TU16

DATA TAPE CREATE

MD-11-DZTUF-A

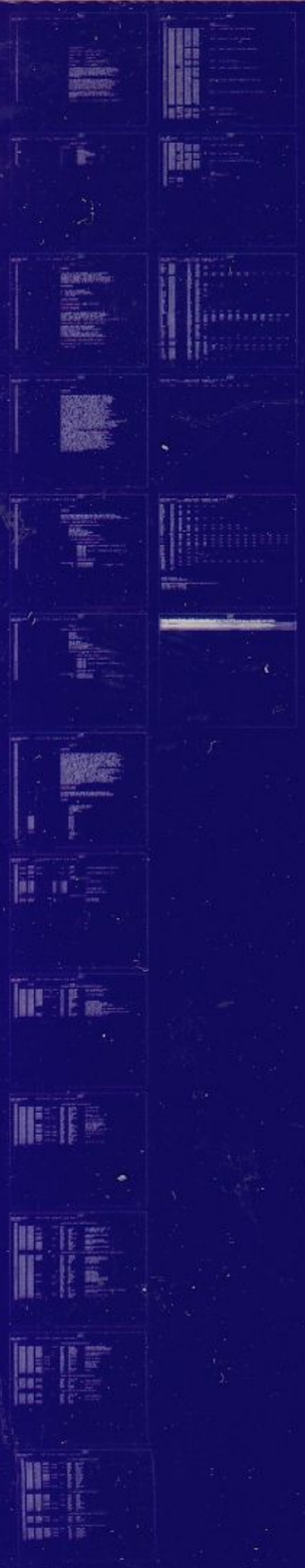
EP DZTUF A DL A

OCT 1976

FICHE 1 OF 1

digital

Made in U.S.A.



```
                                .REM    %
```

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZTUF-A-D

PRODUCT NAME: DATA TAPE CREATE

DATE: 19 SEPT 74

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: R. B. BARNES

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1. ABSTRACT

THIS IS NOT A TEST PROGRAM! IT IS A SUPPLEMENT
TO BOTH THE TM11/TU10 AND TM02/TU16 DATA
RELIBILITY PROGRAMS. ITS PURPOSE IS TO ALLOW THE
OPERATOR TO CREATE A PAPER TAPE OF WHATEVER DATA
PATTERN IS DESIRED, TO BE USED BY THE DATA RELIBILITY
PROGRAMS, WHEN DATA PATTERN ZERO (0) IS SELECTED.

2. REQUIREMENTS

A. ANY PDP-11 PROCESSOR
B. TELETYPE OR LA30 KEYBOARD
C. HIGH SPEED OR LOW SPEED PUNCH
D. 1K OF CORE

3. LOADING PROCEDURE

USE STANDARD BINARY LOADING PROCEDURE

4. STARTING PROCEDURE

THE PROGRAM MAY BE STARTED AT EITHER 200 (8)
OR 204 (8). WHEN STARTED AT 200 (8), OPERATING
INSTRUCTIONS WILL BE PRINTED BEFORE STARTING
INPUT. WHEN STARTED AT 204 (8), INPUT IS
IMMEDIATELY STARTED. INPUT START IS NOTED BY AN ASTERISCK (*).

SAMPLE START AT 200: (LOAD 200, PRESS START)

```
EXTERNAL DATA TAPE CREATE PROGRAM
MAXIMUM OF 377 OCTAL CHARACTERS.
ENTER 3 DIGITS (0-7) FOR EACH CHARACTER.
CR WILL ECHO CR-LF.
CONTROL C ENDS INPUT AT LESS THAN 377.
A SINGLE CHARACTER CORRECTION MAY BE DONE
BY TYPING A SLASH AND RETYPING THE CHARACTER.

* (THE ASTERISCK INDICATES START OF INPUT)
```

SAMPLE START AT 204: (LOAD 204 PRESS START)

```
* (START INPUT)
```

(PAGE 2)

