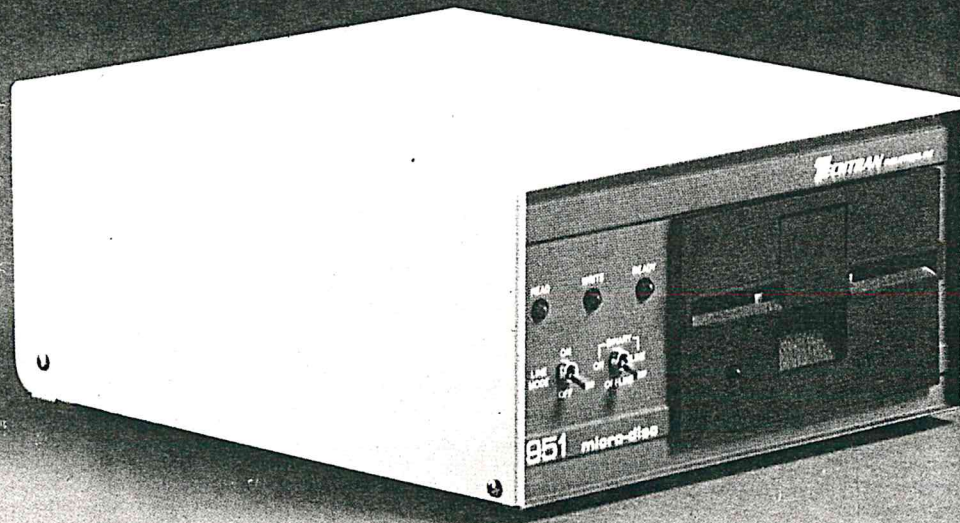


# 900 Series micro-discs



operating instructions



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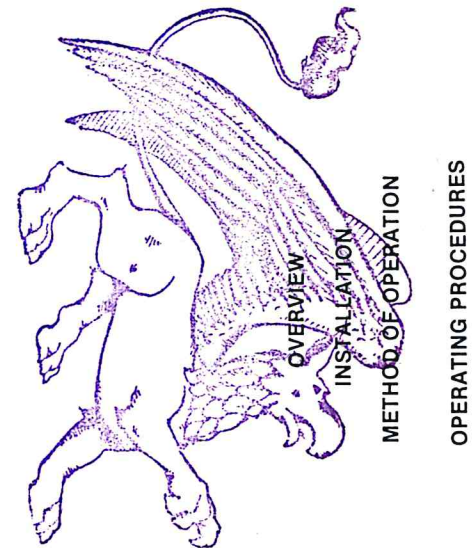
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## INTRODUCTION

The 900 Series Micro-Discs are a family of intelligent data recorders using 5 1/4 inch floppy disks as the recording medium. The Micro-Discs may be attached to a terminal device or computer and can be used as stand-alone data recorders. The Micro-Discs perform the following operations:

- Display the recorded contents of a diskette (**READ**)
- Record data to a diskette in file format (**WRITE**)
- Erase the contents of files and/or a diskette (**DELETE**)
- Alter recorded data (**EDIT**)
- Display the contents of several files, successively (**LINK**)
- Locate specific character strings (**SEARCH**)
- Change file names (**RENAME**)
- Duplicate diskette contents (**COPY**)
- "Squeeze" diskette contents into a compact form (**REPACK**)

The Micro-Discs are controlled by front panel switches and commands received from a remote device, such as a terminal. All remote commands are listed on the back cover for future reference. This manual is intended to teach the inexperienced user how to use the Micro-Discs to maximum potential.

Refer to the **FEATURES** section to identify the operations that are equipped with your model type. Sections I, II and III should be read and understood before attempting to use the Micro-Discs.



## FEATURES

### Standard

The model type of each unit is identified by a serial number printed on a rear panel plate. All model types contain the following features:

980  
Read File  
Read Directory  
Display Freespace  
Line Mode Read  
Write File  
Delete Character  
Erase Diskette  
Reset All Functions  
BINARY Mode  
ONLINE Mode  
OFFLINE Mode

The Model 980 contains only the functions listed above; the remaining model types also contain these additional features:

#### 980X-1/980XX-1

Delete File  
Repack  
Rename

#### 981

Delete File  
Line Mode Write  
String Search  
Global Search  
Partial Backup  
Repack  
Copy  
Link  
Edit

### Optional

In addition to the standard features, the following factory-installed options are available with applicable model types:

Online Speed Control  
Remote Binary Operation  
Read-After-Write  
20mA Current Loop  
Start/Stop Read  
Ready/Busy Output  
Power Options  
Custom Control Codes  
Rack Mounting

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## TERMINOLOGY

The following abbreviations are frequently used in this manual:

T	(CR)	RETURN key, often labelled ENTER OR EXECUTE
f	(LF)	LINE FEED character
c	(SP)	Space character (space bar)
v	(ESC)	Escape key
t	(CTRL X)	Control code
e		
F		
v		

Control codes are commonly used with the Micro-Discs. CTRL represents the CONTROL key on the terminal; hold this key down as you press the designated character (X).

When using numbers, be sure to use the correct number key on the terminal; the Micro-Disc cannot understand substitutions of "I" (el) or "O" (oh) for the numbers one and zero.

**NOTE:** The term "directory" refers to a listing of all file names on a diskette.

## DISKETTES

The Micro-Discs use 5 ¼ inch diskettes to store data. **Only Techtran diskettes (P/N 4300151) or an approved equal should be used with the Micro-Discs;** use of other diskette types may void the machine warranty. Because diskettes are a magnetic medium, observe the following precautions:

- Do not subject diskettes to strong magnetic fields.
- Do not use diskettes in temperatures in excess of 104 °F (40 °C).
- Always insert and remove diskettes when the power is ON.
- Do not open the drive door when the **READ** or **WRITE** buttons are illuminated.
- Keep diskettes away from liquids and smoke.
- Do not touch the exposed areas of a diskette.
- Store diskettes vertically in their protective sleeves when not in use.



