TECHTRAN
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8400 DATACASSETTE

Operating Instructions

8401D

Specialists in data transmission

Table of Contents

A. Introduction

The 8400 DATACASSETTE is a high performance magnetic tape recorder for use in wide varieties of applications where digital data is utilized. The 8400 consists of a highly reliable cassette transport with storage buffer, tape controller and interface electronics. It is designed for use with such devices as keyboard-printers, CRT terminals, minicomputers, calculators and data logging systems as a storage buffer/peripheral unit.

This instruction manual has been prepared to acquaint you with operating features of the DATACASSETTE.

B. Compatibility

The 8400 DATACASSETTE is a digital data recorder compatible with wide ranges of time-sharing and data processing systems using the USA Standard Code for Information Interchange (ASCII). It contains dual interfaces for plug-in to a User's existing terminal system or to newly configured data processing installations.

The TERMINAL interface of the DATACASSETTE conforms to Electronic Industries Association (EIA) RS-232C and European CCITT V.24 standards. An optional 20 MA Current Loop interface is also available which is compatible to those interfaces contained on most models of teletypewriters. Adapter cables to the teletypewriter are required when this optional interface is used. The TERMINAL interface simulates that interface normally found on modems and acoustic couplers and is designed to accept the EIA Line Output of operator entry terminals and other data generators/receivers.

The MODEM/CPU interface of the DATACASSETTE conforms to EIA RS-232C and European CCITT V.24 standards. This interface is designed to plug into modems, acoustic couplers and other data generators/receivers to which remote data terminals normally connect. It is compatible with all Bell System or equivalent datasets.

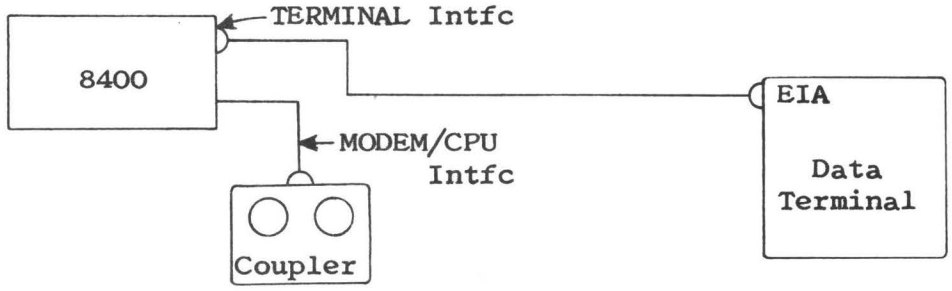
See Paragraph M for more information on these interfaces.

C A U T I O N

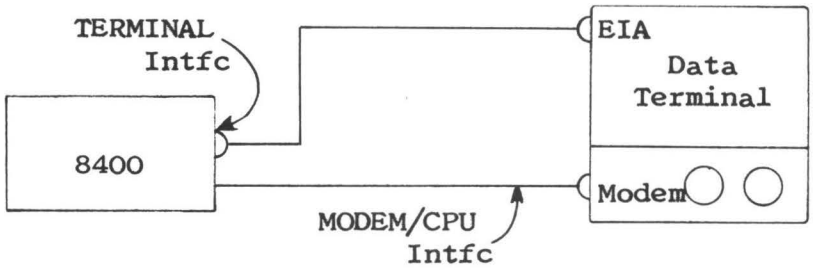
On units containing the optional 20 MA Current Loop interface, ALWAYS insure interface compatibility of the attaching device to the Current Loop interface of the DATACASSETTE BEFORE THAT DEVICE IS ATTACHED. Physical harm to the DATACASSETTE or device being attached can result if this warning is not observed. Units having this feature will contain a "T" as the last letter in their serial numbers.

C. Installation

The 8400 DATACASSETTE is styled to be office installed, either operating on-line alone or in conjunction with other data processing equipment. Typical equipment interconnections are shown below.



