and wire connections of the TMS-3000.
- *Chapter 2 - Common Card Installation* contains installation and optioning procedures for common cards of the TMS-3000.
- *Chapter 3 - Channel Card Installation* describes the installation and optioning procedures for the channel modules of the TMS-3000.
- *Chapter 4 - Operation* describes the function keys, screen format, and general operating procedures for the TMS-3000. It also describes the function of indicators and test points on each TMS module.
- *Chapter 5 - System Initialization* describes how to check out the TMS Controller hardware using the built-in ROM monitor program. It also describes initial installation and setup of SCO XENIX, INFORMIX, and GTS software on various PC platforms.
- *Chapter 6 - Redundant Controllers* describes the TMS-3000 multi-controller network environment, including configuration, startup, and maintenance procedures.
- *Chapter 7 - Maintenance* includes routine maintenance, corrective maintenance, and troubleshooting procedures for the TMS-3000. It also lists telephone numbers and addresses for technical assistance world-wide.
- *Chapter 8 - Connector Pin Assignments* contains tables that list pin assignments for various system connectors and modules.
- *Appendix A - Options* provides descriptions of and installation instructions for options that are available for the TMS-3000.
- *Appendix B - Technical Characteristics* contains system and module specifications and power requirements.
- *Appendix C - TMS-3000 Maintenance Console* describes the procedures for using a TMS Maintenance Console, a software package designed to be used with an ASCII terminal that operates remotely from the TMS Controller.
- *Appendix D - Agency Rules and Regulations* contains specialized information for the UK and the Republic of Ireland.
- *Appendix E - EC Declaration* pertains to GDC's conformance to harmonized standards as described in the *Official Journal of the Euorpean Communities*.

The *Index* contains the TMS-3000 subject and page number.



Although these options appear on the TMS Controller, the TPP and OPP cards do not support:

TPP Redundancy

Microcell

SNA/SDLC

PIR

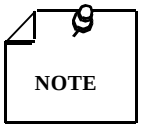
Please refer to the appropriate version of the TPP and OPP release notes.

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.



Notes present special instructions, helpful hints or general rules.

Related Publications

The following documents have additional information that may be helpful when using this product:

GDC Number	Subject	Type of Manual
	Transport Management System	Product Portfolio
035R009-000	GPS-8B Power Supply	Operating and Installation
036R302-A7	TMS Packet Processor (TPP)	Addendum
036R304-000	TMS-3000 Technical Overview	Technical Overview
036R603-Vnnn	TMS-3000 Controller	Operation
036R305-000	Quad Stat Mux Channel	Installation and Operation
036R340-000	OCM-2000	Installation and Operation
036R342-000	OCM Packet Processor (OPP)	Installation and Operation
036R452-000	Sync Status Module	Instruction
S-036R042-001	Sync Status Module with Enhancements	Addendum
036R475-000	VLBRV	Installation and Operation
036R477-000	T1-DS0	Installation and Operation
036R478-000	Digital Bridging Card	Installation and Operation
036R479-000	Turbo Data Channel	Installation and Operation
036R480-000	CELP Channel	Installation and Operation
036R483-000	Turbo Data Channel-2, -5	Installation and Operation
036R485-000	*T1-FT1*	*Operating and Installation*
036R610-000	*TMS-3000 Maintenance Console*	*User Guide*
036R611-000	*OCM-2000 Maintenance Console*	*User Guide*

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. UAS)

R	denotes a technical publication
nnn	a number assigned by Technical Publications
000	identifies a hardware product and does not change
Vnnn	designates software version associated with a product, which may be updated periodically

The issue number on the title page changes only 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.

Glossary of Terms

ACM

The ACM (ADPCM Compression Module) provides the means for a single DS1 (CEPT) line, containing 24 (30) PCM voice circuits, to be brought into the TMS-3000 node and compressed via GDC proprietary ADPCM compression techniques. The compressed signal is then transported across a trunk.

ADPCM

Adaptive Differential Pulse Code Modulation (See ACM)

Aggregate

A connection between two TMS nodes where the entire trunk carries a single bundle carrying the data originating from the TMS channels. This term has conventionally been used to define the TMS's Aggregate Control Card trunk. Also, see Subaggregate.

Aggregate Control Card (ACC)

This module interfaces the 16.896 MHz Fast Bus with a full duplex aggregate trunk connected to a remote node. It buffers data from the Fast Bus and reforms it according to the transmit frame by adding overhead and frame sync bits. Piggyback Cards on board the Aggregate Control Card then prepare the data to comply with transmission standards (EIA or ITU-T). The receive section locates the frame sync bits in the receive aggregate data stream, and, using these bits as a reference, disassembles the remainder of the data stream into channel data, channel controls, and overhead bits.

Aggregate Trunk

A full duplex communication line which transports data between two nodes.

Alarms

These are raised when a malfunction is detected in the system. Major alarms need immediate attention. Minor alarms are not immediately detrimental to the working of the system. Major alarms indicate that hardware on a Common Module is malfunctioning. Minor alarms indicate that the malfunction is in one of the Data or Voice Channel Cards.

Anisochronous

The essential characteristic of a time-scale or a signal such that the time intervals between significant instants do not necessarily have the same duration or durations that are integral multiples of the shortest duration.

Backplane

This is the back panel of TMS-3000's Main and Expansion Shelves. It holds the external connectors used by all the modules and covers the Main Harness Card.

Base Card

A board that can have one or more cards called "piggybacks" plugged into it. It can be tested, removed, and replaced as a unit independent from the piggyback card(s).

B8ZS (Binary Eight Zero Suppression)

Timing is critical in a digital T1 network. If too many consecutive zeros are in the aggregate data stream, the system may lose synchronization. B8ZS is a method used to meet the "ones density" constraints by taking strings of zeros, converting them to ones and zeros, and placing them back into the aggregate bit stream.

bps

Bits per second transmitted or received. Also referred to as Hz

Bridge

A device for connecting similar LANs using the data link layer MAC source and destination addresses contained in the data frames of all LAN traffic.

Buffer

A storage device used to streamline data transfer when there is a slight difference in data rates caused by, for example, doppler shift or separate clock sources.

Card

An assembly of components that can be tested, removed, and replaced as a unit. A card usually refers to a single unit without piggybacks connected to it, although in this manual "card" is usually used interchangeably with "module."

CDA Module

The CDA-T1 (Combined Digital Aggregate) Module allows the TMS-3000 using DS1 framing to operate on a DACS Network (byte-oriented). Also available in a ITU-T 2.048 Mbps version (CDA-E1)

CELP

The CELP Channel Module provides Codebook Excited Linear Prediction (CELP) voice encoding algorithms that maximize voice channel bandwidth utilization. The voice is compressed at rates of 4.8 Kbps, 6.4 Kbps, or 9.6 Kbps.

Channel

Endpoint of a circuit path. The channel is the card at each end of the path.

Channel Module

This Voice or Data Channel Module plugs into an Expansion Shelf, TMS Compact, MEGAMUX Plus or OCM. It interfaces external equipment (via cables) to a Channel Interface Card.

Channel Interface Card

This card interfaces with Channel Modules and the 16.896 MHz Fast Bus. It contains all the circuitry necessary to control, frame, multiplex, and demultiplex up to 64 channels onto the Fast Bus. Channel Card connections to the Channel Interface Card are made via a pair of ribbon cables that run from the backplane of the Expansion shelf, holding the channel cards, to the Main Shelf Backplane where the Channel Interface Card is located.

Circuit

An end-to-end data or voice path which can pass through several entities in a communication system. A circuit is described or referred to by the node/channel names which identify the endpoints of the circuit.

Common Module or Common Card

A generic term for any module that, when removed, will cause a major alarm. This includes all modules housed in the main TMS shelf plus the Expansion Modules located on each TMS Expansion Shelf.

CSU

Channel Service Unit.

DACS Network

DACS (Digital Access Cross-connect System) is a byte oriented (DS0) digital T1 network service.

DCE

Data Communications Equipment.

Dial Backup

A feature that provides a direct node to controller link if normal supervisory communication between the TMS node and the Controller is disrupted. Dial Backup establishes the link using the internal GDC 212A modem on the Redundancy Control Card, or an external modem.

Digital Bridging

A function that provides for a single channel to broadcast to multiple channels and for those channels to respond to the single channel. In TMS-3000, the Digital Bridging Card (DBC) is used for this function

Diversity

The term for two aggregate trunk lines between the same nodes if one trunk is operational and the other is in stand-by in case the first goes down. Both lines are monitored for serviceability by firmware on the Aggregate Control Card. Switching of the line is controlled independently at both ends by the Aggregate Control Card.

DLC

Data Link Connection.

DS0 (Digital Signal Level 0)

A single 64 kbps channel. The data stream is divided into 8-bit bytes. DS0 is a byte-oriented environment.

DS1 (Digital Signal Level 1)

A combination of 24 DS0 channels and 8000 framing bits into a 1.544 Mbps data stream.

DSX-1 Interface

An electrical interface that converts a formatted data signal into the proper signal levels for the digital T1 network. Also called a cross-connect.

DTE

Data Terminal Equipment.

ESCC

Enterprise System Control Card. A card that is installed in the TMS shelf to monitor and control the activities other cards in the shelf. The ESCC is responsible for several functions: Permanent storage of software programs for all of the common cards in the TMS-3000 network, communications with other ESCCs and SCCs in neighboring nodes, communications within the node, communications with the Controller if locally connected, and control of all customer traffic within the node. Supports non-disruptive software downloads, expanded non-volatile memory, better Fastbus select resolution, MicroCell Transport, and additional features.

ESF (Extended Superframe)

A modified D4 framing format. The basic D4 framing structure contains 1 frame bit followed by 24 eight-bit time slots or a 193 bit frame. An ESF contains 24 193-bit frames. ESF allows a greater amount of access to digital network services (See "Superframe").

Ethernet

A LAN for connecting devices within the same building, operating over twisted-pair wire or coaxial cable at speeds up to 10 Mbps. It operates at the Physical and Data Link layers of the OSI model, specifying CSMA/CD.

Expansion Shelf

Shelf that holds up to 16 Channel Modules and 2 Expansion Modules (one primary, one redundant). Since one Channel Interface Card can interface up to 64 channels, at maximum a Channel Interface Card is connected to 4 Expansion Shelves.

Fan

A type of full-duplex circuit topography typified by multiple terminations on one end and a single termination on the other end.

Fast Bus

The Fast Bus carries controls and data between the Channel Interface and the other common modules in the node. One bit of data is conveyed by every clock bit on this bus. Physically, it spans across the Main Harness Card.

FX

See Foreign Exchange

Intelligent Automatic Rerouting (IAR)

A Controller function that automatically determines proper routing of circuits around any failed node or facility.

IP

Internetworking Protocol.

ISDN

Integrated Services Digital Network

Isochronous

A method for transmitting asynchronous data by synchronous means. A transmission format where the asynchronous characters (i.e., those delineated with Start and Stop bits) are sent with a clocking connection between the transmitter and receiver.

ITU-T

International Telecommunications Union - Telecommunications Standardization Sector. A committee that sets international communications standards.

LAN

Local Area Network.

LAN*TMS

Local Area Network Transport Management System. A network-managed system for integrating multiple local area networks (LANs) into a single communications network.

Link

A transmission path between two stations, channels or parts of a communication s system.

Main Harness Card or Main Harness Backplane

This assembly is covered by the back panel of the Main Shelf. It contains the external connectors used by all the modules in the Main Shelf. Three buses on the Main Harness Card enable the modules to communicate with each other. These three buses are the Fast Bus, the MP Bus (or Communication Bus), and the Clock Bus.

Maintenance Console

A software package that allows you to interact with the TMS-3000 on a local level. This software is designed to work with any terminal that runs at 1200 to 9600 baud ASCII on an EIA/TIA-232-E interface. The terminal is connected to the TMS-3000 main shelf backplane.

MINIMUX

A self-contained TDM capable of multiplexing and de-multiplexing as many as six channels of synchronous, asynchronous, isochronous, or anisochronous data, or voice grade telephone signals.

Module

An assembly which has definable performance characteristics so that it can be tested, removed, and replaced as a unit. In a TMS-3000 system, each card on the Main Shelf and Expansion Shelves is a module. A module can have other cards called "piggybacks" or "plug-ins" installed on it. In most cases, in this manual, the terms "module" and "card" are used interchangeably. For example, Channel Interface Card and Channel Interface Module refer to the same component.

Network

Term used to refer to a group of three or more nodes connected together with aggregate trunks. Not all the nodes in a network will necessarily be TMS-3000 nodes.

Node

Any addressable location within a network capable of carrying a TMS-3000 circuit. In a network, a TMS Compact in Philadelphia or an OCM-2000 in Boston are nodes (also see Tail Node).

OCM-2000

Office Communications Manager. A feeder multiplexer that is used as a node in a TMS-3000 network. It is system of modules installed in a OCM-2000 Enclosure or OCM-2000 Shelf, separate from the TMS shelf, that multiplexes data from a variety of analog and digital devices, then transfers that data to the TMS for further routing. May also be referred to as TMS-2000 or OCM*TMS.

OPP

OCM Packet Processor. A module installed in an OCM-2000 Enclosure or Shelf that interfaces externally with public frame relay networks or frame relay devices such as LAN bridges, routers and frame relay PADs. OPP is the OCM counterpart to the TPP.

Packet

A sequence of data, with associated control elements, that is switched and transmitted as a whole; refers mainly to the field structure and format defined within the CCITT X.25 recommendation; multiple packets may be required to carry one complete document or a lengthy block of information.

Piggyback Card

A card that plugs into a base card. The piggyback is a separate assembly that can be tested, removed, and replaced as a unit.

Plesiochronous

The essential characteristic of time-scales or signals such that their corresponding significant instants occur at nominally the same rate, any variation in rate being constrained within specified times. Note that two signals having the same nominal digit rate, but not stemming from the same clock or homochronous clocks, are usually plesiochronous; there is no time limit to the time relationship between corresponding significant instants.

PLL

Permanent Logical Link.

Port

Any switchable entity. A port may be a logical entity that is not necessarily realized through a physical connector. For example, a single Frame Relay interface can support many Frame Relay ports. Traditionally, this has referred to a physical and electrical interface point on a TMS network interface card.

Printed Circuit Board (pcb)

See "card".

Red Alarm

A network alarm that is produced by the receiver to indicate that it has lost its input signal, frame alignment, loss of sync, or error rate exceeding a predetermined level. A red alarm is considered a network alarm and applies to the following TMS-3000 modules only: ACM and CDA.

Redundant Controllers

In the TMS-3000, a network can contain more than one Controller. Software allows the use of multiple PC controllers. One master controller serves as the point of control for the entire network. All other controllers (subordinate) function as backups and as additional access points into the network. The master controllers responsibility is to synchronize its data base (only for the current network configuration data portion) with all subordinate controllers. Software allows up to five subordinate and one master controller.

Route

A logical path through a network from the transmitting equipment to the receiving equipment. The path can go through several nodes.

Subaggregate

A collection of data channels and supervisory communications and frame synchronization information routed to a single destination. One or more subaggregates may be carried on a single physical aggregate and routed to different destinations via a DACS network. Subaggregates can be of different types:

TMS - This type carries TMS proprietary data which includes overhead of synchronization and supervisory communication as well as channel data.

Network - This type carries network (DS0) compatible data. This data originates from a non-TMS device and terminates on a non-TMS device.

X.50 - This type is considered as a network type subaggregate by CDAs and IACs, but as a TMS subaggregate to the OCM.

Superframe

A D4 frame consists of 1 frame bit followed by 24 eight-bit time slots. A D4 superframe contains 12 consecutive 193-bit frames.

Supervisory Data

Information which travels from the Enterprise System Control Card via the MP Bus. It does not have any immediate bearing on the data being multiplexed. Instead, it keeps supervisory software in various parts of the system up to date.

Supervisory Pass Through

A feature that establishes a supervisory data path to several TMS Compact nodes at a local site. This allows an increase in transmission capability from a site by generating more aggregate trunks.

TCP

Transmission Control Protocol.

TMS-3000 Controller

A computer that is connected to the Enterprise System Control Card in a TMS-3000 node via an external connection on the Main Harness Card. The recommended controller is a Pentium 90. It performs configuration and framing calculations for the entire network, as well as other status, diagnostics, and alarm functions. A Maintenance Console is not classified as a Controller because it has limited control over only one node.

TPP

TMS Packet Processor. A module installed in a TMS-3000 main shelf that interfaces externally with public frame relay networks or frame relay devices such as LAN bridges, routers and frame relay PADs. It also has internal access to the Fastbus, allowing it to transfer frame relay, HDLC and SDLC data to other TPP modules in the shelf or to modules such as CIC, CDA, ACC and IAC.

Trunk

Defines a connection between a TMS port and a Network port (or another TMS port). Also see "Aggregate Trunk."

Universal Voice Card

Provides full duplex voice communication capabilities in a TMS-3000. Pulse Code Modulation (PCM), Adaptive Differential Pulse Code Modulation (ADPCM) and Advanced Speech Processing (ASP) card configurations are available.

VLBRV

Very Low Bit Rate Voice Module. An analog voice channel card for TMS-3000, TMS Compact, Universal MM+ V4, MINIMUX, and OCM-2000 TDMs. Maximizes voice channel bandwidth utilization while offering low bit rate values of 9.6, 4.8, and 2.4 kbps.

XNET

XNET allows connection between two independently operating TMS-3000 networks. Supervisory communication does not pass between networks, maintaining independent control of each network. A network operator will be allowed to configure an XNET node and aggregate. The operator can then configure circuits to traverse the XNET aggregate. The operator running the other network must also configure a matching XNET node, aggregate and circuits. XNET allows limited diagnostic tests (loopbacks) to be performed.

1 Shelf Installation

Overview

This chapter contains information on the installation of the TMS-3000. Unpacking, shelf mounting, cable and wire connections, option selection, and system timing are all discussed here. *Figure 1-1* shows the rear panel of the TMS-3000 shelf.

Many tables and diagrams are required to provide sufficient installation information for the TMS-3000 system. Most of the tables and diagrams in this chapter appear with the TMS-3000 module with which they are associated.

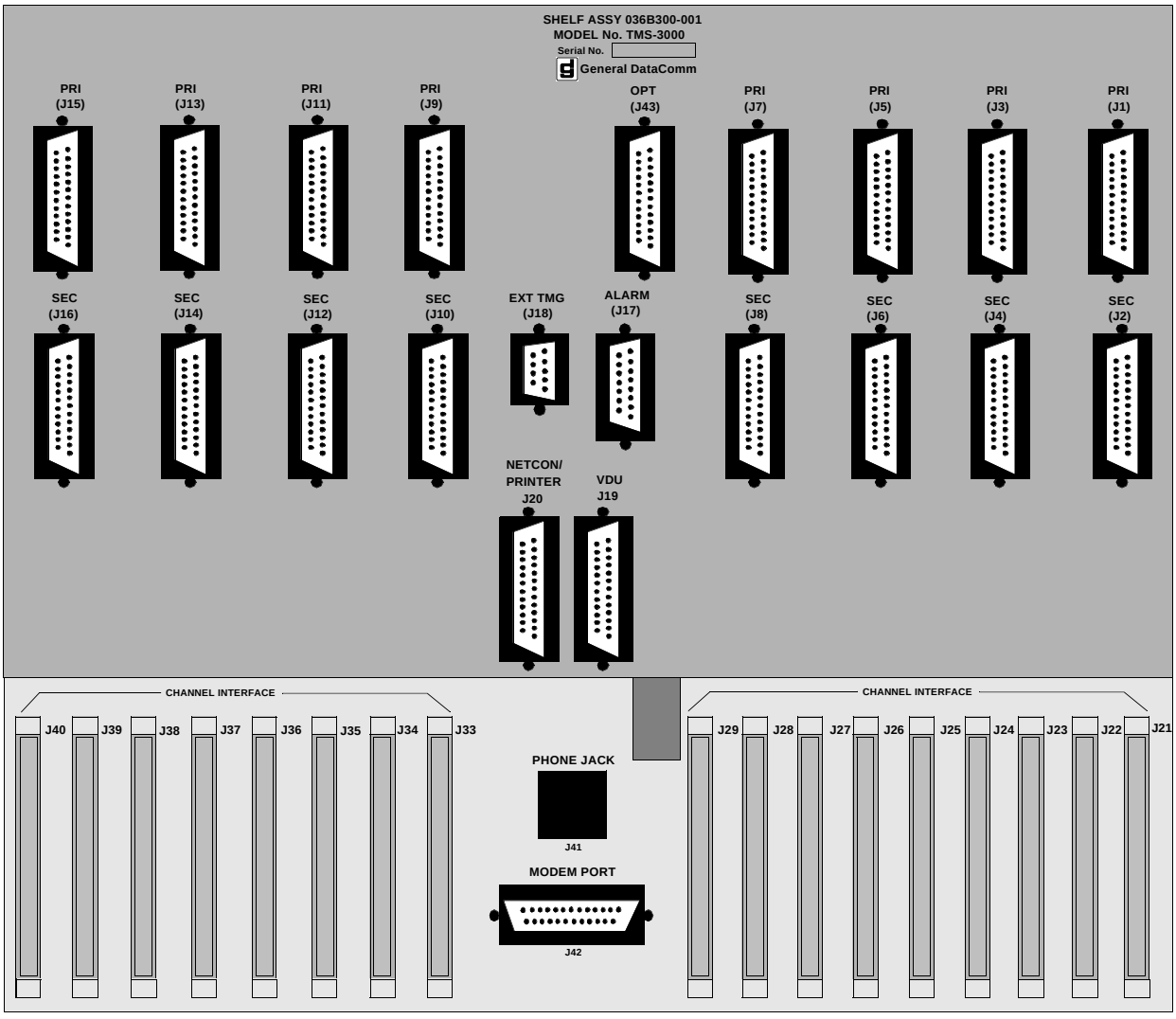


Figure 1-1 TMS-3000 Shelf, Rear Panel

Unpacking and Inspection

These steps detail the unpacking and inspection requirements for the TMS-3000.

1. Remove any extra packing material from the unit.
2. Place the TMS-3000 unit so that you can easily access the front and back of the unit.
3. Remove each spare module from its individual carton. Do not discard carton or packing material; save it for transporting or reshipping if necessary.
4. Inspect the components for visible signs of damage. If you see any damage, notify the shipper immediately.
5. Check the packing list to see if you have all components (module types, quantities, etc.).
6. Verify that the components of the unit and factory settings on the various modules are properly configured for your TMS-3000 applications.

The documentation package which comes with your system determines proper set-up and card arrangements for your system. In particular, ensure that:

1. Each card is in its proper slot in the TMS-3000 shelf. Correct locations are given in your Network Documentation Package. Module locations for a completely filled redundant node are illustrated in *Figure 1-2* (In a non-redundant system, each slot marked "SEC." on the diagram has a blank filler panel). Check that channel cards are in their correct slots. Note that installation of TPP (TMS Packet processor) cards is covered in *GDC 036R302-A7*.
2. Correct aggregate interface piggybacks or interface modules are installed on the ACM (ADPCM Compression Module), the CDA (Combined Digital Aggregate) module, and the ACC (Aggregate Control Card) .

Installation

The TMS-3000 is usually shipped already mounted in a GDC EP-2M or EP-4 cabinet. If your TMS-3000 is already mounted, go to *Step 4* below. Otherwise, follow these directions:

1. If the TMS-3000 shelf assembly is not being mounted in a rack, install it in a reasonably well-ventilated location. Do not locate directly above other equipment (such as power supplies) which generate large quantities of heat. The ambient temperature should not exceed 122^{o} F (50^{o} C).
2. If the TMS-3000 is being rackmounted, install it in a standard 19-inch rack. Two GDC cabinets are available for that purpose:

   EP-2T — 30 in. (76 cm) by 23 in. (59 cm) by 24 in. (61 cm) with two fans

   EP-4 — 76 in. (193 cm) by 23 in. (59 cm) by 26 in. (66 cm) with blower

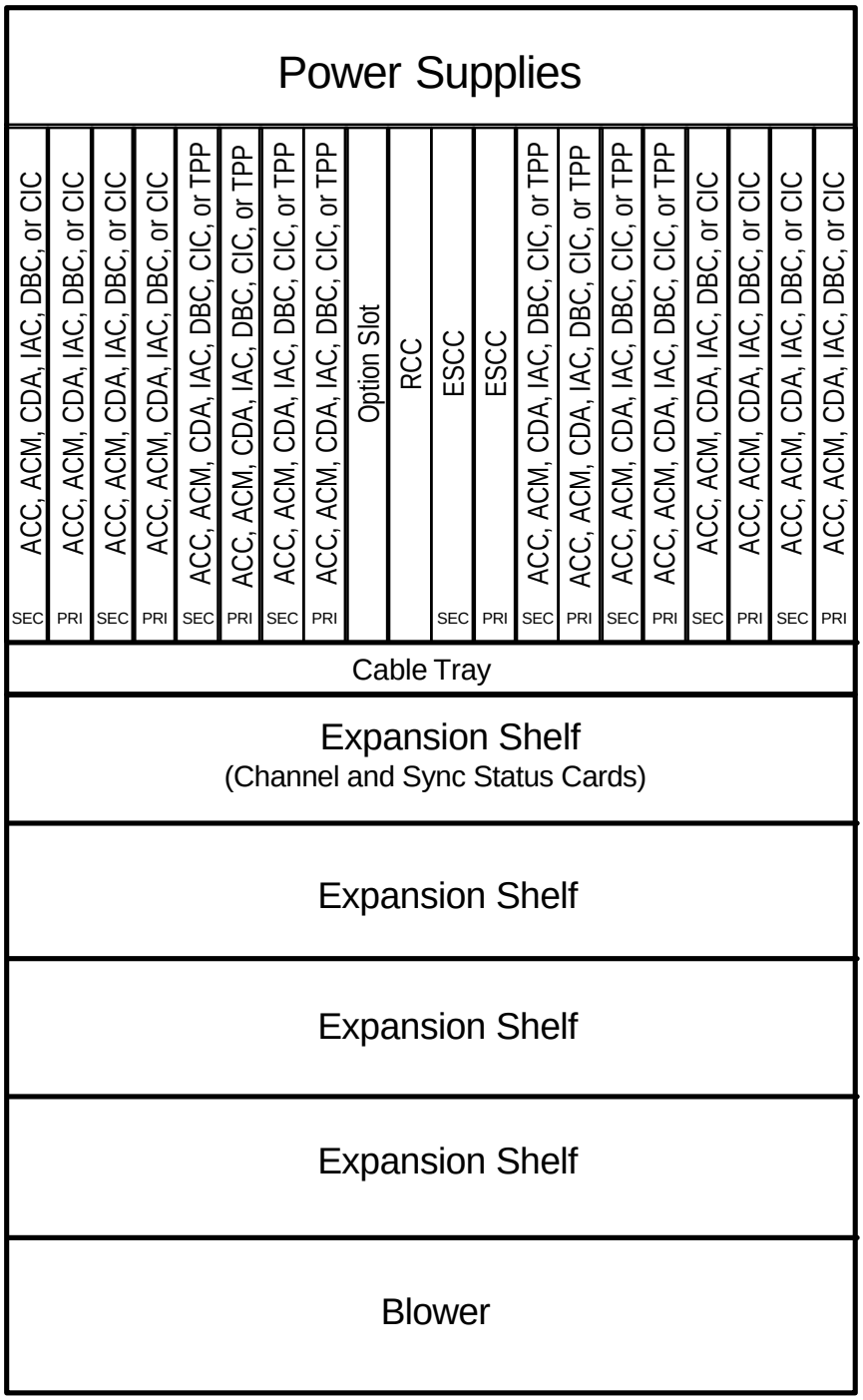
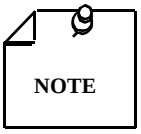


Figure 1-2 TMS-3000 Module Locations



The EP-4 cabinet comes wired with a 20-ampere rated line cord and a twist-lock NEMA L5-20P type plug. This mates with a NEMA 20R type receptacle which must be available adjacent to the installation.

Provide the following vertical rack space for each TMS-3000 shelf component:

GPS-8A,GPS-8B or DPS-8A — 7 in. (18 cm)

TMS-3000 shelf — 14 in. (36 cm)

16-channel expansion shelf — 7 in. (18 cm)

32-channel expansion shelf — 14 in. (36 cm)

Air must be forced through the rack. A blower capable of moving 300 cfm (cubic feet per minute) must be installed at the bottom of the shelves. Three exhaust fans capable of moving 100 cfm must be installed at the top of the cabinet. Ideal external ambient temperature is between 77°and 93°F (25°and 30°C). Operation between 32° and 124° F (0° and 50°C) is allowable only when equipment is mounted in a GDC EP-2T, EP-2M, and EP-4 cabinets (assuming proper airflow requirements have been met).

1. Connect dc power harness on rear of main shelf assembly to the GPS-8A, GPS-8B, or DPS-8A. The drawing package includes a wire list for the harness, where you see the terminal connections for each wire. Connections to the power supply are made by inserting the wire into the appropriate power supply terminal and tightening the screw that fits into the terminal. Alarm connections between the power supplies and the TMS-3000 main shelf is described later in this chapter.

   Location of power supply connectors on the TMS-3000 Harness Card are shown in *Figure 1-3*. *Table 1-1* lists the wire color coding for the power supply harness.

2. Check that power supply Power On/Power Off switch is Off. If GPS-8A or GPS-8B is being used, connect power cord to grounded ac outlet; if DPS-8A, connect to –48 V battery (*Refer to Instruction Manual for DPS-8A, GDC 041R162-000*).

Do not apply primary power until all connections have been made and all options implemented.

Table 1-1 Power Supply Harness Color Codes

Power Supply Harness Wire	Terminal Connection
Orange	+12 V dc
Purple	–12 V dc
White/Red	+5 V dc
White/Black	GND

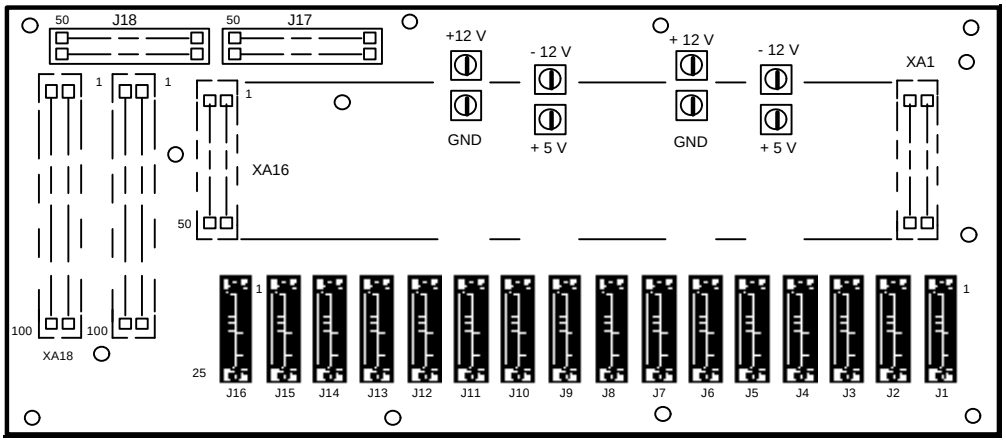


Figure 1-3 Power Supply Connectors on TMS-3000 Expansion Harness Card

AC Power On/Off Procedure for a TMS-3000

GDC products contain voltage sensing circuits that ensure that proper reset signals are generated during power up/down switching. These circuits are designed to protect the electronics from lock-ups and memory loss for ac transients and power on/off conditions.

Switching power on/off via a branch circuit breaker can generate unpredictable transient conditions since inductive and/or capacitive loads connected to the branch affect the voltage on/off sensing circuits. To ensure reliable operation, use the following procedure to turn TMS-3000 power on:

1. Turn the branch circuit breaker on first. This gives transients, due to heavy inductive and capacitive line loads, time to settle.
2. If the communication product is mounted in a cabinet equipped with a local circuit breaker, such as a GDC EP-4 cabinet, turn the local breaker on next.
3. Turn off the dc power supplies mounted in the node.

To turn TMS-3000 Power off, reverse the power-on procedure by first turning off the dc power supplies.

TMS-3000 Controller Initialization

For information on the installation and initialization of the TMS-3000 Controller, *refer to Chapter 5* of this manual.

Fused Links

Fused links in the interface circuits protect the TMS-3000 from damages during operation. To prevent large circulating currents due to differences in ground potential, the TMS-3000 should be powered by the same power source as the equipment with which it interfaces. If you don't know if the equipment is powered by the same power source, confirm that a potential difference of less than 0.25 V rms (as measured by a high impedance digital multimeter or equivalent) exists between the grounding circuits of the respective power outlets.

TMS-3000 incorporates internal fused links which may open if the ground potential exceeds 0.25 V rms between this unit and equipment interfaced with this unit. Do not apply power to the TMS-3000 until you have finished connecting it to peripheral equipment.

Fused links on the TMS-3000 are located on the rear of the harness card.

Each interface circuit (both channel and aggregate) contains a fused link between the chassis ground (earth) connector pin (Pin 1 of the 25-pin connector) and the chassis ground circuit of the TMS-3000. Each link is located directly below each 25-pin connector. Each link appears as an extremely thin solder line, with one end connected to the chassis ground plane on the harness card. Fused links that have opened because of excessive ground currents between equipment can be restored as follows:

1. Normalize the potential difference between associated grounding circuits to less than 0.25 V rms (as measured with a high impedance digital multimeter or equivalent).
2. Disconnect all power connections.
3. Restore fused link with a single strand of No. 32 to 40 AWG gauge copper wire (No. 32 is the standard strand of seven-strand No. 24 gauge wire). Solder the single strand to the appropriate terminals on the rear of the harness card.
4. Reconnect power connections and resume normal operations.

When several cabinets are installed together, use a copper braided ground strap between the cabinets to ensure sufficient grounding.

Compliance With Subpart J, Part 15 of FCC Rules

For full compliance with Subpart J of Part 15 of FCC rules (governing radiated RF energy from computing devices), use shielded cables with metal hooded connectors for all TMS-3000 aggregate and channel connections. Each cable hood must make firm contact with TMS-3000 frame ground.

At the end of the cable hood are two screws that should be screwed in firmly to make ground contact. The hooded cable grounding arrangement is illustrated in *Figure 1-4*.

Follow this procedure when using customer supplied cables. Unshielded cables or improperly installed shielded cables may interfere with nearby radio communications.

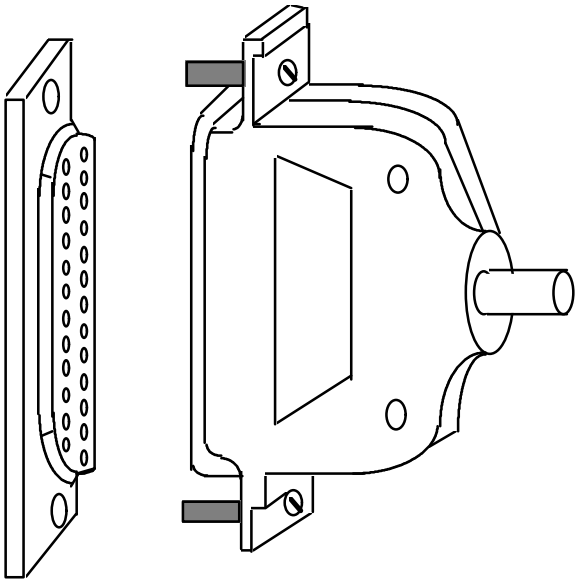


Figure 1-4 Typical Hooded Cable Grounding Arrangement

Power Supply to TMS-3000 Alarm Connections

Any TMS-3000 node can report power supply failures (as an alarm condition) to the Controller. Two separate power supply failures (Primary and Secondary) are reported. To enable node reporting of power supply failures, make the following connections (the metal backplane shield on the main shelf must be removed to make these connections):

Primary power supply Alarm Bus connector to TMS-3000 main shelf connector XA10A, Pin A14.

Secondary power supply Alarm Bus connector to TMS-3000 main shelf connector XA10A, Pin A2.

In most cases, TMS-3000 shelves are shipped from the factory already connected.

TMS-3000 Node External Timing Connections

GTS software is used to set each TMS-3000 node to receive a master timing reference signal from an external source or to be the master timing source for the network.

In most cases, a reference timing signal is received from an aggregate and requires no special cabling. If timing is obtained from channel equipment, a special Y-cable splits timing from the other signals entering the channel interface and transports the timing signal to external timing connector J18 on the TMS-3000 main shelf backplane. Two cables are available for this purpose: 028H504-001 (for unbalanced signals) and 028H505-001 (for balanced signals, EIA-422 adapter required).

The 9-pin connector of the cable connects to J18; the 25-pin connectors mate to a TMS-3000 channel interface connector and to a 25-pin crossover cable, which connects to the data service unit or modem that supplies the reference timing signal.

Select "External" as the timing source for the node when using this arrangement. Any other external timing source connects directly to J18.

On the TMS-3000, 9-pin connector J18 (located on the rear backplane of the main shelf) lets you use a balanced or unbalanced external clocking source.

Table 1-2 provides pin functions and technical specifications for connector J18. *Figure 1-5* illustrates the J18 connector pins as viewed from the TMS-3000 rear backplane.

The TMS-3000 node also outputs an external timing source for transfer of timing. This output is a balanced RS-422 interface clock signal at the rate of 512 KHz and is phase locked with the node reference clock.

Table 1-2 External Clock Input (J18) Function

Pin No.	Function	Unbalanced Clock*	Balanced Clock*
1	Protective Ground	Signal Ground	Cable shield
2	External Timing Input A	Clock input	Clock A input
3	External Timing Input B	No connection	Clock B input
4-7	—	Not used	Not used
8	External Timing Output B		512 KHz Clock Output B
9	External Timing Output A		512 KHz Clock Output A
* See *Table 2-5* for ESCC option settings for balanced and unbalanced interfaces.			

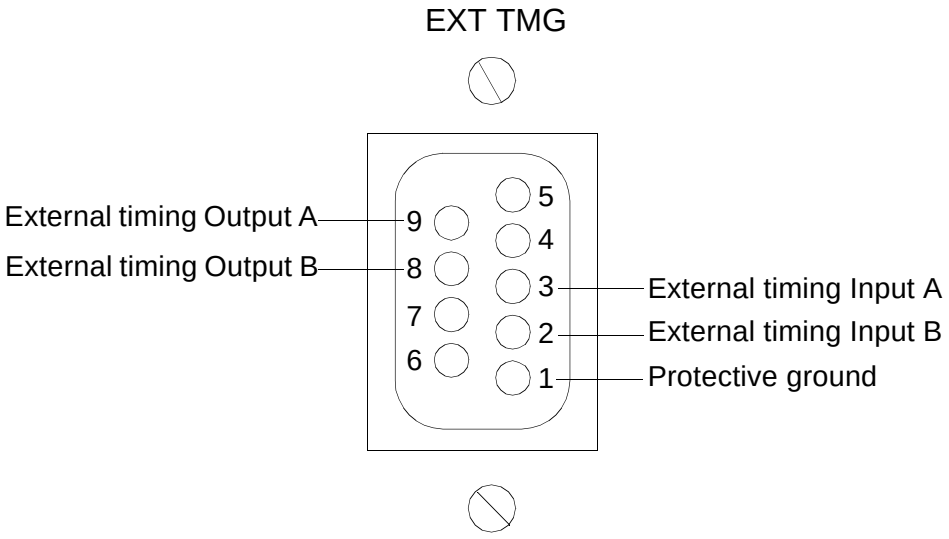


Figure 1-5 External Clock Connector (J18) TMS-3000 Rear Backplane View

Alarm Relay Connections

The RCC (Redundancy Control Card) in the TMS-3000 contains two relays — one for major alarms, and one for minor alarms — that allow connections to activate external equipment. The alarm relays are deenergized during normal operation and provide two sets each of normally open and normally closed contacts (Relay Type 2, Form C). Appropriate relays are energized to signal alarm conditions. Connections are made to a 15-pin connector, J17 on the TMS-3000 main harness card. *Table 1-3* lists the J17 pins used to connect the normally open or normally closed contacts of the relays to the external equipment.

Do not exceed maximum ratings of the relay contacts: 3 W, 0.25 A, 28 V.

Table 1-3 Alarm Relay Connections, Rear Panel Connector J17

Pin Number	Function	Relay State
1	Minor Alarm 2	Common (CO)
2	Major Alarm 2	Common (CO)
3	Spare	
4	Spare	
5	Major Alarm 2	Deenergized (NO)
6	Major Alarm 1	Deenergized (NO)
7	Minor Alarm 2	Deenergized (NO)
8	Minor Alarm 1	Deenergized (NO)
9	Major Alarm 1	Common (CO)
10	Spare	
11	Minor Alarm 1	Common (CO)
12	Major Alarm 2	Energized (NC)
13	Major Alarm 1	Energized (NC)
14	Minor Alarm 2	Energized (NC)
15	Minor Alarm 1	Energized (NC)

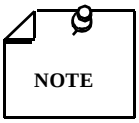
The main harness backplane current rating is 1.4 A maximum. Any dc or ac voltage supplied by a power supply through the alarm port connector J17 should be fused accordingly. Failure to fuse the alarm port connector can result in severe damage to the TMS-3000 main harness backplane.

TMS-3000 Controller Interface Connections

Asynchronous

GDC 028H303 cable connects serial Port 1 of the Controller to connector J20 on the TMS-3000 backplane. You also need a shielded EIA/TIA-232-E extension cable (*GDC 027H506-XXX*). The two cables are combined in *GDC 027H004-XXX*. *Refer to Chapter 5, System Initialization* to connect the keyboard, monitor, and system unit together. *Chapter* 5 also provides a description of TMS-3000 Controller initialization.

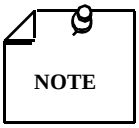
Connect the Maintenance Console to the TMS-3000 using *GDC 028H305*. One end of the cable connects to EIA Connector J19 on the TMS-3000 backplane; the other end connects to the Maintenance Console connector marked *MODEM* or *COMM* (*See Figure 1-6*).



Some of the TMS common cards (ESCC, ACM, CDA, TPP, and OPP) have a front monitor port for connecting the Maintenance Console. The cable required for this connection is GDC 024H140.

An interactive control port for the Controller may be extended to a remote NETCON site. This application uses the NETCON CRT link facility to control TMS-3000 through the CRT of a NETCON operator.

Connections at the Controller site are made to serial Port 1 located at the back of the controller. Typically, a modem link connects the port to a NETCON I/O port at another site.



The Controller can be connected to a modem through which it can communicate with a NETCON at a remote node. A NETCON-CRT link is described in GDC 058R675 and Chapter 4 of this manual. When the PC is connected to the TMS-3000 through serial Port 0, serial Port 1 can be used to link a modem on NETCON to the PC only if the PC monitor and keyboard are not connected or the PC is logged off. Serial Port 1 on the back of the PC is the leftmost I/O Port. Serial Port 0 is to the right of serial Port 1. See Figure 1-7.

Synchronous

GDC 027H328 connects the synchronous port of the Controller to connector J20 on the TMS-3000 backplane. The synchronous port is provided by a Digiboard Digichannel PC/8i+ or MC/8i+ installed in the PC. Refer to Appendix A of this manual for installation instructions.

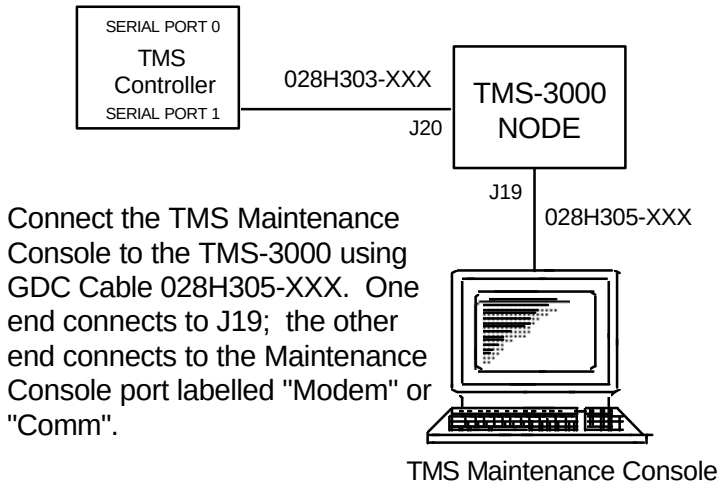


Figure 1-6 Controller Hookup To TMS-3000 Node and Maintenance Console

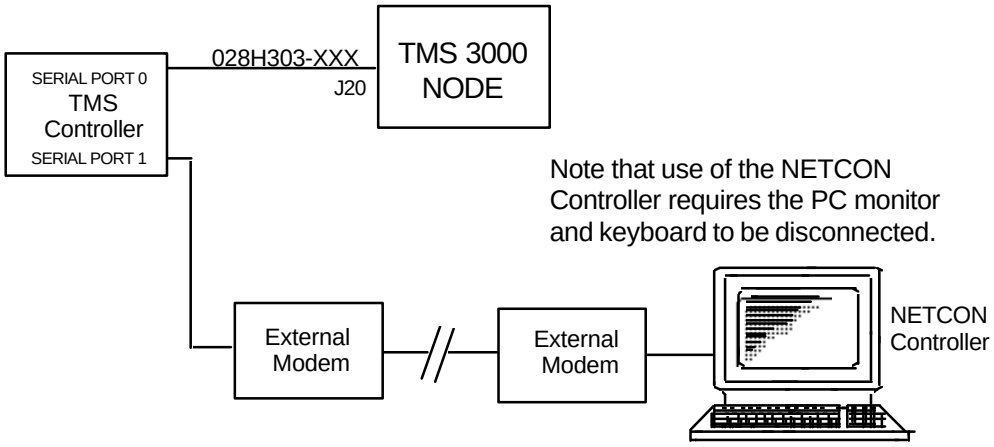


Figure 1-7 Controller Hookup to TMS-3000 Node Using NETCON Controller

Dial Backup Connections

To install Dial Backup using two external modems:

1. Install cable 028H303 to the output port (Port 1) on the Controller. The DB-25 end of this cable connects to the input of an external auto-dial modem. The VF output of this external modem is connected into the phone line at the remote end. The output of the phone line connects into the remote external modem.

2. Utilizing *GDC 028H502-XXX*, connect one end to the output of the external modem. Connect the other side to J42 on the rear of the Main Shelf Backplane.

3. Using the main menu and node configuration screens of the Controller, proceed to initiate Dial Backup.

Supervisory Pass-Through Installation

Using *GDC 028H303-025 or 028H320*, connect the Controller output (Port 1) to connector J20 (TMS Controller Input) on the TMS-3000 Backplane of the node at the local site. Next, using *GDC 028H502-XXX*, connect the output connector (J42) of this node to J20 of the next node at the site. See *Figure 1-8*.

The supervisory route continues using the same GDC Cables until the desired number of nodes at the site are connected.

Utilizing the configuration screens of the Main Controller, software establishes the supervisory data communication path to each node at the site.

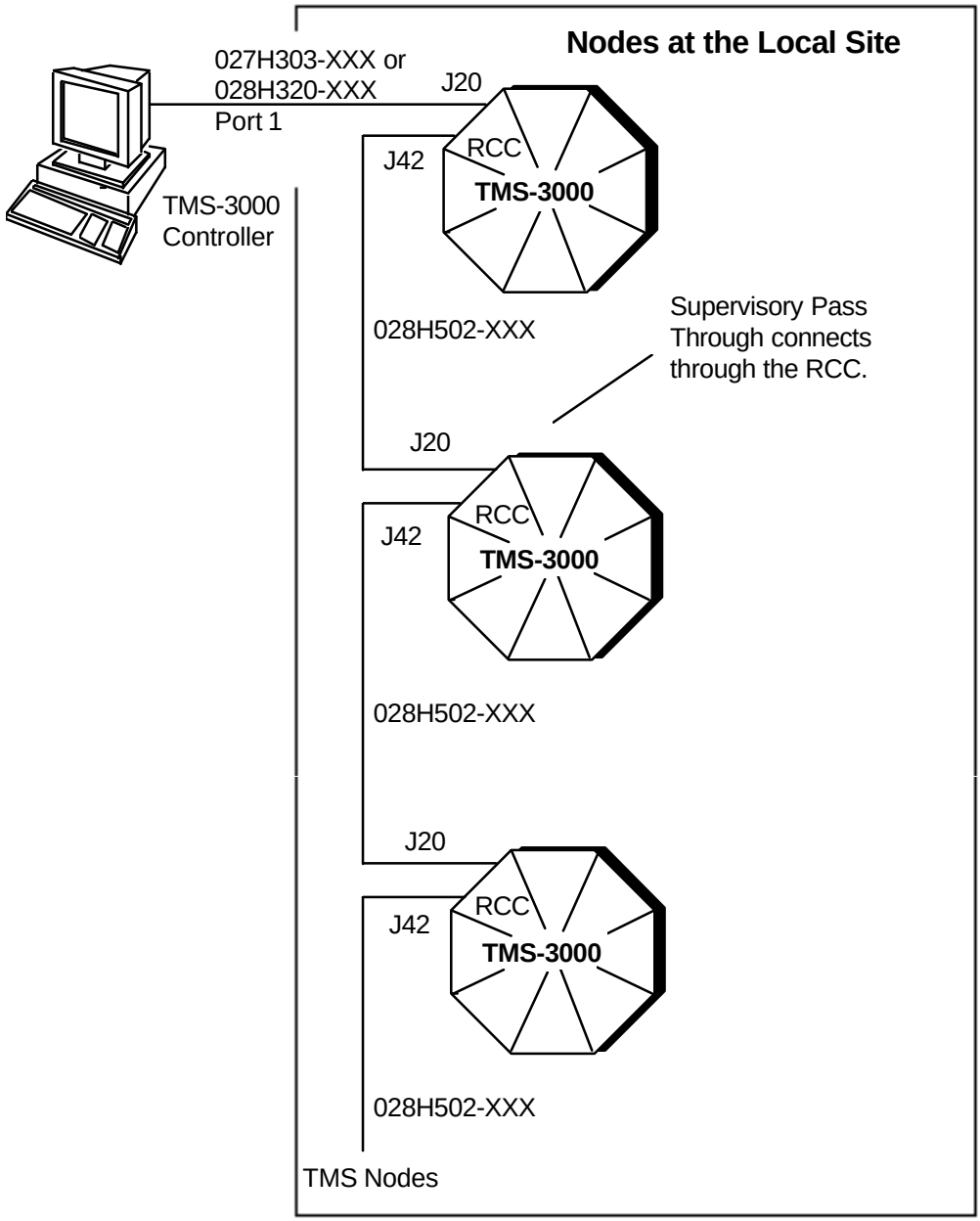


Figure 1-8 Supervisory Pass Through Installation

Summary

In this chapter we provided procedures for installation of the TMS-3000. Unpacking, shelf mounting, cable and wire connections, option selection, and system timing were all discussed.

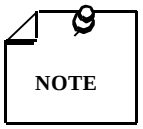
What's Next?

In the next chapter we cover procedures for installation and optioning of TMS common cards.

2 Common Card Installation

Overview

The flexibility of the TMS-3000 system provides many options for TMS-3000 modules. By selecting certain options, the TMS-3000 can operate in many unique environments without needing extensive external interface equipment.



The TMS-3000 utilizes the following components in the main shelf. Note that the terms "Card" and "Module" are commonly used and interchanged in the field (and in this manual). For example, Redundancy Control Card and Redundancy Control Module refer to the same component.

ACC (Aggregate Control Card)
ACM (ADPCM Compression Module)
CDA (Combined Digital Aggregate) Module
CIC (Channel Interface Card)
DBC (Digital Bridging Card)
ESCC (Enterprise System Control Card)
IAC (ISDN Aggregate Control Card)
RCC (Redundancy Control Card)
TPP (TMS Packet Processor)

The following sections provide part numbers and describe the methods of option selection and the options provided for each TMS-3000 common card. Detailed information about specific settings of option devices is given in a number of tables in this chapter. Option tables for each module are grouped with the drawings pertaining to that specific module.

A TMS-3000 system is shipped from GDC with a specific configuration selected through the devices described below. In most cases, the settings need not be changed during installation. Use the information provided here to check for correct settings and to determine necessary changes in the hardware configuration. If you are unsure of the correct setting for any device, contact GDC for technical assistance.

Part Numbers

This section provides information to be used to procure replacement assemblies and pc boards. *Tables 2-1 through 2-4* break down assemblies into sub-assemblies that form the component.

Table 2-1 TMS-3000 Shelf with Non-redundant Common Logic (036M56-001)

Equipment Supplied	Designation	GDC Part No.
Main Shelf Assembly	—	036B300-001
Assembly Filler Card	—	036C011-001
PCB Assembly, ESCC	—	036P336-001
PCB Assembly, Redundancy Control II	—	036P302-001

Table 2-2 TMS-3000 Shelf with Redundant Common Logic (036M356-002)

Equipment Supplied	Designation	GDC Part No.
Assembly Shelf TMS-3000	—	036B300-001
Assembly Filler Card TMS-3000	—	036C011-001
PCB Assembly, ESCC	—	036P336-001
PCB Assembly, Redundancy Control II	—	036P302-001

Table 2-3 TMS-3000 Non-redundant Expansion Shelf (036M302-001)

Equipment Supplied	Designation	GDC Part No.
Assembly Expansion Shelf TMS-3000	—	036B301-001
PCB Assembly, Expansion Card TMS-3000	—	036P307-002

Table 2-4 TMS-3000 Redundant Expansion Shelf (036M302-002)

Equipment Supplied	Designation	GDC Part No.
Assembly Expansion Shelf	—	036B301-001
PCB Assembly, Expansion Card TMS-3000	—	036P307-002

Option Selection Devices

You can implement optional configurations on a module with program plugs, switches, jumper plugs, or resistor networks. Each item is described below.

Program Plugs

Program plugs select different interface configurations on the Data Channel module and on the RS-422/423 Channel Adapter (if used). Program plugs may also provide nonstandard clock rates on the Clock Generator module. These plugs are factory-installed in accordance with intended system usage, but may be altered on site to change the operating configuration of the TMS-3000.

A program plug is designated with the letters PP and a number (for example, PP1). The plug fits into a socket identified with the letters XPP and a number (for example, XPP1).

To remove a program plug:

1. Gently lift the plug from the socket with the extractor tongs provided with the TMS-3000.

To install a program plug:

1. Determine the correct pin alignment.
2. Carefully insert the program plug into the socket.

Switches

Switches are used to select various options on most modules. Option tables for each module provide information on the features obtained by each selection. Switches are designated by the letter S and a number (e.g., S2).

Several different types of switches may be used on TMS-3000 modules. Each type of switch is illustrated in *Figure 2-1*. A vertical or right angle switch must be set up (Off or Open) or down (On or Closed). A DIP switch must be placed On (Closed) or Off (Open). A double pole latch switch has no On or Off position. Both the DIP switches and the double pole latch switches are set according to silkscreen markings on the pc card; simply move the switches to the marking that indicates the desired function. The option tables indicate the silkscreen marking for each option selection. For vertical or right angle switches, the option tables indicate On (Closed) or Off (Open) positions to select each option.

Jumper Plugs

Jumper plugs complete different circuits when placed over certain pins of headers on a component board. Silkscreen markings on the board indicate the selections made by different jumper plug positions. The option tables for each module provide information on the features obtained by each selection. Jumper plugs are designated by the letter X and a number (e.g., X1).

Resistor Networks

The Data Channel module uses resistor networks to develop the signal voltage levels required by different interface standards. These networks must be changed when a channel is configured for a different interface standard (*Table 2-28* describes the switch, jumper, and resistor network required for each interface).

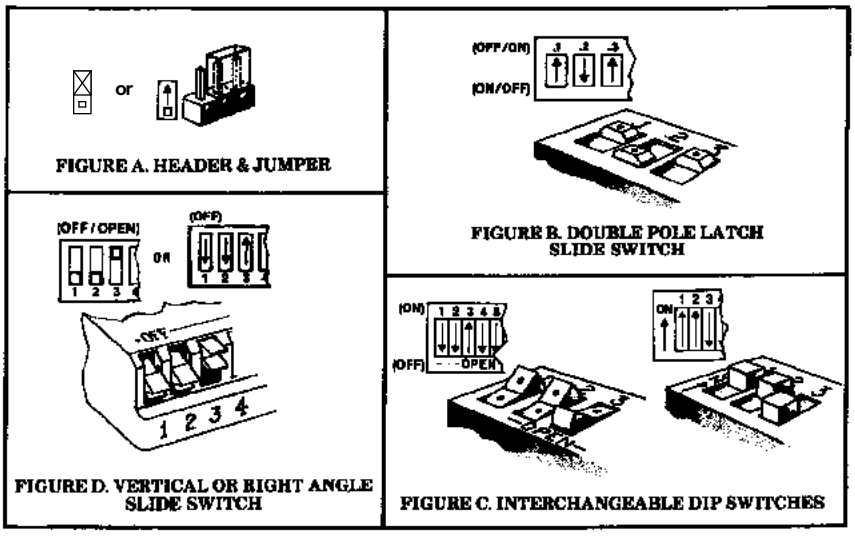


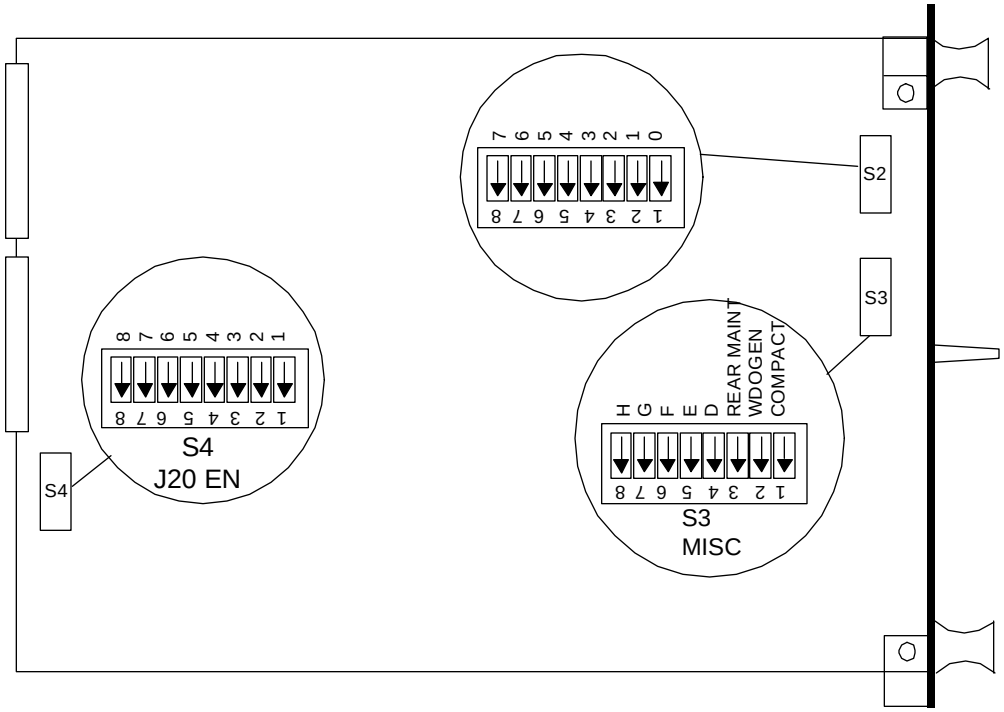
Figure 2-1 Option Switches and Jumpers

Enterprise System Control Card

This section covers ESCC options. Associated tables and drawings provide detailed installation information.

ESCC Option Selection

ESCC options are selected by varying the positions of option Switches S2, S3 and S4 that are located on the ESCC printed circuit board assembly, as illustrated in *Figure 2-2*. Use *Tables 2-5 and 2-6* to determine how to select each option.



ESCC PCB Assembly GDC 036P336

Figure 2-2 Option Switch Locations

Table 2-5 ESCC Option Description

Option	Selection	Switch	Setting	Description
Node Address	1 thru 126	S2-1 thru S2-7	*See Table 2-5*	Used to select the address for the node (*See Table 2-5*).
Node Type	Compact	S3-1	OFF	Configures ESCC for operation as a Compact node.
	TMS-3000	S3-1	ON*	Configures ESCC for operation as a TMS node.
Watchdog	Disabled	S3-2	OFF	Disables watchdog (for testing purposes).
	Enabled	S3-2	ON*	Enables watchdog.
Monitor Port	Back	S3-3	OFF*	Selects back port for maintanance console.
	Front	S3-3	ON	Selects front port for maintenance console.
Clock Bus 6 Frequency	Special Rate (PROG1)	S3-4	OFF	Selects special rate (PROG1) as clock frequency on Clock Bus 6.
	1.536 MHz.	S3-4	ON*	Selects 1.536 MHz as clock frequency on Clock Bus 6.
Clock Bus 7 Frequency	Special Rate (PROG2)	S3-5	OFF	Selects special rate (PROG2) as clock frequency on Clock Bus 7.
	1.344 MHz	S3-5	ON*	Selects 1.344 MHz as clock frequency on Clock Bus 7.
External Timing Source Impedance	Unbalanced	S3-6	OFF	Selects unbalanced impedance for an external timing source, if any, on serial Port J18. Choose unbalanced impedance for EIA-232-D and RS-423 interfaces.
	Balanced	S3-6	ON*	Selects balanced impedance for an external timing source, if any, on serial Port J18. Choose balanced impedance for V.35 and RS-422 interfaces.
J20 RSET	Disabled	S4-1	OFF	Disables signal RSET on serial Port J20.
	Enabled	S4-1	ON*	Enables signal RSET on serial Port J20.
J20 SER1TDATA	Disabled	S4-2	OFF	Disables signal SER1TDATA on serial Port J20.
	Enabled	S4-2	ON*	Enables signal SER1TDATA on serial Port J20.
J20 SER1DTR	Disabled	S4-3	OFF	Disables signal SER1DTR on serial Port J20.
	Enabled	S4-3	ON*	Enables signal SER1DTR on serial Port J20.
J20 TSET	Disabled	S4-4	OFF	Disables signal TSET on serial Port J20.
	Enabled	S4-4	ON*	Enables signal TSET on serial Port J20.
J20 SER1RDATA	Disabled	S4-5	OFF	Disables signal SER1RDATA on serial Port J20.
	Enabled	S4-5	ON*	Enables signal SER1RDATA on serial Port J20.
J20 SER1DSR	Disabled	S4-6	OFF	Disables signal SER1DSR on serial Port J20.
	Enabled	S4-6	ON*	Enables signal SER1DSR on serial Port J20.
J20 LOCKFREQINB	Disabled	S4-7	OFF	Disables signal LOCKFREQINB on serial Port J20.
	Enabled	S4-7	ON*	Enables signal LOCKFREQINB on serial Port J20.
J20 LOCKFREQINA	Disabled	S4-8	OFF	Disables signal LOCKFREQINA on serial Port J20.
	Enabled	S4-8	ON*	Enables signal LOCKFREQINA on serial Port J20.
Not Used	Not Used	S2-8 , S3-7, S3-8	ON*	These option switches must be set in the ON position.
* Default selection				

Table 2-6 ESCC Node Address Option

Node Address	Switch Settings						
	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7
1	OFF	ON	ON	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON	ON	ON
3	OFF	OFF	ON	ON	ON	ON	ON
4	ON	ON	OFF	ON	ON	ON	ON
5	OFF	ON	OFF	ON	ON	ON	ON
6	ON	OFF	OFF	ON	ON	ON	ON
7	OF	OFF	OFF	ON	ON	ON	ON
8	ON	ON	ON	OFF	ON	ON	ON
9	OFF	ON	ON	OFF	ON	ON	ON
10	ON	OFF	ON	OFF	ON	ON	ON
11	OFF	OFF	ON	OFF	ON	ON	ON
12	ON	ON	OFF	OFF	ON	ON	ON
13	OFF	ON	OFF	OFF	ON	ON	ON
14	ON	OFF	OFF	OFF	ON	ON	ON
15	OFF	OFF	OFF	OFF	ON	ON	ON
16	ON	ON	ON	ON	OFF	ON	ON
17	OFF	ON	ON	ON	OFF	ON	ON
18	ON	OFF	ON	ON	OFF	ON	ON
19	OFF	OFF	ON	ON	OFF	ON	ON
20	ON	ON	OFF	ON	OFF	ON	ON
21	OFF	ON	OFF	ON	OFF	ON	ON
22	ON	OFF	OFF	ON	OFF	ON	ON
23	OFF	OFF	OFF	ON	OFF	ON	ON
24	ON	ON	ON	OFF	OFF	ON	ON
25	OFF	ON	ON	OFF	OFF	ON	ON
26	ON	OFF	ON	OFF	OFF	ON	ON
27	OFF	OFF	ON	OFF	OFF	ON	ON
28	ON	ON	OFF	OFF	OFF	ON	ON
29	OFF	ON	OFF	OFF	OFF	ON	ON
30	ON	OFF	OFF	OFF	OFF	ON	ON
31	OFF	OFF	OFF	OFF	OFF	ON	ON
32	ON	ON	ON	ON	ON	OFF	ON
33	OFF	ON	ON	ON	ON	OFF	ON
34	ON	OFF	ON	ON	ON	OFF	ON

Node Address	Switch Settings						
	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7
35	OFF	OFF	ON	ON	ON	OFF	ON
36	ON	ON	OFF	ON	ON	OFF	ON
37	OFF	ON	OFF	ON	ON	OFF	ON
38	ON	OFF	OFF	ON	ON	OFF	ON
39	OFF	OFF	OFF	ON	ON	OFF	ON
40	ON	ON	ON	OFF	ON	OFF	ON
41	OFF	ON	ON	OFF	ON	OFF	ON
42	ON	OFF	ON	OFF	ON	OFF	ON
43	OFF	OFF	ON	OFF	ON	OFF	ON
44	ON	ON	OFF	OFF	ON	OFF	ON
45	OFF	ON	OFF	OFF	ON	OFF	ON
46	ON	OFF	OFF	OFF	ON	OFF	ON
47	OFF	OFF	OFF	OFF	ON	OFF	ON
48	ON	ON	ON	ON	OFF	OFF	ON
49	OFF	ON	ON	ON	OFF	OFF	ON
50	ON	OFF	ON	ON	OFF	OFF	ON
51	OFF	OFF	ON	ON	OFF	OFF	ON
52	ON	ON	OFF	ON	OFF	OFF	ON
53	OFF	ON	OFF	ON	OFF	OFF	ON
54	ON	OFF	OFF	ON	OFF	OFF	ON
55	OFF	OFF	OFF	ON	OFF	OFF	ON
56	ON	ON	ON	OFF	OFF	OFF	ON
57	OFF	ON	ON	OFF	OFF	OFF	ON
58	ON	OFF	ON	OFF	OFF	OFF	ON
59	OFF	OFF	ON	OFF	OFF	OFF	ON
60	ON	ON	OFF	OFF	OFF	OFF	ON
61	OFF	ON	OFF	OFF	OFF	OFF	ON
62	ON	OFF	OFF	OFF	OFF	OFF	ON
63	OFF	OFF	OFF	OFF	OFF	OFF	ON
64	ON	ON	ON	ON	ON	ON	OFF
65	OFF	ON	ON	ON	ON	ON	OFF
66	ON	OFF	ON	ON	ON	ON	OFF
67	OFF	OFF	ON	ON	ON	ON	OFF
68	ON	ON	OFF	ON	ON	ON	OFF

Table 2-6 ESCC Node Address Option (Cont.)

Node Address	Switch Settings						
	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7
69	OFF	ON	OFF	ON	ON	ON	OFF
70	ON	OFF	OFF	ON	ON	ON	OFF
71	OFF	OFF	OFF	ON	ON	ON	OFF
72	ON	ON	ON	OFF	ON	ON	OFF
73	OFF	ON	ON	OFF	ON	ON	OFF
74	ON	OFF	ON	OFF	ON	ON	OFF
75	OFF	OFF	ON	OFF	ON	ON	OFF
76	ON	ON	OFF	OFF	ON	ON	OFF
77	OFF	ON	OFF	OFF	ON	ON	OFF
78	ON	OFF	OFF	OFF	ON	ON	OFF
79	OFF	OFF	OFF	OFF	ON	ON	OFF
80	ON	ON	ON	ON	OFF	ON	OFF
81	OFF	ON	ON	ON	OFF	ON	OFF
82	ON	OFF	ON	ON	OFF	ON	OFF
83	OFF	OFF	ON	ON	OFF	ON	OFF
84	ON	ON	OFF	ON	OFF	ON	OFF
85	OFF	ON	OFF	ON	OFF	ON	OFF
86	ON	OFF	OFF	ON	OFF	ON	OFF
87	OFF	OFF	OFF	ON	OFF	ON	OFF
88	ON	ON	ON	OFF	OFF	ON	OFF
89	OFF	ON	ON	OFF	OFF	ON	OFF
90	ON	OFF	ON	OFF	OFF	ON	OFF
91	OFF	OFF	ON	OFF	OFF	ON	OFF
92	ON	ON	OFF	OFF	OFF	ON	OFF
93	OFF	ON	OFF	OFF	OFF	ON	OFF
94	ON	OFF	OFF	OFF	OFF	ON	OFF
95	OFF	OFF	OFF	OFF	OFF	ON	OFF
96	ON	ON	ON	ON	ON	OFF	OFF
97	OFF	ON	ON	ON	ON	OFF	OFF

Node Address	Switch Settings						
	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7
98	ON	OFF	ON	ON	ON	OFF	OFF
99	OFF	OFF	ON	ON	ON	OFF	OFF
100	ON	ON	OFF	ON	ON	OFF	OFF
101	OFF	ON	OFF	ON	ON	OFF	OFF
102	ON	OFF	OFF	ON	ON	OFF	OFF
103	OFF	OFF	OFF	ON	ON	OFF	OFF
104	ON	ON	ON	OFF	ON	OFF	OFF
105	OFF	ON	ON	OFF	ON	OFF	OFF
106	ON	OFF	ON	OFF	ON	OFF	OFF
107	OFF	OFF	ON	OFF	ON	OFF	OFF
108	ON	ON	OFF	OFF	ON	OFF	OFF
109	OFF	ON	OFF	OFF	ON	OFF	OFF
110	ON	OFF	OFF	OFF	ON	OFF	OFF
111	OFF	OFF	OFF	OFF	ON	OFF	OFF
112	ON	ON	ON	ON	OFF	OFF	OFF
113	OFF	ON	ON	ON	OFF	OFF	OFF
114	ON	OFF	ON	ON	OFF	OFF	OFF
115	OFF	OFF	ON	ON	OFF	OFF	OFF
116	ON	ON	OFF	ON	OFF	OFF	OFF
117	OFF	ON	OFF	ON	OFF	OFF	OFF
118	ON	OFF	OFF	ON	OFF	OFF	OFF
119	OFF	OFF	OFF	ON	OFF	OFF	OFF
120	ON	ON	ON	OFF	OFF	OFF	OFF
121	OFF	ON	ON	OFF	OFF	OFF	OFF
122	ON	OFF	ON	OFF	OFF	OFF	OFF
123	OFF	OFF	ON	OFF	OFF	OFF	OFF
124	ON	ON	OFF	OFF	OFF	OFF	OFF
125	OFF	ON	OFF	OFF	OFF	OFF	OFF
126	ON	OFF	OFF	OFF	OFF	OFF	OFF

ESCC Installation

To install the ESCC in the TMS-3000 shelf, proceed as follows:

1. Place the ESCC front panel Enable/Disable switch in the Disable position.
2. Position the ESCC in the receptacle guides (top and bottom) of the slot shown in *Figure 2-3* and carefully slide the ESCC into the receptacle until it stops. Tilt the top ejector knob up and the bottom ejector knob down and gently push the ESCC into the rear connector. The knobs automatically assume their normal position.
3. Place the ESCC front panel Enable/Disable switch in the Enable position.