**To insert a diskette:**

1. Be sure that the power is **ON**. Grasp the diskette with the label side up and towards you.
2. With the drive door open, fully insert the diskette until it rests against the back of the drive.
3. Pull the door latch down. The **READY** light illuminates when a formatted diskette is inserted.

To remove a diskette, check that the **READY** light is illuminated; pull up the door latch and remove the diskette.

**NOTE:** The **READ**, **WRITE** and **READY** lights flash when a blank diskette is inserted. Remove the diskette and take off the write protect tab (if installed). Insert the diskette and depress the **READ** button or the **(ESC)** key to initialize the diskette.

**WRITE PROTECT**

A write-protected diskette cannot record, erase or edit data. Write protect is used to keep vital diskette data from being lost.

To write protect a diskette, cover the notch in the upper right side of the diskette with the small silver tab provided.

The **READ**, **WRITE** and **READY** lights flash when writing is attempted on a write-protected diskette. Certain units will also display, **\*WRITE PROTECTED DISC\***.

# FRONT PANEL

Read Button

Write Button

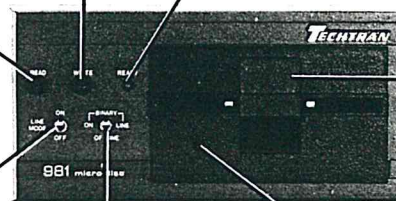
Ready Indicator

Drive Door Latch

Line Mode  
Switch

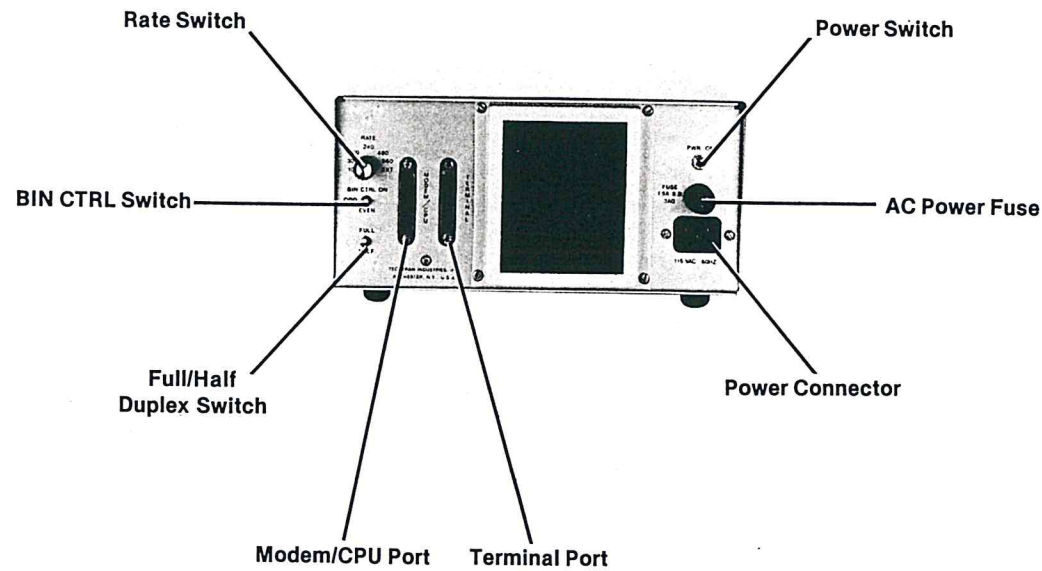
Binary/Online/Offline  
Switch

Power Indicator





# REAR PANEL



INSTALLATION  
METHOD OF OPERATION  
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## SPECIFICATIONS

### General

- Operating System: Microprocessor-controlled, resident program
- Bit Error Rate:  $1/10^9$  maximum; optional Read-After-Write error correction

### Diskettes

Only Techtran diskettes (P/N 4300151) or an approved equal should be used with the Micro-Discs.

- Diskette Capacity: 980, 980X-1, 981 - 192,786 characters; 980XX, 980XX-1 - 397,256 characters
- Recording Format: Double-Density, MMFM, soft-sectored
- Diskette Sides: 980, 980X-1, 981 - one; 980XX, 980XX-1 - two
- Coding: 8-level U.S. ASCII
- Minimum File Size: 254 characters

### Interface

- **TERMINAL** Port: EIA RS-232C/CCITT V.24 compatible
- **MODEM/CPU** Port: EIA RS-232C/CCITT V.24 compatible
- Asynchronous transmission
- Serial communications
- Full or Half Duplex, selectable
- Baud Rates of 110, 300, 1200, 2400, 4800, or 9600, selectable (External baud rate also available)
- Receive:
  - Mark -3V to -25V
  - Space +3V to +25V
- Transmit:
  - Mark -8V with 3K load
  - Space +8V with 3K load
- Maximum short circuit current: 500mA
- Terminating Impedance: 3K to 7K ohms



#### Power

- 103-127 VAC, 47-63 Hz, 60 watts
- Three wire ground
- Optional: 220-240 VAC, 47-63 Hz, 60 watts  
90-110 VAC, 47-63 Hz, 60 watts

#### Environmental/Physical

- Operating Temperature: +50°F to +110°F (10°C to 43°C)
- Operating Humidity: 20 to 90 per cent relative humidity, non-condensing
- Vibration: Normal office environment
- Altitude: 0 to 7000 feet (0 to 2.1 KM)
- Weight: 13 pounds (5.5 Kg)
- Size: 4.83"H x 11.75"L x 10.00"W  
(12.7cm x 29.85cm x 25.65cm)

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## Pin Assignments

### TERMINAL and MODEM/CPU Ports

Pin	EIA/CCITT	Function	Signal Source	
			TERMINAL Port (DTE) DB25S connector	MODEM/CPU Port (DCE) DB25P connector
1	AA/101	Protective Ground	-	-
2	BA/103	Transmitted Data	User	Micro-Disc
3	BB/104	Received Data	Micro-Disc	User
4	CA/105	Request to Send	not supplied	Micro-Disc
5*	CB/106	Clear to Send	Micro-Disc	User
6	CC/107	Data Set Ready	Micro-Disc	not supplied
7	AB/102	Signal Ground	-	-
8	CF/109	Data Carrier Detect	Micro-Disc	User
16*	SBB/119	Ready/Busy Output	Micro-Disc	Micro-Disc
20*	CD/108	Data Terminal Ready	User	User
23*		Remote Binary Enable	User	User
24*	DA/113	EXT Clock Input	User	User
25*		Start/Stop Input	User	User

#### \*NOTES:

1. Pins 16, 23 and 25 are optional features; refer to the **OPTIONS** section.
2. Refer to the **METHOD OF OPERATION** section for the function of Pin 5 at the **MODEM/CPU** port.
3. Pin 20 at the **TERMINAL** port requires +5V to activate the Read Delay.
4. Pin 24 is used to receive external clock signals for the baud rate (if desired). Refer to the Micro-Disc Maintenance manual for further information.



