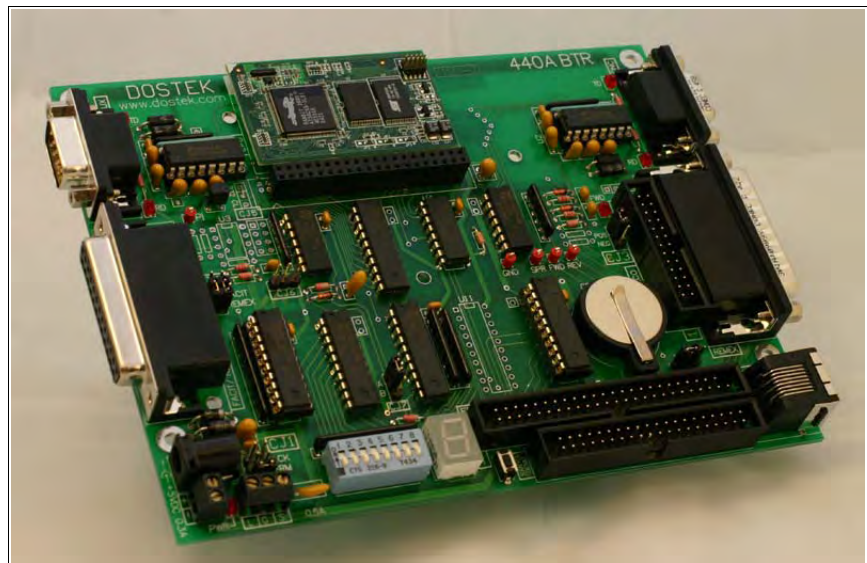




Dostek 440A BTR

User Guide



DOSTEK

Dostek Incorporated
238 Westheights Drive
Kitchener, Ontario
Canada N2N 1J9
Tel (519) 742-5721
Fax (519) 741-8669
www.dostek.com

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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
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Note: In this manual, the abbreviation "CNC" is used to refer to both 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.

