

PDP-7 PROGRAM LIBRARY

- 1. DEC-7U-YXTA-D
- 1.1 PDP-4/7 DECTOG JR.
- 1.2 October 1, 1969

2.0

## ABSTRACT

DECTog Jr. allows the user to format and certify DECTapes using the toggle switches of a PDP-7 or PDP-4 computer.

The routines will allow the formatting of tape to the Standard Format for DIGITAL's 18 and 36-bit computer lines [i.e.,  $1102_8$  blocks per tape with 1536 data lines (3 bits per line) per block].

The tapes formatted by this program differ in three ways from the tapes formatted by DECTog (DIGITAL 7-20-IO-FB).

- a. Check-sum is calculated by XORing six bit bytes.
- b. 199 additional space codes are written between the end-zones and ending blocks on tape.
- c. All blocks on tape are exercised (from block 0 through  $1101_8$ ).

The addition of more space codes enable the tapes to be used with the PDP-7/9 ADVANCED Software.

The user simply sets the ACCUMULATOR switches, as required, and starts the computer at the correct starting address for the particular program. The appropriate messages will be typed when the function is completed or when any error occurs. A brief description of each program is given in the following paragraphs. However, a list of the current programs and their starting addresses follows:

|       | <u>Starting<br/>Address</u> | <u>Mnemonic</u> | <u>Function</u>   |
|-------|-----------------------------|-----------------|---|
| 2.1.1 | 100                         | RWMKTR          | Mark track writer for PDI compatible DECTapes. Use prior to WRNVT below.  |
| 2.1.2 | 101                         | WRNVT           | Second pass virgin tape program for revised mark track writer.<br>(To be used for, and after, RWMKTR above, only) |
| 2.1.3 | 102                         | EXER            | Exercises requested tapes by writing a pattern of all ones and all zeros and sum-checking in both directions.     |

NOTE: The preceding three programs must be run in succession to produce a properly formatted DECTape. The following two programs are used only to check the block numbers on a tape and are not required for formatting.

|       | <u>Starting<br/>Address</u> | <u>Mnemonic</u> | <u>Function</u>   |
|-------|-----------------------------|-----------------|---|
| 2.1.4 | 103                         | RBMN            | Reads block numbers from requested tape into successive locations, beginning at 3600.                             |
| 2.1.5 | 104                         | RBMNR           | Reads reverse block numbers from requested tape in reverse direction into successive locations beginning at 3600. |

### 3.0 EQUIPMENT REQUIREMENTS

Paper Tape Reader, Teleprinter, DECTapes

## 4.0

DETOG JR. is written in the PDP-7 Basic Assembler language. The object binary tape is in Funny Format to load DETOG JR.

1. READ-IN the RIM loader at 17763 (for the PDP-4, the RIM loader must be toggled in by way of the console switches).
2. Load DETOG Jr. in the reader and set the address switches to 17770 and press START.

## 5.0 USAGE

### 5.1 Errors

- 5.1.1 All error messages have the following format:

ERR XXX ZZZ (Y)\*

where ERR is the code for the error, XXX is the block involved, and ZZZ is the nine bits of the report of the DECTape status using the MMRS instruction.

The bits can be interpreted as follows:

Bit 0=Data flag up  
1=Block flag up  
2=Error flag up  
3=End of tape  
4=Timing error  
5=Reverse  
6=Go  
7=Mark track error  
8=Unable

- \* If an error occurs in the exerciser, Y will indicate the offending unit number (in octal).

5.1.1 (continued)

Error Codes are as follows:

FMT = Format Error. Check ACS

NTF = Block number not found.

ERS = Error flag for other than end of tape, during search.

ERR = Error flag during reading.

SUM = Sum check error.

ERW = Error flag during writing.

BMW = Block mark read does not correspond to block mark predicted during writing.

BMC = Block mark read does not correspond to block mark predicted during sum checking.

INT = Program interrupt occurred from other than error or data flags of DECTape unit.

FLC = The block end flag occurred before or after  $400_g$  data flags had been found. Can occur only during writing virgin tape. Register MMWA2 contains the count of the number of flags read; i.e., 400400 (where  $400400=400_g$ ) or 377377 (where  $377377=377_g$ ) etc.

NFL = No flags. Program has stopped receiving program interrupts from DECTape unit.

### 5.1.1 (continued)

BUF = Contents of DECTape buffer were wrong after issuing MMWR command and checking by MMRD. Occurs during writing virgin tape only.

NWR = Actual check sums do not agree with predicted check sums using exerciser, indicating that probably nothing was written. In the exerciser, unit 10 (Octal) will always appear with this message. Can also occur if for any reason the first block in a pass was not written (for example, NTF etc.).