20mA CURRENT LOOP (Optional)  
TERMINAL Port

Pin	EIA/CCITT	Function	Signal Source
2	BA/103	Transmitted Data	User
3	BB/104	Received Data	Micro-Disc
10		Receive Common	.
13		Transmit Common	.

REAR PANEL SWITCH SETTINGS

Baud Rate

Set the rear panel **RATE** switch to the appropriate data transmission rate; values of 110, 300, 1200, 2400, 4800, and 9600 are available (the rear panel shows these values without the final zero). If using the Online Speed Control option, refer to the **OPTIONS** section before setting the baud rate.

The baud rate is determined using an internal Micro-Disc clock. If desired, an external clock can be used to determine the baud rate; refer to the Micro-Disc Maintenance manual for further information. The external clock is selected by setting the **RATE** switch to the **EXT** position; signals for this clock are received at Pin 24 of either the **MODEM/CPU** or **TERMINAL** port.

Parity

The **BIN CTRL** switch has three settings: **BIN CTRL ON**, **ODD** and **EVEN**; set it as follows:

- **ODD** - specifies odd parity
- **EVEN** - specifies even parity
- **BIN CTRL ON** - specifies no parity; refer to **BIN CTRL SWITCH** section for additional functions

### Duplex Control

The **FULL** and **HALF** Duplex switch on the rear panel performs different functions during **ONLINE** and **OFFLINE** communications (refer to **METHOD OF OPERATION** section).

Switch Setting	ONLINE Communication	OFFLINE Communication
<b>FULL</b>	Data read from the diskette is displayed only at the device attached to the <b>MODEM/CPU</b> port.	Input data is displayed at the device attached to the <b>TERMINAL</b> port (echoback).
<b>HALF</b>	Data read from the diskette is displayed at both attached devices.	Input data is not displayed at attached devices (no echoback).

### PENCIL SWITCH SETTINGS

All pencil switches are factory set to the **OFF** position; review the function of each to determine if the switch settings need to be altered.

The pencil switches are located at the right side of the circuit board found directly beneath the top cover of the unit. On desk top models, remove the four screws on the sides of the unit and lift off the cover. On rackmount units, remove the two screws at the top of the unit and lift off the top plate.

### Transmit Backspace Character

When removing unwanted characters from data using the (CTRL X) command, the Micro-Disc automatically issues a Backspace character, causing the cursor of the terminal device to move back to the previous position. This function is controlled by setting pencil switch #3 as follows:

- **OFF** activates transmission of the Backspace character
- **ON** deactivates transmission of the Backspace character

**NOTE:** Deactivate transmission of the Backspace character during **ONLINE** communication if the device attached to the **MODEM/CPU** port is programmed to echo back to the terminal; otherwise, extra Backspace characters will be recorded on the diskette.

### Read Delay

The Micro-Disc can be selected to cause a 300 millisecond delay after each line of data displayed during the **READ** function. The Read Delay only functions when an active device is attached to the **TERMINAL** port and +5V is sent to Pin 20 of the **TERMINAL** port. To eliminate the Read Delay, place pencil switch #4 in the **ON** position.

Either a (CR) or (LF) character will activate the Read Delay. To select this character, set pencil switch #2 as follows:

- **OFF** specifies (CR) character
- **ON** specifies (LF) character

### Motor Stop

To reduce motor wear, the Micro-Disc can be selected to automatically stop the drive motor after being in an idle mode for 90 seconds. The drive motor will return to normal activity once a valid command is received. Set pencil switch #1 as follows:

- **OFF** causes the drive motor to stop after 90 seconds of idle time
- **ON** causes the drive motor to run continuously

### CABLING

1. Attach the supplied power cord from the rear panel power connector to a local power source. Verify that local power matches specifications.

**NOTE:** If using the 20mA Current Loop option, install the unit as required by your type of system.

2. Attach a straight-thru male to male cable meeting EIA RS232C specifications from the **TERMINAL** port to the terminal device. This device may be a CRT, printer, hardcopy terminal or electronic device. The **TERMINAL** connector requires a DB25P mating connector.
3. Attach the male to female cable supplied from the **MODEM/CPU** port to the device to send data. This device may be a modem, acoustic coupler or intelligent process control device. The **MODEM/CPU** connector requires a DB25S mating connector.

**NOTE:** If using the Read-After-Write option, refer to the **OPTIONS** section for special requirements of attached devices.

4. Power on the Micro-Disc and all peripheral equipment.



## INTRODUCTION

The Micro-Discs afford great flexibility in data communications. To insure that you understand each feature of the unit, carefully read this entire section before beginning operation.

To verify that data is being received at the proper port and that all desired features are activated, consider asking yourself the following questions prior to usage:

- Which communication mode is required? (**ONLINE**, **OFFLINE**)
- Is this function operative in the **BINARY** mode?
- Would the **BINARY** mode aid in the completion or future use of this function?
- Should the **LINE MODE** switch be **ON**?
- Are there restrictions if the **BIN CTRL** switch is **ON**?

