IDENTIFICATION

PRODUCT CODE: DEC-8E-UTDEA-A-D

PRODUCT NAME: TD8E DECtape Copy
                  User's Manual

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MAINTAINER: Development

DEC-8E-UTDEA-A-D

TD8E DECtape Copy
User's Manual

SOFTWARE SUPPORT CATEGORY

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ABSTRACT

The TD8E DECtape Copy program is used to copy any
properly formatted DECtape, using a PDP-8/E or PDP-8/M
with TD8E control and dual TU56 tape drives. An
integral number of blocks may be copied from any posi-
tion on the input tape to any position on the output
tape, or the entire tape may be copied.

1.0 EQUIPMENT

TD8E Copy requires a PDP-8/E or PDP-8/M with 4K of read/write memory, a terminal, a TD8E control, and at least one dual TU56 tape drive. The program will also support up to 32K of memory and up to 4 dual TU56 drives. The DECtapes to be used should have been formatted by any of Digital Equipment Corporation's standard DECtape formatters.

1.1 Memory Requirements

TD8E Copy occupies locations 0-2577 of field 0. The remainder of field 0 is used for buffer space. Additional fields may also be used for buffer space, increasing the speed at which a tape may be copied. Locations 7600-7777 of each field are reserved. The starting address is 00200.

2.0 OPERATING INSTRUCTIONS

2.1 Loading

TD8E Copy may be loaded with the Binary Loader (DEC-08-LBAA) or with the Self-starting Binary Loader (DEC-8E-XBINA). The loading procedures for these loaders are in Introduction to Programming 1972, chapter 5. The binary tape is supplied with a starting address at the end, so that it will be started automatically if it is loaded with the Self-starting Binary Loader. The terminal control must be set to LINE before loading.

If the tape is loaded with the Binary Loader, it must be started with the programmer's console according to the following procedure:

1. Set the terminal control to LINE.
2. Set the switch register to 0200.
3. Press EXTD ADDR LOAD and ADDR LOAD.
4. Press CLEAR and then CONT.

The following procedure will load and save TD8E Copy using OS/8. The
procedure assumes that the TD8E Copy binary is on paper tape and will
be saved on the system device.

```
        .R ABSLDR
        *PTR:$↑                      ($ means ALTMODE)
                                     (type any character to continue
                                      transfer)
        .SAVE SYS TDCOPY Ø-2577;ØØ2ØØ=3ØØ1
```

The program may then be called and used with:

```
        .R TDCOPY
```


2.2 Dialog

TD8E Copy is controlled through a dialog on the terminal. The
responses to the questions are in the form of octal numbers followed
by a carriage return. Where more than one answer is required to a
question, the answers are separated by semicolons. Alphabetic or
other illegal characters will cause an error message to be generated
and the question to be repeated. If too many digits are typed for the
response expected, only the last ones typed will be used. If the
response was to be either 0 or 1 (YES or NO), a non-zero final digit
will be assumed to be 1.

Before answering the dialog's questions, the user must ensure that all
the DECtapes involved are mounted on their respective drives. All the
drives must be set to REMOTE. The input drive may be set to WRITE
LOCK or WRITE ENABLE; all output drives must be set to WRITE ENABLE.
No two drives may have the same unit number.

When the routine is first loaded and started, the dialog begins:

```
        TD8E COPY
        HIGHEST FIELD AVAILABLE:
```

The user responds with the number of the highest field he wishes used
for buffer space. This response may allow data to be preserved in
any higher field or may make full use of the memory available. This
question is asked only once, immediately after the program has been
loaded. To change the response, the program must be reloaded. If 4K

of memory is to be used, the response is 0; if 8K, the response is 1, and so forth.

For each set of copies, the dialog is as follows (the user's response is underlined; (CR) means carriage return):

Dialog	Comments
TD8E COPY FROM UNIT:Ø (CR)	User may specify one unit number.
TO UNITS:1;2;3;4;5;6;7 (CR)	User may specify up to 7 unit numbers, separated by semicolons.
FIRST INPUT BLOCK:1ØØ (CR)	User may supply any legal DECtape block number.
FIRST OUTPUT BLOCK:2ØØ (CR)	User may supply any legal DECtape block number.
NUMBER OF BLOCKS TO COPY:5Ø (CR)	User may supply appropriate number of blocks.
VERIFY OUTPUT (YES=1,NO=Ø):1 (CR)	
Ø2Ø1 12-BIT WORDS PER BLOCK	Determined by program from tape on input unit.

The block length of all the specified tapes is checked. If any are found to be different from the input tape, the ILLEGAL FORMAT UNIT n error message is generated.

When all specified copies have been finished, the tapes are rewound and the dialog continues:

DONE

REPEAT (YES=1,NO-Ø):

If there are more tapes to be copied with the same set of specifications, they should be placed on the drives before typing 1 to repeat the previous operation. If a different set of specifications is desired, Ø should be typed to restart the dialog.