NZB = No zero block. WRNVT could not successfully write the first zero block. Rerun WRNVT.

4.5.2 When errors occur, the following registers may be of importance. Since binary tapes are supplied with the DDT symbol table it is suggested that DDT be used to read in DECTog and examine the indicated registers.

MMRVC                    The reverse check sum as read from  
the block.

MMRDC                    The forward check sum as read from  
the block.

5.1.1 (continued)

|       |  |
|-------|--|
| MMCC  | The actual check sum calculated during reading.  |
| MMWC  | The forward check sum as written on the tape during writing. This should agree with MMRDC if the same direction is used. |
| MMWAL | Usually contains the block number of the block being transferred.  |

NOTE: The forward check sum is the one read or written after the data, and the reverse check sum is the one read or written before the data. Therefore, both vary according to the direction being used.

## 6.0 DESCRIPTION

The programs will format tapes that may be used on the PDP-1/4/7/9/10/15. The tape format is specified in the PDP-9 Users Handbook (i.e., 1102<sub>8</sub> blocks per tape with 400<sub>8</sub> words per block).

### TO FORMAT A TAPE

#### 6.1 RWMKTR

Two new programs have been designed to write the mark track, virgin tape pattern, and to check the tape. These are described fully, below:

RWMKTR writes only the timing and mark tracks on the tape. Usage is:

- a. Place the reel as close as possible to the physical start of the tape.
- b. Set the switch which controls writing the timing track to ON.
- c. Set ACS, as follows:

012 345 678 9 10 11 12 13 14 15 16 17  
Unit

- d. Start at 100<sub>8</sub>.
- e. When program is finished, turn MARK TRACK switch off, remount tape if necessary, and continue with the virgin tape program (WRNVT) explained below.



## 6.2 WRNVT

Used to write the virgin tape pattern and the block mark numbers on a tape with a newly created timing and mark track. This program should never be used except after RWMKTR above. It is not a normal virgin tape program, but one which writes through block ends. After the block mark numbers and virgin tape have been written in the forward direction, the tape is automatically sum checked in reverse, showing all errors. In addition, the first block on the tape is rewritten to guarantee a 0 as the first block mark number. Usage is:

- a. Set ACS as follows:

0 1 2      3 4 5      6 7 8      9 10 11      12 13 14      15 16 17  
          └──────────┘  
          Unit

- b. Start at  $101_8$ .

## 6.3 EXER

Exercises a succession of tapes by writing all ones in the forward direction on all desired tapes, sum checking in the reverse direction on all tapes, sum checking in the forward direction on all tapes, writing all zeros in the reverse direction on all tapes, sum checking in the forward

### 6.3 (continued)

direction on all tapes, and finally sum checking in the reverse direction on all tapes. The entire cycle will be repeated continuously until ACS bit 0 is made a 1. A message is written at the end of each cycle giving the octal number of the cycle. The pattern written during each pass is incremented by the pass number. If an error occurs, the program will type a message and continue, beginning with the next block. All error messages will indicate the unit number at the end of the message. The NWR message will stop the program only if it occurs eight times. Usage is:

- a. Set AC switches 1-8 to a 1 to indicate which units (numbered 1-8 respectively) are to be tested. For example, to exercise units 1-4 set only switches 1-4 to a 1; to exercise unit 3 only, set switch 3 to a 1 and all others to a 0. Any combination of bits may be used. Only bits 1-8 are examined. These switches can be reset at any time during the running of the program to add or delete units. If  $ACS_0=1$ , the program will stop at the end of a pass. For purposes of this paragraph those persons using the most recent tape drives numbered 0-7 should use bit 8 to indicate unit 0.

6.3 (continued)

b. Start at 102<sub>g</sub>.

6.4 RBMN

Rewinds the indicated tape unit, then searches forward, reading all block mark numbers and placing them (without masking) in successive locations beginning at 3600. When the reverse end of the tape is reached, the remainder of the area up through 7577 is filled with one's (777777), thus making clear the last block mark number found. The area can be checked by using the EXAMINE key. For the standard tape, block number 0 will be in location 3600 and number 1101 will be in location 4701. Usage is:

a. Set ACS as follows:

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17  
          └───┬───┘  
          Unit

b. Start at 103.

6.5 RBMNR

This program winds the tape forward until the end zone is reached, then searches in reverse, placing the reverse block numbers read in successive locations in memory beginning at 3600. When the end of tape is reached, the remaining locations through 7577 are

6.5 (continued)

filled with one's (777777). For the standard tape, block number 1101 will be in location 3600, and block number 0 should appear in 4701. The locations can be looked at via the EXAMINE key. Usage is:

a. Set ACS as follows:

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17  
          └──────────┘  
          Unit

b. Start at 104.