Operation With An External Modem or Coupler



Operation With Terminals Having Built-In Couplers

D. Front Panel Controls

Front panel controls of the 8400 DATACASSETTE have been designed for simplicity and clarity. Generally, these controls are those that will be used during day-to-day operations. All controls contain an indicator displaying the operating status of that function. Some contain dual function indicators having both a BLINKING and a STEADY ON condition to provide the ultimate in operator signaling.

1. POWER (On/Off)

   Depressing this control causes AC power to be applied to the DATACASSETTE

   ON indicator denotes power is applied

2. ONLINE (On/Off)

   Depressing this control causes the MODEM/CPU interface to be activated, providing a CB (Clear to Send) signal is present from the modem or CPU

   ON indicator denotes interface is active

   BLINKING indicator denotes interface is inactive (CB signal present but switch not depressed)

   OFF indicator denotes CB signal is not present and interface is inactive

3. EDIT (On/Off)

Depressing this control causes the Edit Mode to be activated. When in Edit Mode, data will be written to tape whenever a CR code is received; reading will stop whenever a CR code is read from tape

ON indicator denotes Edit Mode is activated

4. WRITE (On/Off)

Depressing this control causes the Write Mode to be activated or deactivated. When being deactivated, all data contained in the DATACASSETTE buffers will be written to tape

ON indicator denotes Write Mode is active and data received will be written to tape

5. READ (On/Off)

Depressing this control causes the Read Mode to be activated or deactivated

ON indicator denotes Read Mode is active and data is being read from tape or being searched

BLINKING indicator denotes Read Mode has been stopped. Occurs when control is depressed, STOP CODE is read from tape or STOP READ Command is received

6. REWIND (On/Off)

Depressing this control causes the tape to be rewound. Control is inactive when DATACASSETTE is in an active Read, Write or Search mode

ON indicator denotes tape is being rewound

E. Rear Panel Controls

Rear panel controls of the 8400 DATACASSETTE are those used during setup of the unit, but are not generally used during day-to-day operations.

1. DUPLEX (Full/Half)

FULL - When operating off-line, signals received from devices attached to the TERMINAL interface will be echoed-back to those devices on their Receive Data Line. When the DATACASSETTE is operating on-line, signal echo-back is automatically suppressed.

Data being read from tape is sent to the MODEM/CPU interface only (ECHOPLEX operation) so that data received by the device attached to the TERMINAL interface is that which is echoed from the CPU

HALF - Echo-back is suppressed at all times

2. SPEED (110/300/ 1200/2400)

Selecting the appropriate switch position causes the DATACASSETTE internal clock circuits to be activated for the speed selected. Speed setting should correspond to that of the attached device and system (CPU) being interfaced

3. DUP (On/Off)

DUP - Provides a Code Transparent Mode whereby all codes of the ASCII Code Set can be recorded and read from tape. Also deactivates Remote Code Controlled Operation. STOP READ code is not sensed in this mode

OFF - Provides normal recording and Remote Code Controlled Operation

4. MODEM (Send/Off/ Rcv)

(Optional)

SEND - Sets the 202 Modem Controller so that calls originating from the local DATA-CASSETTE station will be reacted to by the DATACASSETTE initially being energized with its Transmit Data Line connected to the Primary Channel of the 202 Modem

OFF (Center Pos) - Deactivates the 202 Modem Controller so that incoming and outgoing data will be handled in the normal manner without channel priority. A 202 Modem should NOT be connected to the DATACASSETTE in this mode

RCV - Sets the 202 Modem Controller so that incoming data will be responded to by the DATACASSETTE initially being energized with its Receive Data Line connected to the Primary Channel of the 202 Modem

F. Adjustments

1. Carriage Return Delay - This function is enabled only when a powered-up data terminal is attached to the TERMINAL interface (+5V required on Pin 20). The CR Dly potentiometer, located on circuit board #4 is used to adjust delay time of the CR Delay Circuit which senses CR codes read from tape, triggering delays in sending the next characters. CLOCKWISE rotation increases delay; COUNTERCLOCKWISE rotation shortens delay. Delay times are adjustable from 0 to approx. 1.5 seconds.