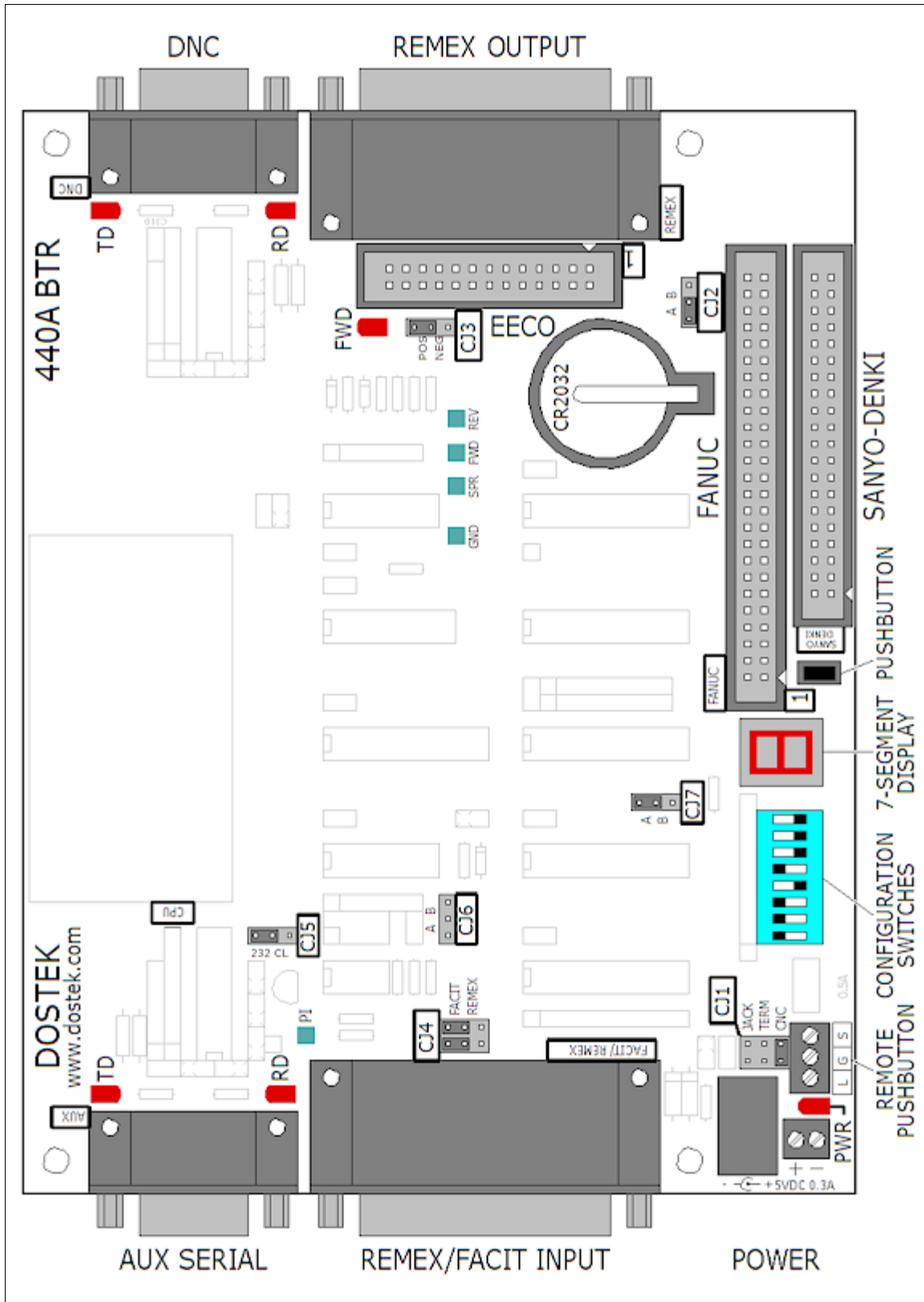


Figure 1 - Connections, Controls and Indicators

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 both 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, Sanyo-Denki and Fanuc tape readers. Adapter cables are available 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 run programs of unlimited size. A memory upgrade is not required. What's more, you can start loading or running the program immediately; there is no need to wait for the program to load into memory.

Simple drip feeding. When the BTR is used with the Dostek DNC software, you can scroll the program on the computer screen while drip feeding to monitor progress, and quickly perform mid-program restarts.

Bi-directional transfers. The 440A BTR works with the CNC's punch output (parallel, Facit, current-loop or RS232) so programs created or modified on the CNC can be sent back 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.

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	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 CTS/RTS flow control is selected, BTR suspends data transmission while CTS is off.
8	RTS	Request To Send output. When CTS/RTS flow control is selected, BTR turns RTS on when ready to receive data, and off when not ready. When CTS/RTS flow control is not selected, RTS output is on all the time.
5	Ground	

Table 2 - Serial Puncher Port (AUX)		
DE9S	Symbol	Function
2	RD	Receive Data input to BTR from CNC serial punch out.
3	TD	Transmit Data output from BTR auxiliary port.
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	

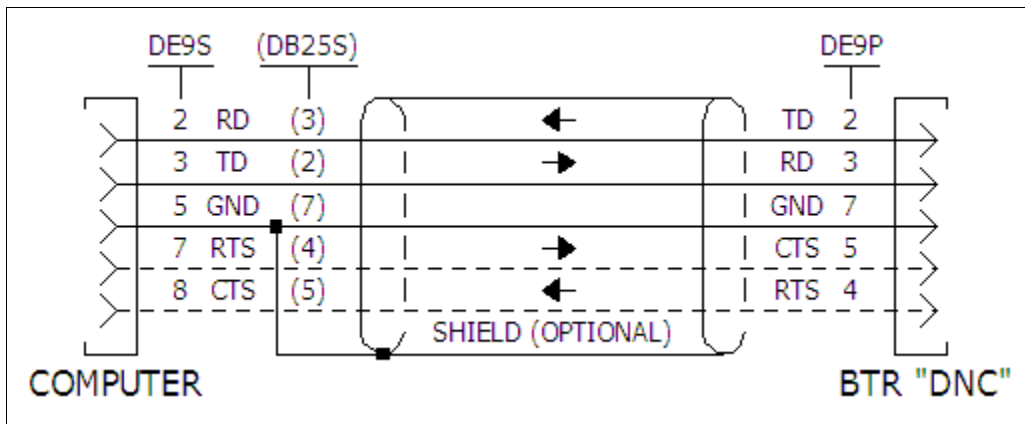


Figure 2 - Computer to BTR Serial Cable

2 Connectors

This section explains 440A BTR connectors:

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

2.1 DNC/Computer Serial Port

The "DNC" port connects the 440A BTR to the computer.

See Table 1 on the previous page for the connector pinout and signal descriptions.

A standard 9-pin direct ("straight through") cable is normally included with your BTR order.

