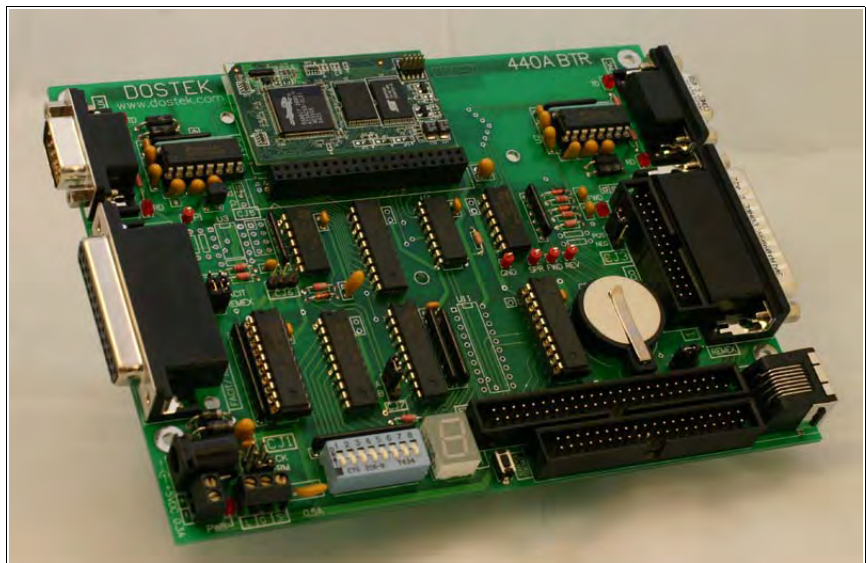




Dostek 440A BTR

User Guide



DOSTEK

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Table of Contents

Introduction	1
Installing the BTR	1
1 Features and Benefits	3
2 Connectors	5
2.1 DNC/Computer Serial Port	5
2.2 AUX Serial Puncher Port	5
2.3 Parallel Output Port	7
2.4 Parallel Input Port	7
2.5 Remote Terminal Block	7
3 Power and Battery	8
3.1 Power Source	8
3.2 Memory Battery Backup	8
Replacing the Battery	8
4 Controls and Indicators	9
Indicators	9
Display (7-Segment)	10
Controls	11
5 Configuring the BTR	13
5.1 Using Configuration Switches	13
5.2 Using Configuration Jumpers	13
5.3 Choosing a BTR Operating Mode	16
5.3.1 Standard Mode	16
5.3.2 Tracking Mode	16
5.3.3 Standalone Mode	17
5.4 Using BTR Parameters	19
5.5 Configuring the Computer	20
6 Using the BTR	21
6.1 How the BTR Works	21
6.2 Getting Started with the BTR	23
6.2.1 Starting the BTR	23
6.2.2 Clearing the BTR Memory	23
6.3 Sending a File to the BTR	24
6.3.1 Fixing Communication Problems	24
6.4 Loading and Drip Feeding to the CNC	25
6.4.1 Continuous Drip Feeding	25
6.5 Punching from CNC to Computer via BTR	26
6.6 Loading Binary Files (CNC Executive)	26
6.7 Using BTR Command Mode	27
6.8 Transcribing Tapes	28

7	Troubleshooting	29
7.1	Troubleshooting Tips	29
7.1.1	Reconnect the Tape Reader	29
7.2	Understanding BTR Alarm Codes	30
7.3	Understanding CNC Alarms and Indications	31
7.4	Viewing BTR File and Memory Information	33
7.4.1	View file information	33
7.4.2	View file (memory) content	33
7.5	Fixing Power Problems	34
7.6	Using BTR Test Features	34
A	Appendix - Illuminated Remote Pushbutton	A-1
B	Appendix - Current-Loop Serial Punch Interface	B-1

Tables

Table 1	DNC/Computer Serial Port	4
Table 2	Serial Puncher Port (AUX)	4
Table 3	REMEX Output (Reader) Port	6
Table 4	Facit/Remex Input (Puncher) Port	6
Table 5	Indicators	9
Table 6	LED 7-Segment Display	10
Table 7	Controls	11
Table 8	Configuration Switch: Reader Emulation Mode	12
Table 9	Configuration Switch: Miscellaneous	12
Table 10	Configuration Jumpers	15
Table 11	Parameter Options	18
Table 12	BTR Alarm Codes	30

Figures

Figure 1	Connections, Controls and Indicators	2
Figure 2	Computer to BTR Serial Cable	4
Figure 3	Power Source	8
Figure 4	Computer to BTR Cables	6
Figure 5	Configuration Jumper Location	14

Dostek Model 440A Behind-the-Tape Reader (BTR) User Guide

The Dostek Model 440A Behind-the-Tape Reader (BTR) is a computer communication interface for numerical control (NC/CNC) machine tools. You can use the 440A BTR to:

- Add an RS-232C communication port to any machine tool equipped with a tape reader.
- Reduce setup time and improve reliability by eliminating the need to use punched tape.
- Integrate older NC machine tools with a modern DNC system.

Information in this manual is organized into the following Sections:

1. Features and Benefits	3
2. Connectors	5
3. Power and Battery	8
4. Controls and Indicators	9
5. Configuring the BTR	13
6. Using the BTR	21
8. Troubleshooting	29

Note:

- > In this guide, the abbreviation "CNC" is used to refer to Numerical Control (NC) and Computer Numerical Control (CNC) machine tools.

Installing the BTR

The procedure for installing the 440A BTR depends on the type of machine. Machine-specific installation instructions are included in the package with your BTR order, or are available from Dostek.

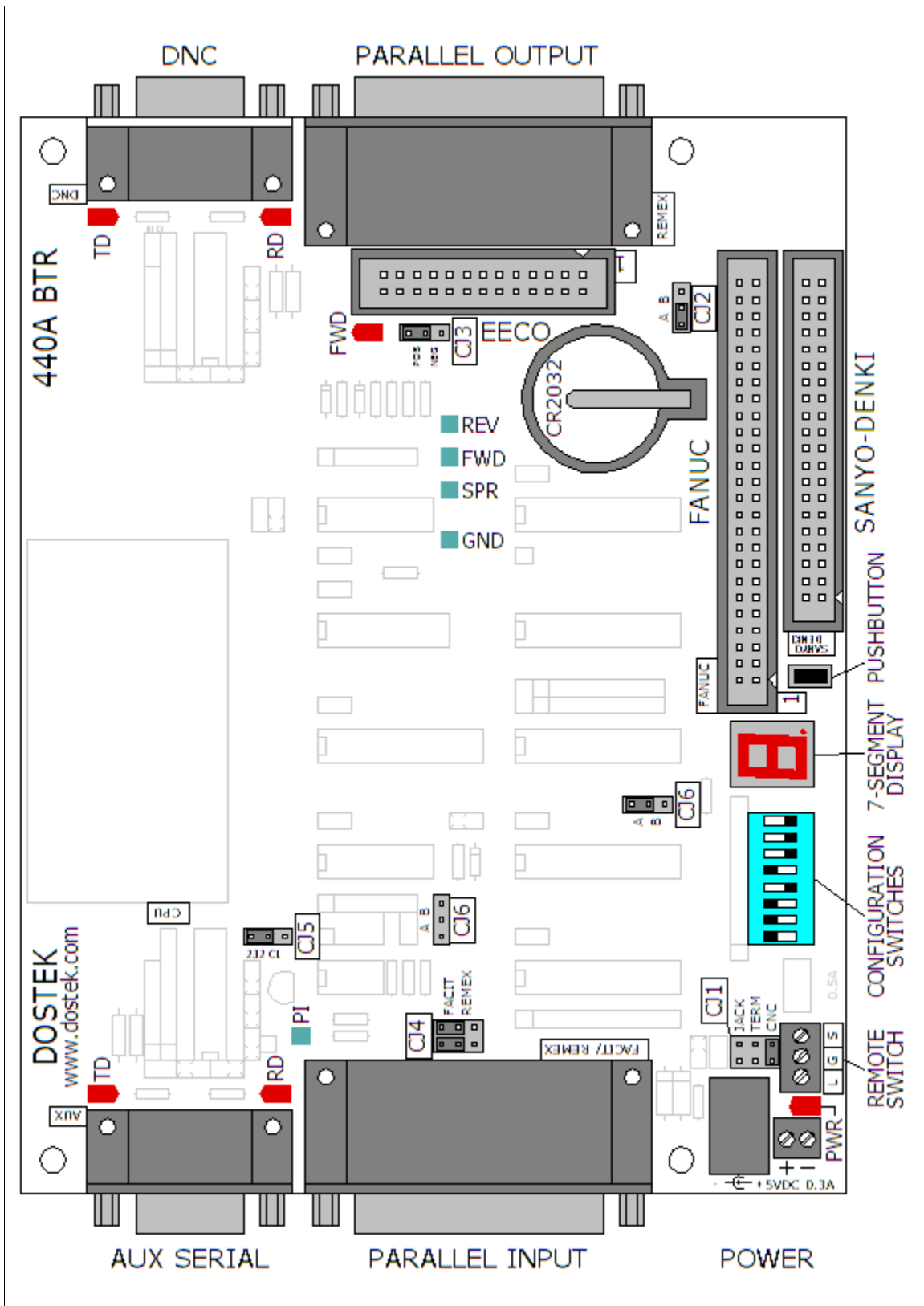


Figure 1 - Connections, Controls and Indicators

1 Features and Benefits

The 440A BTR provides the following features and benefits:

Simple, reliable operation. NC programs and data are stored on computer disk and transferred electronically to the NC, reducing setup and programming time. Punched tape is completely eliminated, along with the associated storage, handling and maintenance problems.

Easy to install and use. The 440A BTR is easily installed on virtually any NC/CNC machine tool equipped with a tape reader. The BTR plugs into the CNC in place of the tape reader, and connects to the computer or DNC system by a standard RS-232C serial (COM) port. Standard connectors on the BTR directly replace most Remex, EECO, Decitek, Sanyo-Denki and Fanuc tape readers. An inexpensive adapter cable is required for replacement of other tape reader models.

Unlimited program size. Programs up to 256Kb in size can be stored in the 440A BTR's solid state battery-powered memory. However, you can easily load or run programs of unlimited size. And the CNC can start loading or running the program immediately. You don't need to wait for the entire file to load into the BTR's memory.