5. OPERATION:

WHEN THE ASTERISCK IS PRINTED AFTER THE START AT 200 OR 204, START INPUTTING CHARACTERS. EACH GROUP OF THREE (3) DIGITS (0-7) EQUALS ONE (1) CHARACTER ON TAPE. ENTER AS MANY 3 DIGIT GROUPS PER THE NUMBER OF CHARACTERS DESIRED IN THE PATTERN. THE PROGRAM WILL ACCEPT UP TO 256 CHARACTERS (377 OCTAL). IF LESS THAN 256 ARE DESIRED, TERMINATE INPUT BY TYPING A CONTROL C. A CARRIAGE RETURN (CR) MAY BE TYPED ANY TIME AND WILL ECHO A CR-LF BUT WILL NOT BE PLACED IN THE DATA PATTERN NOR COUNTED AS AN INPUT CHARACTER. ANY INPUT OTHER THAN AN OCTAL DIGIT (0-7), A CARRIAGE RETURN (CR), OR A CONTROL C WILL BE CONSIDERED ILLEGAL AND BE FLAGGED BY A QUESTION MARK (?). THE ILLEGAL ENTRY IS NEITHER PLACED IN THE DATA PATTERN NOR COUNTED AS A CHARACTER. WHEN INPUT IS COMPLETED (CONTROL C OR 256 CHARACTERS), THE PROGRAM TYPES END OF INPUT AND REQUESTS SELECTION OF HIGH SPEED OR LOW SPEED PUNCH FOR OUTPUT. A RESPONSE OF L TO THIS REQUEST WILL CAUSE OUTPUT ON THE TTY PUNCH, A RESPONSE OF H TO THIS REQUEST WILL OUTPUT ON THE HIGH SPEED PUNCH.
WHEN OUTPUT IS COMPLETE, THE PROGRAM WILL AGAIN REQUEST AN OUTPUT RESPONSE. IF EITHER H OR L IS TYPED, THE SAME DATA PATTERN IS AGAIN OUTPUT. THIS CAN BE REPEATED AS MANY TIMES AS DESIRED. IF NO MORE OUTPUT IS NEEDED, BUT A DIFFERENT PATTERN IS DESIRED, TYPE A CR TO RETURN TO START OF INPUT WHICH WILL BE INDICATED BY AN ASTERISCK (*).
THE FIRST CHARACTER PUNCHED ON THE TAPE IS THE NUMBER OF CHARACTERS ON THAT TAPE AND IS NOT USED AS PART OF THE PATTERN BY THE EXERCISERS. THE DATA ON THE TAPE WILL APPEAR AS BYTES IN CORE WHEN USED BY THE EXERCISERS.

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                                        (PAGE 3)

                                6.      EXAMPLES
                                        --------

                                        THE FOLLOWING EXAMPLES SHOW THE TAPE LAYOUT RESULTING
                                        FROM ITS INPUT AND THE RESULTANT CORE MAP IN THE EXERCISER.
                                        (READ THE EXERCISER DOCUMENT TO SEE HOW TO USE THESE PATTERN TAPES)

                                        EXAMPLE 1: LOAD AND START AT 204 (8)

                                                *0001112223334449?377/6(CONTROL C)

                                                END OF INPUT
                                                ASSURE PUNCH IS ON
                                                AND TYPE L FOR LOW SPEED
                                                OR H FOR HIGH SPEED
                                                OR CR FOR RESTART WITH NO PUNCH

                                                L (OUTPUT IS NOW MADE ON TTY PUNCH)

                                                        OUTPUT TAPE BIT LAYOUT:

                                                        00000.110 (NUMBER OF CHARACTERS IN PATTERN IS 6)
                                                        00000.000
                                                        01001.001
                                                        10010.010 (THE DOT . REPRESENTS THE SPROCKET HOLE)
                                                        11011.011
                                                        00100.100
                                                        11111.110

                                                        EXERCISER CORE MAP:

                                        WRITE BUFFER:   0100100100000000
                                                +2:     1101101110010010        (6 CHARACTER = 3 WORDS)
                                                +4:     1111111011011011
```

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                                        (PAGE 4)

                                EXAMPLE 2: LOAD AND START 204 (8)

                                        *377(CR)
                                        500(CR)
                                        8?G?3(CR)
                                        334266(CONTROL C)

                                        END OF INPUT
                                        ASSURE PUNCH IS ON
                                        AND TYPE L FOR LOW SPEED
                                        OR H FOR HIGH SPEED
                                        OR CR FOR RESTART WITH NO PUNCH

                                        H(OUTPUT IS NOW MADE OF HIGH SPEED PUNCH)

                                                OUTPUT TAPE BIT LAYOUT:

                                                00000.101 (NUMBER OF CHARACTERS IS 5)
                                                11111.111
                                                01000.000
                                                11011.011 (THE DOT REPRESENTS THE SPROCKET HOLE)
                                                00010.110
                                                10000.000

                                                EXERCISER CORE MAP:

                                WRITE BUFFER:   0100000011111111
                                          +2:   0001011011011011        (5 CHARACTER = 2 WORDS + 1 BYTE)
                                          +4:   0000000010000000
```

