

- 1. IDENTIFICATION
- 1.1 Digital-7-40-U
- 1.2 Master Tape Duplicator
- 1.3 December 11, 1964

## 2. ABSTRACT

This program will make master tapes punched with a character count and checksum. The program will also verify a tape duplicated from the master tape. The master tape duplicator may also be used to duplicate a master tape or any tape.

## 4. USAGE

### 1. To make a master tape

Read in the duplicator. Put up  $AC_0$ . (All other switches = 0.) Place the tape from which the master is to be made in the reader. Press CONTINUE. When the computer halts after punching tape feed, type a title consisting of letters, numbers, and dashes on the teleprinter.\* Follow this with a carriage return and line feed. When the punch stops, the new master is complete. A halt in 231 indicates that the checksum computed while reading does not match the one accumulated while punching.

### 2. To verify a tape duplicated from the master

Place the duplicated tape in the reader wrong end first. Make sure that all the AC switches are down. Press CONTINUE. If the tape is correct, the program will type OK. If the tape has an incorrect character count, the program will type ERROR and halt in 630 with  $AC=0$ . If the checksum is incorrect, the program will type ERROR and halt in the same place. The AC contains the difference between the checksum on the tape and the accumulated checksum. Pressing continue after such a halt will restart the program at 200.

### 3. To duplicate a master tape or any tape

Place the tape to be duplicated in the reader. Put up  $AC_1$ . (All other switches = 0.) Press CONTINUE.

## 6. DESCRIPTION

A master tape consists of a typed-in title punched in readable format with the seventh hole punched, a duplicate of the original tape, and a check block consisting of two binary words with the seventh hole punched. In order of punching the two words are the complement of the count of all the characters on the tape starting with the first character read and the checksum of all the characters.

The verify routine reads the master tape backward starting with the check block and compares this checksum and character count to the one accumulated while reading the tape. Neither the title punch nor leading tape feed are included in this count. Every tape duplicated from a master is a master as it has the checksum and character count on it.

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\*True for KSR28 or KSR33.

8. FORMAT

Tape format: FIODEC, ASCII symbolic; FB.  
Starting Address: location 200 (octal).

9. EXECUTION TIME

9.4 Timing

The program is I/O bound (will punch at the rate of 63.3 characters per second on the high-speed punch).