Continuous drip feeding. When the BTR is used with the Dostek DNC software, the program can scroll on the computer screen during drip feeding. This makes it easy to monitor progress, and even stop and restart anywhere in the program.

Bi-directional transfers. The 440A BTR can connect to the CNC's punch output (parallel, Facit, current-loop or RS232C) so you can send programs created or modified on the CNC to the computer for storage.

ASCII, ISO, EIA and binary transfers. You can use the BTR to load ASCII, ISO or EIA part programs, as well as binary files such as executive software.

Convenient configuration. A convenient "DIP" switch lets you quickly configure the BTR for most common applications. And several advanced parameters are provided for customizing BTR operation to suit virtually any reader/CNC combination.

Status Indicators. Six LED indicators display signal and power status, and a 7-segment LED display displays convenient status symbols and messages to simplify installation and troubleshooting.

Tape Transcription Mode. You can use the BTR with a standard Remex (or compatible) tape reader to transcribe existing part program or executive tapes to computer disk files. An optional cable is required.

Software Support. Each 440A BTR is supplied with a free copy of the Dostek DNC Lite Edition software. And the BTR also works with any good third-party DNC software.

Table 1 - DNC/Computer Serial Port (DE9S)		
Pin	Symbol	Function
2	TD	Transmit Data output from BTR to computer.
3	RD	Receive Data input to BTR from computer.
6	DTR	Data Terminal Ready output. Connected internally to RTS output.
7	CTS	Clear To Send input. When the BTR is configured to use CTS/RTS flow control, the BTR suspends data transmission to the computer while CTS is off.
8	RTS	Request To Send output. When the BTR is configured to use CTS/RTS flow control, the BTR turns RTS on when ready to receive data, and off when not ready. When the BTR is not configured to use CTS/RTS flow control, the RTS output is always on.
5	Ground	

Table 2 - AUX Serial Puncher Port (DE9P)		
Pin	Symbol	Function
2	RD	Receive Data input to BTR from CNC serial punch out.
3	TD	Transmit Data output from BTR auxiliary port.
4	CL+	Current-loop receive input. For more information, see Appendix B, "Current-Loop Puncher Interface."
7	RTS	Request To Send output. On when BTR is ready to receive data
8	CTS	Clear To Send input. Normally not used.
5	Ground	

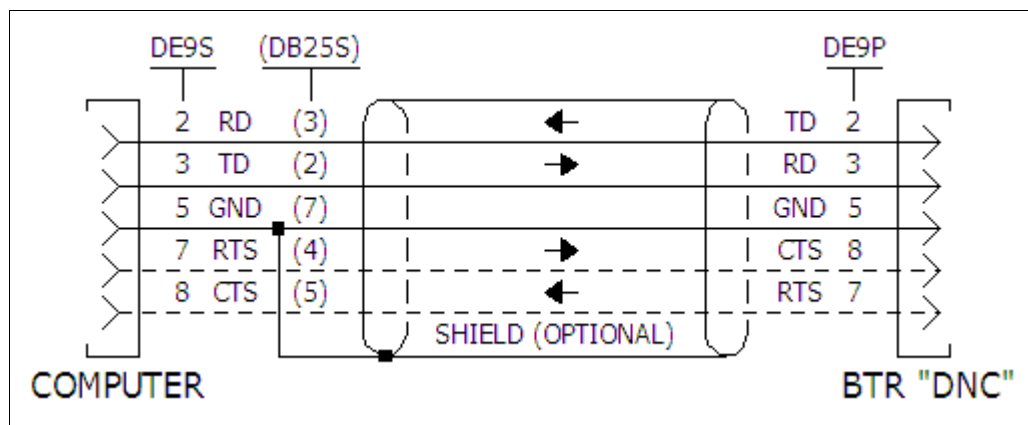


Figure 2 - Computer to BTR Serial Cable

2 Connectors

This section explains 440A BTR connectors:

- DNC/Computer Serial Port (Section 2.1)
- AUX Serial Puncher Port (Section 2.2)
- Parallel Output (Reader) Port (Section 2.3)
- Parallel Input (Puncher) Port (Section 2.4)
- Remote Terminal Block (Section 2.5)

Note:

- › To identify the location of each connector, see Figure 1 on page 2.

2.1 DNC/Computer Serial Port

Connect the computer's RS-232C COM port to the "DNC" port.

A suitable 9-pin direct ("straight through") cable is normally supplied with the 440A BTR. If you need a longer cable, you can order a cable from Dostek, or build a cable yourself following the wiring diagram provided in Figure 2 on the opposite page.

Notes:

- › If you are using the Dostek DNC software, or third-party software configured for XOn/XOff flow control, you can omit the CTS and RTS wires when building a cable.
- › If your computer COM port is equipped with a DB25 connector, use the pin numbers listed under "(DB25S)".
- › Shielded cable is optional, but recommended for cables longer than 50 feet.
- › The DNC port connector pinout and signal descriptions are provided in Table 1 on the previous page.

2.2 AUX Serial Puncher Port

You can use the "AUX" connector to connect the CNC's serial puncher output to the 440A BTR. Connections for a serial puncher cable depend on the type of CNC. You can order a cable from Dostek, or build a cable yourself.

The AUX serial puncher port works with both RS-232C and current loop serial puncher signals. For more information about using the current-loop interface, see Appendix B, "Current-Loop Puncher Interface."

Notes:

- › See Table 2 on the previous page for connector pinout and signal descriptions.
- › When configured as an RS-232C serial puncher input port, only the RD, RTS and Ground signals are used.
- › RS-232C or current-loop mode is selected by configuration jumper CJ5. For more information, see "CJ5 - Serial Puncher Mode" in Table 10 on page 15.

Table 3 - "REMEX" Parallel Output Port

Pin	Signal	Description	Pin	Signal	Description
1	DATA1	Data output 1 (LSB)	14	READY	Output on when BTR ready
2	DATA2	Data output 2	15		Not connected
3	DATA3	Data output 3	16	FWD	Forward/Run input
4	DATA4	Data output 4	17	REV	Reverse/Direction input
5	DATA5	Data output 5	18		Not connected
6	DATA6	Data output 6	19		Not connected
7	DATA7	Data output 7	20	SPARE1	Available for special use
8	DATA8	Data output 8 (MSB)	21	SPARE2	Available for special use
9	SPR/DR	Sprocket/Data Ready output	22		Not connected
10	MODE	Mode input	23	5VDC	Power input (CJ1 = CNC)
11	Ground	Signal ground	24	Ground	Signal ground
12	Ground	Signal ground	25		Not connected
13	Ground	Signal ground			

Table 4 - "FACIT/REMEX" Parallel Input Port

Pin	Signal	Description	Pin	Signal	Description
1	DATA1	Data input 1 (LSB)	14		Not connected
2	DATA2	Data input 2	15		Not connected
3	DATA3	Data input 3	16	FWD	Forward/Run output
4	DATA4	Data input 4	17		Not connected
5	DATA5	Data input 5	18		Not connected
6	DATA6	Data input 6	19		Not connected
7	DATA7	Data input 7	20	Ground	Signal ground
8	DATA8	Data input 8 (MSB)	21	Ground	Signal ground
9	SPR/DR	Sprocket/Data Ready input	22		Not connected
10	MODE	Not connected	23		Not connected
11	PI	CJ4 = FACIT Punch Instruction (PI) input	24		Not connected
	Ground	CJ4 = REMEX Signal ground	25	Ground	Signal ground
12	PR	CJ4 = FACIT Puncher Ready (PR) output			
	Ground	CJ4 = REMEX Signal ground			
13	Ground	Signal ground			

2.3 Parallel Output Port

The 440A BTR parallel output port provides four connectors for direct replacement of the following common tape reader models:

FANUC The "FANUC" connector is compatible with the 50-pin CNT1 connector on the Fanuc tape reader.

SANYO-DENKI The "SANYO-DENKI" connector is compatible with the 40-pin connector on the Sanyo-Denki 2400 series tape reader.

REMEX The "REMEX" connector is compatible with the DB25P connector on Remex 7000 series tape readers, as well as several other Remex, Decitek and EECO tape readers. Data signals are on pins 1 to 8. Pinout of this connector is illustrated in Table 3 on the previous page.

EECO When the Dostek 60-0525 adapter is installed on the BTR, the adapter's DB25S connector is compatible with EECO 9200 and 2100 series (or compatible) tape readers. Data signals are on pins 11 to 18.

CAUTION:

- › Never connect to more than one of the parallel output port connectors at any time.

Note:

- › An optional adapter cable is required for replacement of other tape reader models. Adapter cables connect to the BTR's REMEX connector.

2.4 Parallel Input Port

You can use the 440A BTR's "FACIT/REMEX" parallel input port to:

- Connect the CNC's standard Facit parallel tape punch output port to the BTR to send data from the CNC back to the computer.
- Connect a Remex 7000 series (or compatible) tape reader to the BTR to transfer (transcribe) punched tapes to computer disk files. You can transcribe ISO or EIA part program tapes, or binary machine executive tapes.

Notes:

- › See "CJ4 - Parallel Input Mode" in Table 10, "Configuration Jumpers," for information about configuring the parallel input port.
- › The pinout of the Facit/Remex input connector is illustrated in Table 4 on the previous page.

2.5 Remote Terminal Block

You can install an optional illuminated pushbutton switch on the operator control panel, and connect it to the BTR's "REMOTE" terminal block. This feature lets you monitor and control the BTR from the operator panel. For more information, see Appendix A, "Illuminated Remote Pushbutton."

3 Power and Battery

This section explains BTR power source options and how to use and replace the BTR's memory backup battery.

3.1 Power Source

The 440A BTR requires a 5 volt direct current (DC) **REGULATED** (+/- 5%) 300 milliampere (mA) power source. Power is provided by one of the following sources, depending on the CNC model:

- CNC reader cable.
- CNC power supply connected to BTR's Power Terminal Block.
- Dostek 60-0555 power supply (115VAC) connected to BTR's Power Jack.

The power source is selected by configuration jumper CJ1. See "CJ1" in Table 10 on page 15 for more information about power configuration. See Figure 3 below to identify the location of the power jack, terminal block, CJ1 configuration jumper, power LED indicator and protective device (fuse). The 0.5 amp solid state fuse protects the BTR and power source from short circuits. The fuse automatically resets itself after power is removed for about 10 seconds.