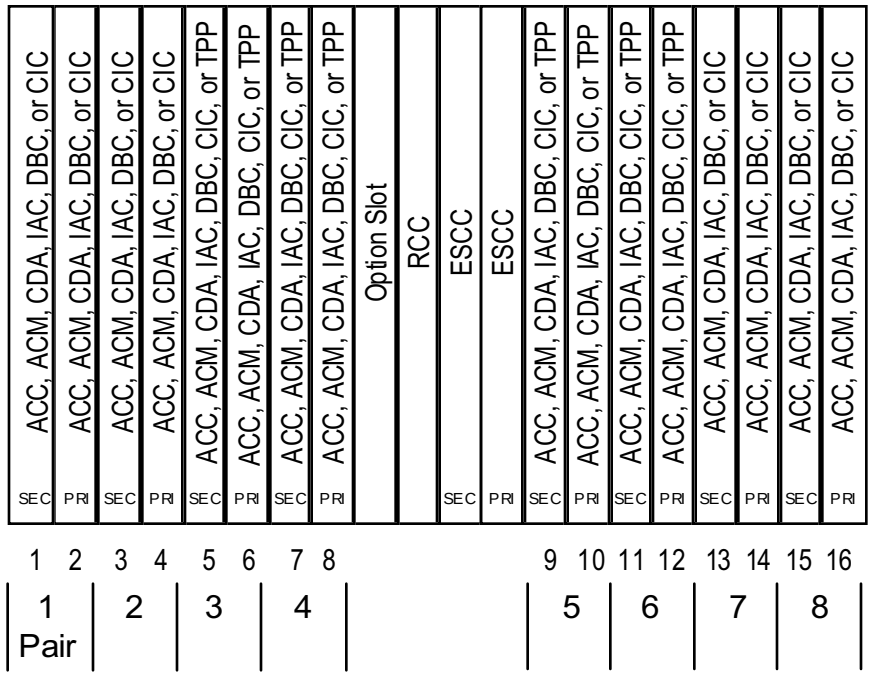


Figure 2-3 TMS-3000 Main Shelf Slot Locations

Redundancy Control Card

Install the RCC in the slot shown in Figure 2-3. The RCC is software controlled and therefore has no option selections.

Aggregate Control Card

This section covers Aggregate Interface part numbers, connections, connector functions, options, and optional plug-in cards as well as associated tables and drawings to provide detailed installation information.

Part Numbers

This section provides information to be used to procure replacement assemblies and pc boards. *Table 2-7* breaks down assemblies into sub-assemblies that form the component.

Table 2-7 Aggregate Control Card Assembly (036M313-006)

Equipment Supplied	Designation	GDC Part No.
PCB Assembly, Aggregate Control II	ACC-II	036P313-003
PCB Assembly Aggregate, Plug-In TMS-3000		036P314-001
Aggregate Interface plug-in cards:		
EIA/TIA-232-E/ITU-T V.28 Aggregate Interface	EIF-E	036P041-001
ITU-T V.35 Aggregate Interface	EIF-V	036P042-001
EIA RS-422/423/MIL-STD-188/ITU-T V.10/V.11 Aggregate Interface	EIF-P	036P043-001
T1/D4 1.544 Mbps Aggregate Interface	T1/D4	036P315-002
T1/D4 1.544 Mbps Aggregate Interface	T1/D4	036P315-003
ITU-T G.703 64 Kbps Codirectional Aggregate Interface	EIF-G	036P064-001
ITU-T G.703 2.048 Mbps 75-ohm Aggregate Interface	EIF-M1	036P065-001
ITU-T G.703 2.048 Mbps 12-ohm Aggregate Interface	EIF-M2	036P065-002
ITU-T G.703 64 Kbps Contradirectional Aggregate Interface	EIF-C	036P066-001
ITU-T G.703 256 Kbps 75-ohm Aggregate Interface	EIF-K1	336P065-001
ITU-T G.703 256 Kbps 120-ohm Aggregate Interface	EIF-K2	336P065-002
ITU-T G.704 2.048 Mbps 75/120 ohm Aggregate Interface	—	036P281-001

Aggregate Interface Connections

Aggregate Interface cables are connected to the DB-25 EIA connectors located in the upper half of the TMS-3000 Harness Card (backplane), from left to right in two rows of eight connectors. In the TMS-3000 system, aggregate interfaces require a matching Aggregate Interface Piggyback Card mounted on the ACC.

A list of Aggregate Interface cables is provided in *Table 2-8* along with a description of the applications for each cable. The connectors on the TMS-3000 backplane for the Aggregate interface cables are listed in *Table 2-9*.

Table 2-8 Aggregate Interface Cables

GDC Cable No.	Description	Application
028H502	EIA/TIA-232-E/ITU-T V.28	For all 232-E and ITU-T V.28 aggregate trunks. Available in 5-, 15-, 25-, and 50-foot lengths. Straight through cable.
027H507	ITU-T V.35	For ITU-T V.35 trunks — generally used for domestic applications. Available in 5-, 15-, and 25-foot lengths.
027H508	EIA RS-422/423 ITU-T V.10/V.11 MIL-STD 188C	For EIA RS-422 or 423, ITU-T V.10 or V.11, MIL-STD 188C aggregate trunks. Available in 5-, 15-, and 25-foot lengths, or other lengths up to 500 feet.
027H201	ATT DS (T1)	Standard connector for T1 lines, for connection to CSUs or other devices with F-DB15 connectors.
036H013	ITU-T V.35 (European)	For European V.35 applications. Available in 5-, 15-, or 25-foot lengths.
027H307	T1 or ITU-T G.703 25-pin connector to wire ends	For T1 or ITU-T G.703 connections where connections to trunk equipment are made using wire ends only (no connectors). Available in 25- or 75-foot lengths.
027H408	EIA/TIA-232-E (422 Signals)	Used for connection of RS-422 Aggregate to 422 Data Chan., Submux.
027H517	EIA/TIA-232-E (V.35 Signals)	Used for connection of ITU-T V.35 Aggregate Link to business equipment connector on the DS-1 shelf.
027H531	EIA/TIA-232-E (422 Signals)	Used for connection of RS-422 Aggregate Link to business equipment connector on the DS-1 Shelf.
027H316	T1/D4 to T1/D4 Y-cable	Used for non-redundant pairs of CDA modules in adjacent slots. Provides two T1 lines with DB-25 connectors.

Table 2-9 TMS-3000 25-Pin Connector Functions

Connector	Function
J1-J16	Aggregate Cable Connectors
J-19	VDU (Maintenance Console Terminal)
J-20	TMS-3000 Controller
J-41	Internal VF Modem
J-42	External Modem Port
J-43	Optional Module

Aggregate Connector Functions — Redundancy and Diversity

Two Common Modules are redundant if the primary is in service, and its pair is in standby in case the primary fails. Aggregate trunks are diverse if the upper aggregate trunk connector on the backplane is in service and the lower connector is in standby. Although, functionally, redundancy and diversity are unrelated, a trade-off exists between the number of channels and the number of aggregates that can be accommodated. This trade-off exists because of the number of hardware connectors on the main shelf backplane.

As shown previously in *Figure 2-3*, the TMS-3000 Main Shelf has 20 slot positions. Of those 20, the four center slots are reserved for the controlling modules. The 16 remaining slots are used for either ACC, CDA, ACM, CIC, DBC, or TPP modules. Note that TPP is covered in *GDC 036R302-A7* .

Think of these remaining 16 slots as 8 pairs because primary and redundant modules must be positioned adjacent to one another on the Main Shelf. Also, each pair of connectors (upper and lower) on the backplane are associated with each pair of slots they are positioned behind.

Up to 16 ACM or CDA Modules can be inserted into the TMS-3000 main shelf. This provides up to 16 non-redundant ACM or CDA Modules or 8 redundant ACM or CDA pairs. Any unused module slots can be used by either ACCs or CICs.

When using 16 ACM or CDA Modules, special provisions for heat dissipation of the main shelf are required. *See Installation in Chapter 1* , which discusses the cooling requirements of the main shelf.

Remember also that the CIC performs the interface for up to 64 data and voice channels at the local node and sends a serial stream across the fast bus to the ACC(s). Only an ACC can perform the interface tasks for each aggregate trunk. A CIC therefore does not use the aggregate trunk connector positioned behind it.

One CIC must use both 50-pin ribbon cable connectors located on the backplane below each pair of slots. For this reason, Channel Interface modules always require two slot positions. If you choose to have a non-redundant CIC, the adjacent slot must be empty. Also, a CIC cannot be paired with an ACM, Aggregate Control or CDA Module. Notice in *Figure 2-11* that the primary module is always on the right; for example, Slot 1 is redundant and Slot 2 is primary.

When configuring an ACC, take the following steps to configure redundant or non-redundant modules and diverse or non-diverse aggregate trunks:

1. Select diversity or single aggregate (non-diverse) on both ACCs in the pair. Use the berg jumpers located on the ACC.
2. Select redundant or non-redundant on both ACCs. Use the berg jumpers located on the ACC.
3. Select the options on Aggregate Interface Piggybacks A and B for both ACCs. Both boards should be set the same.
4. For diversity, place the piggyback interface card for the lower connector on the right. Place the piggyback interface card for the upper connector on the left. *See Figure 2-4.*

Table 2-10 gives the aggregate connector functions. For each pair of slots, choose which of the following applies and connect as described. Note that odd and even numbered slots are as seen from the front of the TMS-3000, starting at the left with number 1.

A redundant pair with diversity — The upper connector (odd or even slot, piggyback A) is connected to the primary aggregate trunk, and the lower connector (odd or even slot, piggyback B) is connected to the secondary aggregate trunk.

A redundant pair without diversity — The upper connector (odd or even slot, piggyback A) is connected to the aggregate trunk. The lower connector is not used.

A non-redundant pair with diversity — The upper connector is connected to the primary aggregate trunk, and the lower connector is connected to the secondary aggregate trunk.

A non-redundant pair without diversity — An ACC in an odd-numbered slot uses the lower connector (piggyback B) for aggregate trunk connections; the ACC in an even-numbered slot uses the upper connector (piggyback A) for aggregate trunk connections.

Do not use diversity in your system if you use AT&T's Automatic Protection Capability

NOTE

A TPP-LAN with two media adapters can draw up to 15 amps from the +5 volt power supplies. Consideration must be given to the maximum current drawn in a TMS-3000.

Consult General DataComm Service for information regarding the quantity of power supplies and backplane selects on TMS nodes containing more than two TPP cards or any number of TPP cards and more than three CDA, ACM, CIC or ACC cards.

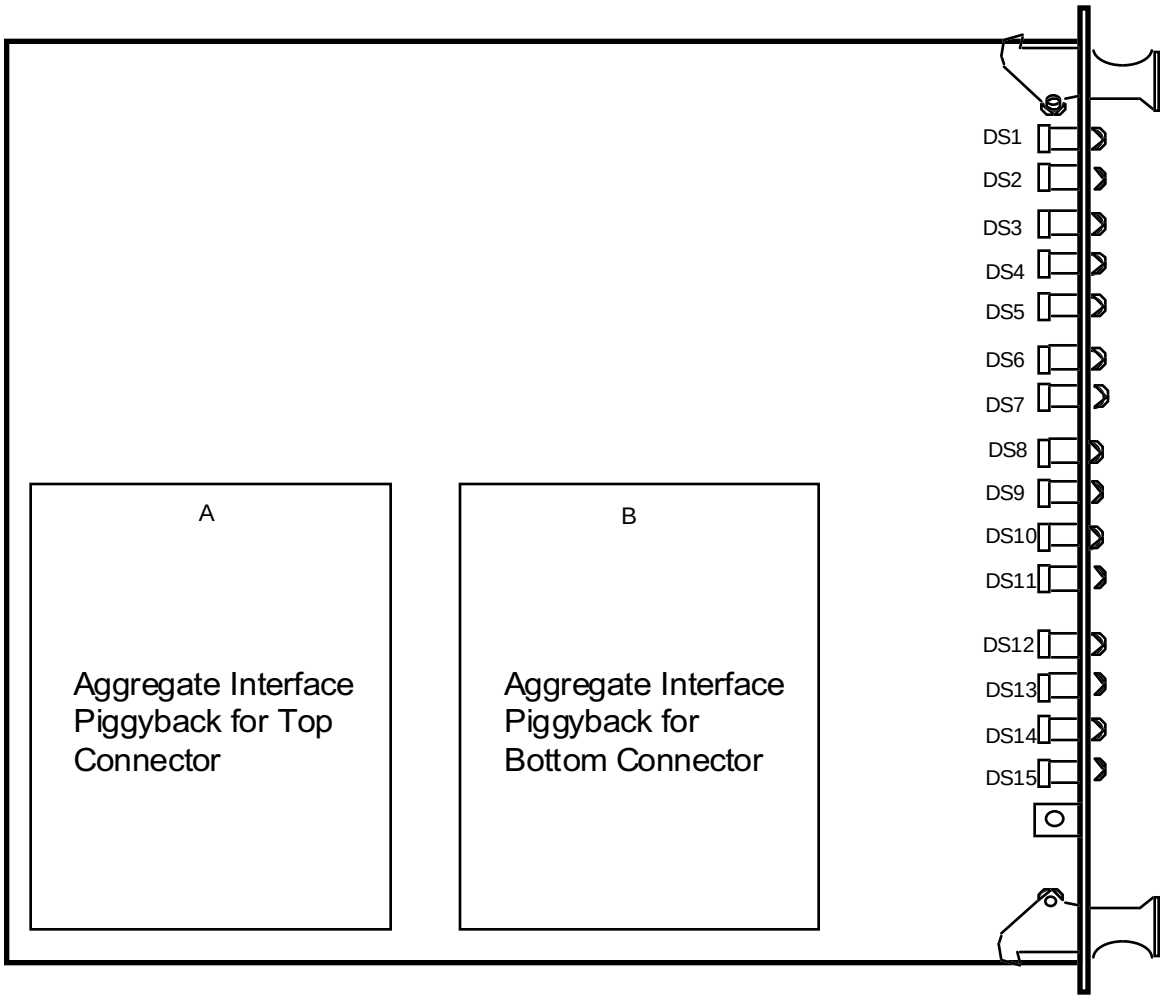


Figure 2-4 Aggregate Interface Piggyback Placement for Diversity

Table 2-10 Aggregate Connector Functions

Connector Number	Redundant, Diverse	Redundant, Non-diverse	Non-redundant, Diverse	Non-redundant, Non-diverse
J1	Slot 1 + 2 Primary Aggregate	Slot 1 + 2 Aggregate	Slot 1 or 2 * Primary Aggregate	Slot 1 Aggregate
J2	Slot 1 + 2 Secondary Aggregate	Not Used	Slot 1 or 2 * Secondary Aggregate	Slot 2 Aggregate
J3	Slot 3 + 4 Primary Aggregate	Slot 3 + 4 Aggregate	Slot 3 or 4 * Primary Aggregate	Slot 3 Aggregate
J4	Slot 3 + 4 Secondary Aggregate	Not Used	Slot 3 or 4 * Secondary Aggregate	Slot 4 Aggregate
J5	Slot 5 + 6 Primary Aggregate	Slot 5 + 6 Aggregate	Slot 5 or 6 * Primary Aggregate	Slot 5 Aggregate
J6	Slot 5 + 6 Secondary Aggregate	Not Used	Slot 5 or 6 * Secondary Aggregate	Slot 6 Aggregate
J7	Slot 7 + 8 Primary Aggregate	Slot 7 + 8 Aggregate	Slot 7 or 8 * Primary Aggregate	Slot 7 Aggregate
J8	Slot 7 + 8 Secondary Aggregate	Not Used	Slot 7 or 8 * Secondary Aggregate	Slot 8 Aggregate
J9	Slot 9 + 10 Primary Aggregate	Slot 9 + 10 Aggregate	Slot 9 or 10 * Primary Aggregate	Slot 9 Aggregate
J10	Slot 9 + 10 Secondary Aggregate	Not Used	Slot 9 or 10 * Secondary Aggregate	Slot 10 Aggregate
J11	Slot 11 + 12 Primary Aggregate	Slot 11 + 12 Aggregate	Slot 11 or 12 * Primary Aggregate	Slot 11 Aggregate
J12	Slot 11 + 12 Secondary Aggregate	Not Used	Slot 11 or 12 * Secondary Aggregate	Slot 12 Aggregate
J13	Slot 13 + 14 Primary Aggregate	Slot 13 + 14 Aggregate	Slot 13 or 14 * Primary Aggregate	Slot 13 Aggregate
J14	Slot 13 + 14 Secondary Aggregate	Not Used	Slot 13 or 14 * Secondary Aggregate	Slot 14 Aggregate
J15	Slot 15 + 16 Primary Aggregate	Slot 15 + 16 Aggregate	Slot 15 or 16 * Primary Aggregate	Slot 15 Aggregate
J16	Slot 15 + 16 Secondary Aggregate	Not Used	Slot 15 or 16 * Secondary Aggregate	Slot 16 Aggregate
* In this arrangement the ACC cannot be paired with another ACC. It must be next to an empty slot.				

ACC Options

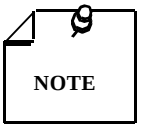
The options available on the ACC are described in *Table 2-11* and option locations are shown in *Figure 2-5*.

ACC (GDC 036P313-001) assembly contains a factory adjustment switch SW3 that should never be changed in the field. It controls a critical factory adjustment option which is set only when the PCB assembly is installed in a specialized test fixture at the factory. The purpose of SW3 is to fine tune the turn-on and turn-off times of the fast bus circuit Improper adjustment of this switch can cause erroneous data transfers between common cards and possible node failure.

Table 2-11 Aggregate Control Card Options

Feature	Selection	Switch (S), Jumpers (X)		Application
		Desig.	Pos.	
Watchdog Inhibit	Watchdog	X1	NORM	This selection is located on the Aggregate Control Piggyback. It is for in-house testing only. It should be left in the NORM position.
	Inhibit Watchdog	X1	INHIB W'DOG	
Redundancy	Redundant	X9	RED	Redundancy is selected if the ACC is part of a redundant pair. RED is selected if the module is not part of a redundant pair.
	Non-redundant	X9		
Diversity	Diversity	X8	DIV	Diversity is selected if the ACC is interfacing two aggregate trunks. DIV is selected if the module is interfacing one aggregate trunk.
	Single Aggregate	X8		
NOTE: Jumper X1 is located on the Aggregate Control Piggyback Card.				

When configuring a non-redundant 128 ACC w/diversity, place the redundancy Jumper X9 into the redundant position. Otherwise, a configuration error appears on the Controller.



Anytime the diversity Jumper X8 is selected on the ACC, check that the redundancy Jumper X9 is in its correct position.

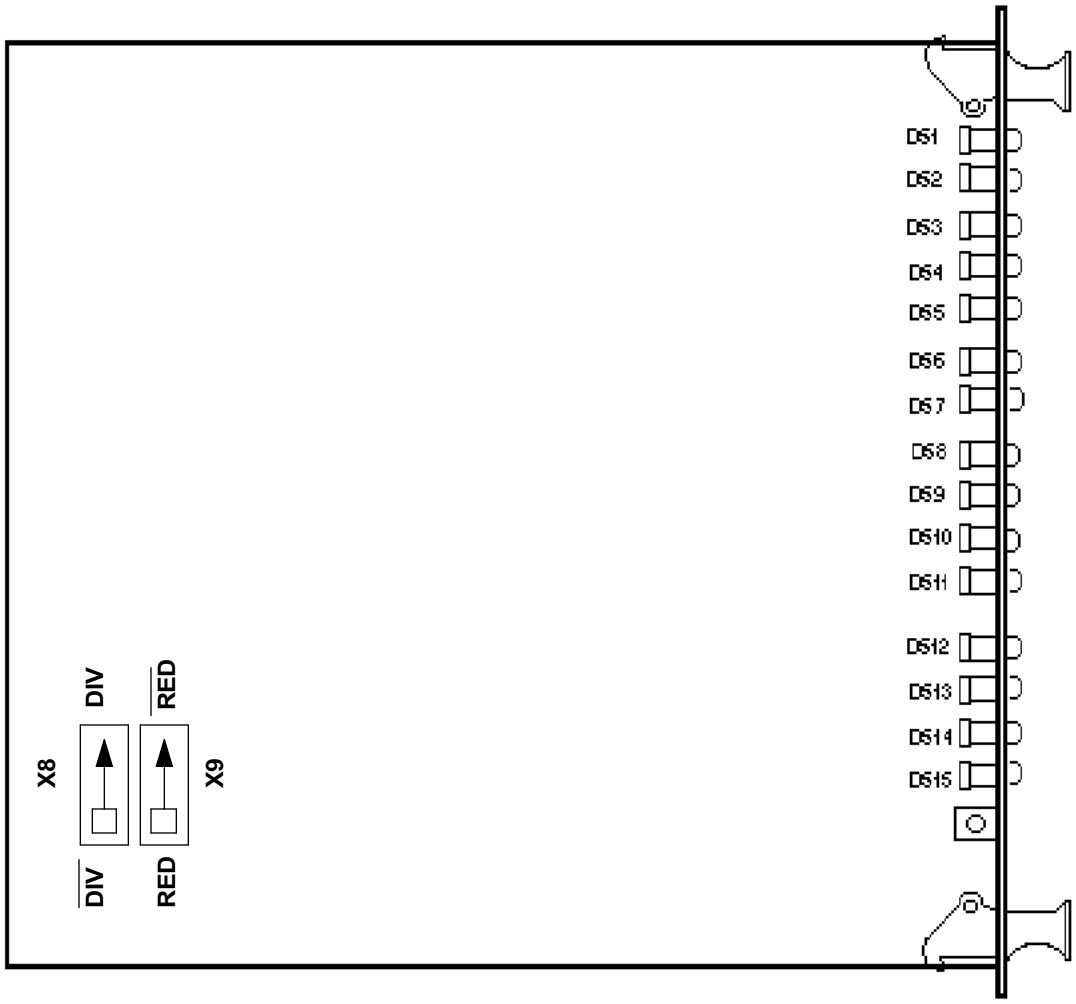


Figure 2-5 Aggregate Control Card Option Locations

Aggregate Interface Plug-In Card Options

Three of the Aggregate Interface Plug-In Cards have hardware option selections. The EIA-RS-422/423 Aggregate Interface Piggyback card requires selection of options to select an RS-422 balanced interface or an RS-423 unbalanced interface. These selections are described in *Table 2-12*. Option locations are shown in *Figure 2-6*. All other Aggregate Interface Piggyback Cards used on the TMS-3000 system do not have hardware options, except the V.35 Aggregate Interface Piggyback, Rev (Revision) J.

A revised V.35 Aggregate Interface piggyback board, Rev J, contains a jumper labeled X2. The positions are not labeled on the pc board but are shown on the reverse side in *Figure 2-7*. The card does not function if the jumper is not installed in either position.

The factory default position for this jumper is the INVERT position. In this position the board is backward compatible with all previous revisions of the board. The NORM position should be used for all applications where a V.35 piggyback is connected to an RS422 piggyback at a remote location.

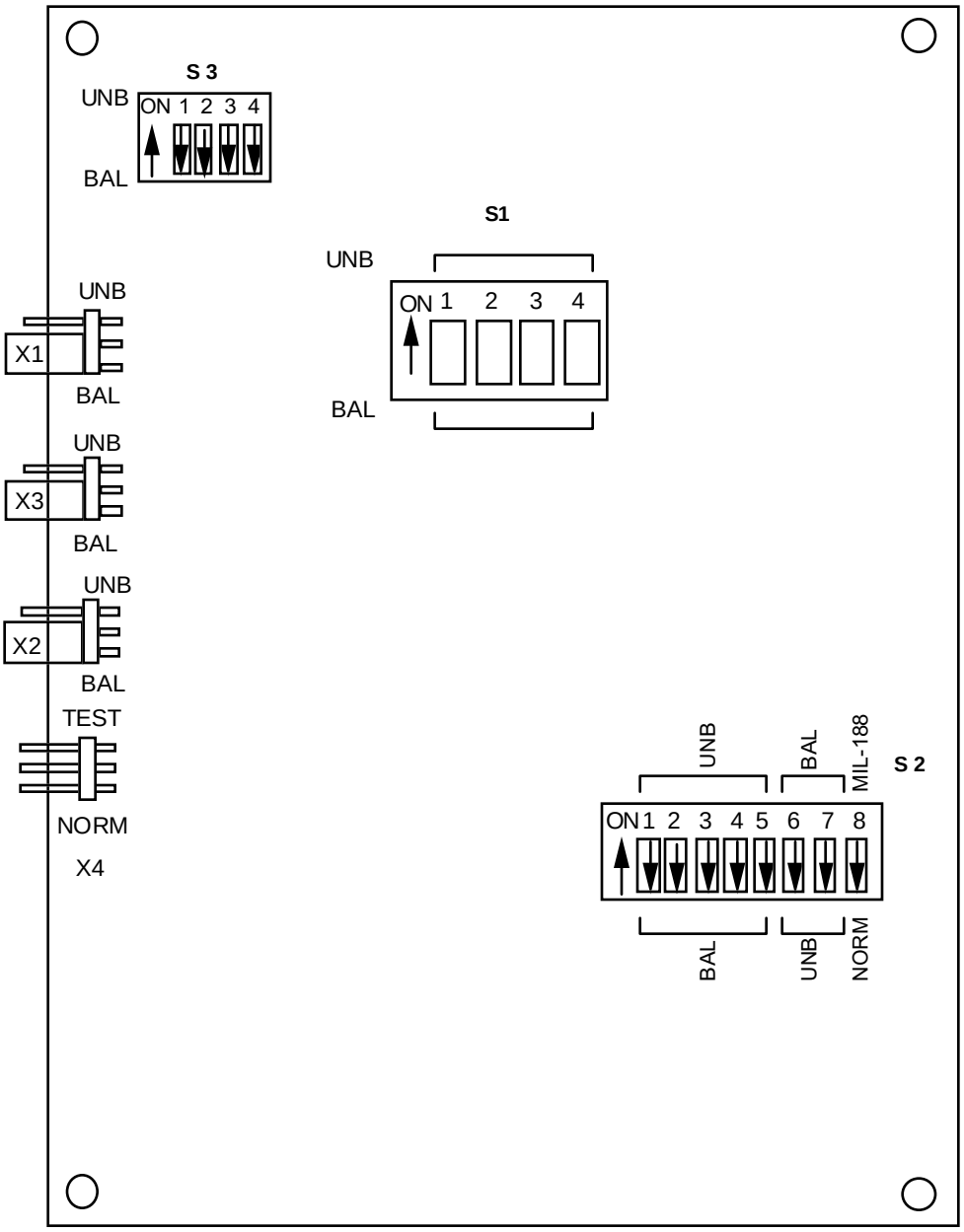


Figure 2-6 RS-422/423 Aggregate Interface Piggyback Option Locations

The purpose of this jumper is to correct a problem with the clocks and data being inverted on older revisions of the piggyback card. Cable number 027H507-XXX compensates for this. If this cable is to be used with Rev J cards, set X2 to the INVERT position for proper operation.

Table 2-12 RS-422/423 Aggregate Interface Piggyback Option Selections

Feature	S1-1 Thru S1-4 Pos.	S2-1,2-5 S3-1,4 Pos.	S2-6,7 Pos.	S2-8 Pos.	X1 Pos.	X2,X3 Pos.	Application
EIA-RS-422 (ITU-T V.11) Balanced Interface	BAL (Off)	BAL (Off)	BAL (On)	NORM (Off)	BAL	BAL	This piggyback may be set to operate in an RS-422 mode (equivalent to ITU-T V.11) balanced mode, or a MIL-STD-188-114 balanced mode.
MIL-STD-188-114 Balanced Interface	BAL (Off)	BAL (Off)	BAL (On)	MIL188 (On)	BAL	BAL	It may be set to operate in an RS-423 mode (equivalent to ITU-T V.10) unbalanced mode or a MIL-STD-188-114 unbalanced mode.
EIA RS-423 (ITU-T V.10) Unbalanced Interface	UNB (On)	UNB (On)	UNB (Off)	NORM (Off)	UNB	UNB	**NOTE:** Berg Header X4 on this card is used for test purposes only.
MIL-STD-188-114 Unbalanced Interface	UNB (On)	UNB (On)	UNB (Off)	MIL188 (On)	UNB	UNB	Do NOT place a jumper in either position on this header.

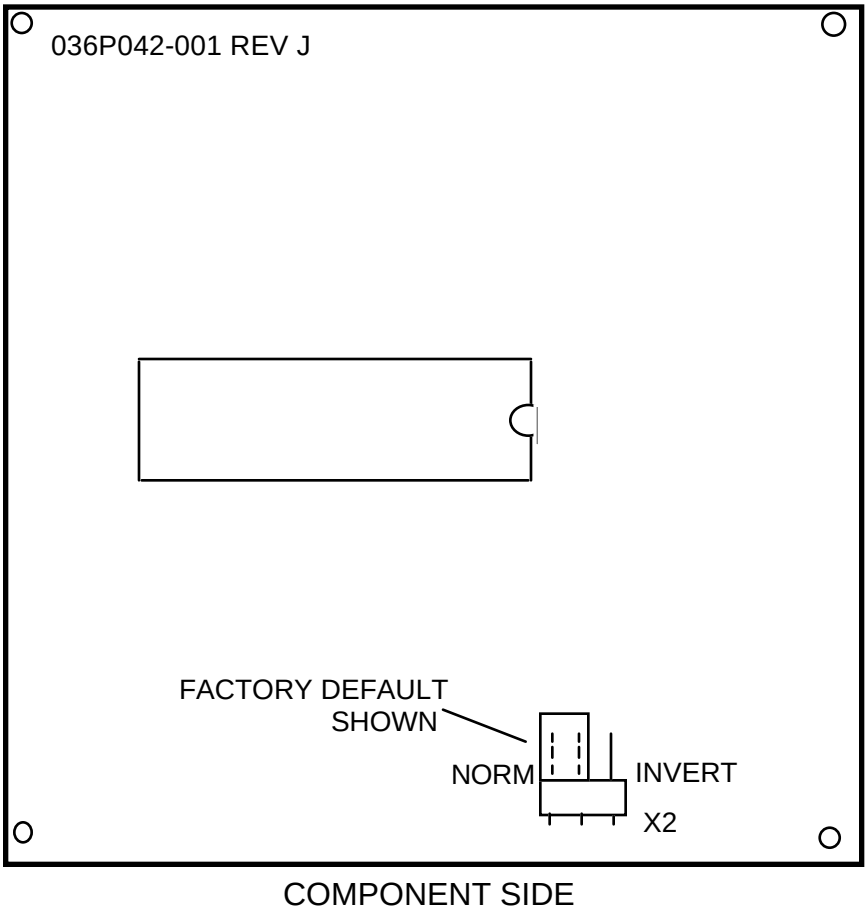


Figure 2-7 V.35 Aggregate Interface Piggyback Card

T1/D4 Aggregate Interface Piggyback

The latest version of the T1/D4 Aggregate Interface Piggyback card (*GDC 036P315-003*) can be used in a TMS-3000. It is installed on the ACC of the TMS-3000 shelf. Jumpers provide option selection for each application. Options are described in *Table 2-13*. *Figure 2-8* shows the physical location of the jumpers on the card.

The primary functions of the T1-D4 piggyback include the transmission and reception of the aggregate data stream as well as the insertion and detection of the D4 framing and synchronization patterns. The T1-D4 piggyback is also capable of local and remote alarm status reporting. These alarm status lines are currently monitored on the TMS system.

Table 2-13 T1/D4 Piggyback Card (036P315-003) Option Selections

Feature	Selection	Jumper Desig.	Jumper Pos.	Application
Clock	External Internal	X1 X1	EXT INT	The EXT position selects the external clock supplied directly from the aggregate interface of the TMS-3000 ACC. The phase-lock loop of the T1/D4 piggyback card is bypassed in EXT mode. With X1 in the INT position, timing is selected from the output of the phase-lock loop on the T1/D4 piggyback card. When X1 is used in a TMS-3000, leave X1 in the EXT mode.
Master/Slave Timing	Master Slave	X2 X2	M S	This option selects an input to the phase-lock loop on the T1/D4 piggyback card. At a master timing node, select M, so that the external timing signal from the node is applied to the phase-lock loop. At a slave timing node, select S, so that timing from the aggregate link is applied to the phase-lock loop. When X1 is in the EXT position, the position of X2 does not matter in a TMS-3000.
Data FIFO Include/Bypass	Include Bypass	X3 X3	INC BYP	The INC position includes FIFO buffers in the data path. BYP bypasses the FIFO buffers. When the T1/D4 piggyback is used in a TMS-3000 node, select BYP for X3.
Clock FIFO Include/Bypass	Include Bypass	X4 X4	INC BYP	The INC position includes FIFO buffers in the timing path. BYP bypasses the FIFO buffers. When the T1/D4 piggyback is used in a TMS-3000 node, select BYP.
MSW/MM+	MSW MM+	X5+X6 X5+X6	MSW MM+	If the T1/D4 piggyback is used in a TMS-3000 node, place X5 and X6 in the MSW position.

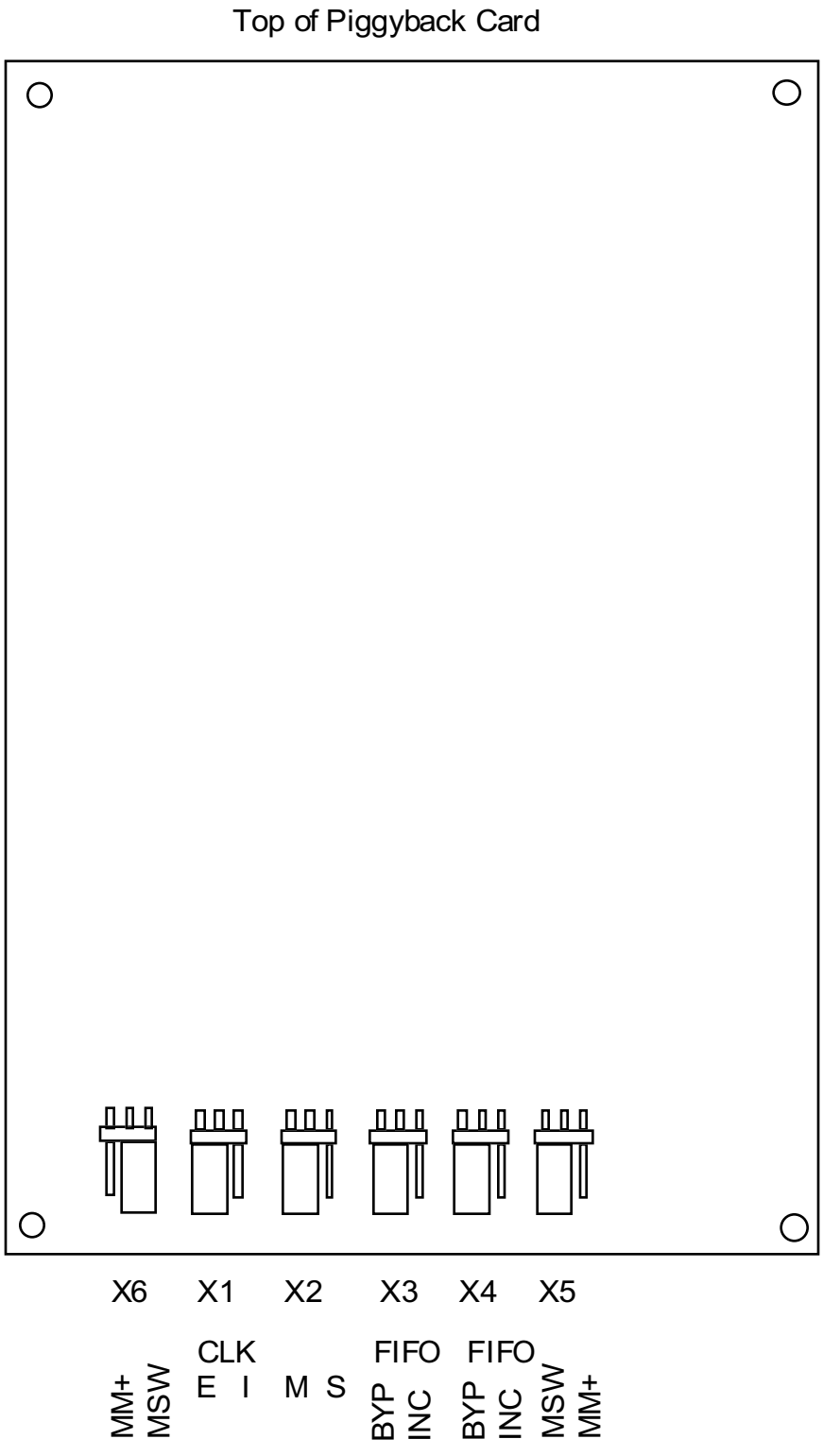


Figure 2-8 T1/D4 Aggregate Interface Piggyback (036P315-003)

T1-DS0 and T1-FT1 Aggregate Interface Piggyback

The T1-DS0 and T1-FT1 Aggregate Interface Piggyback Cards provide a specific electrical and functional interface on the high speed aggregate port of the TMS-3000, TMSC or MINIMUX TDM. The T1-DS0 card (*GDC 036P335-001*) is for use in Canada and the T1-FT1 card (*GDC 036P335-002*) is for use in the USA.

The main difference from other types of T1 interfaces, available from GDC, is that the T1 serial bit stream (at the data rate of 1.544 Mbps) does not have to be fully utilized to carry voice and data information assembled by the associated multiplexer. Fractions of the T1 bit rate (in multiples of 56 or 64 Kbps) can be used by the multiplexer.

The T1-DS0 and T1-FT1 interfaces may be used for TELCO supplied services that are known as fractional T1. In a fractional T1 application, the TDM equipment can be connected to a Digital Access Cross Connect (DACS), to provide routing of individual (56 or 64 Kbps) DS0 channels to various remote locations.

The principal application for the T1-DS0 and T1-FT1 Aggregate Interface Piggyback Cards is to offer a T1 interface that takes advantage of fractional T1 services. Instead of paying for a full T1 line, you pay only for the bandwidth needed by selecting the number (N) of DS0 channels (where $1 \leq N \leq 24$). As bandwidth requirements change, you can change the number of DS0s. This is particularly useful at feeder nodes which typically have smaller bandwidth requirements.

The T1-DS0 (Canada) and T1-FT1 (USA) also provides an aggregate frame structure at 1.544 Mbps in accordance with ATT D4 or Extended SuperFrame (ESF) formats.

Refer to *GDC 036R477-000 and 036R485-000* for complete information on these cards.

G.704 Aggregate Interface Piggyback

Before mounting the G.704 Aggregate Interface Piggyback Card, be certain all the options are configured. The G.704 Aggregate Interface Card contains a 40-pin socket that mates with pins on the ACC. An optional connector, XP2, mates with a later version of the ACC (*GDC 036P313-003*). Line up the pins and gently press the G.704 Aggregate Interface Piggyback onto the ACC.

Using Switches S1 and S2 on the G.704 Aggregate Interface Piggyback Card, CRC4 multiframe, time Slot 16, synchronous/plesiochronous clocking mode and the elastic buffers may be selected in addition to the Transmit/Receive impedance at the aggregate and the line balance. *See Figure 2-9*. *Table 2-14* defines the option selections and describes the application of each. *Table 2-15* shows the buffer size/delay time of the plesiochronous buffers.

The ITU-T requires a provision be made to optionally ground the outer conductor of a coaxial cable (unbalanced) when used with the G.704 interface. Either end of the cable (transmit or receive) may require grounding. Grounding of the aggregate signal DATA B on the G.704 Aggregate Interface Piggyback is performed as follows:

- Receive End — The grounding of signal RCVDATB is achieved by moving DIP Switch S2-8 on the G.704 Aggregate Interface Piggyback card to the UNB or closed (ON) position. This connects RCVDATB to Signal Ground.
- Transmit End — The grounding of signal XMTDATB is achieved by soldering a zero ohm resistor (or a simple wire link) to future use resistor R11 (F/U R11) located on the right hand side of connector XP1 (*See Figure 2-9*). This connects XMTDATB to Signal Ground.

Note that on the aggregate 25-pin D Connectors (J1 and J16 on the back of the main shelf), the grounded signals appear on the following connector pins: RCVDATAB (Pin 16) and XMTDATB (Pin 14). Do not ground both ends of the same cable.

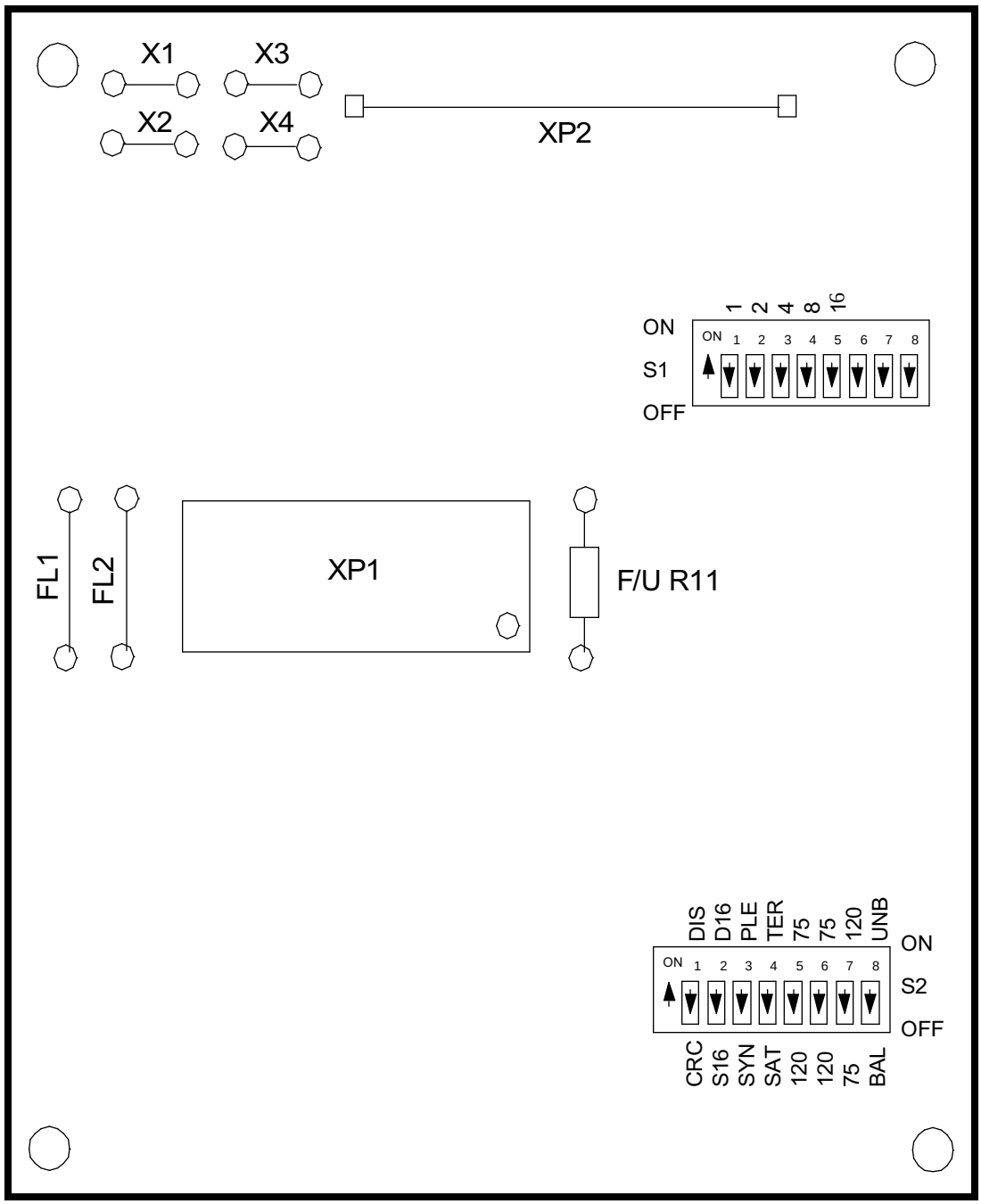


Figure 2-9 G.704 Aggregate Interface Piggyback Card

Table 2-14 G.704 Aggregate Interface Piggyback Card Option Selections

Switch No.	Desig.	Position	Function	Application
S1-1	1	On	Value of 1	Switch S1-1 through S1-5 define the value of N in N x 64. Add the values of the five switches together for the value of N. The switch setting affects the elastic buffer size for the synchronous buffer mode only.
		Off	No value	
S1-2	2	On	Value of 2	
		Off	No value	
S1-3	4	On	Value of 4	
		Off	No value	
S1-4	8	On	Value of 8	
		Off	No value	
S1-5	16	On	Value of 16	
		Off	No value	
S1-6 through S1-8		Off	Not used	Leave Switches S1-6 through 8 in the Off position.
S2-1	DIS	On	CRC4 multiframe disabled	CRC4 multiframe is not used.
	CRC	Off	CRC4 multiframe enabled	The CRC4 multiframe mode is enabled.
S2-2	D16	On	D16 Time slot	Time Slot 16 carries data.
	S16	Off	S16 Time slot	Time Slot 16 is skipped by data.
S2-3	PLE	On	Plesiochronous Clocking Mode	Place the G.704 in the Plesiochronous Clocking Mode if clocks at either end of an aggregate link are synchronized by two different master clocks or communicating via a satellite link. The elastic buffer depth is set by the TER/SAT (S2-4) switch operation.
	SYN	Off	Synchronous Clocking Mode	Place the G.704 in the Synchronous Clocking Mode if at both ends of the aggregate link the transmit and receive clocks are synchronized to the same master clock. The elastic buffer depth is set by hardware.
S2-4	TER	On	Terrestrial Elastic Buffer	Only used in the plesiochronous clocking mode. Selects ±256-bit elastic buffer.
	SAT	Off	Satellite Elastic	Used in the plesiochronous clocking mode. Selects ±2048-bit elastic buffer
S2-5	75	On	75Ω Impedance	Setting to 120 provides a receive data line impedance of 120 ohms for the G.704. Setting at 75 provides a receive line impedance of 75 ohms.
	120	Off	120Ω Impedance	
S2-6	75	On	75Ω Impedance	Same as S2-5.
	120	Off	120Ω Impedance	
S2-7	120	On	120Ω Impedance	Setting to 120 provides a transmit data line impedance of 120 ohms for the G.704. Setting at 75 provides a receive line impedance of 75 ohms.
	75	Off	75Ω Impedance	
S2-8	UNB	On	Unbalanced	Setting to UNB provides an unbalanced line condition.
	BAL	Off	Balanced	Setting to BAL provides a balanced line condition.

Table 2-15 G.704 Aggregate Interface Buffer Size

Mode	Value of N	Buffer Size(bits)	Max. Delay (Bit times)	Max. Delay (µsec)
Plesiochronous (Satellite)	—	±2048	4096	2000
Plesiochronous (Terrestrial)	—	±256	512	250
Synchronous	1	±16	32	16
Synchronous	2-3	±32	64	31
Synchronous	4-7	±48	96	47
Synchronous	8-31	±80	160	78

Combined Digital Aggregate (CDA) Module

The following paragraphs apply to both CDA-T1 and CDA-E1 unless otherwise specified.

Insert the CDA Module into the shelf by pressing it in firmly. To remove the CDA Module, first press the Dsbl (disable) switch on the front panel once. All front panel LEDs should go off. The module is now in a low power mode and may be removed from the shelf in the usual manner. If the module is not removed, pressing the Dsbl switch once more reactivates the module and the INIT LED lights.

Part Numbers

The CDA Module consists of four cards — the CDA base card, the CDA-T1 or CDA-E1 microprocessor plug-in card, and two CDA-T1 or CDA-E1 I/O cards. The CDA-T1 I/O card is the interface between the CDA base card and a T1 line, while the CDA-E1 I/O card provides the interface with CEPT G.732 and G.704 transmission formats. Each I/O plug-in card is a 6.25 X 6.75 inch printed circuit board and contains three connectors that mate with the base card. *Refer to Tables 2-16 and 2-17*.

Table 2-16 CDA-T1 Module (036M309-003)

Equipment Supplied	Designation	GDC Part No.
PCB Assembly, Base Card	—	036P309-001
PCB Assembly, I/O Piggyback (T1)	—	036P310-001
PCB Assembly, Micro Piggyback	—	036P316-001
PCB Assembly, I/O Piggyback (G.732 CEPT 2.048 MHz)	—	036P282-001

Table 2-17 CDA-E1 Module (036M328-002)

Equipment Supplied	Designation	GDC Part No.
PCB Assembly, Base Card	—	036P309-001
PCB Assembly, Micro Piggyback	—	036P316-001
PCB Assembly, I/O Piggyback (G.732 CEPT 2.048 MHz) (Qty. 2)	—	036P282-001

CDA Option Selections

The CDA base card contains a hardware jumper (X15) for redundancy. This jumper should be set to RED when using a redundant CDA pair or when using a non-redundant 256 CDA. It should be set to NRED when using a non-redundant 128 CDA. Note that when using a non-redundant 256 CDA, its paired slot must be empty. The CDA base card also contains Switch S2, which is a factory adjustment switch. Use of this switch may cause erroneous data transfers or complete node failure.

Switch S2 should never be changed in the field. It controls a critical factory adjustment option which is set only when the PCB assembly is installed in a specialized test fixture at the factory. The purpose of Switch S2 is to fine tune the turn-on and turn-off times of the fast bus circuit. Improper adjustment of this switch can cause erroneous data transfers between common cards and possible node failure.

The CDA I/O cards operate in two modes, hardware and software. On power-up, the I/O card comes up in the hardware mode. The DIP Switch S1 on the I/O card establishes the configuration of the card. The I/O card continues to operate in hardware mode until the CDA receives configuration data from the Controller. At that time, the I/O card switches to software mode, using the settings defined in the configuration. *Figure 2-10* shows the location of DIP Switch S1 on the T1 I/O card, and *Table 2-18* defines the switch settings for the T1 I/O. *Figure 2-11* shows the base card, and *Figure 2-12* shows redundant and non-redundant cable connections. The E1 I/O card also provides the means to select the line impedance of the aggregate at either 75- or 120-ohms (Jumpers X1–X4). The TMS-3000 does not supply a coaxial connection to provide a 75-ohm unbalanced interface. *Figure 2-13* shows the location of DIP Switch S1 and Jumpers X1–X4 on the E1 I/O card, and *Table 2-21* defines the settings.

The CDA microprocessor card contains one Jumper, X9. This is the watchdog enable/disable and should always be set to enable.

CDA-T1/E1 Aggregate Interface Cable Connections

The CDA Module has two Input/Output cards. Each Input/Output card contains one port. Each port is dedicated to a specific backplane connector using a specific pinout arrangement. Since the ports are separate, they do not provide a diverse backup to each other. *Refer to Table 2-20.*

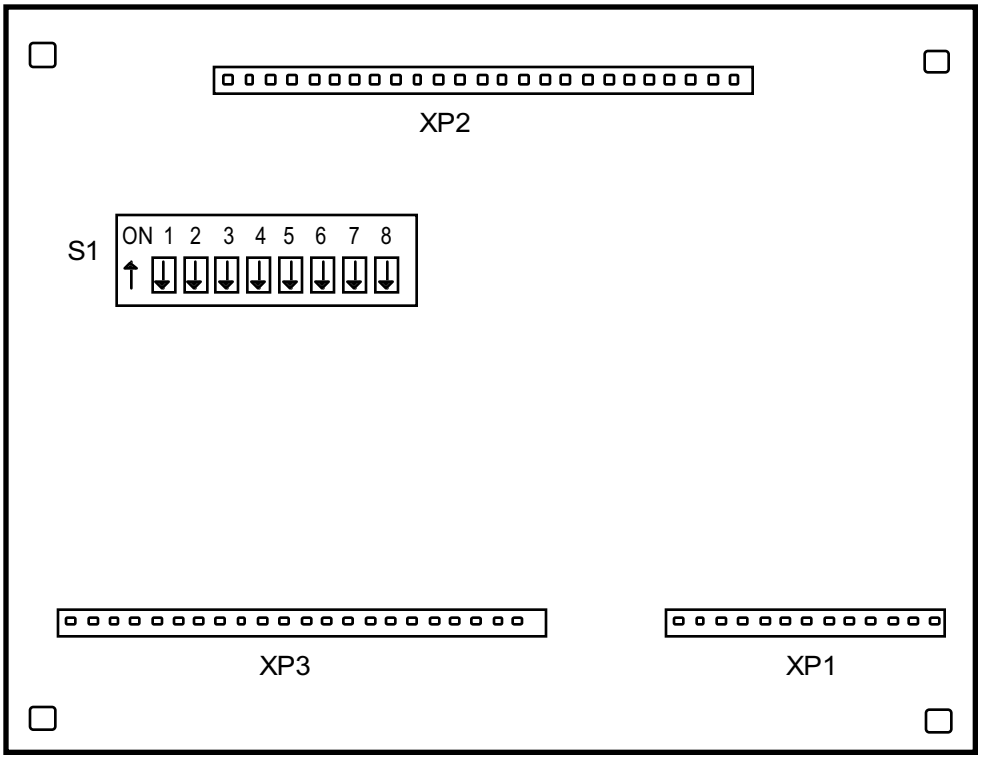


Figure 2-10 CDA-T1 I/O Plug-In Card, Option Locations

Table 2-18 CDA-T1 I/O Plug-In Card (036P310-001) Option Selections

Switch Number	Switch Position	Function	Application
S1-1 B8ZS/Dis	Off On	Enables B8ZS line coding Disables B8ZS line coding	Bit 8 Zero Suppression (B8ZS) is a technique designed to meet the spectral density specification. This technique creates an intentional double Bipolar violation at the transmitting end when 8 consecutive zeros are detected. Bipolar return to zero is the modulation technique used in T1 which requires subsequent marks of polarity opposite to the previous marks. The bipolar violation is detected and removed at the receive end of the network.
S1-2 Bit 7/ Trans	Off On	Bit 7 Substitution Enabled Transparent	In B7 substitution, ones density is implied. This means that bit (7) for select DS0 frames is set to one. When B7 is enabled, the bandwidth available for type subaggregates varies with each DS0 slot selecting "Trans'' bypasses this technique on the DS0 frame format.
S1-3 ESF/D4	Off On	Selects ESF Framing Selects D4 Framing	Two methods of framing exist in a DS1 data stream. A D4 frame consists of twelve 193-bit frames called a Superframe. An ESF retains the structure of D4, but consists of twenty-four 193-bit frames instead of twelve. ESF is known as Extended Superframe.
S1-5 (LEN2) S1-6 (LEN1) S1-7 (LEN2)	S1-5 S1-6 S1-7 On Off Off On On Off On Off On On Off Off Off On On Off On Off Off Off On Off Off Off On On On	Selects line length 0-220 ft. 220-440 ft. 440-655 ft. 0-133 ft. 266-399 ft. 399-533 ft. 533-655 ft. G.704, G.732 2.048 MHz (CEPT)	Clock and data extraction are improved by cable length transmit equalization. This feature allows line lengths of up to 655 feet to be used without the customary line build-out networks. With line transmit equalization, the pulse shape and amplitude at properly terminated receiving equipment conforms to AT&T standards. The line length selections support a three partition arrangement for MAT and ICOT, and a five partition arrangement for ABAM, PULP and PIC cables. Configure S1-5, 6, 7 to the proper length and cable type.
NOTE: S1-2 should always be in the ON position. Only B8ZS or Bit 7 substitution can be enabled at a time. Selecting both functions simultaneously is not allowed. **NOTE:** S1-8 is not used and should remain in the OFF position.			

Table 2-19 CDA Base Card Options

Feature	Selection	Switch (S), Jumpers (X)		Application
		Desig.	Position	
Redundant/ Non-Redundant CDA Module	Redundant Non-Redundant	X15 X15	RED NON-RED	Proper system operation requires that the CDA module knows whether it is redundant or not prior to program or configuration download. If using the CDA as a redundant pair, set this jumper to RED. If using the CDA as a non-redundant pair, set this jumper to NON-RED.

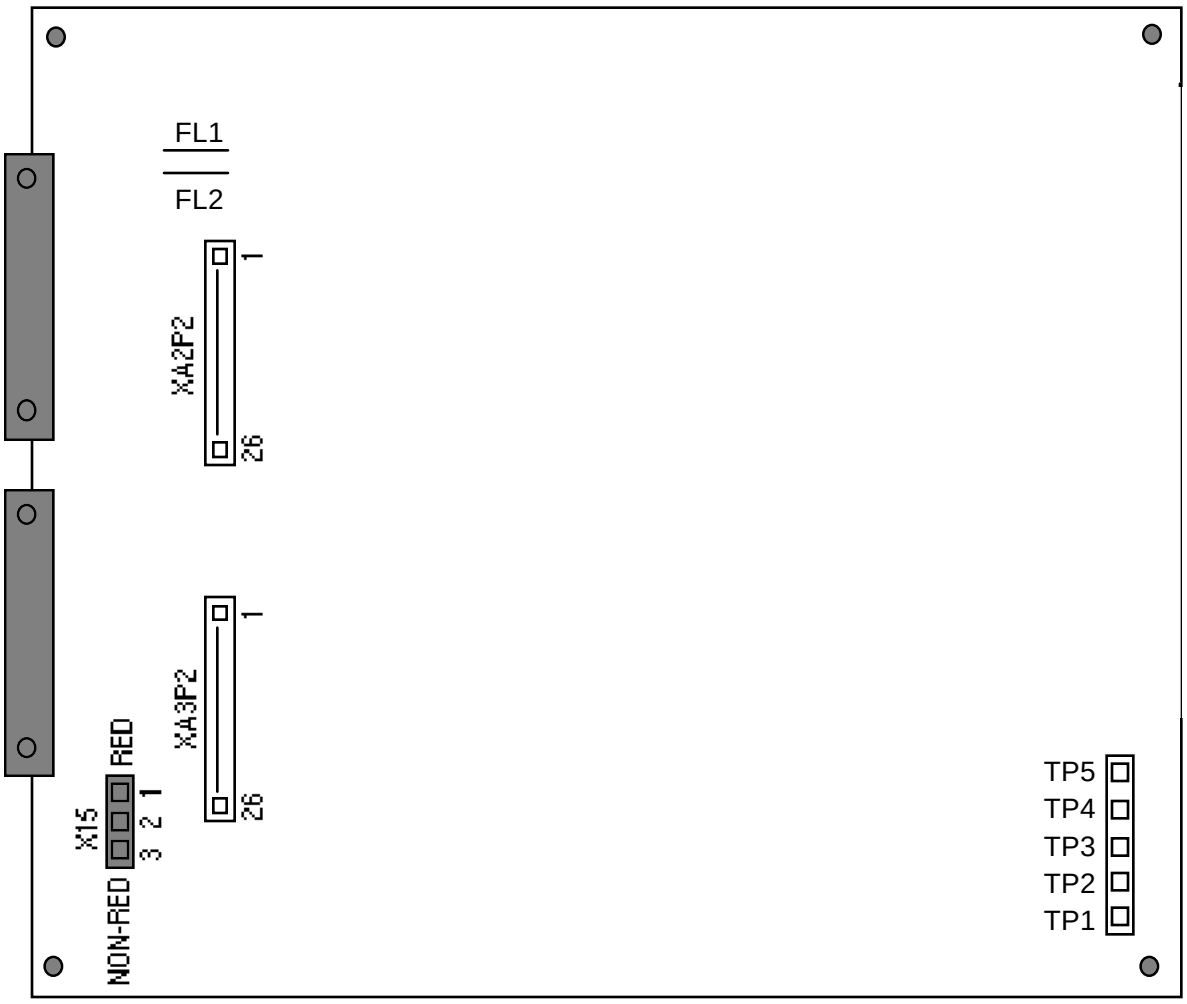
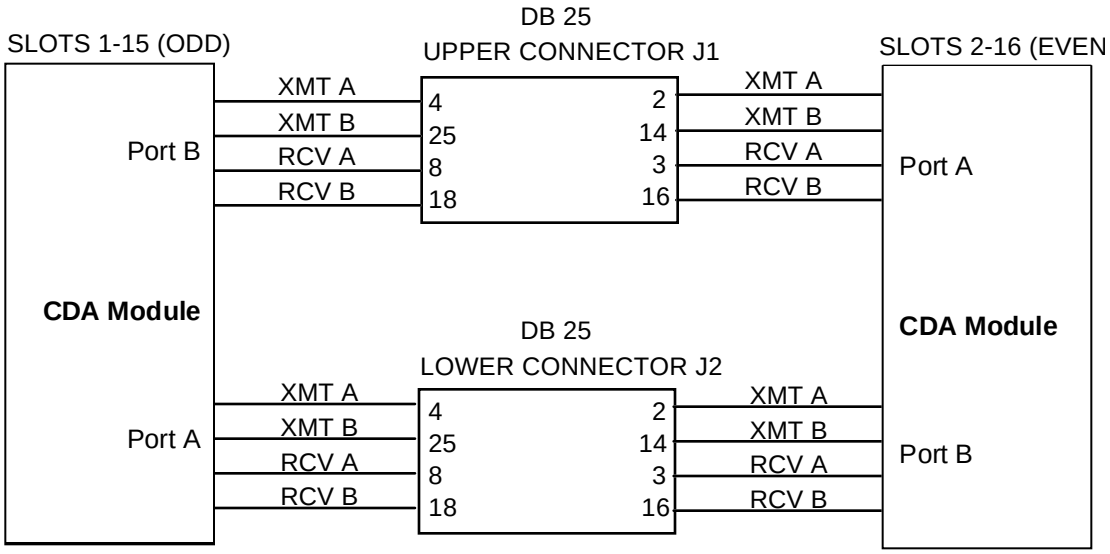


Figure 2-11 CDA Base Card Option Locations

In a redundant situation the CDA Module Input/Output ports are dedicated to one of the DB25 connectors on the backplane. Port 1 goes to the upper connector of the backplane, Port 2 to the lower connector. Use *GDC 027H201* which provides a standard connection to T1 lines.

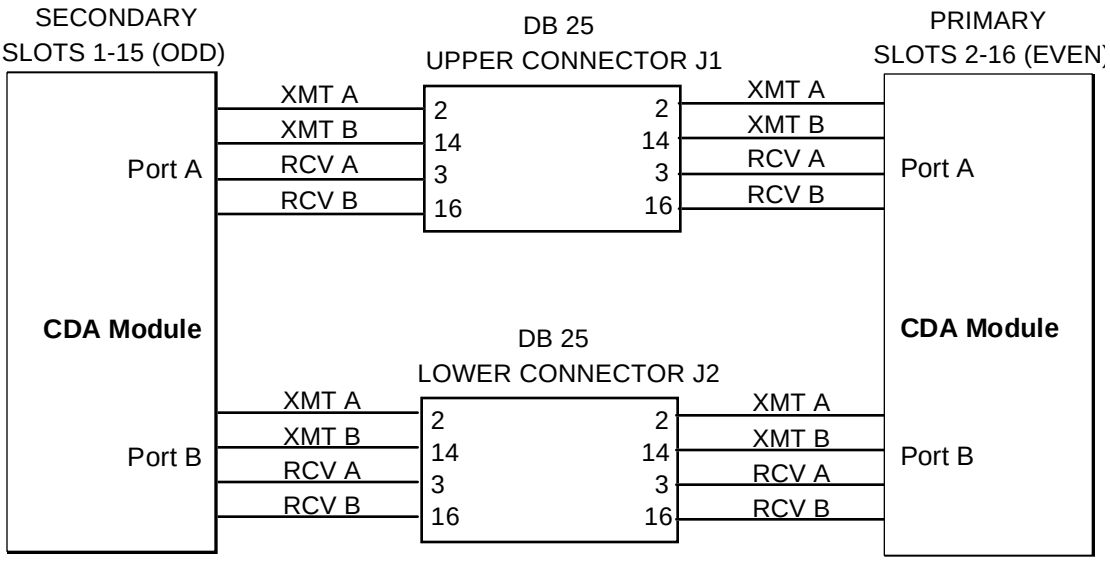
If non-redundant CDA Modules are used in adjacent slots, the Input/Output ports of each module use different pins of the same DB25 connector. They split externally through a "Y cable" (*GDC 027H316*) attached to the backplane. The module in the primary slot uses the upper portion of the upper connector for Port 1 and the upper portion of the lower connector for Port 2. The module in the secondary slot uses the lower portion of the lower connector for Port 1 and the lower portion of the upper connector for Port 2.

DB25 Pinout Configuration for a Redundant CDA Module is given in *Figure 2-12*, along with configuration for a non-redundant CDA Module in adjacent slots. *Table 2-20* contains the CDA aggregate cable connections.



Y-CABLE 027H316 IS REQUIRED TO ACCESS 1 (ODD) AGGREGATE INTERFACE.

FOR NON REDUNDANT MODULES IN ADJACENT SLOTS



CDA MODULES CONFIGURED AS A REDUNDANT PAIR OR ONE
NON-REDUNDANT CDA MODULE WITH THE ADJACENT SLOT EMPTY

Figure 2-12 DB25 Backplane Connections for CDA Module

Table 2-20 CDA Aggregate Cable Connections

Configuration	*Connector	Pins	Y Cable	CDA Port
Redundant	Upper DB-25	2,14,3,16	Not Used	Even or Odd Slot Port A
	Lower DB-25	2,14,3,16	Not Used	Even or Odd Slot Port B
Non-redundant	Upper DB-25	2,14,3,16	P2	Even Slot Port A
	(Odd number)	4,25,8,18	P3	Odd Slot Port B
	Lower DB-25	2,3,14,16	P2	Even Slot Port B
	(Even number)	4,25,8,18	P3	Odd Slot Port A

NOTE: Generally, Port A of either CDA Module in a redundant pair comes out on the upper DB-25 connector and Port B comes out on the lower DB-25 connector. When non-redundant modules are used in adjacent slots, Port A and Port B of the even-numbered slot come out on the upper and lower connectors as before, but Port A and Port B of the odd-numbered slot come out on alternate pins of these connections. The different ports are then split externally using a special Y-cable (*GDC 027H316*).

* This connector is located on the backplane of the main shelf. If a Y-cable is used, connect P1 of the Y-cable to this connector.

Table 2-21 CDA-E1 (G.732) I/O Plug-In Card Options

Feature	Selection	Switch(S), Jumpers(X)		Function
		Desig.	Position	
Receive Line Impedance	75 ohms 120 ohms	X1	75 120	Setting at 75 provides a line impedance of 75 ohms for the G.732. Setting at 120 provides a line impedance of 120 ohms.
Receive Line Impedance	75 ohms 120 ohms	X2	75 120	Setting at 75 provides a line impedance of 75 ohms for the G.732. Setting at 120 provides a line impedance of 120 ohms.
Transmit Line Impedance	75 ohms 120 ohms	X3	75 120	Setting at 75 provides a line impedance of 75 ohms for the G.732. Setting at 120 provides a line impedance of 120 ohms.
Receive Shield Ground	75 ohms 120 ohms	X4	75 120	Setting at 75 provides a ground reference on the Recv B lead for unbalanced interfaces (normally used with 75 ohm coaxial interfaces). Setting at 120 provides for a balanced Recv input (normal setting).
Transmit Shield Ground	Ground Open	X9	GND OPEN	GND selection provides a ground reference on the output port as recommended by G.703 for use with 75 ohm interfaces. OPEN selection is for use with a 120 ohm interface and provides a balanced interface at the output port.
CAS Signaling (TS16) Enabled. CRC-4 Disabled.		S1-1 On	S1-2 On	Switches S1-1 and S1-2 selects CAS, CRC-4, or both for use on the G.732 I/O plug-in card.
CAS Signaling (TS16) Disabled. CRC-4 Disabled.		Off	On	
CAS Signaling (TS16) Enabled. CRC-4 Enabled.		On	Off	
CAS Signaling (TS16) Disabled. CRC-4 Enabled.		Off	Off	

NOTE: Switches S1-3 and S1-4 remain in the OFF position.

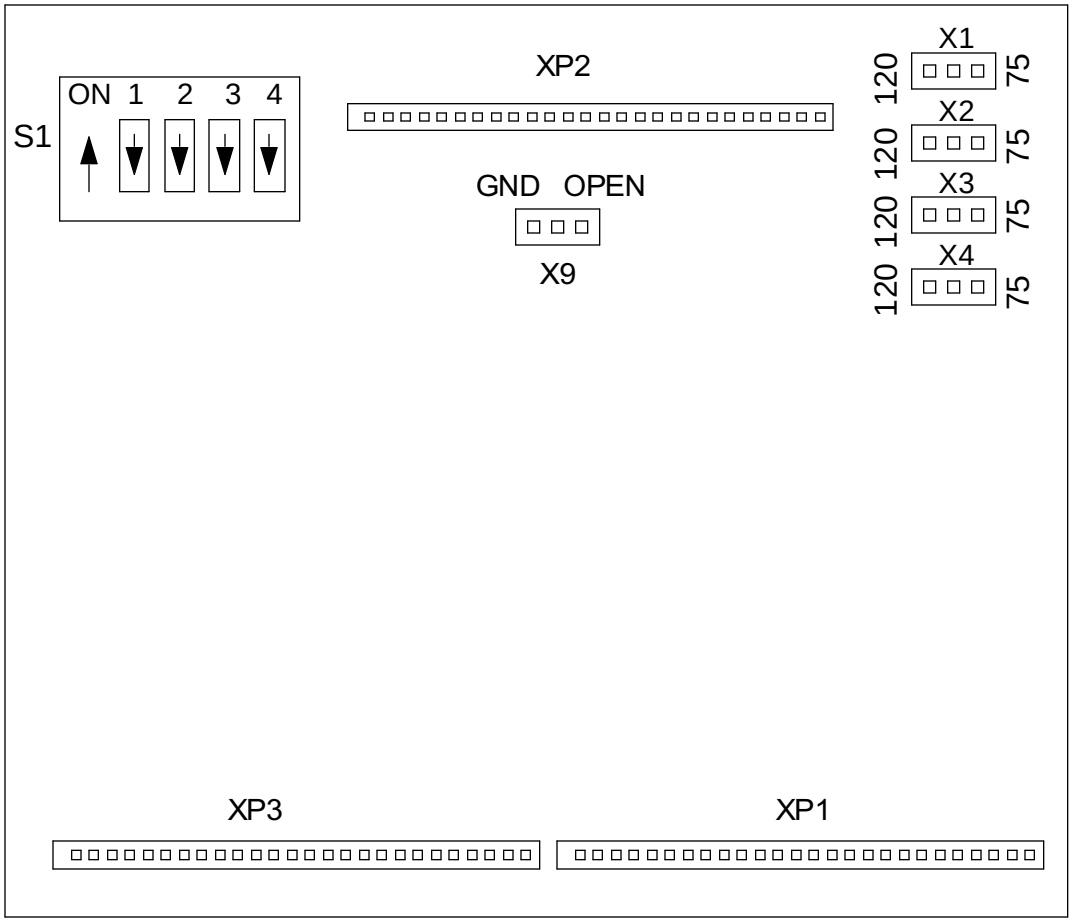


Figure 2-13 CDA-E1 I/O Plug-In Card Option Locations

ADPCM Compression Module (ACM)

Insert the ACM into the shelf by pressing it in firmly. To remove the ACM, first press the Dsbl (disable) switch on the front panel once. All front panel LEDs should go off. The module is now disabled and may be removed from the shelf in the usual manner. If the module is not removed, pressing the Dsbl switch once more resets the module. When the ACM is plugged in, it performs a reset.