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7. EXCEPTION

NOTE THAT THE FIRST DIGIT OF THE 3 DIGITS PER CHARACTER IS LEFT JUSTIFIED. BECAUSE THE TAPE IS ONLY EIGHT (8) BITS WIDE, THE MOST SIGNIFICANT BIT OF THE FIRST DIGIT INPUT FOR EACH CHARACTER IS LOST. SEE EXAMPLE ONE (1), THE FIFTH (5) CHARACTER INPUT IS 444, BUT THE TAPE OUTPUT SHOWS 00100100 BECAUSE THE MOST SIGNIFICANT BIT IS LOST. EXAMPLE 2, THE SECOND (2) CHARACTER INPUT, ALSO SHOWS THIS. REMEMBER, THE FIRST DIGIT INPUT FOR EACH CHARACTER WILL ONLY SHOW THE TWO (2) LEAST SIGNIFICANT BITS OF THAT DIGIT.
THE OTHER EXCEPTION TO KEEP IN MIND, IS THAT IF INPUT IS TERMINATED AT SOME NUMBER OF DIGITS NOT DIVISIABLE BY THREE (3), THE PARTIAL CHARACTER AT THE END OF THE FIELD WILL BE FILLED TO THE RIGHT WITH ZEROS (0). EXAMPLE 2, THE FIFTH (5) CHARACTER, HAS NOT BEEN COMPLETED BY INPUT BEFORE TERMINATION. SEE THE TAPE LAYOUT, CHARACTER 5 WHICH SHOWS THAT THE TWO (2) LEAST SIGNIFICANT DIGIT POSITIONS ARE FILLED WITH ZEROES (0) TO COMPLETE THE CHARACTER FOR OUTPUT.

8. EXERCISER USAGE

THE EXERCISERS WILL READ THE TAPE CREATED BY DTC AND FILL THEIR ENTIRE WRITE BUFFER WITH REPITIONS OF THE DATA TAPE SO THAT ANY SIZE RECORD CAN BE WRITTEN.