10. PROGRAM

10.4 Program Listing

MASTER TAPE DUPLICATOR PDP-7

/DUPLICATE

1/ JMP SERVIS

21/ HLT

SERVIS, DAC AC

RSF

JMP .+2

JMP READER

PSF

JMP OUT

JMP PUNCHO

OUT,

KRB

LAC 0

RAL

LAC AC

ION

JMP I 0

READER,

RRB

XX

/JMP TAPE OR NOP

AND (377

DAC TEMP

ADD TEST

DAC TEST

LAC TEMP

DAC I 10

READ,

RSA

LAC 10

SAD (ENDBUF

LAC (BUF

DAC 10

```

CMA
ADD 11
SPA
ADD (ENDBUF-BUF
ADD (-10
SMA
JMP OUT
LAC (NOP
DAC READ
JMP OUT
TAPe , SNA
JMP READ
DAC TEM
LAC (NOP
DAC READER+1
LAC TEM
JMP READER+2
PUNCHO , LAC I 11
PLS
ISZ COUNT
AND (377
ADD CHKSUM
DAC CHKSUM
LAC 11
SAD (ENDBUF
LAC (BUF
DAC 11
CMA
ADD 10
SAD (1
JMP DONE
SPA
ADD (ENDBUF-BUF
ADD (-10
SMA
JMP OUT
LAC PUNCH1
SAD READ
JMP OUT
DAC READ
PUNCH1 , RSA
JMP OUT
DONE , LAM -100
DAC TE→M
DONE1 , ISZ C→OUNT
PSF
JMP .-1
```

```
PLS+10
ISZ T→EM
JMP DONE1
RRB
LAC I 11
CMA
ADD TEST
DAC TEST
JMP 1 BEG
BEG, 0
LAC (BUF
DAC 10
DAC 11
LAC (JMP TAPE
DAC READER+1
FEED1, LAM -100
DAC TEM
DZM I 10
ISZ TEM
JMP .-2
CLEAR, CRRB
CPCF
LSCF
LPCF
CLOF
KRB
TCF
DCF
MCI
MSI
LAC .+2
DAC READ
RSA
PLS+10
10N
JMP .
```

```
/MASTER TAPE DUPLICATOR
/MAN LOOP
200/MAIN,
```

```
HLTVCLA
CLL
DZM C→OUNT
DZM CHK→SUM
DZM T→EST
LAS
SPA
STL
SZA
```

```
JMP .+3
JMS VERIFY
JMP MAIN
SZL
JMS TITLE
JMS BEG
LAS
SPAVCLL
STL
SNL
JMP MAIN
LAC TEST
CMA
ADD CHKSUM
SAD (-0
JMP .+2
MAIN1, HLT
LAM -100
JMS FEED
LAC COUNT
CMA
DAC COUNT
LAM -1
DAC CHE→CK
LAM -2
DAC FINCN→T
LAC COUNT
ROTBEG, DAC TEMP
AND (77
XOR (300
PSF
JMP .-1
PLS
LAC TEMP
RTR RTR RTR
ISZ FINCNT
JMP ROTBEG
LAC CHKSUM
DAC COUNT
ISZ CHECK
JMP ROTBEG-3
PSF
JMP .-1
LAM -500
JMS FEED
JMP MAIN
```

```
/MASTER TAPE DUPLICATOR
/TITLE PUNCH
TITLE,      0
            LAM -400
            JMS FEED
            DZM FIGA DD
            KSF
            JMP .-1
            KRB
            703301
            SKP
            JMS TITLEA
            DAC TEMP
            SAD (2
            JMP TITLE+3
            SAD (10
            JMP 1 TITLE
            SAD (37
            JMP TITLE+3
            SAD (33
            JMP FIG
            LAC FIGADD
            SZA
            JMP FIG+3
            LAC TEMP
CODEAD,     RCL
            ADD (LAC TABLE-2
            ADD FIGADD
            DAC CODE
            JMS PUNCHR
            JMP TITLE+4
PUNCHR,     0
            LAM-1
            DAC CNT
            XCT CODE
            DAC TEMP
            LAM -2
            DAC CNTPU N
LEFT        LAC TEMP
            RTL
            RTL
            RTL
            DAC TEMP
            RAL
            JMS PUNLET
            ISZ CNTPUN
            JMP LEFT
            ISZ C NT
            JMP .+2
            JMP I PUNCHR
            ISZ CODE
            JMP LEFT-4
```



PUNLET,           0  
                  AND (77  
                  ADD (100  
                  PSF  
                  JMP .-1  
                  PLS  
                  JMP I PUNLET

/MASTER TAPE DUPLICATOR  
/TELETYPE CONVERSION FOR FIGURES  
FIG,

                  LAC (76  
                  DAC FIGADD  
                  JMP TITLE+4  
                  LAC TEMP  
                  SAD (1  
                  LAC (5  
                  SAD (3  
                  LAC (11  
                  SAD (4  
                  LAC (13  
                  SAD (15                   /0  
                  CLA  
                  SAD (35                   /1  
                  LAC (1  
                  SAD (31                   /2  
                  LAC (2  
                  SAD (20                   /3  
                  LAC (3  
                  SAD (12                   /4  
                  LAC (4  
                  SAD (25                   /6  
                  LAC (6  
                  SAD (34                   /7  
                  LAC (7  
                  SAD (14                   /8  
                  LAC (10  
                  SAD (30  
                  LAC (12                   /-  
                  JMP CODEAD

TITLEA,  
                  0  
                  DAC ITEM→A  
                  SAD (240  
                  JMP ATBU  
                  TAD (-237  
                  SPA  
                  JMP ATBL  
                  TAD (-77  
                  SMA



```
JMP TITLE 4
TAD (400100
RCR
ADD (ATB
DAC . 1
XX
SNL      /ODD CODES IN RIGHT HALF, EVEN CODES IN
          /LEFT HALF
TITLED,  JMS TITLEC
          DAC ITEMA
          RAR
          DAC ITEM→B
          LAC FIGADD
          SZA
          JMP XCH1
          SZL
          LAC (76
          DAC FIGADD
ATBY,    LAC ITEMB
          AND (37
          JMP I TITLEA
XCH1,    SNL
          DZM FIGADD
          JMP ATBY
ATBL,    LAC ITEMA
          SAD (211
          JMP ATBTAB
          SAD (212
          LAC (400010
          SAD (215
          LAC (400002
          SMA
          JMP TITLE 4
          AND (37
          JMP I TITLEA
ATBTAB,  LAC (51
          JMP TITLED
ATBU,    LAC (4
          JMP I TITLEA
TITLEC,  0
          RTR
          RTR
          RTR
          RTR
          RAR
          JMP I TITLEC
```

