Warning

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

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

Warranty

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

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Scope

This manual describes how to install, operate, and test the General DataComm DBU-56FW Switched 56K Digital Dial Backup Unit. The manual also includes application examples and the unit’s technical characteristics.

This manual is written for the individual charged with installing, operating, and configuring the unit within your network environment.

Revision History

This manual has been updated to **GDC 058R522-000 Issue 2**. New information has been added on features and applications, and the installation and operation procedures have been updated.

Organization

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

- **Chapter 1 - Introduction** describes key product features and functions.
- **Chapter 2 - Installation** details the step-by-step procedures for installing the unit, and includes tests you can run to verify the installation.
- **Chapter 3 - Operation** describes the hardware controls and indicators and explains how you control and operate the unit.
- **Chapter 4 - Tests** details the tests you may run to verify proper operation and to isolate possible problems.
- **Appendix - Technical Characteristics** provides the detailed operational specifications of the unit.

Document Conventions

**Level 1** paragraph headers introduce major topics.

**Level 2** paragraph headers introduce subsections of major topics.

**Level 3** paragraph headers introduce subsections of secondary topics.

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

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

**NOTE** 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:

- *Operating and installation Instructions for DRA* GDC 048R162-A1
- *Operator's Instructions for Network Management Controller NMC-90* GDC 058R690-000
- *Operating and Installation Instructions for NETCON Small System Controller* GDC 058R674-000

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

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

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

The Issue Number on the title page only changes when a hardware manual is revised or when a manual is reprinted for some other reason; it does not automatically change when the software is updated. A new Software Version is always Issue 1. Other specialized publications such as Release Notes or Addenda may be available depending on the product.

### Service and Support

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

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

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

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

Safety Instructions

Antistatic Precautions

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

The equipment may contain static-sensitive devices that are easily damaged and proper handling and grounding is essential. Use ESD precautionary measures when installing parts or cards and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic 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, such as a screwdriver or a paper clip, to set switches.

Safety Guidelines

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

![Caution]

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

![Warning]

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

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

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

FCC Part 68 Compliance

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

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.

Bundesrepublik Deutschland

Glossary of Terms

Address
A sequence of bits, a character, or a group of characters that identifies a network station, user, or application; used mainly for routing purposes.

ASCII
American National Standard Code for Information Interchange; the standard, predominant, seven-bit (eight bits, with parity) character code used for data communications and data processing.

Asynchronous
Transmission that is not related to a specific frequency or to the timing of the transmission facility; transmission characterized by individual characters or bytes with start and stop bits from which a receiver derives the necessary timing for sampling bits; start-stop transmission.

Asynchronous Transmission
Serial transmission of data in which each character is individually synchronized by the use of start and stop bits. A start bit precedes and one or more stop bits follow continuous information bits. Also called start-stop transmission. There is no definite time relationship between transmission of successive characters.

Bit
A binary digit, the representation of a signal, wave, or state, as either a binary zero or a one.

Bps
Bits per second; basic unit of measure for serial data transmission capacity; also kbps (kilobits), for thousands of bits per second; Mbps (megabits), for millions of bits per second; Gbps (gigabits), for billions of bits per second; Tbps (terabits), for trillions of bits per second.

Buffer
A storage device used to compensate for differences in the rate of data flow when transmitting data from one device to another.

Byte
Generally an 8-bit quantity of information, used mainly in referring to parallel data transfer, memory capacity, and data storage; also generally referred to in data communications as an octet or character.

Card
A card is 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. Also called pc board.

Carrier Detect
An EIA-232-D Interface modem signal that indicates to the attached terminal that a modem is receiving a signal from the remote modem.
CCITT
International Telegraph and Telephone Consultative Committee (from the French, Comité Consultatif International Télégraphique et Téléphonique.)

Clear To Send (CTS)
A signal indicating to the terminal that a modem is ready to transmit.

Clear To Send Delay
The time required by a modem to inform a terminal device that it is ready to send or reply to information just received.

Control Characters
Any transmitted characters, not message or user data, used to control or facilitate data transmission between data terminal equipment (DTE); includes extra characters associated with addressing, polling, message delimiting and blocking, framing, synchronization, and error checking.

Controlled Carrier
When Controlled Carrier is selected, the modem's transmit carrier is turned on and off by Request To Send (CA) from the terminal. The physical carrier signal is impressed on the line and the terminal is allowed to pass data after the Clear To Send delay.

CS
Clear To Send.

CTS
Clear To Send.

Daisy Chaining
The physical connection of cables that allows the cascading of signals between devices.

Data Carrier Detect (DCD)
A signal sent from a data set which informs the terminal that a carrier waveform is being received; also called Carrier Detected, Carrier Found, Carrier On, etc.

Data Communications
Transmitting and receiving coded digital signals between computers or other digital devices or systems according to agreed upon specifications or standards.

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

Data Service Unit
Component of customer premises equipment (CPE) used to interface to a digital circuit, such as DDS and T1; now generally combined with a CSU; performs conversion of customer's data stream to bipolar format for transmission.

Data Set
A modem; term infrequently used except within the telephone carrier industry.
Data Terminal Equipment (DTE)
Generally end-user devices, such as terminals and computers that connect to DCE, which either generate or receive the data carried by the network; in EIA-232-D (RS-232-C) connections, designation as either DTE or DCE determines signaling role in handshaking; in a CCITT X.25 interface, the device or equipment that manages the interface at the user premises.

dB
Decibel; a unit of measurement used to express the ratio of two values, usually the power of electrical or electromagnetic signals; equal to 10 times the logarithm derived from a ratio of the two power levels, which are expressed in watts; the relative gain or loss of a signal when the measured signal value is compared in a ratio to another, usually its input, value.

dBm
Decibel reference to one milliwatt; relative strength of a signal, calculated in decibels, when the signal is compared in a ratio to a value of one milliwatt; used mainly in telephony to refer to relative strength of a signal (e.g., at 0 dBm, a signal delivers 1 milliwatt to a line load, while at -30 dBm a signal delivers 0.001 milliwatts to a load).

DBU
Dial Backup Unit.

DCD
Data Carrier Detect.

DCE
Data Communications Equipment. A term usually meant to refer to the modem portion of a data communications network. Also, data circuit-terminating equipment. In the case of an EIA-232-D (RS-232-C) connection, the modem is the DCE; in a CCITT X.25 connection, the network access and packet-switching node is the DCE.

DDS
Dataphone digital service; private-line digital service offered intra-LATA by BOCs, inter-LATA by AT&T Communications, with data rates typically at 2.4, 4.8, 9.6, and 56 kbps; now a part of the services listed by AT&T under the Accunet family of offerings.

Diagnostics
Tests used to detect malfunctions in a system or component.

Dial Backup
An option which allows a network to transmit over the switched line system (regular telephone lines). This is used in situations where a network's dedicated lines may fail or degrade to a point where they cannot support good quality data transmission.

Dial-up
The process of, or the equipment or facilities involved in, establishing a temporary connection via the switched telephone network.

DTE
Data Terminal Equipment.
DTR
A signal from the terminal to the modem indicating that the terminal is ready to receive and transmit.

Duplex Transmission
Simultaneous two-way independent transmission in both directions. Also called full duplex transmission.

EIA
Electronic Industries Association.

EIA-530
An interface that complements EIA-532-D for data rates above 20,000 bits per second.

EIA-232-D
An EIA-specified physical interface, with associated electrical signaling, between data circuit-terminating equipment (DCE) and data terminal equipment (DTE); the most commonly employed interface between computers and modems.

FDX
Full duplex.