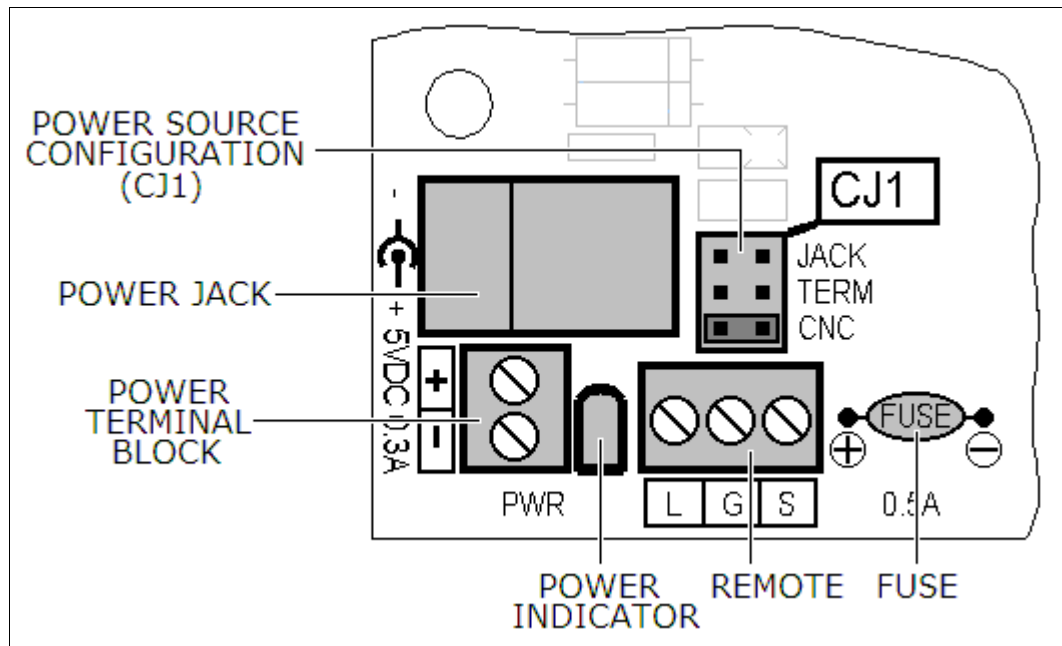


Figure 3 - Power Source

3.2 Memory Backup Battery

A standard CR2032 coin battery provides backup power to retain the BTR memory content when the main power source is off.

Replace the battery with a standard CR2032 coin battery, available at most hardware, electronics and department stores.

CAUTION:

- > Turn the CNC power off while replacing the battery.

4 Controls and Indicators

This section explains BTR controls and indicators. Information is organized into the following tables:

- Table 5 - Indicators
- Table 6 - LED 7-Segment Display
- Table 7 - Controls

The location of each control and indicator is illustrated in Figure 1 on page 2.

Table 5 - Indicators

Item	Description
POWER	<p>The "POWER" indicator is on when the BTR is receiving power. See Section 3, "Power and Battery," for more information about power sources.</p> <p>Location: Adjacent to the BTR's power jack.</p> <p>Note: The POWER indicator may be illuminated with lower than normal brightness even when a power source is not connected, due to leakage currents from signal connections.</p>
TD (DNC)	<p>The DNC "TD" indicator is on or flickering while the BTR is sending data to the computer.</p> <p>Location: Adjacent to the BTR's DNC serial port connector.</p>
RD (DNC)	<p>The DNC "RD" indicator is on or flickering while the BTR is receiving data from the computer.</p> <p>Location: Adjacent to the BTR's DNC serial port connector.</p>
TD (AUX)	<p>The AUX "TD" indicator is on or flickering while the BTR is sending data to the AUX serial port.</p> <p>Location: Adjacent to the BTR's AUX serial port connector.</p> <p>Note: The AUX TD signal is only used for certain BTR diagnostic features, and the AUX TD indicator is therefore normally off.</p>
RD (AUX)	<p>The AUX "RD" indicator is on or flickering while the BTR is receiving data from the CNC's serial puncher output.</p> <p>Location: Adjacent to the BTR's AUX serial port connector.</p>
FWD	<p>The "FWD" indicator is on or flickering while the CNC is reading data from the BTR's memory. For proper FWD indicator operation, configuration jumper CJ3 (Table 10, page 16) must be set correctly.</p> <p>Location: Adjacent to the BTR's REMEX and EECO parallel output connectors.</p> <p>Note: The FWD indicator does not work with certain CNC models that use short-duration pulse signals.</p>
7-SEGMENT LED DISPLAY	<p>The 7-segment LED display indicates BTR operating status or event and error messages. See Table 6 on the following page for a complete list of messages. Messages are displayed one character at a time, sequentially. Error messages repeat continuously until the error condition is cleared by either momentarily pressing the pushbutton or by sending another file from the computer to the BTR.</p>



Table 6 - LED 7-Segment Display















Symbol	Description
	Empty. The BTR's memory is empty, and the BTR is ready to receive data from computer.
	Start. The BTR's memory contains data, and the BTR is positioned at the start of the file and ready to send to CNC.
	End. The BTR's memory contains data, but the BTR is positioned at the end of the file. This may indicate a problem, similar to when the machine reads past the end of a tape.
	Clockwise. A clockwise rotating pattern is displayed while the CNC is reading from BTR in forward direction.
	Counter Clockwise. A counter clockwise rotating pattern is displayed while the CNC is reading from BTR in reverse direction.
	Pause. The CNC paused or stopped reading from BTR. Press the pushbutton to show file displacement (see "Fd" message below).
	Command. The BTR is operating in interactive "Command" mode and is ready to accept commands from computer.
	Punch. The BTR is receiving data from the CNC on either the parallel or serial puncher port.
	Transcribe. The BTR is operating in "Transcribe" mode. See Section 6.8, "Transcribing Tapes," for more information.
Message	Description
	File Open. This message is displayed once when computer starts sending a new file to the BTR. If the BTR recognizes a file number within the first 10 characters of data received from the computer, it is included in the message (for example: "Fo1234"). When the BTR receives a new file, it automatically clears any previous memory content.
	File Close. This message is displayed once about 5 seconds after the computer stops sending data to the BTR.
	File Number. If the BTR memory includes a file number within the first 10 characters, this message is displayed once when power is turned on or when the BTR's pushbutton is pressed momentarily. The file number is the first contiguous string of ASCII/ISO numeric digits found in the first 10 characters in memory. For example, if the file starts with "O1234 (5678 BASE)", the message is "Fn1234".
	File Displacement. This message is displayed once 5 seconds after the CNC stops reading from the BTR or when the pushbutton is pressed momentarily. Displacement is measured from the start of the file. For example: "Fd8473" means the CNC has read 8472 characters from the BTR. The "Fd" message is not displayed if the BTR is positioned at the start of the file, if the file is larger than the BTR memory, or if the BTR is busy.
	Alarm. Alarm messages repeat continuously after the BTR detects an error. AL is displayed followed by a two-digit error code. For more information about alarm codes, see Section 7.2, "Understanding BTR Alarm Codes."

Table 7 - Controls

Item	Description
CONFIGURATION SWITCH	Use the 8-position configuration switch to select configuration options. See Section 5.1, "Using Configuration Switches" for more information.
PUSHBUTTON	<p>The BTR's pushbutton is located near the 7-segment display and ribbon-style connectors.</p> <p>Use the pushbutton for the following functions:</p> <p>To view the file number and file displacement:</p> <ul style="list-style-type: none">• Press the pushbutton for about 1 second, and then release it. (Note: See "Fn" and "Fd" in Table 6 on the previous page for more information.) <p>To "rewind" the BTR to the start of memory:</p> <ul style="list-style-type: none">• Press the pushbutton for about 5 seconds, and then release it. (Note: This function is available only when the BTR is idle and is configured for "Standalone" operating mode (Section 5.3.1).) <p>To reset the BTR:</p> <ul style="list-style-type: none">• Press and hold the pushbutton until the display decimal point starts flashing and then stops flashing (about 10 seconds).
REMOTE PUSHBUTTON/INDICATOR	The REMOTE terminal block (Section 2.5) lets you install a remote pushbutton/indicator on the machine's control panel to monitor and control the BTR. See Appendix A, "Illuminated Remote Pushbutton," for more information.
RESET	A RESET jumper is provided on the underside of the 440A BTR circuit board. To immediately reset the BTR, momentarily bridge the RESET jumper with a small metallic screwdriver.

Note:

- > The position of controls and indicators is illustrated in Figure 1 on page 2.
-

Table 8 - Switch: Reader Emulation Mode Configuration

SW1	SW2	SW3	SW4		Description
OFF	OFF	OFF	OFF	0	User defined signal timing
ON	OFF	OFF	OFF	1	Fanuc
OFF	ON	OFF	OFF	2	Remex, 150 CPS, no data inversion
ON	ON	OFF	OFF	3	Remex, 150 CPS, data inversion
OFF	OFF	ON	OFF	4	Remex, 300 CPS, no data inversion
ON	OFF	ON	OFF	5	Remex, 300 CPS, data inversion
OFF	ON	ON	OFF	6	Photocell, 150 CPS. General Electric series: 7000, 8000, 550, 1050.
ON	ON	ON	OFF	7	Photocell, 300 CPS. General Electric series: 7000, 8000, 550, 1050.
OFF	OFF	OFF	ON	8	Yasnac 2000G/3000 (Sanyo Denki 2401)
ON	OFF	OFF	ON	9	Okuma OSP3000
OFF	ON	OFF	ON	10	Cincinnati Milacron
ON	ON	OFF	ON	11	Mitsubishi Meldas 5000 (Sanyo Denki 2401)
OFF	OFF	ON	ON	12	General Electric GE1050TL/MCL
ON	OFF	ON	ON	13	Yasnac 2000B (Sanyo Denki 2301)
OFF	ON	ON	ON	14	Agie
ON	ON	ON	ON	15	Toshiba Tosnuc 500

Table 9 - Switch: Miscellaneous Configuration

SW5	DNC Port Baud Rate (see Table 11 on page 18)	
ON	DNC port baud rate is 9600 baud. (Normal operation)	
OFF	DNC port baud rate is defined by BTR user parameter # 1.	
SW6	Standalone Mode (see Section 5.3, "Choose a BTR Operating Mode")	
OFF	Use BTR in Standard or Tracking mode.	
ON	Standalone mode. BTR emulates a "tape loop":	
	<ul style="list-style-type: none"> • When end of file is reached while CNC is reading from BTR, BTR automatically "rewinds" to the start of the file. • When the pushbutton is pressed for more than 4 seconds, BTR "rewinds" to start of file. 	
SW7	Transcribe Mode (See Section 6.8, "Transcribing Tapes")	
OFF	Normal. The BTR does not start in Transcribe mode.	
ON	Transcribe Mode. When both SW7 and SW8 are on, the BTR powers up directly in transcribe mode. For more information.	
SW8	Command Mode (See Section 6.7, "Using BTR Command Mode")	
OFF	Normal. The BTR does not start in Command mode.	
ON	Command Mode. When SW8 is on, the BTR powers up directly in command mode.	

