

- 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.

*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
            AND  (377
            DAC  TEMP
            ADD  TEST
            DAC  TEST
            LAC  TEMP
            DAC  I 10
READ,       RSA
            LAC  10
            SAD  (ENDBUF
            LAC  (BUF
            DAC  10
```

/JMP TAPE OR NOP

```

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

/MAIN 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
TITLED,      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 FEE1
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
RSF
VERI,
JMP .-1
RRB
ADD (1 /ISZ GOES THROUGH -0
DAC CHARCT→       /GET MASTER CHARCNT
RSA
VER2,
RSF
JMP .-1
RRB
RSA
ADD NEWCHK
DAC NEWCEK         /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
ERROUT,
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
```