Broadcast Polling
FRAD with Backup

TABLE OF CONTENTS

1. DESCRIPTION

The BPF-BU is a special version of the BPF that provides for dial and/or leased line backup for the frame relay network. Used at the remote site only, the BPF-BU is the same hardware as standard BPF. However, the ports are used in a different manner. To implement the automatic backup functions the async ports are used as follows:

BPF-2 BU	BPF-6 / 14 BU
Ports 1 & 2: RTU	Ports 1-6 & 9-16: RTU
Port 3: Dial backup	Port 7: Dial backup
Port 4: Dedicated link backup	Port 8: Dedicated link backup

The BPF-BU receives data from the host on a regular basis, either user data or a keep alive packet from the host BPF. To keep the remote BPF-BU from going to the backup mode in the absence of user data, the host BPF sends out a keep alive signal to the BPF-BU if there has been no user data for 30 seconds. The keep alive does not interfere with user data. The host BPF must have firmware version 1.7 or higher to insure the unit has the keep alive and can be used with the remote BPF-BU units.

If the data or keep alive fails for 40 seconds, the remote BPF-BU begins the backup process. The BPF-BU first attempts a connection through the Leased Line port if port RTS is asserted. If RTS is not asserted, the BPF-BU tries the Dialup port by sending an "AT" and looking for an "OK" response. If an "OK" is returned, the BPF-BU sends the command ATDS=0. This tells the modem to dial the number stored in phone number register 0. The user must program the remote modem to dial the appropriate phone number of a host end modem. If a number cannot be stored in the modem, the number to dial can be stored in the BPF-BU using the CBN command (see Section 5).

The BPF-BU will continue to cycle through the backup choices, trying to establish a connection, until a connection is made or until the frame relay composite link is re-established. Once the Leased Line or Dial modem backup link is established, the BPF-BU channels data from the backup port to the RTU ports. Data from the RTU ports is channeled back to the host via whichever port is active. The RTU ports that are backed up in this manner can vary from a single port to all RTU ports. If no ports are selected, the backup process will not be performed. The backup link is dropped when the frame relay link is re-established.

At the host end, an Async sharing Unit (ASU) set to the Backup Mode must be installed. The ASU is installed between the host computer serial port and the host BPF and backup modem(s). The ASU Composite port connects to the host, the Device ports are connected to the Host BPF and the backup device(s) (radio, modem, etc).

The ASU scans the device ports for RTS. If RTS is high on any device port, the data channel between the Composite and the Device port is opened. The green DCB NMP cable, part number 9500023, is used between the ASU and the BPF. To connect the ASU to the modem, an RJ45 line cord and the DCB Async Modem adapter, part number 9802018 is used. With this cable, when the backup modem link is established, the modem DCD is wired to the ASU RTS input and the path is opened between the host computer and the remote device served by that modem.
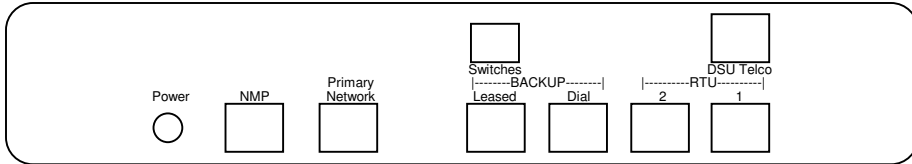
To make the host modem behave properly, the ASU sends out a command string. This command string puts the modem in answer mode, insures that modem DCD follows the call progress and insures that the RS232 interface speed is correct. The command string is sent by the ASU as soon as the ASU is put into Backup mode. Once in Backup mode, the ASU also sends out the string after the ASU is powered on and after the ASU is reset.

Some features of the BPF-BU include:
- Monitor functions allow network management port user to monitor transmit or receive of any data port.
- Many test features allow diagnostics of the system and communications link.
- Power supplies available for 120 VAC, and 240 VAC.

Options:
- Built-in 56 / 64Kbps DSU/CSU.
- Rack mount options available.
- Power supplies for 12, 24, -48 or 125 VDC are also available.

BROADCAST POLLING FRAD

TXD RXD RTS CTS DCD TEST

POWER ACTIVITY LINE ERROR MODEM READY PORT 1 SETUP LOOPBACK

LOOPBACK SETUP RESET

DCB

Power NMP Primary Network Switches |--------BACKUP--------| DSU Telco |----------RTU----------|

Leased Dial 2 1
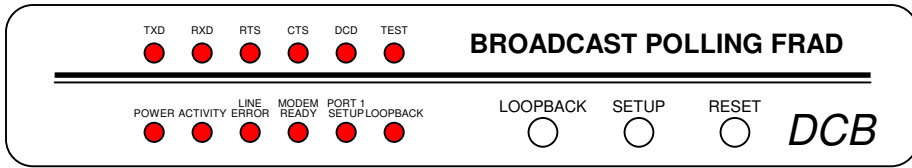
BPF-2 BU shown with optional built-in DSU/CSU