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

Full Duplex (FDX)
Operation of a data communications link in which transmissions are in both directions at the same time between devices at both ends.

Fusible Link
Thin printed circuit fuses on pc boards that open if ground potential exceeds 0.25 V rms between pc board and peripheral equipment.

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

Half Duplex (HDX)
Operational mode of a communications line where transmission occurs in either direction, but not both directions simultaneously; transmission directions are alternately switched to accommodate two-way data flow.

Handshake Protocol
In communications, a predefined exchange of signals or control characters between two devices or nodes that sets up the conditions for data transfer or transmission; also, handshaking.

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

LED
Light-emitting diode.

Loopback
Diagnostic procedure used for transmission devices; a test message is sent to a device being tested, which is then sent back to the originator and compared with the original transmission; loopback testing may be within a locally attached device or conducted remotely over a communications circuit.

Modem
Modulator/demodulator; electronic device that enables digital data to be sent over (typically) analog transmission facilities.

Module
A module is an assembly which has definable performance characteristics so that it can be tested, removed, and replaced as a unit. A module can have other cards called “piggybacks” plugged into it.

NCA
NETCON Communications Adapter.

NDE
Network Diagnostic Extension.

NETCON®
General DataComm's Network Management System.

Network Management
Administrative services performed in managing a network, such as network topology and software configuration, downloading of software, monitoring network performance, maintaining network operations, and diagnosing and troubleshooting problems.

NMS
General DataComm’s Network Management System.

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.

Private Line
A leased line, an unswitched circuit.

Private Network
A network established and operated by a private organization or corporation for users within that organization or corporation.
**Programmable (PR) Arrangement**
A connection arrangement used to connect FCC registered equipment to the DDD network, employing either of two telephone company supplied data jacks: programmable or universal. The telephone company measures signal loss over the local loop between the subscriber's site and the central office. A “programming” resistor is selected and installed in the data jack to enable the communication equipment to transmit at a level that delivers the maximum -12 dBm signal at the central office.

**RD**
Receive Data.

**RDL**
Remote Digital Loopback.

**Request To Send**
A signal to the sending modem that the terminal is ready to transmit; part of modem handshaking.

**RS-422-A**
Electrical characteristics of balanced-voltage digital interface circuits.

**RTS**
Request To Send.

**RTS-CTS Delay**
The delay between the time that the data terminal equipment asserts Request to Send (RTS) and the time that the modem asserts Clear to Send (CTS). Sets the time delay or turnaround time from reception to transmission.

**Self-Test**
A diagnostic test mode in which the modem is disconnected from the telephone facility and its transmitter’s output is connected to its receiver’s input to permit the looping of test messages (originated by the modem test circuitry) through the modem to check its performance.

**Send Data (SD)**
Send data from DTE to DCE.

**ST**
Self-Test.

**Switched Network Backup**
An option in certain communications links (and with certain communications devices such as modems) in which a switched or dial-up line is used as an alternate path if the primary, typically a leased-line, path is unavailable.

**Synchronous Transmission**
Data communications in which characters or bits are sent at a fixed rate, with the transmitting and receiving devices synchronized, eliminating the need for start and stop bits necessary in asynchronous transmission and significantly increasing data throughput rates.
Terminal
A point in a network at which data can either enter or leave; a device, usually equipped with a keyboard, often with a display, capable of sending and receiving data over a communications link (IBM); generically the same as data terminal equipment (DTE).

Two-Wire Circuit
Usually a telephone circuit consisting of two insulated electrical conductors, typical of most local loops.
1 Technical Overview

Purpose and Capabilities
The DBU-56FW Switched 56K Digital Dial Backup Unit is a Network Managed 4-wire digital dial-up unit. It is compatible with AT&T's ACCUNET* Switched 56 Service. This switched service offering is an end-to-end digital, 56 kbps, full duplex, synchronous circuit.

The DBU-56FW Switched 56K Digital Dial Backup Unit gives you these outstanding features:

- Supports four-wire switched 56K services
- Soft optioned from NMC 90, low end SPARC, IFP data sets, Small System Controller
- Supports subrate DTEs via Data Rate Adapter
- Supports dedicated point-to-point and multipoint dial backup
- May be used as a standalone Dialup unit
- Supports dial backup of non-managed DSUs

Operation and Control
The data set operates in conjunction with GDC’s NETCON Network Management System (NMS) and provides comprehensive network management capabilities. It is software controllable, allowing you to configure data set options, including network address, from the NETCON console at the central site. These options are then downline loaded to remote locations. You can also perform diagnostic testing and initiate system restoral through NETCON with no requirement for remote site intervention.

Components
The data set is available in standalone or rackmount versions. The rackmount unit features GDC’s unique DataComm packaging concept that allows a variety of data communications products, including up to 16 data sets, to be mounted in the same high density shelf.

The data set card is contained on one 10.5-inch by 10.75-inch (267 mm by 273 mm) printed circuit (pc) card. It can operate in a DataComm ac-powered standalone enclosure or in a DS-1, DS-5, DS-6 Shelf or Universal System Shelf. The optional Data Rate Adapter piggyback card may be mounted on the base card.

Data Rate Adapter Card
The optional Data Rate Adapter Card is capable of adapting synchronous and asynchronous DTE data transmission speeds of 19.2 kbps and lower to an aggregate line speed of 56 or 64 kbps. Rate adaptation is provided for point-to-point and multipoint applications.

* Service mark of AT&T
Table 1-1 identifies the GDC part numbers of the standard and optional components available for the DBU-56FW.

**Table 1-1** Equipment List

<table>
<thead>
<tr>
<th>Description</th>
<th>GDC Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBU-56 FW Data Set, standalone, 117 Vac</td>
<td>058A102-001</td>
</tr>
<tr>
<td>DBU-56 FW Data Set, standalone, 117 Vac w/IFP</td>
<td>058A102-011</td>
</tr>
<tr>
<td>DBU-56FW IFP, rackmount w/IFP</td>
<td>058P142-002</td>
</tr>
<tr>
<td>DBU-56FW basecard pcb assembly (rackmount)</td>
<td>058P142-001</td>
</tr>
<tr>
<td><strong>DataComm Enclosure</strong></td>
<td></td>
</tr>
<tr>
<td>Base Assembly 117 Vac (DE-19)</td>
<td>010B117-001</td>
</tr>
<tr>
<td>Cover, single</td>
<td>010D500-003</td>
</tr>
<tr>
<td>Cover, double</td>
<td>010D500-004</td>
</tr>
<tr>
<td>Base Assembly 117Vac (DE-17A)</td>
<td>010B070-011</td>
</tr>
<tr>
<td><strong>DataComm Shelf (optional)</strong></td>
<td></td>
</tr>
<tr>
<td>DS-1, 117 Vac</td>
<td>101B015-001</td>
</tr>
<tr>
<td>DS-5, 48 Vdc</td>
<td>010M011-001, -002</td>
</tr>
<tr>
<td>DS-6, 48 Vdc</td>
<td>101M047-001, -002</td>
</tr>
<tr>
<td><strong>Universal System Shelf (optional)</strong></td>
<td></td>
</tr>
<tr>
<td>USS-1-D, Domestic, 117 Vac</td>
<td>010B080-001</td>
</tr>
<tr>
<td>USS-1-DC, 48 Vdc</td>
<td>010M040-001, -002</td>
</tr>
<tr>
<td><strong>Optional Assemblies</strong></td>
<td></td>
</tr>
<tr>
<td>Interface Adapter Card, NETCON:</td>
<td></td>
</tr>
<tr>
<td>Standalone</td>
<td>058P143-001</td>
</tr>
<tr>
<td>Rackmount</td>
<td>058P143-001</td>
</tr>
<tr>
<td>Data Rate Adapter (DRA) Card</td>
<td>058P128-002</td>
</tr>
</tbody>
</table>

**Diagnostics**

The NETCON operator has the ability to download parameters to be monitored by the data set.