Occasionally a TD8E drive will not stop fast enough after the tapes have been rewound and the end of the tape will spin off the reel. If this should happen, the drive may be stopped manually by setting it to OFF and stopping the reel by hand. This will not affect the validity

of the copy. If the dialog does not continue properly after one or more tapes have spun off, the program may be restarted as if it had been loaded with the Binary Loader (see Loading, Section 2.1).

In response to any question in the dialog, the user may type either CTRL/S to restart the dialog at REPEAT (YES=1,NO=$\emptyset$) or CTRL/C to exit to 76$\emptyset\emptyset$ of field $\emptyset$. Either CTRL/S or CTRL/C may also be typed during DECtape motion; it will be acknowledged when possible, usually after a small amount of further motion. If CTRL/S is typed during the dialog the response to the REPEAT question should be NO; this option is mainly for cases where a complete set of specifications is already available.

(CTRL/ characters are typed by holding the CONTROL key down while typing the character. The procedure is similar to that used with the SHIFT key on a typewriter. CTRL/ characters are not echoed (printed).)

A special case of the dialog allows the entire input tape to be copied onto the output tape with a minimum of effort. This case eliminates the need to specify the starting block numbers and number of blocks to copy. In this case, the answer to FIRST INPUT BLOCK: is only a carriage return. The shortened dialog will be as follows:

```
TD8E COPY
FROM UNIT:Ø  (CR)
TO UNITS:1;2;3;4;5;6;7  (CR)
FIRST INPUT BLOCK:  (CR)
VERIFY OUTPUT (YES=1,NO=Ø):  1 (CR)
Ø2Ø1 12-BIT WORDS PER BLOCK
```

The preceding sample dialog will cause the entire tape on unit $\emptyset$ to be copied onto the other 7 tapes and verified.

3.0 ERROR MESSAGES

  ILLEGAL RESPONSE The user's response to the dialog was not correct; for example, an alphabetic character was typed or carriage return was typed before an octal number was given where one was required. The question will be restated and any previous answer ignored. Nothing should be typed until the terminal has stopped printing.

  SELECT ERROR UNIT n During attempted data transfer, unit n was not found. The program waits for the user to correct the cause of the error. The user should check to see that:

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1. if unit n is an output drive, it
is set to WRITE ENABLE.
2. unit n is set to REMOTE.
3. there is only one unit n.
4. all units are set to numbers
appropriate to their TD8E
internal wiring.
When the cause of the error has been corrected,
the user may type CTRL/R to resume transfer
or he may type CTRL/S to restart the dialog.

TAPE ERROR BLOCK x UNIT n
During attempted transfer, a parity error or
timing error was detected, or too great a
block number was requested near block x on
the tape on unit n. The tapes are rewound
and the dialog is automatically restarted at
DONE, REPEAT (YES=1,NO=$\emptyset$).

VERIFY ERROR BLOCK x UNIT n
The data on the input tape does not match the
data which was written on block x of the
output tape on unit n. The user may type
CTRL/R to ignore the error and continue with
the transfer, CTRL/T to try the last trans-
fer again and continue if the error does not
recur, or CTRL/S to restart the dialog.

ILLEGAL FORMAT UNIT n   Either the number of words per block on unit n
does not agree with the number of words per
block on the input unit or, when the number
of blocks on the tape was calculated from the
block length of the input tape, the length was
found to be illegal. The number of blocks is
only calculated if the whole tape copy option
is requested. In either case, when the error
has been corrected, the user may type CTRL/R
to check the formats of all tapes again and
continue, or CTRL/S to restart the dialog.

4.0   DETAILS OF OPERATION

After the answers to the dialog have been stored, the following
procedure is used:

1. The number of words per block is determined from the input
tape. All output tapes are checked to see if they have
the same format as the input tape. If the shortened
dialog option was used, the number of blocks on the tape
is determined using the formula:

# of blocks = (636,160/(words per block + 17)) + 2   (octal)

or

# of blocks = (212,080/(words per block + 15)) + 2 (decimal)

2. The response to the VERIFY question is checked. The copying
loop is set up to verify or not, as was requested.

3. The loop is entered which copies the input tape, using the same set of specifications for each output tape.

   a. The buffers are filled from the input tape.

   b. All output tapes are written with the contents of the buffers.

   c. If verification was requested, a separate set of buffers is filled from the output tape and the two sets of buffers are compared. If there are any discrepancies a VERIFY ERROR has occurred.

   d. If more blocks remain to be copied, the loop is entered again.

4. When all the specified blocks have been copied onto the output tapes, all the tapes are rewound.

5. The REPEAT option is offered.

The number of fields to be used for buffer space is determined immediately after loading. As soon as the question has been answered, it is removed from the program.

If the output tape is to be verified, each available field, including that part of field 0 not occupied by the program, is divided in half. The lower half is used as the input and output buffer; the upper half is used for verification. The output tape is read back into the upper half and the two halves are compared. If they are not identical, a VERIFY ERROR has occurred.

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Digital Software News for the PDP-8 & PDP-12
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