

# RP11-C/RP02

DISKLESS  
MD-11-DZRPE-A

EP-DZRPE-A DL-A

OCT 1976

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**digital**

FICHE 1 OF 1

Made In U.S.A.

B01

09:27:17 MACY11 271732) 08-SEP-76 08:58 PAGE 1  
09:27:17 RP11

.REM %

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZRPE-A-D  
PRODUCT NAME: RP11 DISKLESS DIAGNOSTIC  
DATE CREATED: DECEMBER 1, 1972  
MAINTAINER: DIAGNOSTIC GROUP  
AUTHOR: JOE STUBBLEBINE

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DIGITAL EQUIPMENT CORPORATION  
MAYNARD, MASS.

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4.2 STARTING ADDRESS

1. LOAD STARTING ADDRESS 600 TO RUN THE DISKLESS DIAGNOSTIC. THE RP11 MUST HAVE THE MAINTENANCE SWITCH ENABLED. IF A DRIVE IS ON THE SYSTEM, IT MUST BE POWERED DOWN AND CIRCUIT BREAKER #1 LOCATED TO THE RIGHT OF THE DRIVE'S "SIGNAL IN" CABLE MUST BE TURNED OFF.

4.3 PROGRAMS AND/OR OPERATOR ACTION

1. LOAD THE PROGRAM INTO MEMCRY USING THE ABS LOADER.
2. LOAD STARTING ADDRESS OF 600.
3. SET SWITCHES (SEE SECTION 5.1.1).
4. PRESS START.
5. WHEN RUNNING THE DISKLESS TEST THE PROGRAM WILL MAKE 50 PASSES THRU THE TEST AND THEN TYPE "DONE" AND CONTINUE LOOPING.

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

AFTER LOADING THE STARTING ADDRESS, SELECT THE DESIRED SWITCHES.

5.1.1 SWITCH SETTINGS ARE:

- SW<15>=1 .....DELETE ERROR HALT
- SW<14>=1 .....DELETE PRINTOUT
- SW<13>=1 .....LOOP ON FAILING TEST
- SW<12>=1.....LOOP ON TEST UNCONDITIONALLY

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5.2 SUBROUTINE ABSTRACTS

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5.2.1 TRAP CATCHER

A".+2" - "HALT" SEQUENCE IS REPEATED FROM 0-776 TO CATCH ANY UNEXPECTED TRAPS. THUS ANY UNEXPECTED TRAPS OR INTERRUPTS WILL HALT AT THE VECTOR +2.

6.0 ERRORS

6.1 ERROR PRINTOUTS CONTAIN THE ERROR ADDRESS, CPU STATUS AT ERROR TIME, AND OTHER PERTINENT INFORMATION CONCERNING THE PARTICULAR FAILURE. THIS INFORMATION MAY BE THE CONTENTS OF THE RELEVANT RPI1 STATUS REGISTER OR GOOD/BAD COMPARE DATA. IF THE ERROR OCCURRED IN A SUBROUTINE, THE ADDRESS OF THE SUBROUTINE CALL IS ALSO GIVEN. REFER TO THE PROGRAM LISTING AT THE STATED ADDRESS TO DETERMINE THE CAUSE OF AN ERROR.

7.0 RESTRICTIONS

NONE.

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

THE PROGRAM WILL MAKE 50 ITERATIONS THRU THE DISKLESS TEST TO COMPLETE ONE PASS. AT THE END OF EACH PASS "DONE" IS TYPED OUT AND THE PROGRAM CONTINUES LOOPING.

8.2 STACK POINTER

STACK IS INITIALLY SET TO 600.

9.0 PROGRAM DESCRIPTION

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9.1 DISKLESS TEST

THIS TEST UTILIZES THE RP11 MAINTENANCE REGISTERS TO CHECK THE LOGICAL RESPONSES OF THE RP11. THE MAINTENANCE REGISTERS SIMULATE THE SIGNALS PASSING BETWEEN THE RP11 AND THE RP02. TO RUN THIS TEST THE RP11 MAINTENANCE SWITCH MUST BE ENABLED. IF A DRIVE EXISTS, IT MUST BE POWERED DOWN AND CIRCUIT BREAKER #1 LOCATED JUST TO THE RIGHT OF THE DRIVES'S "SIGNAL IN" CABLE MUST BE TURNED OFF.