Alarm conditions may be reported by operator selection upon any of the following conditions:

- Auto Restoral Fail
- Restoral Time Expired
- Restoral Active
- Streaming
- No Signal
- CSU Loopback
Fault isolation in an NMS digital network is facilitated by comprehensive loopback and testing capabilities.

While the private line is active a test call can be initiated and various tests performed. These tests include Line Loopback Self-Test, Remote Loopback (V.54 or PN127 type) or an End-to-End Error Rate Test.

When the unit is actively on dial backup testing may be performed on the private line DSU. A local Line Loopback Self-test may be performed on the DBU.

Through the use of these loopback tests, system faults may be isolated to the terminal, data set, or line.

The front panel tests are always available (if the option is enabled).

**Configurations and Applications**

The DBU-56FW is designed to operate as either a mated (to the NMS510 or NMS520) dial backup unit or as a standalone dialup unit.

The mated unit is designed for point-to-point dedicated applications. Typical use would be with remote NMS510/NMS520 DSU's.

In standalone use, the user may either dedicate a unit to a particular DDS circuit or use the unit in a modem pool (FEP must provide a spare port).

The advanced design of the DBU-56FW incorporates on-board bridging and switching circuits so that it can be used in multipoint dial backup applications. In addition, a unique cascade feature allows multiple multipoint remote units to be backed up.

The DBU-56FW may also be used to back up non-network managed DSU's, as a simple dialup unit, or as a generic 56 kbps DDS DSU.

The DBU-56FW is supported by the NMC 90 Network Management Controller and the NETCON Small System Controller.

*Figures 1-1 through 1-6 depict typical applications using the DBU-56FW.*
NMS 510 IFP/520 IFP Point-to-Point – Dial Restoration
(No Network Controller Support)

Figure 1-2

NMS 464 Point-to-Point – Dial Restoration

Figure 1-3
A. INDEPENDENT SW 56 kbps UNIT

B. DS-1 or USS

C. Same As (B) With NMC-90 or SSC Support
   (At Central Site the IFP is not necessary - However, it is required at the Remote site)

Figure 1-4 Non-NMS DSU Point-to-Point – Dial Restoral
A. INDEPENDENT SW 56 kbps UNIT

INDEPENDENT SW 56 kbps UNIT

DE-17A

DBU 56FW/IFP

SWITCHED 56 k LINK

DE-17A

DBU 56FW/IFP

B. DBU-56FW with IFP

NMC-90
or SSC

DS-1 or USS

DBU-56FW with IFP

DBU-56FW with IFP

Figure 1-5 DBU-56FW/IFP Point-to-Point – Dial Restoration
Figure 1-6  NMS 510/NMS 520 Multipoint – Dial Restoral
2 Installation

Unpacking and Handling

1. Inspect the DBU-56FW for damage.
2. Report any damage to the shipper immediately.
3. Save the box and packing material; you can use them to ship the unit, if necessary.

Most DBU-56FW data sets are factory configured, tested, and ready to use.

Option Selection

You may use the following information to check the option settings on the DBU-56FW card or the optional Data Rate Adapter (DRA) (Publication No. 048R162-A1 includes complete operating and installation instructions for the DRA).

Hardware Option

The four jumper pins labeled X4 provide the one hardware option on the DBU-56FW card itself. The position of the X4 jumper determines whether equipment ground and signal ground are common, separated by a 100 ohm resistor, or open. Separated is the normal setting.

Software Options

Most options on the DBU-56FW are soft options controlled by the operator of a NETCON system through the Network Management Controller (NMC-90) or Small System Controller.

A port-line-drop method of addressing is incorporated in the NETCON system. A port address is determined by the connection of the master data set to the NETCON system controller. The data set’s line and drop addresses are selected by the operator of the NMC by assigning the appropriate addresses based on the serial numbers of the NMS products that are in the system.

NOTE

All NMS data set products contain a serial number. This number must be reported to the NMC operator when the system is initially installed and configured. The serial number of the DBU-56FW is found on the back of the front panel, and on an EPROM chip located on the pc card. In standalone enclosures, the cover of the unit must be removed to gain access to the serial number (see Figure 2-1).
Optional Data Rate Adapter
058P128

Remove jumpers

TYPICAL 16-DIGIT SERIAL NO.
0025000625930000
058Z142-701

GDC FIRMWARE P/N AND REVISION

Figure 2-1  Option Selection (Sheet 1 of 2)
Data Rate Adapter Card Options

The following options are available and located on the 8-position switch S1 or header X1 on the optional Data Rate Adapter card.

Looking At Solder Side of Card:
Pushing Down Toward Basecard = OFF
Pushing Up Toward Plugin = ON

Figure 2-1  Option Selection (Sheet 2 of 2)
X1 Header
This jumper controls your selection of internal (default) or external (synchronous mode only) timing.

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Setting</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT</td>
<td>Selected</td>
<td>Internal timing</td>
</tr>
<tr>
<td>EXT</td>
<td>Selected</td>
<td>External timing (synchronous)</td>
</tr>
</tbody>
</table>

S1 Switch Settings
The S1 Switch provides eight switch settings that control operation, as follows:

<table>
<thead>
<tr>
<th>Switch #</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B0</td>
<td>In conjunction with B1, sets synchronous/asynchronous data rates</td>
</tr>
<tr>
<td>2</td>
<td>B1</td>
<td>In conjunction with B0, sets synchronous/asynchronous data rates</td>
</tr>
<tr>
<td>3</td>
<td>ASYNC</td>
<td>Sets operating mode: synchronous or asynchronous</td>
</tr>
<tr>
<td>4</td>
<td>7B/8B</td>
<td>Sets data bit transfer rate: 7 bits or 8 bits</td>
</tr>
<tr>
<td>5</td>
<td>P/64</td>
<td>Synchronous mode: sets line rate adaptation at 56kbps or 64kbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asynchronous mode: enables/disables parity bit transmission</td>
</tr>
<tr>
<td>6</td>
<td>OD/EX</td>
<td>Synchronous mode: selects external or internal timing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asynchronous mode: selects odd or even parity (when parity is enabled)</td>
</tr>
<tr>
<td>7</td>
<td>MPT</td>
<td>Selects point-to-point or multi-point operation</td>
</tr>
<tr>
<td>8</td>
<td>SLV</td>
<td>With multipoint operation enables, selects Master or Slave designation</td>
</tr>
</tbody>
</table>

Additional details on each of these switch settings follows.

B0 and B1 (Switch 1 and 2)
B0 and B1 select the following DTE data rates:

<table>
<thead>
<tr>
<th>DTE Data Rate (bps)</th>
<th>Switch #</th>
<th>Switch Name</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2400</td>
<td>1</td>
<td>B0</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>Off</td>
</tr>
<tr>
<td>4800</td>
<td>1</td>
<td>B0</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>Off</td>
</tr>
<tr>
<td>9600</td>
<td>1</td>
<td>B0</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>On</td>
</tr>
<tr>
<td>19.2 K</td>
<td>1</td>
<td>B0</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>On</td>
</tr>
</tbody>
</table>
NOTE

When operating in synchronous mode, send data and receive data LEDs will be dimly lit when not passing data.