5 Configuring the BTR

This section explains how to configure the 440A BTR and the computer. Information is organized into the following topics:

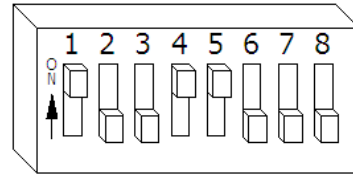
- Using Configuration Switches (Section 5.1)
- Using Configuration Jumpers (Section 5.2)
- Choosing a BTR Operating Mode (Section 5.3)
- Using BTR Parameters (Section 5.4)
- Configuring the Computer (Section 5.5)

To configure the BTR to work with a specific machine type, see the machine-specific installation instructions you received from Dostek.

5.1 Using Configuration Switches

Use the BTR's 8-position configuration switch to select:

- Tape reader emulation mode
- DNC communication port baud rate
- Standalone (tape loop) mode
- Tape transcription mode
- BTR command mode



A configuration switch is "ON" when the slide is pushed up. For example, the adjacent diagram shows switch # 1 in the "ON" position.

Configuration switch options are listed in Tables 8 and 9 on the previous page.

If you change the configuration switch setting while the BTR is powered on, reset the BTR or press the pushbutton switch to apply the changes.

The location of the configuration switch is illustrated in Figure 1 on page 2.

5.2 Using Configuration Jumpers

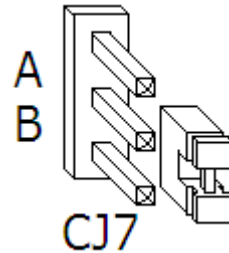
Several additional configuration options are set by solderless jumpers on the 440A BTR circuit board.

To set a jumper, install a "shunt" over two adjacent pins.

Configuration jumper locations are illustrated in Figure 5 on the following page.

Configuration options are listed in Table 10 on page 17.

The location of configuration jumpers is illustrated in Figure 5 on the following page.



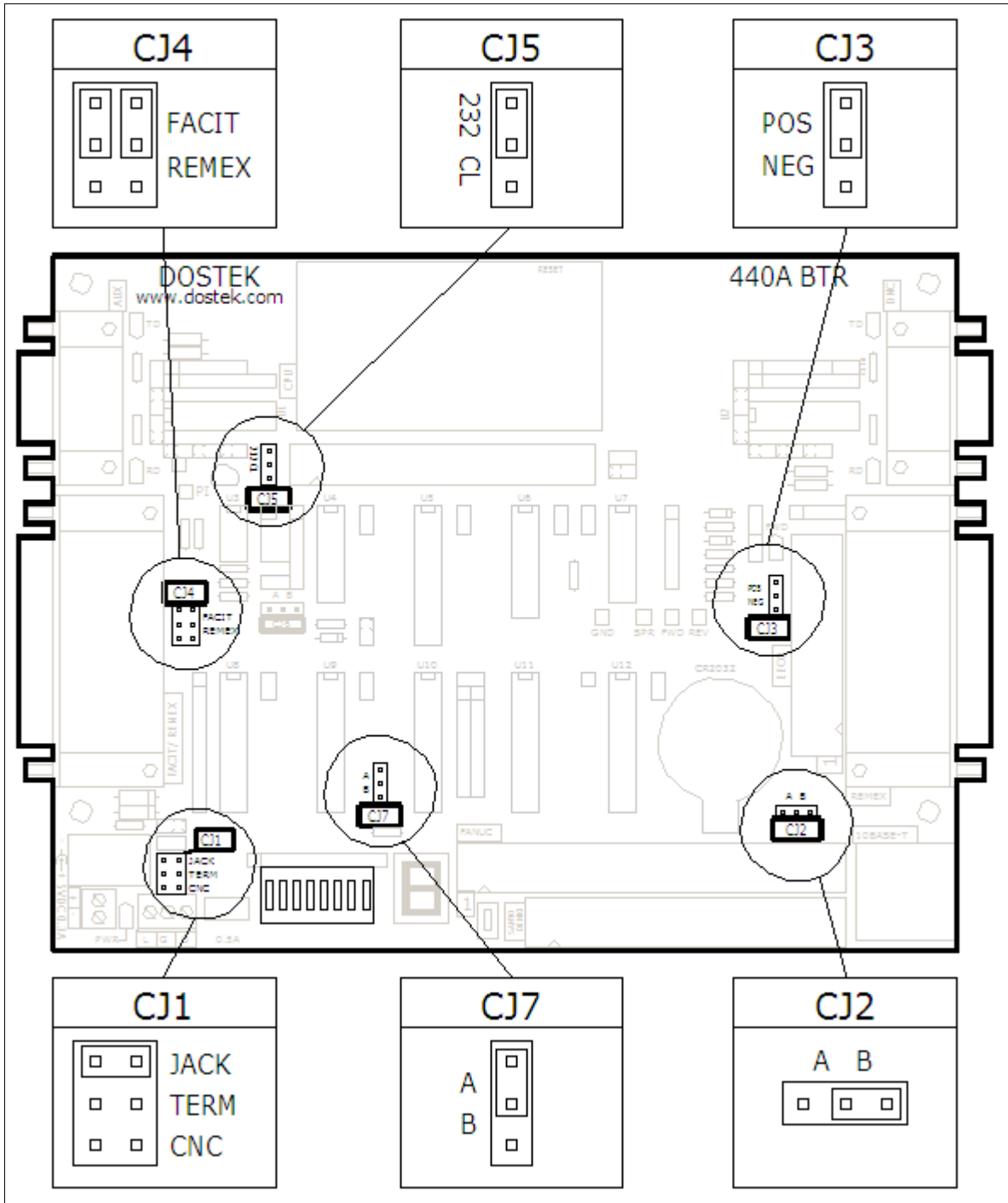


Figure 5 - Configuration Jumper Location

Table 10 - Configuration Jumpers

CJ1 Power Source (see Section 3.1)	
JACK	Power the BTR using an optional Dostek 60-0555 115VAC/5VDC power adapter, or a compatible 5VDC REGULATED power source equipped with a standard 2.5mm ID x 5.5mm OD center positive coaxial jack.
TERM	Power the BTR by connecting wires to the two-position power source terminal block.
CNC	Power for the BTR is provided by the CNC Reader cable.
CJ2 Sanyo Denki Sprocket Mode	
A	Sprocket / Data Ready signal connected to Sanyo-Denki connector pin 35.
B	Sprocket / Data Ready signal connected to Sanyo-Denki connector pin 37.
CJ3 Forward Indicator Polarity	
POS	Positive-true Forward logic signal.
NEG	Negative-true Forward logic signal.
Note: CJ3 affects only the polarity of the "FWD" LED indicator (Table 5 on page 9). The BTR communicates normally with the CNC even if CJ3 is set incorrectly.	
CJ4 Parallel Input Mode (see Section 2.4)	
FACIT	FACIT/REMEX parallel input connector is compatible with a Facit 4060 parallel puncher. Select FACIT when connecting the CNC's Facit parallel puncher output to the BTR.
REMEX	FACIT/REMEX connector is compatible with a Remex tape reader. Select REMEX when connecting a Remex tape reader to the BTR to transcribe punched tapes.
CJ5 Serial Puncher Mode (see Section 2.2)	
232	Select 232 to use the serial puncher input (AUX) with an RS-232C serial puncher signal.
CL	Select CL to use the serial puncher input (AUX) with a 20 milliampere current-loop serial puncher signal. For details, see Appendix B, "Current-Loop Puncher Interface."
CJ6 Special Application	
Not required for normal operation.	
CJ7 Pushbutton Reset Mode	
A	Pushbutton switch resets BTR when pressed for approximately 10 to 12 seconds.
B	Pushbutton switch never resets BTR.

5.3 Choosing a BTR Operating Mode

This section explains how to choose one of the BTR's three operating modes. You can:

- Choose "**Standard**" mode to load programs into CNC memory.
- Choose "**Tracking**" mode to drip feed, using the computer to monitor progress.
- Choose "**Standalone**" mode to drip feed, running the same program many times without constant use of the computer.

5.3.1 Standard Mode

Choose standard mode to load programs into CNC memory.

When the BTR is configured to use standard mode, it works together with the computer. There is no limit to file size. If the file is larger than BTR memory, the BTR synchronizes the transfer with the computer until the entire file is loaded.

Configuring Standard Mode

To configure the 440A BTR for standard mode operation:

- Set BTR configuration switch SW6 OFF (see Table 9 on page 12).
- Set Dostek DNC "Flow control" setting to "BTR440A" or "XOn/XOff," or set third-party communication software to use "XOn/XOff" flow control.

Note:

- › You can also use Standard mode to drip feed to the CNC. However, tracking mode may be more convenient.

5.3.1 Tracking Mode

Tracking mode is recommended for drip feeding. Tracking mode lets you:

- Monitor progress of the transfer between the BTR and the CNC.
- Easily stop and restart at any point in the program.

With tracking mode, progress of the transfer from the BTR to the CNC is indicated by scrolling the program on the computer screen. This means you can watch the program on the computer screen as the CNC executes it, a convenient feature when working with a machine with limited display ability.

Configuring Tracking Mode

To configure the 440A BTR for tracking mode operation:

- Set BTR configuration switch SW6 OFF (see Table 9 on page 12).
- Set Dostek DNC "Flow control" setting to "BTR440A-Echo."
- To configure the Dostek DNC software to automatically restart each time the end of the program is reached, set "Transmit Repeat" to "Continuous." When configured this way, the Dostek DNC software uses the BTR to emulate a "tape loop."