Part Numbers

This section provides information to be used to procure replacement assemblies and pc boards. *Tables 2-22* and *2-23* break down assemblies into sub-assemblies that form the component.

Table 2-22 ACM/T1 Module (036M335-002)

Equipment Supplied	Designation	GDC Part No.
PCB Assembly, Base Card	—	036P332-001
PCB Assembly, Micro Piggyback	—	036P316-001
PCB Assembly, I/O Piggyback	—	036P310-001
PCB Assembly, ADPCM SMT Plug-In	—	036P333-001

Table 2-23 ACM/E1 (ITU-T) Module (036M335-001)

Equipment Supplied	Designation	GDC Part No.
PCB Assembly, Base Card	—	036P332-001
PCB Assembly, Micro Piggyback	—	036P316-001
PCB Assembly, I/O Piggyback	—	036P282-001
PCB Assembly, ADPCM SMT Plug-In	—	036P333-002

A maximum of 12 ACMs (6 pairs) can be installed in the TMS-3000 main shelf regardless of the type of power supply used. Also, keep the ACM away from the end slots in the main shelf where there is minimal airflow.

ACM Option Selections

The ACM consists of four cards: the base card, one I/O plug-in card, a microprocessor plug-in card and an ADPCM SMT plug-in card. Available hardware options are located on the I/O plug-ins and base card. An Input/Output card is the interface between the ACM base card and the T1 line. It is a removable module so that different interfaces can be easily installed. The I/O Plug-in card allows for different interface parameters to be met.

The ACM connects to either of two DB-25 connectors on the backplane for link connections. The top connector is designated as "A", the bottom connector is designated as "B". The top connectors are the odd numbered J designations, the bottom connectors are even numbered.

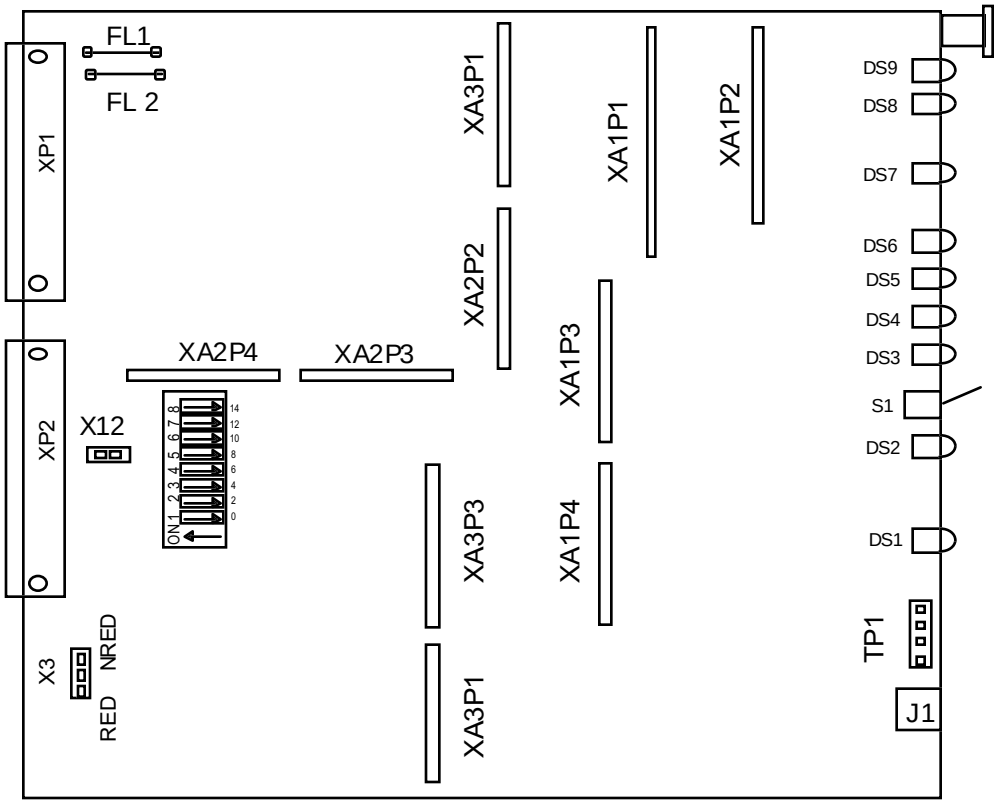
An ACM in Slot N, where N is odd, has its ports at DB-25 connector N+1. When the slot is even, the associated connector is N-1.

An ACM/E1 Module is used on the ITU-T network (2.048 Mbps). Refer to the CDA-E1 Module section to configure the ACM/E1 I/O card.

Configure most ACM options through the Controller software screens. *Refer to the Operation Manual for TMS-3000 Controller, GDC 036R603-Vnnn* for more information on ACM software options.

Jumper X3 is set on the base card for redundancy. Select the option for redundant or non-redundant operation on both ACM Modules. *Table 2-24* shows how to configure Jumper X3 on the ACM base card for redundant or non-redundant operation. *Figure 2-14* shows the location of Jumper X3. Switch S2 on the ACM base card sets the Fast Bus Timing. This switch is factory set and should not be adjusted.

Table 2-25 shows how to configure ACM (T1) I/O plug-in card DIP Switch S1. The location of S1 on the ACM (T1) I/O plug-in card is shown in *Figure 2-15.*



NOTE: Jumper X12 and Switch S2 are factory set. Do not change.

Figure 2-14 ACM Option Locations

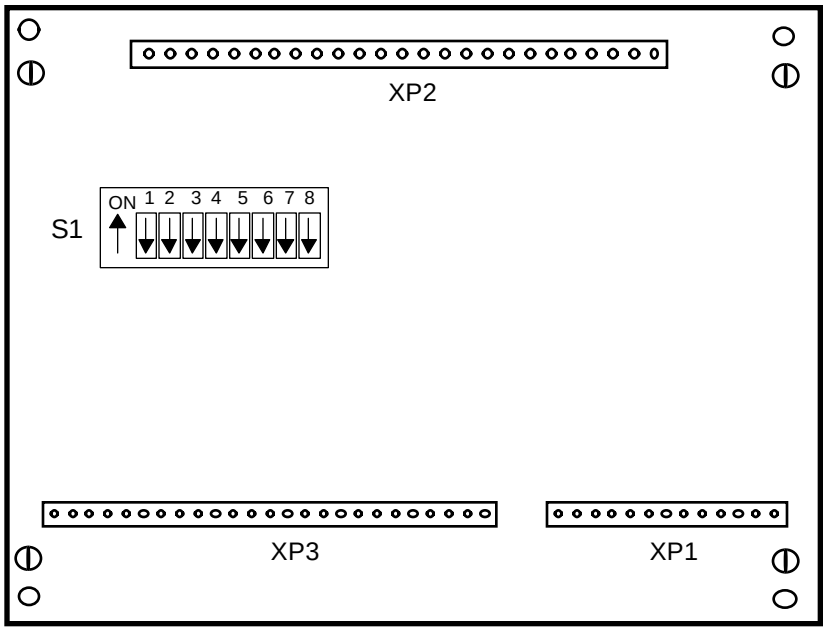


Figure 2-15 ACM/T1 I/O Plug-In Card, Option Locations

Table 2-24 ACM Option Selections

Feature	Selection	Switch (S), Jumpers (X)		Application
		Desig.	Position	
Redundant/ Non-Redundant ACM	Redundant	X3	RED	Proper system operation requires that the ACM knows whether it is redundant or not prior to program or configuration download. If using ACM as a redundant pair, set this jumper to RED. If using ACM as a non-redundant pair, set this jumper to NON-RED.
	Non-Redundant	X3	NON-RED	

Table 2-25 ACM/T1 I/O Plug-In Card Option Selections

Switch Number	Switch Position	Function	Application
S1-1 B8ZS/Dis	Off On	Enables B8ZS line coding Disables B8ZS line coding	Bit 8 Zero Suppression (B8ZS) is a technique designed to meet the spectral density specification. This technique creates an intentional double bipolar violation at the transmitting end when 8 consecutive zeros are detected. Bipolar return to zero is the modulation technique used in T1 which requires subsequent marks of polarity opposite to the previous marks. The bipolar violation is detected and removed at the receive end of the network.
S1-2 Bit 7/ Trans	Off On	Bit 7 Substitution Enabled* Transparent	In B7 substitution, ones density is implied. This means that bit (7) for select DS0 frames is set to one. When B7 is enabled, bandwidth available for type subaggregates varies with each DS0 slot. Selecting "Trans'' bypasses this technique on the DS0 frame format.
S1-3 ESF/D4	Off On	Selects ESF Framing Selects D4 Framing	Two methods of framing exist in a DS1 data stream. A D4 frame consists of twelve 193-bit frames called a Superframe. An ESF retains the structure of D4, but consists of twenty-four 193-bit frames instead of 12. ESF is known as Extended Superframe.
S1-5 (LEN2) S1-6 (LEN1) S1-7 (LEN2)	S1-5 S1-6 S1-7 On Off Off On On Off On Off On On Off Off Off On On Off On Off Off Off On Off Off Off On On On	Selects line length 0-220 ft. 220-440 ft. 440-655 ft. 0-133 ft. 266-399 ft. 399-533 ft. 533-655 ft. G.704, G.732 2.048 MHz (CEPT)	Clock and data extraction are improved by cable length transmit equalization. This feature allows line lengths of up to 655 feet to be used without the customary line build-out networks. With line transmit equalization, the pulse shape and amplitude at properly terminated receiving equipment conforms to AT&T standards. The line length selections support a three partition arrangement for MAT and ICOT, and a five partition arrangement for ABAM, PULP, and PIC cables. Configure S1-5, 6, 7 to the proper length and cable type.
*Bit 7 substitution is not used. Switch S1-2 should always be in the ON position. **NOTE:** S1-8 is not used and should remain in the OFF position.			

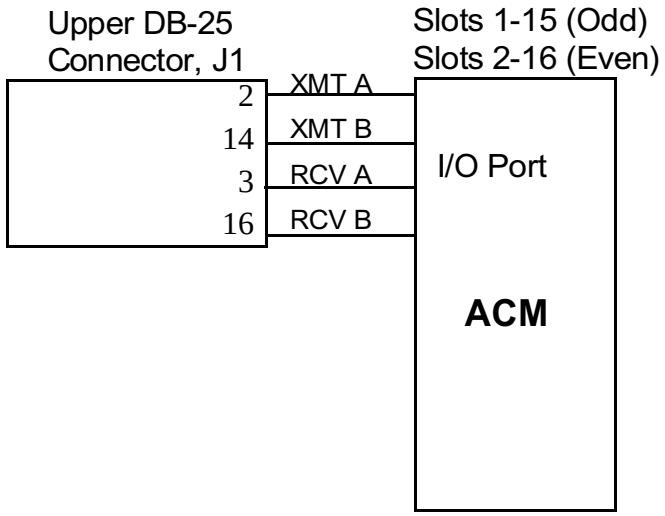
ACM Interface Cable Connections

The ACM has one Input/Output Card. This card contains two ports. Each port is dedicated to a backplane connector using a specific pinout arrangement. Since these ports are separate, they do not provide a diverse backup to each other.

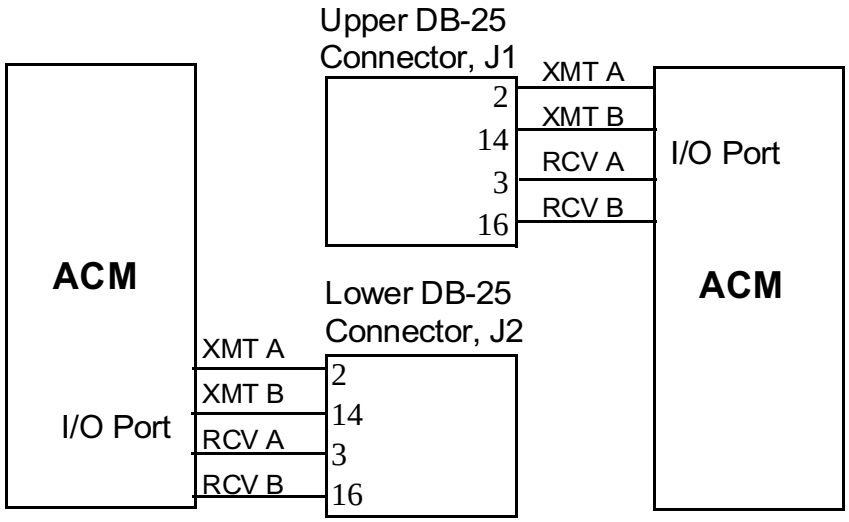
In a redundant situation, the ACM I/O ports are dedicated to one of the DB-25 connectors on the backplane. A redundant or non-redundant ACM in any slot has a standard aggregate pinout. *Refer to Table 2-10* to see the ACC connections.

The ACM aggregate pinout is: Pins 2 and 14 (Transmit Data) and Pins 3 and 16 (Receive Data). *GDC 027H201* provides a standard connection to T1 lines.

Figure 2-16 shows how the DB-25 aggregate pinout configuration appears for a pair of redundant ACMs. *Table 2-26* provides DB-25 aggregate pinout connectors for a pair of redundant ACMs.



A. ACMs configured as a redundant pair or one non-redundant ACM with adjacent slot empty



B. ACMs configured as a non-redundant ACM with the adjacent slot occupied

Figure 2-16 DB25 BP Connector for ACM Module

Table 2-26 ACM Aggregate Cable Connections

Configuration	*Connector	Pins	Y Cable	ACM Port
Redundant	Upper DB-25	2,14,3,16	Not Used	Even or Odd Slot Port A
Non-Redundant	Upper DB-25	2,14,3,16	Not Used	Even slot
	Lower DB-25	2,14,3,16	Not Used	Odd slot
*This connector is located on the backplane of the main shelf. If a Y-cable is used, connect P1 of the Y-cable to this connector.				

Channel Interface Card

This section covers Channel Interface ribbon cabling, module options and installation, and the use, installation, and cabling of Flex Cards.

Channel Interface Card to Expansion Shelf Ribbon Cabling

Refer to your Network Documentation Package for Ribbon Cabling installation instructions for your network. The plug-in locations for the Ribbon Cables on the Main Shelf Backplane and the Expansion Shelf Backplane are shown in *Figures 2-17 and 2-18*.

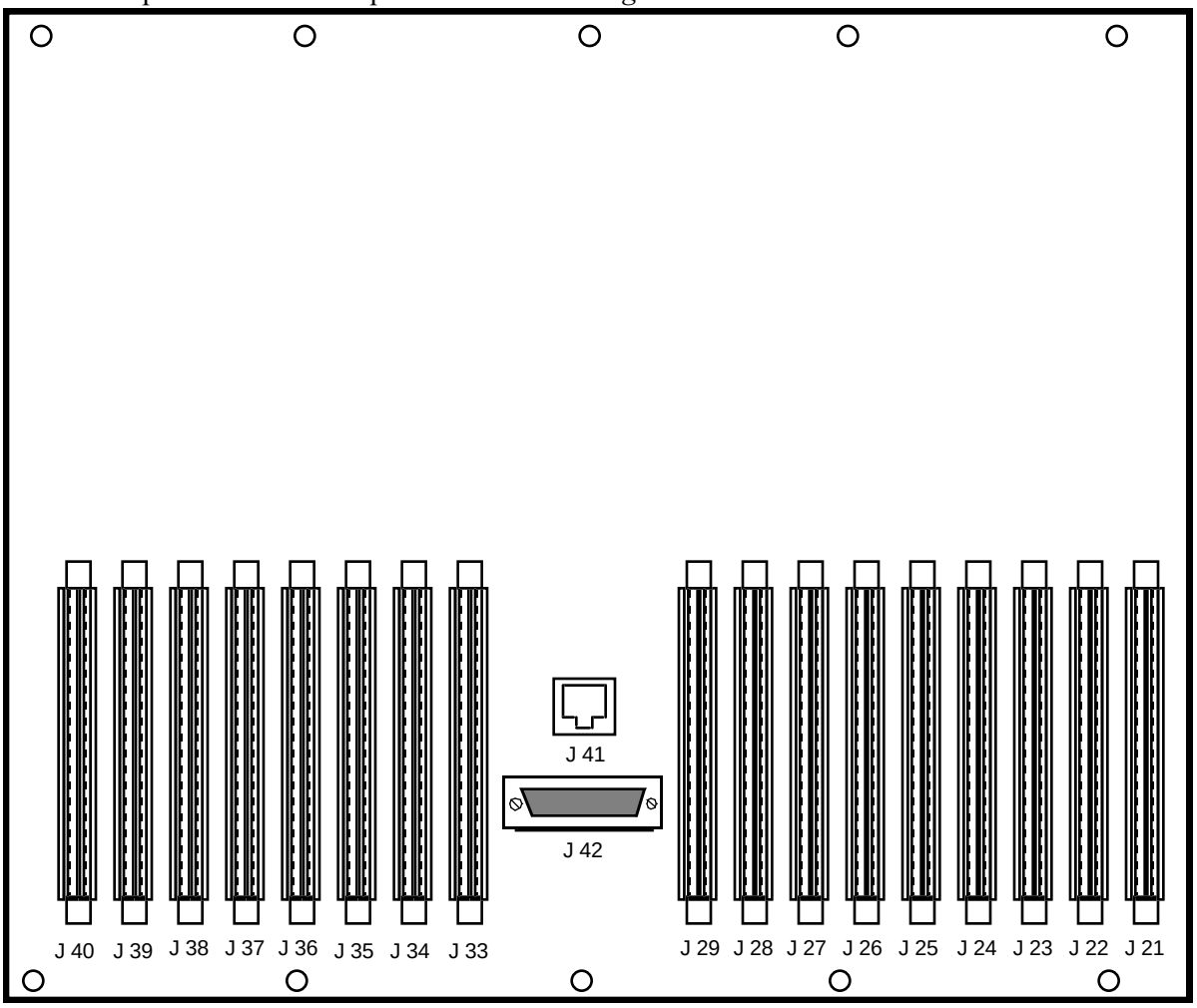


Figure 2-17 Main Shelf Backplane 50-Pin Ribbon Cable Connectors (Rear View)

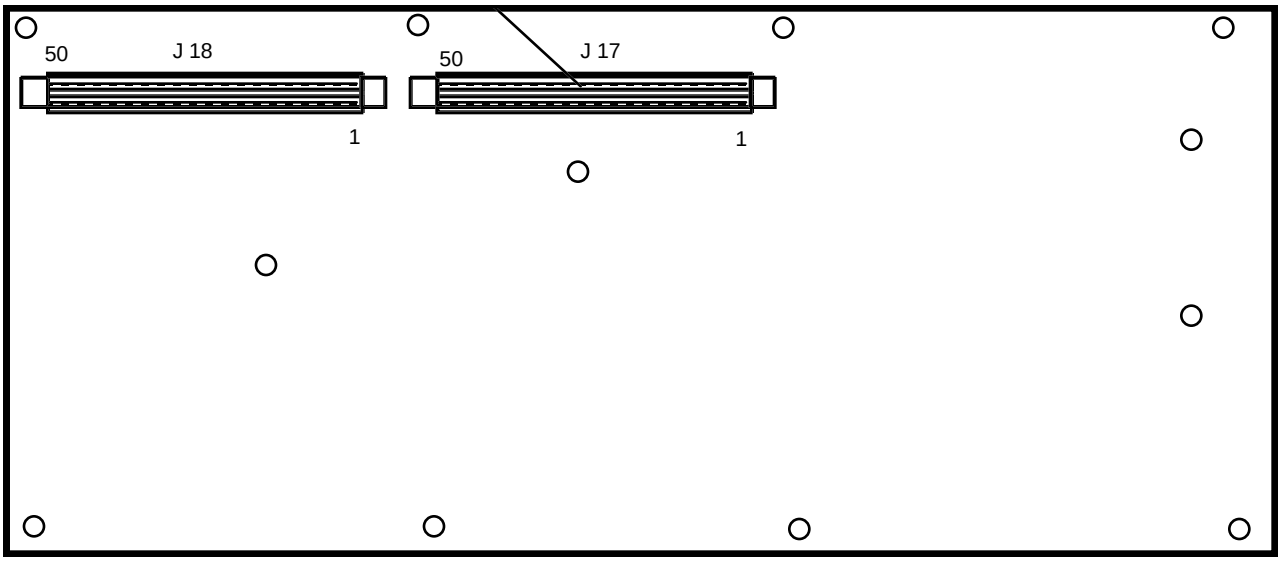
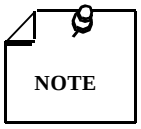


Figure 2-18 Expansion Shelf Backplane 50-Pin Ribbon Cable Connectors (Rear View)

Ribbon cables are extended from the 50-pin connectors for a CIC to each Expansion Shelf holding the channel modules that communicate through that CIC. Expansion shelves can be connected to the TMS-3000 using flex cards. Flex cards are described later in this section.



All channels on an Expansion Shelf must communicate through the same CIC.

On the Main Shelf Backplane the 50-pin ribbon cable connectors are J21 through J29 and J33 through J40. On the Expansion Shelf Backplane the 50-pin ribbon cable connectors are J17 and J18.

When connecting the ribbon cable to the Main Harness Backplane, pin 1 should be up. Pin 1 is identified by a colored tracer on one edge of the ribbon cabling.

The ribbon cable connectors are equipped with special latches that lock the cable into place. They are used to unseat rather than eject the cable. The cable must be removed by hand after it is unseated. Also, when inserting the cable, be sure to close the latches slightly before pushing the cable into locked position, otherwise the latches can be damaged.

The left eight ribbon cables on the Main Harness Backplane must be self-clipped to dress to the left and go through the guide. The right eight cables dress naturally to the right.

Two 50-pin ribbon cable connectors are associated with each pair of CICs (in a redundant system) or each single CIC (in a non-redundant system). In a non-redundant system, the CIC should be placed in the right-hand slot of a pair of slots; the left-hand slot must be left unoccupied. In a non-redundant system, you may not place an ACC in the slot not occupied by a redundant CIC. *Table*

2-27 lists the association between each pair of TMS-3000 shelf slots and each pair of 50-pin ribbon connectors.

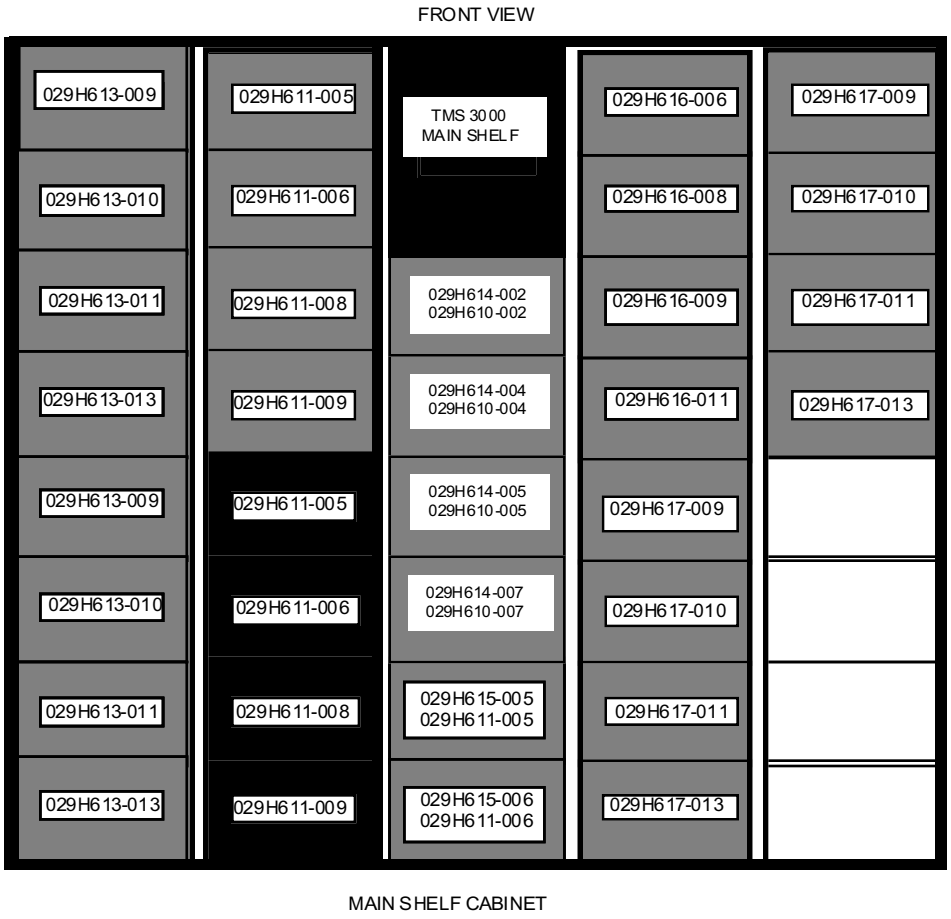
Table 2-27 TMS-3000 Shelf Channel Interface Ribbon Connectors and Associated Slot Numbers

TMS-3000 Shelf Slot Numbers	Associated Ribbon Connectors
1, 2	J21, J22
3, 4	J23, J24
5, 6	J25, J26
7, 8	J27, J28
9, 10	J33, J34
11, 12	J35, J36
13, 14	J37, J38
15, 16	J39, J40

Table 2-28 lists the Channel Interface Ribbon Cables. In *Table 2-28* the first 16 cables dress to the right for the connectors to the right of the center of the backplane. The second group of cables dress to the left for connectors to the left of the center of the backplane. *Figure 2-19* shows the correct cable numbers and cable configuration.

Table 2-28 CIC Expansion Ribbon Cabling

GDC Cable No.	Description
Cables Dressing to the Right* (Rear View)	
029H610-002	Main Harness to Expansion Shelf, length 2.5 ft
029H610-004	Cable 029H610-002 with 1.5-ft extension reaching an additional shelf
029H610-005	Cable 029H610-004 with 1.5-ft extension reaching an additional shelf
029H610-007	Cable 029H610-005 with 1.5-ft extension reaching an additional shelf
029H611-005	Main Harness to Expansion Shelf, length 5 ft
029H611-006	Cable 029H611-005 with 2.5-ft extension reaching an additional shelf
029H611-008	Cable 029H611-006 with 1.5-ft extension reaching an additional shelf
029H611-009	Cable 029H611-008 with 1.5-ft extension reaching an additional shelf
029H612-006	Main Harness to expansion Shelf, length 6.5 ft
029H612-008	Cable 029H611-006 with 1.5-ft extension reaching an additional shelf
029H612-009	Cable 029H612-008 with 1.5-ft extension reaching an additional shelf
029H612-011	Cable 029H612-009 with 1.5-ft extension reaching an additional shelf
029H613-009	Main Harness to Expansion Shelf, length 9 ft
029H613-010	Cable 029H613-009 with 1.5-ft extension reaching an additional shelf
029H613-011	Cable 029H613-010 with 1.5-ft extension reaching an additional shelf
029H613-013	Cable 029H613-011 with 1.5-ft extension reaching an additional shelf
Cables Dressing to the Left* (Rear View)	
029H614-002	Main Harness to Expansion Shelf, length 2.5 ft
029H614-004	Cable 029H614-002 with 1.5-ft extension reaching an additional shelf
029H614-005	Cable 029H614-004 with 1.5-ft extension reaching an additional shelf
029H614-007	Cable 029H614-005 with 1.5-ft extension reaching an additional shelf
029H615-005	Main Harness to Expansion Shelf, length 5 ft
029H615-006	Cable 029H615-005 with 1.5-ft extension reaching an additional shelf
029H615-008	Cable 029H615-006 with 1.5-ft extension reaching an additional shelf
029H615-009	Cable 029H615-008 with 1.5-ft extension reaching an additional shelf
029H616-006	Main Harness to Expansion Shelf, length 6.5 ft
029H616-008	Cable 029H616-006 with 1.5-ft extension reaching an additional shelf
029H616-009	Cable 029H616-008 with 1.5-ft extension reaching an additional shelf
029H616-011	Cable 029H616-009 with 1.5-ft extension reaching an additional shelf
029H617-009	Main Harness to Expansion Shelf, length 9 ft
029H617-010	Cable 029H617-009 with 1.5-ft extension reaching an additional shelf
029H617-011	Cable 029H617-010 with 1.5-ft extension reaching an additional shelf
029H617-013	Cable 029H617-011 with 1.5-ft extension reaching an additional shelf
*Be sure to connect each ribbon cable so that the colored tracer on the edge of the ribbon is up.	



The above diagram is a front view of five cabinets. The center cabinet or "main shelf" cabinet houses the common cards. The other four are independent cabinets.

To connect the expansion shelves in the main cabinet:

Find the expansion shelf in the diagram that corresponds to the one that you are installing. The two numbers in the box are GDC cable numbers. These are the cables that can reach from the main shelf to that expansion shelf. Use the top number if the CIC you are connecting is on the right side of the main shelf (as viewed from the front). Use the bottom number if the CIC you are connecting is on the left side of the main shelf.

To connect the expansion shelves in an independent cabinet:

From the front of the cabinets finds the cabinet and expansion shelf that corresponds to the one you are installing. The number in the box is the GDC cable that you need. The position of the CIC on the main shelf does not matter when installing ribbon cables. Be sure to observe right and left position in relation to the main shelf cabinet.

Figure 2-19 TMS-3000 Ribbon Cable Configuration

Channel Interface Card Options

There is only one option on the CIC. It should be left in the NORM position. It is described in *Table 2-29* and its location is shown in *Figure 2-20*.

Table 2-29 CIC Options

Feature	Selection	Switch (S), Jumpers (X)		Application
		Desig.	Position	
Watchdog	Watchdog	X1	NORM	This selection is for in-house testing only. It should be left in the NORM position.
Inhibit	Inhibit Watchdog	X1	INHBT WDOG	
Frame Switching (for frame required software changes). See note below.		S1-7 S1-8	don't care Factory set*	CIC cannot switch at end of frame.
		S1-7 S1-8	Off Factory set*	CIC can switch at end of frame, but this capability has been disabled.
		S1-7 S1-8	On Factory set*	CIC can switch at end of frame.
—	—	S1, 1-6	—	These switches are reserved for future use. Leave all switches in the OFF position.
Note: S1-7 should be On if using GTS V2.2.0 or later, Off if using an earlier version. * For -2 version cards, the factory setting is Off. For -3 version cards, the factory setting is On.				

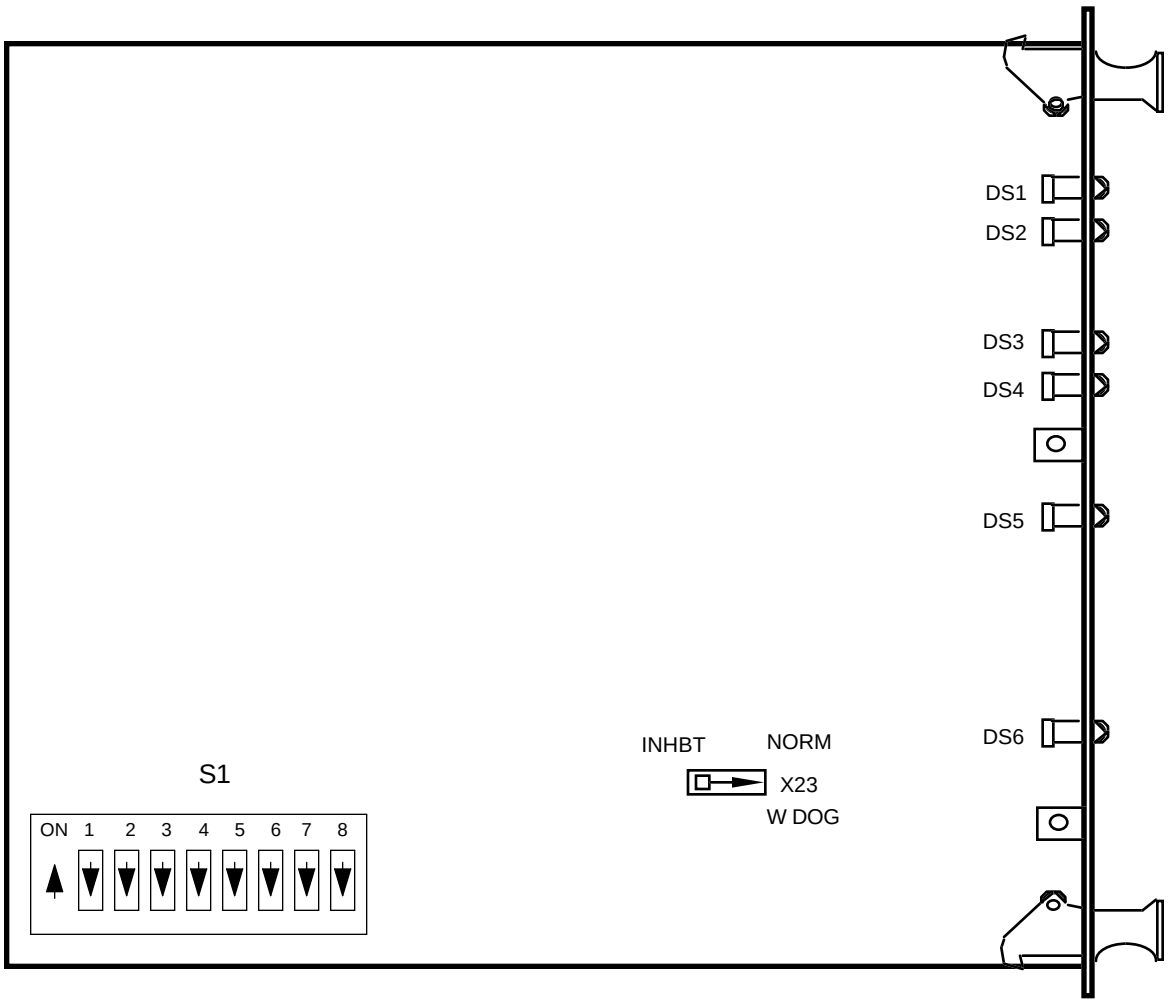


Figure 2-20 Channel Interface Card Option Location

The CIC (*GDC 036P304-002, -003*) assembly contains a factory adjustment Switch S2 that is used only for production testing. Use of the S2 may cause erroneous data transfers or complete node failure.

Switch S2 should never be changed in the field. It controls a critical factory adjustment option which is set only when the PCB assembly is installed in a specialized test fixture at the factory. The purpose of Switch S2 is to fine tune the turn-on and turn-off times of the fast bus circuit. Improper adjustment of this switch can cause erroneous data transfers between common cards and possible node failure.

Channel Module Installation

All Data and Voice Channel Modules are installed in Expansion Shelves. Channel connections are made to 25-pin channel connectors J1 through J16 at the rear of the expansion shelf. *Refer*

to the Network Documentation Package supplied with your system to determine the placement of each channel module in the Expansion Shelf.

Expansion Module

The Expansion Module has one option that selects which shelf the Expansion Module is on. Since each CIC can interface four shelves of channels, there are four selections. These are described in *Table 2-30*. The location of this option is shown in *Figure 2-21*.

Table 2-30 Expansion Module Options

Feature	Selection	Switch (S), Jumpers (X)		Application
		Desig.	Position	
Shelf Selection	EXP1	X1	EXP1	EXP1 is selected if the Expansion Module being addressed contains the first 16 channels interfaced by the CIC.
	EXP2	X1	EXP2	EXP2 is selected if the Expansion Module being addressed contains the 17th through 32nd channel interfaced by the CIC.
	EXP3	X1	EXP3	EXP3 is selected if the Expansion Module being addressed contains the 33rd through 48th channel interfaced by the CIC.
	EXP4	X1	EXP4	EXP4 is selected if the Expansion Module being addressed contains the 49th through 64th channel interfaced by the CIC.

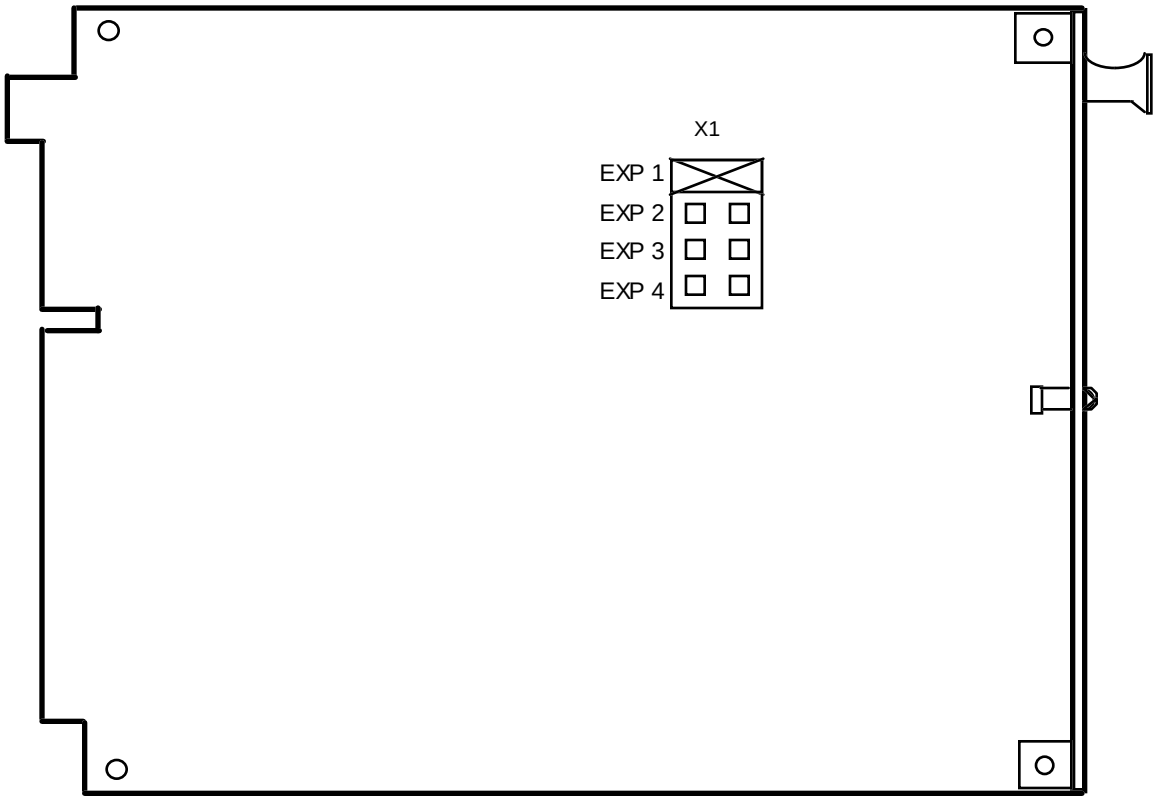


Figure 2-21 Expansion Module Option Locations

All channel modules at a TMS-3000 node reside in Expansion Shelves. A single Expansion Shelf holds up to 16 channel modules. An Expansion Module is required in each Expansion Shelf (two required for redundant operation). *See Figure 2-22.*

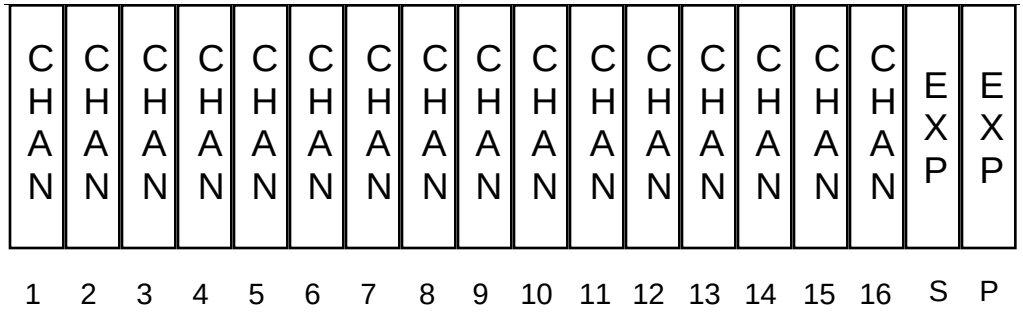


Figure 2-22 TMS-3000 Expansion Shelf

Flex Cards

A Flex Card is an actual pc board that replaces the ribbon cable assemblies previously used. *Figure 2-23* shows a typical Flex Card and how it is used to connect two expansion shelves. The Flex Cards mount between each expansion shelf. Two Flex Cards mount on the left side of each expansion shelf as viewed from the rear. The Flex Cards come in several different lengths to accommodate the number of shelves being connected. Each card has several 50-pin female connectors that provide electrical connections between each expansion shelf and a 50-pin male connector used to connect the Flex Card to a ribbon cable that goes to the main shelf assembly. Several ferrite beads are mounted on one card to reduce the amount of reflection interference from the last shelf to the first. Cutout slots on each card allow quick access to the EIA business equipment connectors. A redesigned rear cover mounts onto each expansion shelf to cover the flex cards and reduce radiated noise.

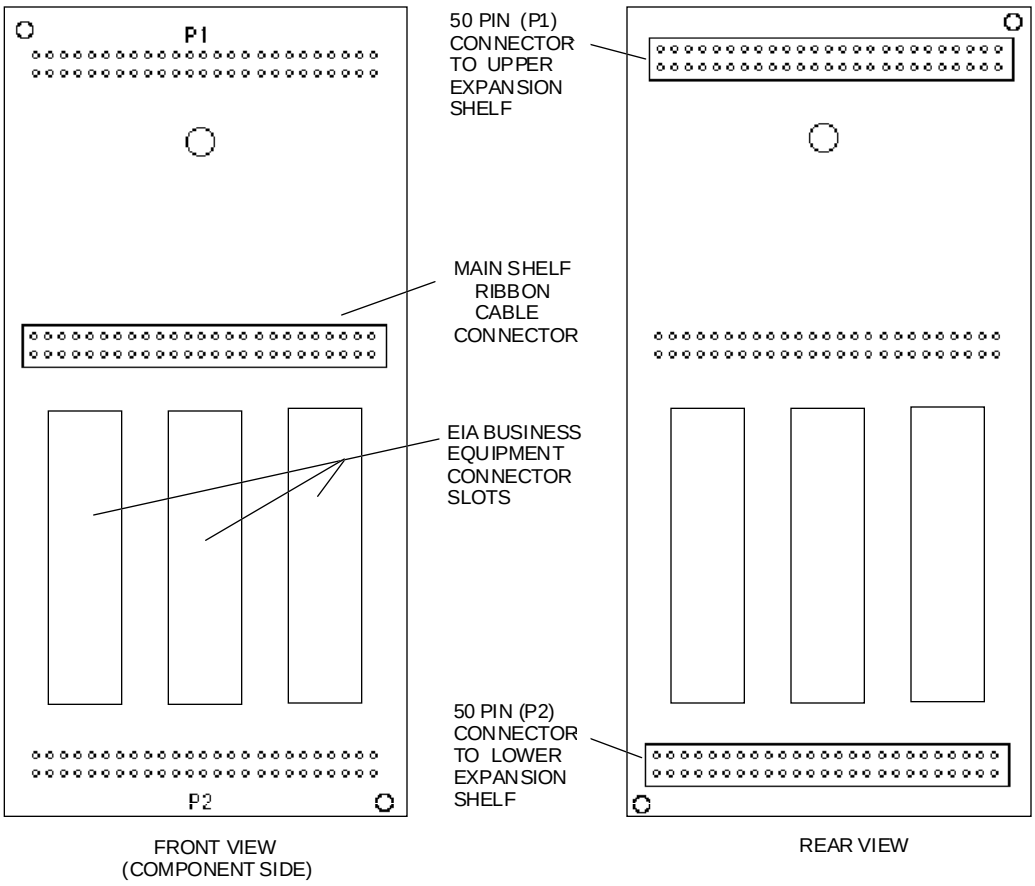


Figure 2-23 Flex Card Front and Rear View (036P091-001)

NOTE

To install flex cards, the expansion shelf must be Revision F or later. A kit is available that allows modification of older expansion shelves.

Flex Card Installation

A maximum of four expansion shelves can be connected to the TMS-3000 main shelf using Flex Card assemblies. *Refer to Figure 2-24* to determine the Flex Card assembly number needed for the application. In this drawing note that each area has four shaded portions corresponding to four expansion shelves. The middle column labeled "Main Shelf Cabinet" shows the following:

- When connecting between the main shelf and two expansion shelves, use Flex Card assemblies *GDC Part Nos. 036P090-001 and 036P091-001*.
- When connecting between the main shelf and three expansion shelves, use Flex Card assemblies *GDC Part Nos. 036P092-001 and 036P093-001*.
- When connecting between the main shelf and four expansion shelves, use Flex Card assemblies *GDC Part Nos. 036P094-001 and 036P095-001*.

The Flex Card assemblies mount where the ribbon cables were previously attached between expansion shelves. The lengths and number of connectors on each card are different to accommodate the number of expansion shelves configured for each channel group.

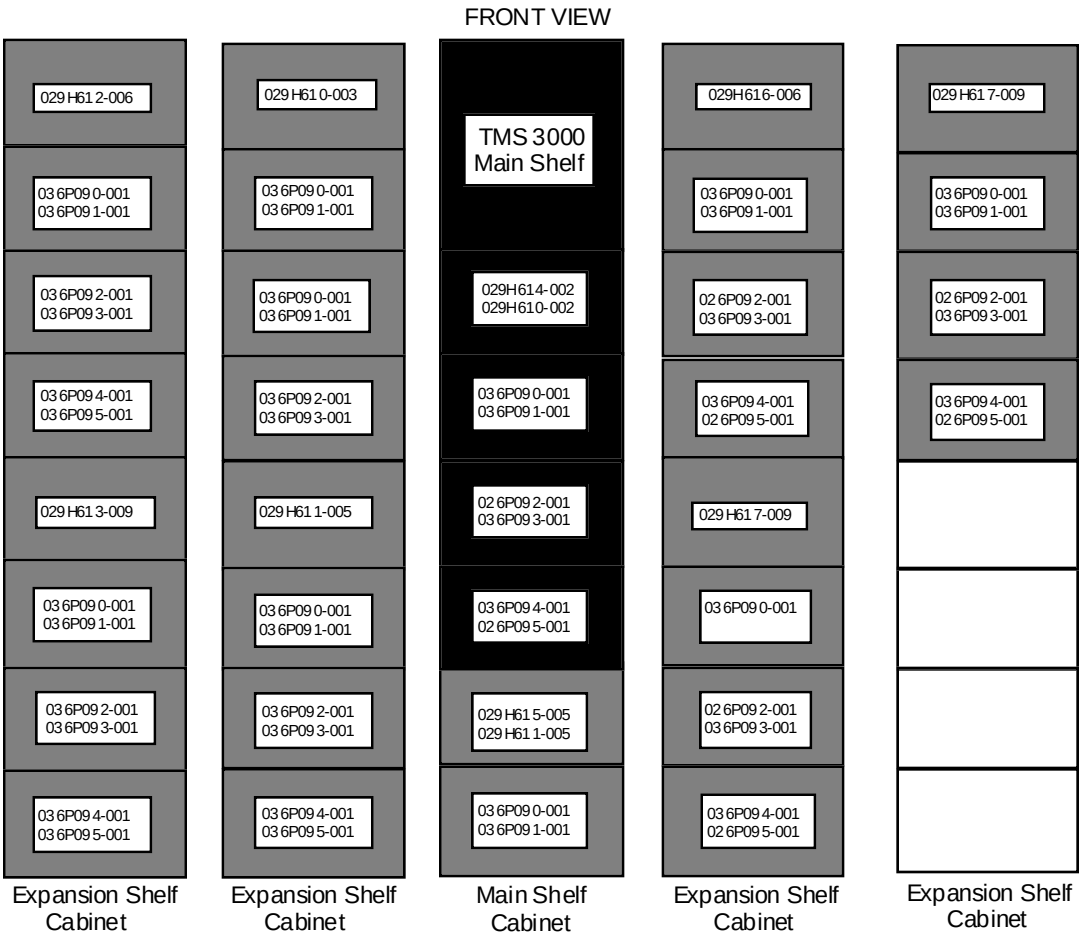
Figure 2-24 shows two Flex Cards mounted in a TMS-3000 with three expansion shelves.

Turn the power off in the TMS-3000 when installing the Flex Card.

To install the Flex Card assembly in the main shelf cabinet, first determine the length of ribbon cable needed to run from the main shelf to the first expansion shelf. *Figure 2-24* lists two cable numbers on the first expansion shelf under the main shelf. These cables are 2.5 feet long. Longer lengths are available if required (*refer to Table 2-31).*

Next, loosen all the expansion shelves in the cabinet, so that the shelves move freely.

Now, determine the length of the Flex Card needed using *Figures 2-24 and 2-25*. The top number is the assembly that mounts to the left-hand side; the bottom number is the assembly that mounts on the right-hand side.



The above diagram is a front view of five TMS-3000 cabinets. The center cabinet or “main shelf” cabinet houses the common cards. The other four are independent expansion shelf cabinets.

To connect expansion shelves in the main cabinet:

Find the expansion shelf in the diagram that corresponds to the one that you are installing. The two numbers in the top box are GDC cable numbers. Appropriate pairs of flat ribbon cables are still required to connect the main shelf to the first expansion shelf. The numbers below the first expansion shelf are the flex card part numbers. When connecting two shelves, use GDC 036P090-001 and 036P091-001. When connecting three expansion shelves, use GDC 036P092-001 and 036P093-001. When connecting four expansion shelves, use GDC 036P094-001 and 036P095-001.

To connect expansion shelves in an independent cabinet:

From the front of the cabinets, find the cabinet and expansion shelf that corresponds to the one you are installing. A flat ribbon cable is required to connect the first expansion shelf to the main shelf. The number below the first expansion shelf is the GDC flex card you need.

Figure 2-24 TMS-3000 Flex Card Configuration

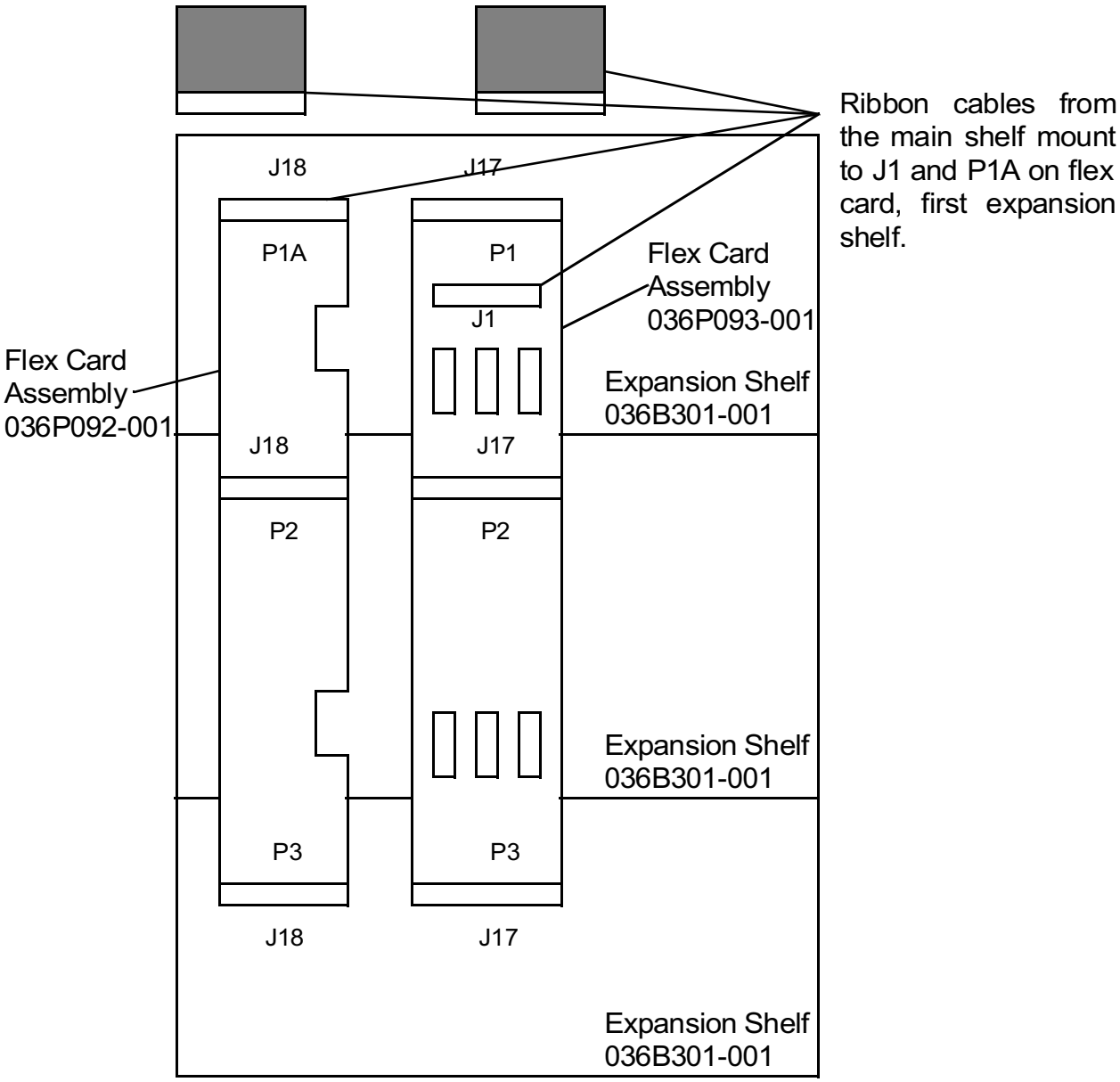


Figure 2-25 Flex Cards Connecting Three TMS-3000 Expansion Shelves

Connect the proper Flex Card assembly to each expansion module connector. If connecting two shelves, the lower female connector should line up with the second expansion shelf. Line up all pins and carefully insert each connector into each expansion shelf. Once the Flex Cards are properly seated, insert the guide pins* between the card and the expansion shelf. The ribbon cables from the main shelf plug into J1 and P1A of the Flex Card Assemblies. Finally, tighten the shelf mounting screws.

* Guide pins not required if using updated TMS-3000 expansion shelf.

NOTE

It is not necessary to install the Cable Filter Plug-In Cards between the expansion shelf and CIC assembly.

Connecting Flex Cards in an Independent Cabinet

When connecting expansion shelves in an independent cabinet, you must use a ribbon cable to connect the first or top expansion shelf to the TMS-3000 main shelf. Referring to the expansion shelf cabinet in *Figure 2-24*, two ribbon cables connect from the main shelf to the first expansion shelf of the Flex Cards. The numbers that follow below each successive expansion shelf show the flex card numbers necessary to attach additional shelves.

Table 2-31 Channel Interface Module Expansion Ribbon Cabling For TMS-3000 Using Flex Card Assemblies

GDC Cable No.	Description
Cables Dressing to the Right* (Rear View)	
029H610-002	Main Harness to Expansion Shelf, length 25 ft.
029H611-005	Main Harness to Expansion Shelf, length 5 ft.
029H612-006	Main Harness to Expansion Shelf, length 6.5 ft.
029H613-009	Main Harness to Expansion Shelf, length 59 ft.
Cables Dressing to the Left* (Rear View)	
029H614-002	Main Harness to Expansion Shelf, length 2.5 ft.
029H615-005	Main Harness to Expansion Shelf, length 5 ft.
029H616-006	Main Harness to Expansion Shelf, length 6.5 ft.
029H617-009	Main Harness to Expansion Shelf, length 9 ft.
*Be sure to connect each ribbon cable so that the colored tracer on the edge of the ribbon is up.	

Other Cards

Other technical manuals contain detailed information on some of the common cards. Refer to *the Preface. For OCM common cards refer to GDC 036R340-000 and its associated addendums.*

Summary

In this chapter we covered the procedures for installation and optioning of TMS common cards. Part numbers were also provided.

What's Next

The next chapter provides the procedures for installation and optioning of channel cards.

3 Channel Card Installation

Overview

The following sections describe the methods of option selection and the options provided for each TMS-3000 channel card. Detailed information concerning specific positioning of option selection devices is given in a number of tables in this chapter. Individual option tables for each module have been grouped with the drawings concerning that module.

As with the common cards, optional configurations are implemented on a channel card by means of program plugs, switches, jumper plugs, or resistor networks.

Note that several channel modules are covered in separate publications. *Refer to the Preface for a complete list of those manuals.*

Data Channel Modules

Data Channel Module interface connections, options, and the TID-III module are presented in the following paragraphs, figures, and tables.

Part Numbers

Connections for data channels vary according to the type of interface required for that channel (i.e., EIA/TIA-232-E, RS-422, RS-423, V.35, etc.). *Table 3-1 through Table 3-18 lists the assembly part numbers for the different interfaces. Table 3-19 lists the cables provided for each interface type.*

Table 3-1 Data II Channel Module with EIA/TIA-232-E Interface (036M048-001)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, EIA/TIA-232-E	—	036M047-001
Data II Channel PC Assembly	—	036P236-001

Table 3-2 Data II Channel Module with RS-422 Interface (036M048-002)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, RS-422	—	036M047-002
Data II Channel PC Assembly	—	036P236-001

Table 3-3 Data II Channel Module with RS-423 Interface (036M048-003)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, RS-423	—	036M047-003
Data II Channel PC Assembly	—	036P236-001

Table 3-4 Data II Channel Module with V.35 Interface (036M048-004)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, V.35	—	036M047-004
Data II Channel PC Assembly	—	036P236-001

Table 3-5 Data III Channel Module with EIA/TIA-232-E Interface (036M058-001)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMTR, EIA/TIA-232-E	—	036M047-001
Data III Channel PCB Assembly	—	036P236-004

Table 3-6 Data III Channel Module with RS-422 Interface (036M058-002)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMTR, RS-422	—	036M047-002
Data III Channel PCB Assembly	—	036P236-004

Table 3-7 Data III Channel Module with RS-423 Interface (036M058-003)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMTR, RS-423	—	036M047-003
Data III Channel PCB Assembly	—	036P236-004

Table 3-8 Data III Channel Module with V.35 Interface (036M058-004)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMTR, V.35	—	036M047-004
Data III Channel PCB Assembly	—	036P236-004

Table 3-9 Data IV Channel Module with EIA/TIA-232-E Interface (036M079-001)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, EIA/TIA-232-E	—	036M047-001
Data IV Channel, PCB Assembly	—	036P236-007

Table 3-10 Data IV Channel Module with RS-422 Interface (036M079-002)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, RS-422	—	036M047-002
Data IV Channel, PCB Assembly	—	036P236-007

Table 3-11 Data IV Channel Module with RS-423 Interface (036M079-003)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, RS-423	—	036M047-003
Data IV Channel, PCB Assembly	—	036P236-007

Table 3-12 Data IV Channel Module with V.35 Interface (036M079-004)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, EIA/TIA-232-E	—	036M047-004
Data IV Channel PCB Assembly	—	036P236-007

Table 3-13 UDC Module with EIA/TIA-232-E Interface (036M078-001)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, EIA/TIA-232-E	—	036M047-001
Data IV Channel, PCB Assembly	—	036P236-007

Table 3-14 UDC Module with RS-422 Interface (036M078-002)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, RS-422	—	036M047-002
Data IV Channel, PCB Assembly	—	036P236-007

Table 3-15 UDC Module with RS-423 Interface (036M078-003)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, RS-423	—	036M047-003
Data IV Channel, PCB Assembly	—	036P236-007

Table 3-16 UDC Module with V.35 Interface (036M078-004)

Equipment Supplied	Designation	GDC Part No.
Interface Set, RCV/XMT, EIA/TIA-232-E	—	036M047-004
Data IV Channel PCB Assembly	—	036P236-007

Table 3-17 UDC Module with X.21 (X.27) Interface (036M078-007)

Equipment Supplied	Designation	GDC Part No.
Interface Set, XMT/RCV-422	—	036M047-002
Data Sync Channel PCB Assembly	—	036P236-010
Conn. Program Plug	—	209-014-116

Table 3-18 TID-III Data Channel (18607-201)

Equipment Supplied	Designation	GDC Part No.
TID-III	TID-III	18607-201
Transmitter Card	TX	18601-201
Receiver Card	RX	18602-200
NCO Card	NCO	18603-200

Table 3-19 Data Channel Interface Cables

GDC Cable No.	Description	Application
028H502	EIA/TIA-232-E	Used for all standard EIA/TIA-232-E applications. Available in 5-, 15-, 25-, 50-foot lengths.
027H408	RS-422/423 Cascade	Used to cascade RS-422/423 channel to aggregate interface of another TMS-3000 or TDM for mux to submux application. Available in 5-, 15-, 25-, 100-, 250-, or 500-foot lengths.
027H511	EIA/TIA-232-E to RS-422-423 adapter	Used when RS-422/423 interface is required, but with EIA/TIA-232-E controls only. Cable is one foot long.
027H407	RS-422/423 Tandem ITU-T G.703	Used for back-to-back RS-422/423 or ITU-T G.703 channels (where channels of two tandem TDMs or TMSs are directly connected). Available in 5-, 15-, 25-, or 50-foot lengths.
027H513	ITU-T V.35 to DB-25 cable (Male-Male)	Used for ITU-T V.35 channels. Available in 15-, 25-, or 50-foot lengths.
027H514	ITU-T V.35 to DB-25 adapter	Used for ITU-T V.35 channels, when V.35 cable is customer-supplied. Available in 1-foot length..
028H311	EIA/TIA-232-E	Crossover Cable — used to connect EIA/TIA-232-E channel to a modem.
027H410	ITU-T V.35	Crossover Cable — used to connect V.35 channel to business equipment connector on DS-1 Shelf.
027H518	RS-422	Crossover Cable — used to connect an RS-422 channel to business equipment connector on DS-1 Shelf.
027H521	ITU-T V.35	Crossover Cable — used to connect V.35 channel to a modem. Connects to 027H514 adapter.
028H415	V.54 unbalanced	Used for V.54 modem application with 54M8 interface.
G023H004	V.28 (M-M)	Used for data sync channel. Male-to-male connector.
G023H010	1-19 Way D (M-M)	1-19 Way D-cable. Male-to-male connector.
G023H019	V.28 Sync (M-M	V.28 Sync Channel Crossover Cable. Male-to-male connector
G024H015	Data II, V.35-DTE	Data Channel II, V.35 DTE applications. Male-to-male connector.
G024H016	Data II, V.35-DTE	Data Channel II, V.35 DTE applications. Male-to-female connector.

Interface Options

Option selections required to support each interface type are discussed in *Table 3-20 and Table 3-21*.

The following interfaces may be selected (not applicable to G.703 channel card):

- EIA/TIA-232-E/ITU-T V.28
- MIL-STD-188C
- RS-423/MIL-STD-188-114 Unbalanced
- RS-422/MIL-STD-188-114 Balanced (no cable termination)
- RS-422/MIL-STD-188-114 Balanced (Transmit Data and Clock cable termination)
- V.35 Balanced Double Current

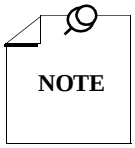
A DCE interface may be selected for connection to data terminal equipment; a DTE interface may be chosen for connection to data communication equipment. *Table 3-21* describes the selections.

Table 3-20 Data Channel Interface Options

Interface Selection	S1-1 Pos.	S1-2 Pos.	S1-3 Pos.	X21 Pos.	XRN7 (XMT) Resistor Network	XRN8 (RCV) Resistor Network	Application
EIA/TIA-232-E MIL-STD-188-114, V.28	NORM	OPEN	OPEN	NORM	RS-232 XMT 331-001-006	RS-232 RCV 331-002-006	The channel interface operates according to any of the interfaces shown in the table. To select an interface, you must set Switches S1-1 through S1-4 and Jumper X21 in the positions shown.
MIL-STD-188C	188	OPEN	OPEN	NORM	RS-232 XMT 331-001-006	RS-232 RCV 331-002-006	S1-1 selects either a MIL-STD-188C or a normal interface.
EIA-RS-423/ MIL-STD 188-114 Unbalanced	NORM	OPEN	OPEN	NORM	RS-423 XMT 331-001-005	RS-423 RCV 331-002-004	S1-2 and S1-3 select 100-ohm cable termination for the Transmit Data and Transmit External Timing signals respectively, in an RS-422 interface arrangement.
EIA-RS-422/ MIL-STD-188-114 Balanced (No cable termination)	NORM	OPEN	OPEN	422	RS-422 XMT 331-001-004	RS-422 RCV 331-002-005	The RS-422 arrangement is used with or without cable termination, as required by data equipment connected to the channel. Selection of termination provides increased noise immunity.
EIA-RS-422/ MIL-STD-188-114 Balanced (With cable termination)	NORM	422/ TER	422/ TER	422	RS-422 XMT 331-001-004	RS-422 RCV 331-001-005	Only one device can be connected to the terminated interface. Up to ten devices can be connected to the unterminated interface. Jumper plug X21 selects the RS-422 interface, with or without cable termination.
V.35 Balanced Double Current	NORM	OPEN	OPEN	NORM	Dual V.35 XMT 331-002-002	Dual V.35 RCV 331-002-003	For each type of interface, resistor networks RN7 and RN8 provide the voltage levels required by the associated interface standard (You must set all switches and jumpers as shown for each interface).

Table 3-21 Data Channel DCE/DTE Interface Option Selection

Feature	S1-4 Position	PP1 Position	Application
DCE (Data Communication Equipment) Interface	DCE	DCE	The Data Channel module communicates with data terminal equipment (CRTs, printers, CPU ports, etc.) by presenting a DCE interface; the module communicates with data communications equipment (modems, multiplexers, etc.) by presenting a DTE interface. Switch S1-4 selects the DCE or DTE interface. Program plug PP1 must also be positioned to select the proper signal interfacing. DTE and DCE markings are visible on opposite sides of program plug socket XPP1. When PP1 is positioned so that a notch (or pin 1) on the plug points to DTE, the DTE interface is selected. When PP1 is positioned so that the notch (or pin 1) points to DCE, the DCE interface is selected.
DTE (Data Terminal Equipment) Interface	DTE	DTE	In the DCE position PP1 passes data, timing and control signals straight through between equipment connected to the channel and circuitry on the Data Channel module. In the DTE position, signals are "crossed over'' to permit the proper communication between the module and data communication equipment connected to the channel. The crossovers are as follows: XMT DATA to RCV DATA RCV DATA to XMT DATA CA (Request to send) to CF (Carrier Detect) CF to CA RCV TMG (Receive Timing) to EXT TMG (External Timing) EXT TMG to RCV TMG RDY IN (Ready In) to RDY OUT (Ready Out) RDY OUT to RDY IN **NOTE:** If the system uses an EIA/TIA-232-E or RS-423 interface, and a synchronous modem is connected to a data channel interface, select the DTE positions for S1-4 and PP1. Also, disconnect the lead connected to pin 15 of the data channel connector. If the system uses a balanced RS-422 or V.35 interface, and a synchronous modem is connected to a Data channel interface, select the DCE positions for S1-4 and PP1. Additionally, a crossover cable must be used to complete the interface connections to the modem. The crossover cable serves to cross the data, timing, and control signals for compatibility with the synchronous modem pins, thereby eliminating potential timing problems.

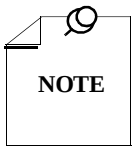


For the Data Channel Module, DTE/DCE component board designations are usually the opposite of the equipment to which the channel is connected. If you are connecting data terminal equipment (CRTs, printers, etc.) to the channel (with a straight through cable), place switches and program plugs in the DCE position. If you are connecting data communication equipment (modems, multiplexers, etc.) to the channel, place switches and program plugs in the DTE position.

When RS-422 or RS-423 is selected for a channel, the Data Channel module supplies only the data and timing signals at RS-422 or RS-423 specified voltage levels. The control signals operate at EIA/TIA-232-E levels. If your channel application requires RS-422 or RS-423 level control signals, you need an external Channel Interface Adapter. Option selections for the Channel Interface Adapter are described in *Table 3-22*.

Table 3-22 EIA RS-422/423 Channel Interface Adapter Option Selection

Feature	Selection	Switch(S)/Jumper(X)		Application
		Desig.	Position	
Data Communication Equipment (DCE) or Data Terminal Equipment (DTE) Connections	Adapter Connected to Data Communication Equipment	S1-1 S1-2	DCE DCE	When this adapter is connected to data communication equipment (modems, multiplexers, etc.) Switches S1-1 and S1-2 must be set in the DCE position. When the adapter is connected to data terminal equipment (CRTs, printers, CPUs, etc.) Switches S1-1 and S1-2 are set in DTE position. **NOTE:** *These designations are the reverse of the DTE and DCE designations for the Data II Channel module.* Program plug PP1 must also be positioned for DTE or DCE. This is done by positioning the plug so that the notch in the plug is adjacent to the DTE or DCE silkscreen markings on the card. The Data Channel module must be set for a DTE interface.
	Adapter Connected to Data Terminal Equipment	S1-1 S1-2	DTE DTE	
EIA-RS-422 or EIA-RS-423 Interface	RS-422	S1-3 S1-4 X1	422 422 422	To select an EIA RS-422 standard balanced interface, set S1-3, S1-4 and X1 in the 422 position. To select an EIA RS-423 standard unbalanced interface, set S1-3, S1-4, and X1 in the 423 position. Program plug PP2 in the adapter card must also be positioned for an RS-422 or 423 interface. This is done by positioning the plug so that the notch on the plug is adjacent to the 422 or 423 silkscreen markings on the card. The Data Channel module must also be set for an RS-422 or RS-423 interface.
	RS-423	S1-3 S1-4 X1	423 423 423	



The following interface sets (Table 3-23 to Table 3-26) are available to change the interface type as required on existing Data II, Data III, Data IV, UDC and G.703 modules.

Table 3-23 Interface Set, RCV/XMT EIA/TIA-232-E (036M047-001)

Equipment Supplied	Designation	GDC Part No.
Resistor Network	RN8	331-002-006
Resistor Network	RN7	331-001-006
Resistor Network	—	036C010-001

Table 3-24 Interface Set, RCV/XMT RS-422 (036M047-002)

Equipment Supplied	Designation	GDC Part No.
Resistor Network	RN7	331-001-004
Resistor Network	RN8	331-002-005

Table 3-25 Interface Set, RCV/XMT RS-423 (036M047-003)

Equipment Supplied	Designation	GDC Part No.
Resistor Network	RN7	331-001-005
Resistor Network	RN8	331-002-004

Table 3-26 Interface Set, RCV/XMT V.35 (036M047-004)

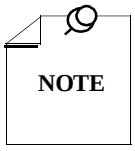
Equipment Supplied	Designation	GDC Part No.
Resistor Network	RN7	331-002-002
Resistor Network	RN8	331-002-003

Digital Line Driver Adapter

A digital line driver adapter is available for applications where a channel device is separated from the TMS-3000 by some distance. All adapters mount in a CP-12 mounting panel and are connected to the back of the TMS-3000 shelf. The Data Channel uses a 16-bit transmit and receive buffer.

Data Channel Module Options

The following options may be selected for the Data Channel module (*Figure 3-1).* (*Refer to Chapter 8, Connector Pin Assignments*, for Channel Connector Pin assignments).