OPTION
MODEM READY
LINE ERROR
ACTIVITY
POWER

PORT 1 SETUP LOOPBACK **BROADCAST POLLING FRAD**

DCB

RESET

NMP PRIMARY NETWORK |--------BACKUP--------| |-------------------------------RTU-------------------------------|

LEASED DIAL 6 5 4 3 2 1

BPF-14 BU

4
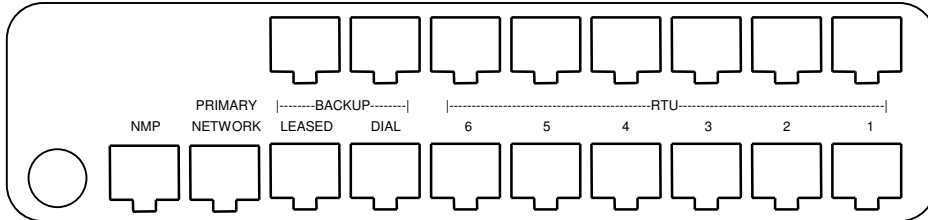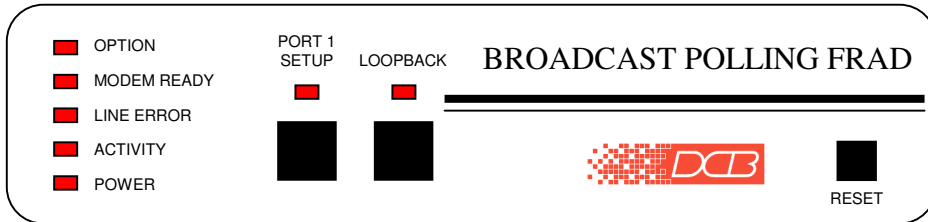
2. SPECIFICATIONS

2.1   Product

2.1.1   Data Ports

Port Speeds
Asynchronous only
300, 1200, 2400, 4800, 9600, 19,200, 38.4 or 57.6 Kbps

Port Rate Selection
Selected per port through network management port control
with an asynchronous terminal.

Data Format
10 bits/character, 1 start, 1 stop, 8 data (including parity)

Interface
CCITT V.24, RS-232D, implemented in RJ-45, 8 position
connectors. (EIA-561 standard physical pin-out used on RJ-
45 connectors)

2.1.2   Composite Port

Full Duplex

Speed
Synchronous up to 128 Kbps

Interface
RS-232D, implemented in RJ-45, 8 position connector

2.1.3   Network Management Port Commands

       Show Port Configuration
       Show Port Map
       Show Frame Relay Status
       Change Port Configuration
       Change Port Map
       Change Delay Timeout
       Change Frame Relay Configuration
       Configure Internal DSU
       Configure Backup Modem
       Configure Backup (phone) Number
       Show / Change ID
       Set NMP Password
       Show Activity Counters
       Zero Activity Counters
       Test Tools
           Monitor Port Tx
           Monitor Port Rx
           Monitor Network Status
           NMP Parity
           Ping DLCI
           Reset BPF
       Type
       Repeat Last Command
       Disconnect NMP

2.2   Environmental

       Operation: -40 to +70° C, 10 to 95% relative humidity
       Storage: -40 to +85° C, 10 to 95% relative humidity

2.3   Physical / Electrical

       10¼" W x 9¾" D x 2½" H
       120 VAC external power supply
       Optional 240VAC power supply available
       30 watts, .25 amps

2.4   Optional Built-In DSU/CSU Specifications
       Compatible with Common Carrier digital signalling
       56 or 64 Kbps
       4 wire digital line
       Can be used as high speed 4 wire line driver in 56K mode

3.   INSTALLATION

3.1   Unpacking

Remove the unit from the shipping container and examine it carefully for external damage. If shipping damage is apparent, notify the shipper immediately.

The following accessories are included with each unit:

- external power supply
- manual
- warranty, maintenance contract and repair information
- Modem to Composite cable (black) for connecting the unit to an external DSU/CSU
- Network Management Port cable (green) for connecting the network management port to an asynchronous terminal or PC for configuration
- If your unit has the optional built-in DSU/CSU, a cable is included for connection to the phone line.

3.2   Setup

The frame relay options for the BPF-BU can be configured using the Frame Relay (FR) command from the network management port. The configurable parameters are:

Management (Type) - Auto, LMI, Annex D or None
Poll Interval - (5-30 sec)
Full Status Interval - (1-255 polls)

3.2.1   Management Type

When set to AUTO, the BPF-BU will automatically determine the correct management type for your network.

3.2.2   DLCI

The BPF-BU will automatically get the proper DLCI from the network and map that DLCI to RTU port 1. If other RTU ports are used, they must be mapped using the CM command. (See paragraph 5.4.6)

3.2.3   Poll Interval

The poll interval determines how often a "keep alive" frame is sent to the network. The default is 10 seconds. This is adequate for most installations.

3.2.4   Full Status Interval

The full status interval determines how often a full status request is sent to the network. The default is 6 polls. So every sixth poll will be a full status request.