Notes:

- › Tracking mode does not work with binary file transfers, with reverse tape motion (rewind), or with third-party software (use of Dostek DNC software is required).
- › Tracking mode is made possible by the 440A BTR's unique data echo feature. When this feature is active, the BTR echoes each character to the computer as the CNC reads it. The Dostek DNC software monitors the echoed data and updates the screen to reflect the progress. A small amount of the BTR memory is used to buffer data.

5.3.1 Standalone Mode

Choose standalone mode to drip feed the same program to the CNC multiple times without the constant use of the computer.

With standalone mode, you send the part program from the computer to the BTR once. The BTR retains the program in its memory. The computer is not needed again until you need to run a different program.

When the end of the file is reached, the BTR automatically resets to the start of the file. When configured this way, the BTR emulates a "tape loop."

The BTR also automatically resets to the start of the file when it is powered up or reset, or when its pushbutton switch is pressed for more than 4 seconds (but less than 8 seconds).

You can start or restart a program at a specific block using the CNC's tape search command, just as you would with a punched tape.

Configuring Standalone Mode

To configure the 440A BTR for standalone mode operation:

- Set BTR configuration switch SW6 ON (Table 9 on page 12).
- Set Dostek DNC "Flow control" setting to "BTR440A" or "XOn/XOff," or set third-party communication software to use "XOn/XOff" flow control.
- Set Dostek DNC "Transmit Repeat" to "None."

Note:

- › The BTR automatically switches to Standard mode when it receives a file that is too large to fit in its memory. In this case, the BTR is unable to automatically reset to the start of the program, so you must re-send the program from the computer to the BTR when the end is reached, or when the BTR is reset.

Table 11 - Parameter Options

#	Description
1	DNC port baud rate. When configuration switch SW5 is turned off, this parameter sets the baud rate for the DNC port (see Table 9 on page 12). 4 = 4800 5 = 9600 (factory default) 6 = 19200
2	DNC port flow control. Sets the flow control protocol used for receiving data from the computer. 1 = CTS/RTS only 2 = XON/XOFF only 3 = Both CTS/RTS and XON/XOFF (factory default)
5	DNC command "escape" character. Sets the character that switches the BTR into command mode. The BTR enters command mode when it receives the designated character from the computer after at least 5 seconds of idle time. The factory default is 94, which is "^" (the "caret" character, Shift+6 on the keyboard). Specify a character with an odd number of binary bits set. For example: 2 = Ctrl+B 38 = & (ampersand) 42 = * (asterisk)
9	Remote Pushbutton/Indicator. 0 = Off (default) 1 = On When parameter 9 is set to 1, the illuminated remote pushbutton feature is enabled. See Appendix A, "Illuminated Remote Pushbutton."
21	AUX serial puncher port baud rate. Sets a puncher baud rate: 0 = 300 3 = 2400 (factory default) 1 = 600 4 = 4800 2 = 1200 5 = 9600
31	Transfer AutoStart. 0 = Off (default) 1 = On When parameter 31 is set to 1, the BTR starts sending data to the CNC if the Forward signal is on when a new program is received from the computer. By default, the BTR starts sending only when the Forward signal turns from off to on after a new program is received. It may be necessary to set this parameter to "1" to load binary executive files into a GE1050 CNC.
34	Detect short Forward pulse. 0 = Off (default) 1 = On When parameter 34 is set to 0 (zero), a noise rejection algorithm prevents the BTR from responding to very short pulses on the Forward signal. When parameter 34 is set to 1, the noise rejection algorithm is disabled, and the BTR can detect very short pulses.

5.4 Using BTR Parameters

This section explains how to use BTR configuration parameters.

Some commonly used BTR parameters are described in Table 11 on the previous page. These parameters let you:

- Set the serial puncher port baud rate
- Set the DNC port baud rate
- Set the DNC port flow control protocol
- Set the DNC port command "escape" character
- Enable transfer "autostart"
- Enable detection of very short pulses on the "forward" signal

Dozens of additional BTR parameters set advanced BTR configuration options. Change unlisted parameters only when directed by a machine-specific installation instruction manual or by Dostek technical support.

5.4.1 Viewing and Setting BTR Parameters

To use your computer to view or set BTR parameters:

1. Ensure the BTR is powered on and connected to the computer.
2. Use the Dostek DNC Com Test Terminal application to activate and use the BTR's "Command Mode" as explained in Section 6.7, "Using BTR Command Mode."

Viewing Parameters

To view a parameter's current setting, enter the "Parameter" command, specifying only a parameter number:

```
P #
```

That is, press "P," the space bar, the parameter number, and then press "Enter."

For example, to view the current setting of parameter # 1:

```
P 1
```

Setting Parameters

To set a parameter to a new value, enter the "Parameter" command, specifying both a parameter number and a new parameter value:

```
P # value
```

That is, press "P," the space bar, the parameter number, the space bar again, the new parameter value, and then press "Enter."

For example, to set Parameter # 1 to a value of 4:

```
P 1 4
```

Saving Parameter Changes

To save parameter changes, restart the BTR using the "Restart" command:

```
R
```

That is, press "R," and then press "Enter."

Parameter changes are discarded if the BTR power is turned off or the BTR is reset before the Restart command is executed.

5.5 Configuring the Computer

If you are using the Dostek DNC software with the 440A BTR, configure the software according to:

- Instructions provided in the machine-specific installation instructions.
- Instructions provided in Section 5.3, "Choosing a BTR Operating Mode."

Notes:

- › When the BTR is configured for "standard" or "standalone" mode, set the Dostek DNC "Flow Control" setting to "BTR440A." This protocol lets the Dostek DNC software report an error if the BTR does not respond when you send a file.

Using Third-Party DNC Software

If you are using third-party software, or have a special application, configure your software as follows:

- Set BTR configuration switch SW5 "on" to select 9600 baud rate. If you need to use a different baud rate, see Section 5.4, "Using BTR Parameters." Specifically, see parameter #1 in Table 11 on page 18.
- To load part programs and data into the CNC using ISO standard data code, you must usually configure your DNC software to use 7 data bits and even parity.
- To load binary data such as machine executive software, configure your DNC software to use 8 data bits and no parity.

Notes:

- › The 440A BTR passes 8 bits of received data directly through to the CNC tape reader port exactly as received from the computer. The BTR performs no data filtering or code conversion.
- › Some CNCs have very strict data format requirements. You may need to format your part program file or configure your DNC software to send specific characters before or after the program or between each block. See to Section 7, "Troubleshooting," for more information about program formatting problems.

6 Using the BTR

This section explains how to use the BTR. Information is organized into the following topics:

- How the BTR works (Section 6.1)
- Getting started with the BTR (Section 6.2)
- Sending a file from the computer to the BTR (Section 6.3)
- Loading or drip feeding from BTR to CNC (Section 6.4)
- Punching from CNC to computer via BTR (Section 6.5)
- Loading binary files (Machine executive software) (Section 6.6)
- Using BTR Command Mode (Section 6.7)
- Transcribing Tapes (Section 6.8)

6.1 How the BTR Works

To help you effectively use the 440A BTR, this section explains three important concepts about how the 440A BTR works.

1. The BTR communicates with the computer and CNC independently.

- The speed of the serial data transfer between the computer and BTR is called the "baud rate." It is 960 characters per second (9600 baud). This speed is completely independent of the speed of communication between the BTR and the CNC.
- The maximum speed of the parallel data transfer from the BTR to the CNC is determined by the reader emulation mode (selected by the BTR's configuration switch). The maximum speed varies from 100 to 300 characters per second.
- The actual speed of the parallel data transfer depends on the CNC, and is usually somewhat less than the maximum speed. The speed is lower because the CNC may read the data from the BTR one character at a time at its own pace, or because the CNC may periodically stop reading from the BTR to process data.
- Because the computer to BTR transfer speed is more than three times as fast as the maximum BTR to CNC transfer speed, the computer to BTR transfer is always ahead of the BTR to CNC transfer. In other words, the computer fills the BTR memory faster than the CNC can read from it. This is why you can start loading data into the CNC from the BTR immediately after you start sending it from the computer to the BTR.

2. The BTR emulates a tape reader.

- The BTR replaces (emulates) the machine's existing tape reader. It does not change how the machine works.
- With punched tape, you load the tape on the tape reader, and then read it. With the BTR, you load the file into the BTR memory, and then read it.
- You can start reading from the BTR immediately after you start sending the file from the computer. You don't need to wait for the entire file to load into the BTR.
- Sending a file from the computer to the BTR does not automatically load the file into the machine. You still need to execute exactly the same load or run procedure on the machine that you would when using the tape reader.
- You can do the same things with the BTR that you can with the tape reader. For example, if the machine can run a program directly from the tape reader (drip feed), then it can run a program directly from the BTR. Conversely, if the machine is not designed to run a program directly from the tape reader, then it also will not run a program directly from the BTR.
- The BTR connects to the machine using the machine's tape reader "interface" circuits. Therefore, the machine's tape reader interface must work to use the BTR.

3. BTR operation is automatic.

The BTR handles three types of data transfers:

- Read transfer (from BTR memory to CNC)
- Punch transfer (from CNC to computer via BTR)
- Load transfer (from computer to BTR memory)

The BTR keeps track of whether each transfer type is "busy" or "idle." A transfer is busy from the time it starts until 5 seconds after it stops. It then becomes idle.

The BTR uses a set of rules to determine what to do:

- A load transfer (computer to BTR memory) can begin only when the CNC is idle (both read and punch transfers are idle).
- When a load transfer begins (10 characters or more receive from the computer), the BTR clears the memory and begins storing the new data to memory.
- When a load transfer becomes idle (computer stops sending data for more than 5 seconds), the BTR "closes" the file.
- When a read transfer (BTR memory to CNC) begins, if the BTR memory is empty or the end of the file has already been reached, the BTR does not respond. This may cause the CNC to indicate an alarm.
- During a punch transfer (CNC to computer via BTR), the BTR sends received data directly to the computer via the DNC communication port. The BTR does not check for a computer connection or monitor flow control.

The BTR indicates an alarm when:

- A new load transfer begins while a read or punch transfer is already busy.
- A new read transfer begins while a punch transfer is already busy.
- A new punch transfer begins while a read transfer or load transfer is already busy.