Ordering or Building a Special Cable

You can order a cable from Dostek, or build your own, if you:

- need a longer cable
- are using a computer serial port with a DB25 connector
- need to replace a damaged cable

You can build a cable following the wiring diagram 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 from the 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 in length.

2.2 Serial Puncher Port (AUX)

The 'AUX' connector is normally used to connect a CNC serial puncher output to the 440A BTR.

RS-232 and current loop serial puncher signals are supported. See "CJ5 - Serial Puncher Mode" in Table 10 on page 15 for information about configuring the serial puncher port.

When configured as an RS-232C serial puncher input port, only the RD, RTS and Ground signals are used. Cable wiring depends on the type of CNC. A wiring diagram is included with your BTR installation instructions.

See Table 2 on the previous page for the connector pinout and signal descriptions.

Table 3 - Remex Output (Reader) Port

Pin	Signal	Description	Pin	Signal	Description
1	DATA1	Data output 1 (LSB)	14	READY	Output on when BTR ready
2	DATA1	Data output 2	15		Not connected
3	DATA1	Data output 3	16	FWD	Forward/Run input
4	DATA1	Data output 4	17	REV	Reverse/Direction input
5	DATA1	Data output 5	18		Not connected
6	DATA1	Data output 6	19		Not connected
7	DATA1	Data output 7	20	SPARE1	Available for special use
8	DATA1	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 Input (Puncher) Port

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

2.3 Parallel Output (Reader) Port

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

FANUC Compatible with the 50-pin CNT1 connector on the Fanuc tape reader.

SANYO-DENKI Compatible with the 40-pin connector on the Sanyo-Denki 2600 series tape reader.

REMEX Compatible with the DB25P connector on Remex 7000 series (or compatible) tape readers. Data signals are on pins 1 to 8. Pinout of this connector is provided in Table 3 on the previous page.

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

CAUTION - All four parallel output connectors are connected internally in the BTR. Never connect to more than one of the connectors in the above list at any time.

Note: The location of each connector is shown in Figure 1 on page 2.

2.4 Parallel Input (Puncher) Port

The 440A BTR parallel input port (labeled as "FACIT/REMEX") is used 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 shown in Table 4 on the previous page.

2.5 Remote Terminal Block

The "REMOTE" terminal block lets you mount an illuminated pushbutton switch on the operator control panel so you can remotely control and monitor the BTR. See Appendix A, "Illuminated Remote Pushbutton," for more information.

3 Power and Battery

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

3.1 Power Source

The 440A BTR requires a 5 volt direct current (DC) **REGULATED** (+/- 5%) 300 milliampere (mA) power source. The power source is selected by configuration jumper CJ1. See "CJ1" in Table 10 on page 15 for more information.

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.

Refer to Figure 3 below to identify the power jack, terminal block, CJ1 configuration jumper, power LED indicator and protective device (fuse).