3.3   Connecting the DSU/CSU

Connect the DSU/CSU to the phone line and power ON the DSU/CSU. Confirm the presence of carrier at each DSU/CSU. If carrier is not detected at both ends, recheck the option settings. If carrier is still not present, check the cable from the telephone line to the DSU/CSU. If everything is correct and still no carrier call the manufacturer of the DSU/CSU or contact the telephone company for assistance.

Connect the BPF-BU composite port to the DSU/CSU using the Modem to Composite cable supplied.

Connect the BPF-BU to power. The Power and Modem Ready indicators on the front panel of the BPF-BU should be ON indicating the on-line condition. (See Section 4). This may take up to one minute. If Modem Ready continues to flash, the BPF-BU was unable to connect to the local frame relay network. Use the SS command to see if the network is responding to Full Status and Keep Alive messages. If not, contact the telephone company for assistance.

3.4   Optional Built-In 56 / 64 Kbps DSU/CSU

The optional DSU/CSU in the 2 port unit is configured using DIP switches accessable from the rear of the unit. See Section 4 for a description and location of these switches. The default settings should be correct for most applications.

The optional DSU/CSU in 6 & 14 port units is configured using the CN command. See paragraph 5.4.9 for a description of this command. The default setting is 56K, Standard Clock.

For line driver applications over customer owned wire set one unit for Master (Line Driver 56) Clock and the other unit to Slave (Standard) Clock.

3.5   Managing the frame relay links

Use the network management port of the unit. Connect the NMP to an ASCII terminal or PC terminal program using the supplied green management cable and connectors. See Section 5 for more information.

Look at the SS status screen. The number of keep alives sent and received should be the same, as well as the number of full status messages. The counters can be zeroed with the Z command.

The BPF-BU sends a keep alive or full status inquiry every 10 seconds. One full status is sent for every 5 keep alive requests. The frame relay vendor equipment responds to each keep alive request and full status request.

Full status responses from the frame relay vendor include the DLCI addresses assigned to the frame relay drop. The BPF-BU reports these addresses on the SS status screen.

If the keep alive and full status messages are sent and received in equal numbers as shown on the SS screen, the frame relay circuit should be up and operational. This is not, by itself, however, a guarantee that the complete frame relay network is up, since the keep alive and full status management messages are only from the customer equipment to the nearest frame relay switch port. The link at the far end must also be up for the circuit to be complete.

3.6   Cabling

Cabling between the BPF-BU and the computer ports or terminal devices (RTUs) is a common source of installation problems. The BPF-BU must have data from attached terminal devices or computer ports, as an input on position 6 of the RJ45 connector. Data from the BPF-BU to any attached equipment will be transmitted on position 5 of the RJ45 connector. See Section 6 for position locations on the RJ45 connector.

See Section 6 to determine the correct cables for your computer and terminal devices.

3.7   Resetting Factory Defaults

The factory default settings for the BPF-BU ports are as follows:

Data Ports:
    Loop   OFF
    Rate   9600

Dial Backup Port:
    Dial Command   ATDS=0

RTU Ports Backed Up: Port 1

To reset the unit to factory defauls use the !R command from the network management port or perform the following steps using the front panel switches:

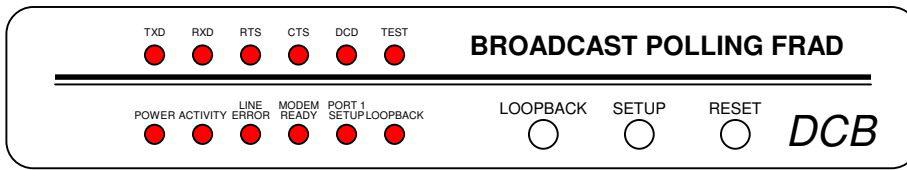1. Depress and hold the PORT 1 SETUP switch while depressing the RESET switch.

2. Be sure to continue to hold the Port 1 Setup switch until its LED has gone OFF and returned ON.

3. Release and depress the Port 1 Setup switch again to return management control to the network management port.

4. All port settings should be at the factory defaults. Use the SC (Show Configuration) command to check the port settings.

4. CONTROLS AND INDICATORS

4.1 BPF-2 BU

| TXD | RXD | RTS | CTS | DCD | TEST | | **BROADCAST POLLING FRAD** |
| POWER | ACTIVITY | LINE ERROR | MODEM READY | PORT 1 SETUP | LOOPBACK | LOOPBACK | SETUP | RESET | *DCB* |

4.1.1 Front Panel Switches (shown with built-in DSU)

Setup – Maps the network management port commands to the terminal attached to data port 1. When Port 1 Setup is active, the indicator is on.

Loopback – The loopback function is disabled in this product.

Reset – Performs a hardware reset of the BPF-BU.