Note:

- › Remember that the BTR considers a transfer "busy" until 5 seconds after it stops. To prevent BTR alarms:
 - Wait at least 5 seconds after stopping a load transfer (computer to BTR) before you begin another.
 - Wait at least 5 seconds after stopping a CNC read or punch transfer before starting another load, read or punch transfer.

6.2 Getting Started with the BTR

Before you start using the BTR, be sure to:

- Install and configure the BTR according to the machine-specific installation instructions supplied by Dostek.
- Install and configure the communication software.
- Choose an operating mode (standard, tracking or standalone) as explained in Section 5.3, "Choosing a BTR Operating Mode."
- Identify the location of the BTR indicators and display (Figure 1, on page 2).
- Understand the BTR status symbols and messages (Table 6 on page 10).

6.2.1 Starting the BTR

To start using the BTR, turn the machine power on while observing the BTR. You will see:

E

- The BTR displays a 3-digit firmware version number.
- If the BTR memory is empty, the BTR displays the empty symbol.
- If the BTR memory contains data:
 - if a program number is found at the start of the data, the BTR displays the file number message "Fn"

F

- the BTR displays the start symbol
- The PWR indicator is on, and all other indicators are off.

Notes:

- > If the FWD indicator is on when the BTR is powered up, configuration jumper CJ3 may be set incorrectly (see Table 10 on page 15).
- > If the BTR does not power on properly, see Section 7.5, "Fixing Power Problems," for more information.

6.2.2 Clearing the BTR Memory

The BTR automatically clears the memory each time you send a new file from the computer. You do not need to manually clear the memory before sending another file. In fact, you can not manually clear the BTR memory.

6.3 Sending a File to the BTR

To send a file from the computer to the BTR:

1. Ensure the CNC and computer are idle. Wait at least 5 seconds after stopping a previous computer or CNC transfer.
2. Start sending the file from the computer. The BTR "clears" the memory and "opens" a new file. Observe the BTR indicators:
 - The BTR's DNC "RD" indicator is on or blinking while the computer sends data.
 - The BTR displays the "Fo" (file open) message once. If a file number is found in the first 10 characters received, the number is included in the Fo message.
 - After the "Fo" message, the BTR displays the start symbol.
 - The file scrolls in the Dostek DNC window as it is sent to the BTR.



You can start the CNC reading or running the program as soon as a file open message or start symbol is displayed. You don't need to wait for the entire file to load into the BTR.

The BTR continues to store data received from the computer. If the file is larger than the BTR memory, the BTR uses the flow control protocol to manage the file transfer:

- When the memory is almost full, the BTR tells the computer to stop sending.
- When the memory is almost empty, the BTR tells the computer to start sending again.



When the computer stops sending data for 5 seconds, the BTR "closes" the file and displays the "Fc" (file closed) message once.

Notes:

- > When sending to the BTR for the first time, include a unique program number at the start of your file (for example: "1234"). If the BTR displays the message "Fo1234" when you send the file, you can be confident that the program is loading into the BTR properly.
- > The BTR acts on received data only after at least 10 consecutive characters are received. This prevents noise or extraneous characters from affecting BTR operation.

6.3.1 Fixing Communication Problems

If the BTR does not respond to the computer, try the following:

1. Start the Dostek DNC Com Test Terminal application (DTerminal). When prompted, choose your BTR's configuration file.
2. Try to connect to the BTR:
 - Click **Query BTR** on DTerminal's **BTR-440A** menu.
 - Click **Locate BTR** on DTerminal's **BTR-440A** menu.
3. Send a stream of data to the BTR:
 - Click **Send Test Pattern** on DTerminal's **Test** menu. The Test Pattern window opens.
 - Click **Test**. DTerminal sends a continuous stream of data to the COM port.
 - Observe the BTR's DNC "RD" indicator. RD remains on or blinking during the test. If RD remains off, the connection between the computer output and the BTR input is defective.
4. View DTerminal's BTR help page:
 - Click **Help** on DTerminal's **BTR-440A** menu. View the help topics listed under the heading "Testing BTR/computer communication."

6.4 Loading and Drip Feeding to the CNC

You can use the BTR to load the program into the CNC memory, or to run (drip feed) the program directly from the BTR. The BTR works the same way in either case.

To start loading or running the program from the BTR:

1. Ensure the CNC is idle. Wait at least 5 seconds after stopping a previous read or punch operation.
2. Execute the appropriate commands on the CNC. Observe the BTR indicators:
 - ✧ The BTR displays a rotating pattern while the CNC is reading from the BTR. The pattern rotates clockwise while the CNC is reading forward, and rotates counter clockwise while the CNC is reading reverse.
 - ✧ The BTR's "FWD" indicator is on or blinking while the CNC is reading.
 - ✧ When the CNC pauses or stops reading from the BTR, the BTR displays the pause symbol and its FWD indicator turns off.



The CNC usually stops reading from the BTR before it reaches the end of the file. If the CNC reads to the end of the file, the BTR displays the end symbol.

If the BTR's FWD indicator remains on after the BTR displays the End symbol, a problem has occurred:

- The program file may be formatted incorrectly. For example, the GE1050 CNC requires that programs are terminated by a '%' character followed by at least two additional characters.
- The BTR or software may be configured incorrectly.

See Section 7, "Troubleshooting," for more information.

6.4.1 Continuous Drip Feeding

You can continuously drip feed the same program again and again in either of two ways:

- Configure the BTR and software for "tracking" mode, as explained in Section 5.3.2, "Tracking Mode." Be sure to follow the instruction to configure the Dostek DNC software to automatically restart at the end of the file.
- Configure the BTR for "standalone" mode, as explained in Section 5.3.3, "Standalone Mode." When operating in standalone mode, the BTR automatically "rewinds" to the start of the file when the end is reached.

6.5 Punching from CNC to Computer via BTR

To punch a program from the CNC to the computer via the BTR:

1. Ensure the computer and CNC are both idle. Wait at least 5 seconds after stopping a previous CNC or computer transfer.
2. Prepare the Dostek DNC software (or your third-party DNC software) to receive a file.
3. Execute the appropriate commands on the CNC. Observe the BTR indicators:
 - ✧ The BTR's DNC "TD" indicator is on or blinking while the CNC is punching.
 - ✧ The BTR displays the punch symbol while the CNC is punching, and for 5 seconds after the CNC stops punching.
 - ✧ Received data is scrolled in the Dostek DNC receive window.



If a problem occurs during punching, see Section 7, "Troubleshooting," for more information.

6.6 Loading Binary Files (CNC Executive)

You can use the 440A BTR to load binary files (such as CNC executive tapes) into the CNC. However, binary transfers require different communication settings on the computer than part program transfers.

For more information about using binary (executive) files, see the following Dostek application notes:

- AN02 - Transcribing Punched Tapes
- AN03 - Loading Binary Files

These application notes are installed on your computer when you install the Dostek DNC software. To view the notes:

1. Start the Dostek DNC Navigator application.
2. Click the **Application Notes** tab, and then click the **Application Note Selector** link. A list of Dostek application notes installed on your computer is displayed.
3. Select an application note, and then click **View**.

6.7 Using BTR Command Mode

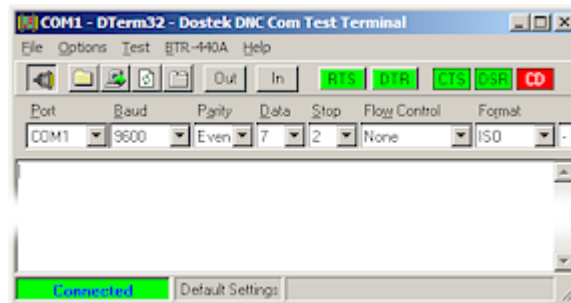


You can use the 440A BTR's interactive command mode to:

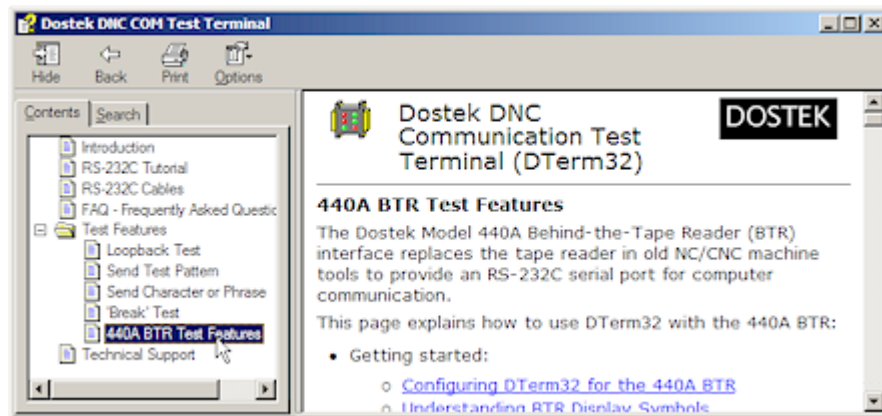
- View and modify BTR configuration parameter settings.
- View BTR file memory content.
- Test BTR parallel input and output signals, and reader and puncher adapter cables.
- Transcribe tapes to computer disk files.
- Update the BTR firmware.

To use the BTR interactive command mode with the Dostek DNC Com Test Terminal application (DTerminal):

1. Ensure the BTR is powered on, connected to the computer, and idle.
2. Start the Dostek DNC Com Test Terminal application (DTerminal).

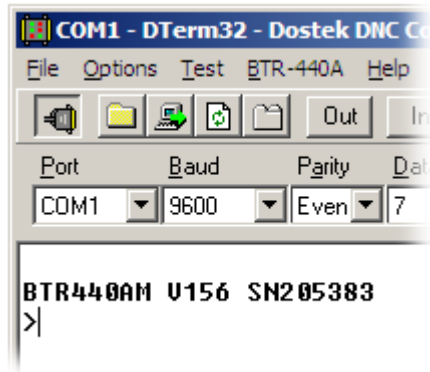


3. Click **BTR Help** on DTerminal's **BTR-440A** menu. The DTerminal help window opens to the "440A BTR Test Features" help topic.



4. Click the **Using BTR Command Mode** link. The command mode help topic is displayed. Detailed instructions for using command mode are included in the DTerminal help file.