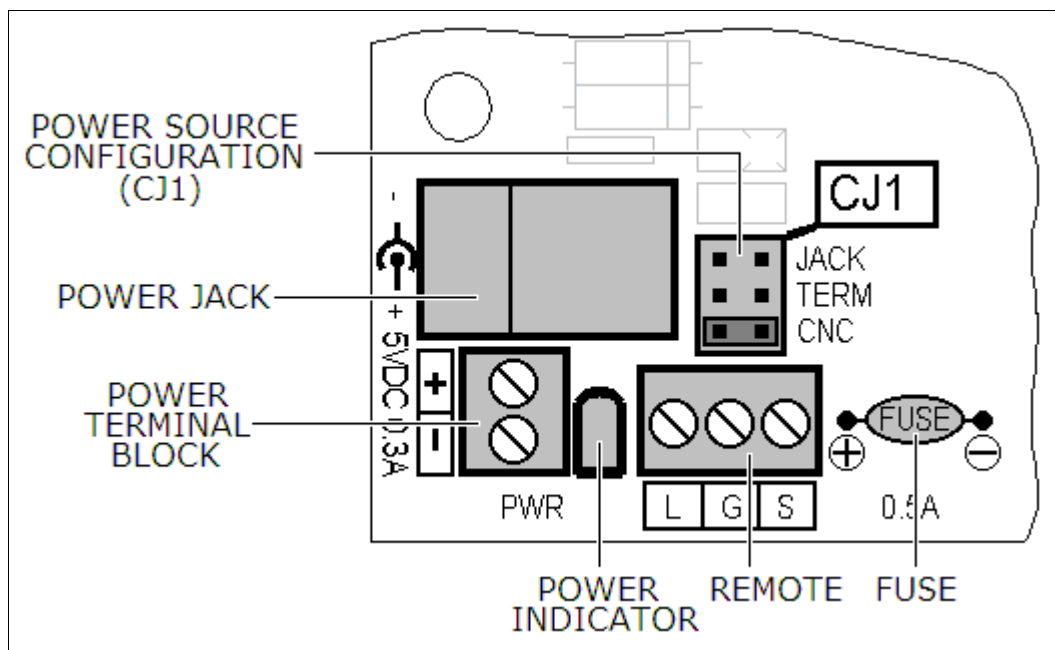


Figure 3 - Power Source

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.

Replacing the Battery

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	Located next to the power jack. On when BTR is receiving power. See Section 3, "Power and Battery," for more information about power sources. Note: May be illuminated with low brightness even when power is not applied (due to leakage currents).
DNC 'TD'	Located next to the DNC serial port connector. On or flickering while the BTR is sending data to the computer.
DNC 'RD'	Located next to the DNC serial port connector. On or flickering while the BTR is receiving data from the computer.
AUX 'TD'	Located next to the AUX (auxiliary) serial port connector. On or flickering when the BTR is sending data. The AUX serial port is normally used as a serial puncher input only. Therefore, TD is not normally used.
AUX 'RD'	Located next to the AUX (auxiliary) serial port connector. On or flickering when the BTR is receiving data, usually from a CNC serial puncher output.
FWD	Located next to the REMEX and EECO parallel output connectors. On or flickering while the CNC is reading data from the BTR. For proper on/off polarity, configuration jumper CJ3 (Table 10, page 16) must be set according to the type of CNC.
7-SEGMENT LED DISPLAY	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.



Table 6 - LED 7-Segment Display















Symbol	Description
	Empty. BTR memory is empty, and the BTR is ready to receive data from computer.
	Start. BTR memory contains data, and BTR is positioned at the start of the file and ready to send to CNC.
	End. BTR 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 shown while the CNC is reading from BTR in forward direction.
	Counter Clockwise. A counter clockwise rotating pattern is shown while the CNC is reading from BTR in reverse direction.
	Pause. CNC paused or stopped reading from BTR. Press pushbutton to show file displacement (see "Fd" message below).
	Command. BTR is in interactive "Command" mode and is ready to accept commands from computer.
	Punch. BTR is receiving data from the CNC on either the parallel or serial puncher port.
	Transcribe. BTR is in 'Transcribe' mode. See Section 6.8, "Transcribing Tapes" for more information.
Message	Description
	File Open. Message is shown once when computer starts sending a new file to the BTR (more than 10 characters received while BTR is idle). If a file number is found, it is included in the message (for example: "Fo1234"; see "Fn" message below). BTR stores received data in memory, automatically clearing previous memory content.
	File Close. Message is shown once about 5 seconds after computer stops sending data to BTR.
	File Number. Message is shown once when power is turned on or when the pushbutton is pressed momentarily, if a file number is included in the first 10 characters of memory. File number is the first contiguous string of 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. Message is shown once when the CNC stops reading from the BTR for 5 seconds, or the pushbutton is pressed momentarily. Displacement is from the start of the file. For example: "Fd8473" means the CNC has read 8472 characters. The "Fd" message is not shown if the BTR is positioned at the start of the file, the file is larger than the BTR memory, or the BTR is busy.
	Alarm. Message repeats continuously after BTR detects an error. AL is displayed followed by a two-digit error code. See Section 7.2, "Understanding BTR Alarm Codes."

Table 7 - Controls

Item	Description
CONFIGURATION SWITCH	Use the 8-position DIP switch to select configuration options. See Section 5.1, "Using Configuration Switches" for more information.
PUSHBUTTON	Use the pushbutton as follows: <ul style="list-style-type: none"> • Press for about 1 second, and then release, to view the file number and file displacement. See "Fn" and "Fd" in Table 6 on the previous page for more information. • Press about 5 seconds, and then release, to "rewind" the BTR to the start of memory. This function is available only when the BTR is idle and is configured for "Standalone" operating mode (Section 5.3.1). • Press and hold for 10 seconds to reset the BTR.
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 shown 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 2000/3000 (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 2000 (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
ON	DNC port baud rate is 9600 baud. (Normal operation)
OFF	DNC port baud rate is defined by BTR user parameter # 1. See Table 11 on page 18 for more information.
SW6	Standalone Mode (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
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 (see Section 6.8, "Transcribing Tapes").
SW8	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 (see Section 6.7, "Using BTR Command Mode").