ASYNC (Switch 3)

When enabled (On), asynchronous operation is selected. In this mode, S1 switches 4 through 6 select the character format, parity, and parity type. When disabled (Off), synchronous operation is selected. In synchronous mode, S1 switches 4 through 6 determine network compatibility, aggregate rate, and external timing.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Switch #</th>
<th>Switch Name</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronous</td>
<td>3</td>
<td>ASYNC</td>
<td>Off</td>
</tr>
<tr>
<td>Asynchronous</td>
<td>3</td>
<td>ASYNC</td>
<td>On</td>
</tr>
</tbody>
</table>

7B/8B (Switch 4)

This switch controls the data bits-per-character for DTE and network data transmission.

For asynchronous operation, the Off position selects 8 bits data per character DTE data transmission. The On position selects 7 bits data per character DTE data transmission.

For synchronous multipoint operation, the Off position selects 5 bits data per character network data transmission. The On position selects 8 bits data per character network data transmission.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Function</th>
<th>Switch #</th>
<th>Switch Name</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asynchronous</td>
<td>8 bits DTE data</td>
<td>4</td>
<td>7B/8B</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>7 bits DTE data</td>
<td>4</td>
<td>7B/8B</td>
<td>On</td>
</tr>
<tr>
<td>Synchronous</td>
<td>5 bits network data</td>
<td>4</td>
<td>7B/8B</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>8 bits network data</td>
<td>4</td>
<td>7B/8B</td>
<td>On</td>
</tr>
</tbody>
</table>

NOTES:

Option is for sync mode 56K/SC Multipoint without clear channel.
5-bit for compatibility with 058P128-001 Rev H- or later and all 058P128-002's. (Maximum 5 consecutive 0's to network)
8-bit for compatibility with 058P128-001 Rev G- or older.

P/64 (Switch 5)

For asynchronous operation, the Off position inhibits transmission of the parity bit. By selecting the On position, parity transmission is enabled.

For synchronous operation, this option provides rate adaptation to the aggregate line rate of 56 kbps or 64 kbps. The Off position selects 56 kbps, the On position selects 64 kbps.
<table>
<thead>
<tr>
<th>Mode</th>
<th>Function</th>
<th>Switch #</th>
<th>Switch Name</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asynchronous</td>
<td>Parity disabled</td>
<td>5</td>
<td>P/64</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Parity enabled</td>
<td>5</td>
<td>P/64</td>
<td>On</td>
</tr>
<tr>
<td>Synchronous</td>
<td>56 kbps adaptation</td>
<td>5</td>
<td>P/64</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>64 kbps adaptation</td>
<td>5</td>
<td>P/64</td>
<td>On</td>
</tr>
</tbody>
</table>

**OD/EX (Switch 6)**

When the unit is set to asynchronous mode and parity transmission is enabled, this OD/EX switch determines odd or even parity. The Off position selects even parity, the On position selects odd parity.

When the unit is set for synchronous operation, this switch controls the timing source and must be used in conjunction with the X1 jumper settings. The X1 EXT/INT jumper provides the physical clock connection and must be optioned according to the selection of Switch 6 for synchronous clock sources. When this Switch 6 is set to On, external DTE timing is selected. The OFF position defaults to internal timing.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Function</th>
<th>Switch #</th>
<th>Switch Name</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asynchronous</td>
<td>Even parity (parity enabled)</td>
<td>6</td>
<td>OD/EX</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Odd parity (parity enabled)</td>
<td>6</td>
<td>OD/EX</td>
<td>On</td>
</tr>
<tr>
<td>Synchronous</td>
<td>Internal (default) timing</td>
<td>6</td>
<td>OD/EX</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>External timing</td>
<td>6</td>
<td>OD/EX</td>
<td>On</td>
</tr>
</tbody>
</table>

**NOTE**

1) The X1 EXT/INT header option must follow S1-6 selection when in synchronous operation.

2) When operating the Data Rate Adapter in an external synchronous point-to-point mode, refer to Figure 1-4. The unit with external timing must be optioned as a multipoint master. The internal timing unit is optioned as a multipoint slave.

3) When the DBU-56FW is mated to a DSU, a Data Rate Adapter is only required on the DSU.
MPT (Switch 7) and SLV (Switch 8)

Switch 7 determines whether the unit operates in a point-to-point or multi-point application. For point-to-point applications, set the switch to the Off position; for multipoint operation, set the switch to On.

Switch 8 is used in multipoint applications: the Off position sets the DSU as the MASTER, and the On position sets the drop as SLAVE (Remote). When configuring the unit for master and slave operation, use the following settings:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Master Options</th>
<th>Slave Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1 Jumper</td>
<td>EXT</td>
<td>X1 INT</td>
</tr>
<tr>
<td>SLV (Switch 8)</td>
<td>Off</td>
<td>SLV (S1-8) ON</td>
</tr>
<tr>
<td>MPT (Switch 7)</td>
<td>On</td>
<td>MPT (S1-7) ON</td>
</tr>
<tr>
<td>OD/EX (Switch 6)</td>
<td>On</td>
<td>OD/EX (S1-6) OFF</td>
</tr>
<tr>
<td>7B/8B (Switch 4)</td>
<td>Selectable</td>
<td>7B/8B (S1-4) Selectable</td>
</tr>
<tr>
<td>B0/B1 (Switches 1 and 2)</td>
<td>Set To Ext Clock Rate</td>
<td>Set To Ext Clock Rate</td>
</tr>
</tbody>
</table>

Summary

The following tables provide a summary of the synchronous and asynchronous settings.

<table>
<thead>
<tr>
<th>Synchronous Mode Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
</tr>
<tr>
<td>2400 bps data rate</td>
</tr>
<tr>
<td>4800 bps data rate</td>
</tr>
<tr>
<td>9600 bps data rate</td>
</tr>
<tr>
<td>19.2 Kbps data rate</td>
</tr>
<tr>
<td>Synchronous mode</td>
</tr>
<tr>
<td>5 data bits per character</td>
</tr>
<tr>
<td>8 data bits per character</td>
</tr>
<tr>
<td>56 kbps data rate adaptation</td>
</tr>
<tr>
<td>64 kbps data rate adaptation</td>
</tr>
<tr>
<td>Internal Timing</td>
</tr>
<tr>
<td>External Timing</td>
</tr>
<tr>
<td>Point-to-point operation</td>
</tr>
<tr>
<td>Multi-point operation</td>
</tr>
<tr>
<td>Multi-point MASTER</td>
</tr>
<tr>
<td>Multi-point SLAVE</td>
</tr>
</tbody>
</table>
### Asynchronous Mode Settings