5. Click **BTR Command mode** on the **BTR-440A** menu. The BTR responds by sending its identification message followed by the ">" command prompt. The identification message includes the firmware version number and the BTR serial number.



You are now ready to use BTR interactive commands.

Note:

- > You can also start command mode by either of the following methods:
 - Type "^" into the DTerminal window while connected to the BTR.
 - Set BTR configuration switch SW8 on, and then reset or restart the BTR.

6.8 Transcribing Tapes



You can use the 440A BTR to transcribe punched tapes to computer disk files.

To transcribe tapes, you also need:

- A Remex (or compatible) tape reader.
- An adapter cable (Dostek part # 60-0530)
- A power supply (Dostek part # 60-0555)
- A computer with Dostek DNC software installed.

For detailed information about using the BTR to transcribe punched tapes, see Dostek application note AN02, "Transcribing Punched Tapes."

To learn how to view application notes, see the note in Section 6.6, "Loading Binary Files," on page 26.

7 Troubleshooting

This section explains how to troubleshoot BTR problems. Information is organized in the following topics:

- Troubleshooting Tips (Section 7.1)
- Understanding BTR Alarm Codes (Section 7.2)
- Understanding CNC Alarms and Indications (Section 7.3)
- Viewing BTR File and Memory Information (Section 7.4)
- Fixing BTR Power Problems (Section 7.5)
- Using BTR Test Features (Section 7.6)

7.1 Troubleshooting Tips

Before you begin troubleshooting, review the following tips:

Verify Configuration. Make sure the BTR, CNC and software are configured correctly according to the machine-specific installation instructions you received with your BTR.

Check Computer Communication. If you are having trouble sending a file from the computer to the BTR, see Section 6.3.1, "Fixing Communication Problems."

Check BTR Reader Cable. Check the cable that connects the BTR to the CNC. A wire may be broken or the cable may be wired incorrectly.

Try Another BTR. If you have more than one BTR, try replacing the BTR that isn't working with one that is. You may need to change the BTR configuration switches and jumpers. Be sure to write down all the current settings before you make any changes.

Reconnect the Tape Reader. If possible, try using the machine's tape reader. A short test tape is included with each BTR for this purpose. See the following section.

7.1.1 Reconnect the Tape Reader

If the BTR does not appear to be working, reconnect the tape reader and try to read a tape. The content of the tape does not matter; you just need to see if the tape moves.

If the tape does not move:

- You may be using the wrong command sequence or switch settings on the CNC. Follow the procedure in the CNC operator manual.
- The CNC's tape reader interface may be defective.

If the tape moves, but the CNC reads past the end of the tape:

- The CNC's tape reader cable or interface may be defective.

If the CNC reads the tape correctly:

- The BTR parallel output port may be defective. See Section 7.6, "Using BTR Test Procedures," for information about testing the BTR parallel output port.

7.2 Understanding BTR Alarm Messages

AL

When the 440A BTR detects an error, it displays an alarm message. The message includes "AL" followed by a two-digit alarm code. The message repeats continuously until cleared by:

- pressing the BTR's pushbutton
- sending another file from the computer
- resetting the BTR

Table 12 - BTR Alarm Codes

Code	Description
01	Communication error, DNC Port. A parity, break or overrun error occurred on the DNC serial port. <ul style="list-style-type: none">• The baud rate on the computer and BTR may not match. The computer and BTR must both use the same baud rate.• The computer's COM port may be defective. Disconnect the cable from the BTR's DNC serial port, reset the BTR, and plug the cable back in. If the alarm occurs again the moment the cable is plugged in, try another COM port or another computer.• Certain computer models or COM port adapters remove power from the COM port when the port is closed or the computer hibernates. This may cause the BTR to detect a "Break" condition on the serial line. Disable hibernation in the computer's BIOS and/or control panel, or try using a different computer.
02	Overflow, DNC port. The flow control protocol between the computer and BTR is not working. Set the Dostek DNC flow control parameter to "BTR440A", "BTR440A-Echo", or "XOn/XOff." If using third-party communication software, set flow control or handshaking to "XOn/XOff."
03	CNC Reverse Overrun. While reading in reverse direction, the CNC attempted to read past the start of data.
04	Remote Command Error. An invalid remote command is received from the computer.
05	Punch Ignored. A punch operation (from CNC to computer) was attempted while the CNC was busy reading. Wait at least 5 seconds after a read or punch operation ends before starting another.
06	Receive Data Ignored. The computer started sending a new file to the BTR while the CNC was busy reading or punching. Wait at least 5 seconds after a read or punch operation ends before starting another. If the CNC starts reading when the BTR memory is empty or at the end of memory, it may continue to read indefinitely. In this case, the BTR's FWD indicator remains on. Reset the CNC. The BTR's FWD indicator turns off when the CNC stops reading.
07	Read Ignored. A CNC read operation (from BTR to CNC) was attempted while a punch operation was already in progress. Wait at least 5 seconds after one operation completes before attempting another.
08	Facit Punch Error. An error occurred during a Facit parallel punch operation.
09	Serial Punch Error. An error occurred during a serial punch operation.

Note:

- > If more than one error is detected, only the most recent alarm code is displayed.

7.3 Understanding CNC Alarms and Indications

This section explains how to understand CNC alarms and indications. Information is organized in the following topics:

- CNC indicates vertical parity (TV) alarm
- CNC indicates horizontal parity (TH) alarm
- CNC indicates another alarm
- CNC indicates "nothing"

CNC Vertical Parity (TV) Alarm

The vertical parity check is an old and seldom used error detection technique that is not supported by the Dostek DNC software. Disable vertical parity checking in the CNC's settings or parameters.

CNC Horizontal Parity (TH) Alarm

The horizontal parity (TH) alarm can indicate the following problems:

- Incorrect baud rate, data bit or parity setting in the Dostek DNC (or third-party) communication software.
 - To load or run part programs using ISO-358 standard code, set the Dostek DNC software to use 9600 baud, 7 data bits, even parity, and ISO-358 data code.
 - To load or run part programs using the older EIA-244 standard code, set the Dostek DNC software to use 9600 baud, 8 data bits, no parity, and EIA-244 data code.
- The CNC is configured to read EIA code, but the computer is configured to send ISO code (or the reverse). See the CNC's manual or the Dostek BTR installation instructions for information about setting the CNC part program data code.
- The BTR may be configured incorrectly. See the machine-specific BTR installation instructions you received from Dostek to determine the correct configuration.
- The BTR, adapter cable, or CNC tape reader interface may be defective. See Section 7, "Troubleshooting," for more information.

Other CNC Alarms

If the CNC indicates an alarm, such as "Reader Error," immediately after starting to read, consider the following:

- Verify that the computer and CNC are both configured to use the same data code (ISO or EIA; see "CNC Horizontal Parity Alarm" above for more information).
- The part program may be formatted incorrectly. See the CNC manual for information about correct formatting of part program tapes.
- The file may contain characters or G-codes that are not acceptable to the CNC. Create a test program with two or three simple lines, and try loading it.
- The BTR may be configured incorrectly. See the machine-specific BTR installation instructions you received from Dostek to determine the correct configuration.
- The BTR, adapter cable, or CNC tape reader interface may be defective. See Section 7, "Troubleshooting," for more information.

CNC Indicates 'Nothing'



If the BTR's FWD indicator remains on after the BTR displays the "End" symbol, the CNC is still trying to read from the BTR, probably because it did not find either the start or end of the program. Consider the following:

- The part program file may be formatted incorrectly. See the CNC manual for information about correct formatting of part program tapes.
 - The CNC may require a specific character or code at the start or end of the program.
 - The CNC may require both a Carriage Return (CR) and Line Feed (LF) at the end of each line, even though the ISO standard specifies a Line Feed only. In the Dostek DNC Configuration application, select both CR and LF on the "Formatting" tab.
- The BTR may be configured incorrectly. See the machine-specific BTR installation instructions you received from Dostek to determine the correct configuration.
- The BTR, adapter cable, or CNC tape reader interface may be defective. See Section 7, "Troubleshooting," for more information.

CNC Does Not Start Reading



If the BTR continues to display the "Start" symbol, the BTR is still waiting to receive a tape run signal from the CNC. Consider the following:

- You may be using the incorrect command sequence on the CNC, or the CNC control panel switches may be in the wrong state. Follow the procedure in the CNC operator manual. Try reconnecting the tape reader as explained in Section 7.1.1, "Reconnect the Tape Reader").
- The CNC may be pulsing the FORWARD signal too quickly for the BTR to respond. Change 440A BTR parameter 34 from "0" to "1" to enable detection of very short pulses. If this change does not correct the problem, set parameter 34 back to "0."
- The BTR may be configured incorrectly. See the machine-specific BTR installation instructions you received from Dostek to determine the correct configuration.
- The BTR, adapter cable, or CNC tape reader interface may be defective. See Section 7, "Troubleshooting," for more information.

CNC Starts Reading, But Stops Immediately



If the CNC starts reading, but the BTR immediately displays the "Pause" symbol, the CNC may think it has found the end of the program. For example:

- If the file contains a "%" character at the start of the file, the CNC may think this is the end of the part program and stop reading. Try removing the "%" character from the start of the file.
- The CNC may require a specific sequence of characters to designate the start of the program or tape. See your CNC's manual for an example of a properly formatted program.

7.4 Viewing File and Memory Information

To diagnose communication problems, you can:

- View the file number and content of the BTR memory to verify that data is loaded correctly from the computer
- View the file position to see where the CNC has stopped reading from the BTR.

7.4.1 View File Information

To view file information, press the BTR pushbutton for more than 1 second and less than 5 seconds. The BTR displays the file number and current file displacement.



The file displacement is the offset from the start of data where the BTR is currently paused. The BTR displays the displacement as "Fd" followed by the displacement.



The file number is the first contiguous ASCII/ISO numeric string found within the first 10 characters of received data. In the following example, the file number is "1234", and the BTR displays the message "Fn1234".

```
%  
O1234  
N10X0
```

To use the BTR's file number feature to verify that data is received correctly by the BTR:

1. Create a file on the computer with a unique number in the first line of the file.
2. Send the file from the computer to the BTR.
3. Verify that the BTR displays the correct file number message.

Notes:

- › The BTR does not display the file number if:
 - The received data uses EIA-244 data code.
 - The BTR memory is empty.
 - The BTR is busy sending to or receiving from the CNC.
 - The computer sends more than 10 spaces, NULLs or line feeds before sending the file content. The file number must be contained in the first 10 received characters.