4.1.2 Optional Built-In DSU Switches

The DSU switches are located at the rear of the unit. Switch functions are shown in the following table:

| Switch	Down	Up
1	56K	64K (optional)
2	Slave Clock	Master Clock
3	Must Be Down	
4	RTS Normal	RTS Forced ON
5	Normal	Local Loop ON
6	Not Used	

NOTE

RTS mode (sw 4) is active in 56Kbps mode only. In 64Kbps mode, RTS is forced on.

For normal operation with a telephone company line, set the DSU for SLAVE clock timing (switch position 2 DOWN). For in-house line driver applications (56K only), set the host DSU for MASTER timing (switch position 2 UP). The remote unit should remain set for Slave clock.

4.1.3   Optional DSU/CSU Indicators

TxD	Flashing	Data is being sent over the link.
RxD	Flashing	Data is being received from the link.
RTS	ON	Forced on or high from the BPF-BU.
	OFF	No RTS from the BPF-BU.
CTS	Follows RTS	CTS signal to the BPF-BU.
DCD	ON	Normal condition.
	OFF	No carrier signal received from the far end.
TEST	ON	Unit is in loopback (DIP switch 5 UP)
	Flashing	Telephone line is in loopback.

4.2   BPF-6 / 14 BU
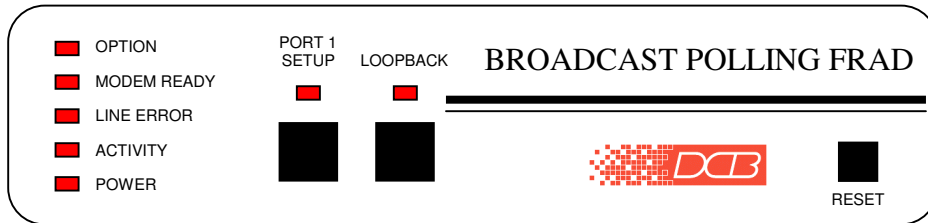
4.2.1   Front Panel Switches

Port 1 Setup – Maps the network management port commands to the terminal attached to data port 1. When Port 1 Setup is active, the indicator is on.

Loopback – The loopback function is disabled in this product.

Reset – Performs a hardware reset of the BPF.

4.3   BPF-BU Indicators (all units)

POWER – is ON when the unit is connected to power.

ACTIVITY – ON whenever data is transmitted from the unit.

LINE ERROR – not used

MODEM READY:

ON – Data Carrier Detect is present from the composite link device indicating an active Frame Relay link.

SLOW CONTINUOUS FLASHING – The unit has lost communication with the local frame relay network.

SLOW FLASHING 2 ON / OFF – The Leased Line Backup port is active.

SLOW FLASHING 3 ON / OFF – The Dial Backup port is active.

OFF – Data Carrier Detect is not present from the composite DSU/CSU indicating a problem with the composite link.

PORT 1 SETUP – is ON when the network management port functions have been mapped to data port 1 by depressing the front panel switch. To return these functions to the network management port, depress the front panel switch again.

LOOPBACK – The loopback function is disabled in this product.

NOTE
The OPTION indicator on the BPF-6 / 14 BU is not used.

5.   NETWORK MANAGEMENT PORT

5.1   Introduction

The Network Management port (NMP) is used to configure the BPF-BU for proper operation. This connection must be used to configure and map the data ports. The NMP can also be used to configure remote BPF-BU ports after a link is established between the host and remote sites.

5.2   Connections and Setup

Connection to the NMP is made either through a port on the rear of the BPF-BU or by using Port 1 Setup.

5.2.1   Port 1 Setup

The easiest way to access the NMP functions is by using a terminal connected to port 1 of the BPF-BU. A switch located on the front panel performs this function. See paragraph 4.1.1 for information.

5.2.2   Dedicated Terminal or PC

The NMP functions are also available through a port on the rear of the unit labeled Network Management Port. To connect a dedicated terminal to this port, use the green cable provided and the appropriate adapter for either a terminal or PC. Set the terminal device for 9600 bps, 8 data bits, no parity, one stop bit, and no flow control.

5.2.3   Dedicated Modem

For remote access to NMP functions, a dial-up modem may be connected to the Network Management Port. You must fix the DTE interface speed of the modem at 9600 bps, 8 data bits, no parity and one stop bit. Refer to your modem manual for appropriate setup procedures. Use the appropriate cable from paragraph 6.3.3 for connection.

5.3   Using the Network Management port

To activate the NMP, press the ENTER key. When you see **AT YOUR COMMAND >>**, the NMP is active and ready for your commands. Type H <Enter> to display the command set.

5.4   Commands

5.4.1   Help (H or ?)

COMMAND		LOCAL	REMOTE	PARAGRAPH
Show:	Config	SC	RSC#	5.4.2
	Port Map	SM	RSM#	5.4.3
	FR Status	SS	RSS#	5.4.4
Change:	Port Config	CP	RCP#	5.4.5
	Port Map	CM		5.4.6
	Delay Timeout	CD	RCD#	5.4.7
	FR Config	FR		5.4.8
Config Internal DSU		CN		5.4.9
Config Backup Modem		CBM		5.4.10
Config Backup Number		CBN		5.4.11
Set ID		ID	RID#	5.4.12
Set Password		PW		5.4.13
Activity Counters/Zero		AC/Z	RAC#/RZ#	5.4.14
Test Tools		TT		5.4.18
Type		TY	RTY#	5.4.15
Repeat Last Command		*		5.4.16
Disconnect NMP		BYE		5.4.17

This Help screen shows the choice of commands available. The commands allow you to display the selected options, configure the BPF-BU, and perform many different diagnostic functions. The # character in the remote commands represents the DLCI number of the Host BPF unit and must be included with the command.