## BINARY/ONLINE/OFFLINE SWITCH

This front panel switch determines both the active communication mode and the **BINARY** mode. **ONLINE/OFFLINE** communications and the **BINARY** mode are further described in subsequent sections. Set this switch as follows:

- **BINARY position** - selects the **BINARY** mode. In this position:
  - **ONLINE** communication is initiated if the device attached to the **MODEM/CPU** port sends +5V (high) to the Micro-Disc via Pin 5.
  - **OFFLINE** communication is initiated if the device attached to the **MODEM/CPU** port sends 0V (low) to the Micro-Disc via Pin 5, or if no device is attached to the **MODEM/CPU** port.
- **ONLINE position** - selects either **ONLINE** or **OFFLINE** communications:
  - **ONLINE** communication is initiated if the device attached to the **MODEM/CPU** port sends +5V (high) to the Micro-Disc via Pin 5.
  - **OFFLINE** communication is initiated if the device attached to the **MODEM/CPU** port sends 0V (low) to the Micro-Disc via Pin 5, or if no device is attached to the **MODEM/CPU** port.
- **OFFLINE position** - always selects **OFFLINE** communication, no matter what voltage is received by the Micro-Disc via Pin 5 of the **MODEM/CPU** port.

## COMMUNICATION MODES

### Online Communication

This mode is used to:

- Send commands directly to the Micro-Disc from the device attached to the **MODEM/CPU** port (if a keyboard is available).
- Send commands to the Micro-Disc from the device attached to the **MODEM/CPU** port *via the device attached to the **TERMINAL** port*. This method works as follows:

Commands are entered at the device attached to the **TERMINAL** port, where they are routed through the Micro-Disc to the device attached to the **MODEM/CPU** port. These commands are then sent back to the Micro-Disc and are treated as if they had originated from the device attached to the **MODEM/CPU** port.

### NOTES

1. If the device attached to the **MODEM/CPU** port is programmed to echo back, then commands will be displayed at the device attached to the **TERMINAL** port.\*
2. Action resulting from commands is displayed at the device attached to the **MODEM/CPU** port (if Micro-Disc in **FULL** Duplex) or at both attached devices (if Micro-Disc in **HALF** Duplex).

### Offline Communication

This mode is used to send commands from the device attached to the **TERMINAL** port directly to the Micro-Disc. Commands are echoed back to the device attached to the **TERMINAL** port if the Micro-Disc is in **FULL** Duplex.

---

\* Under this condition, transmission of the Backspace character by the Micro-Disc should be deactivated to prevent extra Backspace characters from being written on the diskette (refer to **INSTALLATION** section).

## BINARY MODE

To activate the **BINARY** mode, set the front panel **BINARY/ONLINE/OFFLINE** switch to the **BINARY** position (refer to the **OPTIONS** section if the Remote Binary Option is equipped). **BINARY** mode can be initiated during either **ONLINE** or **OFFLINE** communications; *during ONLINE communication, the **BIN CTRL** switch on the rear panel must be ON* (refer to the **BIN CTRL SWITCH** section for further restrictions).

In the **BINARY** mode, all control codes written on the diskette or sent by an attached device are treated as normal characters; this mode is useful to:

- **READ** data continuously; the Micro-Disc will not stop reading when control codes are encountered.
- **WRITE** data which contains control codes; the Micro-Disc will record control codes in the same manner as other characters.

## LINE MODE

The front panel **LINE MODE** switch should be placed in the **ON** position to cause the following results:

- During a **READ** function, **LINE MODE ON** causes the unit to stop at each **(CR)** or **(LF)** character written on the diskette.
- During a **WRITE** function, **LINE MODE ON** should be used if the **EDIT** function may be used in the future.

Several operations also require that the **LINE MODE** switch be **ON**; refer to the **LINE MODE READ** and **LINE MODE WRITE** sections for specific information. Unless otherwise specified, keep the **LINE MODE** switch **OFF**.

#### **BIN CTRL SWITCH**

This rear panel switch limits certain commands when the unit is in the **BINARY** mode. During **ONLINE** communication, the **BIN CTRL** switch must be **ON** for proper operation of the unit.

Mode	BIN CTRL OFF (EVEN/ODD)	BIN CTRL ON
<b>BINARY OFFLINE Communication</b>	Invalid commands: - manual commands - (CTRL R) - .W(SP) (file name) (CR)	Invalid command: - (CTRL T)
<b>BINARY ONLINE Communication</b>	No operative functions.	Invalid command: - (CTRL T)



## RESET ALL FUNCTIONS

Enter (CTRL Z) to reset the unit if an incorrect decimal command has been entered. This command moves the drive head to the first usable diskette space and in certain cases, aborts the current operation.

## READ

The **READ** function permits you to display:

- the contents of the diskette, in either File or Batch modes
- the file names in the directory, displayed in the order by which they were recorded

equipped with the Start/Stop Read option, refer to the **OPTIONS** section for instructions about controlling the readout.

### File Mode

This function allows you to read specific files.

1. To begin reading a file, enter: **.R(SP) (file name) (CR)**.  
Sample Command: **.R MEMO(CR)**

The **READ** light flashes during **ONLINE** communication.

**NOTE:** To access a file but not read it, enter the above command followed immediately by (CTRL S). To begin reading, depress the **READ** button or enter (CTRL Q).

2. To stop reading, depress the **READ** button or enter (CTRL S) or (CTRL Z). Reading will automatically stop when:
  - (CTRL S) is read on the diskette (unless in **BINARY** mode)
  - (CR/LF) is read on the diskette (if **LINE MODE ON** but not in **BINARY** mode)
  - the end of diskette data is reached

### Batch Mode

This function allows you to start reading at the current diskette location.

1. To begin reading at the beginning of the diskette, enter **(CTRL Z)**.  
Then depress the **READ** button or enter **(CTRL Q)**.  
To begin reading at the current diskette location, depress the **READ** button or enter **(CTRL Q)**.
2. To stop reading, depress the **READ** button or enter **(CTRL S)** or **(CTRL Z)**.  
Reading will automatically stop when:
  - **(CTRL S)** is read on the diskette (unless in **BINARY** mode)
  - **(CR/LF)** is read on the diskette (if **LINE MODE ON** but not in **BINARY** mode)
  - the end of diskette data is reached

### Read Directory

To read the contents of the directory, enter: **.D(SP)R(CR)**.