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%  
.ABS  
;RP11 DISCLESS TEST  
;COPYRIGHT 1972. DIGITAL EQUIPMENT CORP., MAYNARD, MASS.  
SR=177570 ;SWITCH REGISTER  
CC=177776 ;CONDITION CODES  
TKS=177560  
TKB=177562  
TPS=177564  
TPB=177566  
TKV=50  
TPV=64  
  
CR=15  
LF=12 ;STACK POINTER  
SP=%6  
R0=%0  
R1=%1  
R2=%2  
R3=%3  
R4=%4  
R5=%5  
R6=%6  
R7=%7  
PC=%7  
XX=HALT  
PS=CC  
NOP=240  
P0=0  
P1=40  
P2=100  
P3=140  
P4=200  
P5=240  
P6=300  
P7=340  
B0=1  
B1=2  
B2=4  
B3=10  
B4=20  
B5=40  
B6=100  
B7=200  
B8=400  
B9=1000  
B10=2000  
B11=4000  
B12=10000  
B13=20000  
B14=40000  
B15=100000  
ERR=EMT  
ERM=TRAP

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GB=80  
DD=81  
DS=82  
ER=83  
CS=84  
DA=85  
POP=5726  
POPPOP=22626

.MACR ANDI A,B  
BIC #-A-1,B ;MASK A APPLIED TO B  
.ENDM

.MACR AND A,B  
COM B ;C(B) =MASK. INVERT IT  
BIC B,A ;AND A WITH B  
COM B ;RESTORE B  
.ENDM

.MACR BITEST A,B  
JSR R5,BITST ;TEST BITS IN REGISTER  
.WORD A ;MASK=A  
.WORD B ;REGISTER=B  
ERR+GB ;LOAD/READ ERROR IN B  
RTS PC ;EXIT FROM ERROR CALL  
.ENDM

.MACR ROTR A  
JSR PC,RTR ;ROTATE R0 A PLACES RIGHT  
.WORD A  
.ENDM

.MACR ROTL A  
JSR PC,RTL ;ROTATE R0 A PLACES LEFT  
.WORD A  
.ENDM

# K01

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|     |        |        |       |          |          |   |
|-----|--------|--------|-------|----------|----------|---|
| 358 |        |        | .MACR | LOOP     | A,B      |   |
| 359 |        |        | JSR   | PC,      | Q#LERCHK | ;LOOP TO A ON ERROR IF SR13=1               |
| 360 |        |        | JMP   | A        |          |   |
| 361 |        |        | JSR   | PC,      | Q#LUPCHK | ;LOOP TO A UNCONDITIONALLY IF SR12=1        |
| 362 |        |        | JMP   | A        |          |   |
| 363 |        |        | .ENDM |          |          |   |
| 364 |        |        |       |          |          |   |
| 365 |        |        | .MACR | CLRSOT   |          |   |
| 366 |        |        | JSR   | PC,      | CLRP     |   |
| 367 |        |        | MOV   | #1,      | RD       |   |
| 368 |        |        | JSR   | PC,      | INDEXP   |   |
| 369 |        |        | BIC   | #88,     | QRP3     |   |
| 370 |        |        | BIS   | #88+814, | QRP3     |   |
| 371 |        |        | BIC   | #88,     | QRP3     |   |
| 372 |        |        | .ENDM |          |          |   |
| 373 |        |        |       |          |          |   |
| 374 |        |        |       |          |          |   |
| 375 |        |        |       |          |          |   |
| 376 |        |        |       |          |          |   |
| 377 |        |        |       |          |          |   |
| 378 |        | 000000 | .=0   |          |          |   |
| 379 |        |        | .REPT | 140      |          |   |
| 380 |        |        | .+2   |          |          |   |
| 381 |        |        | HALT  |          |          | ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS |
| 382 |        |        | .ENDR |          |          |   |
| 383 |        |        |       |          |          |   |
| 384 |        | 000030 | .=30  |          |          |   |
| 385 | 000030 | 006744 | .WORD | ERROR    |          |   |
| 386 | 000032 | 000340 | .WORD | 340      |          | ;NO INTERRUPTS ALLOWED DURING ERRORS        |
| 387 | 000034 | 006744 | .WORD | ERROR    |          |   |
| 388 | 000036 | 000340 | .WORD | 340      |          |   |
| 389 |        |        |       |          |          |   |
| 390 |        |        |       |          |          |   |