5.4.2   Show (Port) Configuration

The Show Config (SC) command shows the current port configuration settings for either the local or the remote (RSC#) ports. Port numbers may be included with this command to limit the display range. If no port numbers are included, settings for all ports are shown. Use this command to verify proper port configuration.

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NOTE

Several commands allow port numbers or port number ranges to be included on the command line. When port numbers are included, the syntax is as follows:

(Command)1	Port 1
(Command)1,2,6	Ports 1, 2 & 6
(Command)1 2 6	Ports 1, 2 & 6
(Command)2-6	Ports 2 thru 6
(Command)1,5-8	Ports 1 and 5 thru 8

5.4.3   Show Port Map

Show Map (SM / RSM#) displays port mapping for the local or remote BPF. Each data port can be mapped to as many as 42 remote DLCIs. The DLCI numbers mapped to each port are displayed in numerical order.

5.4.4   Show Frame Relay Status

The Show Status (SS / SS#) command displays a report of frame relay statistics including error status, keep alive frames sent and received, full status frames sent and received, and a list of all DLCIs assigned to the local frame relay node.

The Z command (Z / RZ#) is used to zero the counters so that current activity can be monitored.

5.4.5   Change Port Configuration

The Change Port Config (CP / RCP#) command sets the loopback and rate configuration for each RTU and Backup port. The backup status of each RTU port is also set using this command. Follow the prompts and examples on the screen to select the port(s) and parameter(s) you wish to change. One or more ports may be set with a single command by selecting a range of port numbers. The factory default setting is loop off, 9600 bps, port 1 backed up.

With optional firmware, this command is also used to set ports for 8 data bits plus EVEN, ODD, MARK, or NO parity.

5.4.6   Change Port Map

The CM command is used to map the host BPF-BU data ports to the
selected remote units. You may ADD or DELETE remote unit DLCIs
to each port as required. A maximum of 40 DLCIs can be mapped to
a single data port

5.4.7   Change Delay Timeout

This command (CD) is used to change two timeout parameters, DCD
to Rx data delay and DCD holdover delay. These delays may be
adjusted to insure data block integrity.

5.4.8   Change Frame Relay Configuration

The Frame Relay (FR) command is used to set the frame relay
parameters. A list of current settings is displayed followed by
prompts for new settings. To change a setting, follow the prompts. If
the current setting is correct, press <Enter> to leave the setting
unchanged.

5.4.9   Configure Internal DSU (6 & 14 Port Units Only)

The Configure Internal DSU (CN) command is only available when
the optional internal DSU/CSU is installed. The command is used to
configure the DSU/CSU clock source to standard clock 64 or 56, or
line driver 56. The default is Standard Clock 56K.

5.4.10   Configure Backup Modem

The CBM command connect the network management port to the dial
backup port to allow configuration of the dialup modem. After
modem configuration is complete, type ESC ESC to return to normal
operation.

5.4.11   Configure Backup Number

The CBN command can be used to store a phone number of up to 25
characters. This may be required if the attached modem cannot store
numbers internally. The ATDT prefix is automatically added and is
not counted in the 25 characters. To return to ATDS=0 dialing,
answer NO to the prompt.

5.4.12 Set ID

The Set ID (ID / RID#) command allows you to set or change the local
or remote BPF identifier. IDs can be a maximum of 15 characters in
length. Pressing <Enter> with no entry will leave the ID unchanged.

5.4.13 Set Password

Use the Set Password (PW) command to set a password for access to
the network management port. The password may be up to 15
characters long and is case sensitive.

To clear the password, type DELETE at the PW prompt or reset the
unit to defaults as described in paragraph 3.7.

5.4.14 Activity Counts / Zero

The Activity Counts (AC / RAC#) command shows transmit and
receive data statistics for all ports. The data are presented in terms
of blocks of information sent and received by the network and each
data port. Error counts are also shown. A range of ports may be
included with this command to reduce the number of ports shown.

The Z command (Z / RZ#) is used to zero the counters so that current
activity can be monitored.

5.4.15 Type

The Type (TY) command displays information about the local BPF-
BU including firmware version, number of ports and unit ID. The
Remote Type (RTY#) command is used to display similar information
about the remote BPF-BU.

5.4.16 Repeat Last Command

To repeat the last command, simply press the * key. This is handy
for repeating screens of constantly changing data.

5.4.17 Disconnect NMP

The BYE command toggles the CTS output from the Network
Management port. This is used to disconnect equipment such as dial-
up modems or the DCB Access Switch.