<table>
<thead>
<tr>
<th>Function</th>
<th>Switch #</th>
<th>Name</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2400 bps data rate</td>
<td>1</td>
<td>B0</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>Off</td>
</tr>
<tr>
<td>4800 bps data rate</td>
<td>1</td>
<td>B0</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>Off</td>
</tr>
<tr>
<td>9600 bps data rate</td>
<td>1</td>
<td>B0</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>On</td>
</tr>
<tr>
<td>19.2 Kbps data rate</td>
<td>1</td>
<td>B0</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>B1</td>
<td>On</td>
</tr>
<tr>
<td>Asynchronous mode</td>
<td>3</td>
<td>ASYNC</td>
<td>On</td>
</tr>
<tr>
<td>7 data bits per character</td>
<td>4</td>
<td>7B/8B</td>
<td>On</td>
</tr>
<tr>
<td>8 data bits per character</td>
<td>4</td>
<td>7B/8B</td>
<td>Off</td>
</tr>
<tr>
<td>Disable parity bit transmission</td>
<td>5</td>
<td>P/64</td>
<td>Off</td>
</tr>
<tr>
<td>Enable parity bit transmission</td>
<td>5</td>
<td>P/64</td>
<td>On</td>
</tr>
<tr>
<td>Even parity (parity enabled)</td>
<td>6</td>
<td>OD/EX</td>
<td>Off</td>
</tr>
<tr>
<td>Odd parity (parity enabled)</td>
<td>6</td>
<td>OD/EX</td>
<td>On</td>
</tr>
<tr>
<td>Point-to-point operation</td>
<td>7</td>
<td>MPT</td>
<td>Off</td>
</tr>
<tr>
<td>Multi-point operation</td>
<td>7</td>
<td>MPT</td>
<td>On</td>
</tr>
<tr>
<td>Multi-point MASTER</td>
<td>8</td>
<td>SLV</td>
<td>Off</td>
</tr>
<tr>
<td>Multi-point SLAVE</td>
<td>8</td>
<td>SLV</td>
<td>On</td>
</tr>
</tbody>
</table>

### Installation Procedures

You can install the data set card in a standalone DataComm Enclosure (in a DE17A or piggybacked on NMS DSU in a DE-19) or a rackmount DataComm Shelf. Either installation should be located in a ventilated area where the ambient temperature does not exceed 122°F (50°C). Do not install the unit directly above equipment that generates a large amount of heat (such as power supplies).

#### Standalone Installation

If it is necessary to remove the component card from the standalone base, follow the instructions in Figure 2-2, and then reinstall the connector at J2.
Figure 2-2  Standalone Cover Removal Procedure

Rackmount Installation

The DBU-56FW card may also be mounted in a DataComm or Universal System Shelf, which can support as many as 16 Data Sets.

To install the DBU-56FW Data Set base card in the DataComm shelf, proceed as follows:

1. Position the card in the top and bottom slot guides with the GDC logo on top.
2. Carefully slide the assembly into the slot until it meets the rear connectors.
3. Push the front panel with both hands until the assembly mates with the rear connectors.

The USS-1 uses harness cards and backplanes, configured to occupy one card slot in the shelf for each data set card. Each backplane assembly is keyed by a tab located at the bottom of the harness card. This tab mates with a slot that is part of the shelf and prevents the backplanes from being inserted incorrectly in the shelf.
To install the card into the **USS-1 shelf**, proceed as follows:

1. Loosen the backplane screws.
2. Install the plug-in card from the front of the shelf by sliding it into the card guides.
3. Seat the card firmly into the mating connector on the backplane using both hands.
4. Tighten the backplane screws.

This assures perfect alignment of the cards in the card guides and the mating connectors on the backplane, and allows for easy removal of the cards.

5. Plug in the four-pin cable harness on the backplane adapter to the shelf power connector located directly above the backplane adapter.

   **NOTE**

   If the optional DBU-56FW card is mated to a base card, insert both cards into the front of the desired DataComm or USS-1 Shelf. Be sure that the DBU-56FW edge connector mates with the adjacent TELEPHONE connector located along the lower part of the shelf. The switched network line used for dial-backup plugs into the modular jack, or connects to the Terminal Block on the rear of the shelf (see Figure 2-4).

### Electrical Connections

The following paragraphs describe the power line, business equipment, and private line connections to the DBU-56FW Data Set.

#### Power Line

**Standalone Enclosure**

The unit is equipped with a captive ac power cord terminated in a molded three-prong plug.

Connect the cord to a polarized outlet providing the required ac power. The outlet should not be under switch control. To prevent large circulating currents caused by differences in ground potential, the unit should be powered by the same ac source as the equipment interfaced with the unit.

If you cannot determine whether the equipment is powered by the same ac source, verify that a potential difference of less than 0.25 V rms exists between the grounding circuits of the respective power outlets.

   **This unit incorporates a fusible link, FL1 which may be opened if the ground potential exceeds 0.25 V rms between the unit and peripheral equipment. Do not apply power to the unit until all connections to peripheral equipment have been made. If a fusible link is opened in a unit, return it to the factory for repair.**

**Rackmount Shelf**

The data set obtains power directly from the shelf when properly installed.
Business Equipment Connections (Data Terminal)


**NOTE**

The EIA/TIA-232-E should only be used in conjunction with the optional Data Rate Adapter. The DBU-56FW operates automatically using the EIA/TIA-232-E interface when the DRA is installed. Otherwise V.35 should be used.

The Appendix describes the signals exchanged through each of the business equipment interfaces.

DDS/VF Line Connectors

To install the DBU-56FW in the standalone enclosure (DE-17A):

1. Bring the 56K switched line through the access hole J1, on the enclosure’s rear panel.
2. Connect the line to the modular jack J3 mounted on the card.

If the DBU-56FW is mated to an NMS510 or NMS520:

1. Bring the 56K switched line through the access hole labeled "SWITCHED NETWORK" on the enclosure’s (DE-19) rear panel.
2. Connect the line to the modular jack located on the appropriate data set's base card.

**NOTE**

When using the modular jack J3, Tx lines are on pins 1 and 2. Rx lines are on pins 7 and 8. Pin 1 is on the left and pin 8 is on the right when facing the rear panel.

To install the DBU-56FW rackmounted in the DataComm DS-1 Shelf:

1. Connect the switched 56K line to the top four screws of the terminal block mounted on the shelf’s rear panel.
2. Before making the connections, verify that the terminal block corresponds to the shelf receptacle in which the data set base card is installed.

These blocks accommodate wires that do not have terminal lugs.

3. Remove the lugs and a portion of the insulation on the existing cable.
4. Insert the wires into the block by first unscrewing the captive screw for that portion of the terminal.
5. Replace the plastic cover.

Daisy Chain Connections

Operation of the NETCON system requires extending the diagnostic channel to all units on an NMC port. Not all master units can be directly connected to a Network Interface Card in an NMC Shelf; for this reason, daisy-chain connections between units are sometimes necessary to cascade transmit and receive diagnostic data to all units assigned to one port. These connections are made via connector J2 on interface adapter 058P143-001 (*see Figures 2-3 and 2-4*). This interface adapter can also be used to cascade the
diagnostic channel if the DBU-56FW is mated to a DSU with the existing interface adapter, 058P059-001.

If the DBU-56FW is mated to a DSU then no interface adapter is required. All communications are accomplished via the inter-card connectors.

**NOTE**

Although the new Interface Adapter Card (058P143-001) can coexist with the original Interface Adapter Card (058P059-001), the DBU-56FW will not function when directly connected to the older 058P059-001 card. The new Interface Adapter Card (058P143-001) is required.

---

**Figure 2-3** Standalone Enclosure, Rear Panel and PC Board Connections

---

GDC 058R522-000
Use 070H002-001 25-pin to 34-pin conversion cable for V.35 appl.

Wire Adapter
(Not Required if Cable 024H205 is Used)
(Tx:4,5; Rx:7,8)

The cables and functions for J1, J2, and J3 are the same as those for the Standalone enclosure.

Figure 2-4  Shelf Rear Panel
Preoperational Check

You should perform a Local Loopback Self-Test to verify normal operation of the data set before connecting it to the private line and DTE. These tests are described in detail in Chapter 4, Tests.

Before conducting the test, verify that the option strapping is correct. Then perform the test on a standalone unit before it is connected to anything except ac power, and on shelf plug-in cards as they are individually installed.