Data IV and UDC channel modules contain several features that are available in later releases of TMS-3000 software.

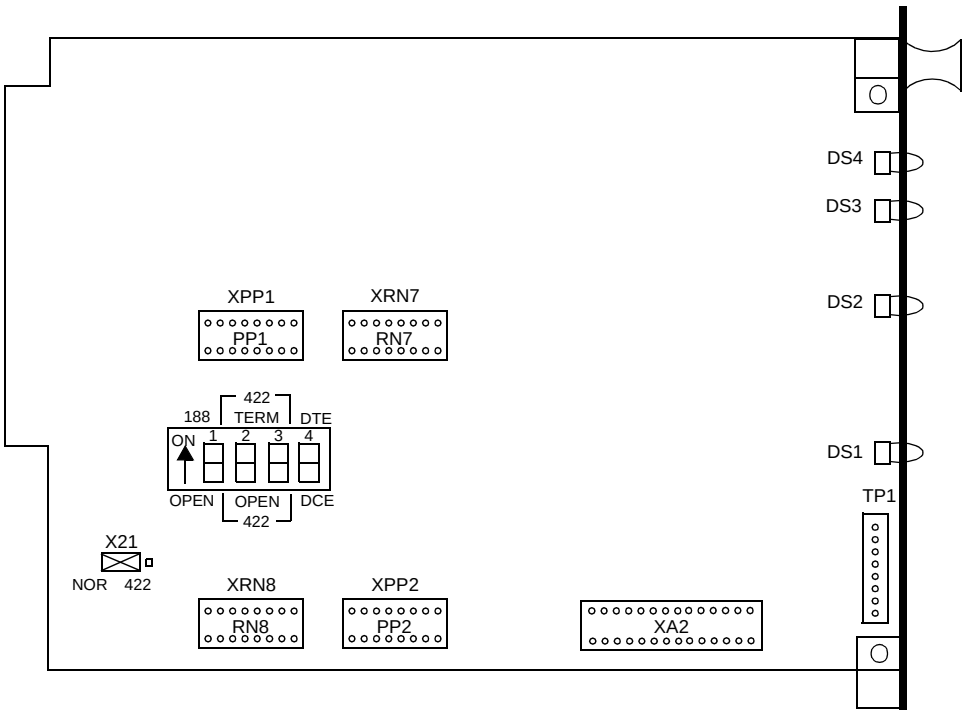


Figure 3-1 Data Channel Module Option Locations (GDC 036P236-007)

For the G.703 channel (*Figure 3-2*), there are two option jumpers. X1 is OCTETALM, which allows bipolar violations to be discontinued when the receive level signal is dropped. X2 is CHSNCLK, which allows enabling of an external clock for system phase locking. Both options are shown in their normal (option disabled) position.

Figure 3-3 shows the option and program plug locations for the Data Sync Channel and *Figure 3-4* shows the option and program plug locations for the UDC, X.21.

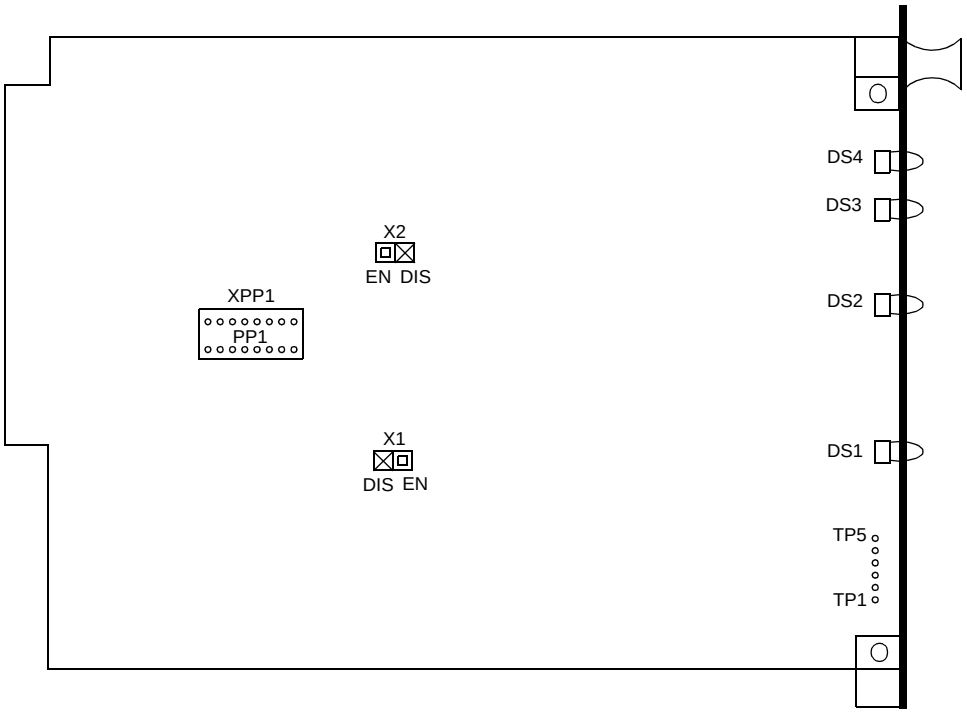


Figure 3-2 Data Channel Module Option Locations (G.703 Data Channel Card, GDC 036P243-001)

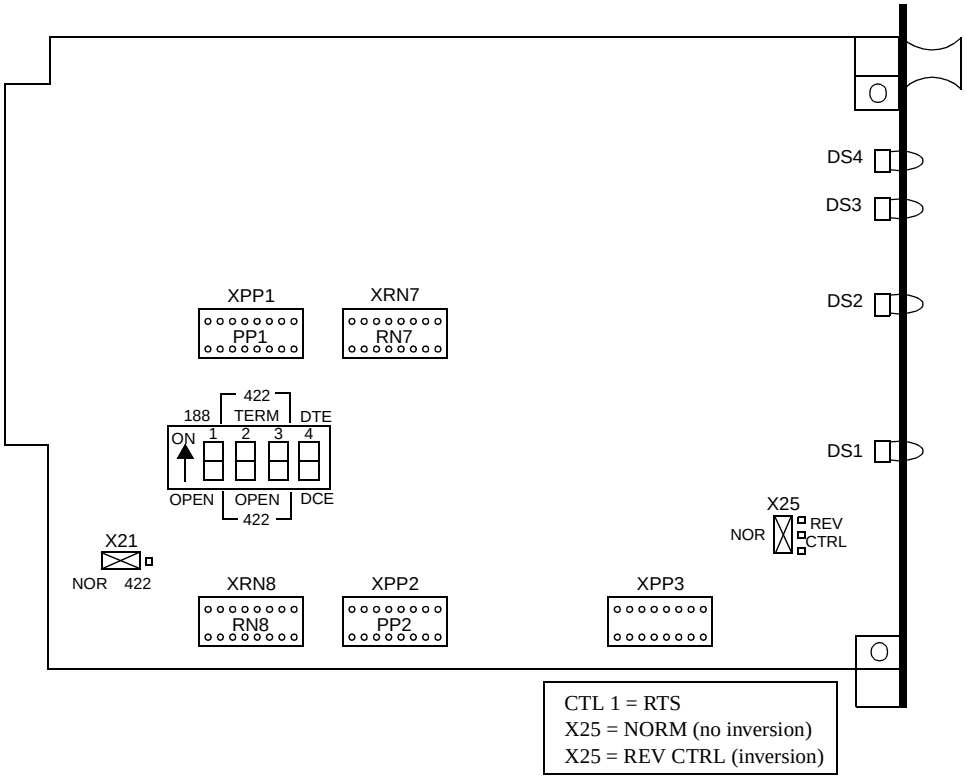


Figure 3-3 Data Sync Channel Card Option Locations (GDC 036P236-010)

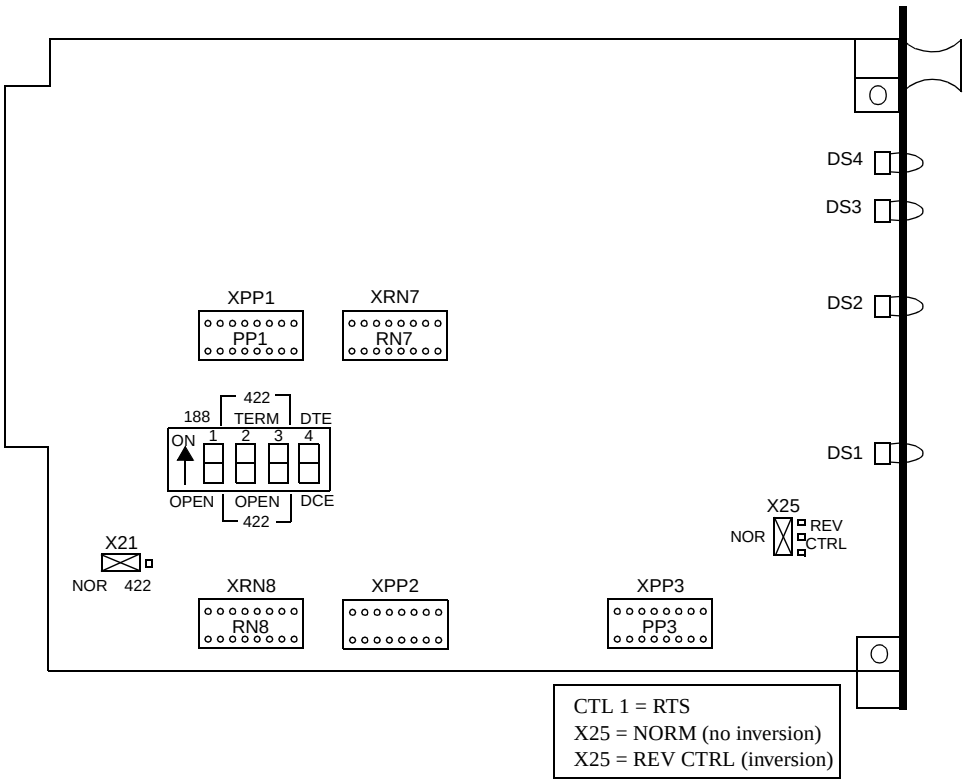


Figure 3-4 UDC, X.21(GDC 036M078-007)

Controls

Program plug PP2 (PP1 on G.703 Data Channel card) selects interface control signals to be multiplexed by the TDM and passed to the remote channel interface. Different plugs are used to support the control signal requirements of various communication circuits. *Figure 3-5* illustrates program plug PP1 positions (not applicable to G.703 channel card) while *Figure 3-6* illustrates PP3 positions. *Figure 3-7 (A-E)* shows each control plug and the channel interfaces implemented by installation of the plug. *Table 3-27* lists the part numbers for the program plugs.

Table 3-27 Program Plugs

Equipment Supplied	Designation	GDC Part No.
Resistor Network Special MM-01	PP2	331-001-010
Resistor Network Special MM-02	PP2	331-001-016
Resistor Network Special MM-05	PP2	331-001-015
Resistor Network Special V.54 MM-08	PP2	331-001-017
Resistor Network Special X.21	PP3	209-014-116

NOTE

Control signals for a data channel may be forced On or Off through the Controller interface. In some channel control arrangements, the channel configuration selected through the Controller holds control signals On or Off as part of the channel control scheme.

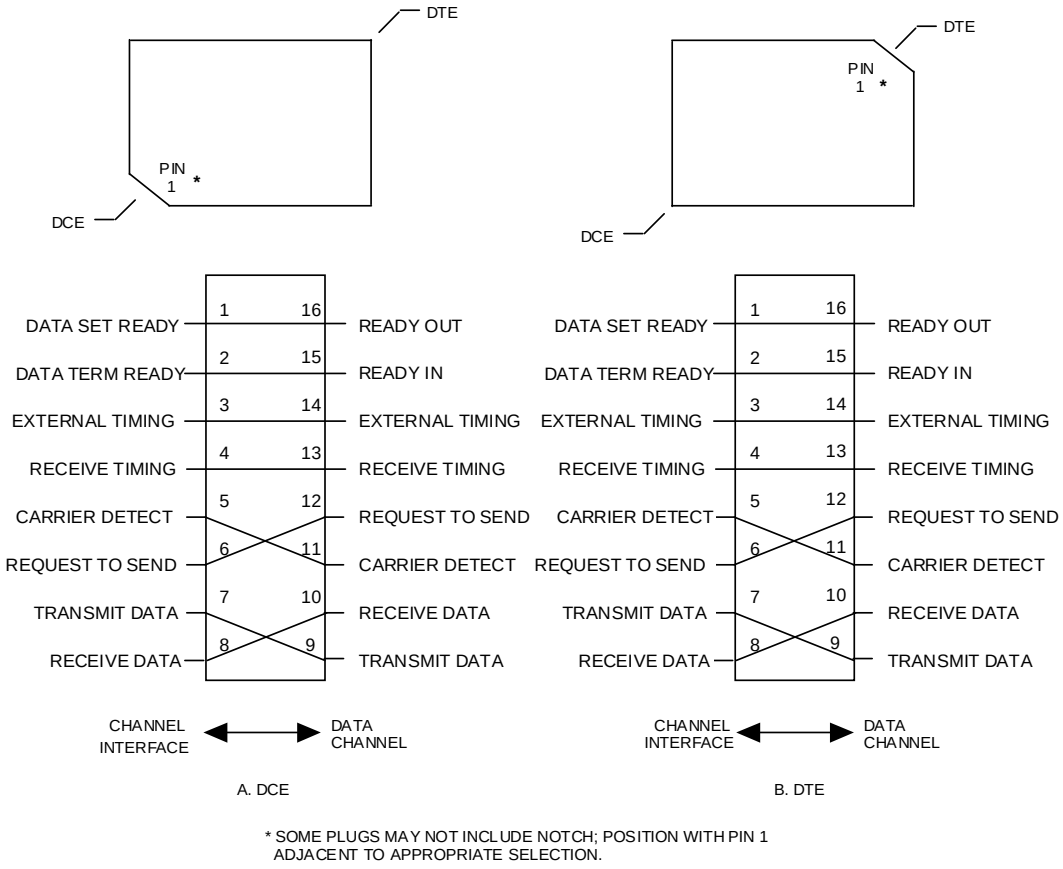


Figure 3-5 Data Channel Program Plug PP1 Positions (DCE/DTE)

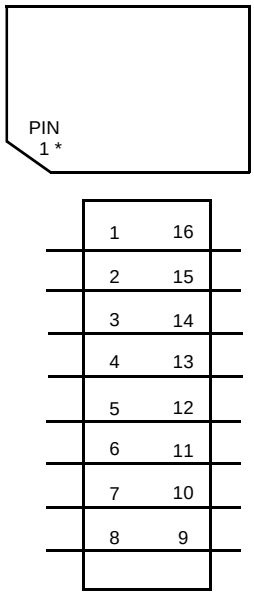
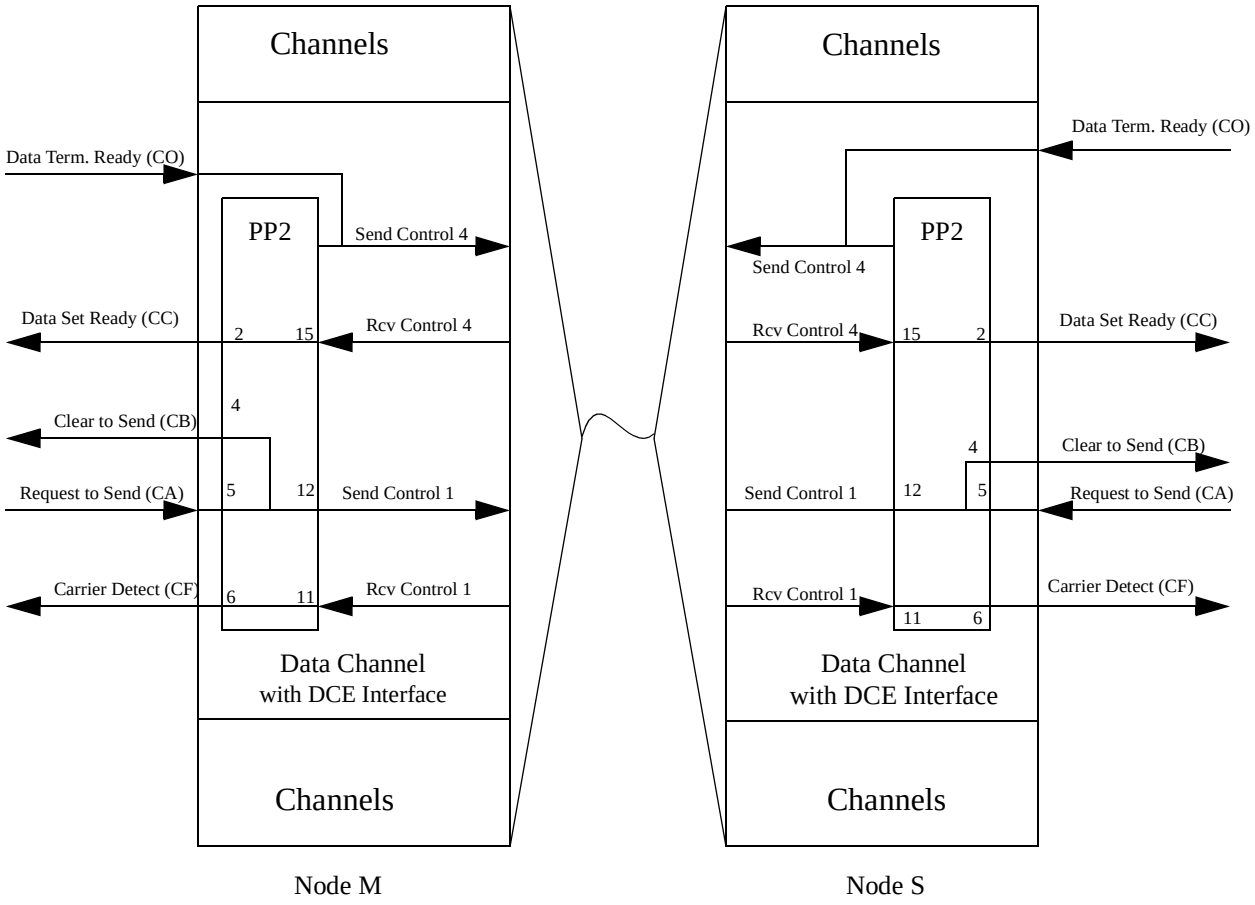


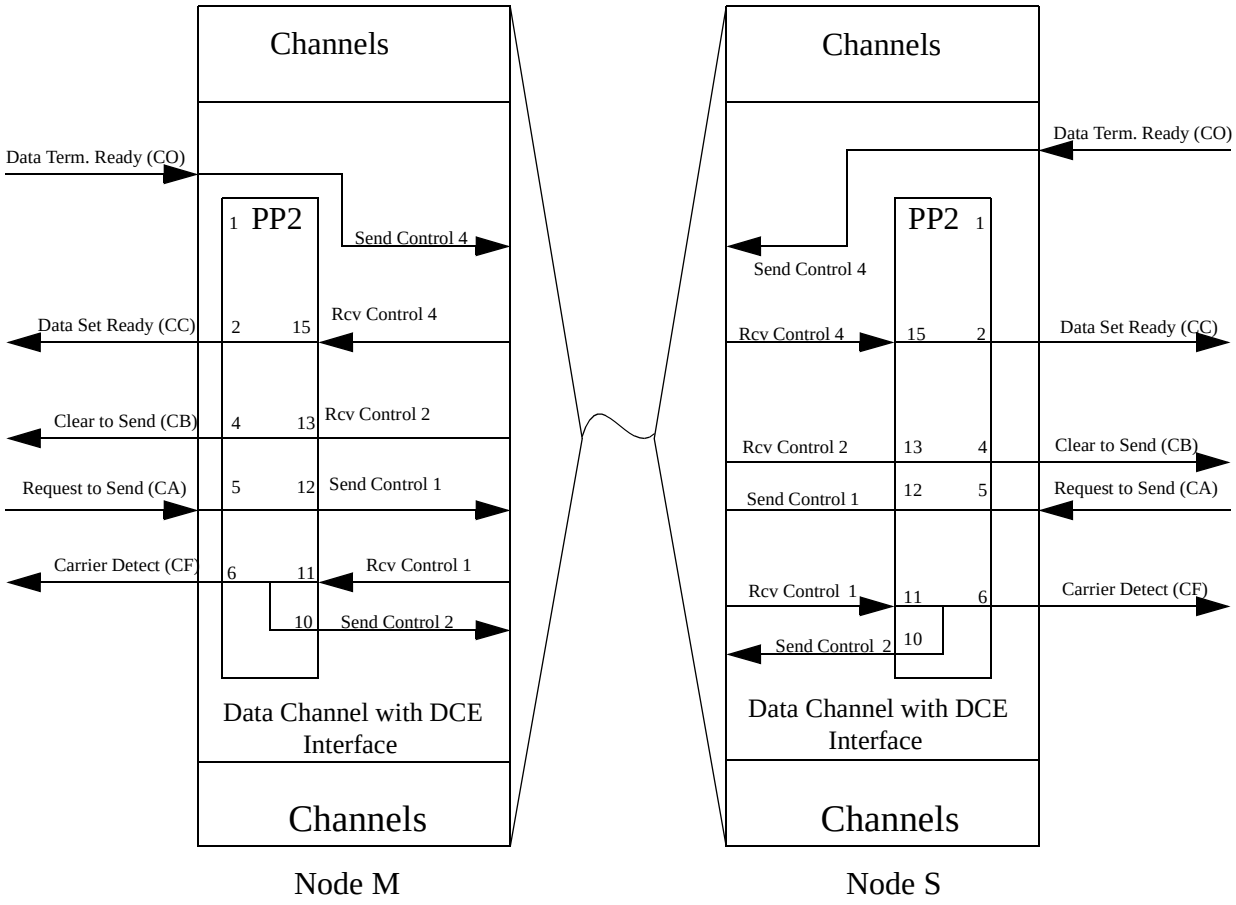
Figure 3-6 Plug PP3 Positions



A send control at one node becomes a receive control at the opposite node. For example, Request to Send is selected as Send Control 1 at Node M. Send Control 1 is transmitted across the link and becomes Receive Control 1 at the Node S data channel. PP2 at the Node S channel interface selects Receive Control 1 and sends it through the channel interface as Carrier Detect.

A. MM01 — CPU to Terminal — Local CTS Wrap

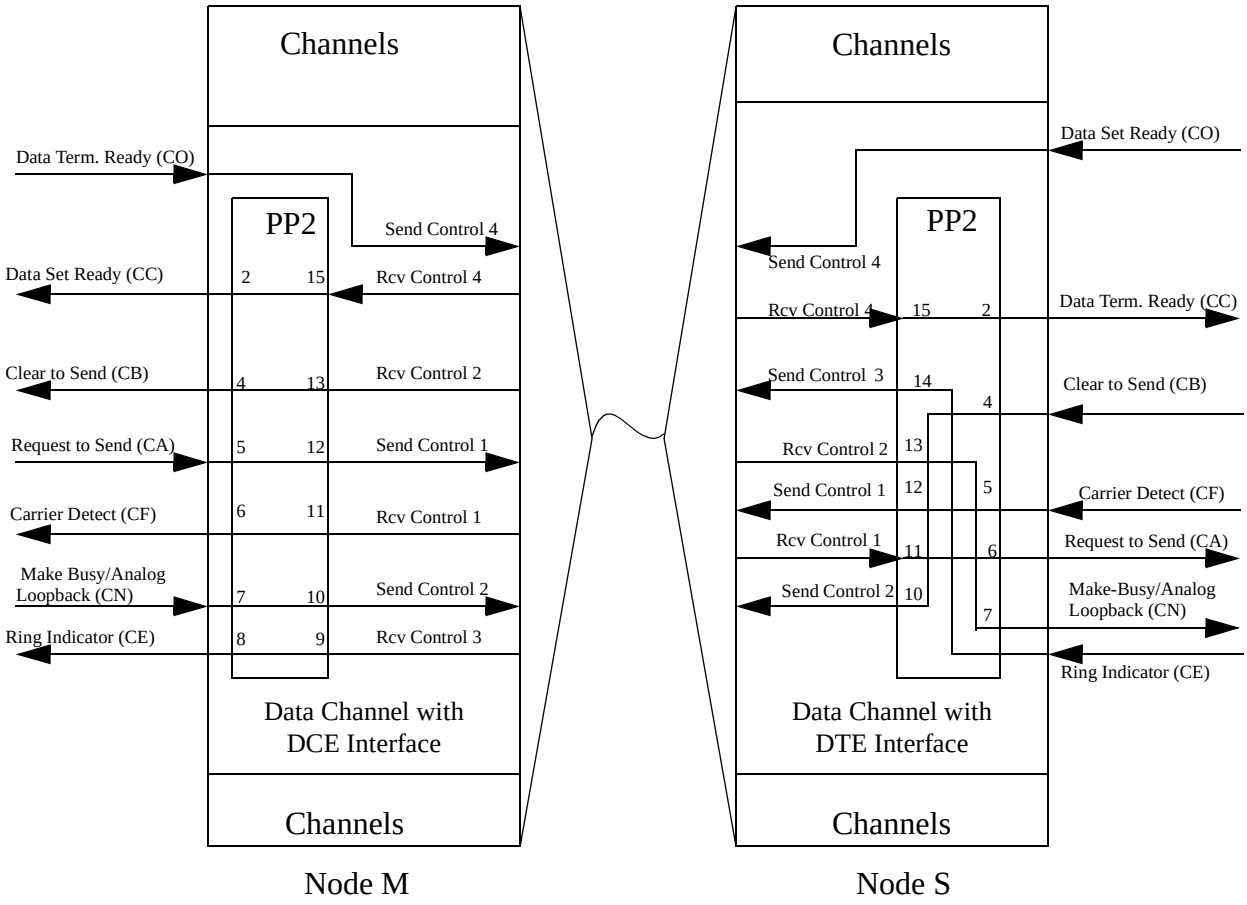
Figure 3-7 Data Channel Control Program Plugs (PP2) (Sheet 1 of 5)



A send control at one node becomes a receive control at the opposite node. For example, Request to Send is selected as Send Control 1 at Node M. Send Control 1 is transmitted across the link and becomes Receive Control 1 at the Node S data channel. PP2 at the Node S channel interface selects Receive Control 2 and sends it through the channel interface as Carrier Detect. MM02 is hand wired at GDC.

B. MM02 — CPU to Terminal — Remote CTS Wrap

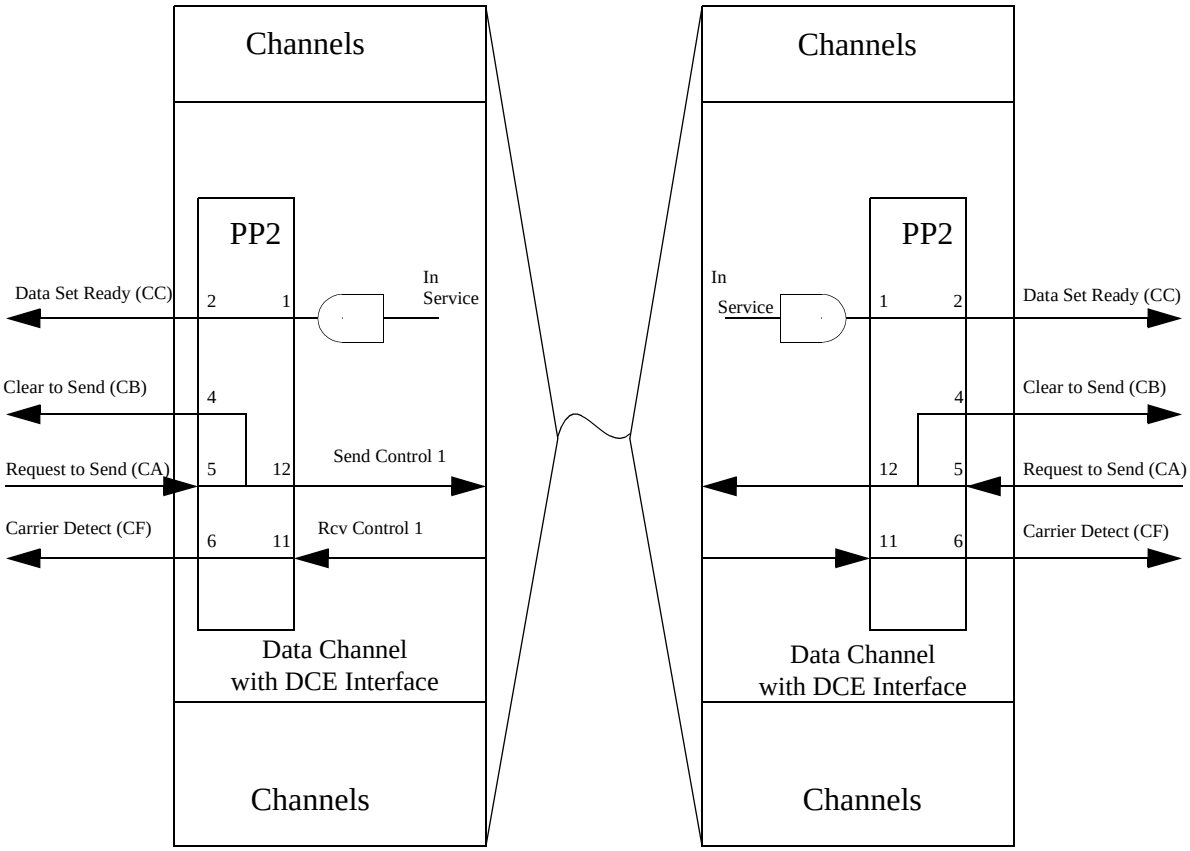
Figure 3-7 Data Channel Control Program Plugs (PP2) (Sheet 2 of 5)



A send control at one node becomes a receive control at the opposite node. For example, Data Terminal Ready is selected as Send Control 4 at Node M. Send Control 4 is transmitted across the link and becomes Receive Control 4 at the Node S data channel. PP2 at the Node S channel interface selects Receive Control 4 and sends it through the channel interface as Data Set Ready. MM02 is hand wired at GDC.

C. MM03 — CPU to Modem

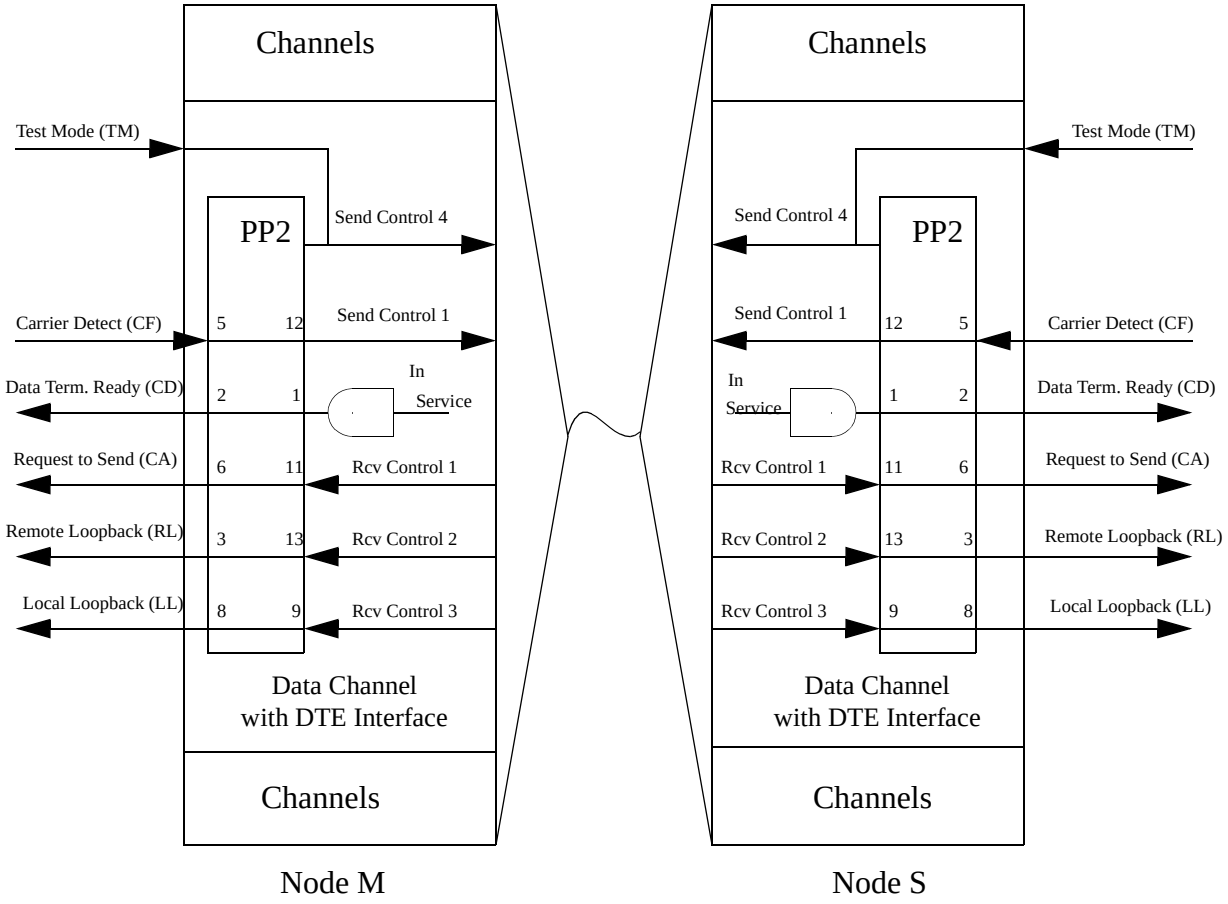
Figure 3-7 Data Channel Control Program Plugs (PP2) (Sheet 3 of 5)



A send control at one node becomes a receive control at the opposite node. For example, Request to Send is selected as Send Control 1 at Node M. Send Control 1 is transmitted across the link and becomes Receive Control 1 at the Node S data channel. PP2 at the Node S channel interface selects Receive Control 1 and sends it through the channel interface as Carrier Detect. The MM05 plug is basically the same as the MM01 plug except that Data Set ready (CC) is held high locally whenever the channel card is in service.

D. MM05 — CPU to Terminal — Local CTS Wrap

Figure 3-7 Data Channel Control Program Plugs (PP2) (Sheet 4 of 5)



A send control at one node becomes a receive control at the opposite node. For example, Carrier Detect is selected as Send Control 1 at Node M. Send Control 1 is transmitted across the link and becomes Receive Control 1 at the Node S data channel. PP2 at the Node S channel interface selects Receive Control 1 and sends it through the channel interface as Request to Send.

E. MM08 — V.54 Modem to V.54 Modem

Figure 3-7 Data Channel Control Program Plugs (PP2) (Sheet 5 of 5)

RS-422/423 Channel Adapter Options

If you use the RS-422/423 channel adapter (*Figure 3-8*) to obtain full RS-422 or RS-423 controls, you must select the 422 or 423 interface; Configure the interface to DTE or DCE devices (*See Figure 3-1 and Table 3-21*).

NOTE

For the RS-422/423 channel adapters, DTE/DCE component board designations always refer to the equipment to which the adapter is connected. If you are connecting data terminal equipment (CRTs, printers, etc.) to the adapter, place switches and program plugs in the DTE position. If you are connecting data communication equipment (modems, multiplexers, etc.) to the adapter, place switches and program plugs in the DCE position.

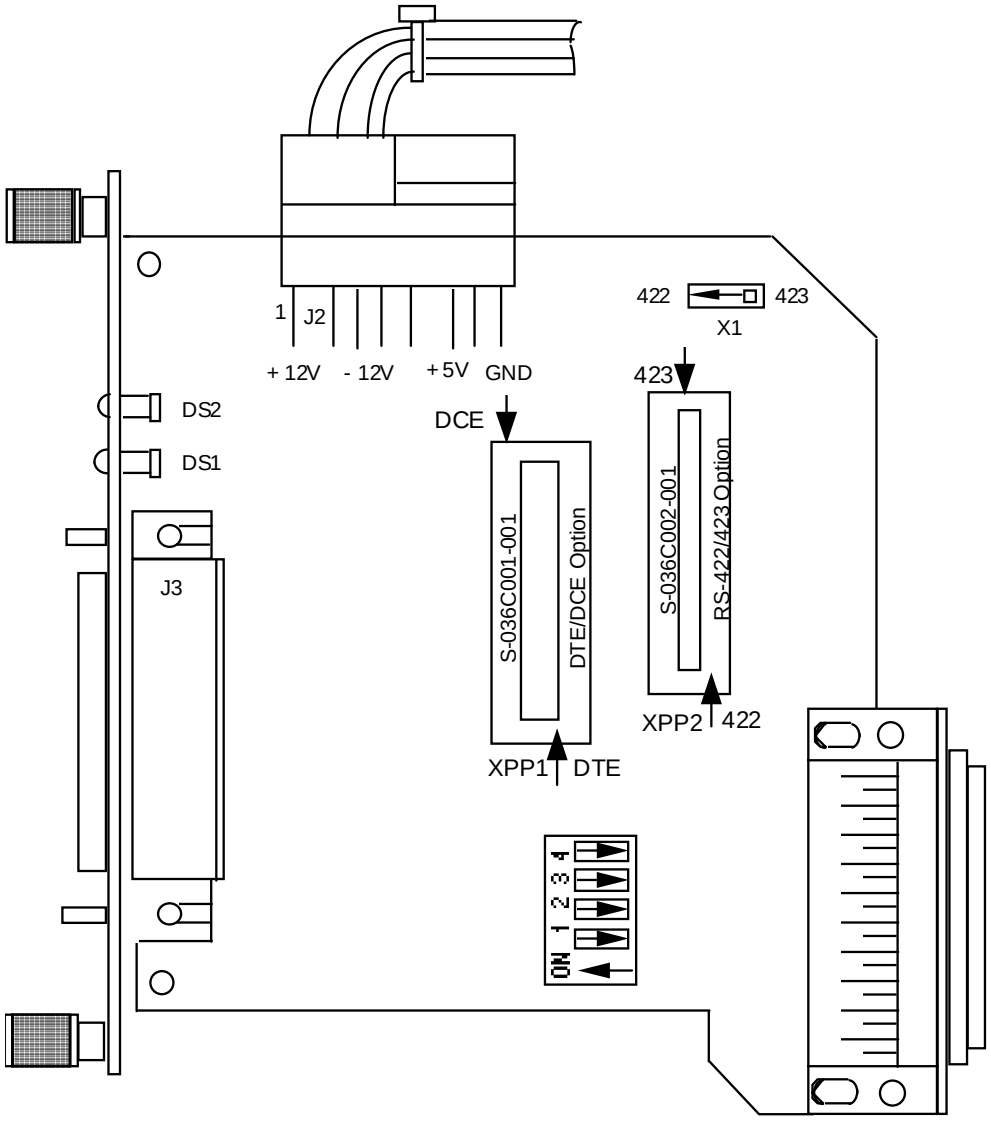


Figure 3-8 RS-422/423 Channel Interface Adapter Option Locations

TID-III (Time-Independent Data III) Module

Before attempting to set up or operate the TID-III Data Channel Module, you must first select a system application mode number. Five application modes, dependent upon your system requirements, are available to you .

TID-II (ECH-2) Emulation Mode (Modes 1-3)

These modes are applicable when you need TID-II performance characteristics over a communications link between two TID-III Data Channel Modules. The TID-II Emulation Mode gives you three (sub)modes, so that you can optimize communications depending upon channel rate and the characteristics of the channel input clock. These three operation modes are:

- Accuracy Tracking (Mode 1)

  This mode gives you extremely accurate input clock rates and when you want to track and output the clock rate with lowest possible offset. In this mode, the TID-III Data Channel Module tracks an input clock with accuracies as high as ± 0.006% depending upon the input rate.

- Program Tracking (Mode 2)

  This mode allows you to program the TID-III Data Channel Module to control signal input and output rate offsets and data delays within specified ranges, thereby optimizing communications for variable external clock characteristics.

- Input Tracking (Mode 3)

  This mode is similar to the ECH-11 emulation mode described below. This mode allows you to support communications where the input frequencies may vary ± 1.5% from the reference frequency due to external clock inaccuracies. When input clock inaccuracies are expected to exceed this threshold, select operation in Mode 4 (TID-I Emulation Mode).

TID-I (ECH-11) Emulation Mode (Mode 4)

This mode is applicable when you require TID-I performance characteristics over a communications link between two TID-III Data Channel Modules. Select Mode 4 when the channel input rate offsets are expected to be in the excess of ±1.5 % from the reference frequency due to the clock inaccuracies or instability. To select TID-I Emulation Mode, configure the TID-III Data Channel Module for Mode 4.

Automatic Tracking Mode (Mode 5)

Operation in the automatic tracking mode supports communications where input rates are subject to change in response to system configuration requirements. To operate in the automatic mode, select a maximum predetermined input rate, and the TID-III Data Channel Module supports all channel rates up to this pre-selected maximum. Operation in the automatic mode is supported only by the TID-III Data Channel Module; therefore, the remote end of the link must also be a TID-III Data Channel Module. To select Automatic Tracking Mode, configure the TID-III module for Mode 5.

The TID-III Data Channel Module can support special interface applications via an optional interface or data conversion requirement can be accommodated to customer specifications. Contact GDC with your specific requirements.

TID-III Configuration Requirements

With the variety of features and operation flexibility available with the TID-III Data Channel Module, it is important to review system communications requirements and constraints before attempting module set-up. Factors to consider are:

- Which type of TID-III Data Channel Module is on the remote end of the link (e.g., TID-I, II, or III)? The answer to this question directs you to one of the system application modes. If there are TID-III Data Channel Modules at both ends of the link, you can select any of the five application modes or three operating (sub)modes.
- What are the characteristics of the input and output clocks? Since all clocks exhibit varying degrees of inaccuracy, this answer allows you to select a mode/submode which optimizes communications with respect to clock accuracy and stability.
- Are there any special communications requirements, such as nonstandard rates or automatic alternate rates, on system configuration changes? If there are, consider the applicability of the automatic mode of operation.
- Are there any special module interface requirements (for example, a requirement to convert encoded data from one standard to another before channel input)? If there are, consult GDC regarding the applicability of our optional interface adapter piggyback.

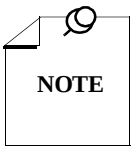
Having reviewed the system application requirements and options, proceed with TID-III Data Channel Module setup.

TID-III Module Setup

Configure the TID-III Data Channel Module with both hardware and software options. The TID-III Data Channel Module is first configured by setting DIP switches on the transmitter board and several jumpers on the receiver board. The location of these devices is shown in *Figure 3-9 and Figure 3-10. Also refer to GDC 036R469-000, Instruction Manual for TID III* .

Application and operation mode settings are accomplished through software for the TMS-3000. A TID-III Control/Status screen is provided in software and is comparable to existing channel screens. For more information on configuring the TID-III Data Channel Module applications modes, *refer to the Operation Manual for TMS-3000 Controller, GDC 036R603-Vnnn.*

By properly configuring the program settings, the TID-III Data Channel Module is set up for the desired operating mode, isochronous channel input rate, and a corresponding TDM synchronous clock rate.



For the RS-422/423 channel adapters, DTE/DCE component board designations always refer to the equipment to which the adapter is connected. If you are connecting data terminal equipment (CRTs, printers, etc.) to the adapter, place switches and program plugs in the DTE position. If you are connecting data communication equipment (modems, multiplexers, etc.) to the adapter, place switches and program plugs in the DCE position.

For operation in Modes 1 through 4, Jumper E1-E2 on the receiver board is installed. This jumper provides automatic module reset for conditions of FIFO buffer overflow/underflow. This jumper is not installed for operation in Mode 5, the automatic tracking mode.

On the receiver board, a jumper is configured between E3 and E5 (normal). In this position, the transmit clock is derived from encoded information in the data received from a remote TDM.

If the jumper is configured between E3 and E4 (optional), the transmit clock is the same as provided on the external clock inputs (EIA pins 4 and 5).

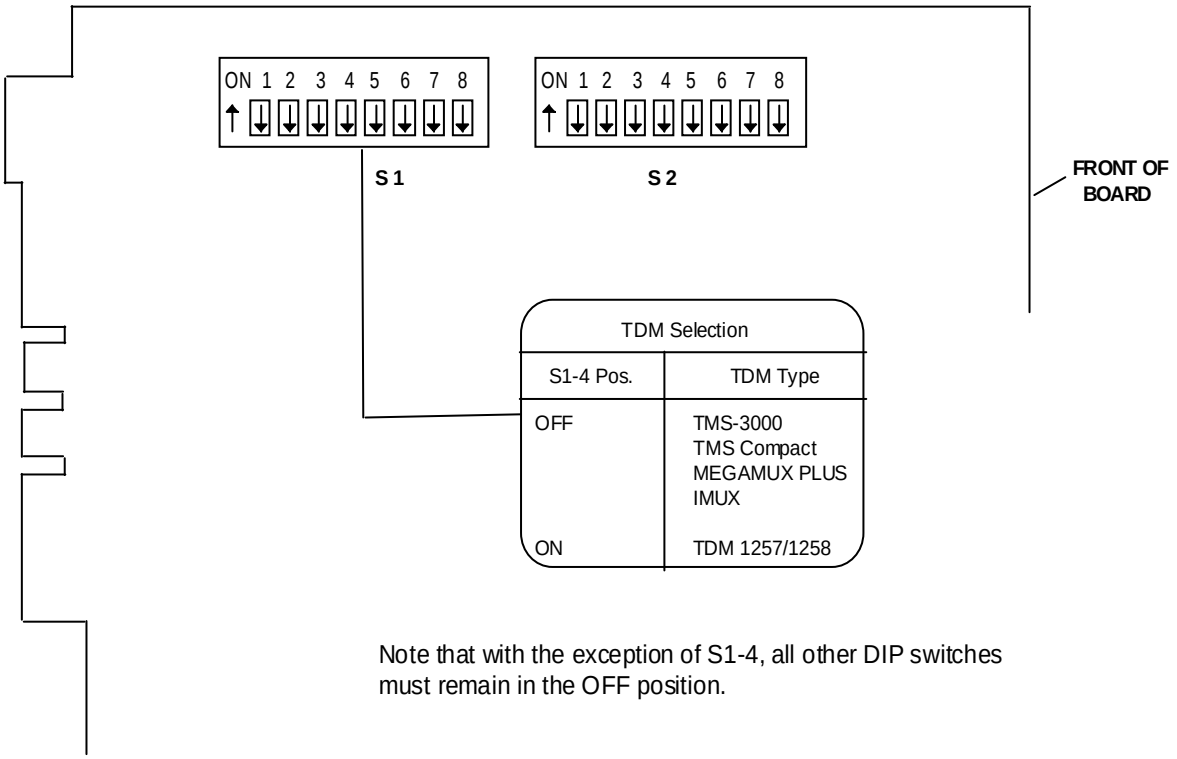


Figure 3-9 TID-III Data Channel Module Transmitter Assembly Option Locations

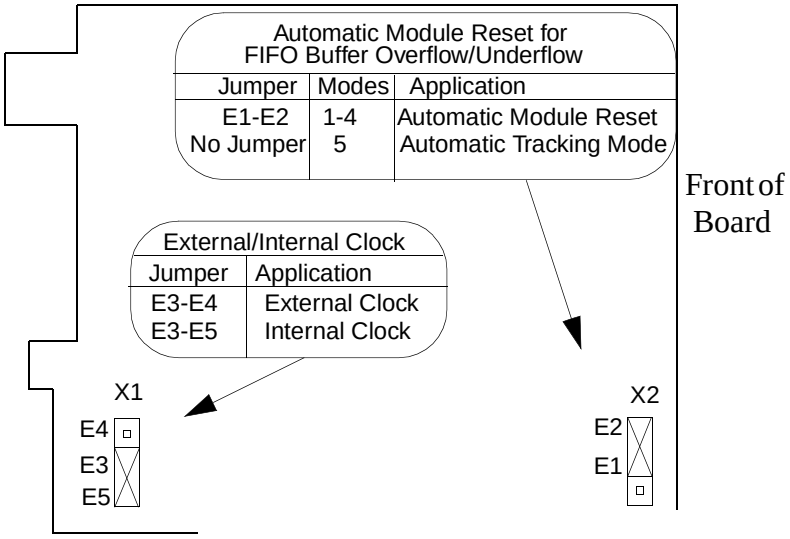


Figure 3-10 TID-III Data Channel Module Receiver Assembly Option Locations

Hyper Plug-In Card

The Hyper Plug-In Card is a plug-in option on the TMS-3000 and mounts onto a Data III Channel, Data IV Channel or Universal Data Channel (UDC) Module. In the TMS-3000 the Hyper Plug-In Card option allows data channels to operate error free in the presence of up to 32 bits of frame jitter.

If an application exists for a Hyper Plug-In Card on a circuit which is configured between two TMS-3000, a Hyper Plug-In Card should be installed on the Data III Channel, Data IV Channel, or UDC Module at both ends.

If an application exists for a Hyper Plug-In Card on a circuit which is configured between a TMS-3000 node and a MINIMUX TDM, a Hyper Plug-In Card should only be installed on the Data III Channel, Data IV Channel, or UDC Module in the TMS-3000 node.

NOTE

Because of increased delay time and translocation of data/control signals, do not use the Hyper Plug-In Card in low speed channel applications or in a polling environment.

All software parameters for the Hyper Plug-In Card (configuration, card type, status, alarms, diagnostics, etc.) are the same as for the synchronous Data III Channel, Data IV Channel, or Universal Data Channel Module.

The Controller cannot identify the need for this card nor can it read of its presence in the network. To the Controller, and a user, a Data III, IV or UDC Module with the Hyper Plug-In option appears exactly as a standard Data III Channel, Data IV Channel, or Universal Data Channel Module.

Part Numbers

Part numbers for the Hyper Plug-In card for use on a UDC module are listed in *Table 3-28*.

Table 3-28 Hyper-UDC Module, Parts List

Equipment Supplied	GDC Part No.
Hyper-UDC Module, RS-422	036M078-005
Hyper-UDC Module, V.35	036M078-006

Installation Procedures

Use the following procedures to install the Hyper Plug-In Card onto a Data III Channel, Data IV Channel or Universal Data Channel Module in the field:

This equipment contains electrostatic sensitive devices. Use ESD precautionary procedures when removing or inserting parts or printed circuit (pc) cards. Keep parts and pc cards in their antistatic packaging material until ready to install.

You should use an antistatic wrist strap, connected to the grounded equipment frame or chassis, when handling pc cards during installation, removal, or setting of on-board option switches. Do not use a conductive tool, such as a screwdriver or paper clip, to set the position of the option switches.

1. Remove IC chip U14 (40-pin sync LSI) from its socket on the Data III Channel, Data IV Channel or Universal Data Channel Module. See *Figure 3-11* for location of the sync LSI chip. Store the sync LSI chip in conductive foam for future use.

2. Remove the two mounting screws from the threaded standoffs on the Hyper Plug-In card.

3. Place the Hyper Plug-In card with the component side facing down towards the Data III Channel, Data IV Channel, or Universal Data Channel Module. Carefully align Pin 1 (of A1P1) on the Hyper Plug-In Card with Pin 1 of the 40-pin U14 IC socket (the vacated sync LSI chip). With all pins aligned, carefully press the Hyper Plug-In Card onto the Data III Channel, Data IV Channel or Universal Data Channel Module. *See Figure 3-12*.

4. The mounting holes on the Hyper Plug-In Card should align with the holes on the Data III Channel, Data IV Channel or Universal Data Channel Module.

5. Re-install the two mounting screws into the threaded standoffs located on the Hyper Plug-In Card.

6. Attach the label over the existing “Data Channel” or “UDC” marking located at the bottom of the Data III Channel, Data IV Channel, or Universal Data Channel Module.

The Hyper Plug-In Card contains no option settings. Once installed, it functions transparently. A Data III Channel, Data IV Channel or Universal Data Channel Module with the Hyper Plug-In Card is configured similar to a standard Data Channel Module.

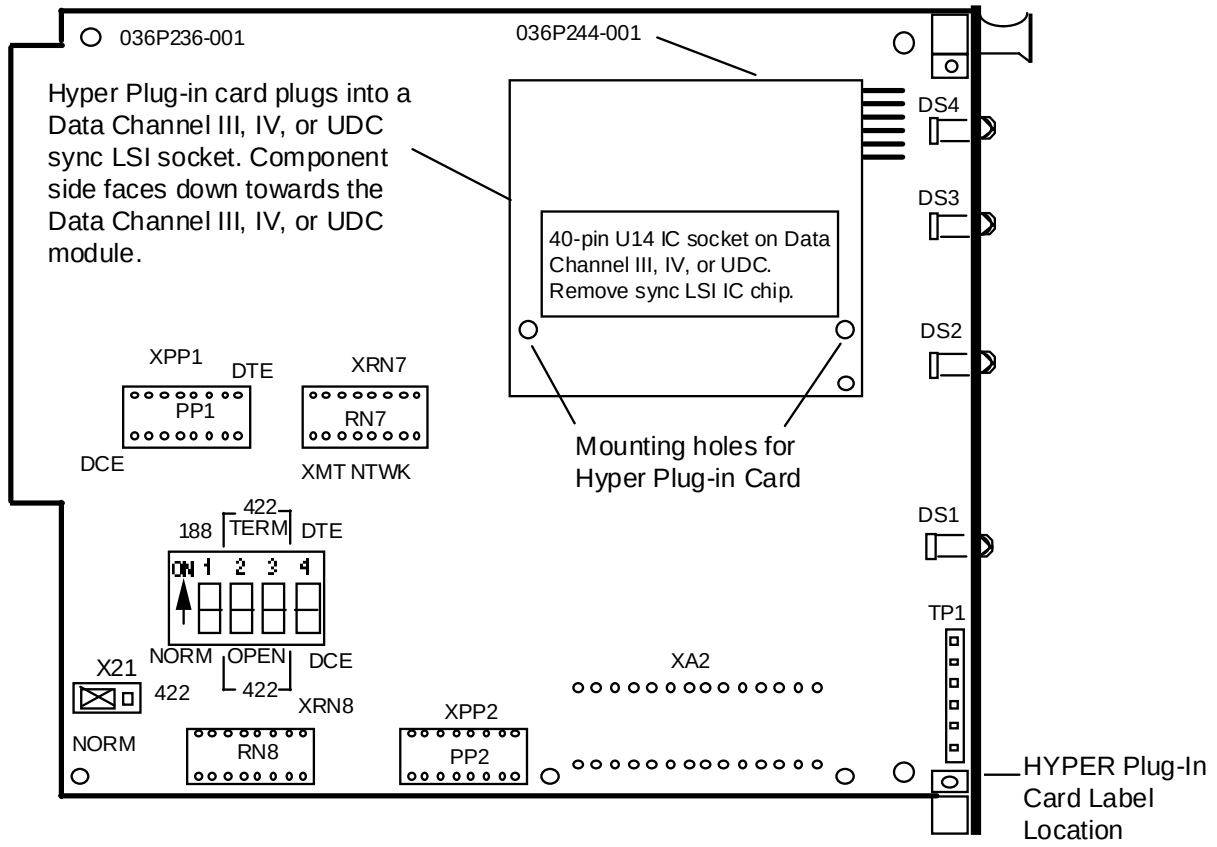


Figure 3-11 Data Channel Module with Hyper Plug-In Card Mounted

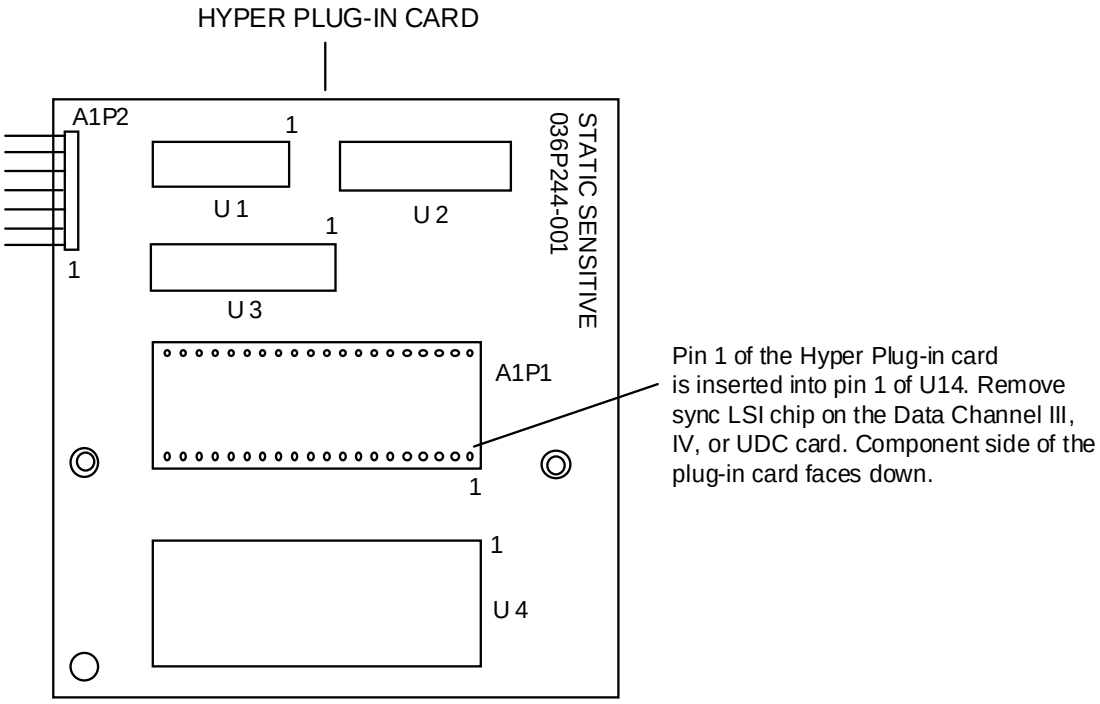


Figure 3-12 Hyper Plug-In Card

Hyper Plug-In Card Upgrade Kit

An upgrade kit allows you to mount the Hyper Plug-In card onto an existing Data III Channel, Data IV Channel or Universal Data Channel Module. The kit number is given in *Table 3-29*. The Hyper Plug-In Card kit can only be used with the Data Channel Module assemblies listed in *Table 3-30*.

Table 3-29 Hyper Plug-In Card, Upgrade Kit

Equipment Supplied	GDC Part No.
Hyper Plug-In Card Kit Contains the following:	036K244-001
Hyper Plug-In Card	036P244-001
Hyper ID label	036N023-001

Table 3-30 Upgradable Equipment List

Equipment Supplied	GDC Part No.
Data III Channel Module	036M058-002, -004
Data IV Channel Module	036M079-002, -004
Universal Data Channel Module	036M078-002, -004
NOTE: Do not use the Hyper Plug-In Card on Data Channel Modules with the EIA/TIA-232-E or RS-423 Interface set or with Data I/Data II Channel Modules.	

Voice Channel Modules

Voice II/CVSD, PCM, ADPCM, and ASP Channel Interface connections, options, and E and M signaling are covered in this section, as well as the Universal Voice Card and Echo Canceller Card.

Part Numbers

Table 3-31 through Table 3-34 are parts listings for voice channel modules.

Table 3-31 Voice II/ADPCM (036M200-004)

Equipment Supplied	Designation	GDC Part No.
ADPCM-2 PCB Assembly	ADPCM-2	036M251-002
PCM-2 PCB Assembly	PCM-2	036P250-002

Table 3-32 Voice II/ADPCM (With E And M) (036M201-004)

Equipment Supplied	Designation	GDC Part No.
ADPCM-2 PCB Assembly	ADPCM-2	036M251-002
PCM-2 PCB Assembly	PCM-2	036P250-002
EAM-1 PCB Assembly	EAM-1	036P252-001

Table 3-33 Voice II/ASP/16K (036M259-001)

Equipment Supplied	Designation	GDC Part No.
ASP Base Card	—	036P255-002
ASP Piggyback	—	036P259-001

Table 3-34 Voice II/ASP/Multi (036M259-002)

Equipment Supplied	Designation	GDC Part No.
ASP Base Card	—	036P255-002
ASP Piggyback	—	036P259-002

Voice II/CVSD and ASP Channel Interface Connections

Connections for voice channels are determined by the type of telephone equipment with which the voice channel interfaces. The requirements of various voice termination systems are too detailed to be covered thoroughly by this manual; use information from the Network Documentation Package and manuals for associated telephone equipment to determine the connection requirements of your system. In this manual, telephone equipment that connects to voice channels falls into three basic categories:

- Automatic Ringdown Circuits
- Direct Connections to PBX Circuits
- Tellabs and Other Voice Termination Systems (Tellabs is the standard voice termination system supplied by General DataComm).

Various standard cables supplied by GDC for voice channel connections are listed in *Table 3-35*. The options available for the Voice II/CVSD, Voice II/PCM and Voice II/ASP Channel modules are described in *Table 3-36 through Table 3-48. Refer to Chapter 8*, for channel connector pin assignments.

Voice II/CVSD Channel Module Options

The following options may be selected for the Voice II/CVSD Channel Module (*See Figure 3-13* for the location of each option selection device on the module).

Input and Output Signal Levels

Nominal levels may be selected for voice input and output, as described in *Table 3-36*. Attenuation or amplification of the input level (to compensate for cable losses or other irregularities) may be selected, as described in *Table 3-37*.

E and M Signaling Interfaces

By selecting various options, the Voice II/CVSD Channel module can be configured to support all E and M signaling types, as described in *Table 3-38. Figure 3-14* depicts the M-lead signaling interface circuits created by jumper plug positions. E-lead responses to loss of power and service interruption may also be selected, as described in *Table 3-39 and Table 3-40*.

Filter Clock

The filter clock of the voice channel helps determine the bandwidth of the voice output. Two sources may be selected for the filter clock: a clock signal at four times the data rate of the voice channel, or a 128-kHz clock signal. The criteria for selecting one clock or the other are discussed in *Table 3-36*.

Table 3-35 Voice II/CVSD And ASP Channel Connection Cables

GDC Cable No.	Description	Application
027H306	Voice Channel, DB-25 connector to spade lugs	Single channel connection; tip, ring, E-lead, M-lead, and ground brought out to spade lugs. Available in 5-, 15-, and 25-foot lengths.
027H409	Voice Channel, DB-25 connector to punch-down wire leads	Single channel connection; tip, ring, E-lead, M-lead, station battery, signal and station ground brought out to wire ends for punch-down applications. Available in 5-, 15-, and 25-foot lengths.
326H024	TMS-3000 to PBX; DB-25 connector to 50-pin Amphenol connector. Up to 8 voice channels	Used to connect up to eight voice channels to private branch exchange. 5-foot length only; requires 021H605-025 extension cable.
326H025	8-channel harness; DB-25 connector to 50-pin Amphenol connector	Used to connect up to eight voice channels to facility. Transmit and receive leads crossed over. Available in 5-foot length only. Requires 021H605-025 extension cable.
326H026	6-channel harness; DB-25 connector to 50-pin Amphenol connector	Used to connect up to six voice channels to facility.
326H021	TMS-3000 to Tellabs 266R shelf (6 voice channels)	Used to connect up to six voice channels to Tellabs 266AR shelf. Available in 5- or 15-foot lengths.
326H023	TMS-3000 to Tellabs 2366R shelf (12 voice channels)	Used to connect up to 12 channels to Tellabs 266AR shelf. Available in 5- or 15-foot lengths.
830-002S008	50-pin Amphenol male to male extension cable (25 pairs)	Used to connect 50-pin cables above to customer voice termination point (demark), (voice channel to PBX).
830-002S007	50-pin Amphenol male to female extension cable (25 pairs)	Used to connect Tellabs shelf to customer voice termination point (demark), (Tellabs Shelf to PBX).
G024H012	Voice Channel and E & M	Used for Voice Channel CVSD and ASP module types. Also used in E&M signaling applications.

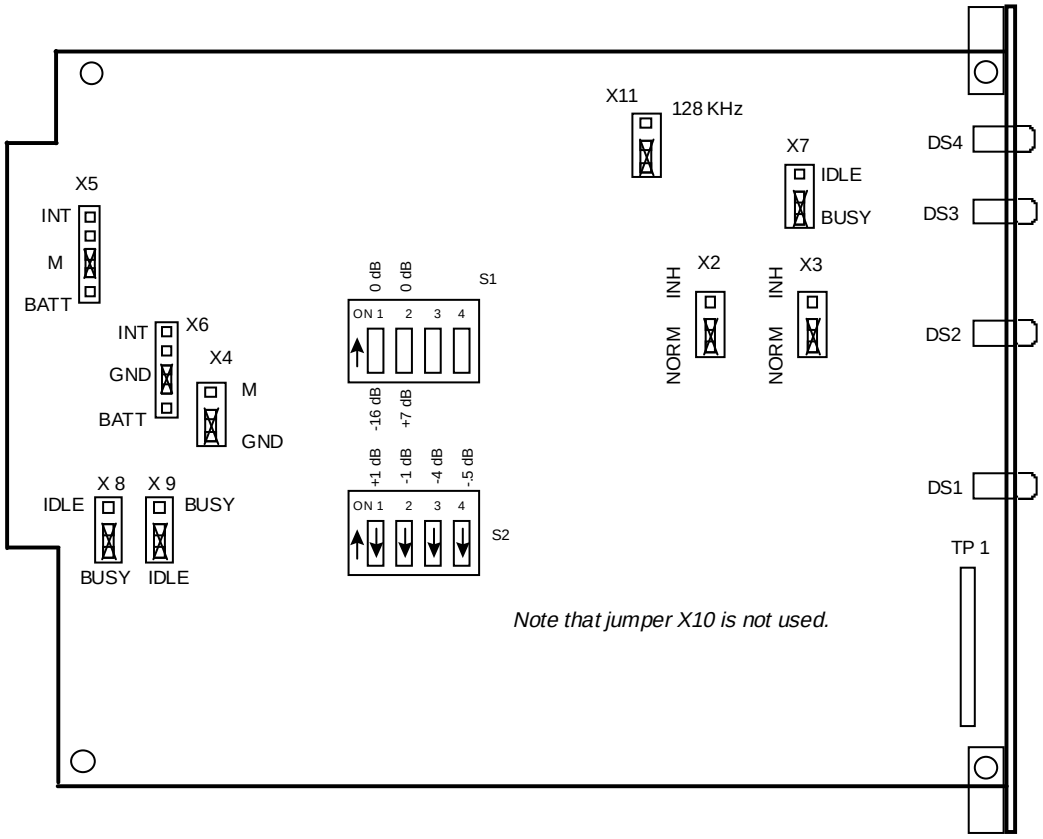


Figure 3-13 Voice II/CVSD Channel Module Option Locations

Table 3-36 Voice II/CVSD Channel Option Selection

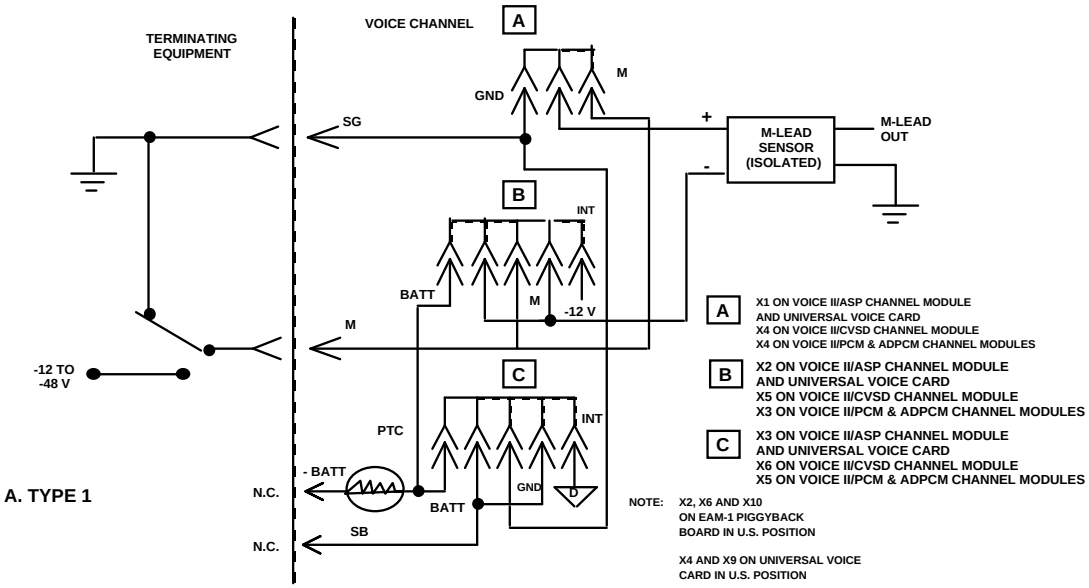
Feature	Selection	Switch(S) Jumper(X)		Application
		Desig.	Position	
Nominal Input Level	0 dBm	S1-1	0	The nominal input level is determined by the nominal output level of the telephone equipment connected to the channel.
	–16 dBm	S1-1	–16	Most systems specify either 0 dBm or –16 dBm as their nominal output. PBX systems generally require selection of 0 dBm; automatic ringdown or Tellabs and other voice termination systems generally require selection of –16 dBm. If actual output levels of connected equipment vary from the nominal levels of 0 dBm or –16 dBm, Switch S2 may be set to achieve some level of compensation.
Nominal Output Level	+7 dBm	S1-2	+7	The nominal output level for the Voice II Channel is either 0 dBm or +7 dBm.
	0 dBm	S1-2	0	This selection depends on the nominal input level specified for the telephone equipment connected to the channel. PBX systems generally require selection of 0 dBm; automatic ringdown or Tellabs and other voice termination systems generally require selection of +7 dBm. Adjustments to the actual measured output level of the voice channel may be made through the CRT interface by setting a degree of attenuation or amplification. The output selected by S1-2 may be varied from +1.5 dB above the nominal level to –6 dB below the level in 0.5 dB steps.
Filter Clock	128 kHz	X11	128 kHz	This selection should be made whenever the data clock for the voice channel (selected through the supervisory port interface in the Configuration routine) is greater than 32 kHz. The 128 kHz selection ensures that the frequency range of the voice output does not exceed telephone line limits.
	4X Data Clock	X11	4XDATA	This selection should be made whenever the data clock for the voice channel (selected through the supervisory port interface in the Configuration routine) is less than 32 kHz. When the data clock is 32 kHz, either position is acceptable.