9. LISTING

```
                        %

                                .TITLE DATA TAPE CREATE
                                ;MAINDEC-11-DZTUF-A-D
                                ;R. BARNES
                                ;19 SEPT 1974
                                .ABS

000000                          R0=%0
000001                          R1=%1
000002                          R2=%2
000003                          R3=%3
000004                          R4=%4
000005                          R5=%5
000006                          SP=%6
000007                          PC=%7

000000                          .=0
                                .REPT 200
                                .+2
                                HALT
                                .ENDR
```

```
                000200
000200  000167  000774                    JMP     START           ;STARTING ADDRESS=200(8) FOR HELP

                000204
000204  000167  001012                    JMP     ST1             ;STARTING ADDRESS FOR NO HELP

                001000                              .=1000
                                                    ;CONSTANTS**********

001000  177560                  TKS:    177560                  ;LOW SPEED PUNCH
001002  177562                  TKB:    177562
001004  177564                  TPS:    177564
001006  177566                  TPB:    177566
001010  177554                  PPS:    177554                  ;HIGH SPEED PUNCH
001012  177556                  PPB:    177556
001014  177776                  PSW:    177776                  ;PROGRAM STATUS WORD

                                                    ;BUFFERS**********

001016  000000                  TIB:    0                       ;INPUT BUFFER
001020  000000                  TOB:    0                       ;OUTPUT BUFFER
```

```
                 001200                                                 .=1200
                                                               ;PROGRAM START AND HOUSEKEEPING**********

        001200   012777   000340   177606   START:   MOV       #340,@PSW          ;SET TO PRIORITY LEVEL 7
        001206   012706   000500                     MOV       #500,SP            ;SET STACK TO 500
        001212   012704   002176                     MOV       #MSG1,R4
        001216   004767   000532                     JSR       PC,TTOUT           ;TYPE HELP MESSAGE
        001222   012777   000340   177564   ST1:     MOV       #340,@PSW
        001230   012706   000500                     MOV       #500,SP
        001234   005067   177560                     CLR       TOB
        001240   005067   177552                     CLR       TIB                ;CLEAR BUFFERS
        001244   012700   000250                     MOV       #250,R0            ;SET SIZE IF DATA AREA
        001250   012702   002754                     MOV       #DAM40,R2          ;SET START OF AREA TO CLEAR
        001254   005022            ST2:              CLR       (R2)+              ;CLEAR DATA AREA
        001256   005300                              DEC       R0                 ;CLEAR R0 FOR USE AS CHARACTER COUNTER
        001260   001375                              BNE       ST2                ;BR IF NOT DONE
        001262   005001                              CLR       R1                 ;CLEAR R1 FOR USE AS DIGIT POSITION POINTER
        001264   012702   003017                     MOV       #DA+1,R2           ;SET START OF DATA AREA
        001270   004767   000642            ST3:     JSR       PC,CRLF            ;TYPE CR,LF AND *
```

```
                                                ;DATA READ FROM TTY**********

001274  004767  000552          READ:   JSR     PC,TTIN         ;GO INPUT DATA
001300  122767  000215  177510          CMPB    #215,TIB
001306  001007                          BNE     RD1             ;BR IF NOT CR
001310  012767  000212  177502          MOV     #212,TOB
001316  004767  000512                  JSR     PC,TOG          ;DO LF
001322  000167  177746                  JMP     READ            ;GET NEXT DATA
001326  122767  000203  177462  RD1:    CMPB    #203,TIB
001334  001004                          BNE     RD2             ;BR IF NOT CONTROL C
001336  005700                          TST     R0
001340  001753                          BEQ     ST3             ;BR IF FIRST INPUT
001342  000167  000234                  JMP     PUNCH           ;GO TO PUNCH ROUTINE
001346  122767  000257  177442  RD2:    CMPB    #257,TIB        ;SEE IF RUBOUT
001354  001002                          BNE     RD2A            ;IF NOT: BR
001356  000167  000042                  JMP     RUBOUT          ;ELSE RUBOUT LAST ENTRY
001362  122767  000260  177426  RD2A:   CMPB    #260,TIB
001370  101407                          BLOS    RD3             ;BR IF NOT TOO LOW
001372  012767  000277  177420  RD2B:   MOV     #277,TOB
001400  004767  000430                  JSR     PC,TOG          ;TYPE?
001404  000167  177664                  JMP     READ
001410  122767  000267  177400  RD3:    CMPB    #267,TIB
001416  103031                          BHIS    RD4             ;BR IF NOT TOO HIGH
001420  000167  177746                  JMP     RD2B
```

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                                        ;LAST ENTRY RUBOUT ROUTINE**********
                                        
001424  000240          RUBOUT: NOP
001426  022701  000001          CMP     #1,R1           ;SEE WHERE LAST ENTRY WAS
001432  101006                  BHI     RB0             ;IF POSITION 0: BR
001434  103414                  BLO     RB1             ;IF POSITION 1: BR
001436  142712  000300          BICB    #300,(R2)
001442  005001                  CLR     R1              ;RESET POSITION POINTER
001444  000167  177624          JMP     READ            ;REENTER
001450  142742  000007  RB0:     BICB    #7,-(R2)
001454  005300                  DEC     R0              ;RESET CHAR POINTER
001456  012701  000002          MOV     #2,R1           ;RESET POSITION POINTER
001462  000167  177606          JMP     READ            ;REENTER
001466  142712  000070  RB1:     BICB    #70,(R2)
001472  012701  000001          MOV     #1,R1           ;RESET POSITION POINTER
001476  000167  177572          JMP     READ            ;REENTER