If the data set passes the test, but subsequently fails to perform data communications, the data set is probably not at fault. Either an error has been made in the installation or option selection or there is a faulty communication line or remote installation. Recheck the cable and line connections and, if necessary, perform the tests in Chapter 4 to isolate the problem. Verify that the remote data set is a compatible type (e.g., a data set operating at the same rate).

In the event the data set does not check out properly, replace it with a spare DSU, if available, and repeat the test. Do not attempt to repair the data set. For assistance, contact DataComm Service Corporation.
3 Operation

Overview

All operations of the Data Set are controlled by the Network Management Controller (NMC). Once the external connections are made and the unit is configured, it functions automatically. This section describes the controls, indicators, connectors and operation of the data set.

Controls, Indicators and Connectors

Figures 3-1 and 3-2 illustrate the DBU-56FW’s front panel and explain the function of each control and indicator.

Figure 3-1  Front Panel Indicators

WHEN ST IS DEPRESSED, THE DSU TEST PATTERN GENERATOR TRANSMITS A TEST PATTERN, AND THE TEST PATTERN DETECTOR CHECKS FOR ERRORS IN THE RECEIVED TEST PATTERN. THE TEST PATTERN IS SELECTABLE VIA NETCON (511 OR 2047).

WHEN RL IS DEPRESSED, THE REMOTE UNIT IS PLACED IN AN RT LOOPBACK CONDITION. THE RL TYPE IS SELECTED VIA NETCON (V.54 OR PN127).

IF THE UNIT IS IDLE AND DIAL IS DEPRESSED, THE UNIT CALLS THE PRE-STORED NUMBER FROM CELL 0. IF THE UNIT IS ACTIVE AND DIAL IS DEPRESSED, THEN THE CALL WILL BE TERMINATED.


**Figure 3-2 Front Panel Controls**

**Rackmount Shelf**

Rackmount shelf front panel controls, indicators, and fuses are described in the manual supplied with the shelf. Refer to it if you have a rackmount shelf.

**Dial Backup**

Dial backup may be provided by the DBU-56FW Card, which plugs into the NMS510/NMS520 Card. In this mode it operates as a slave to the DSU. The DBU-56FW provides point-to-point operation over 4-wire switched network lines. It transmits and receives data at 56000 bps. The DBU-56FW may also function as a standalone dialup unit. In this mode it can backup any 56 kbps DSU, either point-to-point or multipoint.

Configuration and control of the DBU-56FW Dial Back-Up Card are provided by the GDC NETCON Small System Controller and the NMC-90 Controller. Instructions covering configuration and control of the DBU-56FW are provided in Publication No. 058R690-V4, NMC-90 Operating System Module and 058R674-000, Small System Controller User’s Guide.

The following operational modes are supported by the DBU-56FW when used in conjunction with the NETCON Controllers:

- Back-up of both point-to-point and multipoint networks.
- Dialup from the master unit to the remote unit via NETCON. Also, a call can be terminated via NETCON. In this mode the NETCON can command the master DBU-56FW to restore a link. The NETCON controller, only allows NETCON
dialing from a master data set. Any DBU-56FW can be programmed to dial, or answer a NETCON call at any time.

- Manual (front panel or DTE) dialing.
- Automatic dialing.
- Non-compatible device dial-up protection for the DBU-56FW on both ends is provided.
- Remote loopback testing while on the switched network.

The following describes the dial back-up procedure when the NMC operator initiates a call.

Dial Originate (Master)  Upon successful completion of the dial command from the NMC operator, the master DBU-56FW goes OFF-HOOK then dials the remote DBU-56FW. Then, upon completing the handshake sequence, the primary data channel is transferred from the base card to the DBU-56FW's switched network link.

Dial Answer (Remote)  The remote DBU-56FW will detect an incoming ring from the master and then go OFF-HOOK. Then, upon completing the handshake sequence, the primary data channel is automatically transferred from the base card to the DBU-56FW's switched network link.

When the DBU-56FW is mated to an NMS DSU, the switching is done by the base DSUs. Otherwise, the switching is done by the DBU-56FW.
Overview

This Chapter describes the tests you may perform on the DBU-56FW Data Set from the Serving Test Center (STC), NETCON, DTE interface or front panel after installation or whenever operation of the data set must be checked. These tests are also used to isolate problems in the data communications system. Figure 4-1 offers a fault-isolation diagram.

Figure 4-1  Fault Isolation Diagram
Line Loopback Test

Line Loopback (LL) checks the performance of the DBU and its associated DTE. The DBU disconnects its line transmitter and receiver from the communications line, then connects them together, creating a circuit similar to an Analog Loopback circuit that loops signals from the transmitter through the receiver. It also connects the transmit and receive communications lines together, creating a circuit (the Line Loopback circuit) that loops received signals back over the communications line to the network. *Figure 4-2* illustrates LL.

If dial backup is active and the local DBU is performing Line Loopback, the remote DBU can send a Self-Test pattern to the local DBU. The local DBU loops the test pattern back to the remote DBU for verification. This test checks the performance of the remote DBU and the communications line. To perform this test, make arrangements with the remote site personnel before initiating Line Loopback locally.

---

**NOTE**

This test can also be controlled via the DTE.

---

*Figure 4-2* Line Loopback Test
Remote Loopback Test

Remote Loopback checks the performance of the local and remote DBUs, the local DTE, and the communications line. When you initiate this test, the remote DBU enters the RT Loopback condition. The remote DBU disconnects its DTE transmitter and receiver from the DTE interface, then connects them together, creating a circuit that loops the receiver's digital output signals to the transmitter's input. Figure 4-3 illustrates RL.

**NOTE**
Remote Loopback can also be controlled via the local DTE. The DBU-56FW must have an active dial backup connection in order to perform this test.

1. Engage push button RL. This places the remote DBU in an RT Loopback condition.
2. CO and TEST OK will be ON during test.
3. RS and TEST OK will be ON during test.
4. Initiate a test message from the local end of the data communications circuit.
5. SD and RD will flicker an exact copy of test message.
6. Disengage push button RL to end test.

![Figure 4-3 Remote Loopback Test](image-url)
Self-Tests

The Self-Test function causes the DBU to generate a test pattern and monitor the received signal for errors in the received test pattern. Figures 4-4 through 4-6 illustrate Self-Test. If the DBU detects any errors, the TEST OK led will flash. You can use Self-Test in place of DTE-generated test messages for the Line Loopback and Remote Loopback tests.

**NOTE**
When the DBU-56FW does not have an active dial backup connection, Self-Test can only be performed in conjunction with an LL test. When there is an active connection, Self-Test does interfere with data.

1. Engage push button LL.
2. Engage push button ST.
3. RS and TEST OK will be ON during test.
4. SD and RD will flicker.
5. TEST OK will flash to indicate received errors.
6. Disengage push buttons ST and LL to end test.

**Figure 4-4**  Line Loopback Self-Test
1. Engage push button RL. This places the remote DBU in an RT Loopback condition.

2. After TEST OK led turns on, engage push button ST.

3. RS TEST OK will be ON during test.

4. SD and RD will flicker.

5. RS and TEST OK will be ON during test.

6. TEST OK will flash to indicate received errors.

7. Disengage push buttons ST and RL to end test.

**Figure 4-5 Remote Loopback Self-Test**
End-to-End Self-Test

In addition to using the Self-Test function in conjunction with other test features, you can Self-Test independently. In End-to-End Self-Test (Figure 4-6), the local and remote DBUs exchange Self-Test patterns to check the performance of the communications line and the local and remote DBUs (not including the DBUs’ DTE interfaces).

**NOTE**

The DBU-56FW must have an active dial backup connection in order to perform this test.