5.4.18   Test Tools

The Test Tools (TT) menu summarizes the test and troubleshooting
commands. These commands are listed separately to reduce the
clutter in the main help list, but are always available from the
command prompt.

COMMAND	LOCAL	REMOTE	PARAGRAPH
Monitor Port Tx	MT#		5.4.19
Monitor Port Rx	MR#		5.4.19
Monitor Network Status	MS		5.4.20
NMP Parity	P		5.4.21
Ping DLCI	PING#		5.4.22
Reset BPF-BU	RESET	RRESET#	5.4.23

5.4.19   Monitor Port TX or RX

The Monitor Port TX (MT#) command monitors data transmitted
from the selected port to the corresponding port of the remote BPF-
BU. The Monitor Port RX (MR#) command monitors data received by
the selected port from the corresponding port of the Host BPF. A
local port number must be included on the command line.

Using these commands on a active line may cause errors when using
time sensitive protocols. Use the commands as a quick check to see if
data are being sent over the link. Do not try to use these commands
as a data line monitor.

When port monitor is active, two ESC characters are needed to end
the test.

5.4.20   Monitor Network Status

The Monitor Status command (MS) enables or disables a status
monitor function. Normal NMP commands are still available while
this monitor is active. The format and items monitored are as follows:

```
*** Monitor Network Status ENABLED.  Use MS again to disable.
DD HH:MM:SS     [report]
00 00:00:00     Monitor started...
00 00:00:01     Network RX error!
00 00:00:02     Network DCD ON!
00 00:00:03     Network DCD OFF!
00 00:00:04     FRAD decode failure!
00 00:00:05     FRAD FECN flag set!
00 00:00:06     FRAD BECN flag set!
00 00:00:07     No KEEP ALIVE response!
00 00:00:08     No FULL STATUS response!
*** WARNING: Monitor is running.  Stop monitor? [Y/N] >> Y
00 00:00:09     Monitor stopped...
```

5.4.21   NMP Parity

The NMP Parity command (P) sets the parity for the network
management port. To change, type P followed by E, O, M or S. The
factory default is SPACE (8,N,1).

5.4.22   Ping DLCI

The Ping DLCI (PING#) command measures the round trip time, to
the selected remote unit, and displays the result in milliseconds. This
information is useful when troubleshooting the frame relay network.
Excessive delay may indicate problems with the network
configuration. The DLCI must be mapped at both ends for the Ping
command to work.

5.4.23   Reset BPF
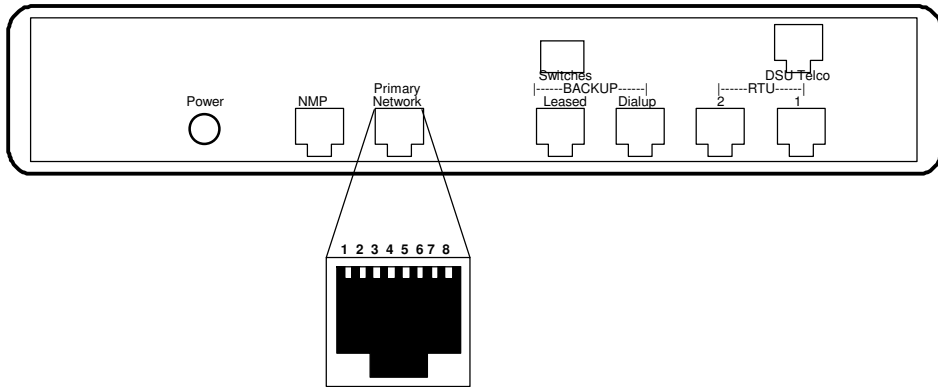
The Reset BPF (RESET) command performs a local reset. To reset
the remote BPF use RRESET# where # is the DLCI of the remote
BPF unit.

6. INTERFACE SIGNALS AND CABLING

6.1   Connector Location and Pin Reference

BPF-BU Rear Panel and RJ-45 Jacks
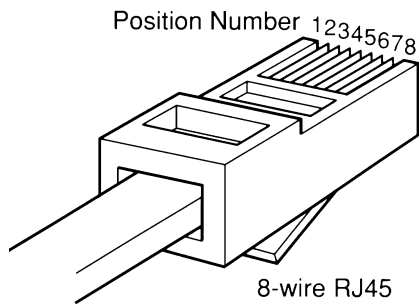
RJ-45 Plug Positions

6.2   Port Interface

6.2.1   Network Port (RJ-45)

Pin	Signal	In/Out
1	Receive Clock	IN
2	Transmit Clock	IN
3	Data Carrier Detect	IN
4	Signal Ground	
5	Transmit Data	OUT
6	Receive Data	IN
7	Request to Send	OUT
8	Clear to Send	IN

6.2.2   RTU and Backup Ports (RJ-45)

Pin	Signal	In/Out
1	Data Set Ready	OUT
2	Data Carrier Detect	OUT
3	Busy	IN
4	Signal Ground	
5	Receive Data	OUT
6	Transmit Data	IN
7	Clear to Send	OUT
8	Request to Send	IN