                                        ;POSITION DIGITS TO FORM CHARACTER AND LOAD DATA AREA**********

001502  016703  177310  RD4:    MOV     TIB,R3
001506  142703  000370          BICB    #370,R3         ;R3=STRIPPED DIGIT(0-7)
001512  022701  000001          CMP     #1,R1           ;TEST POSITION POINTER
001516  101016                  BHI     RD6             ;DO POSITION 2
001520  103410                  BLO     RD5             ;DO POSITION 0
001522  000241                  CLC
001524  106103                  ROLB    R3
001526  106103                  ROLB    R3              ;POSITION DIGIT 1
001530  106103                  ROLB    R3
001532  150312                  BISB    R3,(R2)         ;LOAD DIGIT 1
001534  005201                  INC     R1              ;BUMP POINTER
001536  000167  000026          JMP     RDEX            ;CHECK FOR END
001542  150322  RD5:     BISB    R3,(R2)+        ;LOAD DIGIT 0
001544  005001                  CLR     R1              ;CLEAR POSITION POINTER
001546  005200                  INC     R0              ;BUMP CHARACTER COUNTER
001550  000167  000014          JMP     RDEX            ;LOAD DIGIT
001554  000303  RD6:     SWAB    R3
001556  000241                  CLC
001560  006003                  ROR     R3              ;POSITION DIGIT 2
001562  006003                  ROR     R3
001564  150312                  BISB    R3,(R2)         ;LOAD DIGIT 2 AND BUMP CHARACTER ADDRESS
001566  005201                  INC     R1              ;BUMP POINTER
001570  022700  00037?  RDEX:    CMP     #377,R0
001574  001402                  BEQ     PUNCH           ;BR IF FILLED DATA AREA
001576  000167  177?72          JMP     READ
```

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                                                ;TAPE PUNCH ROUTINE**********
                                                
001602  110067  001210          PUNCH:  MOVB    R0,DA           ;LOAD DATA AREA SIZE
001606  062700  000100                  ADD     #100,R0         ;EXPAND FOR LEADER/TRAILER
001612  012701  002754                  MOV     #DAM40,R1       ;LOAD PUNCH START ADDRESS
001616  012704  002574          PG:     MOV     #MSG2,R4
001622  004767  000126                  JSR     PC,TTOUT        ;TYPE PUNCH REQUEST(H OR L)
001626  004767  000220          PO:     JSR     PC,TTIN         ;GET RESPONSE
001632  122767  000314  177156          CMPB    #314,TIB
001640  001421                          BEQ     P1              ;BR IF LS PUNCH
001642  122767  000310  177146          CMPB    #310,TIB
001650  001427                          BEQ     P2              ;BR IF HS PUNCH
001652  122767  000215  177136          CMPB    #215,TIB        ;SEE IF CR
001660  001002                          BNE     PE              ;IF NOT: BR
001662  000167  177334                  JMP     ST1             ;ELSE RESTART
001666  012767  000277  177124  PE:     MOV     #277,TOB
001674  004767  000134                  JSR     PC,TOG          ;TYPE?
001700  000167  177722                  JMP     PO
                                                
                                                ;PUNCH TAPE ON LOW SPEED**********
                                                
001704  112167  177110          P1:     MOVB    (R1)+,TOB
001710  004767  000120                  JSR     PC,TOG          ;PUNCH CHARACTER
001714  005300                          DEC     R0
001716  001372                          BNE     P1              ;BR IF NOT DONE
001720  116700  001072                  MOVB    DA,R0
001724  000167  177652                  JMP     PUNCH           ;RESTART
                                                
                                                ;PUNCH TAPE ON HIGH SPEED**********
                                                
001730  112167  177064          P2:     MOVB    (R1)+,TOB
001734  004767  000160                  JSR     PC,THG          ;PUNCH CHARACTER
001740  005300                          DEC     R0
001742  001372                          BNE     P2              ;BR IF NOT DONE
001744  116700  001046                  MOVB    DA,R0
001750  000167  177626                  JMP     PUNCH
                                                
```

```
                                                    ;TTY OUTPUT SUBROUTINE**********
                                                    
001754  112467  177040          TTOUT:  MOVB    (R4)+,TOB
001760  122767  000043  177032          CMPB    #43,TOB
001766  001430                          BEQ     TEX
001770  122767  000045  177022          CMPB    #45,TOB
001776  001403                          BEQ     TCRLF
002000  004767  000030                  JSR     PC,TOG
002004  000763                          BR      TTOUT
002006  112767  000015  177004  TCRLF:  MOVB    #15,TOB
002014  004767  000014                  JSR     PC,TOG
002020  112767  000012  176772          MOVB    #12,TOB
002026  004767  000002                  JSR     PC,TOG
002032  000750                          BR      TTOUT
002034  105777  176744          TOG:    TSTB    @TPS
002040  100375                          BPL     TOG
002042  116777  176752  176736          MOVB    TOB,@TPB
002050  000207                  TEX:    RTS     PC
                                                    
                                                    ;TTY READ SUBROUTINE**********
                                                    
002052  005077  176722          TTIN:   CLR     @TKS
002056  005077  176720                  CLR     @TKB
002062  005067  176730                  CLR     TIB
002066  105777  176706          TTIN1:  TSTB    @TKS
002072  100375                          BPL     TTIN1
002074  017767  176702  176714          MOV     @TKB,TIB
002102  105777  176676          TTIN2:  TSTB    @TPS
002106  100375                          BPL     TTIN2
002110  116777  176702  176670          MOVB    TIB,@TPB