1. Engage push button ST on local DBU.
2. SD and RD will flicker.
3. RS and TEST OK will be ON during test.
4. TEST OK will flash to indicate received errors.
5. Disengage push button ST to end test.

*Figure 4-6 End-to-End Self-Test*
CSU Loopback Test

The CSU Loopback test is controlled by the STC, which reverses the polarity of the sealing current. When the DBU detects the reversed current, it disconnects its line transmitter and receiver from the communications line and connects them together. It also connects the transmit and receive communications lines together, creating a circuit (the Line Loopback circuit) that loops received signals back over the communications line to the STC. Figure 4-7 illustrates CSU Loopback.

When it is necessary to isolate a problem, contact the STC and ask them to initiate the CSU Loopback test. Use the test results in conjunction with the fault-isolation diagram (Figure 4-1) to pinpoint a problem, if any.

While the unit is in CSU Loopback, you can send a test message from the local DTE through the local DSU, which loops the message back to the DTE for verification. This test checks the performance of the local DSU, DTE and DSU-DTE interconnections.

1. Contact the STC and ask them to initiate the CSU Loopback test.
2. TEST OK and TM will flash during the test.
3. SD and RD will flicker an exact copy of test message.
4. Coordinate with the STC to end test.

Figure 4-7 CSU Loopback
DSU Loopback Test

The DSU Loopback test is controlled by the STC, which sends network codes. When the DBU detects the codes, it disconnects its line transmitter and receiver from the communications line, then connects them together, creating a circuit that loops the receiver's digital output signals to the transmitter's input. Figure 4-8 illustrates DSU Loopback.

When it is necessary to isolate a problem, contact the STC and ask them to initiate the DSU Loopback test. Use the test results in conjunction with the fault-isolation diagram (Figure 4-1) to pinpoint a problem.

1. Contact the STC and ask them to initiate the DSU Loopback test.

2. TEST CK and TM will flash during the test.

3. SD and RD will flicker.

4. Coordinate with the STC to end test.

Figure 4-8 DSU Loopback Test
## Technical Characteristics

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<table>
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</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>PC card (rackmount installation)</td>
<td></td>
</tr>
<tr>
<td>Height (DBU56FW card only)</td>
<td>0.87 in. (22 mm)</td>
</tr>
<tr>
<td>(With base DSU)</td>
<td>1.75 in. (45 mm)</td>
</tr>
<tr>
<td>Width</td>
<td>10.5 in. (267 mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>10.75 in. (273 mm)</td>
</tr>
<tr>
<td>Weight (DBU-56FW card only)</td>
<td>1 lb 3 oz (0.54 kg)</td>
</tr>
<tr>
<td>Shipping weight (DBU-56FW card only)</td>
<td>2 lb 3 oz (1.0 kg)</td>
</tr>
<tr>
<td>Standalone installation</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>3.9 in. (99 mm)</td>
</tr>
<tr>
<td>Width</td>
<td>10.9 in. (277 mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>12.5 in. (318 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>6 lb 5 oz (2.8 kg)</td>
</tr>
<tr>
<td>Shipping weight</td>
<td>7 lb 5 oz (3.3 kg)</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td></td>
</tr>
<tr>
<td>Temperature, pc card assembly</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>32° to 122°F (0° to 50°C) (Derate by 1°C/1000 ft above sea level)</td>
</tr>
<tr>
<td>Nonoperating</td>
<td>–40° to 185°F (–40° to 85°C)</td>
</tr>
<tr>
<td>Temperature, standalone</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>32° to 122°F (0° to 50°C)</td>
</tr>
<tr>
<td>Nonoperating</td>
<td>–40° to 158°F (–40° to 70°C)</td>
</tr>
<tr>
<td>Humidity, operating</td>
<td>5% to 95% without condensation</td>
</tr>
<tr>
<td>Altitude</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>0 ft to 10,000 ft (0 m to 3,047 m)</td>
</tr>
<tr>
<td>Non-operating</td>
<td>0 ft to 40,000 ft (0 m to 12,191 m)</td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td></td>
</tr>
<tr>
<td>Power requirements</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>117 V ac (+10%, –15%)</td>
</tr>
<tr>
<td>Frequency</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Power dissipation</td>
<td></td>
</tr>
<tr>
<td>Standalone</td>
<td>15 W maximum</td>
</tr>
<tr>
<td>Rackmount</td>
<td>10 W maximum</td>
</tr>
<tr>
<td>Fusing</td>
<td></td>
</tr>
<tr>
<td>PC card</td>
<td>Two 3.0 A, 250 V, 2AG (GDC Part No. 215-202-005)</td>
</tr>
<tr>
<td>Enclosures</td>
<td>See respective enclosures for fusing requirements.</td>
</tr>
</tbody>
</table>
### Technical Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical (Cont.)</strong></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td></td>
</tr>
<tr>
<td>DDS</td>
<td>Full or half duplex, point-to-point or full duplex, multipoint</td>
</tr>
<tr>
<td>Switched 56</td>
<td>Full or half duplex, point-to-point</td>
</tr>
<tr>
<td>Signal format</td>
<td>Serial, synchronous</td>
</tr>
<tr>
<td>Signal encoding</td>
<td>Bi-polar, return-to-zero</td>
</tr>
<tr>
<td>Data rate</td>
<td>56000 bps (synchronous)</td>
</tr>
<tr>
<td>Communications line</td>
<td>Switched 56 kbps 4-wire</td>
</tr>
<tr>
<td>Terminating impedance</td>
<td>135 ohms ±20%</td>
</tr>
<tr>
<td>DTE interface</td>
<td>EIA/TIA-232-E (with Data Rate Adapter) or CCITT V.35</td>
</tr>
<tr>
<td>Transmitter Power</td>
<td></td>
</tr>
<tr>
<td>56000 bps</td>
<td>6.0 dBm, maximum (50% duty cycle, random bipolar sequence, 135 ohm impedance)</td>
</tr>
<tr>
<td>RTS-CTS delay (synchronous)</td>
<td>0.35 ±0.02 ms</td>
</tr>
<tr>
<td>Timing</td>
<td>Receiver (slave/network), internal (DSU) ±0.01%, or external (DTE) (will accept external clock up to ±0.02%)</td>
</tr>
<tr>
<td>Receiver</td>
<td>Dynamic range 48 dB extended range at 56 kbps</td>
</tr>
<tr>
<td></td>
<td>Acquisition time 200 ms, maximum</td>
</tr>
<tr>
<td></td>
<td>Release time 1 sec, maximum</td>
</tr>
<tr>
<td><strong>Optional Data Rate Adapter</strong></td>
<td></td>
</tr>
<tr>
<td>Format</td>
<td>Serial synchronous and asynchronous binary data.</td>
</tr>
<tr>
<td>DSU data rate</td>
<td>56, 64 kbps</td>
</tr>
<tr>
<td>DTE data rate</td>
<td>19.2, 9.6, 4.8, 2.4 kbps synchronous.</td>
</tr>
<tr>
<td></td>
<td>19.2, 9.6, 2.4, 1.2 kbps asynchronous.</td>
</tr>
<tr>
<td>DTE Interface</td>
<td>EIA/TIA-232-E</td>
</tr>
<tr>
<td>Operating modes</td>
<td>DDS full duplex point-to-point.</td>
</tr>
<tr>
<td></td>
<td>DDS full or half duplex multipoint.</td>
</tr>
<tr>
<td>Height</td>
<td>0.5 inches (12.70 mm)</td>
</tr>
<tr>
<td>Width</td>
<td>1.78 inches (45.21 mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>4.30 inches (109.22 mm)</td>
</tr>
</tbody>
</table>

**NOTE:** When the piggyback is plugged into the base card, the unit shall meet the environmental, power and quality assurance requirements.