Sample Command: **.D R(CR)**

The entire directory will display and the available diskette space (freespace) will be displayed at the end of the directory. If equipped with the Read-After-Write option, then any bad sectors on the diskette will be displayed at the end of the directory.

### Display Freespace

Freespace indicates the number of characters that can still be recorded on the diskette. Freespace is normally displayed at the end of a directory readout. To terminate a directory readout but display the freespace, enter **(CTRL Z)** once the readout has begun. Freespace is displayed as follows:

**\*FREESPACE: XXXXXX CHARACTERS\***

#### Line Mode Read

This feature is activated by setting the **LINE MODE** switch to **ON** and proceeding with regular **READ** commands. Line Mode Read causes the **READ** function to stop each time a **(CR)** or **(LF)** character is read from the diskette. Line Mode Read is inoperative in the **BINARY** mode. To display the next line in Line Mode Read, use **(CTRL Q)** or the **READ** button.

#### Partial Backup

This function permits you to read previous diskette data. If the data was written in Line Mode, then the previous line of data will be displayed. If data was not written in Line Mode, then data from the previous diskette sector will be displayed.

The **LINE MODE** switch should be **ON** to complete this function. To back up, enter **(CTRL W)**. Previous sector data will display until a **(CTRL S)** or **(CR)** character is encountered.

#### WRITE

This function permits you to create data files. Files can be created in File or Batch mode. In File mode, you assign file names of up to five characters; in Batch mode, the unit automatically assigns file names (displayed as **XX-XX** in the directory). All file names are entered into the directory. The **WRITE** light flashes during this function when data is received via the **MODEM/CPU** port during **ONLINE** communication.

If you plan to edit recorded data in the future, refer to the **LINE MODE WRITE** function before beginning to write. The minimum file size is 254 characters.

**WARNING:** After terminating the **WRITE** mode, *wait at least five seconds* before performing another operation.

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#### File Mode

1. To create and name a new file, enter: **.W(SP) (file name)(CR).**

Sample Command: **.W LIST(CR)**

File names cannot exceed five characters. To change a file name before entering **(CR)**, enter a second **(SP)** after the file name and enter the new file name.

2. Enter the data to be recorded. To delete unwanted characters during data recording, enter **(CTRL X)** (Delete Character); the previous character will be eliminated. Be sure to enter both **(CR)** and **(LF)** characters as needed to define the end of each line.

3. To stop data recording, depress the **WRITE** button or enter **(CTRL S)** or **(CTRL T)**.

#### Batch Mode

1. To create a new file and have the unit assign a file name, depress the **WRITE** button or enter **(CTRL R)**.

2. Enter the data to be recorded. To delete unwanted characters during data recording, enter **(CTRL X)** (Delete Character); the previous character will be eliminated.

3. To specify the end of the file, enter **(CTRL S)**.

4. To stop data recording, depress the **WRITE** button or enter **(CTRL T)**.

#### Line Mode Write

***Always write data in Line Mode if future updates or corrections to recorded data are expected.*** Writing in Line Mode causes sections of the diskette to be left blank in anticipation of editing. Each line of data written in Line Mode with less than 127 characters can later be expanded to 127 characters.

To write in Line Mode, simply set the **LINE MODE** switch to **ON** and proceed with regular **WRITE** commands. ***Data must be written in Line Mode for proper operation of the EDIT functions.***

\*



If writing in Line Mode and data is received from an uninterrupted data source (such as terminal or computer), the following minimum line lengths must be observed (prior to (CR/LF)):

Baud Rate of Received Data	Minimum Line Length
110	2 characters
300	4 characters
1200	15 characters
2400	31 characters
4800	62 characters
9600	125 characters

This insures that data will not be transmitted faster than the Micro-Disc can accept it. Use filler characters, such as (SP), to obtain the minimum line length. If equipped, the Ready/Busy Output feature can be used to suspend data transmission, thus eliminating the need for filler characters.

## DELETE

### Delete Character

To delete unwanted characters during data recording, enter (CTRL X) immediately after the unwanted character. This command may be repeated up to 127 times to eliminate the previous 127 characters.

### Delete File

This function removes the file name from the directory and replaces the file data with null codes. To recover this file space, refer to the **REPACK** function.

To delete a file, enter: .X(SP) (file name)(CR).

Sample Command: .X DATE(CR)

Bat The **READ** button illuminates, and **\*EDIT WAIT\***, **\*EDIT OFF\*** display. The time required to complete this  
Thi function will vary with the size of the file.

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#### Erase Diskette

1. To erase all data on the diskette, enter: **.D(SP)D(CR)**.  
Sample Command: **.D D(CR)**

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2. The **READ**, **WRITE** and **READY** lights will flash as warning. Enter: **(ESC)**.  
Any character other than **(ESC)** aborts this command.

#### EDIT

These functions update and correct previously recorded data. The diskette cannot be edited in the **BINARY** mode. *Data must be written in Line Mode for proper operation of the edit functions.*

Re Several edit functions are provided; read through each section to determine the capabilities of the **EDIT**  
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#### Substitute

This function writes over one or more recorded characters at a specified location. Be sure to write over only the characters to be changed; this function does not allow you to insert more characters than were originally recorded on a line. This function is inoperative in the **BINARY** mode. Follow these steps:

1. Set the **LINE MODE** switch to **ON**.
2. **READ** to the line of data to be changed.
3. Enter **(CTRL Y)**. The following is displayed:

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**\*EDIT WAIT\***  
(line to be edited)  
**\*EDIT ON\***

4. Use (CTRL Q) or the READ button to advance to each (SP) character recorded on the line; proceed to the location indicated below:
  - *If replacing one or more characters*, proceed to the position after the first word to be written over. Then enter (CTRL R). Use the (CTRL X) command to back up until the cursor is over the first character to be replaced.  
 Enter the characters to be written over the original data. Be sure not to write over data unintentionally, and remember to include (SP) characters to separate words. Proceed to step #5.
  - *If replacing the end of a line*, proceed to the position before the first word to be replaced. Then enter (CTRL R).  
 Enter the characters to be written over the original data, terminated with (CR/LF). The edited data will match the current display. Proceed to step #5.
5. Depress the WRITE button or enter (CTRL T).
6. Enter (CTRL Y). \*EDIT WAIT\* and \*EDIT OFF\* will be displayed; the edit function is now complete.  
 NOTE: To abort an EDIT function in progress, enter (CTRL Z).