5 Configuring the BTR

This section explains how to configure the 440A BTR and the computer:

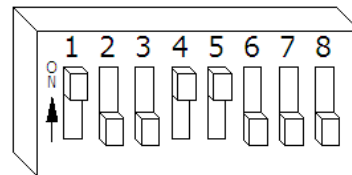
- 5.1 - Using Configuration Switches
- 5.2 - Using Configuration Jumpers
- 5.3 - Choosing a BTR Operating Mode
- 5.4 - BTR Parameters
- 5.5 - Configuring the Computer

To configure the BTR for use with a specific machine type, set the switches and jumpers according to the installation instructions 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. Switch 1 in the adjacent illustration is ON, while switch 8 is OFF.

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 shown in Figure 1 on page 2.

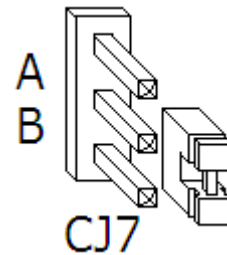
5.2 Using Configuration Jumpers

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 shown in Figure 5 on the following page.

Configuration options are listed in Table 10 on page 17.



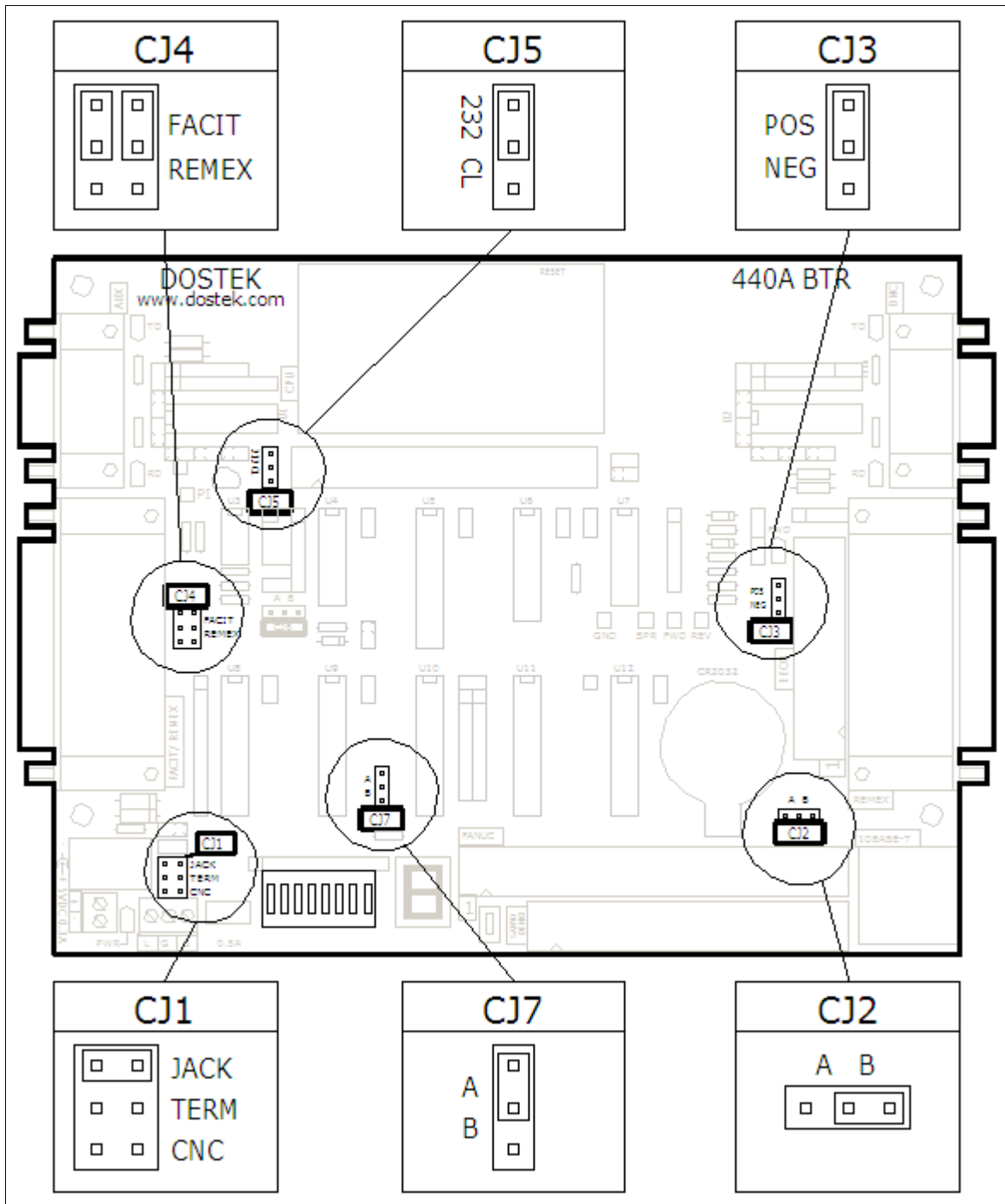


Figure 5 - Configuration Jumper Location

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 using the computer.

5.3.1 Standard Mode

Choose standard mode to load programs into CNC memory.

With standard mode, the BTR and computer work together using the BTR memory as a large buffer. 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 (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.

5.3.2 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 shown 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 capability.

Configuring Tracking Mode

To configure the 440A BTR for tracking mode operation:

- Set BTR configuration switch SW6 OFF (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 BTR and software emulate a "tape loop."

Notes:

- Tracking mode does not work with binary file transfers, or with third-party software (you must use Dostek DNC software).
- Tracking mode does not support reverse tape motion.
- 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 show the progress. A small amount of the BTR memory is used as a data buffer.

5.3.3 Standalone Mode

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

With standalone mode, you send the part program from the computer to the BTR once. The computer is not needed again until you need to run another program.

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

Mid-program restart is not supported. You can, however, use the CNC's tape search command to find a particular block in BTR memory, just as you would with a punched tape.

If a file is too large for the BTR memory, the BTR automatically switches to standard mode, and the program can be executed only once.

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

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."

Table 11 - Parameter Options

#	Description
1	DNC port baud rate. When configuration switch SW5 (Table 9 on page 12) is turned off, this parameter sets the baud rate for the DNC port. 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	Serial puncher port (AUX) 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 begins loading into memory. By default, the BTR starts sending only when the Forward signal turns from off to on after the new program begins loading. 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, noise rejection is turned off and the BTR can detect very short pulses.

5.4 Using BTR Parameters

This section explains how to use BTR configuration parameters to:

- 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

Parameters are described in Table 11 on the previous page.

To set BTR parameters:

First, activate the 440A BTR "Command Mode" as explained in Section 6.7, "Using BTR Command Mode."

View Parameter