2. 1760 Potentiometer (110 Baud Speed Setting) - The 1760 potentiometer located on circuit board #3 , is used to provide fine tuning for the 110 Baud speed setting of the DATACASSETTE. CLOCKWISE rotation increases speed; COUNTERCLOCKWISE rotation decreases speed. A clock period of 0.568 ms viewed at the "1760" Test Point using an oscilloscope (or 1760 Hz on an electronic counter) corresponds to the proper setting for this adjustment.

3. 10/11 Bit Strap - A printed circuit strap is located on circuit board #3 for purposes of selecting the bit structure of characters transmitted by the DATACASSETTE.

   With the strap IN PLACE, 11 bit characters are transmitted at all speed settings.

   With the strap REMOVED (trace can be cut using sharp knife or EXACTO Tool), 11 bit characters are transmitted at the 110 Baud speed setting and 10 bit characters are transmitted at all other settings.

G. Preventative Maintenance

Cleaning of the Read/Write head MUST BE PERFORMED DAILY using a small soft cotton swab (such as Q-tip) dampened in alcohol. Neglecting this care may cause abnormal tape wear, transport damage or read/write errors.

H. Cassette Tape Characteristics

Use only high quality tape cassettes certified for DIGITAL RECORDING. The following cassettes have been tested and approved for use with the 8400 DATACASSETTE:

Techtran Industries, Inc.	Part No. 4300001
K/Tronic, Inc. 3260 Scott Blvd. Santa Clara, Calif. 95054	Part No. 102-16

W A R N I N G

Care should be taken not to subject tape cassettes to strong magnetic fields or to temperatures in excess of 110° F.

I. Operations

CASSETTE INSERTION

1. Raise the Transport Door Latch allowing the door to swing open.
2. Insert cassette into the tape guides with its front side facing forward (large tape spool on left). Insure that cassette is inserted to the bottom of the guides.
3. Close transport door.

SETUP

1. Select proper settings for the following controls:

   DUPLEX
   SPEED
   DUP
   ONLINE
   EDIT
   MODEM (optional feature)

2. With power applied, POWER indicator should be ON (ONLINE indicator will be BLINKING or ON if an activated modem is connected).

C A U T I O N

ALWAYS REWIND cassette before turning power off. Powering down with cassette NOT on its leader may cause tape errors to be recorded at that time.

AVOID rapid turn-on and turn-off of POWER as the Power-On-Reset Circuits may not respond correctly.

READING

1. Activate Read Mode by depressing READ control (or DC1 Command). READ indicator goes to STEADY ON.

2. Reading will stop whenever

   a) Blank tape is sensed (unless in Search Mode)

   b) STOP READ Code is read from tape (unless in DUP Mode)

   c) DC3 Command is received (unless in DUP Mode)

      DC3 Command must originate from MODEM/CPU interface if 8400 is on-line, TERMINAL interface if off-line

   d) READ control is depressed

   e) CR character is read from tape (Edit Mode only)

WRITING

1. Activate Write Mode by depressing WRITE control (or DC2 Command). WRITE indicator goes to STEADY ON.

2. Send data to DATACASSETTE. If on-line, data must originate from MODEM/CPU interface, if off-line, data must originate from TERMINAL interface. A cassette will nominally hold 145,000 characters.

   If in Edit Mode, data is written to tape ONLY upon receipt of a CR character.

3. DC3 character MUST be sent to DATACASSETTE to be written onto tape following recording of a data file. (DC3 is sensed in Read Mode to activate STOP READ at the end of file).

4. Deactivate Write Mode by depressing WRITE control (or DC4 Command). Data in buffers will be recorded and WRITE indicator will go OUT.