6.2.3   Network Management Port (RJ-45)

Pin	Signal	In/Out
1	Not Used	
2	Not Used	
3	Busy	IN
4	Signal Ground	
5	Receive Data	OUT
6	Transmit Data	IN
7	Clear to Send	OUT
8	Request to Send	IN

6.2.4   Optional Built-In DSU Interface (RJ-48S)

Pin	Signal	In/Out
1	Transmit Data	OUT
2	Transmit Data	OUT
7	Receive Data	IN
8	Receive Data	IN

6.3   Cables

6.3.1   Network Port to Modem or DSU/CSU

A two foot modem to composite cable is included with each BPF-BU.
The configuration is as follows:

```
    BPF-BU              Modem
     RJ-45              DB-25P

      1 ——————————————— 17
      2 ——————————————— 15
      3 ——————————————— 8
      4 ——————————————— 7
      5 ——————————————— 2
      6 ——————————————— 3
      7 ——————————————┐ 4
                      └—— 20
      8 ——————————————— 5
```
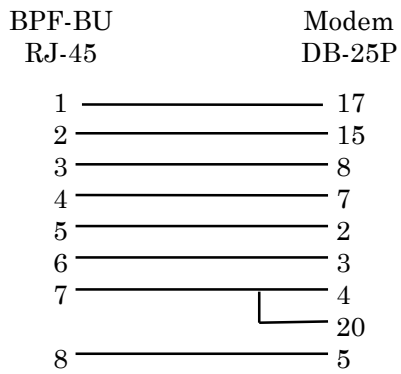
6.3.2   RTU Ports

To a DTE device

```
    BPF-BU              Device
     RJ-45              DB-25

      1 ——————————————— 6
      2 ——————————————— 8
      3 ——————————————— 20   (or other flow control output pin)
      4 ——————————————— 7
      5 ——————————————— 3
      6 ——————————————— 2
      7 ——————————————— 5    (or other flow control input pin)
      8 ——————————————— 4    (or 20 if 4 is flow control)
```
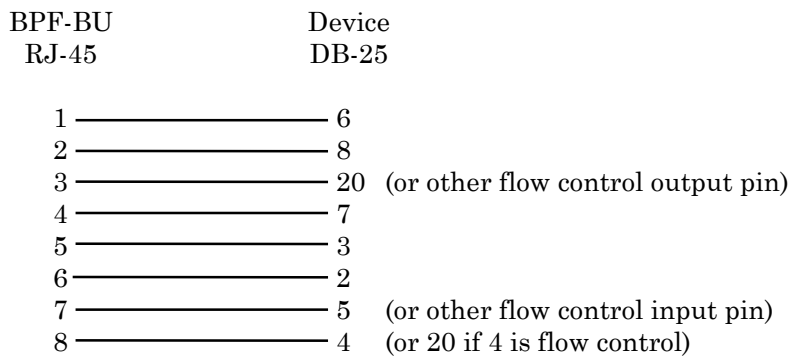
6.3.2   RTU Ports, continued

To a DCE device

```
   BPF-BU                  Device
    RJ-45                  DB-25

       1
       2 ──────────────── 20   (or 4 if 20 is flow control)
       3 ──────────────── 5    (or other flow control output pin)
       4 ──────────────── 7
       5 ──────────────── 2
       6 ──────────────── 3
       7 ──────────────── 4    (or other flow control input pin)
       8 ──────────────── 8
```

To a PC Com Port

```
   BPF-BU                  Computer
    RJ-45              DB-25S    DE-9S

       1 ──────────────── 6    or   6
       2 ──────────────── 8    or   1
       3 ──────────────── 4    or   7
       4 ──────────────── 7    or   5
       5 ──────────────── 3    or   2
       6 ──────────────── 2    or   3
       7 ──────────────── 5    or   8
       8 ──────────────── 20   or   4
```

6.3.3   Dial Backup Port to ASYNC Modem (9802018)

```
      BPF-BU                Modem
       RJ-45                DB-25P
         1                   N/C
         2 ──────────────── 20
         3 ──────────────── 5
         4 ──────────────── 7
         5 ──────────────── 2
         6 ──────────────── 3
         7 ──────────────── 4
         8 ──────────────── 8
```