#### Insert

This function inserts data into a line of recorded data. Up to 127 characters can be recorded for each line of data; you may only expand lines to this number of characters. The characters in the line will shift to the right as data is expanded. Once the line is filled, a Backspace code is sent after any further entries; this indicates that the line is filled to capacity. Follow these steps:

1. Set the LINE MODE switch to ON.
2. READ to the line of data to be changed.
3. Enter (CTRL Y). The following is displayed:  
 \*EDIT WAIT\*  
 (line to be edited)  
 \*EDIT ON\*

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4. Use **(CTRL Q)** or the **READ** button to advance to each **(SP)** character recorded on the line; proceed to the location indicated below:

- *If inserting one or more characters only*, proceed to the position before the first character to be inserted. Proceed to step #5.

- *If inserting an entire line*, proceed to the position past the **(CR/LF)**. Proceed to step #5.

5. Enter **(CTRL F)**. An asterisk will display.

6. Enter the characters to be inserted (up to 127). Be sure to insert spaces as needed to separate words. If inserting a line, terminate with **(CR/LF)**; the edited data will match the current display.

7. Depress the **WRITE** button or enter **(CTRL T)** or **(CTRL F)**.

8. Enter **(CTRL Y)**. **\*EDIT WAIT\*** and **\*EDIT OFF\*** will be displayed; the edit function is now complete.

**NOTE:** To abort an **EDIT** function in progress, enter **(CTRL Z)**.

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#### Delete

Data is deleted by using the **(CTRL X)** command. Follow these steps:

1. Set the **LINE MODE** switch to **ON**.

2. **READ** to the line of data to be changed.

3. Enter **(CTRL Y)**. The following is displayed:

**\*EDIT WAIT\***

(line to be edited)

**\*EDIT ON\***

4. Use **(CTRL Q)** or the **READ** button to advance to each **(SP)** character recorded on the line; proceed as follows for your application:

- *If deleting one or more characters only*, proceed to the position after the character to be deleted. Then enter **(CTRL F)**; an asterisk will display.



Use the (CTRL X) command to back up until the cursor is over the last character to be deleted. Be sure to leave (SP) characters to separate words. Proceed to step #5.

- *If deleting the end of a line*, proceed to the position before the first word to be deleted. To complete the edit, enter (CTRL R) and (CR/LF). Proceed to step #5.
- *If deleting an entire line*, depress the **WRITE** button or enter (CTRL T). If you wish to edit this line in the future, enter three (SP) characters followed by (CR); if no future editing is required, enter only (CR). Then enter (CTRL Y) to complete the line deletion; do not complete steps #5 and #6 listed below.

5. Depress the **WRITE** button or enter (CTRL T).
6. Enter (CTRL Y). \*EDIT WAIT\* and \*EDIT OFF\* will be displayed; the edit function is now complete.

**NOTE:** To abort an EDIT function in progress, enter (CTRL Z).

## LINK

This operation permits one or more files to be linked together during the **READ** function. For example, you can specify to begin reading in File A and, at a specific point, jump to File B and read to the end of that file. If desired, you may also command the unit jump back to File A and read to the end. This function is inoperative in the **BINARY** mode.

*To link files as you are writing them*, enter one of the following commands at the location of the link:

- |                               |  |
|-------------------------------|--|
| (CTRL B)(File B name)(CTRL B) | - to jump to File B at this point and read data to the end of file; unit then jumps back to File A but no readout will occur |
| (CTRL C)(File B name)(CTRL C) | - to jump to File B at this point, read data to the end of file, and jump back to File A to read data to end of file         |

Sample Command: (CTRL C)TIME(CTRL C)

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*To link recorded files, follow these steps:*

1. Set the **LINE MODE** switch to **ON**.
2. **READ** to the line of data where the link will occur.
3. Enter **(CTRL Y)**. The following is displayed:  
**\*EDIT WAIT\***  
(line at which link occur)  
**\*EDIT ON\***
4. Use **(CTRL Q)** or the **READ** button to advance to each **(SP)** character recorded on the line; proceed to the position at which data should be read from File B.
5. Enter **(CTRL F)**; an asterisk will display.
6. Enter one of the following commands:  
**(CTRL B)(File B name)(CTRL B)** - to jump to File B at this point and read data to the end of file; unit then jumps back to File A but no readout will occur  
**(CTRL C)(File B name)(CTRL C)** - to jump to File B at this point, read data to the end of file, and jump back to File A to read data to end of file  
Sample Command: **(CTRL B)DAY(CTRL B)**
7. Depress the **WRITE** button or enter **(CTRL T)**.
8. Enter **(CTRL Y)**. **\*EDIT WAIT\*** and **\*EDIT OFF\*** will be displayed; the link function is now complete.

**NOTE 1:** To abort a **LINK** in progress, enter **(CTRL Z)**.

**NOTE 2:** The link file is displayed during **EDIT** with the file name in quotation marks ("file name"). To remove a link, simply delete the "file name" (including quotation marks) during an **EDIT** function.

## SEARCH

This function permits you to search the diskette for character strings of up to fifteen characters in length. The search begins from the current diskette location and only proceeds in a forward direction. Once the character string is located, data will display as follows:

- **LINE MODE ON** - data will display to the end of the line: (CR) or (LF)
- **LINE MODE OFF** - data will display to the end of the file: (CTRL S)

The diskette can be searched in String or Global modes; refer to the appropriate sections.

### String Mode

This mode will locate only the first occurrence of a data string of up to fifteen characters. Once the string is located, you may use any **EDIT** functions to alter the data. Follow these steps:

1. To begin the search from the beginning of the diskette, enter (CTRL Z).
2. Enter (CTRL A).
3. Enter the character string to be searched for. If an incorrect entry is made, enter (CTRL Z) and begin at step 2.
4. Depress the **READ** button or enter (CTRL Q) to display data. The (CTRL X) command can be used to delete characters.