   ALWAYS deactivate Write Mode after last data has been recorded so that data does not remain in buffers.

   To protect recorded data from accidental erasures, break off the plastic TAB located on top-left portion of the cassette. The DATACASSETTE will not allow recording on such a cassette.

REWINDING

Neither Read nor Write Mode can be active (indicators STEADY ON) to initiate Rewind.

1. Initiate Rewind by depressing REWIND control (or SUB Command). REWIND indicator goes to STEADY ON for duration of rewind.

   Rewind off the tape trailer is designed to function only if the trailer has been reached in the Read, Write or Search modes. If the trailer has not been reached in this manner (such as when a cassette is inserted for purposes of being rewound), proceed as follows:

   1. Activate Read Mode (using READ control or DC1 Command)

   2. Initiate Rewind (using REWIND control or SUB Command)

2. No DATACASSETTE operations (including Search Address entry) can be performed while tape is being rewound.

PARTIAL REWINDING

1. Initiate Partial Rewind by sending CAN Command (this feature is code controlled only).

   If in Edit Mode, tape will first backup 2 lines and then read forward 1 line.

   If not in Edit Mode, tape will backup 2 recorded tape blocks and then read forward as in normal read operations.

This feature can also be used for the re-transmission of data.

J. Remote Code Controlled Operation

The Remote Code Controlled Operation feature provides the capability to remotely control most functions of the DATACASSETTE using codes generated from remote sources. The following DATACASSETTE functions can be controlled:

Function	Code
Start Read	DC1 (Cntrl Q)
Start Write	DC2 (Cntrl R)
Stop Read	DC3 (Cntrl S)
Stop Write	DC4 (Cntrl T)
Rewind	SUB (Cntrl Z)
Partial Rewind	CAN (Cntrl X)
Search	SOH (Cntrl A)
Character Delete	← (Shifted O or Underscore)

Remote Code Controlled Operation can be disabled by placing the rear panel DUP switch to the DUP position.

Remote Code Control must originate from MODEM/CPU interface if DATACASSETTE is operating on-line, TERMINAL interface if off-line.

K. High Speed Search Operation

The High Speed Search feature provides the capability to store and selectively retrieve up to 100 different data files stored on a cassette. Search rate is approximately 1000 characters per second. For this operation, each file when recorded, is preceeded by a single SEARCH Code followed by a two-digit numeric address. Files are ended with a STOP READ Code.

To search for a desired file, enter the SEARCH Command from the keyboard followed by the two numerics corresponding to the file desired, followed by a START READ Command. The tape will be automatically searched at high speed for the desired file and readout of that file will occur when it has been located.

To search for files located earlier in the tape, first rewind the tape before proceeding as outlined above.

A DC3 (STOP READ Command) will reset the Search Counter if the command to perform a search was entered incorrectly.

When searching for files, the SEARCH Code and two-digit numeric addresses will be suppressed, so that printing of these characters does not take place. Printout will occur, however, during normal reading of search addresses.

Example of Recorded Data File

SEARCH Code (SOH)
Two-digit Numeric Address (00-99)
File (Any length)
STOP READ Code (DC3)

Example of Search Procedure for File Number 3

Enter SEARCH Command (SOH)
Enter 0 (Zero)
Enter 3
Enter START READ Command (DC1)

L. Data Edit Operations

1. Character Delete

The Character Delete feature (normally Shifted "O" or Underscore) is used as a Backspace-Cancel operation during data recording. Upon receipt of this command, the last character received by the DATACASSETTE will be deleted. A minimum of 24 characters can be erased in this manner.

2. Line Edit

The Line Edit feature provides the capability to selectively correct or rewrite previously recorded data as a line editing function. Complete lines of data can be deleted, rewritten character-for-character, shrunk and even expanded, easily and without disturbing lines of data recorded on either side of the correction.

When in the Edit Mode (EDIT control depressed), and in the Write Mode, data blocks will be written to tape at 96 character intervals or whenever a CR (Carriage Return) operation takes place. Blanks will be recorded for later use in expanding data lines if the full 96 characters has not been used for a line.