6.3.4 Network Management Port

To a TERMINAL

```
    NMP                    Terminal
    RJ-45                  DB-25P

     3 ───────────────────── 20
     4 ───────────────────── 7
     5 ───────────────────── 3
     6 ───────────────────── 2
     7 ──────────────┐─────── 5
                     ├─────── 6
                     └─────── 8
     8 ───────────────────── 4
```
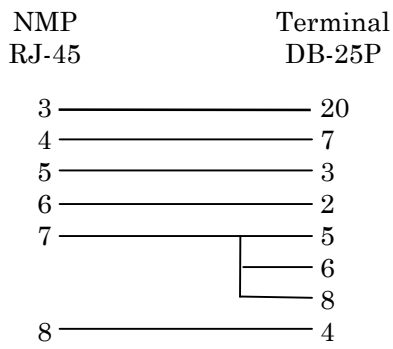
To a PC using terminal emulation

```
    NMP                         Computer
    RJ-45                   DE-9S    DB-25S

     3 ───────────────────── 4    or    20
     4 ───────────────────── 5    or    7
     5 ───────────────────── 2    or    3
     6 ───────────────────── 3    or    2
     7 ──────────────┐────── 8    or    5
                     ├────── 6    or    6
                     └────── 1    or    8
     8 ───────────────────── 7    or    4
```
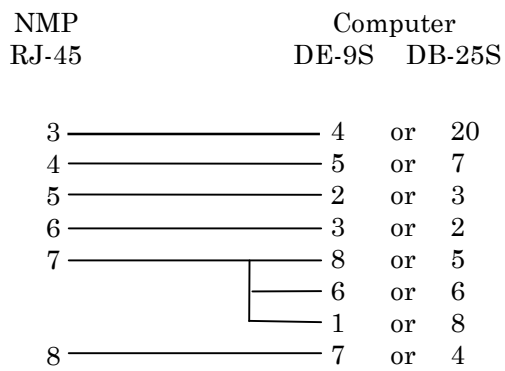
To a dial-up MODEM for remote access

```
    NMP                    Modem
    RJ-45                  DB-25P

     3 ───────────────────── 8
     4 ───────────────────── 7
     5 ───────────────────── 2
     6 ───────────────────── 3
     7 ──────────────┐─────── 4
                     └─────── 20
     8 ───────────────────── 5
```
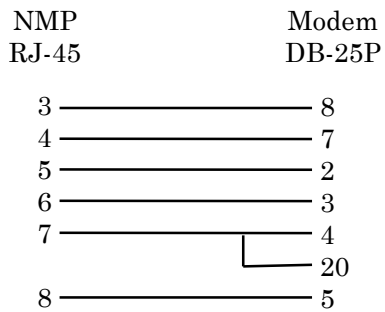
7.   TROUBLESHOOTING

7.1   General Approach

When troubleshooting problems, a rational plan can save you many hours of frustration. The following is a brief outline of standard troubleshooting procedures.

1. Gather the facts to determine the exact nature of the problem.

2. Draw a picture of the system showing the equipment at both the host and remote ends and the phone lines or in-house wiring. Use this as a reference to note your observations, test steps and test results. A picture keeps you focused and often saves duplicate effort.

3. Record the front panel indications before changing anything. This is an important part of fact gathering

4. If you change anything, change only one thing at a time.

5. Use the built-in test functions and record your results.

7.2   Loopback Tests

It is best to begin loopback testing at the remote terminal and work toward the host. If all the loopbacks are successful, the data communications equipment and the terminal are working correctly.

Put the remote BPF-BU port in loopback and have someone type alpha characters on the keyboard of the affected terminal. If the characters appear correctly on the screen, the port is working. Next loop the associated port of the host BPF-BU. If characters again appear correctly, the communications link and the ports on both BPF-BUs are working correctly. The problem then is with the host computer port or the cable between the host computer and the BPF-BU.

Port loopbacks can be turned on and off from the Network Management port of the BPF-BU. If a NMP terminal is not available, port loopback can be enabled using the Port 1 Setup function of the remote BPF-BU

7.3   Installation Troubleshooting, DSUs

First, set up the DSUs without connecting the BPF-BUs. The DSUs
should be set to constant carrier, also called forced Request To Send,
or constant RTS.

Carrier Detect should be ON at both locations.

7.4   Installation Troubleshooting, BPF-BUs

Before trying terminals, make sure the BPF-BUs are able to "see"
each other. Use the RTY# command to verify a response from the
remote BPF-BU. If you get a correct response to RTY#, the link is up
and the BPF-BUs are communicating.

7.5   Assistance

If you need assistance troubleshooting your system, contact DCB
customer support at (217) 897-6600 between 8:00 am and 5:00 pm
central time Monday through Friday.

8.   WARRANTY

DCB products are warranted to be free of defects in materials and workmanship for two years. Data Comm for Business will repair or replace any equipment proven to be defective within the warranty period. All warranty work is F.O.B. Dewey, IL. This warranty is exclusive of abuse, misuse, accidental damage, acts of God or consequential damages, etc. DCB liability shall not exceed the original purchase price.

All equipment returned for repair must be accompanied by a Returned Material Authorization (RMA) number. To receive an RMA number, call (217) 897-6600 between the hours of 8 AM and 5 PM central time. Equipment must be shipped prepaid to DCB and will be returned at DCB's expense.

Ship returned items to:

Data Comm for Business
2949 County Road 1000E
Dewey, IL 61840
ATTN: Your RMA#

Data Comm for Business, Inc.
PO Box 6329
Champaign, IL 61826-6329

Tel   (217) 897-6600
Fax   (217) 897-1331