002116  000207                          RTS     PC
                                                    
                                                    ;HIGH SPEED PUNCH SUBROUTINE**********
                                                    
002120  105777  176664          THG:    TSTB    @PPS
002124  100375                          BPL     THG
002126  116777  176666  176656          MOVB    TOB,@PPB
002134  000207                          RTS     PC
                                                    
                                                    ;CR, LF, * TYPE SUBROUTINE**********
                                                    
002136  012767  000215  176654  CRLF:   MOV     #215,TOB
002144  004767  177664                  JSR     PC,TOG
002150  012767  000212  176642          MOV     #212,TOB
002156  004767  177652                  JSR     PC,TOG
002162  012767  000252  176630          MOV     #252,TOB
002170  004767  177640                  JSR     PC,TOG
002174  000207                          RTS     PC
```

```
                                                .EVEN
                                                ;MESSAGES**********

002176  022445  054105  042524  MSG1:   .ASCII  /%%EXTERNAL DATA TAPE CREATE PROGRAM%/
002204  047122  046101  042040
002212  052101  020101  040524
002220  042520  041440  042522
002226  052101  020105  051120
002234  043517  040522  022515
002242  040515  044530  052515          .ASCII  /MAXIMUM OF 377 OCTAL CHARACTERS%/
002250  020115  043117  031440
002256  033467  047440  052103
002264  046101  041440  040510
002272  040522  052103  051105
002300  022523
002302  047105  042524  020122          .ASCII  /ENTER 3 DIGITS(0-7)FOR EACH CHARACTER%/
002310  020063  044504  044507
002316  051524  030050  033455
002324  043051  051117  042440
002332  041501  020110  044103
002340  051101  041501  042524
002346  022522
002350  051103  053440  046111          .ASCII  /CR WILL ECHO CR-LF%/
002356  020114  041505  047510
002364  041440  026522  043114
002372     045
002373     103  047117  051124          .ASCII  /CONTROL C ENDS INPUT AT LESS THAN 377.%/
002400  046117  041440  042440
002406  042116  020123  047111
002414  052520  020124  052101
002422  046040  051505  020123
002430  044124  047101  031440
002436  033467  022456
002442  020101  044523  043516          .ASCII  /A SINGLE CHARACTER CORRECTION MAY BE DONE%/
002450  042514  041440  040510
002456  040522  052103  051105
002464  041440  051117  042522
002472  052103  047511  020116
002500  040515  020131  042502
002506  042040  047117  022505
002514  054502  052040  050131          .ASCII  /BY TYPING A SLASH AND RETYPING THE CHARACTER.%%/
002522  047111  020107  020101
002530  046123  051501  020110
002536  047101  020104  042522
002544  054524  044520  043516
002552  052040  042510  041440
002560  040510  040522  052103
002566  051105  022456     043

        002574                          .EVEN
002574  022445  047105  020104  MSG2:   .ASCII  /%%END OF INPUT%/
002602  043117  044440  050116
002610  052125     045
002613     101  051523  051125          .ASCII  /ASSURE PUNCH IS ON%/
002620  020105  052520  041516
002626  020110  051511  047440
```

```
                                                .ASCII  /AND TYPE L FOR LOW SPEED%/
                                                .ASCII  /OR H FOR HIGH SPEED%/
                                                .ASCII  /OR CR FOR RESTART WITH NO PUNCH%%/
                                                .EVEN
                                                ;DATA AREA**********
002754  000000                          DAM40:  0
        003016                                  .=.+40
003016  000000                          DA:     0
                                                .END
```

```
CRLF    002136  318  468#
DA      003016  317  392*  415  424  554#
DAM40   002754  312  394   552#
MSG1    002176  305  479#
MSG2    002574  395  526#
PC    =%000007  270# 306*  318* 322* 326* 339* 396* 397* 406* 412* 421* 434* 437*
                439* 444*  457* 464* 469* 471* 473* 474*
PE      001666  403  405#
PG      001616  395#
PPB     001012  292# 463*
PPS     001010  291# 461
PSW     001014  293# 303*  307*
PUNCH   001602  332  387   392#  416  425
PO      001626  397# 407
P1      001704  399  411#  414
P2      001730  401  420#  423
RB0     001450  349  354#
RB1     001466  350  358#
RDEX    001570  375  379   386#
RD1     001326  324  328#
RD2     001346  329  333#
RD2A    001362  334  336#
RD2B    001372  338# 343
RD3     001410  337  341#
RD4     001502  342  364#
RD5.    001542  368  376#
RD6     001554  367  380#
READ    001274  322# 327   340  353  357  360  388
RUBOUT  001424  335  347#
R0    =%000000  263# 311*  314* 330  355* 378* 386  392  393* 413* 415* 422* 424*
R1    =%000001  264# 316*  348  352* 356* 359* 366  374* 377* 385* 394* 411  420
R2    =%000002  265# 312*  313* 317* 351* 354* 358* 373* 376* 384*
R3    =%000003  266# 364*  365* 370* 371* 372* 373  376  380* 382* 383* 384
R4    =%000004  267# 305*  395* 429
R5    =%000005  268#
SP    =%000006  269# 304*  308*
START   001200  279  303#
ST1     001222  282  307#  404
ST2     001254  313# 315
ST3     001270  318# 331
TCRLF   002006  433  436#
TEX     002050  431  444#
THG     002120  421  461#  462
TIB     001016  297# 310*  323  328  333  336  341  364  398  400  402  450* 453*
                456
TKB     001002  288# 449*  453
TKS     001000  287# 448*  451
TOB     001020  298# 309*  325* 338* 405* 411* 420* 429* 430  432  436* 438* 443
                463  468*  470* 472*
TOG     002034  326  339   406  412  434  437  439  441#  442  469  471  473
TPB     001006  290# 443*  456*
TPS     001004  289# 441   454
TTIN    002052  322  397   448#
TTIN1   002066  451# 452
TTIN2   002102  454# 455
TTOUT   001754  306  396   429#  435  440
```

```
.     = 003020          272#    277     278#    281#    284#    300#    525#    553#
```