Table 3-37 Voice II/CVSD Channel Input Level Adjustment Option

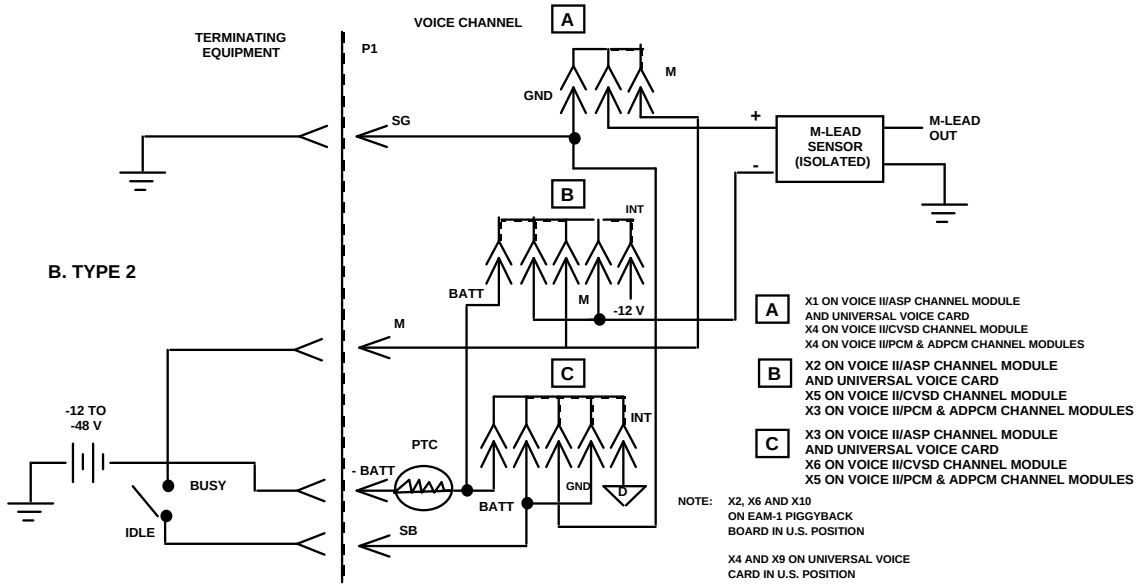
S2-1 (+1 dB)	S2-2 (–2 dB)	S2-3 (–4 dB)	S2-4 (+0.5 dB)	Input Compen-sation	Application
ON	OFF	OFF	ON	+1.5 dB	Switches S2-1 through S2-4 select attenuation or amplification for the voice input level. This compensates for cable losses or improper output levels from connected telephone equipment. The switch selects a level of compensation from +15 dB to –6.0 dB, in 0.5 dB steps. Each segment of Switch S2 selects a level of attenuation or amplification; the individual steps are added to produce a particular level. A level is selected to compensate for some measured deviation of the output level of equipment connected to the channel. The deviation is the difference between the actual level and the nominal level of 0 dBm and –16 dBm selected on Switch S1-1. For example, if the nominal level is 0 dBm, and the actual level is +2 dBm, selection of –2 dB would compensate for the difference between the nominal and measured input values.
ON	OFF	OFF	OFF	+1.0 dB	
OFF	OFF	OFF	ON	+0.5 dB	
OFF	OFF	OFF	OFF	0 dB	
ON	ON	OFF	ON	–0.5 dB	
ON	ON	OFF	OFF	–1.0 dB	
OFF	ON	OFF	ON	–1.5 dB	
OFF	ON	OFF	OFF	–2.0 dB	
ON	OFF	ON	ON	–2.5 dB	
ON	OFF	ON	OFF	–3.0 dB	
OFF	OFF	ON	ON	–3.5 dB	
OFF	OFF	ON	OFF	–4.0 dB	
ON	ON	ON	ON	–4.5 dB	
ON	ON	ON	OFF	–5.0 dB	
OFF	ON	ON	ON	–5.5 dB	
OFF	ON	ON	OFF	–6.0 dB	

Table 3-38 Voice II/CVSD Channel E And M Signaling Option Selection

Type	Berg Jumper Positions			Signaling States		Application
	X4	X5	X6	Idle	Busy	
1	GND	M	GND	0 Vdc	–12 to –48 Vdc	X4, X5, and X6 select the proper interface for different E & M signaling types. The jumper positions selected depend entirely on the E & M signaling type used by the voice equipment connected to a Voice Channel module. For most applications, the selections shown for Signaling Type 1 are used.
2	GND	M	BATT	Open	–12 to –48 Vdc	
3	GND	M	BATT	0 Vdc	–12 to –48 Vdc	
4	M	BATT	GND	Open	0 Vdc	
5	M	BATT	GND	Open	0 Vdc	
2*	M	INT	INT	Open	0Vdc	
* Back to back; i.e., when the VF interfaces of two voice II Channel modules are connected directly together.						

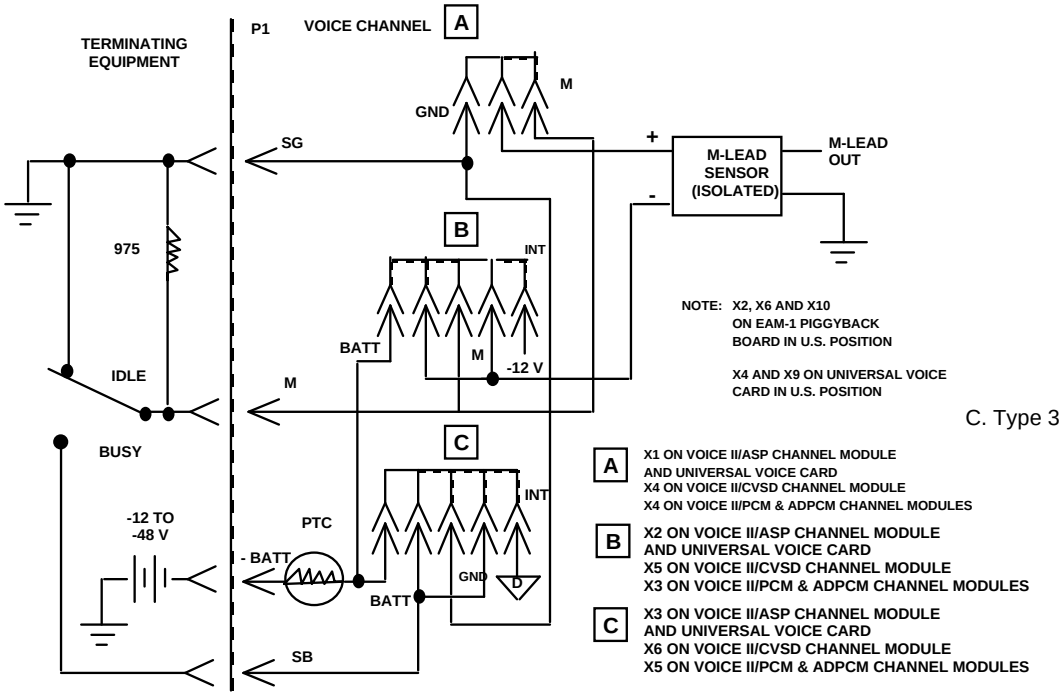


NOTE : **For Type I interface, the ground of the Signalling CKT and the ground of the Trunk CKT must be referenced to the same place for reliable operation. The GDC Type I interface is correctly pictured as:**



NOTE : **The additional external signal for -BATT may be common for multiple PCM cards and are not related to the Trunk CKT. 48 Volts is not presently available in the TMS and so an external source is required.**

Figure 3-14 M-Lead Signaling Interfaces (Sheet 1 of 4)



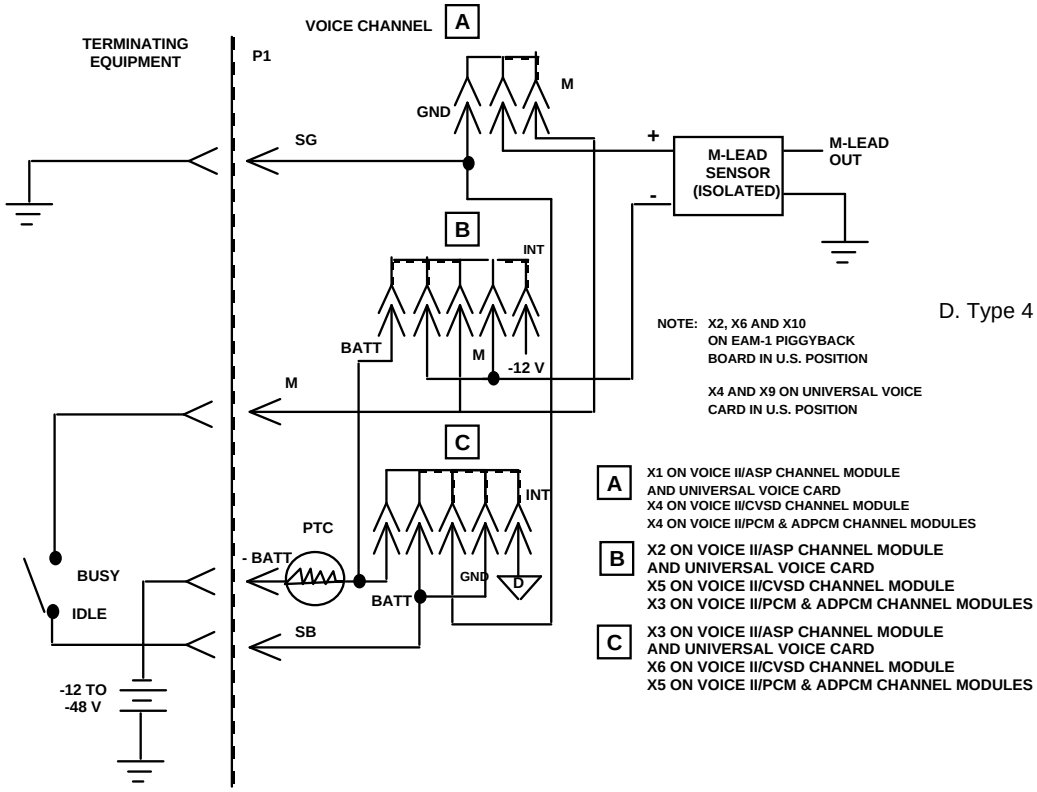
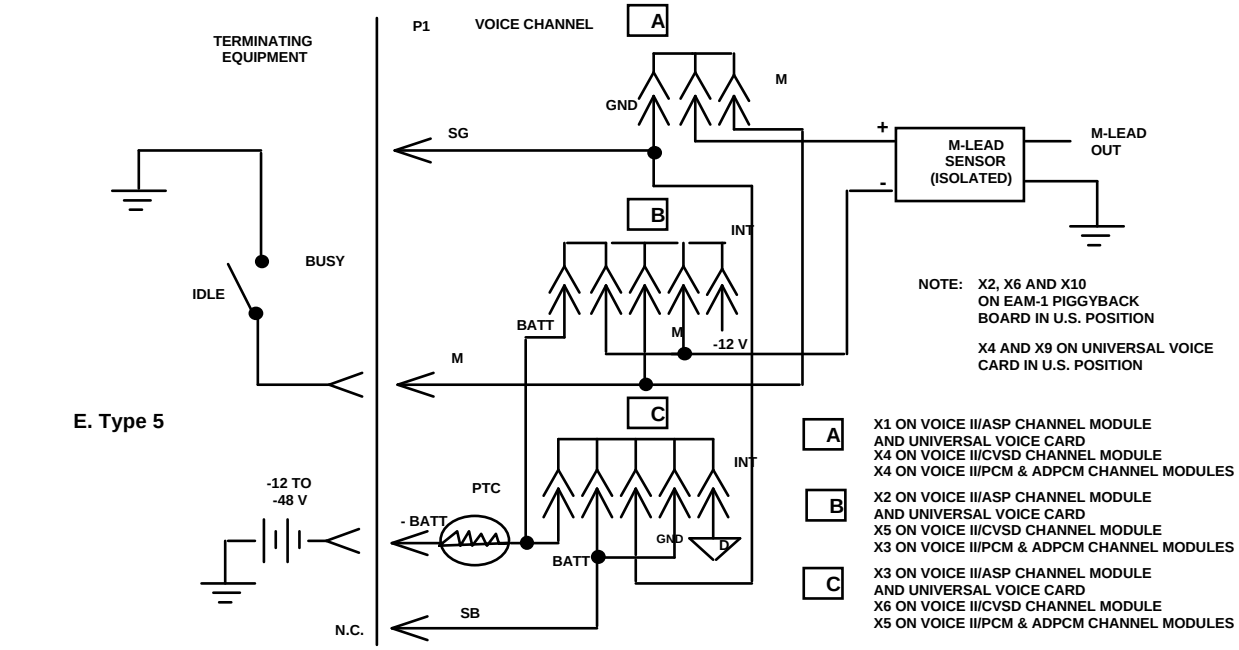


Figure 3-14 M-Lead Signaling Interfaces (Sheet 2 of 4)



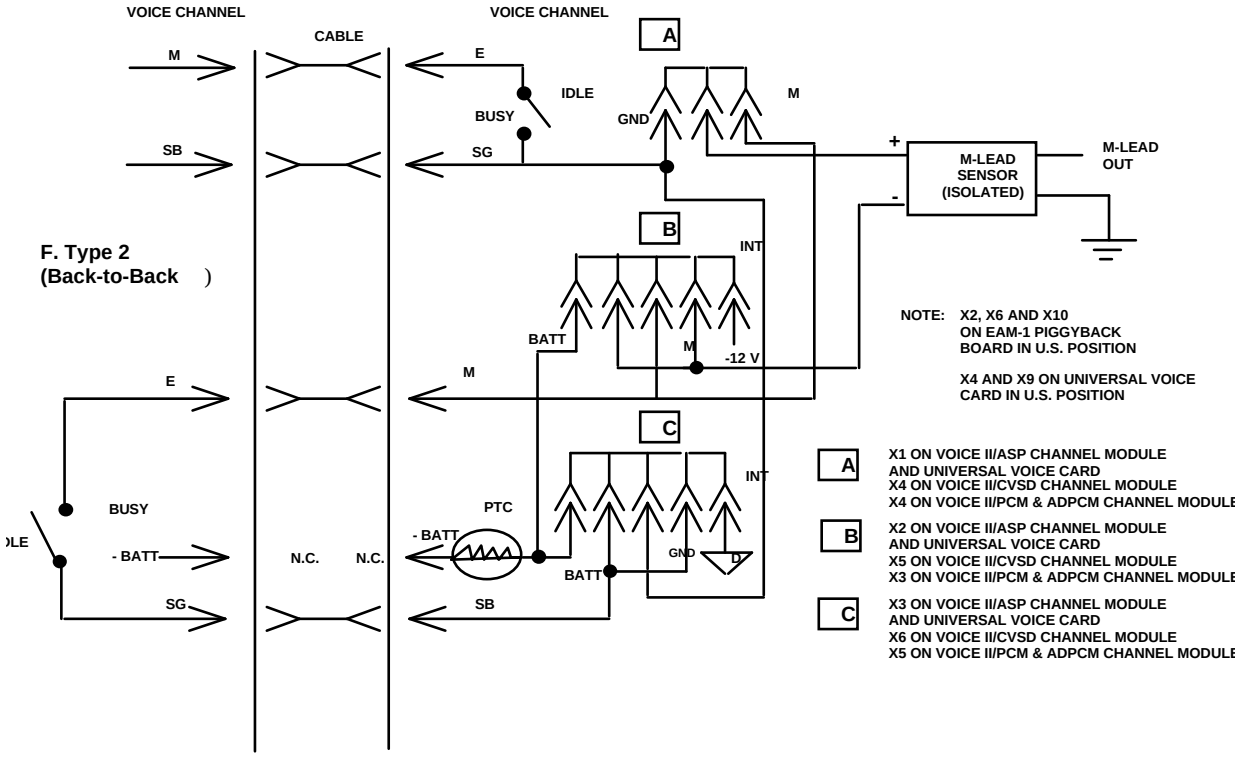
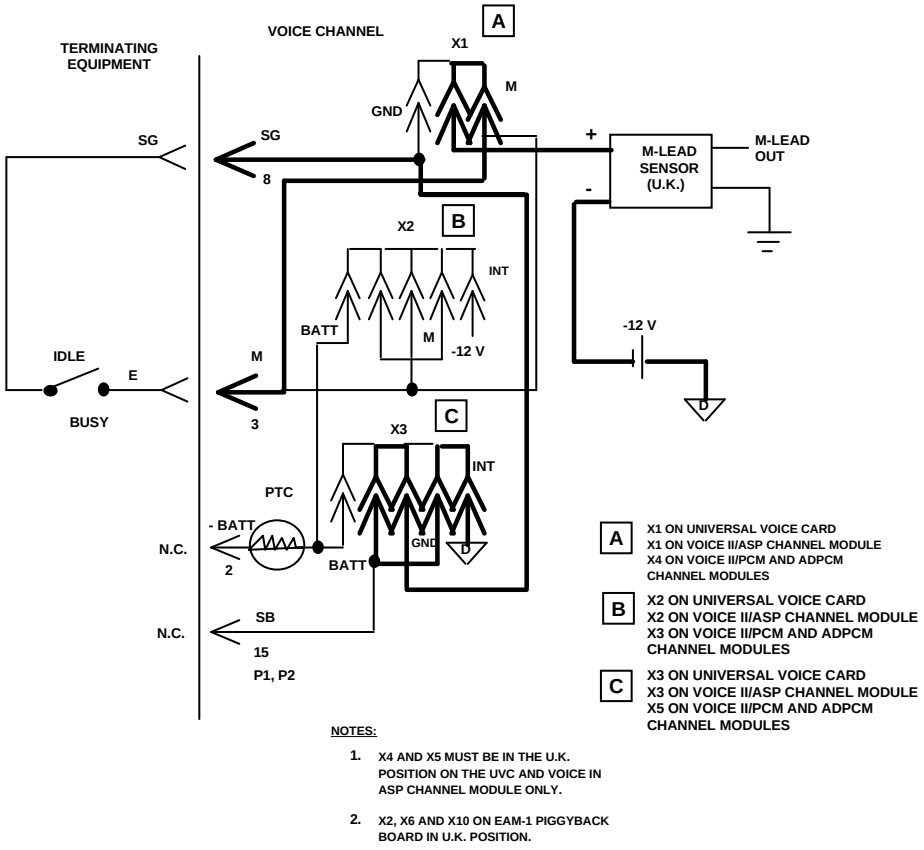


Figure 3-14 M-Lead Signaling Interfaces (Sheet 3 of 4)



G. U.K. OPERATION (SSDC5)

Figure 3-14 M-Lead Signaling Interfaces (Sheet 4 of 4)

Table 3-39 Voice II/CVSD Channel E-Lead Relay State Option Selection

Feature	X7 Position	X8 Position	X9 Position	Application
Loss of Power E-Lead Signaling State	Busy	Idle	Idle	With these three jumpers set in the position shown, the E-Lead (pin 24 on the DB-25 EIA connector) is in an Idle state during loss of power. The E' lead (pin 11 on the DB-25 EIA connector) is in a Busy state during loss of power. This selection is generally made for connections between the voice channel and automatic ringdown circuits.
	Idle	Busy	Busy	With these three jumpers set in the position shown, the E-Lead (pin 24 on the DB-25 EIA connector) is in a Busy state during loss of power. The E' lead (pin 11 on the DB-25 EIA connector) is in an Idle state during loss of power. This selection is generally made for connections between the voice channel and PBX systems, or Tellabs and other voice termination systems.

Table 3-40 Voice II/CVSD Channel E-Lead Out-of-Service Option Selection

Feature	X2 Position	X3 Position	Application
Service Interruption/ Loss of Sync Signaling Response	NORM	NORM	If TMS-3000 synchronization is lost or the channel is placed out of service, the E-Lead is forced to the Idle state for 2.5 seconds, and then reverts to the Busy state.
	INH	NORM	If TMS-3000 synchronization is lost or the channel is placed out of service, the E-Lead is forced to the Busy state 2.5 seconds after synchronization is lost.
	NORM	INH	If TMS-3000 synchronization is lost or the channel is placed out of service, the E-Lead is forced to the Idle state immediately.
	INH	INH	The E-Lead state is not changed due to loss of synchronization or channel placed out-of-service.

Table 3-41 E And M Signaling Option Selections (EAM-1 Board)

Signaling Type	Berg Jumper Positions			Signaling States		Berg Jumper Positions
	X4	**X3**	**X5**	**IDLE**	**BUSY**	**X2, X6, X10**
1	GND	M	GND	0 V dc	–12 to –48 V dc	U.S.
2	GND	M	BATT	OPEN	–12 to –48 V dc	U.S.
3	GND	M	BATT	0 V dc	–12 to –48 V dc	U.S.
4	M	BATT	GND	OPEN	0 V dc	U.S.
5	M	BATT	GND	OPEN	0 V dc	U.S.
2*	M	INT	INT	OPEN	0 V dc	U.S.
U.K.**	M	INT	INT/GND	OPEN	0 V dc	U.K.

* For back-to-back signaling with no external battery.

Application: X2-X5 and X10 select the proper interface for different E and M signaling types. The jumper positions selected depend entirely on the E and M signaling type used by the voice equipment connected to the Voice II/PCM or Voice II/ADPCM module.

** For SSDC5 signaling, two jumper plugs are required on X5, in both the INT and GND positions.

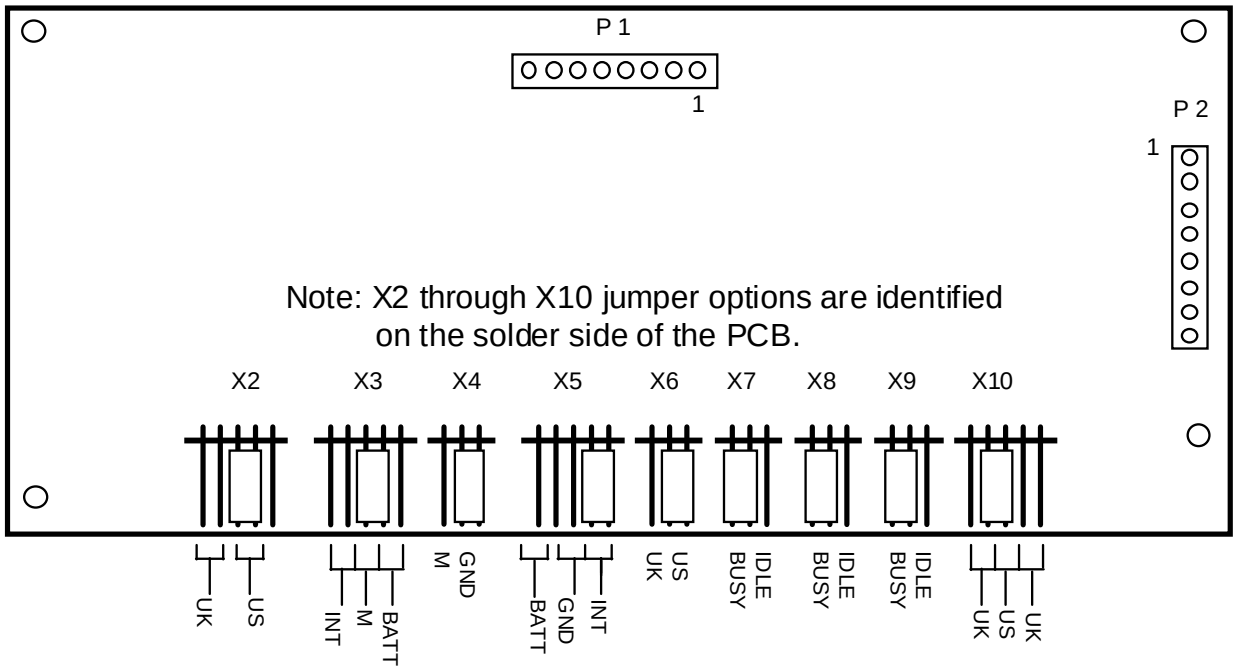


Figure 3-15 E and M Signaling Piggyback Card (EAM-1) Option Locations

Table 3-42 Idle/Busy E-Lead Option Selection (EAM-1 Board)

Jumper	Selection	Application
X7 X8 X9	BUSY BUSY BUSY	When the E-Lead is used for signaling, loss of TDM power results in a BUSY E-Lead.
X7 X8 X9	IDLE IDLE IDLE	When the E-Lead is used for signaling, loss of TDM power results in an IDLE E-Lead.
NOTE: The E'-Lead (P1-54) is the inverted state of the E-Lead (P1-56).		

Voice II/ASP Channel Module Options

The following options can be selected for the Voice II/ASP Channel Modules (*See Figure 3-16* for the location of each option selection device).

Input and Output Signal Levels

Nominal levels may be selected for voice input and output as described in *Table 3-43*. Attenuation of the input level (to compensate for cable losses or other irregularities) may be selected as described in *Table 3-44*.

E and M Signaling Interfaces

By selecting various options, the Voice II/ASP Channel Module can be configured to support all E and M signaling types, as depicted in *Table 3-45*. *Figure 3-14 (shown earlier in chapter)* depicts the M-lead signaling interface circuits created by jumper plug positions. E-lead polarity selection and E-lead responses to loss of power and service interruption can also be selected as described in *Table 3-46 through Table 3-48*.

Table 3-43 Voice II/ASP Channel Option Selection

Feature	Selection (dBm)	Switch(S), Jumper(X)		Application
		Desig.	Position	
Nominal Input Level	0 –16	S1-1 S1-1	OFF ON	The nominal input level is determined by the nominal output level of the telephone equipment connected to the channel. If actual output levels of connected equipment vary from the nominal levels, Switch S1 may be set to achieve some level of compensation.
Nominal Output Level	0 +7	S1-3 S1-3	OFF ON	The nominal output level for the ASP Channel is either 0 dBm or +7 dBm. This selection depends on the nominal input level specified for the telephone equipment connected to the channel. Adjustments to the actual measured output level of the voice channel may be made through the Controller by setting a degree of attenuation or amplification. The output selected by S1-3 may be varied from +1.5 dB above the nominal level to –6 dB below the level in 0.5 dB steps. *Refer to GDC 036R603-Vnnn*, for information on the output level.

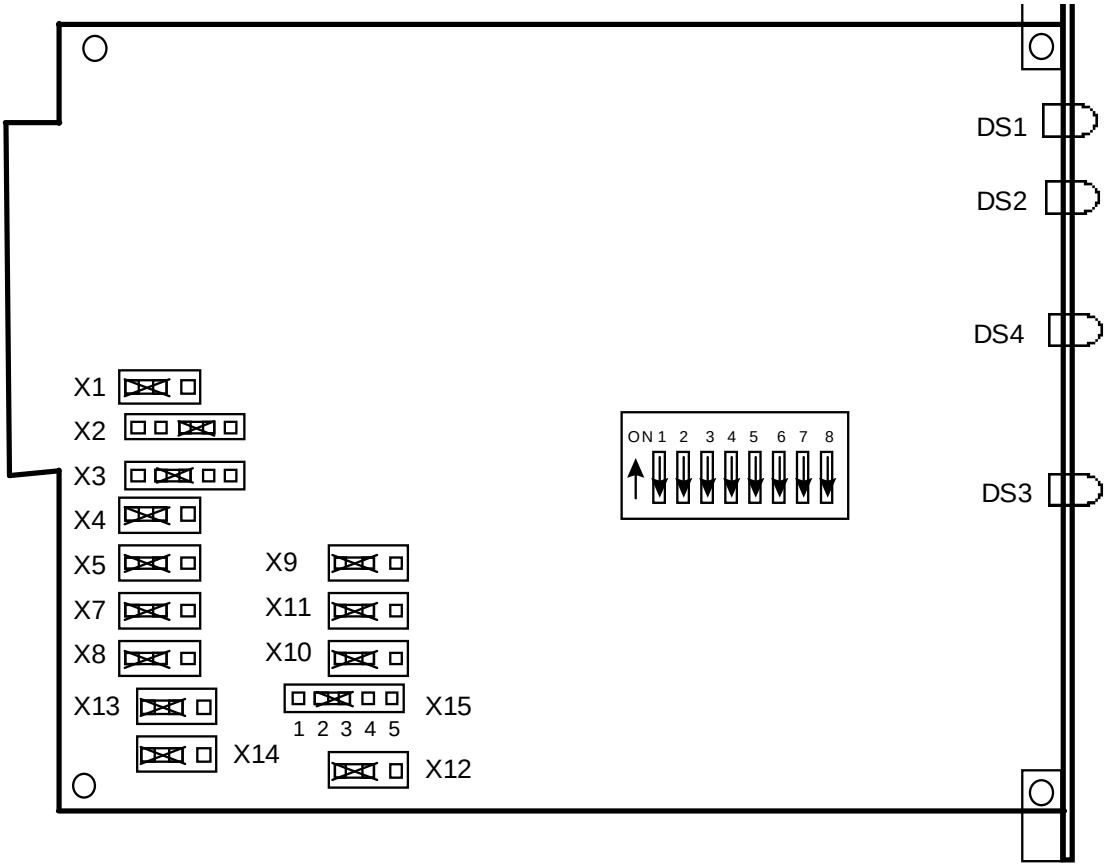


Figure 3-16 Voice II/ASP Channel Module Option Locations

Table 3-44 Voice II/ASP Channel Input Level Adjustment Option

S1-5 (+1 dB)	S1-6 (+0.5 dB)	S1-7 (–2 dB)	S1-8 (–4 dB)	Input Compensation (dB)	Application
ON	ON	OFF	OFF	+1.5	Switches S1-5 through S1-8 select attenuation or amplification for the voice input level. This compensates for cable losses or improper out-put levels from connected telephone equipment. The Switch selects a level of compensation from +1.5 dB to –6.0 dB in 0.5 dB steps. Each segment of Switch S1 selects a level of attenuation or amplification; the individual steps are added to produce a particular level. A level is selected to compensate for some measured deviation of the output level of equipment connected to the channel. The deviation is the difference between the actual level and the nominal level (selected on Switch S1-1).
ON	OFF	OFF	OFF	+11.0	
OFF	ON	OFF	OFF	+0.5	
OFF	OFF	OFF	OFF	0	
ON	ON	ON	OFF	–0.5	
ON	OFF	ON	OFF	–1.0	
OFF	ON	ON	OFF	–1.5	
OFF	OFF	ON	OFF	–2.0	
ON	ON	OFF	ON	–2.5	
ON	OFF	OFF	ON	–3.0	
OFF	ON	OFF	ON	–3.5	
OFF	OFF	OFF	ON	–4.0	
ON	ON	ON	ON	–4.5	
ON	OFF	ON	ON	–5.0	
OFF	ON	ON	ON	–5.5	
OFF	OFF	ON	ON	–6.0	

Table 3-45 Voice II/ASP VF Channel E And M Signaling Type Selection

Signaling Type	Berg Jumper Positions					Signaling States	
	X1	X2	X3	X15	X9,X10,X11,X12	IDLE	BUSY
1	2-3	2-3	2-3	2-3	1-2	0 Vdc OPEN	–12 to –48 Vdc
2	2-3	2-3	1-2	2-3	1-2	0 Vdc	–12 to –48 Vdc
3	2-3	2-3	1-2	2-3	1-2	OPEN	–12 to –48 Vdc
4	1-2	4-5	2-3	2-3	1-2	OPEN	0 Vdc
5	1-2	4-5	2-3	2-3	1-2	OPEN	0 Vdc
U.K.	1-2	4-5	2-3, 4-5	1-2, 3-4	2-3		0 Vdc

Table 3-46 Voice II/ASP Channel E-Lead Polarity Option Selection

Feature	Selection	X13, X14 Position	Application
E-Lead Polarity	Negative Polarity	1-2	Jumpers X13 and X14 select polarity for the E-Lead. These jumper positions depend on the requirements of the equip-ment connected to the ASP channel interface. Normally, the M-Lead detector of the channel equipment provides only a negative voltage and requires a negative polarity E-Lead setting. But if the M-Lead detector provides a positive voltage, the E-Lead polarity should be set to positive.
	Positive Polarity	2-3	

Table 3-47 Voice II/ASP Channel E-Lead State During Loss Of Power Option

Feature	E-Lead State	X4 Position	X5 Position	Application
Loss of Power E-Lead Signaling State	Idle	2-3	2-3	With this selection, the E-Lead is in an Idle state during loss of power.
	Busy	1-2	1-2	With this selection, the E-Lead is in a Busy state during loss of power.

Table 3-48 Voice II/ASP Channel E-Lead Service Interruption Options

Feature	ASP	Jumper Positions	Application
E-Lead State Upon Loss of Sync/Service Interruption	X7 X8	1-2 1-2	The E-Lead is forced Idle 0.5 seconds after sync loss, and then reverts to the Busy state after two seconds.
	X7 X8	2-3 1-2	The E-Lead is forced Busy two seconds after sync loss.
	X7 X8	1-2 2-3	The E-Lead is forced to the Idle state 0.5 seconds after sync loss.
	X7 X8	2-3 2-3	The E-Lead is not affected by loss of sync.

Universal Voice Card Channel Options

Option selection switches and headers are used to configure the various Universal Voice Card configurations to provide the desired voice encoding techniques, input and output levels, signaling types, and service interruption requirements. Voice encoding options, unique to each type of Universal Voice Card, are selected using Switch S1 on the card (*See Figure 3-17*). *Table 3-49* defines the switch positions, the corresponding part number of the Universal Voice Card, and the application of each voice type. Option selections for input and output levels, signaling types, and service interruption requirements are common for all versions of the card and are selected using Switch S2 and Headers X1 through X12 (*See Figure 3-17* and *Table 3-50 through Table 3-54*).

PCM Voice Encoding

Universal Voice Card P/N 036P265-002 is used for PCM voice encoding. This card furnishes PCM voice encoding at a synchronous data rate of 64 Kbps. Either U.S. or U.K. signaling types can be accommodated. PCM voice encoding with either 2 kHz or 800 Hz may be selected (*See Table 3-49*).

ADPCM Voice Encoding

Universal Voice Card P/N 036P265-003 is used for ADPCM voice encoding. The ADPCM option provides ADPCM voice encoding with 800 Hz overhead and software controlled variable synchronous data rates of 32 Kbps, 24 Kbps, or 16 Kbps with PCM-T (64 Kbps) fallback mode (*See Table 3-49*).

Input and Output Signal Level Option Selections

The PCM and ADPCM versions of the Universal Voice Card accept nominal input levels of –16 dBm and 0 dBm and provide nominal output levels of 0 dBm and +7 dBm. You can choose nominal input and output levels for the voice input and output as described in *Table 3-50.* Nominal input level may be adjusted (to compensate for cable losses or other irregularities) as described in *Table 3-51*. The nominal output level may also be adjusted to achieve additional compensation, but the adjustments are software selectable only. The output level adjustments have the same dBm range as the input level adjustments.

E and M Signaling Options

The E and M signaling subsystem gives you a means of supervisory pulse communications between local and remote telephone networks. The signaling data is transmitted over the same path as the voice data. But additional bandwidth is used for the E and M signaling information.

By selecting various options, the PCM or ADPCM versions of the Universal Voice Card can be configured to support seven types of E and M signaling as described in *Table 3-52*. The M-Lead signaling interface circuits created by the jumper plug positions were previously shown in *Figure 3-14.*

Idle/Busy E-Lead and Voltage Polarity Options

E-Lead inversion and loss of power states are selected by Jumpers X5 and X6 on the Universal Voice Card. These options select the state (BUSY or IDLE) that the E-Lead reverts to when TMS-3000 power is lost. Jumpers X7 and X8 on the Universal Voice Card select the voltage polarity for the E-Lead. The option selections are shown and described in *Table 3-53*.

Service Interruption Options

Four options are available for E-lead operation following either a loss of synchronization or an out-of-service condition. The available options are shown in *Table 3-54*.

Echo Canceller Option

Header X12 (*See Figure 3-17*) is provided for use with the Echo Canceller Piggyback Card. Header X12 allows selection between the incoming transmit PCM from the Codec NORM, or the PCM with echo cancellation from the Echo Canceller Piggyback Card (ECH). Place Jumper X12 in the ECH position if you are using the Echo Canceller Piggyback Card, otherwise it should be left in the NORM position.

Voice Channel Configuration Selections

The Universal Voice Card voice channel software configuration parameters are selected using the Controller for the Transport Management System. The available selections are:

- VF/dB Levels
- ADPCM — Selection of a reduced rate, or the PCM-T (64 Kbps) pass-through mode

Detailed configuration instructions are provided in *GDC 036R603-Vnnn*.

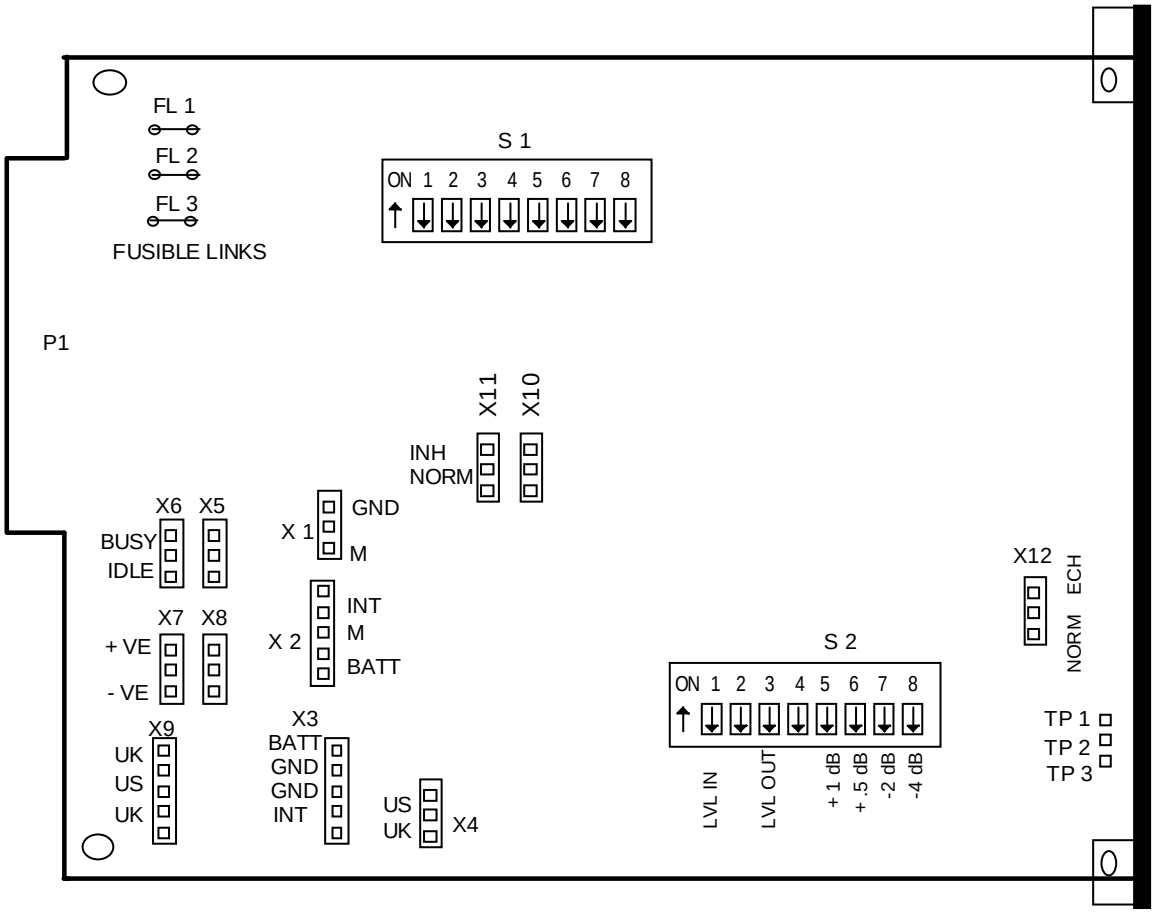


Figure 3-17 Universal Voice Card, Option Switch and Jumper Locations

Table 3-49 Universal Voice Card Voice Encoding Option Selections

Modulation	Voice Card Type	Switch Positions								UVC Used (GDC Part No.)	Application
		S1-1	S1-2	S1-3	S1-4	S1-5	S1-6	S1-7	S1-8		
PCM	PCM	ON	ON	ON	OFF	ON	ON	OFF	ON	036P265-002 036P265-003	Provides PCM encoding at 64 Kbps with-2 kHz over-head (for com-patibility with P/N 036P250 Voice II/PCM cards).
PCM-T	LO-HPCM-VF	OFF	ON	OFF	ON	ON	ON	OFF	OFF	036P265-002 036P265-003	Provides PCM encoding at 64 Kbps with 800-Hz overhead.
ADPCM	ADPCM	ON	ON	ON	ON	ON	ON	ON	OFF	036P265-003	Provides AD-PCM encoding at 32-KHz with 2 kHz overhead (for compatibility with P/N 036M200 and 036M201 cards).
UADPCM	UADPCM IF	OFF	ON	OFF	ON	OFF	ON	ON	OFF	036P265-003	Provides AD-PCM voice en-coding with variable rates and 800-Hz overhead.
ASP	ASP	OFF	ON	ON	OFF	ON	ON	OFF	OFF	036M265-001	Provides ASP en-coding at a rate of 16-KHz, A-law, PCM with PCM-T fallback mode.
ASP	MASP	OFF	ON	OFF	OFF	ON	ON	OFF	OFF	036M265-001	Provides variable rate ASP.
TOR	TOR VF	OFF	ON	ON	OFF	OFF	ON	OFF	OFF	036P265-002 036P265-003	Provides TOR encoding
CADM	CADM VF	OFF	ON	ON	ON	ON	ON	OFF	ON	036P265-012	Provides CADM encoding, Mu-law PCM at 16-KHz.

Table 3-50 Universal Voice Card Input/Output Level Option Selections (Switch S2)

Feature	Selection (dBm)	Switch (S)		Application
		Desig.	Position	
Nominal Input Level	–16 0	S2-1 S2-1	ON OFF	The nominal input level is determined by the nominal output level of the telephone equipment connected to the channel. If actual output levels of connected equipment vary from the nominal levels, Switch S2 may be set to achieve an additional level of compensation.
Nominal Output Level	0 +7	S2-3 S2-3	OFF ON	The nominal output level for the channel is either 0 dBm or +7 dBm. This selection depends on the nominal input level specified for the telephone equipment connected to the channel. Adjusting output level to get more compensation is a software option.
Note: Switch S2 is located on the Analog Universal Voice Card.				

Table 3-51 Universal Voice Card Input Level Adjustment Options (Switch S2)

S2-5 (+1 dB)	S2-6 (+0.5 dB)	S2-7 (–2 dB)	S2-8 (–4 dB)	Input Compensation (dB)	Applications
ON	ON	OFF	OFF	+1,5	Switches S2-5 through S2-8 select attenuation or amplification for the voice input level. This compensates for cable losses or improper output levels from connected telephone equipment. The switch selects a level of compensation from +1.5 dB to –6.0 dB in 0.5 dB steps. Each segment of Switch S2 selects a level of attenuation or amplification; the individual steps are added to produce a particular level. A level is selected to compensate for some measured deviation of the output level of equipment connected to the channel. The deviation is the difference between the actual level and the nominal level (selected on Switch S2-1).
ON	OFF	OFF	OFF	+1.0	
OFF	ON	OFF	OFF	+0.5	
OFF	OFF	OFF	OFF	0	
ON	ON	ON	OFF	–0.5	
ON	OFF	ON	OFF	–1.0	
OFF	ON	ON	OFF	–1.5	
OFF	OFF	ONB	OFF	–2.0	
ON	ON	OFF	ON	–2.5	
ON	OFF	OFF	ON	–3.0	
OFF	ON	OFF	ON	–3.5	
OFF	OFF	OFF	ON	–4.0	
ON	ON	ON	ON	–4.5	
ON	OFF	ON	ON	–5.0	
OFF	ON	ON	ON	–5.5	
OFF	OFF	ON	ON	–6.0	

Table 3-52 Universal Voice Card E And M Signaling Option Selections

Signaling Type	Jumper Positions					Signaling States
	X1	X2	X3	X4, X9	IDLE	BUSY
1	GND	M	GND	U.S.	0 V dc	–12 to –48 V dc
2	GND	M	BATT	U.S.	OPEN	–12 to –48 V dc
3	GND	M	BATT	U.S.	0 V dc	–12 to –48 V dc
4	M	BATT	GND	U.S.	OPEN	0 V dc
5	M	BATT	GND	U.S.	OPEN	0 V dc
U.K. (SSDC5)	M	BATT	INT/GND	U.K.	OPEN	0 V dc
2*	M	INT	INT	U.S.	OPEN	0 V dc

* For back-to-back signaling with no external battery.

NOTE: Headers X1, X2, X3, X4, and X9 are located on the Universal Voice Card.

Table 3-53 Idle/Busy E-Lead And Voltage Polarity Option Selections

Jumper	Jumper Position	Application
X5 X6	BUSY BUSY	When the E-Lead is used for signaling, loss of TMS-3000 power results in a BUSY E-Lead.
X5 X6	IDLE IDLE	When the E-Lead is used for signaling loss of TMS-3000 power results in an IDLE E-Lead.
X7 X8	+VE +VE (Positive Polarity)	Jumpers X7 and X8 select polarity for the E-Lead. These jumper positions (+ or –) depend on the requirements of the interface. Normally, the M-Lead detector of the channel equipment will provide only a negative voltage and requires a negative (–) polarity E-Lead setting. But if the M-Lead detector provides a positive voltage, the E-Lead polarity should be set to positive (+).
X7 X8	–VE –VE (Negative Polarity)	

NOTE: Headers X5, X6, X7, and X8 are located on the Universal Voice Card.

Table 3-54 E-Lead Service Interruption Options

X10	X11	Application
NORM	NORM	The E-lead is forced to IDLE 0.5 seconds after a service interruption and reverts to BUSY after an additional 2.5 seconds.
NORM	INH	The E-Lead is forced to BUSY 3.0 seconds after a service interruption.
INH	NORM	The E-Lead is forced to IDLE 0.5 seconds after a service interruption.
INH	INH	The E-Lead is not affected by a service interruption.

NOTE: Headers X10 and X11 are located on the Universal Voice Card.

Echo Canceller Card

The Echo Canceller Piggyback Card is a double-sided, printed circuit card assembly with physical dimensions of 4.4 inches by 3.95 inches. It mounts on the Universal Voice Card and is supported by four standoffs. Electrical connections are made by means of a 13-pin header. The Echo Canceller Card contains one right-angle DIP switch mounted near its upper edge, enabling options to be selected without removing the card from the Universal Voice Card.

Echo Canceller Options

The Echo Canceller Card options are selected using Switches S1-1 through S1-5 on the Echo Canceller Card.

In the TMS-3000, the Residual Echo Suppressor option on the Echo Canceller Card is no longer supported. The use of this option may cause the Universal Voice Card to synchronize incorrectly after a loss of sync due to link errors. The Adaptive Bulk Delay feature now has a factory default value of 0 dBm .

Figure 3-18 locates option selection Switch S1. *Table 3-55* defines the option selections.

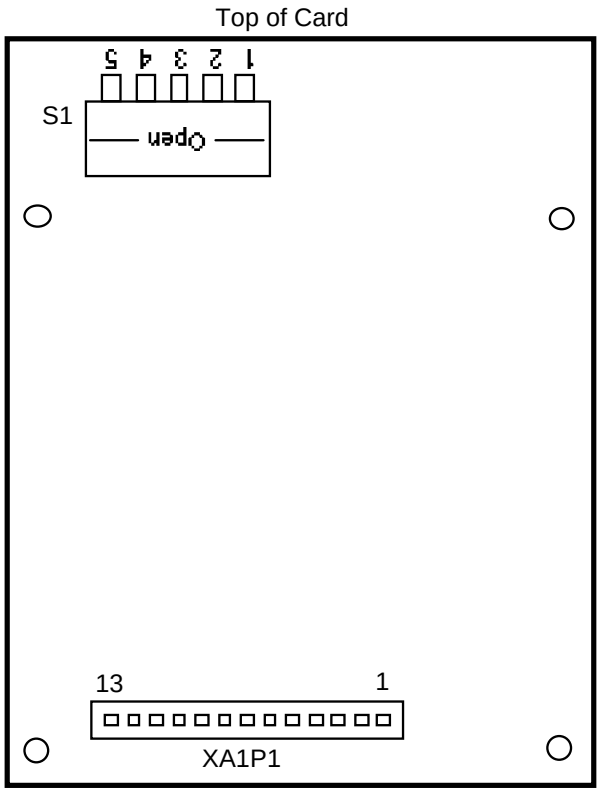


Figure 3-18 Echo Canceller Card Option Switch Location

Table 3-55 Echo Canceller Card Option Selections

Feature	Selection	Switch (S)		Application
		Desig.	Position	
Bulk Delay	0 ms fixed delay	S1-2 S1-3	Closed (Down) Closed (Down)	These switch positions control the length of the bulk delay. The bulk delay is required to enable echo cancellation on tail circuits with a delay in excess of 16 ms. In most situations, the bulk delay value can be determined by trying the three possible settings (0 ms, 7 ms and 14 ms) and then selecting the setting that provides the best results. In cases where the length of the tail circuit varies greatly with different call routings, then the "Adaptive Delay'' setting should be selected to allow the length of the bulk delay to adapt itself to the optimum value for each call. The Echo Canceller Adaptive Bulk Delay Algorithm may not function properly if the digital transmit and receive levels on the voice channel card are not set to be the same and the Echo Canceller may not converge to this situation. It is essential to adjust the gains and losses in the analog circuitry so that a 0 dBm signal at each end of the link results in the same signal level (measured in dBm) at the analog input/output of the PCM CODEC. Therefore, the factory default setting of Bulk Delay option is now 0 ms.
	7 ms fixed delay	S1-2 S1-3	Closed (Down) Open (Up)	
	14 ms fixed delay	S1-2 S1-3	Open (Up) Closed (Down)	
	Adaptive Delay (0 ms initially)	S1-2 S1-3	Open (Up) Open (Up)	
External Line Enable/Disable	Disable Always	S1-4 S1-5	Closed (Down) Closed (Down)	These switch positions control the operation of the external control line. The control line is used by external equipment to enable or disable the Echo Canceller, when required. With the switches set to the external control line. "Disable'' or "Enable'' position, the Echo Canceller is either disabled or enabled when the external control line is grounded.
	Enable Always	S1-4 S1-5	Open (Up) Open (Up)	
	Disable when external control line is grounded	S1-4 S1-5	Closed (Down) Open (Up)	
	Enable when external control line is grounded	S1-4 S1-5	Open (Up) Closed (Down)	With the switches set to the "Disable Always'' or "Enable Always'' position, the Echo Canceller is permanently disabled or enabled regardless of the state of the external control line.

NOTE: Switch S1-1 is to remain in Open (Up) position at all times.

The residual echo suppresser option on the Echo Canceller Card may cause the Universal Voice Card to synchronize incorrectly after a loss of sync due to link errors. The Adaptive Bulk Delay has a factory default of 0 dBm.

Variable Rate ASP Piggyback Card

Either a fixed or variable rate ASP Piggyback card may be installed on the Voice II/ASP or UVC/ASP Channel Module. With the *ASP Piggyback Card GDC 036P259-001* installed, fixed rate ASP at 16 Kbps is provided. With *ASP Piggyback Card, GDC 036P259-002* installed, variable rate ASP rates of 10, 11, 12, and 16 Kbps may be selected by means of the software. The location of option Switch S1 on the ASP Piggyback Card is shown in *Figure 3-18*. The option selections for fixed or variable rate ASP are described in *Table 3-56*.

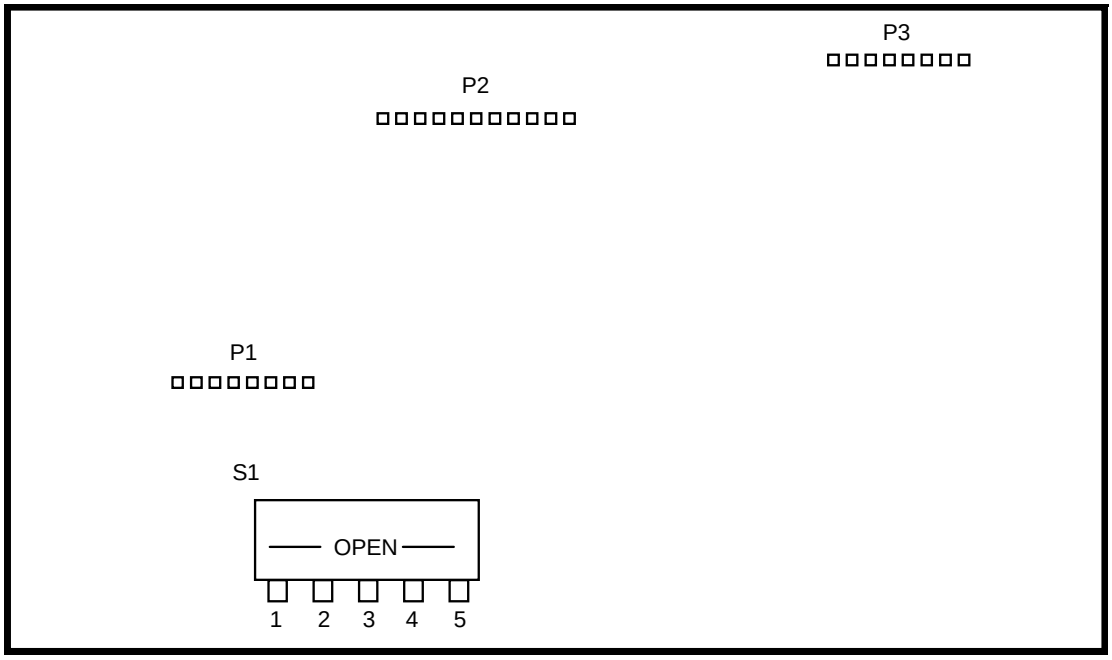


Figure 3-19 Fixed or Variable Rate ASP Piggyback Card, Option Switch S1 Location

Table 3-56 Fixed or Variable Rate ASP Piggyback Card, Option Switch S1 Selection

Switch	Fixed Rate ASP (ASP Piggyback Card 036P259-001)	Variable Rate ASP (ASP Piggyback Card 036P259-002)	Application
S1-1	ON	ON	Fixed rate ASP switch positions provide fixed rate ASP at 16 Kbps. Variable rate ASP switch positions provide software selectable, variable rates of 10, 11, 12, or 16 Kbps.
S1-2	OFF	OFF	
S1-3	OFF	OFF	
S1-4	ON	OFF	
S1-5	OFF	OFF	
		OFF	

Other Channel Cards

There are several other channel cards that can be used in the TMS-3000. The technical manuals that contain detailed information about these cards are listed in *the Preface*. *For OCM channel cards refer to GDC 036R340-000 and associated addendums.*

Summary

This chapter provided information on the installation and optioning of the TMS-3000 channel cards. Part numbers and option selection were discussed in this chapter.

What's Next

In the next chapter we cover the procedures for operating the TMS Controller hardware and software.

4 Operation

Overview

The chapter provides information on the TMS Controller keyboard, screen format and colors, general operating procedures, multiport cards, printer options, and the front panels of TMS cards.

TMS-3000 Controller Operation

A TMS Controller is pictured in *Figure 4-1*. A software version of the Operation manual for the TMS-3000 Controller is installed on the hard disk drive and is referred to as a disk-based manual. The disk-based manual provides:

- Menu-driven selection
- Cursor position selection method
- Option to have information displayed on the Controller CRT screen or printed from the Controller printer port.

See *Chapter 5* of this manual for instructions on bringing up the system and gaining access to the disk-based manual.

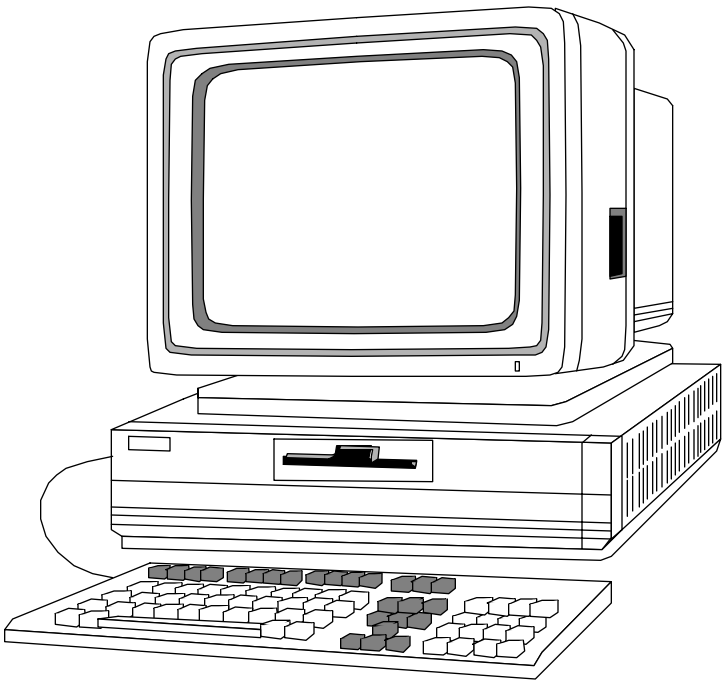


Figure 4-1 TMS-3000 Controller

Function Keys

The function keys (located at the top of the keyboard and labeled F1 through F12) are the primary means of selecting and exiting from TMS-3000 routines. The keys also step between display pages within a routine. These keys are illustrated in *Figure 4-2*.

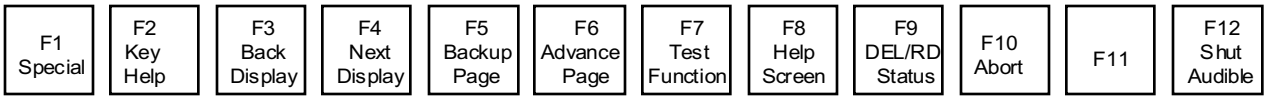


Figure 4-2 TMS-3000 Controller Function Keys

The following describes each function key.

F1 Special

This key functions similarly to a shift key on a keyboard. It selects an alternate function for any function key or keys in the numeric key pad. Whenever the Special key must be used to obtain an alternate key function, this is indicated.

F2 Help

This key selects Help screens for the function keys and the numeric keypad keys. Once you have selected Help, select information on a key by pressing that key. The Help screen for that key appears. Help screens contain directions for returning to TMS-3000 displays.

F3 Back Display

This key steps backward through a sequence of displays and menus, reversing the steps that you followed to enter that routine. This is the normal method of exiting from a routine. Repeatedly pressing F3 brings you back to the TMS-3000 Main Menu.

Take care in using F3 to exit a Diagnostic routine. Some TMS-3000 tests continue to run until stopped. If you exit a test routine by using F3, make sure you end the test first if you don't want it to continue.`

F4 Next Display

This key steps forward through a display sequence in those instances where there is only one possible forward sequence (no menu or other choices required). In the Modify Node Equipment Routine, this key selects the Aggregate Configuration and Channel Configuration displays when the cursor is positioned at a parameter field for that node component in the Modify Node Equipment display.

F5 Backup Page

This key is used in routines that require more than one display page for a particular display. Pressing this key returns the previous display page to the screen.

F6 Advance Page

This key is used in routines that require more than one display page for a particular display. Pressing this key brings the next display page to the screen.

F7 Test Function

This key is used in status and diagnostic routines for channels. In specific applications, it is pressed to start a test or select a display (the screen directs you whenever this key is required).

F8 Help Screen

This key selects the Disk-Based Manual topic that is most relevant to the current operating routine.

F9 Del/Read Status

This key steps through the status messages displayed on the Status Line (the lower green line in all displays). Each message is deleted after it appears unless you press the F1 key before pressing the F9 key.

The message queues can hold up to forty messages. The messages report important events occurring in the system. When such an event occurs, the normal alarm information is overwritten by the resulting status message, and the line becomes yellow. You must then press the Status Message key up to forty times to return the normal alarm information to the status line.

F10 Abort

This key aborts the retrieval of active or historical alarm messages from the alarm data base.

F12 Shut Audible

This key lets you turn off the terminal beep for the current alarm. When a new alarm is received, the beep resumes. To shut off the beep permanently, select NO for terminal beep in the Modify Alarm Handling screen.

Editing Keys

The editing keys (located in the block of keys at the right side of the keyboard) provide utilities for entering and changing information within configuration displays. These keys are illustrated in *Figure 4-3*.

Insert

This key functions exactly like the `Enter` key in the main section of the keyboard. It may be used to:

- Select a menu item (with the cursor positioned at that entry)
- Step forward through a limited range of values
- Enter a response to a prompt (such as Y for Yes)

Home

This key restores a previously entered character string to a string field while the cursor is positioned at that field.

Page Up

This key deletes an entire character string in a field when the cursor is positioned at that field.

Delete

This key deletes a single character within a character string entry. The character at the current cursor position is deleted. Characters to the right of the cursor shift one position to the left.

End

In a limited range entry, this key steps backward (that is, the reverse order from that obtained by the `Enter`/Step Forward key) through the list of selections.

Page Down

This key, when pressed alone, deletes all characters from the right of the cursor to the next space in the field. When pressed simultaneously with F1, it restores a word previously deleted by the Del Wrd key.

Cursor Position Keys

The cursor position keys (located below the editing keys) move the cursor to desired locations in menus and displays.

Cursor Up

This key moves the cursor in an upward direction to the next highest modifiable parameter field on the screen. When the cursor reaches the topmost position on the screen, it "wraps" to the bottom of the screen when you press the key again.

Cursor Left

This key moves the cursor to the left, between each modifiable parameter field on the screen. When the cursor reaches the leftmost position on the screen, it "wraps" to the right side of the screen and also moves up to the next row of modifiable fields.

Within a character string field, the cursor moves only to the left until it reaches the leftmost character position of the field. You must use the up or down cursor to exit the field.

Cursor Down

This key moves the cursor down to the next lowest modifiable parameter field on the screen. If the cursor reaches the bottom field, it "wraps" to the top of the field when you press the Cursor Down key.

This key also moves the cursor out of a character string field. When the cursor leaves the field, the character string is complete until you reenter that field.

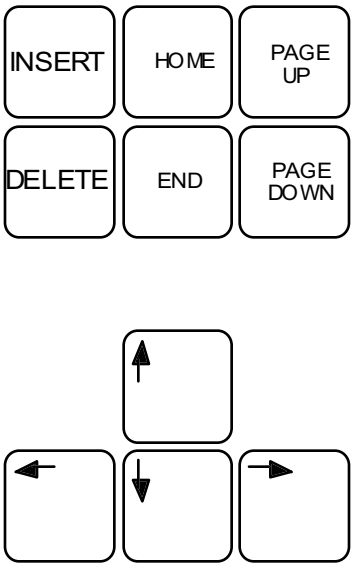


Figure 4-3 TMS-3000 Controller Editing and Cursor Position Keys

Cursor Right

This key moves the cursor to the right between each modifiable parameter field on the screen.

When the cursor reaches the rightmost position on the screen, it "wraps" to the left side of the screen and also moves down to the next row of "live" fields.

Within a character string field, the cursor moves to the right only until it reaches the rightmost character position of the field. You must use the up or down cursor to exit the field.

Alphanumeric/ASCII Keys

These keys are enabled by the Controller whenever a character string entry or numerical range entry is required. When entering a character string, you may use any character shown on the main keyboard (alphabet characters, numbers, punctuation marks, etc.). The first character of a character string must, however, be an alphabet character.

Enter Key

The `Enter` key is used in several ways to select, enter, and perform Controller operations.

- Select a menu item (with the cursor positioned at that entry)
- Step through a limited range of values for a configuration entry
- `Enter` a response to a prompt (such as Y for Yes)

Control Keys

Combinations of the Ctrl (Control) key and various alphabet keys select specific controller functions.

Screen Print/Control P

To print the current screen, press the Ctrl and the P keys simultaneously. The screen display is immediately printed to either LP0 or LP2, depending on which one was selected in Controller Maintenance (Configure Parallel Ports).

Flow Control/Control S

To "freeze" the screen, press the Ctrl and the S keys simultaneously. The display remains locked after this action. To resume normal operation, press any key on the keyboard.

Restore Field/Control X

This restores the previously stored character string to the field. Press the Ctrl and X keys simultaneously.

Refresh Screen/Control W

To refresh the screen, press the Ctrl and the W keys simultaneously. The reverse video disappears (except when the cursor is in a prompt or string field) until the next keystroke is entered.

Screen Format and Colors

All displays of the TMS-3000 Control System are framed within a screen format and include certain display colors. The intent of the format and color combination is to provide as much information as possible concerning the current status of the system, regardless of what routine is running.

Screen Format

The Controller screen is 80 characters wide. There are 25 lines from the top of the screen to the bottom of the screen.

The top line of the display is highlighted in green and reports the following:

- Name of Currently Displayed Menu or Routine
- Current Software Version or Network Currently Displayed
- Current Time/Date

The next 20 lines are the display window (or "page") for the TMS-3000 operating routines. All menus and displays occur on these 20 lines. Any display that contains too much information to fit into this window is divided into two or more pages. You use the Advance Page (F6) and Back-up Page (F5) to change pages for these displays.

Line 22 is reserved for system messages and prompts from the Controller. The messages report error conditions and indicate intermediate processes (such as Searching For Node) that may delay initiation of a routine. The prompts solicit information required in the course of a routine (node, circuit, or route names, for example) and enable you to save configuration changes before exiting a routine.

Line 23, called the alarm/status line and normally highlighted in green or yellow, reports network status information. The on-line network and active configuration are reported. The number of Active alarms (those alarm conditions which exist presently in the network) are reported in three categories — Major, Minor, and Warning.

A Major Alarm indicates a failure which could disrupt the flow of network traffic (usually disrupts a group of channels or an aggregate trunk). A Minor Alarm indicates a failure of a lesser extent (usually disrupts only a single channel). A Warning Alarm is for information about an event that has occurred in the system.

Line 23 also displays status messages from "asynchronous" processes occurring in the network. For example, a downloading operation in a complex network may take several minutes. Complete messages from the download appear in this status line.

This report facility frees the Controller to perform other tasks in the "foreground," while a time-consuming process runs in the "background."

The alarm/status line is blue whenever a status message is present. Up to forty status messages may be stored for display on the status line. The function key F9 is used to step through each status message present and delete them after display. You may read these messages without deleting them by pressing F1 before pressing the F9 key. With either display method, the green alarm line is eventually returned to the screen. As many as 40 such messages may be accessible through this line.

Lines 24 and 25 report the two most recent alarm messages received from the network by the Controller.

Screen Colors

Colors in the Controller screen display reflect the type of information provided by the Controller or the type of entries required by the Controller. The screen may display text presented in a single color or in a combination of a highlighted field color and a text color.

The color arrangements used on TMS-3000 Controller displays are:

- White Text on Blue Field — Display Headers
- Blue Text on White Field — Limited Range Entry
- Black Text on Blue Field — String Entry
- Black Text on White Field — Cursor Selection (Pokepoint)
- Red Text — Indicates failure condition for alarms, status, or diagnostics
- Green Text — Indicates normal operating condition for alarms, status, or diagnostics
- Yellow Text — Indicates warning (potential problem) condition for alarms, status, or diagnostics

General Operating Procedures

TMS-3000 Controller operation is characterized by:

- Menu-Driven Selection of Operating Routines
- Cursor Position Selection Method
- Prompt/Message System Responses
- Predefined Key Functions
- Formatted Screen Displays

The first step in entering TMS-3000 operating procedures is password entry — you must enter a Login Name and a Password to gain access to the system.

The display then presents the TMS-3000 Main Menu. The tasks required to initialize, configure, and maintain a TMS-3000 system are represented by the entries in the main menu. MAIN MENU FUNCTIONS describes each item in the TMS-3000 Main Menu.

To select an entry from the main menu, move the cursor to the desired entry and press the `Enter` key. Another menu appears listing the operating routines that perform specific functions. Select an entry from this menu in the same manner. Depending on the particular task that you wish to perform, you may encounter another level of menus or enter the operating routine that performs the task.

As you step through menus to initiate a routine, you may need to specify a node or other device that the operating routine is directed toward. For example, to select a status display for a node, you must enter the symbolic name of that node. At these points, the system prompts you to enter the symbolic name or other information required and highlights a field where the entered characters appear.
A typical prompt is:

```
Enter Node Name:
```

You answer this prompt by typing in an already configured symbolic name for the node, and pressing the `Enter` key. If you make a mistake, such as mistyping the node name, the system reports the problem through a message such as:

```
Node Does Not Exist. Continue? [Default YES (Y/N)]
```

To enter another node, answer Yes (or simply Y). Entering No (or N) returns you to the previous level of menus. If you press the `Enter` key without entering an answer, the default response shown is selected (in this case, pressing the `Enter` key is interpreted as a Yes response).

These prompts and messages always appear on line 22 of the screen. Whenever any event or problem occurs that should be reported, messages and prompts appear on that line.

When you reach an operating routine, a display related to that routine is presented. Depending on the exact nature of the routine, you probably must supply some information as you use the routine. The information is located in labeled fields in each display.

For example, the configuration routines require the entry of much specific information that defines equipment operation and desired modes of operation for the equipment at a node.

Several types of entries are used to supply information to the system. They are Cursor Position Entry, String Entry, and Limited Range Entry. For detailed descriptions of these entry types, refer to Entry Types.
After completing all entries, or having finished with an operating routine, press F3 to exit from the routine. You may have to respond to a prompt, such as:

```
Do you wish to save your configuration? [Default Continue Y/N/C]
```

Repeatedly pressing F3 brings you back to the TMS-3000 Main Menu. You also may have to answer prompts to return there.

Use the other Function Keys and Editing Keys to accomplish specialized operating functions in the TMS-3000 system. While most operations may be performed in the manner described above, these keys enable you to operate the system more efficiently.

Entry Types

Three types of entries supply information to the TMS-3000 controller. The entry types are:

- Cursor Position Entry
- String Entry
- Limited Range Entry.

Cursor Position Entry

This entry is made by moving the cursor (using the cursor position or "arrow" keys) to the desired field and pressing the `Enter` key. Normally, a cursor position entry selects an item from a menu. The menu may occupy an entire screen or only a small section of a screen.

When you move the cursor to a desired field, it becomes highlighted in white, with black letters.

Making a cursor position entry usually results in the initiation of a new routine. In some situations, a function may be selected for the current display. For example, some configuration displays contain a Delete field within them.

You may select the Delete field by positioning the cursor at that field and pressing `Enter`.

String Entry

Any symbolic name, password, number, or other sequence of characters that must be entered is a character string entry.

String entries perform several functions. A password allows access to a routine. A symbolic name represents some unique entity in the network (including the network itself) and functions as an address for that device. Some strings function only as reference information for an operator of a TMS-3000 Controller (for example, names and street addresses for node sites).

A numerical entry is a form of string entry. The only difference between a numerical string and any other character string is that each entry must be within some numerical range. For example, the node address of a TMS-3000 node must be between 1 and 126.

The TMS-3000 Controller does not accept any TMS node numbers higher than 126, or OCM node numbers higher than 9999.

To make a string entry, move the cursor to the desired field. The selected field is highlighted in cyan (light greenish-blue) and the characters are displayed in black. Enter the character string, and press the `Enter` key. The TMS-3000 Controller then accepts the string as complete. You may also move the cursor out of a string field using the up or down cursor position (arrow) keys. When the cursor leaves the field, the string is complete.

When you have completed an entry (by pressing the `Enter` key or moving the cursor out of the field) the TMS-3000 Controller checks the entry for correctness. A node name, for example, is not accepted if the name has already been used to identify another node. You can, however, apply the same name to two different logical components. A node and a circuit may both be named A, for example.

The editing keys on the keyboard (labeled Insert, Home, Page Up, Delete, End, and Page Down) support editing functions for character strings. While many of these functions are not required for string entry, they may enable greater speed and accuracy in character string entry.

If you enter a character string field and wish to exit it without entering a string, press the key marked Page Up. This key is the Delete Field editing key and deletes all characters in the field. The TMS-3000 Controller does not let you exit a string field while an invalid entry remains in the field.

When you highlight a character string field, the number of characters that may be included for that particular entry is indicated. A password may have up to 16 characters.

The number of characters allowed for the fields is:

16 – Network
8 – Configuration
16 – Node
20 – Circuit (including the ".nnn" extension)
16 – Group
16 – Trunk

Limited Range Entry

For many system parameters entered in a routine you must select one of a limited number of entries.