# L01

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|-----|--------|--------|--------|--------|--------|--------|---------------------------------|
| 391 |        |        |        |        |        |        |                                 |
| 392 | 000600 |        |        |        |        | .=600  |                                 |
| 393 |        |        |        |        |        |        |                                 |
| 394 | 000600 | 012706 | 000600 |        | START: | MOV    | #START,%6 ;SET STACK POINTER    |
| 395 | 000604 | 012767 | 000340 | 177164 |        | MOV    | #340,CC ;LOCK OUT OTHER DEVICES |
| 396 | 000612 | 012767 | 000062 | 007470 |        | MOV    | #50.,BT0G                       |
| 397 |        |        |        |        |        |        |                                 |
| 398 | 000620 | 000005 |        |        | T1:    | RESET  |                                 |
| 399 | 000622 | 005777 | 007474 |        |        | TST    | 0RPDS                           |
| 400 | 00062E | 001405 |        |        |        | BEQ    | T1P                             |
| 401 | 000630 | 104004 |        |        |        | ERR+DS | ;RPDS NOT=0 AFTER RESET         |
| 402 | 000632 |        |        |        |        | LOOP   | T1,T1P                          |
| 403 |        |        |        |        |        |        |                                 |
| 404 | 000652 | 000005 |        |        | T2:    | RESET  |                                 |
| 405 | 000654 | 005777 | 007446 |        |        | TST    | 0RPER                           |
| 406 | 000660 | 001405 |        |        |        | BEQ    | T2P                             |
| 407 | 000662 | 104010 |        |        |        | ERR+ER | ;RPER NOT=0 AFTER RESET         |
| 408 | 000664 |        |        |        |        | LOOP   | T2,T2P                          |



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|     |        |        |               |      |        |            |                         |
|-----|--------|--------|---------------|------|--------|------------|-------------------------|
| 465 | 001302 | 000005 |               | T11: | RESET  |            |                         |
| 466 | 001304 | 005777 | 007056        |      | TST    | @RPB1      |                         |
| 467 | 001310 | 001410 |               |      | BEQ    | T11P       |                         |
| 468 | 001312 | 017767 | 007050 006752 |      | MOV    | @RPB1,DATA |                         |
| 469 | 001320 | 104002 |               |      | ERR+DD |            | ;RPB1 NOT=0 AFTER RESET |
| 470 | 001322 |        |               |      | LOOP   | T11,T11P   |                         |

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T12: RESET  
TST JRPB2  
BEQ T12P  
MOV JRPB2.DATA  
ERR+DD  
LOOP T12,T12P  
:RPB2 NOT=0 AFTER RESET

T13: RESET  
TST JRPB3  
BEQ T13P  
ERR+DD  
LOOP T13,T13P  
:RPB3 NOT=0 AFTER RESET

:TEST LOADING AND READING OF ALL POSSIBLE BITS IN RP11 REGISTERS USING A  
:PATTERN OF WALKING 0'S (-2,-3,-5,ETC.) AND WALKING 1'S (1,2,4,10,ETC.).

:RPDS- DEVICE STATUS REGISTER

001434 DSBT: BITEST 377,RPDS

:RPER- ERROR REGISTER

001450 ERBT: BITEST 176656,RPER

:RPCS- CONTROL STATUS REGISTER

001464 CSBT: BITEST 037576,RPCS

:RPWC- WORD COUNT REGISTER

001500 RPBT: BITEST 177777,RPWC

:RPBA- BUS (CURRENT) ADDRESS REGISTER

001514 BABT: BITEST 177777,RPBA

:RPCA- CYLINDER ADDRESS REGISTER

001530 CABT: BITEST 377,RPCA

:RPDA- DISK ADDRESS REGISTER

001544 DABT: BITEST 17417,RPDA

:RPB1- BUFFER 1

001560 B1BT: BITEST 177777,RPB1

:RPB2- BUFFER 2

001574 B2BT: BITEST 177777,RPB2

:RPB3- BUFFER 3

C02

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001610

938T: BITEST 17.RP83



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585
;RP11 RESET TEST

RESDS:  MOV      #377, RPM2      ;SET ATTN7-C
        MOV      #B1, RPPM3     ;FIRST INDEX
        MOVB     #374, RPPM3    ;SECOND INDEX & OTHER GOODIES
        JSR      PC, CLRP       ;CLEAR RP11
        BIC      #B13, RPPM3
        TST      RPPDS         ;RPPDS=0?
        BEQ      RESDSP        ;YES
        ERR+DS  RESDS, RESDSP   ;NO-RESET FAILED TO CLEAR RPPDS
        LOOP