GDC 058R522-000
# Business Equipment (DTE) Interface Signals (EIA/TIA-232-E)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>165</th>
<th>Circuit Designation</th>
<th>CCITT</th>
<th>EIA</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td></td>
<td>AA</td>
<td></td>
<td></td>
<td>This circuit is connected to the equipment frame. Optionally, it may be connected to signal ground, pin 7.</td>
</tr>
<tr>
<td>103</td>
<td></td>
<td>BA</td>
<td></td>
<td></td>
<td>Transfers data signals from DTE for modulation and transmission over communications line.</td>
</tr>
<tr>
<td>104</td>
<td></td>
<td>BB</td>
<td></td>
<td></td>
<td>Transfers data signals to DTE that were received over communications line and demodulated by Data Set.</td>
</tr>
<tr>
<td>105/133</td>
<td></td>
<td>CA/CJ (1)</td>
<td></td>
<td></td>
<td>Indicates to Data Set that DTE is prepared to transmit and is ready for receiving.</td>
</tr>
<tr>
<td>106</td>
<td></td>
<td>CB</td>
<td></td>
<td></td>
<td>Indicates to DTE that Data Set is prepared to transmit.</td>
</tr>
<tr>
<td>107</td>
<td></td>
<td>CC</td>
<td></td>
<td></td>
<td>Indicates to DTE that Data Set is prepared for data communications.</td>
</tr>
<tr>
<td>102</td>
<td></td>
<td>AB</td>
<td></td>
<td></td>
<td>Establishes common ground reference for all interface circuits except protective ground, pin 1.</td>
</tr>
<tr>
<td>109</td>
<td></td>
<td>CF</td>
<td></td>
<td></td>
<td>Indicates to DTE that Data Set is receiving data (not receiving idle or OOS codes).</td>
</tr>
<tr>
<td>126</td>
<td></td>
<td>(4) Unassigned</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>122/112</td>
<td></td>
<td>SCF/CI (2)</td>
<td></td>
<td></td>
<td>Secondary Received Line Signal</td>
</tr>
<tr>
<td>121</td>
<td></td>
<td>SCB</td>
<td></td>
<td></td>
<td>Secondary Clear to Send</td>
</tr>
<tr>
<td>118</td>
<td></td>
<td>SBA</td>
<td></td>
<td></td>
<td>Secondary Transmitted Data</td>
</tr>
<tr>
<td>114</td>
<td></td>
<td>DB</td>
<td></td>
<td></td>
<td>Transfers transmitter signal timing information from Data Set to DTE.</td>
</tr>
<tr>
<td>119</td>
<td></td>
<td>SBB</td>
<td></td>
<td></td>
<td>Secondary Received Data</td>
</tr>
<tr>
<td>115</td>
<td></td>
<td>DD</td>
<td></td>
<td></td>
<td>Transfers receiver signal timing information from Data Set to DTE.</td>
</tr>
<tr>
<td>141</td>
<td></td>
<td>LL</td>
<td></td>
<td></td>
<td>Local Loopback</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>SCA</td>
<td></td>
<td></td>
<td>Secondary Request to Send</td>
</tr>
<tr>
<td>108/1,2</td>
<td></td>
<td>CD</td>
<td></td>
<td></td>
<td>Indicates to Data Set that DTE is prepared for data communications.</td>
</tr>
<tr>
<td>140/110</td>
<td></td>
<td>RL/CG (2)</td>
<td></td>
<td></td>
<td>Remote Loopback/Signal Quality</td>
</tr>
<tr>
<td>125</td>
<td></td>
<td>CE</td>
<td></td>
<td></td>
<td>Ring Indicator</td>
</tr>
<tr>
<td>111/112</td>
<td></td>
<td>CH/CI (2)</td>
<td></td>
<td></td>
<td>Data Signal Rate Selector</td>
</tr>
<tr>
<td>113</td>
<td></td>
<td>DA</td>
<td></td>
<td></td>
<td>Transfers transmitter signal timing information from DTE to Data Set</td>
</tr>
<tr>
<td>142</td>
<td></td>
<td>TM</td>
<td></td>
<td></td>
<td>Indicates to DTE that Data Set is in a test mode.</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td>(3) No Connection</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. When hardware flow control is required Circuit CA may take on the functionality of Circuit CJ.
2. For designs using interchange circuit SCF, interchange circuits CH and CI are assigned to pin 23. If SCF is not used, CI is assigned to pin 12.
3. Pin 26 is contained on the Alt A connector only. No connection is to be made to this pin.
4. Pin 11 is unassigned. It will not be assigned in future versions of EIA/TIA-232. However, in international standard ISO 2110, this pin is assigned to CCITT Circuit 126, Select Transmit Frequency.
## Business Equipment (DTE) Interface Signals (CCITT V.35)

<table>
<thead>
<tr>
<th>V.35 Pin</th>
<th>Circuit Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>101 AA</td>
<td>This circuit is connected to the equipment frame. Normally, it is separated from signal ground (pin B) by 100 ohms, but it may be connected to signal ground by means of an option strap (X4).</td>
</tr>
<tr>
<td>B</td>
<td>102 AB</td>
<td>Establishes a common ground reference for all interface circuits except protective ground, pin A.</td>
</tr>
<tr>
<td>C</td>
<td>105 CA</td>
<td>Indicates to Data Set that DTE is prepared to transmit.</td>
</tr>
<tr>
<td>D</td>
<td>106 CB</td>
<td>Indicates to DTE that Data Set is prepared to transmit.</td>
</tr>
<tr>
<td>E</td>
<td>107 CC</td>
<td>Indicates to DTE that Data Set is operational.</td>
</tr>
<tr>
<td>F</td>
<td>109 CF</td>
<td>Indicates to DTE that Data Set is receiving data (not idle or OOS codes).</td>
</tr>
<tr>
<td>J</td>
<td>125 CE</td>
<td>Ring Indicator</td>
</tr>
<tr>
<td>K</td>
<td>142 TM</td>
<td>Indicates DTE that Data Set is in test mode.</td>
</tr>
<tr>
<td>P</td>
<td>103 BA(A) 103 BA(B)</td>
<td>Transfers data signals from DTE for modulation and transmission over communication line.</td>
</tr>
<tr>
<td>R</td>
<td>104 BB(A) 104 BB(B)</td>
<td>Transfers data signals received over communication line and demodulated by Data Set to DTE.</td>
</tr>
<tr>
<td>U</td>
<td>113 DA(A) 113 DA(B)</td>
<td>Transfers transmitter signal timing information from DTE to Data Set.</td>
</tr>
<tr>
<td>V</td>
<td>115 DD(A) 115 DD(B)</td>
<td>Transfers receiver signal timing information from Data Set to DTE.</td>
</tr>
<tr>
<td>Y</td>
<td>114 DB(A) 114 DB(B)</td>
<td>Transfers transmitter signal timing information from Data Set to DTE.</td>
</tr>
<tr>
<td>H</td>
<td>108/2 CO</td>
<td>Indicates to Data Set that DTE is prepared for data communication.</td>
</tr>
<tr>
<td>BB/b</td>
<td>140 RL</td>
<td>Transfers signal from DTE to control Remote Loopback test if option is enabled.</td>
</tr>
<tr>
<td>L</td>
<td>141 LL</td>
<td>Transfers signal from DTE to control Line Loopback test if option is enabled.</td>
</tr>
</tbody>
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