For example, a node type could be either a TMS-3000 node or a Universal MM+ V4 node. This particular parameter is selected as a limited range entry. The field displays sequentially each possible entry for the parameter, and you step through the range of entries until the proper choice appears.

To select a limited range entry, move the cursor to the desired field and press the `Enter` key repeatedly until the desired parameter appears. When you move the cursor to a limited range entry field, the field is highlighted in white, and the characters are displayed in blue.

CRT Link

An interactive control port for the TMS-3000 Controller may be extended to a remote site. This application uses the CRT link facility to control TMS-3000 through a remote operator's CRT.

Connections at the TMS-3000 Controller site are made to Serial Port 1 at the back of the controller. Typically, a modem link connects the port to a NETCON I/O or MEGAVIEW port at another site.

Refer to *NETCON CRT Link, GDC 058R675*, for detailed information concerning NETCON CRT Link.

The remote operator terminal supports all functions of the Controller keyboard. Keys F1 through F10 and F12 on the remote keyboard perform operations equivalent to those of the Controller keyboard (when used with the Controller).

The Controller is a single-user system. You cannot use the Controller interface and the CRT Link interface simultaneously.

If you log in through a CRT Link interface while another person is using the Controller console, the screen indicates that the software is busy on tty--.

To ensure that only one user is logged in to the controller at one time, follow these procedures when using the CRT Link to operate the TMS-3000 network:

1. Select the Configure Serial Ports routine (found under the Controller Maintenance Menu) and make sure that Port 1 is enabled and the data rate is correct.
2. Make sure that any network operations (such as diagnostics or downloads) have been completed. Return the Network Access menu to the controller CRT screen. Power must remain on in the Controller to operate the CRT Link.
3. Log in through the operator terminal that is being used as the CRT Link by typing gts at the `login` prompt.
4. When finished using the CRT Link interface, make sure that any operations initiated from the CRT Link interface have been completed. Then return to the `Network Access` menu and log out.

   After you log out using the CRT link, you have three minutes before control is lost and is taken over by the TMS Controller. To cancel this three-minute timer, log into a network on the CRT link interface.
5. Resume operations through the Controller interface. The serial port becomes disabled when returning from the CRT Link to the Controller. With the port disabled, no further operations are initiated through the CRT Link.

Multiport I/O Card

When the Multiport I/O card is installed in the Controller, the I/O Port Configuration screen contains additional field selections that appear.

Port

The number of the I/O port being configured. 00 for Serial Port 0, 01 for Serial Port 1. With the I/O card installed, Ports 00 - 05 appear when using the Digiboard 4e, and Ports 00 - 09 appear when using the 8i or 8i+ card. If only one serial port is installed in the Controller, the Digiboard port numbers begin at 01. Port 01 on the Digiboard cable corresponds to either Port 02 or Port 01 on the screen. If installed, Ports 00 and 01 are used for the TMS Controller and other functions such as VT100, dial backup, TTY login, etc. Digiboard ports are used for other applications.

Application

Defines what the port is being configured for. Port 0 selections are Network I/O or Not in Use. Port 01 selections are Dial Backup, Local TTY, Dialin TTY and Not in Use. The choices you can select for Ports 02-07 are Dial Backup, Local TTY, Dialin TTY, Not in Use, MEGAVIEW, MEGAVIEW DU, Audible Alarm, Sync, and VT100.

Communication Mode

Defines the serial communication parameters of the I/O port. Chooses if this is asynchronous; 7 or 8 data bits; 1 or 2 stop bits; and even, odd, or no parity.

Data Rates

Defines the speed (bits per second) in which the I/O port communicates to an external device. Selections are 300, 1200, 2400, 4800, and 9600 Hz. Ports configured for Network I/O cannot be modified.

Security

This field defines an error checking method the controller uses. You have two methods: CRC 16 (Cyclic Redundancy Check 16-bits) and LRC (Longitudinal Redundancy Check).

More information on configuring the serial I/O ports is found in *Chapter 42 of GDC 036R603-Vnnn*. Installation and configuration of a MEGAVIEW Interface is found in Appendix B.

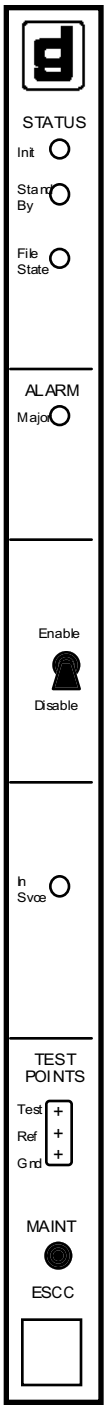
Printer Options

Controller software includes routines that print an entire network configuration, IAR data, Alarm Reports, or individual screens.

These routines are described in *GDC 036R603-Vnnn, Chapter 41*.

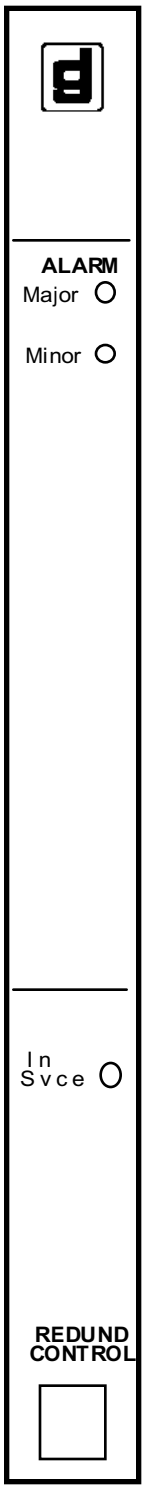
TMS-3000 Front Panel Components

The following pages describe the function of each indicator and test point on each TMS-3000 card. Front panels are shown in *Figures 4-4 through 4-20*.



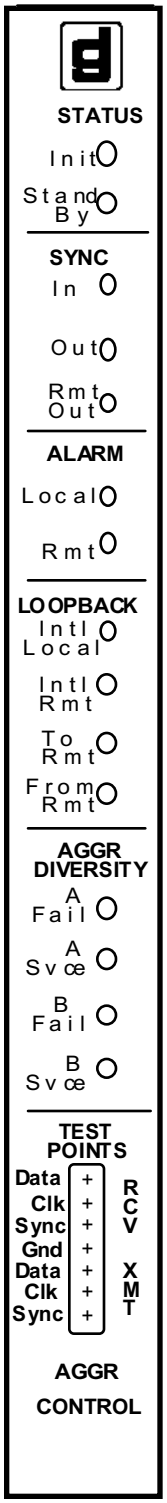
Name	Part	Description
Init	Status LED	Red LED lights during the ESCC initialization sequence (during initialization, the ESCC is not operational).*
Stand By	Status LED	Green LED lights if the ESCC is the idle card of a redundant pair of ESCCs.*
File State	Status LED	Yellow LED lights if the ESCC requires a download of its file system. Flashes when a download of the ESCC file system occurs.*
Major	Alarm LED	Red LED lights if the ESCC experiences a failure that affects its operation. Also lights at power-on reset, but turns off after positive status and self-tests are performed.
Enable-Disable	Switch	Permits installation and removal of the ESCC without disruption of the TMS 3000. Before installing or removing the ESCC into or from a shelf, place the switch in the Disable position. After installation, place the switch in the Enable position after the Init and Major LEDs are lit.
In Svce	LED	Green LED lights when the ESCC is operating.
Test	Test Point	Test point is the 8 kHz clock that is phase-locked to the node reference.
Ref	Test Point	Test point is the incoming reference clock from a master timing source.
Gnd	Test Point	Test point is the ground reference for the other two test points.
Maint	Jack	Connector is used to connect a monitoring device to the ESCC.
		* Refer to *Operation Manual for TMS-3000 Controller, GDC 036R603-Vnnn* for information as to how the Init, Stand By, and File State LEDs interact to provide status information.

Figure 4-4 Enterprise System Control Card, Front Panel



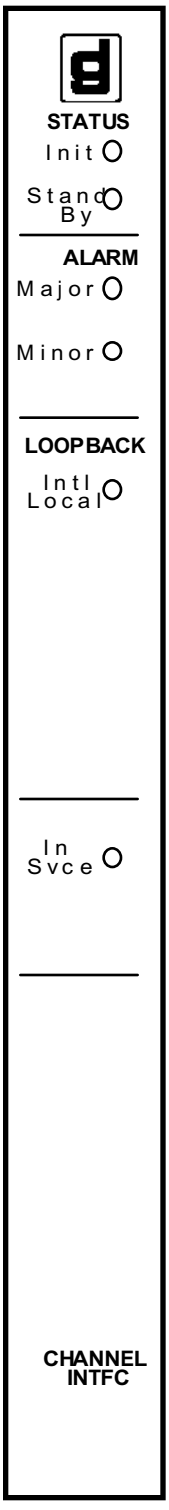
Name	Part	Description
Major	Alarm LED	Red LED lights when there is a hardware failure of one of the common cards.
Minor	Alarm LED	Red LED lights when there is a hardware failure of one of the channel cards.
In Svce	LED	Green LED lights when power is applied to the RCC.

Figure 4-5 Redundancy Control Card, Front Panel



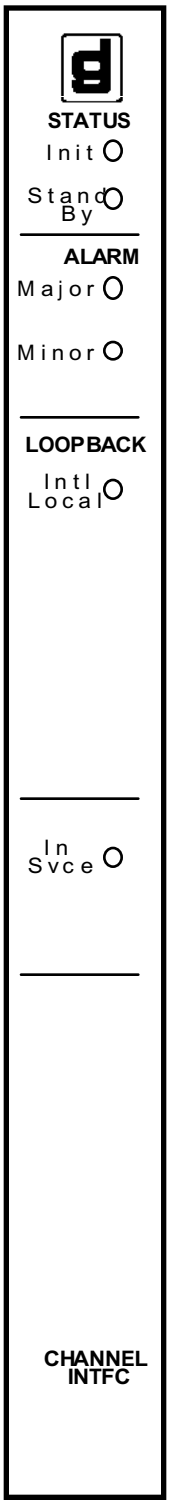
Name	Part	Description
Init	Status LED	Red LED lights during initialization sequence. The board cannot operate during this time.
Stand By	Status LED	Green LED lights if this is the standby card of a redundant pair.
In	Sync LED	Green LED lights when the card is synchronized with received data.
Out	Sync LED	Red LED lights when the card is not synchronized with received data.
Rmt Out	Sync LED	Red LED lights when remote end is not synchronized with its received data.
Local	Alarm LED	Red LED lights if there is a hardware failure in this card. When the LED flashes rapidly, a local software transfer is occuring. When the LED flashes slowly, a remote software transfer is occuring.
Rmt	Alarm LED	Red LED lights if there is a hardware failure in the remote end.
Intl Local	Loop-backLED	Red LED lights if there is an internal local loopback at the aggregate interface (Transmit data is looped back as received data).
Intl Rmt	Loop-backLED	Red LED lights if the remote ACC is in an internal local loopback (Transmit data looped back as receive data at remote aggregate interface).
To Rmt	Loopback LED	Red LED lights when receive data is looped back at the aggregate interface to the remote ACC.
From Rmt	Loopback LED	Red LED lights when data from the local ACC is looped back at the remote aggregate interface.
A(B) Fail	Diversity LED	Red LED lights when the "A (B)" aggregate is not receiving data.
A(B) Svce	Diversity LED	Green LED lights when the "A (B)" aggregate is passing data.
Data (RCV)	Test Point	Receive aggregate data isolated through a 1K ohm resistor.
Clk (RCV)	Test Point	Receive aggregate clock isolated through a 1K ohm resistor.
Sync (RCV)	Test Point	First bit of Frame Receive Not. This bit marks the beginning of each aggregate frame received from the remote aggregate interface (isolated through a 1K ohm resistor).
Gnd	Test Point	Ground Reference Point.
Data (XMT)	Test Point	Transmit aggregate data isolated through a 1K ohm resistor.
Clk (XMT)	Test Point	Transmit aggregate clock isolated through a 1K ohm resistor.
Sync (XMT)	Test Point	End of Frame Not. This bit marks the end of each frame transmitted to the remote aggregate interface (isolated through a 1K ohm resistor).

Figure 4-6 Aggregate Control Card, Front Panel



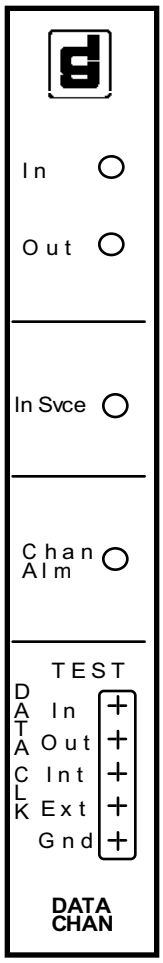
Name	Part	Description
Init	Status LED	Red LED lights during initialization sequence. The board cannot operate during this time. LED blinks when a local or remote software transfer takes place.
Stand By	Status LED	Green LED lights if this is the standby card of a redundant pair.
Major	Alarm LED	Red LED lights if there is a hardware failure on this CIC.
Minor	Alarm LED	Red LED lights if there is a failure in one of the data or voice channel cards interfaced by this CIC.
Intl Local	Loopback LED	Red LED lights if there is an internal local loopback (Data received from a channel card is looped back to the channel card).
In Svce	LED	Green LED lights when card is in service.

Figure 4-7 Channel Interface Card/Digital Bridging Card, Front Panel



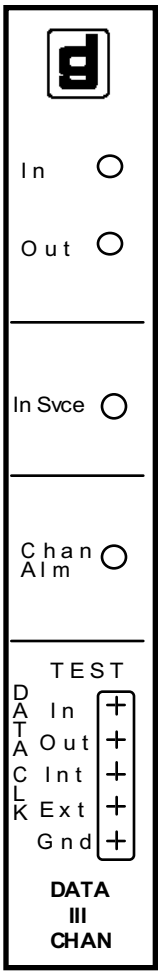
Name	Part	Description
In Svce	LED	In redundant systems, this green LED lights on the Expansion module that currently in operation. In non-redundant systems, this LED should always be lit.

Figure 4-8 Expansion II Module, Front Panel



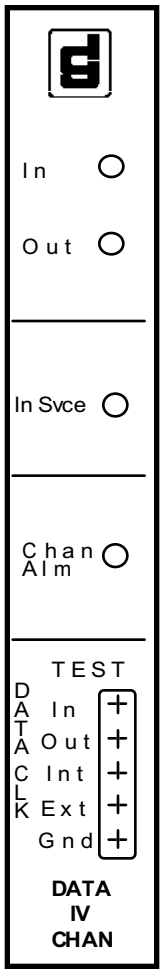
Name	Part	Description
In	LED	Amber LED lights when transmit data into a channel is a space.
Out	LED	Amber LED lights when receive data out of the channel is a space.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel*Alarm descriptions are in GDC 036R603-Vnnn*.
In	Test Point	Test point for transmit data into the channel. Test point isolated through a 10K ohm resistor.
Out	Test Point	Test point for receive data out of the channel. Test point isolated through a 10K ohm resistor.
Int	Test Point	Test point for internal clock used to process and transfer data between the channel card and the CIC.
Ext	Test Point	Test point for external clock. If DCE interface is selected for the channel, the external timing signal from pin 24 of the channel connector appears here. If DTE interface is selected, the receive timing signal from pin 15 of the channel connector appears here.
Gnd	Test Point	Signal Ground for all measurements.

Figure 4-9 Data II Channel Module Front Panel



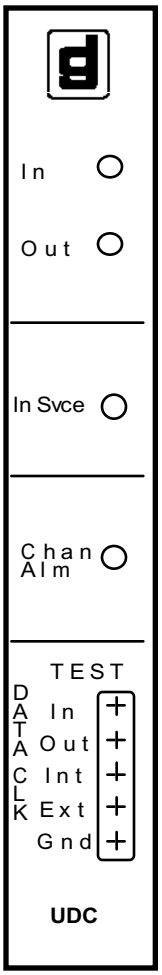
Name	Part	Description
In	LED	Amber LED lights when transmit data into a channel is a space.
Out	LED	Amber LED lights when receive data out of the channel is a space.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. *Alarm descriptions are in GDC 036R603-Vnnn.*
In	Test Point	Test point for transmit data into the channel. Test point isolated through a 10K ohm resistor.
Out	Test Point	Test point for receive data out of the channel. Test point isolated through a 10K ohm resistor.
Int	Test Point	Test point for internal clock used to process and transfer data between the channel card and the CIC.
Ext	Test Point	Test point for external clock. If DCE interface is selected for the channel, the external timing signal from pin 24 of the channel connector appears here. If DTE interface is selected, the receive timing signal from pin 15 of the channel connector appears here.
Gnd	Test Point	Signal Ground for all measurements.

Figure 4-10 Data III Channel Module, Front Panel



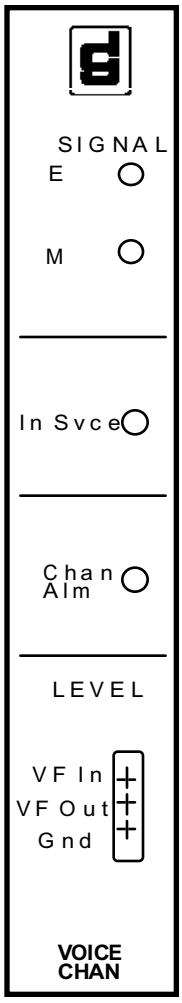
Name	Part	Description
In	LED	Amber LED lights when transmit data into a channel is a space.
Out	LED	Amber LED lights when receive data out of the channel is a space.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. *Alarm descriptions are in GDC 036R603-Vnnn*.
In	Test Point	Test point for transmit data into the channel. Test point isolated through a 10K ohm resistor.
Out	Test Point	Test point for receive data out of the channel. Test point isolated through a 10K ohm resistor.
Int	Test Point	Test point for internal clock used to process and transfer data between the channel card and the CIC.
Ext	Test Point	Test point for external clock. If DCE interface is selected for the channel, the external timing signal from pin 24 of the channel connector appears here. If DTE interface is selected, the receive timing signal from pin 15 of the channel connector appears here.
Gnd	Test Point	Signal Ground for all measurements.

Figure 4-11 Data IV Channel Module, Front Panel



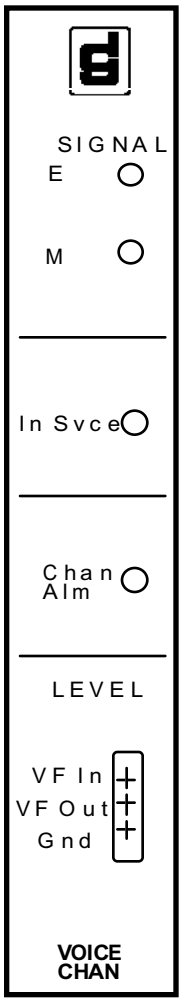
Name	Part	Description
In	LED	Amber LED lights when transmit data into a channel is a space.
Out	LED	Amber LED lights when receive data out of the channel is a space.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. *Alarm descriptions are in GDC 036R603-Vnnn.*
In	Test Point	Test point for transmit data into the channel. Test point isolated through a 10K ohm resistor.
Out	Test Point	Test point for receive data out of the channel. Test point isolated through a 10K ohm resistor.
Int	Test Point	Test point for internal clock used to process and transfer data between the channel card and the CIC.
Ext	Test Point	Test point for external clock. If DCE interface is selected for channel, the external timing signal from pin 24 of the channel connector appears here. If DTE interface is selected, the receive timing signal from pin 15 of the channel connector appears here.
Gnd	Test Point	Signal Ground for all measurements.

Figure 4-12 Universal Data Channel Module, Front Panel



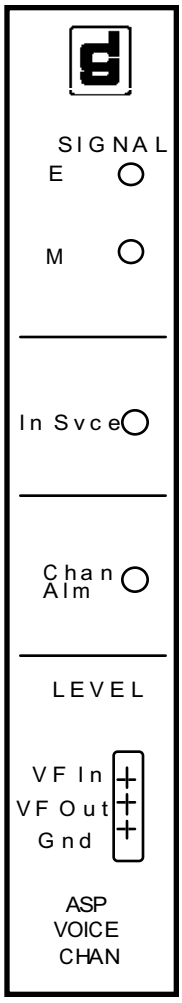
Name	Part	Description
E	Signal LED	Amber LED lights when the E-lead of the voice channel is busy.
M	Signal LED	Amber LED lights when the M-lead of the voice channel is busy.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. *Alarm descriptions are in GDC 036R603-Vnnn.*
VF In	Test Point	Test point for bridged measurement of Voice Channel VF input level. Test point isolated through a 10K ohm resistor.
VF Out	Test Point	Test point for bridged measurement of Voice Channel VF output level. Test point isolated through a 10K ohm resistor.
Gnd	Test Point	Ground for VF input and VF output measurement.

Figure 4-13 Voice II/CVSD Channel Module, Front Panel



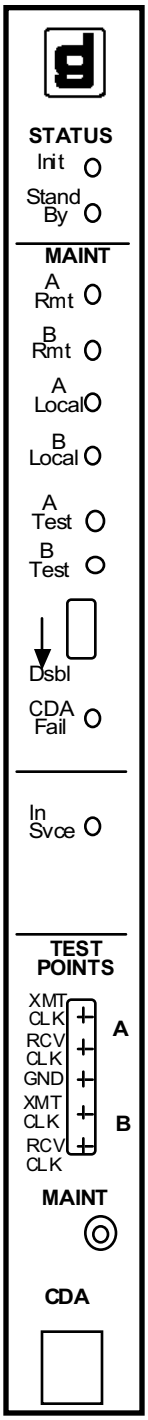
Name	Part	Description
E	Signal LED	Amber LED lights when the E-lead of the voice channel is busy.
M	Signal LED	Amber LED lights when the M-lead of the voice channel is busy.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. *Alarm descriptions are in GDC 036R603-Vnnn*.
VF In	Test Point	Test point for bridged measurement of Voice Channel VF input level. Test point isolated through a 10K ohm resistor.
VF Out	Test Point	Test point for bridged measurement of Voice Channel VF output level. Test point isolated through a 10K ohm resistor.
Gnd	Test Point	Ground for VF input and VF output measurement.

Figure 4-14 UVC/ASP Channel Module, Front Panel



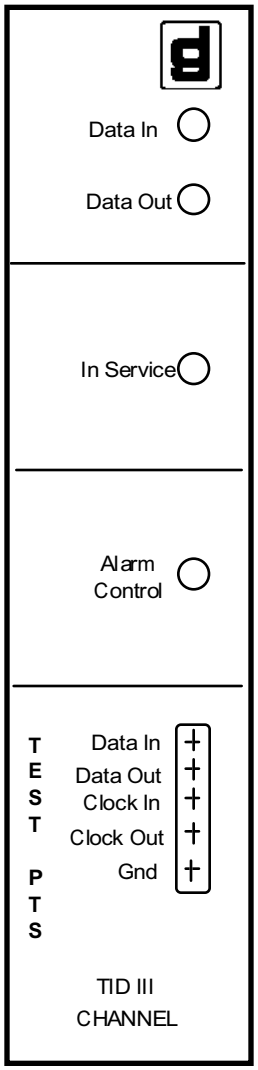
Name	Part	Description
E	Signal LED	Amber LED lights when the E-lead of the voice channel is busy.
M	Signal LED	Amber LED lights when the M-lead of the voice channel is busy.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. *Alarm descriptions are in GDC 036R603-Vnnn.*
VF In	Test Point	Test point for bridged measurement of Voice Channel VF input level. Test point isolated through a 10K ohm resistor.
VF Out	Test Point	Test point for bridged measurement of Voice Channel VF output level. Test point isolated through a 10K ohm resistor.
Gnd	Test Point	Ground for VF input and VF output measurement.

Figure 4-15 Voice II/ASP Channel Module, Front Panel



Name	Part	Description
Int	Status LED	Red LED lights during the initialization sequence. The board cannot operate during this time.
Stand By	Status LED	Green LED lights when the CDA module is in the standby mode. Mode is entered in the following ways: Module is inserted and used as a redundant mate to an already in-service module or the module is forced from in-service to standby via a software command from the TMS Controller.
A Rmt	Maint. LED	Amber LED lights if Port A link detects the DS1 remote alarm signal on its receive data stream.
B Rmt	Maint. LED	Amber LED lights if Port B link detects the DS1 remote alarm signal on its receive data stream.
A Local	Maint. LED	Red LED lights if Port A link has lost DS1 sync on its receive data stream.
B Local	Maint. LED	Red LED lights if Port B link has lost DS1 sync on its receive data stream.
A Test	Maint. LED	Red LED lights if the Port A link is under test and not in normal operation.
B Test	Maint. LED	Red LED lights if the Port B link is under test and not in normal operation.
Dsbl	Maint. Switch	Allows you to remove module from service without physically removing it from the shelf. If performed on an in-service CDA of a redundant pair, a redundant switch occurs. If performed on a non-redundant in-service module, module still goes into the standby mode. To return to in-service, toggle switch again, or a presettable software timer resets the module.
CDA Fail	Maint. LED	Red LED lights if the CDA has detected an internal hardware failure.
In Svce	LED	Green LED lights to indicate that the card is in-service.
XMT CLK	Test Point	Port A Transmit Clock isolated through a 1K ohm resistor.
RCV CLK	Test Point	Port A Receive Clock isolated through a 1K ohm resistor.
GND	Test Point	Ground
XMT CLK	Test Point	Port B Transmit Clock isolated through a 1K ohm resistor.
RCV CLK	Test Point	Port B Receive Clock isolated through a 1K ohm resistor.
MAINT	Jack	Port for connecting a maintenance terminal.

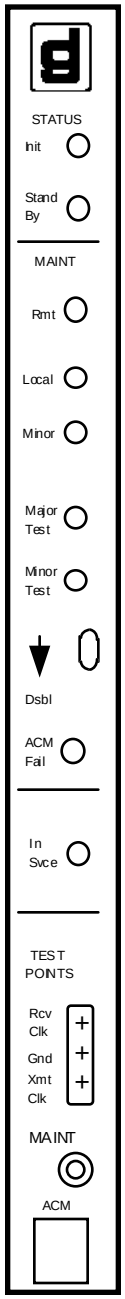
Figure 4-16 CDA Module Front Panel (T1 and E1 versions)



Name	Part	Description
Data In	LED	Indicates data activity is being transmitted by the module. A space (high) lights the amber LED.
DataOut	LED	Indicates data activity is being transmitted by the module. A space (high) lights the amber LED.
In Svce	LED	Green LED lights when the TID-III channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to parameters entered for that channel in the active configuration.
Alarm Control	LED	Red LED lights when an alarm condition exists in the channel. Alarm messages are described in GDC 036R603-Vnnn.
Data in	Test Point	Transmit data into the channel. Test point is isolated through a 1K ohm resistor.
Data Out	Test Point	Transmit data out of the channel. Test point is isolated through a 1K ohm resistor.
Clock In	Test Point	The clock from the customer interface which is encoded and transmitted to the remote end. Test point is isolated through a 1K ohm resistor.
Clock Out	Test Point	The regenerative receive clock based on timing from the remote channel. Test point is isolated through a 1K ohm resistor.
Gnd	Test Point	Signal ground for all measurements.

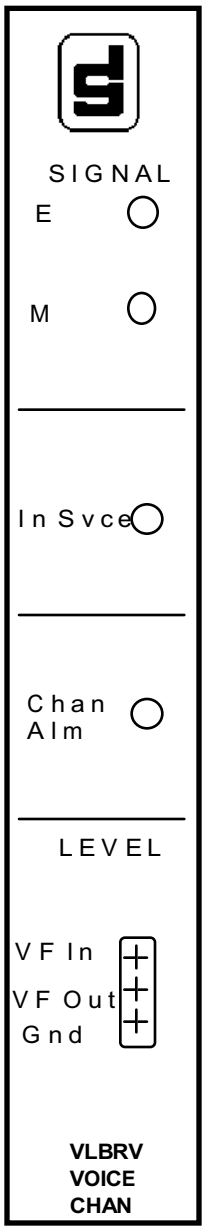
Figure 4-17 TID III Data Channel Module Front Panel Switches and Indicators

Note that any reset condition causes all LEDs to light for about one second.



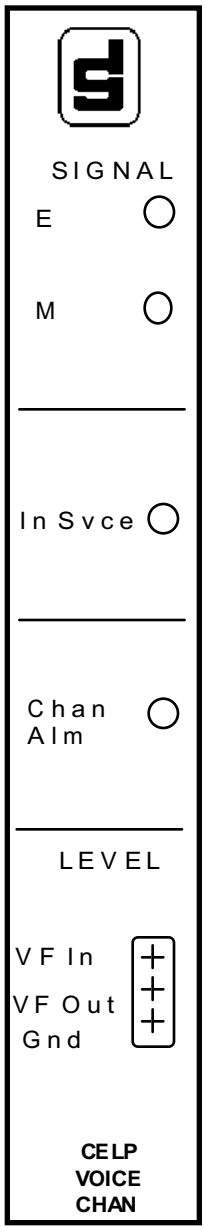
Name	Part	Description
Init	Status LED	Red LED lights when the ACM is executing the boot program.
Stand By	Status LED	Green LED lights during self diagnostic test. If a failure occurs, LED is de-activated making ACM unavailable for automatic redundancy operation. LED also indicates which ACM is attached to the aggregate. The LED is active after initialization and is controlled by a microprocessor.*ACM self diagnostic tests are described in Chapter 2*. If lit during a configuration download, it indicates the ACM is unconfigured, or the out-of-service card is ready to go in service.
Rmt	Maint. LED	Yellow LED lights when a receiving ACM has detected a yellow carrier fail alarm signal. The minimum detection time is 335-msec for a superframe format. Maximum detection time is 1-second. LED is disabled when the ACM is not in service. The remote alarm is the equivalent of the yellow CFA alarm.
Local	Maint. LED	Red LED is triggered by continuous loss of framing or by an intermittent out-of-frame condition in an incoming signal. The local alarm is the equivalent of the AT&T red alarm. The LED is disabled when the ACM is not in service during configuration download. When the Stand By LED and Local Alarm LED are both lit, it indicates incorrect configuration loaded due to incorrect hardware, PC board, or software version.
Minor	Maint. LED	Red LED lights when status transitions are reported from various areas in the ACM are detected (e.g., any channel having any type of fault).
Major Test	Maint. LED	Red LED informs you that a power on self-test is in progress. The LED flashes during a program download. The flashing persists as long as download packets are received from the node. If packets are not received for two seconds, the flashing stops; if the download resumes within the download failure timeout period, the flashing resumes as the next download packet is received.
Minor Test	Maint. LED	Red LED is on when the ACM is performing channel loopbacks only. The LED goes off when tests are completed.
Dsbl	Maint. Switch	Pressing the switch isolates the ACM from the port and the node. Press the switch before the board is removed from the shelf. This minimizes problems caused by the line drivers on the backplane. If the switch is toggled again before removing the card, the ACM reverts to a boot program. In a redundant system, toggling causes a redundant switch by forcing the ACM out-of-service. When the ACM is disabled, all front panel LEDs are off.
ACM Fail	Maint. LED	Red LED lights when the ACM fails a self diagnostic test or when it is unable to function properly in the boot program.
In Svce	LED	Green LED lights to indicate that the card is in-service.
Rcv Clk	Test Point	Receive Aggregate Clock isolated through a 1K ohm resistor.
Gnd	Test Point	Ground
Xmt Clock	Test Point	Transmit Aggregate Clock isolated through a 1K ohm resistor.
MAINT	Jack	Port for connecting a maintenance terminal.

Figure 4-18 ADPCM Compression Module, Front Panel



Name	Part	Description
E	Signal LED	Amber LED lights when the E-lead of the voice channel is busy. Output from the VLBRV is in the form of a solid state switch. Low resistance equals a busy condition (E-lead to ground).
M	Signal LED	Amber LED lights when the M-lead of the voice channel is busy. E-signal is a product of the remote channels M-signal.
In Svce	LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. Alarm messages are described in GDC 036R603-Vnnn.
VF In	Test Point	For bridged measurement of voice channel VF input level to the transmit section. Isolated through a 10K ohm resistor. Input levels should be 0 dBm or –16.0 dBm.
VF Out	Test Point	For bridged measurement of voice channel VF output level from the receive section. Isolated through a 10K ohm resistor. Input levels should be 0 dBm or +7.0 dBm.
Gnd	Test Point	Analog ground point for VF input and VF output measurement.

Figure 4-19 VLBRV Voice Channel Module, Front Panel



Name	LED	Description
E	Signal LED	Amber LED lights when the E-lead of the voice channel is busy. Output is in the form of a solid state switch. Low resistance equals a busy condition (E-lead to ground). E-signal is a product of the remote channels M-signal.
M	Signal LED	Amber LED lights when the M-lead of the voice channel is busy.
In Svce	Signal LED	Green LED lights when the channel is entered in the currently active TMS configuration. This indicates that the card is either operating or prepared to operate according to the parameters entered for that channel in the active configuration. When off, the channel is out-of-service and the control leads are conditioned.
Chan Alm	LED	Red LED lights when an alarm condition exists in the channel. Alarm messages are described in GDC 036R603-Vnnn.
VF In	Test Point	For bridged measurement of voice channel VF input level to the transmit section. Isolated through a 10K ohm resistor. Input levels should be 0 dBm or –16.0 dBm. This test point is a high impedance input and is not for injection of tones.
VF Out	Test Point	For bridged measurement of voice channel VF output level from the receive section. Isolated through a 10K ohm resistor. Input levels should be 0 dBm or +7.0 dBm.
Gnd	Test Point	Analog ground point for VF input and VF output measurement.

Figure 4-20 CELP Voice Channel Module, Front Panel

Summary

In this chapter we covered the use of the Controller screen and keyboard. Also discussed were the front panels of the TMS cards.

What's Next

In the next chapter we cover the procedures for the initial setup of your controller. Procedures for loading XENIX, Informix, and GTS software are also provided.

5 System Initialization

Overview

This chapter covers the procedures for the initial setup of your controller. Procedures for loading XENIX, Informix, and GTS software are also provided.

Initial Setup

The following procedure should be followed only when you first receive your controller or after moving it. If software is already loaded, refer to *Chapter 1, System Startup, in manual GDC 036R603-V220.*

1. Set up the Controller in accordance with the instructions from the manufacturer.
2. Connect *GDC 028H303* to Slot 1 of the Controller and connector J20 of the TMS-3000 Main Harness Card. You may need to add a *GDC shielded EIA/TIA-232-E extension cable (GDC 028H506-XXX or other)* that carries Pins 2, 3, and 7. The two cables are combined in *GDC 028H320-XXX*.

The TMS Controller can be connected directly to a modem through which it can communicate with a NETCON at a remote node. A NETCON-CRT link is described in GDC 058R675 and Chapter 4 of this manual. When the PC is connected to the TMS-3000 through Serial Port 0, Serial Port 1 can be used to link a modem on NETCON to the PC only if the PC monitor and keyboard are not used to operate Controller software and you are logged off of the controller. Serial Port 1 on the back of the PC is the leftmost I/O port. Serial Port 0 is to the right of Serial Port 1.

3. Apply power to the Controller when all previous controller component connections are completed (*See Steps 1 and 2*).

- Move the ON/OFF switch located in the back of the system unit to ON.
- Turn on the color monitor by pushing the ON/OFF button located at the bottom of the monitor to ON. A green LED indicates that the power is on.

TMS-3000 Controller

In most cases, SCO XENIX and GTS software is loaded at General DataComm before your system is shipped. R*efer to the Operation Manual for TMS-3000 Controller, GDC 036R603-Vnnn* for procedures to follow when using the Controller.

Initial Loading of Software

Circumstances may occur when you need to initialize a system that does not already have proper software.

The procedures needed to install SCO XENIX SYSTEM V for use with the Controller follow. To install the XENIX operating system, approximately seven disks are loaded onto the hard disk. This procedure may take up to several hours to complete.

When responding to prompts from the computer, use all lowercase letters except where uppercase letters are specifically required (e.g., Serial and activation key numbers).

What You Need

To install the XENIX System you need:

- A Model 486 or better computer containing a minimum of 5 Megabytes of RAM (*8 megabytes recommended*).
- One hard disk with a minimum of 80 megabytes of storage is required (*200 megabytes recommended*).
- If *not* using an ESDI, IDE (Intelligent Drive Electronics) computer, a copy of the list of bad tracks located on top of the hard disk drive (if your disk supplies such a list)
- One double-sided 1.44 Mb (3.5-inch) floppy drive
- XENIX Operating System floppy disks (version 2.3.4)
- Software serial number supplied with the XENIX disks
- Software activation key supplied with the XENIX disks

To install the Informix data base you need the hardware listed above with the XENIX operating system loaded, plus the Informix Runtime diskette, Informix serial number, and Activation Key.

Setup procedures are given for the Pentium 100, Pentium 90, Intel 486-66, Zenith 386, Zenith 486SX 25MHz, Zenith 486DX 33MHz, Zenith 433Dh 33MHz PCs and Zenith 486DX Z-Select 100. Use the procedure that is appropriate for your PC.

Using Large Hard Drives

SCO XENIX cannot recognize hard drives that are larger than 1023 cylinders or 16 heads. To use PCs with these larger drives, you must reconfigure the hard drive parameters in your CMOS or ROM setup utility to use 1023 cylinders or less. Unfortunately, doing so renders otherwise usable disk space unusable. On the Intel Pentium 100 the setup we recommend is as follows:

1022 cylinders, 16 heads, 63 sectors

Using Other PCs Not Listed Here

Because of the extremely large variety of PCs on the market, GDC cannot possibly test all PC configurations for XENIX compatibility. If you wish to use other PCs, you should be aware that they may or may not work with SCO XENIX.

SCO has attempted to test as many PC makes, models, and hardware configurations as possible. There are many models that work, but some do not. Please record the exact model number of your prospective PC and contact General DataComm Service to ensure it is supported by SCO XENIX. There are some models that require special XENIX boot disks (n1) and special GDC GTS kernel disks.

The best approach is to try loading the XENIX software. If you encounter problems with the loading procedure, contact technical support. In general, most 486 or Pentium PCs should be compatible. The main points to follow are:

1. Avoid using SCSI hard drive adapters as they are troublesome to SCO XENIX.
2. Ensure that the number of hard drive cylinders are less than 1024 and the number of heads does not exceed 16.

Pentium 100 Setup Procedures

For the Intel 100 MHz Pentium to function properly, the BIOS must be configured as follows:

1. Re-boot the machine.
2. Press `F1` when the message `Press F1 key` appears on the screen.
3. Select the top menu-line item `Main` with the left or right arrows.

```
System Date <date>
System Time <time>


Floppy Options <Press Enter here for sub-menu>
```

(Select your floppy configuration if different from display)

```
Primary IDE Master <Press Enter here for sub-menu>
```

IDE device configuration: (Select either `User Definable` or `Auto Configure`)

This setting depends on the hard drive installed. If the drive has less than 1024 cyinders, you may select `Auto Configure`*. If it does not, then the drive settings must be manipulated from the original settings to make the drive appear that is less than 1024 cylinders. This is necessary for XENIX to recognize the hard drive. If these changes have been made, the parameters appear below this field.*

Below is a suggested setup. These settings allow XENIX to recognize the drive, but give you about 503 Mbytes of useable space on a 1 Gigabyte hard drive.

Number of cylinders: 1022

Number of heads: 16

Number of sectors: 63

Maximum capacity: 503

Press `ESC` to return to `MAIN` menu.

After returning to the main menu, the following drives should be listed as `Not Installed`:

```
Primary IDE Slave
Secondary IDE Master
Secondary IDE Slave
```

Language: English <Grayed Out>

Boot Options <Press Enter here for sub-menu>

First Floppy

Second Hard drive

All others Disabled

System prompt Enabled

Type-matic programming rate Default

Hit <ESC> to return to the MAIN menu

Video Mode EGA/VGA

Mouse Not installed

Base Memory 640KB

Extended Memory 15360KB *(May Differ)

4. Press the right arrow and highlight ADVANCED on the top menu line.

Check the following fixed entries:

Processor type Pentium Family

Processor speed 100 MHZ.

Cache size 256K

Peripheral configuration <Press enter here for sub-menu>

Configuration mode Auto

The following six entries are grayed out:

PCI IDE interface Enabled

Floppy Interface Enabled

Serial port 1 Address COM1 3F8 IRQ4

Serial port 2 Address COM2 2F8 IRQ3

Serial port 2 IR MODE Disabled

Parallel Port Address LPT1 378 IRQ

Parallel port mode Compatible

Press <ESC> to return to ADVANCED main menu.

Advanced Chip-set configuration <Press enter here for sub-menu>

```
Base memory size 640KB
ISA LFB size Disabled
Video Palette snoop Disabled
Latency timer 66
PCI burst Enabled
```

Press <ESC> to return to ADVANCED main menu.

Check the following entries:

```
Power management cnfg. <Press enter here for sub-menu>

Advanced power management Disabled
```

Press <ESC> to return to ADVANCED main menu.

```
Plug and Play <Press enter here for sub-menu>

Configuration Mode Use setup Utility
ISA shared memory size 64KB
ISA shared memory base address D0000h
IRQ5 Used by ISA card
all others Available
```

Press <ESC> Save changes, re-boot.

In certain pentium platforms, if a DIGIBOARD card is installed, when exiting the BIOS configuraiton, you see this Digiboard error when booting XENIX:

```
CMDMAX-CMDSTART
```

After XENIX restarts, log in as root *and at the # type:*

```
etc/shutdown 0
```

Press enter *to re-boot the machine again.*

Pentium 90 Setup Procedures

Use the following procedures to set up the parameters needed to run GTS software on a Pentium 90 machine.

1. While the machine is booting up, after the memory check, press F1 when prompted.
2. You see the following display. If necessary, change your settings to correspond to the ones below.

```
      Main   Advanced  Security     Exit

System Date:    YYYY DD MMM
System Time:    HH:MM:SS

Floppy A type:  1.44 MB, 3.5 Inch
Floppy B type:  Disabled

Hard disk type: c:  <type of drive installed>
                d:  not installed
                e:  not installed
                f:  not installed
Language:       English

Boot Options:   <PRESS ENTER>
```

3. Press Enter. You see the following sub-menu:

```
Boot sequence   A:  first then C:

System Cache    enabled
Boot speed      turbo
Num lock        OFF

Setup Prompt       enabled
Hard disk pre-delay3 seconds
Type-matic rate    programming refresh
```

4. Press <Esc> to return to the previous menu. The following fields are fixed:

```
Video mode:      EGA / VGA
Mouse:           not installed
Base memory:     640KB
Extended memory: 15360K (may differ)
```

5. Press the right arrow key to display the advanced setup screen.
6. Highlight `Peripheral Configuration` and press `Enter`. You should see the following fields. Correct if needed:

```
(Fixed Fields)
Configuration mode      Auto
PCI IDE Interface       Enabled
Standard IDE Interface  Enabled
Floppy Interface        Enabled

(Fixed Fields)
Serial Port 1 Address COM13F8H
Serial Port 2 Address COM22F8H
Parallel Port Address LPT1378H

Parallel Port Mode      Compatible

(Fixed Fields)
Serial Port 1 IRQ4
Serial Port 2 IRQ3
Parallel Port IRQ7
```

7. Press <Esc> to return to the previous menu.
8. Highlight `Advanced Chipset` and press Enter. You should see the following fields. Correct if needed:

```
Base memory size:             640KB
ISA Bus speed:                Compatible
Byte merging:                 Enable
PCI IDE prefetch buffers      Enabled
ISA LFB size                  Disabled
Latency timer (PCI Clocks)    66
```

9. Press <Esc> to return to the previous menu.
10. Highlight `Power management configuration` and press `Enter`. You should see the following field. Correct if needed:

```
Advanced power management     Disabled
```

11. Press <Esc> to return to the previous menu.
12. Highlight `Plug and play configuration` and press `Enter`. You should see the following fields. Correct if needed.

```
Configuration mode:          Use setup utility

ISA shared memory size         64KB
ISA shared memory base address D000h

IRQ 5 used by ISA card
IRQ 9 available (fixed field)
IRQ 10 available (fixed field)
IRQ 11 available (fixed field)
```

The optional Digiboard card will not function properly unless the ISA shared memory size and and shared mamory base address are set correctly.

13. Press <Esc> to return to the previous menu. Press F10 (save and exit).

Continue with the procedure *Starting XENIX From the Boot Floppy Set.*

INTEL 486-66 Setup/Configuration Program

When loading software on a 486, be aware that this computer has an IDE (Intelligent Drive Electronics) hard drive. The drive is low level formatted at the factory by the manufacturer.

A DOS "Prep" or any other "low level format" utility must not be used on this or any other IDE hard drives. Doing so erases all preconfigured information that was factory installed and render the drive unbootable and unusable.

You don't have to do a XENIX badtrack scan as the badtracks have already been identified and flagged at the factory. To bypass this step, type: Q

The Setup/Configuration Program lets you tell the computer how your system is configured. The following procedure is *only* for an Intel 486-66. To set up the Intel, follow these steps:

1. Reboot the machine.
2. When the number `135` appears in the upper left hand corner of the screen, hit the F1 key.
3. Ensure that all of the following parameters are set as indicated:

```
Onboard diskette:    Enabled
Diskette A:          3.5" 1.44 MB  (may vary)
Diskette B:          Not Installed
Onboard IDE:         Enabled
```

```
Hard Drive          1: Type 2 CYL HD PRE LZ SEC SIZE
                          723 13  0  0  51  234 (may vary)
                    2: Not Installed

      User definable drives     2 & 3
      Boot Device               Diskette or hard drive
      Post memory test prompt   Disable
      Post setup prompt         Disable
      Scan flash user area      Disable
      Speaker                   Enable
      On board mouse            Disable
      Keyboard                  [Installed]
      Numlock on at boot        No
      Password                  Not installed

      (Hit Page Down key for next page)

      Base memory               [640Kb]   (may vary)
      Extended Memory           [7168Kb]  (may vary)
      Base memory above 512K    Enable
      Parallel port             Address 378H:Output only
      Serial Port1:             Address 3F8H
      Serial Port2:             Address 2F8H
      Video Type                [VGA/EGA]
      Video Horizontal refresh  31.5 - 37.8 Hz
      VGA mode refresh rate     60 Hz
      On board BIOS mapping     To E0000H

      (Hit Page Down key for next page)
      CPU Speed                 Fast
      Cache                     Memory only
      Refresh mode              Synchronous
      Shadow                    disable all ranges)
      .
      .
      Power save mode           None
      Screen blank              Disabled
      Hard drive spin down      Disabled
```

Continue with the procedures *Starting XENIX From The Boot Floppy Set.*

Hardware Checkout Using ROM Monitor Program (16MHz Zenith)

A special test program (the monitor program) is contained in a ROM on the CPU card. The CPU card is located in the system unit. The ROM monitor program provides the following advantages:

- Automatically tests various circuits every time you turn the computer on.
- Allows you to select tests from the keyboard to check various functions of the computer
- Lets you enter configuration data from the keyboard
- Displays a color bar pattern used to adjust the video display
- Selects a video/scroll mode required by your video monitor and video card
- Contains a debugging routine for machine language programmers.

To access the monitor program, press the Ctrl (control) and Alt (alternate) keys, and then press the Insert key. Depending on the configuration of your particular Zenith system, there is a time delay. The following message appears on the screen:

```
MFM-300 Monitor, Version X.X
Memory Size: 640 K
Enter "?" for help.
_>
```

Press the question mark (?) key and ENTER. A summary of the ROM monitor commands appears and their syntaxes are displayed. Here are six commands used most frequently:

?: Help

B: Boot

C: Color bar

V: Set Video/Scroll

TEST

SETUP

The "?" command displays the Help menu.

The "B" command manually boots any drive installed in your system. The syntax involved in the boot command follows:

```
B[{F/W}] [{0/1/2/3}] [:<partition>] <Enter>
```

where B stands for Boot, F for Floppy, and W for the Winchester hard disk drive. Reference numbers 0, 1, 2, or 3 refer to the drive numbers to boot from. Partition function (:) specifies the partition number from the hard drive.

To boot from the hard disk drive, type BW. The computer boots from the default partition. To boot from a hard disk drive partition, type BW followed by 0 (or 1 if you have more than one hard disk drive), a colon (:), and the partition number you want to boot from.

The "C" command displays a 16-bar color pattern to adjust the contrast and brightness of the display. To access this program, type C and press Enter.

The "V" command is used to set both the video mode and scroll mode. The video mode determines the number of characters per line and the number of lines per screen and whether the dis-

play is color or monochrome. The scroll mode determines how information is scrolled, or moved, on and off the screen. To access, type **V** and press Enter.

The "TEST" command runs a series of built-in tests that diagnose problems you may be having with your computer. To access, type TEST and press Enter.

The SETUP command accesses the Setup/Configuration Program. To access this program, type **SETUP** and press Enter.

To access the rest of the ROM monitor commands, follow the same syntax procedure as discussed in the SETUP command.

Zenith 386 Setup/Configuration Program

The Setup/Configuration Program lets you tell the computer how your system is configured. The following procedure is *only* for a Zenith 386.

You can set the time and date, enter the amount of memory installed in your computer, choose the drive you want your computer to boot from when you first turn it on, enter the type of video card you have, and tell the computer the number and type of floppy and hard disk drives you have so it recognizes them. You can slow down the computer for special applications. You can enter all this information from the keyboard instead of setting switches and installing jumpers like on earlier computers.

Once you use the Setup/Configuration Program to configure your computer, the only time you need to use it again is if you change the configuration for your computer or if you replace the battery on the backplane board.

Accessing the Program

To access the Setup/Configuration Program:

1. At the "Boot" prompt,

   :

   press and hold the Ctrl (control) and Alt (alternate) keys down, then press the **Insert** key. After a short delay, you see the Monitor prompt on the screen.

2. Type Setup and press Enter.

The reverse-video images you see on the display are the factory selections in each field or group of options.

Directions for proceeding through the program are located at the bottom of the display. These directions change as you go through the program.

Time and Date

When you enter the time and date, use:

- The number keys to type in the time and date
- The Enter key to lock in the selection
- The Backspace key to return to a position if you make a mistake.

The time is entered in a 24-hour format as shown below. It is not necessary to type the colons, they are entered automatically.

XX:XX:XX

hour (01-24) minutes past the hour (00-59) seconds into the minute (00-59)

The date is entered in the following format. It is not necessary to type the slashes, they are entered automatically.

XX/XX/XXXX

month (0-12) day (01-31) year (199X)

The rest of the Setup/Configuration Program reflects settings that were entered at the factory. If these settings agree with your system configuration, there is no reason to change them. Change only the reverse-video selections that do not reflect your system configuration. Also, if you add to your system, these settings must be changed to reflect the additions. In the remaining fields, use:

- The arrow keys to move from one field to another.
- The Space Bar and Backspace keys to make a selection in the field. Your selection is locked in when you move to a new field.
- The Esc (escape) key to exit from the program when you are finished.

These are the choices you can make:

DST (Daylight Savings Time) — Select Enabled.

Base Memory Size — Choose 640K of base memory.

Expansion Memory — Choose 4096K of expansion memory.

Floppy Drive 0 — Indicates the size of the first floppy drive. Your computer is shipped from the factory with a 1.44 Megabyte 3.5-inch drive.

Floppy Drive 1 — Optional, an extra drive can mount here.

Boot Drive — Choose Floppy, then Hard Disk.

Video Display — Select Enhanced Graphics.

Video Refresh Rate — Select the entry that describes the power line frequency in your area. In the United States, it is typically 60 Hz. If you have the wrong setting, the video screen flickers.

Speed — Select Fast mode.

Hard Disk Drive 0 — This section of the Setup/Configuration Program menu reflects the specifications of your high-capacity hard disk drive.

Continue with the procedure *Starting XENIX From The Boot Floppy Set*.

Zenith 486SX 25 MHz and 486DX 33 MHz Setup Procedures

When loading software on a Zenith 486, be aware that these computers are equipped with IDE (Intelligent Drive Electronics) hard drives. The drives are low level formatted at the factory by the manufacturer.

You don't have to perform a XENIX badtrack scan as the badtracks have already been identified and flagged at the factory. To bypass this step, type: Q

The Zenith 486 PCs have an EISA bus or an ISA bus. To identify which you have, look at the disks supplied with your 486. The Configuration Utilities Disk is marked as ISA or EISA. There is no longer a "ROM" setup screen available to configure the computer from the ALT-CTRL-INS key sequence. To configure the computer, you now must use the EISA or ISA configuration utility disk that is supplied with the instruction manual (Exception: Zenith 486DX-66MHz Z-Select 100). The following is a brief description of how to use this configuration utility. (*This must be done before SCO XENIX is loaded on the hard drive)*:

1. Turn PC off.
2. Insert the Configuration Utilities Disk into the boot drive.
3. Turn PC on.
4. At the EISA Screen press `Enter` to continue.

Throughout this manual, the designation `Enter` *refers to the key that is labelled* `Enter.`

5. At the `Welcome` window, press `Enter`.
6. At the `Main Menu` screen use the arrow keys to highlight `Configure Computer` and press `Enter`.
7. At the `Configure Computer` window, use the arrow keys to highlight `Configure Computer — Advanced Method` and press `Enter`.
8. A screen `System Configuration Overview` appears, then a window saying `Loading Configuration Files`.
9. When the files are loaded from the floppy into memory, a window appears with the message: `Configuration Files Loaded - Z-486 System Version 1.nn, Continue`, Press `Enter`.
10. At this point, a screen appears showing you the boards installed in the system, e.g., System board, monitor card and hard/floppy drive controller. Use the arrows and highlight `Z486 System Board` and press `Enter`. You do not have to enter through each slot separately. No matter where you enter you can configure the entire system since it is only a starting place. So if you start at the system board, you start at the beginning.
11. Using the arrow keys scroll downward and verify that each entry of each installed option board is the same as the following lists.

Z 486 System Board

```
SYSTEM BOARD INTERNALVersion n.nn
  Speed              Fast
  Slow Speed Option  AT Compatible for 25 MHZ CPU
CACHE: QUEUE
  Cache Options      Cache : ON  Queue : 0
BOOT DEVICE
  Boot Device        Floppy, Then Hard Disk
SYSTEM VIDEO PARAMETERS
  Default Video Type       Enhanced Graphics
  Video Refresh Rate :     Slushing  60 Hz :  Non-Slushed
SYSTEM BOARD MEMORY
  System Board Base Memory        Base:   640K
  System Board Extended Memory Extended:   3072K
  System Board EMS Memory           EMS:  224K
```

Note that this memory configuration may differ from other units.

```
NON-SYSTEM BOARD MEMORY
  Non-Configurable Additional Base memory      Base: 0K
  Non-Configurable Additional Extended memory  Base: 0K
SERIAL PORTS
  Serial Port 1               COM1
  Serial Port 2               COM2
PARALLEL PORT                 LPT1
Cachability of Slushed ROMs   OEM and BIOS Enabled
```

IDE/Floppy Controller Board Mass Storage Device

```
IDE SUB-SYSTEM
  IDE Controller        Enabled
  IDE Drive 0           IDE Auto-Configure
  IDE Drive 1           No Drive Present
FLOPPY SUBSYSTEM
  Floppy Drive Controller     Enabled
  Floppy Drive 0              3 1/2 1.44M Floppy Present
  Floppy Drive 1              No Floppy Present
  SCSI                        Disable
```

Z649 Video Adapter Board

```
Host IRQ                    IRQ10
Host Ports                  Ports 290-29F
Video Daughter Card         Installed
```

The video information may vary depending on your video type installed.

12. These entries should be "factory defaults" but it is possible that they are incorrect or have inadvertently been changed at some point. If you need to change any of these selections, just highlight the selection using the arrow keys and press `Enter`. Use the arrows to highlight the corrected selection. If you have to move left to right to multiple selections, you need to use the TAB key. In some selection lists (like the memory screen), you may need to scroll up and down using the arrow keys. After highlighting the entry you want, press `Enter`.

13. After all changes have been made, press the F10 key. At the top of the screen use the arrow keys to highlight `System`, and press `Enter`. At the exit window, highlight `Exit` using the arrow keys and press `Enter`. Highlight `Save Configuration and Exit` and press `Enter`. If you were satisfied with all the selections and did not change anything, exit through the `Exit, no change` menu selection to be safe.

14. At the yellow window press `Enter` to reboot. If no configuration error messages appear at the top of the screen, place the SCO XENIX N1 boot disk in Drive 0 and reboot.

Additional Notes:

- If an optional DIGIBOARD/4E is installed, it is not seen by the EISA configuration utility. When you boot up after installing GTS software, you see a message that the board is or is not installed.
- It is a good idea to make a copy of this disk and use that copy to configure the system. Use the DOS diskcopy utility.

Continue with the procedure *Starting XENIX From The Boot Floppy Set*.

Zenith 433Dh 33 MHz Setup Procedures

The Zenith 433Dh comes with only one serial port. For an additional serial port (Com 2), you must add the HP24540B Serial/Parallel Interface Card. This card also supports an additional printer port. Before inserting the card, verify that the following jumpers are set correctly:

Jumpers P1-P4 set for SER-B

Jumpers P1-P2 set for PAR-B

Mode jumper set for AT

When loading software on an IDE or ESDI hard drive, be aware that these computers are equipped with IDE (Intelligent Drive Electronics) hard drives. The drives are low level formatted at the factory by the manufacturer.

You do not have to perform a XENIX badtrack scan as the badtracks have already been identified and flagged at the factory. To bypass this step, type: Q

The Zenith 433Dh PC has an ISA bus. The Configuration Utilities Disk is marked as ISA. There is no longer a ROM setup screen available to configure the computer from the ALT-CTRL-INS key sequence. To configure the computer, you must use the ISA configuration utility disk that is supplied with the instruction manual. Here is a brief description of how to use this configuration utility. *This must be done before SCO XENIX is loaded on the hard drive*:

1. Power off the PC.
2. Insert the ISA Configuration Utilities disk into the boot drive and apply power to the PC.
3. The Zenith Logo screen comes up; press `Enter`.
4. When the list of configurations appears, select it and press `Enter`.
5. The configuration screen appears. Ensure that each parameter is set as described below. To change settings, highlight the setting you wish to change with the cursor and press `Enter`. This brings you to a sub-menu. Use the tab and arrow keys to change the selections. When changes are completed, press <Esc> (Escape key) and then F10. Select Save Configuration and reboot the PC.

Settings:

```
System Board                V1.07 (may differ)
Speed                       Fast
Cache                       Cache On
Boot Device                 Floppy then Hard Drive
System Board Video          Video Enabled
Video Settings              EGA/VGA:60HZ:Slushed
System Board Memory         8m => 640K + 7 (may differ)
*Hard Drive System          Controller Enabled
                                (Sub Menu)
            Controller      Drive 0  Drive 1
            *Enabled         *Auto IDE  None
Floppy Drive System   Floppy Drive Controller Enabled
LAN System            Disabled
Windows Accelerator   Not Present
SCSI Port             SCSI Disabled
Serial Port           COM1
Parallel Port         LPT1
PS/2 Mouse            Disabled
Optional Serial Port* Disabled
```

* Note that if a second serial port is added, it should always be disabled.

Continue with the procedures *Starting XENIX From The Boot Floppy Set.*

Zenith 486DX-66MHz Z-Select 100 Setup Procedures

When loading software on a Zenith 486, be aware that these computers are equipped with IDE (Intelligent Drive Electronics) hard drives. The drives are low level formatted at the factory by the manufacturer.

You do not have to perform a XENIX badtrack scan as the badtracks have already been identified and flagged at the factory. To bypass this step, type: Q

Following are the setup parameters needed to run GTS software on the Z-Select 100 486. These must be performed before loading XENIX on the PC. To start the procedure, press CTRL-ALT-S.

```
Standard System Parameters


System Time:      xx:xx:xx    Numlock on at boot?
System Date:      xx/xx/xx          [yes] *
Diskette A:       3.5" 1.44 Mb
Diskette B:       Not Installed
Hard Disk 1:      Auto-Type 1
Hard Disk 2:      Not Installed
Base Memory:      640K
Extended Memory:  7296K (may be different)
Video Type:       VGA/EGA
Keyboard:         Installed
```

* Your preference

```
              (Hit Page Down key for next page)


                    Advanced CMOS Setup
   *1.   Serial Port 2/Modem Port[COM] [IRQ3]
               Serial Port 1:    [COM1][IRQ4]
               COM3/COM4 Base:   [3e8/2e8]
  **2.   Parallel Port:          [LPT3]   [OUTPUT ONLY]
               Hard Disk 1:      [Standard PIO]
               Hard Disk 2:      [Standard PIO]
               Floppy Controller:[Enabled]
               IDE Controller:   [Enabled]
               Password:         Not Installed
               Power Management: IDE Power Down[Disabled]
                                 Video Power Down [Disabled]
```

* If additional serial port is installed.

** If additional parallel port is installed.

Continue with the procedure *Starting XENIX From The Boot Floppy Set*.

Starting XENIX From the Boot Floppy Set

Follow the steps below, remembering to press `Enter` after you type your responses on the keyboard.

If you are installing SCO XENIX on an ESDI hard drive, first initialize the hard drive with a low level format. But *you must not do this with a Zenith 486 or 433 or newer models (See earlier descriptions for 486 and 433)*. The low level format may be accomplished with Zenith's DOS PREP or any other commercially available low level formatting software.

If you are using an IBM PS/2, ensure that you have the correct version of SCO XENIX for the PS/2 (SCO XENIX 386mc 2.3.4).

If you are using an IBM Value Point, you may need to order from GDC a special software package that includes a special N1 disk. The IBM Value Point does not use the XENIX 386mc version. Newer versions of the Value Point may not need this special N1 disk. If you are not sure of the requirements of your Value Point, contact General DataComm Service.

1. Insert the `BOOT/N1` diskette into the top drive. If you have more than one floppy drive, use the primary drive (sometimes called the boot drive). Check your computer hardware manual if you are not sure which drive is the primary drive.
2. Turn on your computer.
3. The computer loads the XENIX bootstrap program from the diskette and executes it. In the upper left corner of the screen, the computer may display the total amount of memory installed. Next, you see:

```
XENIX System V

Boot

:
```

4. Press `Enter` to boot from the floppy drive.
5. You see this message:

```
fd(64)xenixroot=fd(64)swap=ram(0)pipe=ram(1)swaplo=0nswap=1000 ronly
```

Leave the BOOT/N1 floppy in the drive.

During the loading procedure, using a 3.5 inch floppy drive and loading XENIX version GT, you may be asked to install the disk labelled FILE SYSTEM. At that time, remove the N1 disk and install the N2 disk.

6. After XENIX is loaded in memory, the system displays information concerning memory allocation along with other system information.

   The system now performs a self-check to determine if there are any problems with the hardware.

The letters A-Z appear in succession. Note that the letters overwrite each other as they appear.

7. After the letter Z is displayed, the following message appears:

```
No single-user login present
Entering System Maintenance Mode
```

If the letters stop appearing before the letter Z is reached, run hardware diagnostics as explained in your computer manual, correct any identified problems, and start the installation procedure again from the beginning. If the letters stop again, call the Support Center listed on the information card and be prepared to tell them at what letter the display ended. The self-check using letters A-Z occurs every time you bring up your XENIX system.

8. Once the system begins to run, the following menu appears:

```
Keyboard Selection

1.  American

2.  British

3.  French

4.  German

5.  Italian

6.  Spanish
```

Use the Numeric Keypad if present, using <NUM LOCK> if necessary, to select one of the above options:

Select the option that corresponds to your keyboard.

9. The following message is displayed:

```
XENIX System V Hard Disk Initialization

What type of disk controller will be supporting this disk?

1. Standard disk support (ST506, MFM, RLL, ESDI, IDE)

2. OMTI 8620 or OMTI 8627

3. SCSI
```

Respond to this question by pressing 1, 2 or 3 and the `Enter` key. Most approved TMS Controllers use a standard disk (1). If you are using a SCSI interface, you must select 3. Additionally, you must ensure that the interface card is an Adapter 1540, the only SCSI adapter supported by SCO XENIX. For some newer machines that use a SCSI-2 board for increased speed, this interface is not recognized by SCO XENIX. You must also ensure that your hard drive does not use more than 1,024 cylinders. SCO XENIX cannot address cylinders => 1024. To get around this problem, you must adjust the sectors/heads information to change the number of cylinders. By doing this, a small amount of storage space may be lost.

Preparing the Hard Disk

The following steps describe how to initialize the hard disk. This includes mapping bad tracks (bad spots) on the disk so that they are avoided by the operating system and creating one disk partition and one file system.

1. You see the message:

```
During installation you may choose to overwrite all or part of the
present contents of your hard disk. Do you wish to continue? (y/n)
```

If you want to save any files, enter n and press `Enter`. If you do not have any files you want to save, enter y and press `Enter`.

If you have files on the hard disk that you wish to save, respond n and the installation is aborted and the system shut down automatically. You should then reboot the computer, back up any files you want to save, and restart the XENIX installation procedure from the beginning.

2. When you respond "yes," you see information about your hard disk and this menu:

```
Hard Disk Drive 0 Configuration

1.  Display current disk parameters

2.  Modify current disk parameters

3.  Select default disk parameters

Enter an option or "q" to quit:
```

You, at this point, should select option 3 (Select default disk parameters) and press `Enter`.

If you have a standard hard disk, one that is supported by your computer hardware or special basecard ROM, enter **q** followed by `Enter` to continue the installation.

Entering q at this point selects the default parameters for your hard disk. Unless you know that your disk is nonstandard, assume that it is standard and enter **q** to continue your installation. Skip to Step 6.

If your disk is nonstandard, you must input information that overrides the ROM disk configuration information, replacing it with new information. If you are unsure of what parameters to enter for your nonstandard disk, contact your disk manufacturer for this information.

3. If your disk is nonstandard, select option 1 to view the current disk parameters. Next, select option 2 to modify them as necessary. When you enter either "1" or "2" you see the following display:

```
Disk Parameters     Values

-----------------------------------

1.    Cylinders        value

2.    Heads            value

3.    Write Reduce     value

4.    Write Precomp    value

5.    Ecc              value
```

```
6.    Control          value
7.    Landing Zone     value
8.    Sectors/track    value
```

In the actual display, value is replaced with the default value for that variable.

The "Cylinders" value refers to the number of cylinders on the entire hard disk and should not be confused with the number of cylinders allocated (or intended to be allocated) to a given partition.

4. If you entered a "1", you now see the first menu again. If you entered a "2", you are now prompted:

   `Enter a parameter to modify or q to return to the main menu:`

   Enter a number, 1-8, to change the disk parameters, or q to return to the previous menu.

   `Enter the new value or press Enter to use the existing value:`

   If you wish to change the value, enter a new value now, or press `Enter` to use the existing value.

5. After you finish changing the disk parameters, enter **q** to return to the main menu. Next, enter q again to save the changes you made (Exiting by entering **q** overwrites any parameters you have changed with the new values). To restore the default parameters after making modifications, enter **3** from the first menu.

6. The installation program prepares to partition the hard disk.

   After a moment, you see this partitioning menu:

   ```
   1.  Display Partition Table
   2.  Use Entire Disk for XENIX
   3.  Create XENIX Partition
   4.  Activate Partition
   5.  Delete Partition

   Enter your choice or q to quit:
   ```

   Select option 2 and press `Enter`.

   The following partitioning table displays.

   `Current Hard Disk Drive: /dev/"XYZ"`

Partition	Status	Type	Start	End	Size

`Total disk size: nnnn tracks` (m reserved for masterboot and diagnostics)

If you have previously installed an operating system on your disk, the partitioning table contains information. If not, it is empty.

If any other operating systems were previously installed on your system, you also see the following warning message:

```
Warning! All data on your disk will be lost!

Do you wish to continue? (y/n)
```

Enter **y** and press `Enter`. This ensures that there is one partition on the whole disk for XENIX. The new partitioning table is then displayed.

7. Press `Enter` and you see the partitioning menu. You have now set up the XENIX partition on your hard disk. To continue with the next step in the installation procedure, enter **q** and press `Enter`.

8. Now you see a menu for verifying disk integrity. Using this menu, you can scan your hard disk for defective tracks. Any flawed locations are mapped to good tracks elsewhere on the disk. It also creates a bad track table, which is a list of all the bad tracks on your hard disk (You should also have a bad track list from the top of your hard disk drive).

   The main badtrack menu looks like this:

```
1.  Print Current Bad Track Table

2.  Scan Disk (You may choose Read-Only or Destructive later)

3.  Add Entries to Current Bad Track Table by Cylinder/Head Number

4.  Add Entries to Current Bad Track Table by Sector Number

5.  Delete Entries Individually from Current Bad Track Table

6.  Delete All Entries from Bad Track Table

Please enter your choice or q to quit:
```

   If using a Zenith 486 or newer model or any PC with an IDE hard drive, press q, and go to Step 16.

   Enter 2, then press `Enter`.

9. You see the following submenu:

```
1.  Scan entire XENIX partition

2.  Scan a specified range of tracks

3.  Scan a specified file system
```

   Select option 1.

10. After you select the area you want scanned, you are given the choice:

```
1.  Quick scan (approximately 7 megabytes/min)

2.  Thorough scan (approximately 1 megabyte/min)
```

   Select option 2.

11. You are prompted:

```
Do you want this to be a destructive scan? (y/n)
```

   Enter **y**. You are warned:

```
This will destroy the present contents of the region you are
scanning.

Do you wish to continue? (y/n)
```

Enter **y** and press `Enter`. You see the following message:

```
Scanning in progress, press q to interrupt at any time.
```

12. After you respond to the above prompts, the program scans the XENIX partition for flaws. The larger your disk, the longer the scanning process takes (a 40 megabyte disk takes approximately 40 minutes for a thorough scan if the disk has never been initialized before).

    As the disk is scanned, the number of each track is examined, and the percentage of the disk already scanned is displayed:

    ```
    Destructively scanning track nnn/n, xx% of scan completed.
    ```

    Pressing the **q** key at any time interrupts the scan. If you press **q** to interrupt the scan, you do not need to press `Enter`. You are asked whether to continue scanning or press `Enter` to return to the main menu.

    Whenever a defective track is found, the location of that track is listed using both the sector number and cylinder/head conventions.

    Defective track information is entered into the bad-track table and appears on the screen. An example of a bad track might be:

```
wd: ERROR: on fixed disk ctrl=0, dev=0/47, block=31434, cmd-
=00000020, status=00005180, sector=62899, cylinder/head = 483/4
```

13. When the scan is complete, the menu reappears. Select option **1** to see the results of the scan. Your bad track table might look like this:

    ```
    Defective Tracks
    ```

	Cylinder	Head	Sector Number(s)
1	818	5	83521-83537

    Press `Enter` to continue.

    Press `Enter` to return to the main menu.

If there is a flaw in the first few tracks of the XENIX partition, you must return to the previous installation step. Repartition the disk so that the XENIX partition no longer includes the defective tracks. You have to experiment to determine how many tracks to exclude. Leave these defective tracks unassigned to any operating system. When you finish repartitioning the disk, check the disk integrity again and scan the disk for further flaws. Repeat this process until you find no flaws in the first few tracks.

Because most flaws are marginal or intermittent, your disk flaw map probably lists more bad tracks than the scanning process reveals. If so, you should now add these defective tracks to the bad tracks table (If you are using an ESDI hard disk/controller, it is not possible to enter additional bad tracks to this table. The low level format from Step 1 and XENIX bad track scan automatically flags any bad tracks).