RESER:  MOV      #177776, RPER   ;SET RPER
        JSR      PC, CLRP       ;CLEAR RP11
        TST      RPER          ;RPER=0?
        BEQ      RESERP        ;YES
        ERR+ER  RESER, RESERP  ;NO-RESET FAILED TO CLEAR RPER
        LOOP

RESCS:  MOV      #177760, RPPCS  ;SET RPPCS
        JSR      PC, CLRP       ;CLEAR RP11
        CMP      #B7, RPPCS    ;RPPCS=0 EXCEPT FOR READY?
        BEQ      RESCSP        ;YES
        ERR+CS  RESCS, RESCSP  ;NO-RESET FAILED TO CLEAR RPPCS
        LOOP

RESWC:  MOV      #-1, RPPWC     ;SET RPPWC
        JSR      PC, CLRP       ;CLEAR RP11
        TST      RPPWC         ;RPPWC=0?
        BEQ      RESWCP        ;YES
        MOV      RPPWC, DATA   ;NO-PUT RPPWC INTO DATA DISPLAY
        ERR+DD  RESWC, RESWCP  ;RESET FAILED TO CLEAR RPPWC
        LOOP

RESBA:  MOV      #-1, RPPBA     ;SET RPPBA
        JSR      PC, CLRP       ;CLEAR RP11
        TST      RPPBA         ;RPPBA=0?
        BEQ      RESBAP        ;YES
        MOV      RPPBA, DATA   ;NO
        ERR+DD  RESBA, RESBAP  ;RESET FAILED TO CLEAR RPPBA
        LOOP

RESCA:  MOV      #377, RPPCA    ;SET RPPCA
        JSR      PC, CLRP       ;CLEAR RP11
        TSTB     RPPCA         ;CAR=0?
        BEQ      RESCAP        ;YES
        MOV      RPPCA, DATA   ;NO
        ERR+DD  RESCA, RESCAP  ;RESET FAILED TO CLEAR CAR
        LOOP