|      |       |                              |
|------|-------|------------------------------|
| AIB, | 55    | /BAUDOT CODES IN 9 BIT BYTES |
|      | 43013 | /LEAST SIX CONCISE           |
|      | 45000 |                              |
|      | 27065 |                              |
|      | 75023 |                              |
|      | 13027 |                              |
|      | 15061 |                              |
|      | 17057 |                              |
|      | 33073 |                              |
|      | 63041 |                              |
|      | 25003 |                              |
|      | 53071 |                              |
|      | 31007 |                              |
|      | 35037 |                              |
|      | 0     |                              |
|      | 47    |                              |
|      | 60    |                              |
|      | 46034 |                              |
|      | 44040 |                              |
|      | 54026 |                              |
|      | 12030 |                              |
|      | 64074 |                              |
|      | 22016 |                              |
|      | 14006 |                              |
|      | 32072 |                              |
|      | 24050 |                              |
|      | 2070  |                              |
|      | 36062 |                              |
|      | 56052 |                              |
|      | 42000 |                              |
|      | 0     |                              |
|      | 55000 |                              |

|                         |        |        |
|-------------------------|--------|--------|
| /MASTER TAPE DUPLICATOR |        |        |
| /TABLE FOR TITLE PUNCH  |        |        |
| TABLE,                  | 010177 | 010100 |
|                         | 0      | 0      |
|                         | 364141 | 413600 |
|                         | 0      | 0      |
|                         | 771010 | 107700 |
|                         | 770214 | 207700 |
|                         | 770214 | 027700 |
|                         | 0      | 0      |
|                         | 774040 | 404000 |
|                         | 771111 | 314600 |
|                         | 364151 | 513000 |

|        |        |
|--------|--------|
| 004177 | 410000 |
| 771111 | 110600 |
| 364141 | 412200 |
| 073060 | 300700 |
| 774545 | 414100 |
| 615141 | 454300 |
| 774141 | 413600 |
| 774545 | 453200 |
| 224545 | 453000 |
| 010274 | 020100 |
| 770505 | 010100 |
| 412214 | 224100 |
| 761111 | 117600 |
| 376014 | 603700 |
| 204040 | 403700 |
| 0      | 0      |
| 374040 | 403700 |
| 364151 | 215600 |
| 771014 | 224100 |
| 364141 | 413600 |
| 004277 | 400000 |
| 625151 | 514600 |
| 224145 | 453200 |
| 141211 | 771000 |
| 274545 | 453100 |
| 364545 | 453000 |
| 010171 | 050300 |
| 324545 | 453200 |
| 065151 | 513600 |
| 101010 | 101000 |
| 0      | 0      |

FEED,

0  
DAC CNT  
PLS+10  
PSF  
JMP .-1  
PLS+10  
ISZ CNT  
JMP FEEL  
JMP I FEED

FEE1,

```
/MASTER TAPE DUPLICATOR
/VERIFY
VERIFY,      0
              DZM → ERROR
              DZM NEWCHK          /INITIALIZE NEW CHECKSUM
              RSB
              RSF
              JMP .-1
              RRB
              DAC CKSUM          /GET MASTER CHECKSUM
              RSB
VERI,         RSF
              JMP .-1
              RRB
              ADD (1 /ISZ GOES THROUGH -0
              DAC CHARCT→       /GET MASTER CHARCNT
              RSA
VER2,         RSF
              JMP .-1
              RRB
              RSA
              ADD NEWCHK
              DAC NEWCHK         /ACCUMULATE NEW CHECKSUM
              ISZ CHARCT        /ACCUMULATE NEW CHARCNT
              JMP VER2
              RSF
              JMP .-1
              RRB
              SZA
              JMP ERROUT
              LAC NEWCHK
              CMA
              ADD CKSUM
              SAD (-0
              JMP OK
              DAC ERROR
              JMP ERROUT
OK,           LAW A-1
              JMS ERR1
              JMP MAIN
ERRROUT,     LAW B-1
              JMS ERR1
              LAC ERROR
              HLT
              JMP MAIN
```

/MASTER TAPE DUPLICATOR  
/TYPE ROUTINES

```
ERR1,      0
            DAC 17
ERRO,      LAC I 17
            SNA
            JMP I ERR1
            703301
            SKP
            JMS RR6
            TLS
            TSF
            JMP .-1
            JMP ERRO
A,         20037
            31703
            31336
            21502
            21502
            21210
            0
B,         20037
            30520
            32212
            32212
            31703
            32212
            21502
            21502
            21210
            0
RR6,      0
            RTR
            RTR
            RTR
            JMP I RR6
BUF,      BUF 6000/
            ENDBUF, 0
START MAIN
```