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

Set Parameter

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

Save Parameter Changes

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

R

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

If power is turned off or the BTR is reset before the Restart command is executed, parameter changes are discarded.

Note: There are more than 50 parameters available for setting advanced BTR configuration options. Change unlisted parameters only when directed by Dostek to do so.

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."

Note: 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 the software as follows:

- Set BTR configuration switch SW5 "on" to select 9600 baud rate. If you need to use a different baud rate, refer to 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 format, set the computer software to use 7 data bits and even parity.
- To load part programs and data into the CNC using the older EIA-244 standard data format, set the computer software to use 8 data bits and no parity.
- To load binary data such as machine executive software, configure the computer 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 does not perform any filtering or code conversion.
- Some CNCs have very strict data format requirements. It may be necessary to format the part program or configure the computer software to send specific characters before or after the program or between each block. Refer to Section 7, "Troubleshooting," for more information about program formatting problems.

6 Using the BTR

This section explains how to use the BTR:

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

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 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 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 empties it.

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

F

- the display shows 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 (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.

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. You will observe:
 - The BTR's DNC "RD" indicator is on or blinking while the computer sends data.
 - The BTR shows 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.
 - The BTR shows the start symbol.
 - The file scrolls in the Dostek DNC window as the file is sent.



You can start the CNC reading or running the program as soon as a file open message or start symbol is shown. 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 shows 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. Choose your BTR's configuration file.
2. Try to connect to the BTR:
 - On DTerm32's **BTR-440A** menu, click, **Query BTR**.
 - On the **BTR-440A** menu, click **Locate BTR**.
3. Send a stream of data to the BTR:
 - On the **Test** menu, click **Send Test Pattern**. The Test Pattern dialog box opens.
 - Click **Test**. DTerm32 sends a continuous stream of data to the COM port.
 - Observe the DNC "RD" indicator on the 440A BTR (next to the BTR's "DNC" connector). 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 DTerm32's BTR help page:
 - On the **BTR-440A** menu, click **Help**. 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 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. Observing the BTR, you will see:
 - The BTR display shows a rotating pattern while the CNC is reading from the BTR. A clockwise pattern is shown when the CNC is reading forward, and a counter clockwise pattern is shown when 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 display shows the pause symbol and the FWD indicator turns off.