F02

DZTUFA.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
ADD     393
BEQ     331  387  399  401  431  433
BHI     349  367
BHIS    342
BICB    351  354  358  365
BISB    373  376  384
BLO     350  368
BLOS    337
BNE     315  324  329  334  403  414  423
BPL     442  452  455  462
BR      435  440
CLC     369  381
CLR     309  310  313  316  352  377  448  449  450
CMP     348  366  386
CMPB    323  328  333  336  341  398  400  402  430  432
DEC     314  355  413  422
HALT    277
INC     374  378  385
JMP     279  282  327  332  335  340  343  353  357  360  375  379  388  404  407
        416  425
JSR     306  318  322  326  339  396  397  406  412  421  434  437  439  469  471
        473
MOV     303  304  305  307  308  311  312  317  325  338  356  359  364  394  395
        405  453  468  470  472
MOVB    392  411  415  420  424  429  436  438  443  456  463
NOP     347
ROLB    370  371  372
ROR     382  383
RTS     444  457  464  474
SWAB    380
TST     330
TSTB    441  451  454  461
.ABS    261
.ASCII  479  485  491  498  502  509  516  526  529  533  538  542
.END    557
.EVEN   476  525  549
.REM      1
.REPT   273
.TITLE  257


ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

*DZTUFA,DZTUFA.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DZTUFA.P11
RUN-TIME:  1  3  .6 SECONDS
RUN-TIME RATIO: 29/6=4.2
CORE USED:  6K  (12 PAGES)
```

G02.

Spooler runtime 2 Seconds, 13 KCS, 51 disk reads, 3 disk writes, 18 pages

[redacted]

[redacted]000000000000000000000000000000000000000000000000000000000000111111111111111111111111111111110

[redacted]5555555555666666666677777777778888888888999999999900000000001111111111222222222233312

[redacted]567890123456789012 **

000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000001111111111111111111111111111111110

9000000011111111112222222222333333333344444444445555555555666666666677777777778888888888999999999900000000001111111111222222222233312