Select either option **3** or option **4** depending upon the format of the flaw map furnished with your disk. Enter the defective tracks, one per line. Do not worry about entering a number

that has already been found by the scanning process or accidentally entering a number twice. Duplicate entries are ignored. If you make a mistake, enter **q** and press Enter. You can always delete accidental entries from the bad-track menu.

14. If your disk is not furnished with a flaw map, or you are finished making changes to the bad track table, enter **q** and press Enter.

15. You are next prompted for the number of tracks to allocate as replacements for those tracks that are flawed. You should allocate at least as many as the recommended number. The default number of replacement tracks is based on the number of bad tracks currently in the table, plus an allowance for tracks that may go bad in the future. If you ever exceed the number of allocated bad tracks, you must reinstall XENIX. The following appears:

```
Enter the number of bad tracks to allocate space for (or
press Enter to use the recommended value of n):
```

Accept the default by pressing Enter.

16. Next, the installation program allocates portions of your partitioned disk for the root and swap areas. It also allocates a small portion of the disk for a recover area that is used during autoboot. First you are prompted for the swap space allocation:

There are nnnnn blocks in the XENIX area.

```
Between xxxx and yyyy blocks should be reserved for the swap area.

Please enter the swap space allocation, or press Enter to get the
default allocation of zzzz blocks.
```

The actual numbers we recommend for swap space vary depending upon the size of your disk. If your hard disk is between 80 and 100 megabytes, enter 8000 and press Enter. If your disk is between 120 and 200 megabytes, enter 16000 and press Enter. If your disk is over 200 megabytes, enter 30000 and press Enter.

If you have enough disk space for a /u (user) file system, you see the prompt:

```
Do you want a separate /u filesystem? (y/n)
```

Respond **n**.

You see the statement:

```
The layout of the file systems and swap area is now prepared.
```

17. You are asked:

```
Do you wish to make any manual adjustments to the sizes or names of
the filesystems or swap area before they are created on the hard disk?
(y/n)
```

Enter **n** and press Enter.

On older versions of XENIX, Step 18 appears. Newer versions of XENIX bypass Step 18 (especially when the Autologin feature is enabled).

18. If you have a large root file system, you may be asked if you want to allocate an additional, small portion of the disk as scratch space for the fsck program. This scratch space is needed for temporary storage when checking large file systems. Respond **y** and press Enter.

19. The system now loads a rudimentary XENIX file system onto your hard disk. This takes several minutes. You see the message:

```
Making filesystems
```

20. The Restricted Rights Legend is displayed, followed by the message:

```
Operating system serialization

Enter your serial number and press Enter:
```

Enter your XENIX Operating System serial number exactly as shown on your serialization card and press `Enter`. Then you see the message:

```
Enter your activation key and press Enter:
```

Enter your XENIX Operating System activation key exactly as it is shown on your serialization card and press `Enter`.

21. When the file system is made, the message is displayed:

```
Hard disk initialization procedure completed
```

The system then shuts down and displays instructions on booting the newly initialized hard disk. Make note of these instructions.

You then see:

```
**    Normal System Shutdown    **

**      Safe to Power Off       **

            - or -

**    Hit Any Key to Reboot     **
```

Starting XENIX on the Hard Disk

The following steps explain how to start the XENIX system using the hard disk.

1. Remove the BOOT/N1 disk. Next, press any key to continue.
2. At the Boot: prompt, press `Enter`.
3. Follow the screen prompts.
4. Next you see some copyright information and information about the memory configuration of your system.

   As before, the system performs a self-check to determine where any problems exist with the hardware. The letters A-Z appear successively on screen. If the letters appearing stop before the letter Z is reached, run hardware diagnostics as explained in your computer manual. Correct any identified problems and start the XENIX installation procedure. If the letters stop again, call the Support Center listed on the support information card and be prepared to tell them the last letter displayed.
5. Now the installation program checks the root file system on your hard disk. In this case, it checks only the root file system.
6. At this point you are prompted to insert the Operating System (Basic Utilities) volume B1 floppy diskette.
7. Follow any additional screen prompts for floppies. Note that you are not prompted to insert all the volumes in your distribution at this time.

If you insert a floppy in the wrong order, you see this prompt:

```
Error: incorrect volume in drive!
```

Make sure you are using the correct diskette. Make certain the door of the floppy drive is completely closed. Enter **y** and press `Enter`.

If there is an error with the extraction procedure, you see the message:

```
Extraction error: try again? (y/n)
```

Remove the floppy from the drive, insert the correct volume, and press `Enter`.

Continuous extraction errors on the same disk may indicate that you either have a defective SCO XENIX disk or your floppy drive is malfunctioning.

Setting the Root Password

To set a new password, proceed as follows:

1. When the last of the "B" diskettes is installed, you see:

```
Please assign a password for the super-user account, "root".

Enter new password (minimum of 5 characters)

Please use a combination of upper and lowercase letters and
numbers.

New password:
```

The new password can be any combination of letters, numbers, and punctuation marks, but should be at least five characters long (e.g., meansquare). Enter the new password and press `Enter`.

The system does not display the password as you enter it, so type carefully. After you press `Enter`, the system displays the message:

```
Re-enter new password:
```

2. Enter the new password once more (as a verification step) and press `Enter`. Make sure you enter it correctly, otherwise the program prompts you to enter the password again. When you have entered the password correctly, you see some information about XENIX passwords and how to change your super-user password in the future.

The super-user password is now in place. From now on, the password is required whenever you attempt to access the system as super-user. The super-user password keeps the system safe from unauthorized use.

It is important that you create a super-user password during system initialization to ensure maximum protection of the system and to prevent unnecessary use of the super-user (also known as "root") account.

It is very easy to make errors when you are logged in as super-user that could destroy files. Log in as super-user only to install programs, do system maintenance tasks, and change the super-user password.

Do not forget the super-user password. To restore a forgotten super-user password you must reinstall the XENIX system. If necessary, keep a copy of the super-user password in a safe place.

Proceed to *Establishing the Time Zone*.

Establishing the Time Zone

The procedure is simple if you are in North America. In countries in other areas, read this entire section carefully and obtain the necessary information before continuing.

1. The first thing you see is:

```
Time zone initialization
```

You then see:

```
Are you in North America? (y/n)
```

If you are not in North America, enter n and proceed to Step 3.

If you are in North America, enter y. You see the following menu:

```
1.    NST  -  Newfoundland Standard Time
2.    AST  -  Atlantic Standard Time
3.    EST  -  Eastern Standard Time
4.    CST  -  Central Standard Time
5.    MST  -  Mountain Standard Time
6.    PST  -  Pacific Standard Time
7.    YST  -  Yukon Standard Time
8.    HST  -  Hawaiian/Alaskan Standard Time
9.    NST  -  Nome Standard Time
```

Enter the number that represents your time zone:

If, for example, your time zone is Nome Standard Time, you would enter the number **9** and press `Enter`.

2. You see the following:

```
Does daylight savings time (summer time) apply at your loca-
tion? (y/n)
```

If daylight savings/standard time changes occur in your area, enter **y**. If not, enter **n**. In either case, skip Steps 3 through 8 and proceed to Step 9.

3. You see the following:

```
What is the abbreviation of your standard time zone?

Enter 1-9 characters or enter q to quit:
```

Enter the abbreviation of your time zone (*See above, for instance, EST*).

4. For areas not in North America, you see:

```
How many hours west of Greenwich Mean Time are you?

Enter hh[:mm:ss] (e.g. 10:30:00 or 10:30, use negative num-
bers or locations east of GMT) or enter q to quit:
```

Enter a number.

5. You see:

```
Does summer time (daylight savings time) apply at your loca-
tion? (y/n)
```

If summer time does not apply, enter **n**. Proceed to Step 9.

If summer time does apply, enter **y**. You then see:

```
What is the summer abbreviation of your time zone?

Enter 1-9 characters or enter q to quit:
```

Enter the summer abbreviation of your time zone.

6. You see:

```
1.  Week of the year (1-52).

2.  Week of a specific month (e.g., 1st week of April).

3.  Day of the year, ie, Julian date (1-365).
```

Select the method your time zone uses to convert from standard time to summer time (daylight saving time) or enter **q** to quit:

Select 1, 2, or 3.

7. You see:

```
At what time of day is the conversion made (use 24 hour
clock)?

Enter hh[:mm:ss] or press Enter for default value of 2 am or
enter q to quit:
```

Enter a number.

8. Depending upon which method your time zone uses, you see the following prompt:

```
How many hours does your time zone adjust for summer time
(daylight savings time)?

Enter hh[:mm:ss] or press Enter for the default value of 1
hour or enter q to quit:
```

Enter a number or press `Enter`.

9. Your time zone is now set. You see the message:

```
Setting up system directories
```

10. Next, information about your file system(s) appears, including the number of blocks currently used.

You also see another menu that gives you the option of stopping or continuing with the installation.

```
1.    Stop installation

2.    Continue installation
```

So far you have installed the minimal XENIX system, the Run Time System. To install Operating System packages, select option 2 and press `Enter`. You can now proceed to the next subject, "Installing the XENIX Distribution."

Installing the XENIX Distribution

This stage involves "customizing" your system, adding only those parts of the Operating System distribution that are useful to you.

Choosing Packages to Install

The BASE, LPR, LINK, and DOS packages are required for the TMS-3000 installation.

When choosing the TERMINF package, you are prompted as to whether you want the terminfo data base compiled at this time (a somewhat lengthy process). If you choose to defer this until later, you are given instructions for doing so. This process takes approximately five to ten minutes to complete.

Installing Your Packages and Applications

To install your XENIX packages, proceed as follows.

1. The main custom menu is displayed.

```
1.  Operating System
2.  Development System
3.  Text Processing System
4.  Add a Supported Product
```

   Select a set to customize or enter **q** to quit:

2. Select option 1, Operating System. The following messages appear:

```
Installing custom data files . . .
```

   Insert Operating System (extended utilities) Volume X1 and press `Enter` or enter q to quit:

   Remove diskette B1 (if not already done) and insert the diskette X1 as instructed and press `Enter`.

3. The following submenu appears:

```
1.  Install one or more packages
2.  Remove one or more packages
3.  List the available packages
4.  List the files in a package
5.  Install a single file
6.  Select a new set to customize
7.  Display current disk usage
8.  Help
```

Select an option or enter q to quit:

Select option **1**. A list appears. Using uppercase letters, type

```
BASE LPR DOS LINK
```

Press `Enter`. The installation program prompts for the necessary volume numbers. Insert the appropriate diskettes and follow the screen prompts.

4. After the last package is loaded, select option 3 to list the packages that have been installed. Verify that all three packages were successfully loaded. If one or more are missing, try re-installing the appropriate packages.

   Complete your hard-disk initialization by entering **q** at the main menu. A message appears about booting the system. You then see

```
**      Normal System Shutdown      **
**        Safe to Power Off         **
                - or -
**      Hit Any Key to Reboot       **
```

   The system shuts down. Remove any floppy that is in the drive. If you have engaged the Caps Lock key to type the preceding upper case package names, disengage the Caps Lock key now.

5. Press any key to reboot the system and press `Enter` when the boot prompt appears:

```
XENIX System V
Boot
```

Loading Informix Software

You must now install the INFORMIX data base package.

1. Simultaneously hold down the **Control** key and D key **(Ctrl-D)**.
2. Enter the correct time in the proper format, followed by `Enter`, or just press `Enter` if the time is already correct (The time is based on a 24 hour clock).
3. A message saying!

```
*** cron started ***
```

   appears, followed by

```
xenix386! login:.
```

   Enter

```
root
```

   When the password prompt appears, enter your super-user password.

4. You see:

```
Welcome to SCO Xenix System V
            from
The Santa Cruz Operation, Inc.
#
```

is the super-user prompt. When you see this, enter

mkuser

5. The system prompts you with the following message:

```
Do you require detailed instructions ? (y/n/q) :
```

Respond **n** to this message.

6. Enter new user login name, or enter **q** to quit:

7. Type

informix

followed by Enter. The next prompt that appears is

```
Do you wish to use the next available user id ? (y/n/q):
```

8. Enter **y** followed by Enter. The next prompt that appears is

```
Do you wish to use the default group ? (y/n/q):
```

9. Respond **n** followed by Enter. The following prompt appears:

```
Existing groups are Group "group" (50): Do you want to use
one of these groups ?
```

10. Respond **n** followed by Enter. You are asked:

```
Please enter the name for the new group or enter q to quit.
```

11. Type

informix.

The new group name is informix. The next prompt that appears asks:

```
Please enter number for new group, press ENTER for default
number, or enter q to quit :
```

12. Press Enter. This selects the next default group #.

The following menu appears :

```
1.  sh Standard (Bourne) Shell
2.  rsh Restricted Shell
```

13. Enter **1** to select the Standard (Bourne) Shell. Next the following prompt appears :

```
Enter Password :
```

14. Enter at least 5 characters for the Informix password then press the Enter key. You are asked:

```
Re-enter for check:
```

15. Enter the same characters you did in the previous step. Press the Enter key again for comments. Now the selected information is displayed:

```
User name is "informix", user id is "201".
Group name is "informix", group number is "51".
Shell is "sh".
Comment field is:
```

The following prompt appears:

```
Do you want to change anything ? (y/n/q):
```

16. Answer **n** and press Enter. The following prompt appears:

```
Do you want to add another user ? (y/n/q):
```

17. Answer **n** and press Enter.

18. At the # prompt, type in the following lines and press Enter after each line:

```
INFORMIXDIR=/usr/informix
PATH=$PATH:$INFORMIXDIR/bin
export INFORMIXDIR PATH
cd $INFORMIXDIR
```

19. If you are installing Informix Version 2.10.03K, place the first informix runtime diskette of the set in the disk drive and type the following:

```
cpio -icvdBum</dev/rfd0135ds18
```

(for 3.5-inch floppies in drive 0)

20. Press Enter.

21. After the files are loaded, type the following:

```
./installesqrf
```

(for Version 2.10.03K Informix)

22. Press Enter.

The following appears:

```
Press Enter to continue, or the interrupt key (usually Con-
trol-C or Delete) to abort.
```

23. Press Enter.

The following message is displayed:

```
Informix serialization
Enter your serial number and press Enter:
```

24. Enter your Informix serial number exactly as shown on your serialization card and press Enter. Then you see the message:

```
Enter your activation key and press Enter:
```

25. Enter your Informix System activation key exactly as it is shown on your Serialization card and press Enter.

Next, you see `Installing <filename> messages.` When this process is finished, the message `Installation Complete` appears signifying that Informix is loaded.

26. Carefully remove the diskette.

Proceed to the next topic, *Loading GTS Software*.

Loading GTS Software

Once Informix is installed, you load GTS software. You only need to follow this procedure when loading GTS for the first time. For routine updates to software, you may use the "Load a Software Release" routine in the Maintenance Utilities menu.

GTS software is provided on a set of fourteen diskettes. The first disk is a setup disk which contains the basic loading software which handles the rest of the loading operation; this minimizes the number of XENIX commands required on your part. After the setup disk are a kernel disk, two ESCC disks, and a set of disks labelled 1 — 10. When you enter XENIX commands, be sure to include the spaces shown in these directions and follow upper/lower case spelling exactly. Everything that you must type in at the keyboard is in boldface type.

Before you begin these procedures, check the Caps Lock indicator on your keyboard. If illuminated, press the Caps Lock key until the indicator turns off. Do not attempt to log in to XENIX with the Caps Lock key set.

Follow these instructions to load GTS software:

At the # prompt:

1. Type **shutdown 0** and press `Enter`. The system shuts down. When the shutdown is finished, the reboot prompt appears:

   ```
   Press any key to reboot
   ```

2. Press `Enter`. The screen displays:

   ```
   XENIX System V
   Boot
   :
   ```

3. Press `Enter`. The screen displays:

   ```
   hd(40) xenix
   ```

4. Press the **Ctrl** and **D** keys simultaneously. Enter the date by year, month, and day (yy/mm/dd). The date and time prompt appears. Enter the time in the 24 hour (military) format (hh/mm). Press `Enter`. The login prompt appears:

   ```
   xenix386! login
   ```

5. Type **root** and press `Enter`. The password prompt appears:

   ```
   Password:
   ```

6. Enter the super-user password. The super-user prompt appears:

   ```
   #
   ```

   Insert Basic Setup floppy disk of the TMS-3000 software set into the disk drive slot. Type:

   `fsck -n /dev/fd0135ds18`

   (if using 3.5-inch drive 0)

   and press `Enter`.

7. When the superuser prompt # appears again, type

   /etc/mount -r /dev/fd0135ds18 /mnt

   (if using 3.5-inch drive 0)

   and press Enter.

   The drive that you mount to perform the mninstall procedure is set as the default drive and all further floppy disk drive access through the TMS software uses the default drive.

8. When the superuser prompt appears again, type

   cp /mnt/mninstall .

   and press Enter.

9. Type:

   ./mninstall

   and press Enter.

10. Follow the directions appearing on the screen concerning the loading and removing of floppy disks.

11. When instructed to do so, remove the last diskette from the disk drive. Then press Enter to reboot the system.

You may have to perform Steps 13 through 15 when a TMS software upgrade is made (without reinstalling XENIX O.S.) or when a shutdown with the Autologin feature disabled is performed. Otherwise, the system goes through the complete Autologin function (automatically boots itself without operator interaction). After several minutes, the first screen appearing is the GDC logo screen. Follow Steps 1 and 2 (on the next page) to continue.

12. Press Enter again and the following appears:

```
XENIX System V
Boot
:
```

    Press Enter. The following appears:

```
hd(40) xenix:
```

    Press Enter. Another prompt appears.

13. Press the **Ctrl** key and the **D** key simultaneously to proceed with normal startup.

14. Enter the correct time if necessary. Press Enter. The message

```
cleaning print queue done
```

    appears.

    If the optional Digiboard multiport card is not installed in your PC, you see the following message:

```
No Board found at port 0000nnn.  Check switch settings.
```

15. At the Xenix386! login prompt, type

    gts

The Controller should now initialize. Press **F4** to reach the Network Access menu.

16. Move the cursor to Access Disk-Based Manual and press `Enter`.

17. If you are not familiar with using the disk-based manual, *refer to the Preface in GDC 036R603-Vnnn.*

Installing INFORMIX in a Controller Containing a Previous Version

If TMS software is already installed, perform the following steps:

1. Select Controller Maintenance from the TMS main menu. Next, select Shutdown (Disable AutoLogin). Answer **y** to the question about shutting down to reinstall TMS. If you want to restore the Auto Login function, you have to do the mninstall procedure again.

2. Reboot the controller.

3. Login as root.

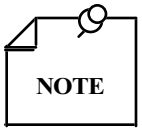
If TMS software is not installed, you should login as root. Use the following procedure to install informix on the hard disk. Type the commands shown in boldface and press `Enter`.

1. Enter the following at the # prompt:

   `rm -r /usr/informix`

2. At the next # prompt enter:

   `rmuser`



XENIX may prompt you to manually delete some mail files, etc.

3. The following prompt appears:

   `Press Enter when you are ready.`

   Press `Enter`

4. The following prompt appears:

   `Enter login name..`

   Type **informix** in response to this prompt.

5. The computer responds with the message

   `Removing user...CONFIRM..`

   Enter **y**. The next message appears:

   `Do you want to remove another...`

   Enter **n**.

6. At the # prompt, simultaneously press the **Ctrl** and **D** keys to logout.

7. Follow the instructions *Loading INFORMIX Software* as decribed earlier in this chapter.

Maintenance Console

At a remote TMS-3000 node or any TMSC node that does not house the Controller you may need to use a separate Maintenance Console to initialize the node. The Maintenance Console is used to set up a single aggregate that communicates with the master TMS-3000 node or with another node that is already communicating with the master node. Once you have established communication, configuration information can be downloaded to the node.

Some of the TMS common cards (ESCC, ACM, CDA, TPP and OPP) have a front monitor port for connecting the Maintenance Console. The cable required for this connection is GDC 024H140.

Refer to Appendix C of this manual for complete instructions on the use of the Maintenance Console.

Summary

In this chapter we covered the procedures for installing the TMS Controller hardware and software.

What's Next

In the next chapter we cover the use of redundant controllers.

6 Redundant Controllers

Overview

Redundant PC controllers in a TMS-3000 network do two things:

- Prevent the flow of network management control from interruption because of the single controller failure.
- Lets you access the network from different node localities.

In a TMS-3000 multi-controller environment, only one master controller serves as the point of control for the entire network. All other controllers (referred to as subordinates) serve as back-ups and as additional access points to the network. The master controller responsibility is to synchronize its on-line network configuration including IAR data with all subordinate controllers. TMS-3000 software supports up to five subordinate controllers and one master controller.

Some performance degradation occurs as the number of subordinate controllers increases.

Controller and Network Configuration

To start a network with multiple controllers, a pre-configured master and subordinate controller are required. The Controller initially designated as the master should contain a complete network and controller configurations for at least one of the three supported networks. You must select the desired network as the on-line network at the master. After the master has finished downloading its configuration to all nodes in the network, it connects the subordinates to their designated nodes.

A dummy network may be created at the subordinate while off-line. This dummy network contains a minimum network configuration that includes the local node and remote node to which the master controller connects and a minimum controller configuration that includes the local controller and the master controller. This dummy network serves as a token to receive download from the master. The name of the dummy network must be the same as the current on-line network at the master.

Controller configuration contains the following information:

- Name of each controller in the network.
- Name and address of the node to which each controller connects.
- Controller priority for each controller (Controller priority number defines the order in which a subordinate controller can become the new master controller in the event of a network separation).
- Phone numbers used for dial backup functionality, if required.

Primary User vs. the Master/Subordinate Controller

The primary user of a TMS-3000 network can relocate the mastership from one controller to another; From the master controller, you can:

- Modify on-line configuration data.
- Initiate a download.

On either the master or subordinate controller, the following tasks can be performed (provided that access is granted via the log-in user password protection):

- Modify off-line network configuration data.
- Examine configuration data (either on-line or off-line network).
- Examine status of controllers.
- Examine network status.
- Run diagnostics.
- Use the mail facility to pass information between users at different controllers.
- Initiate a mastership switchover if the user is a primary user.

Controlling/Propagating Data Base Changes

To provide redundancy against failure, each controller in the on-line network shall keep its local version of configuration, including IAR data, up-to-date. This ensures that if one controller fails, all relevant network data is still available in other controllers.

The master is responsible for synchronizing the data (as mentioned previously) to all subordinates. This ensures that data remains current for all controllers in the network. Whenever a change is made to the data on the master (either through an IAR or by modifying configuration data through the menu), the master controller tries to get the changes shipped across the network to subordinates.

For recovery purposes, the master can save a large number of changes on the hard disk (limited by the amount of available free disk space). In the event that a subordinate is missing the last few changes, the master can load only the missing changes (instead of the entire on-line network data). The subordinate is not allowed to select a network other than the Current Control Network (CCN) as the on-line network once the subordinate comes on-line.

When connecting a subordinate controller, make sure the files in the Modify SW Revision screen reflect the network and what's in the master controller. If a subordinate is connected/reconnected to the network, and the master finds a discrepancy between the two configurations, it either downloads the differences, or the entire on-line network configuration, including IAR data to the subordinate.

A subordinate controller can avoid lengthy downloads from the master if it starts up with a recent copy of the CCN. At a subordinate, you are not allowed to access the on-line network menu system when the local controller is in the process of updating a configuration change from the master. This is indicated by the message `Controller RESET Initiated` shown on the status line.

Network Startup Procedure

To simplify the process of starting up the network using multiple controllers, both the network and controller configurations need to be populated. That is, the master controller is preassigned and contains a complete configuration data base of the on-line network. When you attach a subordinate controller to the network, wait until the master finishes downloading the network before proceeding. The start-up procedure is described below:

1. Disconnect all controllers from the network.
2. Power-on the master controller and logon to the system. If you are not sure how to do this, *refer to Chapter 1, System Startup in GDC 036R603-Vnnn*.
3. Populate off-line network configuration data using the Modify Configuration menu (The master should have complete configuration data of the network which is intended for on-line use).
4. Connect the Master Controller to the network. On the master, select the network populated in the previous step as the on-line network and initiate Download as Required.

Ensure that the PC contains all of the obj files which are selected in the Software Revision lists (Obj files are those software files that are held on the TMS-3000 cards). If this startup is for a new network, you must first select obj files for the stored list and download it to the nodes in the network. After all nodes have received their obj files, activate the stored revision list.

5. Wait for the master to complete downloading of the network.
6. Power-on the subordinate controller and configure a dummy network of the same name as the on-line network. *See Controller and Network Configuration earlier in this chapter* for an explanation of a dummy network.
7. Connect the subordinate controller to the network. At the subordinate, log on-line to this dummy network (This step is needed only if the logged on-line network is a dummy network).
8. The master downloads its on-line network configuration including IAR data to the subordinate and maintain configuration data synchronization between the two, thereafter.

In a network with multiple redundant controllers, check for consistency between controllers when the network is separated by a failure, then restored. You do this by entering the Controller Status screen.

Mastership Switchover

A primary user can request a switchover of the mastership to a subordinate. After the master has received a mastership-switchover request, it honors the request and prepares for the control transfer. But if the request is received at the master while IAR is still in progress, the master maintains its mastership until IAR is completed.

Before transfer of the mastership, a warning message appears on the status line on the master indicating a switchover. At the alternate subordinate, a message indicates whether the transaction is successful. At the new master, warning messages, which indicate that the Controller is becom-

ing a master, appear on the screen. The switchover takes place immediately at the desired subordinate when it receives the request from the master. Therefore, before a primary user issues the request, you should inform the subordinate controller about the switchover.

If a controller is configured as a Permanent Subordinate, it does not take over the mastership of the network

Network Separation

The master enforces its mastership by polling subordinates periodically. If a subordinate does not receive polling from the master within 210 seconds, the subordinate assumes it is separated from the master controller. This timing interval is initially set to 210 seconds, but can be set at 50 to 900 seconds in 10 second increments based on the size of the network. This change may be made on the `Controller Configuration` screen.

When a subordinate cannot communicate with the master and both controllers are up and running, the network becomes separated. In a multiple controller environment, link failures can cause the following problems in the network:

- The master controller becomes isolated from its subordinates.
- One subordinate becomes isolated from the rest of the controllers.
- A group of subordinates is isolated from the rest of the controllers.

In all cases, once the network is separated, the process of selecting a new master within each isolated sub-network begins. This process is done without intervention. The selection is based on controller priorities and addresses of the controllers. The one with the best controller priority value becomes the master of the isolated sub-network (The value of the controller priority is from 1 through 10. The smaller the value the better the controller priority). If more than one controller has the same controller priority, the one with the lowest address becomes the master.

After the new master establishes local node ownership, it broadcasts its existence to all other controllers.

The subordinates reply indicating acceptance. When the master completes exchanging status with its subordinates, the process of data resynchronization and periodic network communication between the new master and subordinate controllers begins.

The selected master controller does not become a master of the network unless it successfully seizes the local node connected to it.

Network Restoral

When the links between isolated sub-networks are restored, the polling message from the master reaches controllers previously isolated from the network. When a master receives polling messages from other masters, the network restoral process begins.

Without intervention, the master which has a better switchover priority becomes the new master of the merged network. In the event that more than one master controller has the best controller priority, operator intervention becomes necessary to facilitate network restoral. Such intervention is accomplished by either changing the switchover priority of the local master controller or switching mastership via the Controller Diagnostic screen.

If you choose the first method after the local master controller priority value is changed, the master with the best controller priority is then allowed to take over the network. If the new selected master is not the controller you desire, you can perform a mastership switchover when the merge is completed, making the target controller the master.

We recommend that the controller priority not be set to either its largest (10) or smallest (1) value for controllers in the network. This leaves room for you to be able to force the local controller to become either a subordinate or master by either lowering or raising the local controller switchover priority. Once the new master establishes handshaking between itself and its subordinates, the next phase of network restoration begin. These are data resynchronization and periodic network communication between the new master and the subordinates. The CCN configuration data of the new master becomes the base for the CCN data of all subordinates.

Adding/Removing a Controller

Modifying the controller configuration at the master controller lets you add/remove a controller to/from the on-line network. To add a controller to the on-line network:

1. Power-on the added controller.
2. On the added controller, if the intended on-line network does not exist, you can either restore the same network by using a floppy saved from the master or create a dummy network with the same on-line network name. *See Controller and Network Configuration description earlier in this chapter* for an explanation of dummy network.
3. Modify controller configuration on the master controller (via Create/Modify Controller menu selection).
4. Wait until the master finishes downloading this new configuration into all nodes in the network, then connect the added controller to the designated node.
5. Login to the intended on-line network on the added controller. This step may or may not be required depending on whether the selected network on the added controller is recognized by its local node. If the selected network on the added controller is not recognized by its local node, then you need to login.

To remove a controller from the network:

1. Disconnect the target controller from the network.
2. Delete the target controller from the controller configuration on the master controller.

Moving a Controller from one Node to Another

To move a controller from one node to another node in the same network, as long as both nodes are configured as controllers in the network configuration, do the following:

1. Unplug the controller from the node.
2. Wait for the `Controller Link Level port` (`0` or `10`) `inoperative` alarm.
3. Log out of the on-line network.

4. Connect the controller to the new node.
5. Log into the on-line network.

Changing a Network

TMS-3000 supports three networks. Only the CCN (Current Control Network) has automatic enforcement of data consistency among controllers. CCN is defined as the current on-line network at the master. When you change the on-line network from the CCN to another on the master, a message appears on the screen. It warns that a massive download may follow between the master and subordinate controllers when such a switch is made.

When the subordinate detects the on-line network is being changed on the master, it logs you off automatically. A message appearing on the screen warns you a network change is in progress and to wait for its completion. When the network change has completed at the subordinate, a message indicating the change has completed appears.

Before the master completes downloading the new network configuration to all nodes, you are advised to not make any further changes on the master. You should not login before the network change has completed at the subordinate. Otherwise, the changing process on the subordinate may become disrupted. You may end up with several master controllers trying to control different on-line networks.

The process of on-line network changing on the subordinate may or may not involve receiving a download from the master. Downloading the new network to a subordinate takes place if such a network does not exist on the subordinate. If the subordinate has three networks, then the downloaded network replaces the one having the same network name or the current on-line network if the previous conditions do not prevail.

Otherwise, the downloaded network is added to the existing networks on the subordinate.

Upgrading Operating Software

When upgrading operating software in the system, all subordinate controllers should be disconnected from the network and upgraded off-line. Only after the network has been fully upgraded by the master controller should the subordinate controllers be reconnected into the network. Controllers using different operating software versions should never be simultaneously connected to the network.

In an on-line network environment, key features are distributed among connected redundant controllers. Currently available key features are MEGAVIEW, XNET, ISDN, DRR, OCM, OPP, TPP, and X.50 Switching.

Support Utilities for Multiple Users

Several screens provide communications between users in the same network. A Read Controller Mail display contains information such as which node the mail originated from, a date/time stamp when the message was sent, and the subject of the message. Additional information on Controller Mail facilities is presented in Controller Mail.

Although the Controller is capable of downloading configuration data from one controller to another, the system does not support downloading of actual operational software from one controller to another.

Summary

In this chapter we covered the use of redundant PC controllers in a TMS-3000 network.

What's Next

The next chapter covers routine and corrective maintenance for the TMS-3000.

7 Maintenance

Overview

This chapter provides routine maintenance and troubleshooting procedures for the TMS-3000.

The troubleshooting information describes sequences of tests and other troubleshooting procedures which isolate TMS-3000 failures to a single replaceable module. For detailed instructions on performing a particular test, *refer to the Status and Diagnostics chapters* in *GDC 036R603-Vnnn*. Refer to the front panel drawings in *Chapter 4* of this manual to help you develop a basis of knowledge for informed troubleshooting.

Routine Maintenance

Performance of the following routine maintenance tasks considerably reduces "down time" due to equipment failure:

- Check alarm display on the Controller at least once a day to identify alarm conditions as soon as possible. Leave the Controller in the alarm screen display mode when otherwise inactive, so that newly reported alarms are observed immediately.
- Observe front panel indicators for signs of equipment failures. When checking indicator conditions, remember that green LEDs indicate normal operation when lit; red LEDs indicate an alarm condition when lit.
- Inspect cable connections for looseness, bent or missing pins, or damage to cable.

Corrective Maintenance

Corrective maintenance consists of troubleshooting a suspected fault to a system component (module, cable, etc.), removal of the malfunctioning item, and repair or replacement to restore normal operation. The next paragraphs describe the removing and installing TMS-3000 modules and discuss various troubleshooting features for spotting failures within the TMS-3000 system.

Module Replacement

In many instances, removing and replacing TMS-3000 modules corrects a problem. When replacing modules, follow the instructions below to avoid unnecessary disruption of the system and possible module damage.

NOTE

GDC recommends periodically testing the "out of service" modules in a TMS-3000 that utilizes redundant common modules. In a TMS-3000, not all failures of the out-of-service module are detectable. Certain conditions may prevail causing disruption of the network when that module is placed into service.

Effects of Module Removal and Replacement

Removal of most common modules (or in-service common modules in a redundant system) stops data traffic through the system or through some segment of the system. Removal of any module may cause temporary disruption of the node. The following describes the effect of the removal of each of the common modules; be sure that you understand these consequences before removing a module from the shelf.

Enterprise System Control Card

Before removing the Enterprise System Control Card, place the Enable/Disable switch in the Disable position. In many instances, removing and replacing an ESCC corrects a problem, as described below.

ESCC Removal — To remove an ESCC from its assigned receptacle in the TMS-3000 shelf, proceed as follows:

1. If the ESCC is the in-service ESCC of a redundant pair, place it in the standby mode by using the diagnostics function of the Controller.
2. Place the ESCC front panel Enable/Disable switch in the Disable position.
3. Grasp the ejector knobs on the top and bottom of the ESCC front panel. Tilt the top knob up and the bottom knob down to unhook the ESCC, then guide it straight out from the receptacle.

NOTE

Removing an ESCC in a non-redundant system, or the redundant pair of ESCCs in a redundant system, stops all data traffic on the node and isolates the node from the Controller.

Removing the in-service ESCC in a redundant system causes the node to reinitialize. As a result, all data and communications traffic is interrupted for approximately 2 to 5 minutes. Therefore, before removing the in-service ESCC, use the Controller to switch it to the standby mode.

When replacing a defective ESCC with a spare, remember that software must be downloaded from the Controller at the master site.

ESCC Replacement/Installation — To reinsert an ESCC in the TMS-3000 shelf, proceed as follows:

1. Select the ESCC options.
2. Place the ESCC front panel Enable/Disable switch in the Disable position.

3. Position the ESCC in the receptacle guides (top and bottom) of the slot shown in *Figure 4-3* and carefully slide the ESCC into the receptacle until it stops. Tilt the top ejector knob up and the bottom ejector knob down and gently push the ESCC into the rear connector. The knobs automatically assume their normal positions.

4. Place the ESCC front panel Enable/Disable switch in the Enable position.

Redundancy Control Card

Removal of the Redundancy Control Card in a redundant system causes the primary module in each pair of redundant modules (the right-hand module of the pair) to become in-service except the ESCC in which the secondary card is in-service. In a non-redundant configuration, all common modules and expansion cards must be in the right-hand slot of each pair of slots; any common module or expansion cards in the left-hand slot are removed from operation except the ESCC which is in the left-hand slot.

Aggregate Control Card

Removal of the Aggregate Control Module in a non-redundant system, or the redundant pair of modules in a redundant system, stops data traffic on the associated aggregate trunk for that module and on any channel that is routed through that aggregate trunk.

CDA (Combined Digital Aggregate) Module

Removal of the CDA Module in a non-redundant system, or the redundant pair of modules in a redundant system, stops data traffic through the associated DS1 ports for that module and on any channels routed through the DS1 ports to a TMS-3000 node or associated D4 device. To remove the CDA Module, first press the Dsbl (disable) switch on the front panel once. All front panel LEDs should go off. The module is now in a low power mode and may be removed from the shelf in the usual manner. If the module is not removed, pressing the Dsbl switch once more reactivates the module and the INIT LED lights.

ACM

Removal of the ACM in a non-redundant system, or the redundant pair of modules in a redundant system, stops data traffic through the associated ports for that module and on any channels routed through the ports to a TMS-3000 node, DPBX or APBX.

To remove the ACM, first press the Dsbl (disable) switch on the front panel once. All front panel LEDs should go off. The module is now deactivated and may be removed from the shelf in the usual manner. If the module is not removed, toggling the Dsbl switch once more reactivates the module and the INIT LED lights.

Channel Interface Card

Removal of the Channel Interface Module in a non-redundant system, or the redundant pair of modules in a redundant system, stops data traffic on any channel that communicates through that module or pair of modules.

Removal of any other channel module disrupts data flow for that channel and causes minimal disruption of system data flow.

Module Removal

To remove a module from its assigned receptacle in the TMS-3000, grasp the ejector knobs on the top and bottom of the module front panel. Tilt the top knob up and the bottom knob down to unhook the module, then guide it straight out from the receptacle.

Module Installation

To reinsert a module in the TMS-3000 shelf, proceed as follows:

1. Verify correct module location by referring to your Network Documentation Package.
2. Select all options required on the module according to your Network Documentation Package (unless some problem with option configuration is found, reproduce the option selections made on the module being replaced). Make sure that any required program plugs or resistor networks are mounted on the module.
3. Position the module in the receptacle guides (top and bottom) and carefully slide the module into the receptacle until it stops. Tilt the top ejector knob up and the bottom ejector knob down and gently push the module into the rear connector. The knobs automatically assume their normal position.
4. When reinstalling the ESCC, make sure the Enable/Disable switch is in the Disable position before placing it into the Main Backplane. After the module is correctly seated, move the switch to the Enable position.

Maintenance Console

The Maintenance Console can set some aggregate parameters and perform basic maintenance functions. *Refer to Appendix C of this manual* for more information on these functions.

Troubleshooting Procedures

The diagnostic features of the TMS-3000 generally allow isolation of a failure to a single component within the system. The TMS-3000 has the following diagnostic features:

- Front Panel Alarm Indicators
- Controller Reported **Alarms** and Status Displays
- Data Path/Loopback Tests
- Maintenance Console Diagnostics
- Front Panel Test Points

Preliminary Checks

TMS-3000 problems may often be diagnosed by checking the condition of cables, power cords, and other mechanical connections. Incorrect TMS-3000 configuration entries may also be the cause of some problems. Perform the following preliminary checks before starting detailed troubleshooting procedures.

1. If no indicators on TMS-3000 are lit, check the ac power cord (or battery connections for system using DPS-8A dc power supply). Check the power supply for a blown fuse.

2. Inspect tightness and integrity of all connections, such as channel device cables and aggregate line connections.

3. If the TMS-3000 communicates at the aggregate level, but channels seem unable to pass data, check the configuration entries for those channels. This problem is most likely to occur when a new configuration is being activated.

4. If channels are correctly configured and appear to function normally, but do not seem to be communicating with connected channel devices, check the fused link located beneath the channel connector. *See Chapter 1 for more details on fused links.*

Alarms

Alarms are the first indication of problems in the TMS-3000 system. Alarms are divided into two categories: major alarms, representing failures which could disrupt system operation, and minor alarms, representing failures which could affect a single channel. Generally, common module failures are reported as major alarms, and channel module failures are reported as minor alarms.

Alarms are reported through the Controller, the Maintenance Console CRT, or front panel LEDs. You can also connect an additional alarm to the external alarm connector on the Main Shelf backplane. For a comprehensive evaluation of the condition of a system, you should note both the CRT reported alarm messages and front panel indicators.

Test Points

The test points located at the bottom of the ESCC, ACM, CDA, ACC, Voice Channel, and Data Channel Modules provide immediate indications of TMS-3000 functions. By connecting oscilloscope leads between test points and a reference point, a technician may observe data and clock signals and identify conditions that characterize proper or improper TMS-3000 operation. *Chapter 4 of this manual contains descriptions of each module front panel, including the test points. Pin assignments for the card connectors are defined in Chapter 8*. The following paragraphs suggest checks and comparisons that may be made with the front panel test points on each module.

Enterprise System Control Card

The ESCC test points provide immediate indications of TMS-3000 timing functions. By connecting oscilloscope leads between test points and a reference point, a technician may observe data and clock signals and identify conditions that characterize proper or improper TMS-3000 operation. *Chapter 4* of this manual contains descriptions of ESCC front panel, including the test points. The following paragraphs suggest checks and comparisons that may be made with the front panel test points on each module.

Each of the following frequencies is produced by a phase-lock loop: 18.432 MHz, 16.896 MHz and 1.544 MHz. After achieving phase lock with the master timing source, the 18.432-MHz primary frequency is used as a reference to create the other two primary frequencies of the clock bus of this node. The 18.432 MHz primary frequency is further divided to create the slower channel and aggregate frequencies.

The ESCC test point labeled “Test” is the 8-kHz prescaled frequency after it has been fed back to the phase detector from a phase-locked voltage controlled oscillator. The test point labeled “Ref” is the incoming frequency produced by a master timing source. The test clock must be synchronized to the Ref clock.

Use this procedure for the in-service ESCC only. An out-of-service ESCC shows erroneous results if the node is configured for aggregate or external timing.

1. Place oscilloscope leads on the Test point and the Ref point. If they are frequency locked, the incoming clock from the master timing source is successfully being phase locked at this node.
2. Place oscilloscope leads on the Test point and the Aggregate Control XMT CLK test point. If they are frequency locked, the clock rate for that Aggregate Control Card's aggregate trunk has successfully gone through the ESCC divider circuits and the clock bus to the Aggregate Control Card.
3. Place oscilloscope leads on the Test point and a Channel Module XMT CLK test point. If frequency locked, the clock has made it through the ESCC divider circuits, the clock bus, and the Channel Interface divider circuits.

A few incoming frequencies may not be an even multiple of the test signal and therefore, it may be difficult to determine frequency lock with an oscilloscope.

Aggregate Control Card

Check for the following conditions:

- RCV CLK and XMT CLK should be frequency locked with some jitter.
- Placing oscilloscope leads on RCV data and XMT data shows whether data is being received and transmitted.
- Placing oscilloscope leads on RCV sync and XMT sync shows whether the TDM is in sync. It also shows the size of frame being run.

ACM or CDA Modules

Check for the following conditions:

1. Place the leads of a dual trace oscilloscope on the XMT CLK A and RCV CLK A test points. Both patterns displayed should be frequency locked with some jitter.
2. Place the leads of a dual trace oscilloscope on the XMT CLK B and RCV CLK B test points. Both patterns displayed should be frequency locked with some jitter.

Data II, III, IV Channel or UDC Modules

Check for the following conditions:

- If the channel is active, data should be present on the DATA In and DATA Out test points.
- Receive data should be synchronized (no phase slippage) to the internal (INT) channel clock. If the channel is in the synchronous mode, the clock frequency is the same as the channel data rate; if the channel is in any other mode, the clock frequency is 16 times the channel data rate (except for Data IV Channel or UDC Modules).
- If channel is in synchronous mode and using external timing, internal (INT) and external (EXT) clock signals should be synchronized (no phase slippage).

Voice II or UVC Channel Modules

Check for the following conditions:

- If Voice Channel is active (busy) the voice signals in and out of the channel should be present at the IN and OUT test points.

Technical Assistance Procedure

For technical assistance, customers should call General DataComm Service at 203-598-7526.

In Canada:

General DataComm (Canada) Ltd.

Service and Repair Facility

1790 Beaulac Street

St. Laurent, Montreal, Quebec H4R 1W8

Telephone: 1-514-336-5454

TWX: 610-421-3221

Telex: 05824085

In the United Kingdom, contact the GDC area manager at:

General DataComm (U.K.) Ltd.

Molly Millars Close

Molly Millars Lane

Wokingham, Berkshire

England RG11 2QF

Telephone: 011-44-734-774-868

Telex: 851 847298

Fax: 011-44-734-774-871

In Europe/Africa/Middle East:

General DataComm

14, rue Jules Saulinier

Parc du Colombier, BP 221

93200 ST DENIS, France

Tel: 011-33-1-48133470

Fax: 011-33-1-42430021

In the Pacific:

General DataComm Pty. Ltd.

Suite 902

275 Alfred Street North

North Sydney, NSW 2060, Australia

Tel: 011-61-2-956-5099

Fax: 011-61-2-956-5083

In Asia:

General DataComm

803 Century Square

1-13 D'Aguilar Street

Central, Hong Kong

Tel: 011-852-5265511

Telex: 780-80579

Fax: 011-852-5259944

In Latin America:

General DataComm, International

1579 Straits Turnpike

P.O. Box 1299

Middlebury, Connecticut 06762-1299

Telephone: 203-574-1118

Telex: 7400905

Fax: 203-758-9518

To return a unit for repair, if so authorized by GDC, use the return tag and address the package:

Product Repair Department

General DataComm, Inc.

1579 Straits Turnpike

P.O. Box 1299

Middlebury, Connecticut 06762-1299

Lease and Maintenance contract customers may call General DataComm Service toll-free at 1-800-243-1030, 24 hours a day, 7 days a week for trouble reporting or installation scheduling. (Installations are normally scheduled between 8 a.m. and 5 p.m.)

Training

Hands-on training courses are available from General DataComm Service Educational Services in the USA and in the UK. Courses offered range from basic data communications, modems and multiplexers, to complex network systems, and are given at our Connecticut facility or at your location.

For information call:

USA (203) 574-1118, Ext. 6190.

UK 011-44-734-774-868

Summary

This chapter covered routine and corrective maintenance for the TMS-3000.

What's Next

The next chapter provides card connector pin assignments.

8 Connector Pin Assignments

Overview

This chapter lists pin assignments for 25-pin aggregate and channel connectors. It also lists the pin assignments for the 5-pin external timing connector, the internal/external modem connector, the external alarm relay connector, echo canceller piggyback card, CDA module, T1/D4/E Aggregate piggyback card, TID-III Data Channel Module, and ACM.

Aggregate Interface

Tables 8-1 through 8-8 list the pin assignments of the 25-pin aggregate connectors. The functions listed are determined by the type of aggregate piggyback card used on the associated Aggregate Control Card.

Data And Voice II Channel

Tables 8-9 and 8-10 list the pin assignments for the Data Channel and Voice II Channel connectors.

External Timing

Table 8-11 lists the pin assignments for the external timing connector (J18) on the TMS-3000 backplane.

Internal/External Modem

Table 8-12 lists the pin assignments for the phone jack J41 located on the rear of the TMS-3000 main shelf. The phone jack connects to the internal GDC 212A modem on the Redundancy Control Card. Note that the internal modem is available only on earlier versions of the RCC. *Table 8-13* lists the pin assignments for the external modem Port J42 located on the rear of the TMS-3000 main shelf.

External Alarm Relay

Table 8-14 lists the pin assignments for the external alarm relay connector (J17) located on the rear of the TMS-3000 main shelf.

Echo Canceller Card

Table 8-15 lists the pin assignments for the Echo Canceller piggyback card. This card plugs into the Universal Voice Card.

CDA Module DB25 Output 25-Pin

Table 8-16 lists the pin assignments for the Combined Digital Aggregate Module.

TID-III Data Channel Module

Table 8-17 lists the pin assignments for the TID-III Data Channel Module.

G.704 Aggregate Interface Piggyback Card

Tables 8-18 and 8-19 list the pin assignments for the G.704 Aggregate Interface piggyback card.

ACM Module DB25 Output 25-Pin

Table 8-20 lists the pin assignments for the ADPCM Compression Module.

Table 8-1 ITU-T G.703 256 KBPS Interface To Aggregate Line Transceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The “A’’ side of the transmit data pair.
3	RCV DATA A	The “A’’ side of the receive data pair.
14	XMT DATA B	The “B’’ side of the transmit data pair.
16	RCV DATA B	The “B’’ side of the receive data pair.

Table 8-2 ITU-T G.703 64 KBPS Codirectional Interface To Aggregate Line Transceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The “A’’ side of the transmit data pair.
3	RCV DATA A	The “A’’ side of the receive data pair.
14	XMT DATA B	The “B’’ side of the transmit data pair.
16	RCV DATA B	The “B’’ side of the receive data pair.

Table 8-3 T1/D4 1.544 MBPS Interface To Aggregate Line Transceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The “A’’ side of the transmit data pair.
3	RCV DATA A	The “A’’ side of the receive data pair.
14	XMT DATA B	The “B’’ side of the transmit data pair.
16	RCV DATA B	The “B’’ side of the receive data pair.

Table 8-4 ITU-T G.703 2.048 MBPS Interface To Aggregate Line Transceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The "A'' side of the transmit data pair.
3	RCV DATA A	The "A'' side of the receive data pair.
14	XMT DATA B	The "B'' side of the transmit data pair.
16	RCV DATA B	The "B'' side of the receive data pair.

Table 8-5 ITU-T G.703 64 KBPS Contradirectional Interface To Aggregate Line Transceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The "A'' side of the transmit data pair.
3	RCV DATA A	The "A'' side of the receive data pair.
13	RCV CLK B	Receive clock for B
14	XMT DATA B	The "B'' side of the transmit data pair.
15	XMT CLK A	Transmit clock for A
16	RCV DATA B	The "B'' side of the receive data pair.
17	RCV CLK A	Receive clock for A
19	XMT CLK B	Transmit clock for B

Table 8-6 ITU-T V.35 Interface To Aggregate Line Transceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The "A'' side of the transmit data pair.
3	RCV DATA A	The "A'' side of the receive data pair.
4	+V	+5V
12	EXT TIM B	External transmit clock for B
13	RCV CLK B	The receive clock for B
14	XMT DATA B	The "B'' side of the transmit data pair.
15	XMT CLK A	Transmit clock for A
16	RCV DATA B	The "B'' side of the receive data pair.
17	RCV CLK A	The receive clock for A
19	XMT CLK B	The transmit clock for B
20	+V	+5V
24	EXT TIM A	The external transmit clock for A

Table 8-7 RS-422/423, MIL-188-114 Interface To Aggregate LineTransceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The “A’’ side of the transmit data pair.
3	RCV DATA A	The “A’’ side of the receive data pair.
4	+V	+5V
12	EXT TIM B	External transmit clock for B
13	RCV CLK B	The receive clock for B
14	XMT DATA B	The “B’’ side of the transmit data pair.
15	XMT CLK A	Transmit clock for A
16	RCV DATA B	The “B’’ side of the receive data pair.
17	RCV CLK A	The receive clock for A
19	XMT CLK B	The transmit clock for B
20	+V	+5V
24	EXT TIM A	The external transmit clock for A

Table 8-8 EIA/TIA-232-E Interface To Aggregate LineTransceiver 25-Pin Connector Pin Assignments

Pin No.	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA	Transmit data
3	RCV DATA	Receive data
4	+V	+12V
7	SIG Gnd	Signal Ground
15	XMT CLK	Transmit clock
17	RCV CLK	Receive clock
20	+V	+12V
24	EXT TIM	External terminal timing
25	–V	–12V

Table 8-9 Data Channel Connector Pin Assignments

Pin No.	Signal Unbalanced (EIA/TIA-232-E/ RS-423)	Signal Balanced (RS-422/ITU-T V.35)	Signal Balanced (ITU-T G.703)	RS-422 Adapter	Signal Unbalanced V.54 Using MM08	X.21 (X.27)
1	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground
2	Transmit Data	Transmit Data "A"	Transmit Data "A"	Xmt Data A	Transmit Data	SD-A
3	Receive Data	Receive Data "A"	Receive Data "A"	Receive Data A	Receive Data	RD-A
4	Request To Send*	Request to Send*	Request to Send*	RTS A, RTS B	Request to Send*	RTS-A
5	Clear To Send*	Clear To Send*	Clear To Send*	CTS A, CTS B		RTS-B
6	Ready Out* (DSR)	Ready Out* (DSR)	Ready Out* (DSR)	Rdy A, Rdy B	Test Mode*	DCD-B
7	Signal Ground	Signal Ground	Signal Ground	Signal Gnd	Signal Ground	Signal Ground
8	Carrier Detect*	Carrier Detect*	Carrier Detect*	DCD A, DCD B	Carrier Detect*	DCD-A
10	Non-Standard Control Signal*	Transmit/Receive Clock "B"	Nonstandard control signal	Xmt Data B	Remote Loopback	ST-B
11	Receive Ground	External Transmit Clock "B"		Xmt Clk B		TT-B
15/ 17**	Transmit/Receive Clock	Transmit/Receive Clock "A"		XmT/Rx Clk A	Transmit/Receive Clock	ST-A
20	Ready In* (DTR)	Ready In* (DTR)	Ready In* (DTR)	Rdy A, Rdy B	Ready Out (DTR)*	
22	Ring Indicator*	Transmit Data "B"	Transmit Data "B"	Xmt Data B	Local Loopback*	SD-B
24	External Transmit Clock	External Transmit Clock "A"		Xmt Clock A	External Transmit Clock	TT-A
25	Busy Out*	Receive Data “B’’	Receive Data “B’’	Receive Data B		RD-B

* Control signals are unbalanced, at EIA/TIA-232-E voltage levels.

** Pins 15 and 17 are tied together on backplane.

Table 8-10 Voice II/CVSD And PCM Channel Connector Pin Assignments*

Pin Number	Description
2	–BATT
3	M Lead
4	Receive Tip (RT)
5	Receive Ring (RR)
7	Signal Ground
8	Station Ground
10	Transmit Ring (TR)
11	E' Lead
15	Station Battery
24	E Lead
25	Transmit Tip (TT)
The E' lead is the same signal as the E lead, and provides no additional functions. The CVSD card had a type C relay driving the E Lead and so both NC and NO outputs were made available for customer use. The UVC connected the E and E' together. Station Ground (pin 8) is the SG lead which is paired with the E Lead. Signal Ground is an internal mux ground, and so is not normally used for signalling due to the added noise which may then be injected.	

Table 8-11 External Timing Connector (J18) Pin Assignments

Pin Number	Description
1	Protected Ground
2	External Timing A (In)
3	External Timing B(In)
8	512 KHz Reference B (Out)
9	512 KHz Reference A (Out)

Table 8-12 Phone Jack Internal Modem Connector Pin Assignments

Pin Number	Description
3	Tip
4	Ring
Note that the internal modem is available only on earlier versions of the RCC.	

Table 8-13 External Modem Port J42 25-Pin Connector Pin Assignments

Pin Number	Description	
1	Protected Ground	
2	Send Data	(TD)
3	Receive Data	(RD)
4	Request to Send	(RTS)
5	Clear to Send	(CTS)
6	Data Set Ready	(DSR)
7	Ground	
8	Data Carrier Detect	(DCD)
12	Speed Mode Indicate	(SPD IND)
20	Data Terminal Ready	(DTR)
22	Ring Indicator	(RI)

Table 8-14 Alarm Relay Connections, Rear Panel Connector J17

Pin Number	Function	Relay State	
1	Minor Alarm 2	Common	(CO)
2	Major Alarm 2	Common	(CO)
3	Spare		
4	Spare		
5	Major Alarm 2	Deenergized	(NO)
6	Major Alarm 1	Deenergized	(NO)
7	Minor Alarm 2	Deenergized	(NO)
8	Minor Alarm 1	Deenergized	(NO)
9	Major Alarm 1	Common	(CO)
10	Spare		
11	Minor Alarm 1	Common	(CO)
12	Major Alarm 2	Energized	(NC)
13	Major Alarm 1	Energized	(NC)
14	Minor Alarm 2	Energized	(NC)
15	Minor Alarm 1	Energized	(NC)

Table 8-15 Echo Canceller Card Pin Assignments

XAP1 Pin Number	Signal Name	Description
1	+5V	+5 V dc Supply
2	TEST/	Disables the Echo Canceller during diagnostics
3	PCMDAT	Near-end speech signal
4	RESET/	Power-on reset pulse
5	PCMCK	Clock signals for RX64KDAT, PCMDAT, ECHOUT
6	FRASYN	Byte timing for RX64KDATA, PCMDAT, ECHOUT
7	MULAW/	Indicates Universal Voice Card “A’’ or “MU-LAW’’ Codec
8	RX64KDATA	Far-end speech signal
9	EHOUT	Echo Canceller output signal
10	DISABLE	External disable line
11	–12 V	–12 V dc supply
12	SPARE	Not used
13	GND	Ground

Table 8-16 CDA Module DB25 Output 25-Pin Connector Pin Assignments

Pin Number	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The “A" side of the transmit data pair
3	RCV DATA A	The “A" side of the receive data pair.
14	XMT DATA B	The “B" side of the transmit data pair.
16	RCV DATA B	The “B" side of the receive data pair.
These pins are used when the second CDA module is connected as a non-redundant pair in conjunction with the special Y cable.		
18	RCV DATA B	The “B" side of the receive data pair.
4	XMT DATA A	The “A" side of the transmit data pair.
8	RCV DATA A	The “A" side of the receive data pair.
25	XMT DATA B	The “B" side of the transmit data pair.

Table 8-17 TID-III Data Channel Module EIA RS-422 Interface Connector Pin Assignments

Channel Card EIA Connector	Module Edge Connector P1 Pin Number	Signal Description
1	1	Chassis Ground
7	32	Ground
17	27	Receive Clock A*
10	52	Receive Clock B*
3	28	Receive Data A*
25	51	Receive Data B*
24	56	Transmit Clock A**
11	54	Transmit Clock B**
2	55	Transmit Data A**
22	50	Transmit Data B**
5	25	External Clock A
4	24	External Clock B
20	26	Test Signal
6	23	Test Signal

* From TID Channel to User
** From User to TID Channel

Table 8-18 G.704 Aggregate Interface Piggyback Card Connector Pin Assignments (XP1)

Pin No.*	Description	Function
1	CHASSIS GND	Chassis ground — Connects to system chassis ground through Aggregate Control Card.
2	XMT DATA	Transmit data from Aggregate Control Card. Data changes on falling edge of the Transmit Clock.
3	XMT CLK	Transmit Clock to Aggregate Control Card — N x 64 kHz.
4	RCV DATA	Receive data to Aggregate Control Card. Data is sampled on rising edge of RCV CLK.
5	RLB	Receive Remote Loopback. Causes a remote loopback condition on the G.704 Aggregate Interface Piggyback card.
6	RCV CLK	Receive Clock to Aggregate Control Card — N x 64 kHz.
8	ROOS (L)	Indicates that the remote end is out of G.704 frame sync. Multiplexers is out of sync also. Signal low for ROOS.
9	SIG GND	Signal Ground
13	EXT TMG	External Transmit Input from TMS-3000 clock circuitry. 2.048 MHz code clock for transmit timing.
18	+5 V	Positive 5-volt dc supply.
19	SIG GND	Signal Ground.
20	LOOS (L)	Indicates that the local end is out of G.704 frame sync. Multiplexers is of sync also. Signal low for LOOS.
24	CDET	Carrier Detect output. Goes low when receive data is lost. High indicates carrier is present.
31	RCLK	Receive 2.048 MHz clock for node clocking.
35	RCVDATA B	Balanced Receive Data B from one side of T1 line input. Grounded by the UNB switch.
36	RCVDATA A	Balanced Receive Data A from one side of T1 line input.
38	XMTDATA A	Balanced Transmit Data A from one side of T1 line output.
39	XMTDATA B	Balanced Transmit Data B from one side of T1 line output.
40	PROT GND	Protective ground output from G.704 Aggregate Interface Piggyback to equipment cabinet.
* Pin numbers 7, 10-12, 14,-17 21-23, 25-30, 32-34, and 37 are not used. Note that Connector XP2 on the G.704 Aggregate Interface Piggyback is used on a later version of the Aggregate Control Card.		

Table 8-19 G.704 Aggregate Interface Piggyback Card Connector Pin Assignments (XP2)

Pin	Description	Signal Description
1	+5 V	Positive 5 volt input
3	SIG GND	Signal Ground
4	BD0	Microprocessor Data Bus 0
5	BD1	Microprocessor Data Bus 1
6	BD2	Microprocessor Data Bus 2
7	BD3	Microprocessor Data Bus 3
8	BD4	Microprocessor Data Bus 4
9	BD5	Microprocessor Data Bus 5
10	BD6	Microprocessor Data Bus 6
11	BD7	Microprocessor Data Bus 7
12	WRSTB	Write Strobe (when low condition is true)
13	RDSTB	Read Strobe (when low condition is true)
14	CSN	Board Select (when low condition is true)
15	BA0	Microprocessor Address Bus 0
16	BA1	Microprocessor Address Bus 1
17	BA2	Microprocessor Address Bus 2
18	BA3	Microprocessor Address Bus 3
Note that plesiochronous buffers introduce unwanted end-to-end delay on the aggregate link. Keep their size to a minimum when configuring the system.		

Table 8-20 ACM DB25 Output 25-Pin Connector Pin Assignments

Pin Number	Signal Name	Description
1	Gnd	Chassis Ground
2	XMT DATA A	The “A’’ side of the transmit data pair
3	RCV DATA A	The “A’’ side of the receive data pair.
14	XMT DATA B	The “B’’ side of the transmit data pair.
16	RCV DATA B	The “B’’ side of the receive data pair.

Summary

This chapter provided the connector pin assignments for the various TMS-3000 cards.

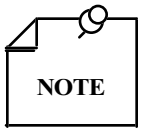
A Options

Overview

The TMS-3000 supports both asynchronous and synchronous network communications in the GTS version 2.2.0 and later software. It continues to support ASYNC Network I/O through a standard serial card (Port 0) or through the DigiBoard DigiChannel PC/4e card or the DigiBoard DigiChannel PC/8i+ card. It supports other asynchronous applications as well, such as Dial Backup, Local TTY, Dialin TTY, and Megaview Alarm Interface. These applications are supported through the standard serial card (Port 1) or through the expansion I/O card. The expansion I/O card could be the DigiBoard DigiChannel PC/4e card, DigiBoard DigiChannel PC/8i+ card, or DigiBoard DigiChannel MC/8i+ card. The Synchronous Network I/O is supported only by the DigiBoard DigiChannel PC/8i+ or MC/8i+. This chapter provides an overview of these cards and a description of the installation procedure.

DigiBoard DigiChannel PC/4E Overview

The DigiChannel PC/4e card mounts inside the TMS Controller to expand the I/O port capacity of the controller to four. The Digichannel PC/4e card supports the following interfaces: Local Terminal, Remote Dialin Modem, MEGAVIEW, Remote Dialin MEGAVIEW, and MEGAVIEW PC. With the DigiChannel PC/4e card, network communications and dial backup communications are not supported in MSO version 3.0.0 and later software versions.



A floppy disk is included in the shipping container that contains your DigiBoard card. But you do not need to use this floppy disk because all of the necessary software is included in the TMS-3000 software.

DigiBoard DigiChannel PC/4E Installation

The following procedure describes the installation of the DigiChannel PC/4e card and its DIP Switch settings.

Install the card as follows:

1. Shut down XENIX and turn the power off in the controller.
2. Remove the outer casing of the TMS Controller.

   If you intend to use the Digiboard DigiChannel PC/4e card as an additional I/O card, you only need to install the hardware since software is already installed.

   The following procedure briefly outlines the DIP Switch settings on the Digiboard DigiChannel PC/4e card. For more information on the Digiboard DigiChannel PC/4e card, *refer to the Installation Guide Reference Manual from Digiboard.*
3. Set the dual-port memory starting address to D0000 (Hex). Configure dual-port memory starting address Switches SW 1 through SW 8 of DS1 (Dip Switch 1) as follows:

When the switch is closed, it is ON. When the switch is open, it is OFF.

SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8
OFF	ON	OFF	OFF	ON	ON	ON	ON

4. Set the I/O port address to 320 (Hex). Configure I/O port address Switches SW 9 through SW 11 as follows:

SW-9	SW-10	SW-11
ON	ON	ON

5. Set the Interrupt (IRQ) at IRQ11. You have to set Switch SW6 of DS2 to ON, the rest of the switches remain OFF.

SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF

6. Install the card in any 32-bit slot. Install the fastening screw.
7. Replace the outer casing of the TMS Controller.
8. Turn the power on and respond to the boot prompts.
9. Install the TMS-3000 software according to the installation instructions in *Chapter 5* of this manual.

DigiBoard DigiChannel PC/8i+ Overview (386/486)

19.2K Hz synchronous communications between the TMS Controller and the Enterprise System Control Card (ESCC) is supported in GTS software. The DigiChannel PC/8i+ is an expansion I/O card which, when installed in a 386/486 Controller, provides eight asynchronous communication ports and one synchronous communication port. The ESCC provides the clock for the DigiChannel PC/8i+ for synchronous communications.

DigiBoard DigiChannel PC/8i+ Installation

The following procedure describes the installation of the DigiChannel PC/8i+ card and its DIP switch settings.

Install the card as follows:

1. Shut down XENIX and turn the power off in the controller.
2. Remove the outer casing of the TMS Controller.
3. There are two sets of jumpers on the card. One set consists of three jumpers (J1, J2, J3) that are vertically aligned at the left edge of the processor board. Each of these jumpers should be set to pins 2 and 3 (16K local RAM and 64K dual-port RAM). *Refer to Figure 1 on Page 3 of the Installation Guide Reference Manual from Digiboard.*

The second set consists of four jumpers (J1, J2, J3, J4) that are horizontally aligned at the top of the I/O Mate. Jumpers J1, J2 and J3 should be set to pins 2 and 3 and Jumper J4 should be set to pins 1 and 2 [DSRA (input), RTxCA, and TRxCA]. *Refer to Figure 33 on Page 61 of the Installation Guide Reference Manual from Digiboard.*

The following procedure briefly outlines the DIP switch settings on the Digiboard DigiChannel PC/8i+ card. For more information on the Digiboard DigiChannel PC/8i+ card, refer to the *Installation Guide Reference Manual.*

4. Set the dual port RAM starting address to 0xD0000 by setting SW-1 through SW-8 of DIP Switch 1 as follows:

SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8
OFF	ON	OFF	OFF	ON	ON	ON	ON

5. Set the I/O port address to 320 (Hex). Configure I/O port address Switches SW 9 through SW 11 as follows:

SW-9	SW-10	SW-11
ON	ON	ON

6. Set the Interrupt (IRQ) at IRQ11. You have to set Switch SW6 of DS2 to ON, the rest of the switches remain OFF.

SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF

7. Install the card in any 32-bit slot. Install the fastening screw.
8. Replace the outer casing of the TMS Controller.
9. Turn the power on and respond to the boot prompts.
10. Install the TMS-3000 software according to the installation instructions in *Chapter 6* of this manual.

Digiboard DigiChannel MC/8i+ Overview (IBM PS/2)

19.2K Hz synchronous communications between the TMS Controller and the Enhanced System Control Card (ESCC) is supported in GTS software. The DigiChannel MC/8i+ is an expansion I/O card which, when installed in an IBM PS/2 Controller, provides eight asynchronous communication ports and one synchronous communication port.

DigiBoard DigiChannel MC/8i+ Installation

The following procedure describes the installation of the DigiChannel MC/8i+ card and its DIP switch settings.

Install the card as follows:

1. Shut down XENIX and turn the power off in the controller.
2. Remove the outer casing of the PS/2.

3. Jumper settings are briefly described here. For more detailed information, *refer to the Installation Guide Reference Manual from DigiBoard*.

4. There are two sets of jumpers on the card. One set consists of only one jumper (J1). It is located above the edge connector on the Processor Board. *Refer to Figure 1 on Page 2 of the Installation Guide Reference Manual*. The setting should be Pin 1 and Pin 2.

   Jumper J1 = pin 1 and pin 2 (128K Dual-Ported RAM)

5. 5The second set consists of four jumpers (J1, J2, J3, J4) that are located above the DB-78 connector on the endplate. *Refer to Figure 28 on Page 52, Appendix B of the Installation Guide Reference Manual*. The settings are as follows:

   Jumper J1 = pin 1 and pin 2 —— RTxCA

   Jumper J2 = pin 1 and pin 2 —— TRxCA

   Jumper J3 = pin 1 and pin 2 —— DSRA (input)

   Jumper J4 = pin 1 and pin 2 —— DSRA (input)

6. Install the card in any I/O slot.

7. Replace the outer casing of the PS/2.

8. Turn the power on and reboot XENIX.

MEGAVIEW Overview

The MEGAVIEW-to-TMS-3000 Interface is also available. MEGAVIEW provides the following features and benefits to the MEGAVIEW user:

Object-Oriented Graphics Interface — Alarm information is presented to you in a graphical depiction, with color changes indicating the location and severity of problems. You benefit by being able to react to the graphics interface more quickly than traditional, text-oriented displays.

Full TMS Controller Access — With our UNIX-based terminal emulation program, you are able to gain access to all of the features available via the TMS controller: configuration routines, IAR, diagnostics, maintenance, etc. This feature may be displayed and used concurrently with other MEGAVIEW operations and allows the TMS Controller to be an Element Manager that may also provide management of Virtual Private Networks (VPNs).

The primary benefit to you is that training on the original TMS system is not wasted, as the TMS-related routines operate exactly as before. An additional benefit is that the control of both MEGAVIEW and TMS routines is consolidated onto one display.

Centralized Network Management — MEGAVIEW maintains a centralized approach to network management in which one or more TMS controllers are used as Element Managers or for VPNs and can be displayed on the MEGAVIEW console.

You benefit by constructing a centralized management scheme, yet still allowing TMS network visibility from a secondary console.

Concurrent Views of Network Events — by deploying the MEGAVIEW graphics interface and the TMS text-oriented screens (such as Network Diagnostics), you can simultaneously monitor a network problem from two perspectives. You gain a more thorough analysis of intermittent problems affecting network performance.

Enhanced Security Access — TMS provides security access as before. At the MEGAVIEW level, you have additional security access by function(s), very similar to the security access capabil-

ities provided in TMS. The resultant benefit to you is that operators can be assigned access to functions in a virtually unlimited fashion, increasing administrative flexibility in assigning management tasks.

Universal Trouble Ticket — You can deploy MEGAVIEW Universal Trouble Ticket option to track TMS-related problems (or problems relating to any other component/service/facility in the network, for that matter). You benefit by being able to create, modify, escalate, and close trouble tickets for TMS components, something that was previously unavailable within the TMS-3000.

Reports Application — You can deploy MEGAVIEW Reports application to provide an integrated reporting mechanism for TMS data. You benefit by being able to create custom reports on the alarms, trouble tickets, and configuration data resident in the MEGAVIEW data base. The customizing capabilities of this application allow you to specify the information required to meet management objectives, rather than being restricted to a set of fixed report types.

Terminal Emulation — A UNIX-based terminal emulation capability allows you to create windows to control other CRT-managed products in the network. You benefit by being able to display multiple controller windows at the same time, thereby providing simultaneous visibility of multiple product consoles.

Alarm Summary Window — In addition the MEGAVIEW graphics display and the TMS alarm displays, an Alarm Summary window provides you with the necessary alarm detail required for proper analysis of the problem. You benefit by having a complete complement of information about a particular network alarm available on a single console-graphical depiction, TMS alarm data, and MEGAVIEW alarm data.

On-Line HELP — In addition to the TMS-3000 on-line HELP manual, an on-line, context sensitive HELP facility is available via MEGAVIEW. You benefit by having all HELP documentation available on a single console.

EMAIL — In addition to the TMS EMAIL capability, an on-line EMAIL application is available on the MEGAVIEW console. You benefit by having a full featured MAIL facility for communication among multiple MEGAVIEW operators.