### Global Mode

This mode will locate each successive occurrence of a data string of up to fifteen characters. No **EDIT** functions may be used once the data is located; data must be written in Line Mode to complete this function.

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Follow these steps:

1. To begin the search from the beginning of the diskette, enter (CTRL Z).
2. Enter (CTRL O).
3. Enter the character string to be searched for. If an incorrect entry is made, enter (CTRL Z) and begin at step 2.
4. Depress the **READ** button or enter (CTRL Q) to display data. The (CTRL X) command can be used to delete characters.
5. To display the next occurrence of the string, enter (CTRL Q) as required to advance to the desired location. When the last occurrence of the string has been found, **\*END GLOBAL SEARCH\*** is displayed.

#### RENAME

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This function permits you to assign a new name to data files.

To rename a file, enter: **.N(SP) (old name)/(new name)(CR).**

Sample Command: **.N OLD/NEW(CR)**

**\*EDIT WAIT\*** and **\*EDIT OFF\*** are displayed. A file name can consist of up to five characters.

#### COPY

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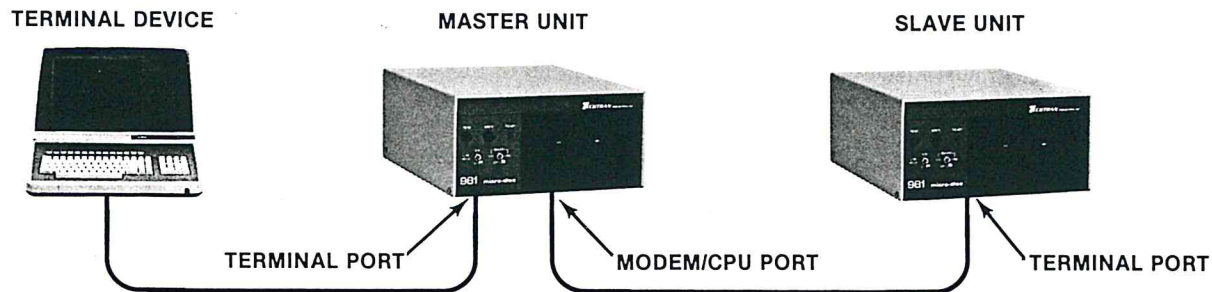
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This function provides the ability to copy the contents of a diskette if two Micro-Discs are available. Only the following pairs of units can be used to copy diskettes:

- Two units equipped with the Read-After-Write option
- Two standard 981 units

Observe the following equipment setup required to **COPY**; then follow the procedure for your types of units.



#### Standard Units

1. Set the **BINARY/ONLINE/OFFLINE** switches on both units to **BINARY**.
2. Set both units to **BIN CTRL ON**.
3. Set both units and the terminal device to **FULL Duplex**.
4. Set the same **RATE** setting for both units and the terminal device.
5. Be sure that the **READY** lights are illuminated. Insert the diskette to receive the copy in the **SLAVE** unit and the diskette to be copied in the **MASTER** unit. The **SLAVE** unit diskette should be blank and formatted.
6. Enter: **.D(SP)C(CR)**. The **WRITE** and **READY** lights will illuminate.  
Sample Command: **.D C(CR)**
7. Depress the **READ** button on the **MASTER** unit. All lights will extinguish and the following messages will display:
  - \*SLAVE TO HALF DUPLEX\***
  - \*PRESS MASTER READ\***
  - \*WAIT FOR READY LAMPS\***
8. Set the **SLAVE** unit to **HALF Duplex** and press the **READ** button on the **MASTER** unit. When the **READY** lights illuminate, the copy procedure is complete.



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### Read-After-Write Units

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With the Read-After-Write option, you may copy the contents of the MASTER diskette onto a SLAVE diskette that already contains files. The original SLAVE diskette files will not be written over, but take the following precautions:

- Do not try to transfer more data than the SLAVE diskette can hold.
- Do not try to copy duplicate file names. **RENAME** files before copying.

2.

To speed the **COPY** procedure, diskettes are copied at 9600 baud, regardless of the **RATE** switch settings.

1. Set the **BINARY/ONLINE/OFFLINE** switch to **OFFLINE** on the SLAVE unit and **ONLINE** on the MASTER unit.
2. Set both units to **BIN CTRL ON**.
3. Set both units and the terminal device to **FULL Duplex**.
4. Set the same **RATE** setting for both units and the terminal device.
5. Be sure that the **READY** lights are illuminated. Insert the diskette to receive the copy in the SLAVE unit and the diskette to be copied in the MASTER unit. The SLAVE unit diskette should be blank and formatted.

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6. Enter: **.D(SP)C(CR)**. The **READ** and **WRITE** lights will illuminate.  
Sample Command: **.D C(CR)**
7. Depress the **READ** button on the MASTER unit. All lights will extinguish and the following messages will display:

**\*BINARY & BINARY CTRL ON\***  
**\*SLAVE TO HALF DUPLEX\***  
**\*PRESS MASTER READ\***  
**\*WAIT FOR READY LAMPS\***

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8. Set the **BINARY/ONLINE/OFFLINE** switch to **BINARY** on both units and the SLAVE unit to **HALF Duplex**. Press the **READ** button on the MASTER unit. The **READ** light of the SLAVE unit will extinguish, followed by the **WRITE** light of the MASTER unit.

9. The message, **\*COPY COMPLETE\*** is displayed. If the **READY** light on the MASTER unit flashes, this indicates that the MASTER unit could not recover data from a sector. Open both drive doors and repeat the **COPY** procedure.

If the following messages are displayed, respond as indicated:

**\*FULL\*** Indicates that the SLAVE diskette is full before all data has been copied from the MASTER diskette; this will occur if the SLAVE diskette contains more bad sectors or more data than the MASTER diskette. Repeat the **COPY** procedure with a new SLAVE diskette.