RESDA:  MOV      #-1, RPPDA     ;SET RPPDA
        JSR      PC, CLRP       ;CLEAR RP11
        BIT      #17417, RPPDA  ;TAR & SAR=0
        BEQ      RESDAP        ;YES
        MOV      RPPDA, DATA   ;NO
  
```

E02

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586 002236 104002  
59 002240

EHR+DD  
LOOP RESDA,RESDAP

:RESET FAILED TO CLEAR TAR & SAR

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589
590 ;RPDS FUNCTION TEST
591 002260 005077 006076 DSF1: CLR @RPM3
592 002264 005077 006032 CLR @RPDS
593 002270 052777 040000 006064 BIS #B14,@RPM3 ;SET MAINT. READY
594 002276 032777 100000 006016 BIT #B15,@RPDS ;TEST READY=1
595 002304 001005 BNE DSF1P ;PROCEED IF SET
596 002306 104004 ERR+DS ;READY NOT SET BY RPM3.B14=1
597 002310 LOOP DSF1,DSF1P
598
599 002330 005077 006026 DSF2: CLR @RPM3
600 002334 005077 005762 CLR @RPDS
601 002340 032777 040000 006014 BIT #B14,@RPM3 ;SET M. READY
602 002346 042777 040000 006006 BIC #B14,@RPM3 ;CLEAR M. READY
603 002354 032777 100000 005740 BIT #B15,@RPDS ;TEST READY=0
604 002362 001405 BEQ DSF2P ;PROCEED IF CLEAR
605 002364 104004 ERR+DS ;READY NOT CLEARED BY RPM3.B14=0
606 002366 LOOP DSF2,DSF2P
607
608 002406 DSF3: CLRSOT
609 002444 117700 005676 MOV @RPDA,RO ;FETCH CURRENT SECTOR
610 002450 ROTR 4
611 002456 005200 INC RO ;LOAD SAR WITH
612 002460 110077 005662 MOV @RPDA,RO ;CURRENT SECTOR+1
613 002464 005077 005632 CLR @RPDS
614 002470 012777 000001 005640 MOV #1,@RPWC
615 002476 052777 020000 005656 BIS #B13,@RPM3
616 002504 012777 000017 005620 MOV #17,@RPCS ;READ AND GO
617 002512 004767 003522 JSR PC,TP ;3 TP
618 002516 042777 000400 005636 BIC #B8,@RPM3
619 002524 052777 040400 005630 BIS #B8+B14,@RPM3 ;1 SP
620 002532 042777 000400 005622 BIC #B8,@RPM3
621 002540 012700 000002 MOV #2,RO ;ISSUE 2
622 002544 004767 003500 JSR PC,INDEXP ;INDEX PULSES
623 002550 032777 010000 005544 BIT #B12,@RPDS ;TEST HEADER-NOT-FOUND=1
624 002556 001007 BNE DSF3P ;OK IF SET
625 002560 104004 ERR+DS ;HEADER-NOT-FOUND NOT SET BY PROPER SEQUENCE
626 002562 004767 003506 JSR PC,HEADER
627 002566 LOOP DSF3,DSF3P
628
629 002606 DSF4: CLR @RPM3
630 002612 005077 005550 CLR @RPDS
631 002616 052777 002000 005536 BIS #B10,@RPM3 ;SET M. SEEK INC.
632 002624 032777 004000 005470 BIT #B11,@RPDS ;TEST SEEK INC.=1
633 002632 001005 BNE DSF4P ;OK IF SET
634 002634 104004 ERR+DS ;SEEK-INCOMPLETE NOT SET BY RPM3. BIT10=1
635 002636 LOOP DSF4,DSF4P
636
637 002656 DSF5: CLR @RPM3
638 002662 005077 005434 CLR @RPDS
639 002666 052777 002000 005466 BIS #B10,@RPM3 ;SET M. SEEK INC.
640 002674 042777 002000 005460 BIC #B10,@RPM3 ;CLEAR M. SEEK INC.
641 002702 032777 004000 005412 BIT #B11,@RPDS ;TEST SEEK INC.=0
642 002710 001405 BEQ DSF5P ;OK IF CLEAR
643 002712 104004 ERR+DS ;SEEK-INCOMPLETE NOT CLEARED BY RPM3,BIT10=0

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G02

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644 002714

LOOP DSF5,DSF5P

# H02

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645
646 002734 000240          DSF6:  NOP                      ;DO LATER
647
648 002736 005077 005420    DSF7:  CLR      @RPM3
649 002742 005077 005354    CLR      @RPDS
650 002746 052777 004000 005406  BIS      #B11,@RPM3      ;SET M. FILE UNSAFE
651 002754 032777 001000 005340  BIT      #B9,@RPDS      ;TEST FILE-UNSAFE=1
652 002752 001005          BNE      DSF7P          ;OK IF SET
653 002764 104004          ERR+DS  ;FILE-UNSAFE NOT SET BY RPM3, B11=1
654 002766          LOOP   DSF7,DSF7P
655
656 003006 005077 005350    DSF10: CLR      @RPM3
657 003012 005077 005304    CLR      @RPDS
658 003016 052777 004000 005336  BIS      #B11,@RPM3      ;SET M. FILE UNSAFE
659 003024 042777 004000 005330  BIC      #B11,@RPM3      ;CLEAR M. FILE UNSAFE
660 003032 032777 001000 005262  BIT      #B9,@RPDS      ;TEST FILE-UNSAFE=0
661 003040 001405          BEQ      DSF10P         ;OK IF CLEAR