The CNC may stop reading from the BTR before it reaches the end of the file. If the CNC reads to the end of the file, the BTR display shows the end symbol .

Note: If the BTR CNC continues to read after the end of file is reached (FWD indicator remains on while BTR displays 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 punching 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 communication software) to receive a file.
3. Execute the appropriate commands on the CNC. You will observe:
 - The BTR's DNC "TD" indicator is on or blinking while the CNC is punching.
 - The BTR display shows the punch symbol while the CNC is punching, and for 5 seconds after punching stops.
 - Received data is scrolled in the Dostek DNC receive window.



If a problem occurs while 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 when transferring part programs.

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

AN02 - Transcribing Punched Tapes

AN03 - Loading Binary Files

Note: 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:

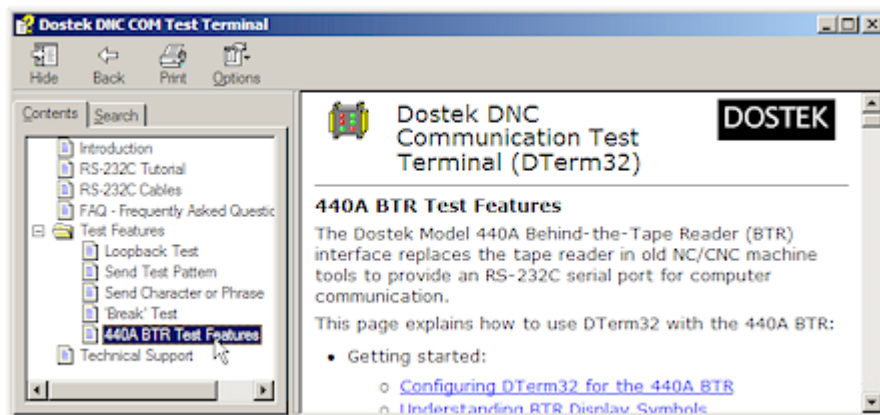
- View and modify BTR configuration parameter settings.
- View BTR file memory content.
- Test BTR parallel input and output signals, and reader and puncher adapter cables.
- Transcribe tapes to computer disk files.
- Update the BTR firmware.

To use the BTR interactive command mode with the Dostek DNC Com Test Terminal application (DTerm32):

1. Ensure the BTR is powered on, connected to the computer, and idle.
2. Start the Dostek DNC Com Test Terminal application (DTerm32).



3. On DTerm32's **BTR-440A** menu, click **BTR Help**. The DTerm32 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 DTerm32 help file.

7 Troubleshooting

This section explains how to troubleshoot BTR problems:

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

7.1 Troubleshooting Tips

Before you start troubleshooting, here are a few 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 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 shows an alarm message on its display. 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	<p>Communication error, DNC Port. A parity, break or overrun error occurred on the DNC serial port.</p> <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 when the cable is plugged in, try another COM port or another computer. • Certain computer models remove power from the COM port when the port is closed or the computer hibernates, which causes 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	<p>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 (handshaking) to "XOn/XOff."</p>
03	<p>CNC Reverse Overrun. While reading in reverse direction, the CNC attempted to read past the start of data.</p>
04	<p>Remote Command Error. An invalid remote command is received from the computer.</p>
05	<p>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.</p>
06	<p>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. Note: 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.</p>
07	<p>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.</p>
08	<p>Facit Punch Error. An error occurred during a Facit parallel punch operation.</p>
09	<p>Serial Punch Error. An error occurred during a serial punch operation.</p>

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:

- 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 440A BTR. 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 standard format, set the Dostek DNC software to use 9600 baud, 7 data bits, even parity, and ISO-358 data format.
 - To load or run part programs using the older EIA standard format, set the Dostek DNC software to use 9600 baud, 8 data bits, no parity, and EIA-244 data format.
- The CNC is configured to read EIA formatted part programs, but the computer is configured to send ISO formatted part programs (or the reverse). See the CNC's manual or the Dostek BTR installation instructions for information about setting the CNC part program data format.
- The BTR may be configured incorrectly. See the BTR installation instructions for the correct BTR settings.
- 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 format (see "CNC Horizontal Parity Alarm" above).
- 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 BTR installation instructions for the correct BTR settings.
- The BTR, adapter cable, or CNC tape reader interface may be defective. See Section 7, "Troubleshooting," for more information.