**\*DISC FULL - MAXIMUM ERRORS ALLOWED\***  
Indicates that the SLAVE diskette has accumulated 125 bad sectors during the **COPY** procedure. Repeat the **COPY** procedure.

**\*XX BAD SECTORS SKIPPED\***  
Indicates that the SLAVE unit skipped XX bad sectors during the **COPY** procedure.

## REPACK

When a file is deleted, the data characters are transformed to null codes. The **REPACK** function changes these null codes into usable diskette space and "squeezes" the data into a compact form.

Files written in Batch mode (XX-XX) will be assigned new file names as a result of this function; therefore, it is recommended that you note the Batch mode file names before repacking. After the repack, the files are organized in the same order as before, except with new file names.

The time required to complete this function varies according to the amount of data to be moved. Copy all diskette data before completing **REPACK**; this insures that data will not be lost. This function cannot be interrupted once begun.

1. Copy all diskette data to a backup diskette.
2. To repack the diskette, enter: **.D(SP)P(CR)**.  
Sample Command: **.D P(CR)**
3. **\*PAK?-** is displayed. Enter **Y** to continue or **N** to abort the repack.  
The **READ**, **WRITE** and **READY** lights illuminate during a repack.  
**\*PAK FINISHED\*** is displayed when the repack is complete.

**NOTE:** If using the Read-After-Write option, **REPACK** cannot be completed if bad sectors are contained on the diskette. The following messages will display: **\*PAK ILLEGAL\* \*XX BAD SECTORS SKIPPED\***

### ONLINE SPEED CONTROL

This option automatically selects a preset alternate baud rate for the **MODEM/CPU** port during **ONLINE** communication. This feature eliminates the need for altering the baud rate if transmission speed differs during **ONLINE** and **OFFLINE** communication.

Set the **RATE** switch at the rear of the unit to the baud rate of the **TERMINAL** port (**OFFLINE** communication); the baud rate of the **MODEM/CPU** port will be factory set as specified. The **MODEM/CPU** port baud rate will be selected automatically when **ONLINE** communication is activated.

### REMOTE BINARY OPERATION

This option permits you to place the unit in the **BINARY** mode from a remote device. To initiate the **BINARY** mode remotely, send 0V to Pin 23 of the active port; to disable the **BINARY** mode remotely, send +5V.

### READ-AFTER-WRITE

With this option, the Micro-Disc can verify that data has been written correctly to the diskette. After a sector of data is written to the diskette (254 characters), the unit checks and verifies that the data is written correctly by reading it back and re-writing it internally. The unit will attempt to read the data two times; if the data cannot be read correctly, then the unit will list the bad sector in the directory.

When copying a diskette, the bad sectors will not be copied, and the data will be repacked to replace the bad sectors. This option also includes the **RENAME** function and the Ready/Busy Output option. Diskettes written by a Read-After-Write unit should never be used with a standard unit.

### Protocol

With this option, devices attached to either port must recognize and respond to the Micro-Disc as follows; otherwise, data may be lost.

- Data transmission to the Micro-Disc must be suspended when one of the following signals is received:
  - (CTRL S) or DC3 (X-off code)
  - +5V at Pin 16 (Ready/Busy Output)
- Data transmission to the Micro-Disc must resume when one of the following signals is received:
  - (CTRL Q) or DC1 (X-on code)
  - +0V at Pin 16 (Ready/Busy Output)

### 20mA CURRENT LOOP

This option provides 20mA Current Loop (active) as an alternate medium of transmission. Refer to the pin assignments provided when installing Current Loop.

### START/STOP READ

This option can be used during the **READ** function to interrupt and resume the readout as follows:

- Interrupt **READ**: send +5V to Pin 25 of the active port
- Resume **READ**: send 0V to Pin 25 of the active port

This option cannot be used to begin or end the **READ** function.



#### READY/BUSY OUTPUT

This option indicates when the Micro-Disc can accept data by registering the following voltages on Pin 16 of the active port:

- Diskette Busy: +5V
- Diskette Idle: 0V

No input can be accepted when the diskette is busy.

#### POWER OPTIONS

The following AC power options are available:

- 220-240 VAC, 47-63 Hz, 60 watts
- 90-110 VAC, 47-63 Hz, 60 watts

#### CUSTOM CONTROL CODES

This factory-installed option permits user selection of control code commands. A list of the altered control code commands will be included with this option.

#### RACK MOUNTING

A rackmount version of the Micro-Disc is available as a factory-installed option. Instructions and accessories required for mounting are included with this option.

## REMOTE COMMANDS

### General Application

.D(SP)R(CR)		Read directory
.D(SP)C(CR)		Copy diskette
.D(SP)P(CR)		Repack diskette data
.D(SP)D(CR)	(ESC)	Erase diskette
.N(SP) (old name)/(new name) (CR)		Rename file
(CTRL A)	(SOH)	Initiate string search
(CTRL O)	(SI)	Initiate global search
(CTRL W)	(ETB)	Read previous sector
(CTRL X)	(CAN)	Delete previous character
(CTRL Z)	(SUB)	Reset all functions

### Edit Mode

(CTRL Y)	(EM)	Initiate EDIT mode
(CTRL B) (file name) (CTRL B) (STX)		Initiate LINK (no READ upon return)
(CTRL C) (file name) (CTRL C) (EXT)		Initiate LINK (READ upon return)
(CTRL F)	(ACK)	Initiate INSERT and DELETE modes
(CTRL X)	(CAN)	Delete previous character

### Batch Mode

- Files are named by the unit in WRITE, files are read from the current diskette location.

(CTRL Q)	(DC1)	Initiate READ function
(CTRL R)	(DC2)	Initiate WRITE function
(CTRL S)	(DC3)	Terminate READ function
(CTRL T)	(DC4)	Terminate WRITE function

### File Mode

- File names are specified in WRITE, selected files are read.

.R(SP) (file name) (CR)		Initiate READ function
.W(SP) (file name) (CR)		Initiate WRITE function
.X(SP) (file name) (CR)		Delete specified file
(CTRL S)	(DC3)	Terminate READ and WRITE functions
(CTRL T)	(DC4)	Terminate WRITE function

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