7.4.2 View File (Memory) Content

To view the actual content of the BTR file memory:

- Use the BTR's "Display memory content" command. See Section 6.7, "Using BTR Command Mode," for more information.

In particular, you can use the "D =" command to view the memory content in the area where the CNC stopped reading from the BTR. This feature can help you determine if the CNC stopped reading due to a particular character or G-code that it does not accept. Look backward through the file content several blocks, since the CNC may stop reading a few blocks after the problem is detected.

7.5 Fixing Power Problems

If the BTR does not power up as described in Section 6.2.1, "Starting the BTR," try the following:

- Turn the power off, wait 10 seconds, and then turn the power back on.
- Check BTR configuration jumper CJ1 (see Table 10 on page 15). Verify that it is set correctly for the power source you are using, and verify that it is making proper electrical contact with the jumper pins.

If the BTR still does not power up correctly, measure the actual input voltage using a digital voltmeter:

1. Set your digital voltmeter to read DC voltage.
2. Measure the voltage by holding the meter's negative lead to the "-" (minus) terminal on the BTR's terminal power block and the positive lead to the exposed metallic part of the shunt installed on configuration jumper CJ1.

The DC voltage should measure between 4.90 and 5.10 volts.

3. Set the meter to read AC voltage, and then repeat step 2.

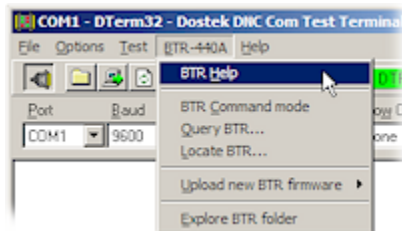
The AC voltage should measure less than 0.1 volts.

If the voltage measurement is incorrect, there may be a problem with the power source.

If the voltage measurement is correct, the BTR may be defective. Contact Dostek.

7.6 Using BTR Test Procedures

The Dostek DNC Com Test Terminal application (DTerminal) includes several features to help you test the 440A BTR. BTR test features are available in BTR command mode or by clicking **BTR-440A** in the DTerminal menu.



For detailed information about BTR test features, view DTerminal's help file as explained in Section 6.7, "Using BTR Command Mode."

The following topics are included:

- Viewing BTR configuration information
- Testing BTR/computer communication:
 - Detecting the BTR
 - Testing Communication: Computer Output to BTR Input
 - Testing Communication: BTR Output to Computer Input
 - Resolving Communication Problems
- Testing Parallel Input and Output Ports:
 - Testing BTR Parallel Output (Reader) Output
 - Testing BTR Parallel Input (Puncher) Port

Appendix A - Illuminated Remote Pushbutton

This appendix explains how to install the optional Dostek 60-0553 Illuminated Remote Pushbutton and use it with the Dostek Model 440A Behind-the-Tape Reader (BTR).

Use the Illuminated Remote Pushbutton to:

- Monitor the state of the BTR (indicated by flashing of the LED indicator).
- Reposition (rewind) the BTR to the start of the file.

A1 Introduction

The 440A BTR "REMOTE" terminal block lets you connect an external illuminated (LED) remote momentary-contact pushbutton switch.

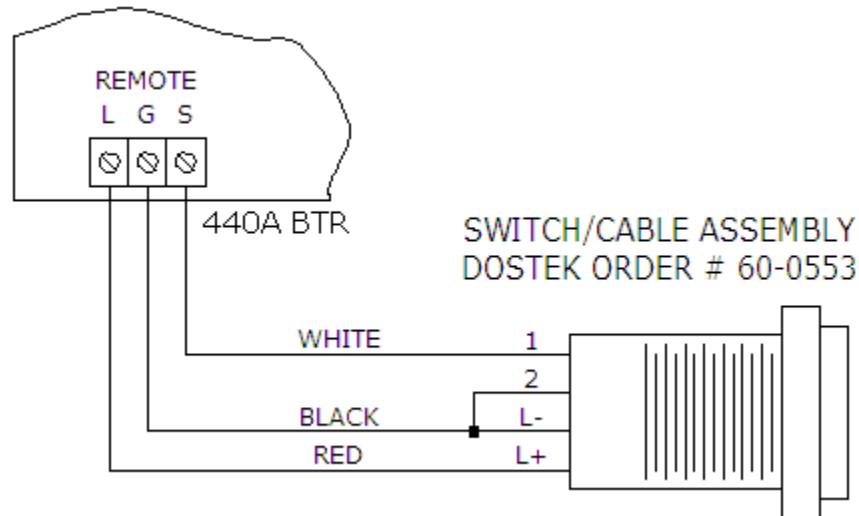
The "REMOTE" terminal block is located near the bottom left corner of the 440A BTR circuit board (see Figure 1 on page 2).

The remote pushbutton switch is wired in parallel with the BTR's built-in miniature pushbutton switch. The remote pushbutton functions in the same way as the built-in pushbutton.

The remote LED indicator flashes in certain patterns to show the BTR status.

A2 Installation

Connect the 60-0553 remote pushbutton assembly to the 440A BTR as illustrated by the following diagram:



A2.1 Activate Remote Indicator

By default, the remote LED indicator is disabled. To activate the indicator, set BTR parameter number 9 to "1." For information about setting BTR parameters, see Section 5.4, "Using BTR Parameters".

Note:

- > When the remote LED is activated, the decimal point on the 440A BTR's 7-segment display is also activated. However, the decimal point displays with the opposite polarity. The decimal point is off when the remote LED is on.

A3 Remote LED Indicator

When activated, the remote LED indicator is normally on, and flashes off in certain patterns to indicate BTR status:

- Messages and alarms.
- Reader emulation.
- Puncher emulation.

A3.1 Messages and Alarms

The remote LED indicator flashes off briefly (once for each character) when a message is displayed on the BTR's display.

In case of a BTR alarm condition, the indicator flashes continuously until the alarm is reset. To reset the alarm, press the pushbutton momentarily.

A3.2 Reader Emulation

The remote LED indicator flashes off for 1/8 second every 1/2 second while the CNC is reading data from the BTR. The remote indicator stops flashing when the CNC stops or pauses reading from the BTR.

A3.3 Puncher Emulation

The remote LED indicator flashes off for 1/8 second every second while the CNC is sending data to the BTR puncher port.

A4 Remote Pushbutton

Use the remote pushbutton to:

- Rewind to start of file.
- Clear alarms.
- Reset BTR.

A4.1 Rewind Control

When the BTR is configured to operate in "standalone" mode, pressing and holding the pushbutton for more than 2 seconds (but less than 10 seconds) "rewinds" the BTR to the start of the memory content.

For detailed information about standalone mode, see Section 5.3.3.

A4.2 Clear Alarm

Press the remote pushbutton momentarily (more than 1/4 second) to clear a BTR alarm message.

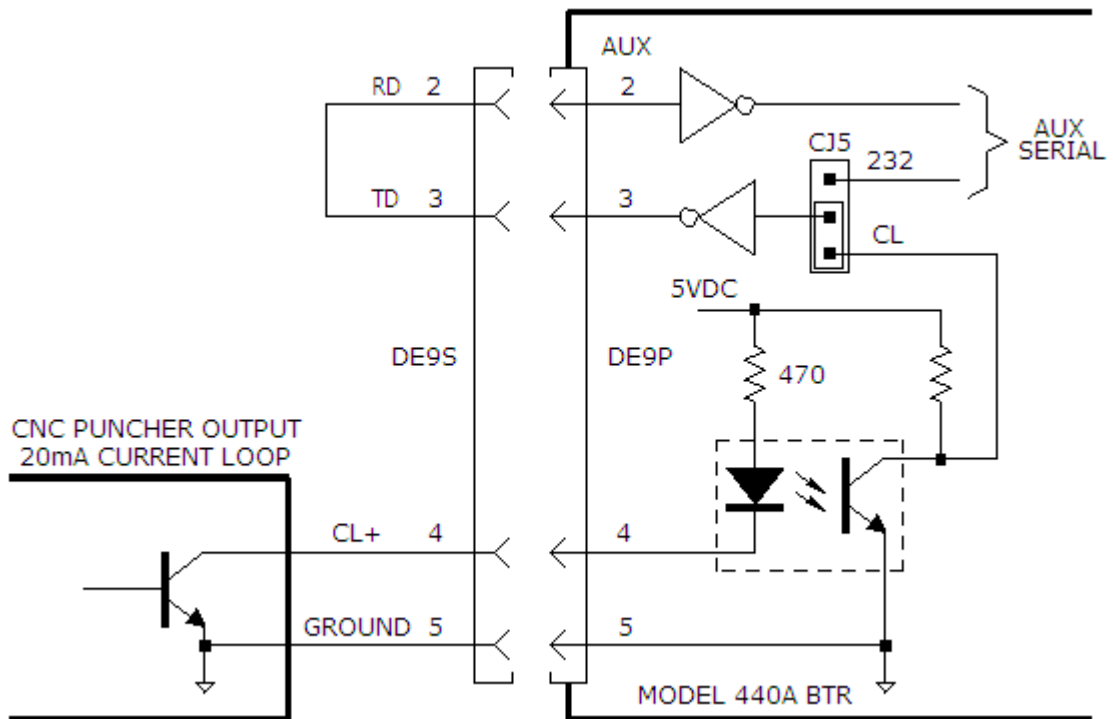
Appendix B - Current-Loop Puncher Interface

The BTR's 20 mA current-loop serial puncher interface lets a CNC equipped with a current-loop puncher port to send data to the computer. To use the BTR's current-loop port:

- Connect the CNC puncher open-collector current-loop output signal to pin 4 on the BTR's "AUX" serial puncher port (Section 2.2).
- Connect a jumper wire between pin 2 and pin 3 on the BTR's "AUX" serial puncher port.
- Set the BTR serial puncher baud rate to match the baud rate of the CNC's current-loop serial puncher port. See Section 5.4, "Using BTR Parameters," and parameter # 21 in Table 11 on page 18 for more information.

Note:

- > The BTR actually converts the current-loop input signal to an RS-232 output signal on pin 3 of the "AUX" connector. A jumper wire connects the converted output to the RS-232 input on pin 2. This way, you can tap into the signal for diagnostic purposes.



Notes