CNC Indicates 'Nothing'

The CNC may read the entire BTR memory without indicating an alarm or appearing to read or store any data. In this case, the BTR displays a rotating pattern on its display, followed by the "End" symbol. If the BTR's FWD indicator remains on, the CNC is still trying to read from the BTR. 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 BTR installation instructions for the correct BTR settings.
- 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 CNC appears to never start reading data from the BTR (the BTR continues to display the "Start" symbol), 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 BTR installation instructions for the correct BTR settings.
- 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 stops immediately (the BTR displays the "Pause" symbol), the part program may be formatted incorrectly. 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. Refer to your CNC's manual for an example of a properly formatted program.

7.4 Viewing File and Memory Information

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 file number and current file displacement are shown on the BTR display.

The file displacement is the offset from the start of data where the BTR is currently paused. The message is displayed as "Fdnnnn".

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

```
%  
O1234  
N10X0
```

You can use the file number feature to verify that data is received correctly at 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.

Notes:

- Display of the file number and displacement does not work when the BTR memory is empty or when the BTR is busy sending to or receiving from the CNC.
- If the computer sends more than 10 spaces, NULLs or line feeds before sending the file content, there is no program number to display.

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.")

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 be useful to determine if the CNC has 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 (Table 10 on page 15) to verify that it is set correctly for the power source you are using, and to 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 as follows:

1. Set the meter to read DC voltage.
2. Measure the voltage by holding the meter's negative lead to the "-" terminal on the 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.

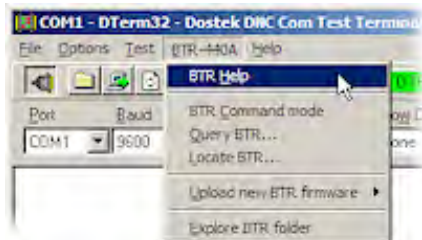
The AC voltage should measure less than 0.1 volts.

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 (DTerm32) 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 DTerm32 menu.



For detailed information about BTR test features, open the DTerm32 application and its 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 and use the optional Dostek 60-0553 Illuminated Remote Pushbutton 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.

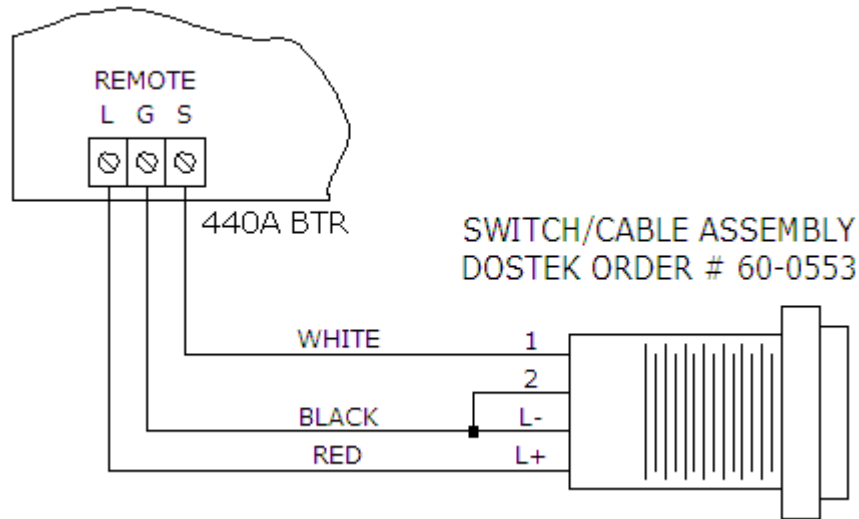
The "REMOTE" terminal block is located near the bottom left corner of the 440A BTR circuit board (see Figure 1 on page 2).

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 shown by the following diagram:



A2.1 Activate Remote Indicator

The remote LED indicator is disabled, by default. To activate the indicator, set 440A BTR parameter number 9 to a value of 1 (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 as the alarm code is displayed on the BTR's display. Press the pushbutton momentarily to clear the alarm.

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

To use the BTR's 20 mA current-loop serial puncher interface:

- Connect the CNC puncher open-collector 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.

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.