Additionally, through the deployment of the terminal emulator window for TMS, remote TMS operators can deliver messages to MEGAVIEW operators, and vice versa.

Utilities — In addition to the Network and Controller Maintenance routines (accessible via the TMS terminal window on MEGAVIEW), a Utility application is available for MEGAVIEW-related maintenance. You benefit by having access to all utility functions (at both the TMS and MEGAVIEW levels) from the MEGAVIEW console.

MEGAVIEW Installation

Hardware connections must be made from the TMS-3000 to the MEGAVIEW. The Controller must have the Digiboard Multiport Card already installed in it before any MEGAVIEW connections are made. If you have not installed the Digiboard Multiport Card in the TMS-3000, return to Page 17-1.

From the `Controller Maintenance` screen, select Configure Serial Ports. Press **`Enter`**. `The I/O Ports Configuration` screen appears.

To install the hardware cables to the TMS-3000 proceed as follows:

1. Locate Port 1 at the rear of the Controller. Install one end of cable (*GDC 027H223-XXX*) to this port. The opposite end of this cable contains a 25-pin connector that mounts into Digiboard Port 3 on the Sun Workstation.

   This cable functions as the terminal emulator (window) interface. Configure Port 01 on the I/O Port Configuration screen as a local or remote TTY. Select the baud rate on this screen.

2. Locate Port (02 through 07) on the TMS-3000 Digiboard Multiport Card. If you are using a DCE adapter from the TMS-3000 to the MEGAVIEW, select the cable *GDC 028H507-XXX*. If you are using a DTE adapter from the TMS-3000 to the MEGAVIEW, select the cable *GDC 028H313-025*.

   Connect the RJ-45 end of the cable into the selected port. The other end of the cable contains a 25-pin connector that mounts into the Digiboard Port 4 of the Sun Workstation.

   This cable functions as the MEGAVIEW alarm interface. Configure the port on the I/O Port Configuration screen as MEGAVIEW. Select the baud rate on this screen.

As an alternative, an external modem can operate between the MEGAVIEW and TMS-3000 for the alarm sessions interface. To connect the external modem, proceed as follows:

1. Locate an unused Port (02-07) on the TMS-3000 Digiboard Multiport Card. Install the RJ-45 connector side of the cable (*GDC 027H238-XXX*) into this port. The other end of this cable connects into the external modem.

2. Another cable (*GDC 028H502-XXX*) connects from the external modem into the 25-pin connector of an unused Sun TTY port on the Sun Workstation.

   This cable functions as the MEGAVIEW DU (Dialup) alarm interface. Configure this Port (02-07) on the I/O Port Configuration screen as MEGAVIEW DU. Select the baud rate on this screen.

3. From the Controller Maintenance menu, select Load a Software Release, install the MEGAVIEW Feature Module disk into the floppy drive and proceed to follow the on-screen instructions.

   Allow the system time to reboot. When the `TMS Main Menu` appears, continue to follow the instructions in the MEGAVIEW User's Guide for initializing the TMS-3000.

   An alarm configuration window should appear on the MEGAVIEW. Set up the alarm sessions on this screen. *Refer to the MEGAVIEW User guide* for further information.

Aggregate Performance Installation

From the `Controller Maintenance` menu, select Load a Software Release, install the Aggregate Performance Feature Module disk into the floppy drive and proceed to follow the on-screen instructions.

To verify installation, select Examine Software Versions from the `Controller Maintenance` menu. When the `Examine Software Revision` menu appears, select Examine TMS/GTS Options Installed. `Aggregate Performance` should appear in the `Software Item` list.

TCP/IP and STREAMS

The following instructions are for loading TCP/IP and STREAMS software on your TMS controller. The purpose of this software is to allow remote access to a TMS Controller through your Local Area Network (LAN). This remote access allows you to log into the TMS controller from anywhere on your LAN. It functions the same as a remote dial-up modem, but at a faster screen refresh rate.

Although following these directions helps you load the software into your TMS controller, you, or your Network Administrator, are required to resolve configuration issues that are specific to your local network addressing scheme. You must also supply the remote access terminal, such as PC-NFS running on a DOS machine.

Key mapping for the function keys on your local machine are listed in the following table. Your network administrator can customize your machine so you may easily use the TMS Controller remotely with the function keys. GDC highly recommends the use of key mapping since using the TMS Controller without the full set of function keys is awkward.

PF1	<ESC>[M	CURSOR UP	<ESC>[A
PF2	<ESC>[N	CURSOR DOWN	<ESC>[B
PF3	<ESC>[O	CURSOR RIGHT	<ESC>[C
PF4	<ESC>[P	CURSOR LEFT	<ESC>[D
PF5	<ESC>[Q	BACKSPACE	<ESC>[J
PF6	<ESC>[R		
PF7	<ESC>[S		
PF8	<ESC>[T		
PF9	<ESC>[U		
PF10	<ESC>[V		
PF11	<ESC>[W		
PF12	<ESC>[X		

Using the Custom Utility on Drives Other than the Boot Drive

It is possible that your TCP software and STREAMS software is a different format (i.e., 3.5" or 5.25") than the original disk type you used to load your SCO Xenix operating system. A*lways* ensure that you order and use the same disk format as you used to originally load the operating system since loading is much less complex.

If this is *not* the case, you must perform the following:

Substitute the command `custom` with:

`custom -m /dev/fd[device]ds[sectors]`

where [device] = 0 or 1, device 0 is the boot floppy drive, 1 is the second drive (most likely **`1`**).
and [sectors] = `9 (320K 5.25" or 720K 3.5")`

15 (1.2M 5.25")

18 (1.4M 3.5")

It is possible that the two software packages, STREAMS and TCP/IP, are on different disk formats. If this is true, prior to loading TCP/IP, quit the `custom` routine by answering **`q`** to all questions and re-running the `custom` routine by entering the command from above.

Loading Ethernet Software

Be sure you have the following items before starting:

1. SCO STREAMS Kit and multi-user license for SCO XENIX V2.3.4, including serial numbers and activation keys.
2. SCO TCP/IP Kit and multi-user license for SCO XENIX V2.3.4, including serial numbers and activation keys.
3. IP address and node name (This is provided by your Network Administrator).
4. A 3ComB 3c503 Etherlink II card (Etherlink III cards are *not* supported by SCO).
5. SCO Xenix Operating System Disks, serial numbers and activation keys.

To load any Ethernet software, first load the "LINK" package supplied in the SCO XENIX Operating System.

The LINK package installs certain directories and files needed to relink the "kernel" (the executable part of the Operating system).

1. Log in as **root**
2. At the # prompt type **custom** and press **Enter**.
3. Select **1** Operating System and press **Enter**.
4. Select **1** Select one or more packages and press **Enter**.
5. At the prompt

   ```
   Enter the package(s) to install or enter q to return to the menu:
   ```

   type **link** and press **Enter**.
6. Follow the prompts to insert the needed Operating System disks and to enter the link kit serial number and activation key which are the same numbers that were supplied with the Operating System disks.
7. When the main menu appears, type **6** `Select a new set to customize.`

Loading GTS

Unless previously loaded, load the GTS software (*Refer to Chapter 5*).

Loading SCO STREAMS

Install the first software package that allows Ethernet access from your TMS Controller.

1. Insert disk #1 of the "STREAMS runtime" set into the boot drive.
2. Select `4 Add a supported product` and press **Enter**.
3. At the prompt:

```
Insert distribution disk number volume 1 and press Enter
```

Press **Enter**.

4. Select 1 `Install one or more packages` and press **Enter**.

5. At the prompt:

```
Enter packages to install
```

type **runtime** and press **Enter**.

6. At the prompt:

```
Insert disk #1 of the "STREAMS runtime" into the boot drive and press
     Enter
```

Press **Enter**.

7. You are prompted to enter your serial number and activation key. These are on the SCO Product Activation Key Card that came with the STREAMS software package.

```
SCO STREAMS Runtime Serialization

Enter your serial number:
```

Enter your serial number from your Product Activation Key Card.

```
Enter your activation key:
```

Enter your activation key from your Product Activation Key Card.

If they were entered correctly, you see:

```
Installing STREAMS module.

The STREAMS kernel parameters are reset to the following values (You
     are given the parameters and their values):
```

8. You see the message:

```
You must create a new kernel to use the STREAMS module.

Do you wish to create a new Kernel now?
```

Type **n** and press **Enter**

9. You see the message:

```
The streams module you installed will not be functional until
the kernel is re-linked and installed.

Do you wish to create a new kernel now? (y/n/q)
```

Type **n** and press **Enter**.

10. You see the message

```
Checking file permissions...
```

Loading TCP/IP

At this point, you load the SCO TCP/IP software release.

1. Remove STREAMS disks 1 of 1 and insert SCO TCP/IP Runtime system disk 1 of 3.

2. At the main menu, type 6 `Select a new set to customize`.

3. Select 4 `Add a supported product.`
4. At the prompt:

   ```
   Insert distribution volume 1 and press Enter
   ```

   Press **Enter**.
5. Select 1 `Install one or more packages.`
6. At the prompt

   ```
   Insert SCO TCP/IP disk 1 of 3 and press Enter
   ```

   Press **Enter**.
7. Select 1 `Install one or more packages.`

   Press **Enter**.
8. At the prompt:

   ```
   Enter packages to install
   ```

   type **tcprt** and press **Enter**.
9. Follow the prompts to insert and load all three disks.
10. At the end of the three disk installation you see the message :

    ```
    SCO TCP/IP Runtime System initialization
    Enter your serial number:
    ```

    Enter your serial number found on your SCO PRODUCT ACTIVATION KEY CARD. *Please remember that this serial number is case sensitive; you must type it exactly as shown.*

    At the prompt:

    ```
    Enter your activation key:
    ```

    Enter your activation key found on your SCO PRODUCT ACTIVATION KEY CARD.

    You see the message:

    ```
    Updating system configuration . . .
    ```
11. You are asked:

    ```
    Do you wish to relink the Kernel now?
    ```

    Type **n** and press **Enter**.
12. After the Main Menu appears, you are prompted:

    ```
    Select an option or enter q to quit.
    ```

    Type **q** and press **Enter**.

Ethernet Device Configuration

1. Type **cd /usr/sys/conf** and press **Enter**.
2. Type **mv e503* ../inet/3comB** and press **Enter**.

3. Type **cat link_xenix | sed ' /e503/d' > link_xenix.new** and press **Enter**.
4. Type **cp link_xenix link_xenix.save** and press **Enter**.
5. Type **cp link_xenix.new link_xenix** and press **Enter**.
6. Type **cd /dev** and press **Enter**.
7. Type **mkdev 3comB** and press **Enter**.
8. At the prompt:

   ```
   Do you wish to install or delete 3comB driver?
   ```

   Type **i** and press **Enter**.

   You are then shown a paragraph on 3comB 503 setup and a prompt:

   ```
   Do you wish to continue?
   ```

   Type **y** and press **Enter**.
9. Answer the questions:

   ```
   board0: Interrupt vector number (2-7) []
   ```

   Type **5** and press **Enter**.

   ```
   board0: Network type (thin or thick) [thin]
   ```

   This connection type depends on the connection type available for your local area network. Ask your network administrator.

   ```
   I/O Base address in hexidecimal 000-310 [300]
   ```

   Type **2e0** and press **Enter**.

   ```
   Do you have another 503 board?
   ```

   Type **n** and press **Enter**.

   ```
   Do you wish to re-link the kernel now?
   ```

   Type **y** and press **Enter**.

   ```
   Do you wish to use the kernel by default?
   ```

   Type **y** and press **Enter**.
10. At # prompt, type

    mkdev tcp

    You see a short paragraph about TCP setup. If you are unsure of what your local host name and domain name are, ask your network administrator.

    You see the prompt:

    ```
    HOST: [host]
    ```

    Type your host name, and press **Enter**.

    Next you see the prompt:

    ```
    DOMAIN: [UUCP]
    ```

Type your domain name and press **Enter**.

You see some information about Ethernet configuration. If you do not know your IP address, contact your system administrator.

At the prompt:

```
Interface 3comB0 IP address:
```

Type your local IP address and press **Enter**.

At the prompt:

```
Does interface 3comB0 use all 0s for its broadcast address:
```

Type **no** and press **Enter**.

At the prompt:

```
Interface 3comB0 broadcast address
```

This default address is derived from what you entered for an IP address.

Press **Enter** or change to suit your system.

At the prompt:

Interface 3comB0 netmask [255.255.255.0]

Press **Enter** or change to suit your system.

At the prompt:

```
Would you like TCP started automatically when the system goes
multi user?
```

Type **no** and press **Enter**.

Remove the floppy disk from the drive.

You must now do a `Normal Controller Shutdown` in order for these changes to take effect.

The installation is now complete. Contact your Network Administrator to arrange for a physical hook-up to your LAN.

After the Controller has rebooted, press <ALT-F2>, and log in as: root

Type: **tcp start** and press **Enter**.

If the card is installed correctly and your network is working, you see no error messages. If there are error messages, you must resolve them with your Network Administrator before continuing.

You must always type **tcp stop** *before shutting down the TMS Controller using the Controller Maintenence functions. You must be logged in as* **root** *to do this on the ALT-F2 screen.*

Using Your Ethernet Connection to run GTS Remotely

You If you have previously disabled "Autologin" on the TMS Controller, you must re-enable it before performing the following steps.

Leave your TMS controller on the GDC title screen.

Connect to your TMS Controller through your LAN by typing telnet <address>.

You see a login prompt.

Log in as GTS (This immediately kills GTS on the TMS Controller, and GTS runs on your remote terminal session).

Once the title screen appears on your remote terminal, you have three minutes to log into a network.

When you are done, log out to the GDC title screen.

Your remote session is killed and the TMS Controller once again gains control.

Additional Printer Port Installation

To use two printers simultaneously with the TMS Controller, add the optional *Serial/Parallel Card HP 24540B, GDC S-076P022-001*. To install this card, perform the following steps:

1. Remove jumpers on `P1-P4` (serial A, B, C, D).
2. Place jumper for `PAR-2` on `P-2`.
3. Place mode jumper on `AT`.
4. Install the HP 24540B card in the Controller.

Alternatively, you may use the BOCA I/OAT55 serial/parallel adapter. To install this card, perform the following steps:

1. Ensure that all jumpers are removed from header `J5`.
2. On `J4`, place a jumper on the pins labeled `LPT` and `0278`.
3. On `J4`, place a jumper on the pins labeled `LPTINT` and `IRQ5`.
4. Remove the the supplied DB-25 cable and bracket assembly (not used).
5. Install the IO/AT55 card in the Controller.

To utilize this port, in the `Controller Maintenance` screen, select Configure Parallel Ports and configure LP2.

B Technical Characteristics

Table B-1 Technical Characteristics

Item	Specifications
Multiplexing Technique	Bit-interleaved, time division
Multiplexing Efficiency	Up to 99%, essentially unaffected by speed or mix of channels
Microcell Backplane Internal Data throughput	Bit mode — 16.896 Mbps, Nibble mode — 45 Mbps, Packet mode — 270 Mbps
Channel Capacity	Up to 512 channels of voice or data per node
Aggregate Interfaces	EIA/TIA-232-E/ITU-T V.28
	ITU-T V.35
	EIA RS-422 (ITU-T V.11), EIA RS-423 (ITU-T V.10), MIL-STD-188-114
	T1/D4 1.544 Mbps
	T1 1.544 Mbps (non AT&T)
	ITU-T G.703 64 Kbps Codirectional
	ITU-T G.703 64 Kbps Contradirectional
	ITU-T G.703 256 Kbps
	ITU-T G.703 2.048 Mbps
	ITU-T G.704 2.048 Mbps
	Fiber Optic 1.544 Mbps or 2.048 Mbps
Aggregate Capacity	Up to 8 redundant or 16 non-redundant aggregate trunks per node
Aggregate Rates	From 2400 bps to 2.048 Mbps — *see Table 1-2* for listing of all standard rates.
Environmental:	
Operating Temperature*	32°F to 124°F (0°C to 50°C) (for equipment mounted in EP-2T,EP-2M, and EP-4
Nonoperating	–4°F to 186°F (–40°C to +85°C)
Humidity	95% relative humidity with no condensation
Altitude	
Operating	10,000 ft (3048 m)
Nonoperating	40,000 ft (12,192 m)
Enterprise System Control Card	
Internal Clock Accuracy	25 ppm
Timing Specifications	Meets ATT Pub. 62411 specification — Stratum 4 Enhanced
Input/Output Ports	TMS Controller Port — sync at 19.2 Kbps, async up to 9600 bps
	Maintenance Port (front and rear) async up to 9600 bps
	External modem — async up to 4800 bps
* Derate operating temperature by 1°C/1000 ft above sea level.	

Table B-1 Technical Characteristics (Cont.)

Item	Specifications
CDA Module	
Framing method	Bit oriented proprietary or Byte oriented (DS0)
Frame structure	D4 or ESF (CDA-T1), CEPT G.732 or G.704 (CDA-E1)
CDA module compatibility	DACS (Digital Access Cross-connect), D4 Devices and TMS-3000 w/CDA
Cross connection	Meets DSX-12 interconnect specification
CDA channel capacity	128 TMS-3000 channels (Non-redundant CDA pair)
	256 TMS-3000 channels (Redundant CDA pair)
CDA line rate	T1 — 1.544 Mbps
	E1 — CEPT G.704 and G.732 — 2.048 Mbps
PLL Jitter Tolerance (Receiver)	Meets ATT Pub. 62411 specification — Stratum 4 Enhanced
Input/Output Ports	Two DS1 ports support up to 48 DS0 channels per CDA-T1 module.
	Two DS1 ports support up to 32 DS0 channels per CDA-E1 module (CEPT G.704, G.732)
Pulse Density Requirements	B8ZS or Bit 7 stuffing (suppression)
Data II/III/IV/UDC Channel	
Data\ Rates	
Synchronous	From 75 bps to 1.152 Mbps
Asynchronous	From 0 to 19.2 Kbps
Isochronous, Anisochronous	From 0 to 64 Kbps
	See Table 1-1 in *Chapter 1* for listing of all standard channel rates
Interfaces	EIA/TIA-232-E/ITU-T V.28/ITU-T V.28
	ITU-T V.35
	EIA RS-422 (ITU-T V.11), MIL-STD-188-114 Balanced (Data and Timing)
	EIA RS-423 (ITU-T V.10), MIL-STD-188-114 Unbalanced (Data and Timing)
Interface Signal Characteristics:	DTE (Data Terminal Equipment) or DCE (Data Communications Equipment) may be chosen.
TID-III Data Channel	
Interface	Conforms to EIA RS-422 balanced differential interface for data and clock. Special application specific interfaces supported through interface piggyback.
Data Rates (Modes 1-4)	Channel rates, 1, 2, 2.4, 4, 4.8, 8, 9.6, 16, 32, 56, 64, 72, 96, 128, 192, 256, 512, 1024 Kbps*
	Corresponding TDM Rates: 1.2, 2.4, 3.2, 4.8, 6.4, 9.6, 12, 19.2, 38.4, 72, 76.8, 100, 112, 153.6, 224, 228, 576, 1152 Kbps.
Data Rates (Mode 5)	Any rate below pre-set maximum standard channel rates above**
Input Distortion (includes Clock/Data Skew and Clock Asymmetry)	Up to 25% maximum
Output Distortion (includes Clock/Data Skew	Less than 2.5%

* Other rates available. Consult GDC regarding availability of any specific desired rate not listed.

** For rates 2 Kbps and above, the lower limit is 850 Hz. For the 1 Kbps rate, the lower limit is 150 Hz.

Table B-1 Technical Characteristics (Cont.)

Item	Specifications
TID-III Data Channel (Cont.)	
Input Rate Offset	Dependent on input rate and mode selected. From ±0.001% to ±2%
Output Rate Accuracy	Dependent on input rate and mode selected. From ±0.001% to ±2%
Output Clock Jitter	Rate Dependent: From ±20 ns (±2%) bit-to-bit jitter at 1024 Kbps to ±0.03%
(Modes 1-3 and 5)	1 Kbps
Output Clock Jitter	±25 ms bit-to-bit jitter at 1024 to 512 Kbps. Less than ±0.75% at all other data rates
End-to-End Channel Delay	With 384-bit output FIFO Buffer Delay Setting: 527 ±135 bits
	With 96-bit output FIFO Buffer Delay Setting: 239 ±50 bits*
Acquisition Time	Maximum of 512 bits with no errors detected and 768 bits with detected errors
Transparency	Transparent to any data pattern
Channel Capacity	Requires 2 contiguous channel card slots of a TDM Multiplexer shelf
Power Requirement	+5 V at 3 A
Temperature	
Operating	0°C to 50°C (derate by 1°C/1000 ft above sea level)
Storage	–40°C to +85°C
Humidity	Up to 95% without condensation
Altitude	
Operating	10,000 ft
Storage	40,000 ft
Voice II/CVSD Channel	
Digital Interface	Synchronous
Impedance	600 ohms resistive ±10%
Return Loss	15 dB minimum, 300 to 3400 Hz
Longitudinal Balance	60 dB minimum, 300 to 3300 Hz
Usable Bandwidth	300 to 3300 Hz (3 dB points)
Input Levels	–16 or 0 dBm at transmitter input, switch selectable.
	–6.0 to +1.5 dB of compensation available in 0.5 dB steps.
Output Levels	0 or +7 dBm at receiver output, switch selectable.
	–6.0 to +1.5 dB of compensation available in 0.5 dB steps.
Performance Levels at 32 Kbps	
Idle Channel Noise	23 dBrnc0 maximum
Cross Talk Loss	60 dB minimum (0 dB Channel Gain)
	48 dB minimum (23 dB Channel Gain)
Harmonic Distortion at 1004 Hz	–25 dBm0 maximum
Intermodulation Distortion	2nd order –40 dBm0 max.
	3rd order –36 dBm0 max.

* For input rate tracking mode 1, the output FIFO settles to almost full (27-bit delay for 96-bit tap) and buffer excursion is limited to ±10 bits.

Table B-1 Technical Characteristics (Cont.)

Item	Specifications
Voice II/CVSD Channel (Cont.)	
Dynamic Range	+3 to –50 dBm0
Level Stability	±0.25 dB
Channel Gain at 1004 Hz	0 ±0.5 dB or 23 ±0.5 dB (Nominal gain ± Trim)
Signal to Quantizing	
Noise (1004 Hz Test Tone)	
At –39 dBm0 Signal Level	19 dB S/N
At –27 dBm0 Signal Level	25 dB S/N
At –18 to +3 dBm0 Signal Level	26 dB S/N
Frequency Response,	–1.5 dB to +1 dB (Relative to 1004 Hz)
400 to 3200 Hz	
Envelope Delay	
300 to 500 Hz	700 µs
500 to 2400 Hz	300 µs
800 to 2400 Hz	100 µs
2400 to 2900 Hz	300 µs
2900 to 3400 Hz	700 µs
E and M signaling states	
E-lead relay	Open = idle, Closed = busy
M-lead detector	Compatible with Types 1-5 signaling interface
M-lead input impedance	10 kilohms minimum, diode-protected
M-lead sensitivity	1 mA maximum
E-Lead Relay Contact Ratings	
Maximum Current	0.25 A
Maximum Voltage	100 volts*
Minimum Resistance	100 milliohms
Voice II/ASP Channel Module	
4-Wire Interface:	
Impedance	600 ohms resistive ±10%
Return Loss	20 dB minimum, 300 to 3400 Hz
Longitudinal Balance	56 dB minimum, 300 to 3400 Hz
Usable Bandwidth	300 to 3400 Hz (ASP Mode)
	300 to 3400 Hz (PCM Mode)
Nominal Input Levels:	–16 dBm or 0 dBm (switch selectable)
	–6.0 to +1.5 dB of compensation available in 0.5 dB steps (switch selectable)
Nominal Output Levels:	0 dBm or +7 dBm (switch selectable)
	–6.0 to +1.5 dB of compensation available in 0.5 dB steps (selected through supervisory port interface)
*This is an operating parameter, not a transient parameter.	

Table B-1 Technical Characteristics (Cont.)

Voice II/ASP Channel Module (Cont.)	
Voice Channel Performance (PCM mode):	
Signal-to-total distortion ratio as function of input level (noise)	
–3 dBm0	26.3 dB
–6 to –27 dBm0	33.9 dB
–34 dBm0	32.2 dB
–40 dBm0	27.6 dB
–55 dBm0	12.6 dB
Signal-to-total distortion ratio as function of input level (sine wave)	
0 to –30 dBm0	33 dB
–40 dBm0	27 dB
–45 dBm0	22 dB
Idle Channel Noise	–67 dBm0p (ITU-T Weighted)
	23 dBrnc0 (C-Message Weighted)
Cross Talk Loss	–65 dB minimum (1.5 dB channel gain)
Intermodulation	35 dB maximum
Level Stability	10 minutes ±0.2 dB
	1 year ±0.5 dB
Frequency Response	
300 to 3000 Hz	0 dB ±0.5 dB
3000 to 3400 Hz	0 dB –1.8 dB +0.5 dB
Channel Gain at 800 Hz	±0.3 dB from nominal
Cross Talk Loss	–65 dB minimum (1.5 dB channel gain)
Envelope Delay	The absolute envelope delay at the frequency of minimum envelope delay is less than 600 microseconds. The minimum value is taken as reference for the envelope delay distortion.
Envelope Delay Distortion	
500 to 600 Hz	1.5 ms
600 to 100 Hz	0.75 ms
1000 to 2600 Hz	0.25 ms
2600 to 2800 Hz	1.5 ms
Voice Channel Performance (ASP Mode):	
Signal-to-Total Distortion	>20 dB at –40 dBm0 Input
Ratio (Sine wave input 700 to 1100 Hz)	>25 dB from –30 dBm0 to 0 dBm0 Input
Idle Channel Noise	–67 dBm0P (ITU-T Weighted), 23 dBrnC0 (C-Message Weighted)
Cross Talk Loss	–65 dB minimum (0 dB channel gain)

Table B-1 Technical Characteristics (Cont.)

Item	Specifications
Voice II/ASP Channel Module (Cont.)	
Variation of Gain with Input Level (802 Hz ref.)	±0.5 dB from –40 dBm0 to +2.5 dBm0 relative to level at –10 dBm0
Level Stability	10 minutes: ±0.2 dB
	1 year: ±0.5 dB
Frequency Response	
300 Hz to 2400 Hz	0 dB ±0.5 dB
2400 Hz to 3400 Hz	0 dB –1.8 dB, +0.5 dB
Channel Gain at 800 Hz	±0.3 dB from nominal
Output Power Spectral Density	
5 kHz to 9 kHz	–40 dBm
10 kHz	–42.5 dBm
50 kHz to 500 kHz	–70 dBm
Power Requirements:	+5 V dc ±5% 230 mA max.
	+12 V dc ±10% 10 mA max.
	–12 V dc ±10% 30 mA max.
Universal Voice Card	
Interface Characteristics:	
Impedance	600 ohms resistive ±10%
Return Loss	20 dB minimum (300 to 3400 Hz)
Longitudinal Balance	56 dB minimum (300 to 3400 Hz)
Usable Bandwidth	300 to 3400 Hz
Signal to Total distortion Ratio:	
PCM Voice Channel and all PCM-T mode options (noise signal in accordance with ITU-T 0.131)	
Input level	
–3 dB	>26.3 dB
–6 dB	>33.9 dB
–34 dB	>32.2 dB
–40 dB	>27.6 dB
–55 dB	12.6 dB
ADPCM Voice Channel	
Input level	
–3 dB	27 dB
–6 dB	34 dB
–34 dB	32 dB
–40 dB	28 dB
–55 dB	13 dB
PCM Voice Channel	±3 dB at –50 to –55 dBm0 relative to channel level at –10 dBm
	Unspecified at less than –55 dBm0.
ADPCM Voice Channel	±3 dB at –50 to –55 dBm0 relative to channel level at –10 dBm

Table B-1 Technical Characteristics (Cont.)

Item	Specifications
Universal Voice Card (Cont.)	
Level Stability	10 minutes: ±0.2 dB
Frequency Response:	
300 Hz to 3000 Hz	0 dB ±0.5 dB
3000 Hz to 3400 Hz	0 dB +1.8 dB, –0.5 dB
Channel Gain at 800 Hz	±0.3 dB from nominal
Power Requirements:	
PCM	+5 V dc, 83 mA max. +12 V dc, 8 mA max. –12 V dc, 20 mA max.
ADPCM	+5 V dc, 107 mA max. +12 V dc, 8 mA max. –12 V dc, 20 mA max.
Echo Canceller Card	
Power Requirements:	
Using TMS32030 Digital Signal Processor	+5 V dc ±5%, 330 mA, typical –12 V dc ±10%, 1.2 mA, typical
Using TMS320C25 Digital Signal Processor	+5 V dc ±5%, 100 mA, typical –12 V dc ±10%, 1.2 mA, typical
Power Consumption:	
Using TMS-3000 32020 Digital Signal Processor	1.6 Watts
Using TMS320C25 Digital Signal Processor	0.5 Watts
TMS-3000 Power Requirements	
Domestic Unit	Input Voltage Range: 85-129 V ac
(USA, Canada, Japan)	Fuses: 8 Amp 3AG
Non-Domestic Unit	Input Voltage Range: 175-242 V ac
(Europe)	Fuses: 5 Amp 5x20 mm
Non-Domestic Unit	Input Voltage Range: 204-264 V ac
(United Kingdom)	Fuses: 5 Amp 5x20 mm
Frequency	50/60 Hz
Output Voltage and Current	+5.1 V +3.0%, –2.5% at 8 to 105 amps
3 MOPS non-redundant	+12 V ±10% at 0.25 to 12 amps
4 MOPS redundant	–12 V ±10% at 0.25 to 12 amps
Remote Alarm Relay Contact Rating	Maximum Current: 0.25 amp
Power Consumption:	
CDA-T1 Module	Maximum: 28.75 Watts [5.75 amps (+5 V dc) (±12 V dc)]
CDA-E1 Module (with G.732 I/O Plug-In Card)	Maximum: 27.0 watts [5.4 amps (+5 V dc) (0.2 amps ±12 V ac)]

Table B-1 Technical Characteristics (Cont.)

Item	Specifications
TMS-3000 Power Requirements (Cont.)	
Channel Interface Card	Maximum: 9.2 Watts [1.83 amps (+5 V dc) (±12 V dc)]
Enterprise System Control Card	Maximum: 20 Watts [4 amps (+5 V dc) 0.06 amps (–12 V dc)]
Redundancy Control Card	Maximum: 4.1 Watts [0.55 amps (+5 V dc), 0.10 amp (+12 V dc), 0.01 amp (–12 V dc)]
ACM Module	Maximum: 20.0 watts [4.0 amps (+5 V dc) (0.5 amps ±12 V ac)]
TPP-LAN	Maximum 75 Watts [15 amps (+5 Vdc)]
TPP-FR	Maximum 50 Watts [10 amps (+5 Vdc)]
Aggregate Control Card	Maximum: 18.5 Watts [3.6 amps (+5 V dc), 0.10 amp (+12 V dc)]
Harness Card	Maximum: 2.8 Watts [557 milliamps (+5 V dc) (+12 V dc)]
EIA/TIA-232-E Aggregate Interface Plug-In	0.5 Watts
V.35 Aggregate Interface Plug-In	1.2 Watts
RS-422/423 Aggregate Interface Plug-In	0.7 Watts
WECO 303 Aggregate Interface Plug-In	1.5 Watts
G.703 64 Kbps Codirectional Aggregate Interface Plug-In	1.0 Watts
G.703 64 Kbps Contradirectional Aggregate Interface Plug-In	0.4 Watts
G.703 2.048 Mbps Aggregate Interface Plug-In (75-ohm)	2.0 Watts
G.703 2.048 Mbps Aggregate Interface Plug-In (120-ohm)	1.9 Watts
G.704 2.048 Mbps Aggregate Interface Plug-In (75/120 ohm)	1.5 Watts
Expansion	0.2 Watts
Data II/III/IV Channel:	
EIA/TIA-232-E Interface	1.9 Watts
RS-422 Interface	1.8 Watts
RS-423 Interface	1.7 Watts
V.35 Interface	1.7 Watts
Voice II/PCM Channel	1.4 Watts
	0.42 Watts
ADPCM Plug-In	2.1 Watts
Voice II/CVSD Channel	1.9 Watts
Voice II/ASP Channel	1.6 Watts

Table B-1 Technical Characteristics (Cont.)

Item	Specifications
TMS-3000 Power Requirements (Cont.)	
Universal Voice Card PCM Voice	0.69 Watts
Universal Voice Card ADPCM Voice	0.81 Watts
Maximum Power Consumption for TMS-3000 node with 96 local data channels, 4 redundant Channel Interface Cards, 4 redundant Aggregate Control Cards, redundant ESCCs, and 1 Redundancy Control Card	350 Watts
ADPCM Compression Module (ACM)	
Framing method	Bit oriented proprietary to Byte oriented (DS0)
Frame structure	D4, T1/D4E, CEPT G.732
ACM Port Capability	DPBX, DACS Network or D4 devices
ACM module compatibility	Full TMS-3000 compatibility
ACM channel capacity	Up to 24 voice circuits compressed via GDC ADPCM compression techniques across a single DS1 line.
	Up to 30 voice circuits (E1 only) compressed via GDC ADPCM compression techniques across a single DS1 line.
ACM line rate	T1 DS1 — 1.544 Mbps
	ACM/E1 (G.704 and G.732) — 2.048 Mbps
PLL Jitter Tolerance	Meets ATT Pub. 62411 specification
ADPCM voice rates	64, 32, 24 and 16 Kbps
Input/Output Ports	One DS1 port supports up to 34 DS0 channels per ACM/T1
	One DS1 port supports up to 30 DS0 channels (CEPT G.732) per ACM/E1
Signaling Types	
Network	Robbed Bit,
	G.704 CAS Channel 16
	Message Oriented Common Channel Signaling (CCS)
	In Band Signaling (SF, Tone type)
Channel	No ABCD Signaling (Inband or CCS)
	2-State Signaling (A or E/M (ACM or UVC))
	4-State Signaling (A,B to ACM)
	16-State Signaling (A,B,C,D to ACM only)
Signaling Conditioning Types	A0+B0 (On-Hook)
	A0+B1 (On-Hook, No ringing for FXS Loop Start and FX0 Ground Start)
	A0/1+B0/1 (On-Hook, then Off-Hook)
	A1/0/1+B1/0/1 (Off Hook, then Hook Flash)
	A1+B1 (Off-Hook or Disconnect/Blocked (ITU-T)
	A1/0+B1 (Off-Hook, then On-Hook, No ringing for FXS Ground Start)

C TMS-3000 Maintenance Console

Overview

The TMS 3000 and MEGAMUX TMS (Transport Management System) Maintenance Console (hereinafter referred to as the Console) is a software package that allows you to interact with the TMS 3000/MEGAMUX TMS system on a local level, i.e., at a site remote from the Controller. This software is designed to work with any terminal that runs 1200 to 9600 baud, ASCII, on an EIA/TIA-232-E interface. The Console terminal is connected to J19 of the TMS 3000 Main Shelf Backplane. The 25-pin D-type connector should have the pin designations shown in Table C-1.

Some of the TMS common cards (ESCC, ACM, CDA, TPP and OPP) have a front monitor port for connecting the Maintenance Console. The cable required for this connection is GDC 024H140.

There are two components of the Console: the boot console and the loadable console. The boot console is used to initially configure the local node using only the boot firmware [located on the Enterprise System Control Module (ESCC)], which establishes a communication link between the local node and the TMS system. This communication link allows the TMS to download software to the local node. This "node control" (software which is downloaded to the node from the TMS controller) gives the Console the ability to configure the local node and diagnose any problems.

The Console can be used to configure the controller port interface (J20 and J42) and the aggregates at the local node. The main purpose for this ability is to communicate with the network controller, either directly (via J20 or J42 if an external modem is selected) or indirectly (via an aggregate or J42 if it is a pass-through port to another node). Once communication is established, software and configuration information can now be obtained.

The Console can also assist in diagnosing local problems. Through the console, you can display status for all common and channel modules. Diagnostic loopbacks can be invoked for the Aggregate Control and Channel Interface Modules. You can invoke loopbacks for the channel modules with an optionally injected BERT test pattern. (Accumulated test pattern errors can be monitored.)

Table C-1 EIA/TIA-232-E Pin Designations

Pin No.	Symbol	Direction	Description
2	TXD	Out	Transmit Data
3	RXD	In	Receive Data
7	Sig GND	—	Signal Ground

Terminal Type and keyboard Operation

The Console software is designed to operate with an ASCII terminal that runs between 1200 and 9600 baud and uses an EIA/TIA-232-E interface. The character format is asynchronous with 7 data bits, 1 start bit, 1 stop bit, and even parity. The data rates are 9600, 4800, 2400, or 1200 baud. Console baud rate is set automatically when you press <Return>.

After powering up, the maintenance console is "booted" through firmware. After the console is booted, select a menu item by typing the associated three-letter command and pressing <Return>. Whenever a selection is made the screen is not cleared; the previous displays are scrolled up. "ESCC>" is the normal prompt. While in boot, the prompt is "ESCC-b>." The HELP screen can be displayed with a new prompt at any time by typing HEL and pressing <Return>. Should an unknown command or invalid data be entered, a "???" and a new prompt appears.

If you want to go to the help menu hit the "CTL" and "C" keys simultaneously.

System Startup

This section describes the initial power up of the Console, including the procedure for setting up the preliminary configuration if there is no node control software or if there has been an unexpected memory loss. Node Control software is downloaded via an aggregate, or J42, from the TMS Controller, or directly from the TMS Controller through J20 or J42.

Node Startup Procedures

Two different startup procedures are described in the following paragraphs: startup with boot firmware and startup with node control software.

Startup with Boot Firmware

In this situation the program and configuration information that was factory-loaded into the node has somehow been erased, or, for some reason, was never loaded into the node. In this case, you must configure the aggregate sufficiently to allow the node to communicate so program and configuration information can then be downloaded.

For the ESCC, you are normally always be in full-feature (not boot) software. If you are not, contact GDC for further instructions.

In the TMS Compact, J6 replaces J20 and J8 replaces J42.

After power-up on the ESCC, do not type any console keys until the in-service or standby LEDs are on. Hitting a key could cause an error, causing the ESCC to restart again.

Startup with Node Control Software

In this situation the node and the aggregate contain a complete set of software, but do not have the correct configuration information to communicate across the aggregate. In this case, the console does not need to be booted up.

When either of these procedures is performed, an operator at the TMS controller site should monitor network status to confirm that the TMS Controller is communicating with the node once the procedure is complete.

Console baud rate is set automatically by autobaud. By typing a Carriage Return, the ESCC autobauds to console rates of 1200, 2400, 4800, or 9600 baud. By typing the Break key, the ESCC autobauds again when the Carriage Return is typed.

The following procedure should be used if the node has loadable software and you want to reconfigure the aggregate.

1. Press the <Return> key on the console. The prompt "ESCC>" is displayed.
2. Type **H** and press <Return>. The following menu is displayed.

```
HEL     - View Help
VCH     - View Chan.
VEQ     - View Equipment
VPT     - View Port Configuration
MNT     - (Re) Set Maint. Mode
CFM     - Configure Ext. Modem
DIA     - Perform Diag.
MFP     - Modify I/O Port Configuration
AGR     - Set Agg. Cfg. & Activation
```

3. Type **VEQ** and press <Return>. The current configuration information is displayed.
4. If any of the configuration information needs to be modified, follow the procedures detailed in *Chapter 4*, Command Reference.

TMS Controller Interface Baud Rate

The baud rate of the Controller Interface at the TMS node (the node local to the controller) and the PC Serial I/O Port 0 baud rate must agree. In the event of a direct connection to the TMS Controller, a rate of 9600 bps is recommended for 486 controllers. When there is a modem link for dial backup use, baud rates of 1200 bps or 2400 bps are recommended. Refer to the MFP command later in this appendix for further details on setting baud rate.

Help Menu

The following is a description of the Console Main Menu. If you do not have loadable software, or have experienced an unexpected memory loss, follow the procedure Node Startup Procedures discussed earlier in this section. After powering up the Console, you see this screen :

```
HEL     - View Help
VCH     - View Chan.
VEQ     - View Equipment
VPT     -  View Port Configuration
MNT     - (Re) Set Maint. Mode
CFM     - Configure Ext. Modem
DIA     - Perform Diag.
MFP     - Modify I/O Port Configuration
AGR     - Set Agg. Cfg. & Activation
```

To select an item in the HELP menu, type the command (all upper-case) and press <Return>. When you make a selection, the display scrolls up. The symbol ">" is displayed on the current line as a prompt. If at any time you enter an unknown command or invalid data, a "???" message appears on the screen with an ESCC> prompt.

The following paragraphs describe each HELP menu selection in their order of appearance on the menu. Each is selected by typing the three-letter command and pressing <Return>.

HEL - To View the Help Menu

This **HEL** command is used to display the HELP or Main Menu. It can be selected any time the ">" or the "Slave>"prompt is on the screen.

VCH - To View Channel Information

This command is used to display the configuration and status of a band of up to 64 channels. You can only view the running configuration; you cannot change it from the TMS Maintenance Console.

If you select VCH, the following prompt is displayed:

```
Slot # ? (1-16)
```

If the Console is connected to a MEGAMUX TMS Compact or TMS 3000 Compact Node, the following prompt is displayed:

```
Slot # ? (1-5)
```

If the slot number you enter is not a Channel Interface Module, no information is displayed.

If the parameters are entered correctly, a screen similar to the following is displayed.

CHNL#	SHELF#1	SHELF#2	SHELF#3	SHELF#4
1	SYNC-28	ASYNC-23	UNDEF	UNDEF
2	ASYNC-01*	PCM-40	SYNC-28	SYNC-28
3	.	.	.	.
.	.	.	.	.
.	.	.	.	.
	.	.	.	.
16	SYNC-28	ASYNC-23	UNDEF	UNDEF

The numbers following PCM, SYNC, etc., are rate indexes. The corresponding rates can be found in Table C-2. The following list shows the different types of channel cards and how they appear on the console:

1. Async: Asynchronous
2. Sync : Synchronous
3. Isoc: Isochronous
4. Pcm: Pulse Coded Modulation
5. Adpcm: Adaptive Differential Pulse Coded Modulation
6. Pcm-t: Pulse Coded Modulation (with reduced overhead) (also used for Acm-Pcm channel type)
7. Uadpcm: Universal Adaptive Differential Pulse Coded Modulation (with reduced overhead) (also used for Acm-UVC channel type)
8. Asp: Advanced Speech Processing
9. Cvsd: Continuously Variable Slope Delta Modulation
10. Cadm: Compressed Adaptive Differential Modulation
11. Tor: Thinned Out Residual
12. T-enc: Transition Encoded
13. Tid: Time Independent Data
14. Vlbrv: Very low bit rate voice
15. Celp: Codebook Excited Linear Predictable Coding

VEQ - To View Equipment

This command is used to view the currently running common modules on the TMS Main Shelf. If you select **VEQ**, a screen similar to the following is displayed:

```
                                        T1/D4          1's
Slot #        Index #    Tx     Ext     NTT     Red    Den     Adr     Status
                         Clk    Clk
01            64         I      A       Y       Y      Y       5       In_alarm
02            UNDEF
03            63         I      A       Y       Y      N       6
.
.
.
15            CIC                                                       In_alarm
16            CIC
P_scc         In_serv                                          3
C_scc         Out_serv                                         3
```

Slot # indicates the number of each specific slot in the equipment shelf. Slot numbers range from 1 to 16.

Index # indicates what type of common (card) module occupies the slot in this configuration. If a number is entered here, it indicates aggregate rate by code digit. These code digits are defined in Table C-2. For example, the number 64 entered in this column indicates that the Aggregate Control module in this slot is running at 2048K baud.

If the aggregate is configured for a special rate, a valid rate code digit is **not** displayed. Special channel rates that are entered on the TMS Controller appear as code digits (240 through 249) on the Console.

The following list shows the other common (card) modules that are represented on the console:

CIC: Channel Interface Module

CDA: Combined Digital Aggregate Module

CDA_E: Combined Digital Aggregate Module/E1 Version

IAC: ISDN Aggregate Control Module

ACM: ADPCM Compression Module

If UNDEF appears, it indicates that this slot is undefined in the currently running configuration.

Table C-2 Aggregate/Channel Rate Code Digits

Rate	Number to Enter	Usage
0	62t	CDA
75	1	Channel
100	2	Channel
150	3	Channel
200	4	Channel
300	5	Channel
400	6	Channel
600	7	Channel
800	8	Channel
900	9	Channel
1000	10	Channel
1200	11	Channel
1600	12	Channel
1800	13	Channel
2000	14	Channel
2400	15	Channel
3200	16	Channel
3600	17	Channel
4000	18	Channel
4800	19	Aggregate/Channel
6400	20	Aggregate/Channel
7200	21	Aggregate/Channel
8000	22	Aggregate/Channel
9600	23	Aggregate/Channel
12000	24	Aggregate/Channel
14000	25	Aggregate/Channel
14400	26	Aggregate/Channel
16000	27	Aggregate/Channel
19200	28	Aggregate/Channel
24000	29	Aggregate/Channel
25000	30	Aggregate/Channel
28000	31	Aggregate/Channel
28800	32	Aggregate/Channel
32000	33	Aggregate/Channel

Note that special rates entered from the Controller appear as rates 240-249 on the maintenance console VEQ or VCH screens.

Table C-2 Aggregate/Channel Rate Code Digits (Cont.)

Rate	Number to Enter	Usage
36000	34	Aggregate/Channel
38400	35	Aggregate/Channel
48000	36	Aggregate/Channel
50000	37	Aggregate/Channel
56000	38	Aggregate/Channel
57600	39	Aggregate/Channel
64000	40	Aggregate/Channel
72000	41	Aggregate/Channel
76800	42	Aggregate/Channel
96000	43	Aggregate/Channel
100000	44	Aggregate/Channel
112000	45	Aggregate/Channel
115200	46	Aggregate/Channel
128000	47	Aggregate/Channel
144000	48	Aggregate/Channel
153000	49	Aggregate/Channel
192000	50	Aggregate/Channel
224000	51	Aggregate/Channel
230400	52	Aggregate/Channel
256000	53	Aggregate/Channel
288000	54	Aggregate/Channel
384000	55	Aggregate/Channel
460800	56	Aggregate/Channel
512000	57	Aggregate/Channel
576000	58	Aggregate/Channel
768000	59	Aggregate/Channel
1024000	60	Aggregate/Channel
1152000	61	Aggregate/Channel
1536000 (T1/D4)	62	Aggregate
1544000	63	Aggregate
2048000	64	Aggregate
66000	65	Channel — PCM
34000	66	Channel — AD-PCM
64800	67	Channel — PCM
Note that special rates entered from the Controller appear as rates 240-249 on the maintenance console VEQ or VCH screens.		

Table C-2 Aggregate/Channel Rate Code Digits (Cont.)

Rate	Number to Enter	Usage
1056000	68	Not Used
2112000	69	Not Used
3168000	70	Not Used
4224000	71	Not Used
5280000	72	Not Used
6336000	73	Not Used
7392000	74	Not Used
3152000	75	Not Used
6312000	76	Not Used
921600	77	Aggregate/Channel
896000	78	Aggregate/Channel
448000	79	Aggregate/Channel
307200	80	Aggregate/Channel
2034000	81	Not Used
8448000	82	Not Used
394000	83	Channel
1344000	84	Aggregate
1472000*	85	Aggregate
1528000*	86	Aggregate
1536000 (422)	87	Aggregate
10400	88	Tor Channel Rate
32800	89	ADPCM2 Channel Rate
50	90	Channel
39000	91	Channel
40800	92	Channel
168000	93	Aggregate
338000	94	Channel
1536000 (NTT)	95	Aggregate
8800	96	Tor Channel Rate
10000	97	ASP Channel Rate
11000	98	ASP Channel Rate
12000	99	ASP Channel Rate

*T1/D4-E only.

Note that special rates entered from the Controller appear as rates 240-249 on the maintenance console VEQ or VCH screens.

Table C-2 Aggregate/Channel Rate Code Digits (Cont.)

Rate	Number to Enter	Usage
12800	100	ASP Channel Rate
15000	101	ASP Channel Rate
16800	102	ASP Channel Rate
32800	103	ADPCM Channel Rate
24800	104	ADPCM Channel Rate
32800	105	ADPCM Channel Rate
32800	106	ADPCM Channel Rate
320K	107	Aggregate/Channel
640K	108	Aggregate/Channel
704K	109	Aggregate/Channel
832K	110	Aggregate/Channel
960K	111	Aggregate/Channel
1.088M	112	Aggregate/Channel
1.216M	113	Aggregate/Channel
1.280M	114	Aggregate/Channel
1.408M	115	Aggregate/Channel
1.600M	116	Aggregate/Channel
1.664M	117	Aggregate/Channel
1.728M	118	Aggregate/Channel
1.792M	119	Aggregate/Channel
1.856M	120	Aggregate/Channel
1.920M	121	Aggregate/Channel
1.984M	122	Aggregate/Channel
280K	124	Aggregate/Channel
336K	125	Aggregate/Channel
504K	126	Aggregate/Channel
560K	127	Aggregate/Channel
616K	128	Aggregate/Channel
672K	129	Aggregate/Channel
728K	130	Aggregate/Channel
784K	131	Aggregate/Channel
840K	132	Aggregate/Channel
952K	133	Aggregate/Channel
1.008M	134	Aggregate/Channel
Note that special rates entered from the Controller appear as rates 240-249 on the maintenance console VEQ or VCH screens.		

Table C-2 Aggregate/Channel Rate Code Digits (Cont.)

Rate	Number to Enter	Usage
1.064M	135	Aggregate/Channel
1.120M	136	Aggregate/Channel
1.176M	137	Aggregate/Channel
1.232M	138	Aggregate/Channel
1.288M	139	Aggregate/Channel
392K	140	Aggregate/Channel
328K	141	Aggregate/Channel
25	123	Not Used
7.600M	142	Not Used
Note that special rates entered from the Controller appear as rates 240-249 on the maintenance console VEQ or VCH screens.		

The code digits correspond to ten special rates, as follows:

240 Special Channel Rate 1

241 Special Channel Rate 2

242 Special Channel Rate 3

243 Special Channel Rate 4

244 Special Channel Rate 5

245 Special Channel Rate 6

246 Special Channel Rate 7

247 Special Channel Rate 8

248 Special Channel Rate 9

249 Special Channel Rate 10

Special Channel Rates 1 through 10 may refer to any of the special channel rates listed in *Table 1-4 in Chapter 1 of this manual*.

Tx Clk indicates the source of the transmit clock for this slot: "I," internal; "E", external.

Ext Clk indicates the source of the external clock for this slot. "A" indicates that the aggregate clock is used for timing. "R" indicates that the timing signal is to be derived from the aggregate receive data or the aggregate receive clock.

T1/D4 NTT indicates that a T1/D4 or NTT interface is used. "Y" appears if this type of interface is used for this slot; "N" appears if this type of interface is not used for this slot.

Red indicates whether or not this system is redundant. "Y" indicates a redundant system, "N" indicates a nonredundant 64 system.

1's Den indicates whether or not one's density is used. "Y" indicates that it is used; "N" indicates that it is not used.

Adr indicates the node address to which this aggregate is connected. The Adr column gives the address of the remote connected node if the module is an Aggregate Control module or the ad-

dress of the local node if the module is a System Control module. For all other equipment types, nothing is entered.

Status indicates the status of this slot. "Lnk_down" indicates that this aggregate link is currently down. "Out_slot" indicates that the module is not physically in the slot. "Out_serv" indicates that this link is totally out of service. "In_alarm" indicates that this link is currently in an alarm condition. If this field is blank, it indicates that this link is currently healthy, with no prevailing conditions to affect it.

The Status column indicates the alarm condition of the corresponding Aggregate Control module or Channel Interface module. An asterisk in the Status column indicates a major alarm.

If the Console is connected to a TMS Compact node, selecting VEQ results in a screen similar to the following being displayed:

```
                                    T1/D4          1's
Slot #     Index #  TxClk  Ext Clk  NTT    Red     Den    Addr   Status
01         62       I       A       Y      Y       Y      085
02         SET TO BACK UP:  1                              003    Out_serv
03         64       E       A       N      Y       N      003
04         CIC
05         CIC


P_scc      In_serv
S_scc      Out_serv
```

Up to two aggregate trunks can be supported by a TMS Compact node. Each trunk requires one Aggregate Control module in the TMS Compact shelf. A third Aggregate Control module provides "1 of 2" redundant backup in a redundant system.

In the screen above, Slots 1 and 3 contain the Aggregate Control modules; Slot 2 contains the third Aggregate Control module (which provides the "1 of 2" redundant backup for the other two Aggregate Control modules). The Aggregate Control module in Slot 2 is currently set to back up the Aggregate Control module in Slot 1 in the event of a failure.

VPT - View Port Configuration

This command is used to view port information. If you select **VPT**, a screen similar to the following is displayed:

Port	Rate	Data-Type	Parity	(J20) (J42) Timing/Modem	Data Bits
J20	4800	Async	Even		8
J42	1200	Async	Even		8
J19	Auto	Async	Even		7

MNT - Set or Reset Maintenance Mode

This command is used to tell the network controller that a technician is on-site. The on-site user must set maintenance mode to "on" before the console software allows diagnostics. During maintenance mode, no alarm messages are sent to the network controller. After you select MNT, you see:

```
Current Mode: Normal

Change? (Y/N)
```

By entering **Y** for yes, the current mode changes to "Maint." If you select MNT again, you see:

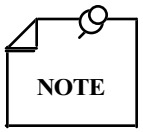
```
Current Mode: Maint

Change? (Y/N)
```

By entering **Y** for yes, the current mode returns to "Normal."

DIA - To Perform Diagnostics

This command is used to initiate Diagnostic tests only after the MNT command is used to change the console to maintenance mode (Maint).



From the Maintenance Console, diagnostics may only be performed on the Aggregate Control Card (ACC) and the Channel Interface Card (CIC).

After selecting **DIA** you see:

```
1 = Equipment

2 = Channel
```

Select **1** or **2** and press <Return>. If you select (1) Equipment, the following prompts are displayed in successive order. You must respond to each of these prompts.

```
Slot #? (1-16) [(1-5) for MEGAMUX TMS Compact]

Lcl or Rem Lpbk, Stop Test? (L/R/S)
```

If the test is being performed successfully, the screen displays an "OK." If the console outputs an error code instead, look up the meaning of the error code in Table C-3. The prompt:

```
Lcl or Rem Lpbk, Stop Test? (L/R/S)
```

continually repeats until you press the CONTROL key and the letter X to exit this diagnostic test. The ">" or "slave >" prompt then reappears.

If you select (2) Channel, the following prompts are displayed in successive order. You must respond to each of these prompts.

```
Slot #? (1-16) [(1-5) for MEGAMUX TMS Compact]

Lcl or Rem Lpbk, Stop Test, Monitor BERT (L/R/S/M)

BERT? (Y/N)
```

If the test you initiated is being performed successfully, the screen displays an "OK." If the console outputs an error code instead, look up the meaning of the error code in Table C-3. The prompt

```
Lcl or Rem Lpbk, Stop Test, Monitor BERT? (L/R/S/M)
```

continually repeats until you press CTRL X to exit this diagnostic test. The ">" or "slave >" prompt then reappears.

This feature is particularly useful for monitoring accumulated test pattern errors.

Typing S at the "(L/R/S)" or "(L/R/S/M)" prompts, terminates the test.

Table C-3 Diagnostic Error Codes

Code	Meaning
01	Channel Test Fail
02	Controller Test Fail — Hardware
03	Controller Test Fail — Aggregate Control or Channel Interface Not Responding or Not In Slot
04	Channel Not In Slot and/or Not Configured
05	Channel Tests Already in Progress

MFP - Modify I/O Port Configuration

This command is used to set the configuration for the TMS Controller Port (J20 on the Main Shelf backplane of the TMS node), the Internal/External Modem Port (J42) and, in the future, J19. After you select MFP, you see:

```
Modify Port:
0 - J20
1 - J42
2 - J19
Enter #
```

Modify Port I/O Configuration for J20 — Select **0** and press RETURN.

You see:

```
0-Sync
1-Async
Enter Serial I/F Type
```

1. For sync select 0 and press <Return>. You see:

```
Enter Data Rate (Ref: User Manual for Max allowed)
Enter #
```

After entering a rate at the prompt you see:

```
0 - J20 set to loop timing
1 - Ext device in loop timing
2 - Normal timing
```

After making your choice you are returned to the "slave>" prompt.

2. For Async select 1 and press <Return>. You see:

```
0-Deconfigure for communications
1-300
2-1.2k
3-2.4k
4-4.8k
5-9.6k
6-19.2k (Entry not valid for J19)
```

Select choice (0-6) for rate and press <Return>. You see:

```
0-8 bits no parity
1-8 bits even parity
2-8 bits odd parity
3-7 bits even parity
4-7 bits odd parity
```

Enter #

Slave>

Modify Port I/O Configuration for J42 — After you select MFP, you see:

```
Modify Port:
0 - J20
1 - J42
2 - J19
Enter:
```

Select **1** and press RETURN.

You see:

```
0-Passthru
1-Int Modem
2-Ext Modem - Pulse Dial
3-Ext Modem - Tone Dial
```

If you select 0, 2, or 3 and press <Return> (By selecting 1, the internal modem baud rate is automatically set to 1200). You see:

```
0-Deconfigure for communications
1-300
2-1.2k
3-2.4k
4-4.8k
5-9.6k
6-19.2k (Entry not valid for J19)
```

Make selection and press <Return>. You see:

```
0-8 bits no parity
1-8 bits even parity
2-8 bits odd parity
3-7 bits even parity
4-7 bits odd parity
```

Enter #

After selecting the parity and bits you are sent to the "Slave>‘‘ prompt.

Modify Port I/O Configuration for J19 is currently not allowed, but may be available in a future release.

To deconfigure Port J20, select Async (1), and enter 0 for the rate. To deconfigure the Port J42, select either Passthru or Ext. Modem, and enter 0 for the rate. You are then returned to the "Slave>" prompt.

CFM - Configure the External Modem

This command is used to configure an external dial-back modem on Port J42. After you select **CFM**, the current configuration for J42 is checked. If Port J42 is not configured as an external dial-back modem, the message "Not Cfg'd for Ext Modem" is displayed.

The external modem is then checked to make sure it is currently on line. If it is on line, the message "On Line" is displayed and the modem is not allowed to be configured until the current call is terminated.

The console I/O is then internally routed to the external modem and the modem’s help menu is displayed on the screen. Please refer to the appropriate modem manual for a detailed description of the modem commands.

To terminate the modem configuration session, press **CTRL X**.

AGR - Set Aggregate Parameters

This command is used to set minimum aggregate configuration data and force the aggregates to run sync frames. Use this command when a node has no configuration or a bad configuration. In these cases, some of the Aggregate Control Modules at the local node are out-of-sync with those at remote nodes. No communications can be established between these nodes. When the AGR command is used, the TMS Controller can then download a more complete configuration. After you type AGR and press <Return>, you see the following prompts in successive order:

```
Slot #? (1-16) [(1-5) for MEGAMUX TMS Compact]
Agg Rate? (1 - 255)
Tx Clk Source? (I/E)
Ext Clk Source? (A/R)
T1/D4 or NTT? (Y/N)
Red. Agg? (Y/N)
1’s density? (Y/N)
```

You should only select Slot 1 or Slot 3 (the Aggregate Interface Cards) for the TMS Compact node. Selecting other Slots (2, 4, or 5) can cause the configurations for these slots to be corrupted.

If you need to know the currently running node configuration before using the AGR command, type **VEQ** and press <Return>. The current node configuration is displayed. Once you know the configuration you want to set up, input each category on the menu as follows:

1. Enter the slot number of the local aggregate that you are configuring and press <Return>.
2. Use Table C-2 to enter the aggregate rate. Press <Return>.

If you are using a T1DS0 interface, the aggregate index rate must be followed by a "T". For example: 140T.

If you are using a G704 interface, the aggregate index rate must be followed by a "G". For example: 122G.

3. To select the transmit clock source (Tx Clk Source), external clock source (Ext Clk Source), and T1 or NTT refer to Table C-3. After entering these parameters, press <Return>.
4. To select a redundant aggregate (Red. Agg), enter Y and press RETURN. To select a non-redundant aggregate, enter N and press RETURN.
5. To select 1s density, enter Y. After entering the correct letter, press <Return>.

If T1DS0 interface, and Nx56k DS0s, answer Yes (Y) to the 1's density prompt.

If T1DS0 interface, and Nx64k DS0s, answer No (N) to the 1's density prompt.

When the new aggregate parameters are accepted, a new prompt sign (>) appears.

Table C-3 Aggregate Interface Selections

Interface Type	Allowable Data Rates (bps)	Transmit Clock Source	External Clock Source	T1/D4 or NTT
64 K Contra	64 K	I	A	NO
BELL T1/D4	1.536 M	I	A	YES
NTT	192 K-1.536 M	I	A	YES
BELL T1	1.544 M	E	A	NO
CCITT 2.048 M	2.048 M	E	A	NO
64 K Codirectional	64 K	E	A	NO
CCITT V.35	4800-2.048 M	E	A	NO
BELL 303	19.2 K-230.4 K	E	A	NO
MIL-STD-188-114	4800-2.048 M	E	A	NO
RS-422 (V.11)	4800-2.048 M	E	A	NO
RS-423 (V.10)	4800-100 K	E	A	NO
EIA/TIA-232-E (V.24)	4800-19.2 K	E	A	NO
BELL T1-D4/E	1.472M, 1.536M	I	A	YES
64K CONTRA'L	64K	I	A	NO
G704 (CCITT)	64K-1.984M N by 64K	I	A	YES
T1D4/DS0, FT1	56K-1.344M N by 56K 64K-1.536M N by 64K	I	A	YES

D Agency Rules and Regulations

This appendix supersedes any information contained in GDC 036R303-000.

Before installing the equipment refer to the applicable national regulations within this document.

Part 1: UK Regulations

This appendix must be read before connecting the equipment in the United Kingdom and, where appropriate, overrides any information provided in the text of the international manual. Any inquiries should be addressed to

GENERAL DATACOMM LIMITED
Molly Millars Close
Molly Millars Lane
Wokingham
Berkshire
RG11 2QF

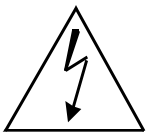
Equipment to which these regulations apply:

TMS-3000

Applicable Regulations

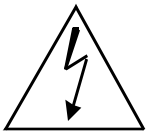
Safety Aspects

Safety protection for this equipment relies on the provision of a protective earth. This should be hardwired to the earth stud provided on the rear of the power supply shelf.



This equipment must be earthed.

Alternatively, the unit must be isolated from the PTO line interface before the mains plug, containing the protective earth, is removed. In such cases, the PTO line interface should not be hardwired.



Connect only equipment complying with BS6301 to the ports.

This equipment does NOT provide an isolation barrier between the PTO digital service and equipment connected to the ports. All equipment connected to the multiplexer ports should carry BS6301 approval, or be connected via an approved safety barrier.

It is possible to connect equipment having both BS6301 compliant and non-compliant ports to the multiplexer, thus creating a non-isolated path between hazardous voltages in the connected equipment and the PTO digital network. When connecting equipment of this type to the multiplexer, advice should be sought from a competent engineer.

Part 2: Telecommunication Attachment Details

This apparatus is approved for connection to Kilostream and Megastream services.

The approval of this equipment for connection to circuits provided by a Public Telecomms Operator is invalidated if the apparatus is subjected to any modification in any material way not authorised by British Telecomm or Telecomm Eireann. Misuse of the equipment by external software control or unconventional interconnection of auxiliary equipment, in such a way as to contravene relevant designated standards and regulatory specifications, shall invalidate the attachment approval.

Part 3: Attachment Information — UK

When completing the enclosed form for telecommunications attachment, the following details must be inserted for this equipment:

MODEL NUMBER	TMS-3000
ATTACHMENT APPROVAL No.	NS/1132/123/H/452743
AUTHORISED FOR CONNECTION	Megastream 2 private circuits Kilostream X21bis (V.28) private circuits Kilostream X21bis (V.35) private circuits Kilostream X21 (V.11) private circuits The PSTN utilising PCM and ADPCM encoding

Part 4: Attachment Information — Republic Of Ireland

MODEL NUMBER TMS-3000

ATTACHMENT APPROVAL NO.

AUTHORISED FOR CONNECTION

TELECOMMUNICATION ATTACHMENT DETAILS

GENERAL DATACOMM LIMITED
Molly Millars Close, Molly Millars Lane, WOKINGHAM, Berkshire RG11 2QF.
Telephone Wokingham (0734) 774868 Facsimile (0734) 774871

SUBSCRIBER'S PROCEDURE

IF THERE IS NO APPROPRIATE TELECOMMUNICATION CONNECTION POINT WITHIN 3 METERS OF THE SITING OF THIS EQUIPMENT, DISPATCH THIS FORM TO YOUR LOCAL TELEPHONE AREA OFFICE AS A REQUEST FOR SERVICE CONNECTION.

FOR GENERAL DATACOMM PRODUCT SUPPORT Telephone (0734) 774868

SUBSCRIBER'S DETAILS

COMPANY

ADDRESS

POSTCODE

TELEPHONETELEX

CONTACT NAME

* MODEL NO.

* ATTACHMENT APPROVAL NO. ——/1132/—/——/————————-

* AUTHORISED FOR CONNECTION TO THE FOLLOWING SERVICE(S)

2-WIRE PSTN LINE

4-WIRE LEASED LINE

KILOSTREAM

MEGASTREAM

PLEASE COME AND FIT EXTENSION SOCKETS AS SOON AS POSSIBLE.

E EC Declaration

EC Declaration of Conformity for Electromagnetic Compatibility and Safety

We, General DataComm Inc., declare under our sole legal responsibility that the following products conform to the following relevant harmonized standards, the reference numbers of which have been published in the Official Journal of the European Communities:

Electromagnetic Compatibility — (EMC Directive 89/336/EEC):

- The affixing of the CE mark is based on compliance with directive 89/336/EEC as amended by directive 93/68/EEC.
- EN 55022 (Based on CISPR 22), Specification for limits and methods of measurement of radio interference characteristics of information technology equipment.
- EN 55024 Limits and methods of measurement of the immunity to Electro-Magnetic interference for information technology equipment.
- EN 50081-1(Based on IEC 801), Electromagnetic compatibility generic emissions standard Part 1: Residential, Commercial and light industry.
- EN 50082-1 Electromagnetic compatibility generic immunity standard Part 1: Residential Commercial and light industry.

Low Voltage Directive — (LVD 73/23/EEC):

- The affixing of the CE mark is based on compliance with directive 73/23/EEC as amended by directive 93/68/EEC.
- EN 60950 Safety of Information Technology Equipment including Electrical Business Equipment.
- EN 41003 Particular Safety Requirements for Equipment to be connected to Telecommunications Networks.

Equipment List

TMS Channel Cards	
036M078-001	UDC/232/V.24/V.2036M078-002
036M078-002	UDC/422/V.11
036M078-003	UDC/423/V.10
036M078-004	UDC/V.35
037M078-007	UDC/X.21 (X.27)
GS936M014-001	TDC-2 (256K0
GS936M014-002	TDC-5 (512K0
036P265-003	UVC/ADPCM
036M285-002	CELP Voice Channel w/Fax
036M285-003	CELP Voice Channel
036M285-004	CELP 9.6K Voice Channel w/Fax
036M285-005	CELP 9.6K Voice Channel
036P270-001	Echo Canceller
036M335-001	ACM II/E1
TMS 3000 Options	
036M337-001	ESCC (Enterprise System Control Card)
036P302-001	RCC (Redundancy Control Card)
036P307-002	ECC-II (Expansion Common Card)
S-036P042-001	Sync Status Module
S-036B001-002	CP-12 Adapter (Expansion Shelf)
S-036P001-001	CP (422/423/449 Ext. Adapter)
039P002-001	DLD=M (Ext. Line Driver
OCM*TMS 2000 Feeder	
036M486-002	2121 Standalone Enclosure w/CCM N/R
036M481-001	2220 Shelf w/CCM, N/R
036M481-002	2320 Shelf w/CCM, Redundant
036M482-001	2230 Shelf w/CCM, NR -48VDC
OCM 1000 Point-to-Point	
036M488-002	1120 Standalone Enclosure, w/CCM, N/R
036M484-001	1220 Shelf w/CCM, N/R
036M484-002	1320 Shelf w/CCM, Redundant
OCM*TMS 1000/2000 LIM Cards	
036M410-002	E-1
036P436-002	V.35 LIM
036P436-001	V.11 LIM
036P437-001	Subrate LIM (RS232/V.28)
Expansion Shelf (OCM*TMS 1000/2000)	
010M065-001	MS-1 AC Expansion Shelf 220/240V
010M066-001	MS-1 DC Expansion Shelf

Data Channel Cards	
036P413-001	DDC (RS-232)
036P410-001	HS SDC (RS-232)
036P410-002	HS SDC (V.35)
036P410-003	HS SDC (RS-422)
036P410-004	HS SDC (RS-423)
LAN/Frame Relay Cards	
036M450-003	OPP/Ethernet
036M450-004	OPP/Ethernet w/o Packet Bus
036M451-001	OPP Token Ring *(-003 non-existent P/N)*
036M451-004	OPP Token Ring w/o Packet Bus
Voice Signaling (2W/4W E&M)	
036M420-006	PCM/ADPCM-No Echo
036M420-003	PCM/ADPCM-w/Echo
036M420-028	CELP No Fax
036M420-025	CELP w/Fax
Voice Signaling (2W FXS)	
036M420-004	2W FXS/ADPCM/No Echo
036M420-001	2W FXS/ADPCM w/Echo
036M420-026	
036M420-023	
Spares and Options	
036M040-004	CCM-4
036M040-005	CCM-5
TMS-3000 Compact Shelf	
036M357-001	TMS Compact w/ESCC, N/R
036M357-002	TMS Compact w/ESCC, Redundant
Module Interface	
036P041-001	EIF-E (RS232/V.24)
TMS-3000 Channel Cards	
036M078-005	Hyper UDC/422
036M078-006	Hyper UDC/V.35
TMS-3000 Options	
036P365-001	Universal I/O red.
036P351-001	Sync Status Module
OCM*TMS 2000 Feeder	
036M482-001	2230 Shelf w/CCM, N/R, -48
Data Channel Module	
036P416-001	OCM G.703 Data Channel

Voice Signaling (2W FXO)	
036M420-005	2W FXO/ADPCM - No Echo
036M420-002	2W FXO/ADPCM w/ Echo
036M420-027	2W FXO/CELP No Fax
036M420-023	2W/4W FXS/CELP w/Fax
036M420-024	2W FXO/CELP w/Fax
Minimux Plus Basic Assembly	
G036B003-015	Minimux Plus Enclosure 220/240V
G036B015-002	Minimux Plus Exp. Encl.
TMS-3000 Compact	
036M358-001	TMS Compact w/ESCC, N/R
036M358-002	TMS Compact w/ESCC, Redundant
Module Interface	
036P064-001	EIF-G (64K Co-Direct)
036P066-001	EIF-C (64K Contra-Direct)
Data Channel Cards	
036P243-001	TMS G.703 Data Channel
036P414-001	X.50 Quad Data Card

Index

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