When in the Edit Mode, reading will stop whenever a CR code is read from the tape. Continued reading or activation of the Write Mode can be performed at that time to respectively read or rewrite the following line. Partial Rewind operations can be used to facilitate the reading and editing of data lines. See Paragraph I for use of this feature.

To abort a line being written, deactivate the Write Mode (using the WRITE control or DC4 Command) and key a CR operation. No data will be written onto the tape. Reactivate the Write Mode for continued recording.

To write a STOP READ Code onto the tape when in the Edit Mode, key the DC3 Code followed by a CR operation from the keyboard.

Lines initially recorded at LESS THAN 96 characters should NOT be re-recorded at GREATER THAN 96 characters as internal operations handled by the Line Edit feature will not auto-

matically compensate for this increase. For this same reason, lines initially recorded at GREATER THAN 96 characters should NOT be re-recorded at LESS THAN 96.

When using the Edit Mode to record data from "steady transmission" sources (such as computers), the following line length restrictions should be observed:

Speed of Received Data	Minimum Line Lengths
110 Baud	4 Characters
300 Baud	4 Characters
1200 Baud	12 Characters
2400 Baud	24 Characters

The Edit Mode should be selected prior to activation of the Write Mode and should NOT BE SWITCHED when in the Write Mode.

M. Interface Specifications

Signal Characteristics - EIA RS-232C

1. Receive
   a. Mark -3 to -25 volts
   b. Space +3 to +25 volts

2. Transmit
   a. Mark -8 volts with 3K load
   b. Space +8 volts with 3K load

Maximum short circuit current 500 ma
Terminating Impedance 3K to 7K

Signal Characteristics - Optional 20 MA Current Loop

When using the Teletype Model 33 or similar data terminal employing a current interface, the data terminal MUST be setup to operate in the Full-Duplex 20 Milliampere Neutral configuration. Refer to the related equipment manual for instructions.

1. TERMINAL Interface Pin Assignments - EIA RS-232C

Pin	Function
1	Protective Ground
2	Transmitted Data (8400 Data In)
3	Received Data (8400 Data Out)
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Data Carrier Detector
20	Data Terminal Ready
16	Rdy/Busy Output (Rdy=0V, Busy=+5V)
25	Start/Stop Input (Start=0V, Stop=+5V)

(16 & 25 are optional features)

2. TERMINAL Interface Pin Assignments - Optional 20 MA Current Loop

Pin	Function
2	Transmitted Data (8400 Data In)
3	Received Data (8400 Data Out)
10	Transmit Common
13	Receive Common

The TERMINAL interface connector conforms to EIA RS-232C and European CCITT V.24 standards and is a 25-pin (DB-25S) connector. The mating connector (DB-25P) and necessary interconnecting cables between the DATACASSETTE and User's data terminals are provided by the User. The interconnecting cables should NOT exceed 50 feet in length if the RS-232C mode is used or 25 feet in length if the optional 20 MA Current Loop mode is used. Signals to pins 5, 6 and 8 are supplied by the DATACASSETTE.

3. MODEM/CPU Interface Pin Assignments - EIA RS-232C

Pin	Function
1	Protective Ground
2	Transmitted Data (8400 Data Out)
3	Received Data (8400 Data In)
4	Request to Send
5	Clear to Send
7	Signal Ground
20	Data Terminal Ready
16	Rdy/Busy Output (Rdy=0V, Busy=+5V)
25	Start/Stop Input (Start=0V, Stop=+5V)

(16 & 25 are optional features)

The MODEM/CPU interface cable and connector conform to EIA RS-232C and European CCITT V.24 standards and is a 25-pin (DB-25P) connector. The mating connector, located on the dataset or acoustic coupler, should be a DB-25S or equal. Signals to pins 4 and 20 are supplied by the DATACASSETTE.