662 003042 104004          ERR+DS  ;FILE-UNSAFE NOT CLEARED BY RPM3,B11=0
663 003044          LOOP   DSF10,DSF10P
664
665 003064 005077 005272    DSF11: CLR      @RPM3
666 003070 005077 005226    CLR      @RPDS
667 003074 052777 100000 005260  BIS      #B15,@RPM3      ;SET M. READ ONLY
668 003102 032777 000400 005212  BIT      #B8,@RPDS      ;TEST WRITE-PROTECTED=1
669 003110 001005          BNE      DSF11P         ;OK IF SET
670 003112 104004          ERR+DS  ;WRITE-PROTECTED NOT SET BY RPM3,BIT15=1
671 003114          LOOP   DSF11,DSF11P
672
673 003134 005077 005222    DSF12: CLR      @RPM3
674 003140 005077 005156    CLR      @RPDS
675 003144 052777 100000 005210  BIS      #B15,@RPM3      ;SET M. READ ONLY
676 003152 042777 100000 005202  BIC      #B15,@RPM3      ;CLEAR M. READ ONLY
677 003160 032777 000400 005134  BIT      #B8,@RPDS      ;TEST WRITE-PROTECTED
678 003166 001405          BEQ      DSF12P         ;OK IF CLEAR
679 003170 104004          ERR+DS  ;WRITE-PROTECTED NOT CLEARED BY RPM3,BIT15=0
680 003172          LOOP   DSF12,DSF12P
681
682 003212 012767 000001 005046  DSF13: MOV      #1,GOOD ;START WITH M. ATTN IN GOOD
683 003220 005077 005136    DSL13: CLR      @RPM3
684 003224 005077 005072    CLR      @RPDS
685 003230 016777 005032 005120  MOV      GOOD,@RPM2      ;SET RELEVANT M. ATTN BIT
686 003236 126777 005024 005056  CMPB    GOOD,@RPDS      ;TEST RELEVANT ATTN BIT
687 003244 001410          BEQ      DSF13P         ;PROCEEDS IF OK
688 003246 117767 005050 005014  MOVB    @RPDS,BAD        ;PUT RPDS7-0 ON BAD BOR DISPLAY
689 003254 104001          ERR+GB  ;M. ATTN DID NOT SET CORRECT ATTN BIT
690 003256          LOOP   DSL13,DSF13P
691 003276 000241          CLC
692 003300 006167 004762          ROL      GOOD
693 003304 032767 000400 004754  BIT      #B8,GOOD
694 003312 001742          BEQ      DSL13          ;CLEAR LINK
                          ;SHIFT ATTN TEST BIT
                          ;FINISHED 7-0?
                          ;RECYCLE IF NO

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DZRPER.P11

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695
696
697
698 003314 000005
699 003216 052777 100000 005036 ERF1: RESET ;CLEAR THE FREE WORLD
700 003324 112777 000003 005000 BIS #B15,DRPM3 ;SET M. READ ONLY
701 003332 004767 002702 MOVB #3,DRPCS ;WRITE + GO TO CONTROL REGISTER
702 003336 032777 100000 004762 JSR PC,T3P ;3 TP
703 003344 001001 BIT #B15,DRPER ;IS WRITE VIOLATION SET?
704 003346 104010 BNE ERN1 ;PROCEED IF YES
705 003350 004767 002720 ERF1: JSR PC,HRDR ;WRITE VIOLATION NOT SET BY WRITE FUNCTION
706 003354 LOOP ERF1,ERF1P ;TEST INCLUSIVE ERROR BITS
707
708 003374 005077 004726 ERF2: CLR DRPER
709 003400 052777 004000 004754 BIS #B11,DRPM3 ;SET M. FILE UNSAFE
710 003406 112777 000003 004716 MOVB #3,DRPCS ;TRY TO GO
711 003414 004767 002620 JSR PC,T3P
712 003420 032777 040000 004704 BIT #B14,DRPCS ;IS FILE UNSAFE SET?
713 003426 001001 BNE ERN2 ;PROCEED
714 003430 104010 ERR+ER ;FILE UNSAFE ERROR BIT NOT SET
715 003432 004767 002636 ERF2: JSR PC,HRDR ;TEST INCLUSIVE ERROR BITS
716 003436 LOOP ERF2,ERF2P
717
718 003456 005077 004660 ERF3: CLR DRPCA
719 003462 005067 004604 CLR DATA ;START AT CAR=0
720 003466 005077 004634 ERF3: CLR DRPER ;LOAD CAR WITH DATA
721 003472 016777 004574 004642 MOV DATA,DRPCA
722 003500 012777 000003 004624 MOV #3,DRPCS
723 003506 004767 002526 JSR PC,T3P
724 003512 032777 020000 004606 BIT #B13,DRPER ;IS NXT CYLINDER SET?
725 003520 001405 BEQ ERL3P ;IF NO - PROCEED
726 003522 104012 ERR+DD+ER ;NXT CYLINDER SET BY A LEGAL ADDRESS
727 003524 LOOP ERF3,ERL3P
728 003544 005267 004522 INC DATA ;ADVANCE TO NEXT ADDRESS
729 003550 022767 000313 004514 CMP #203.,DATA ;ENTERED INTO ILLEGAL AREA?
730 003556 001343 BNE ERL3 ;IF NOT - RECYCLE
731
732 003560 005077 004542 ERF4: CLR DRPER
733 003564 016777 004502 004550 MOV DATA,DRPCA ;MOVE ILLEGAL ADDRESS INTO CAR
734 003572 012777 000003 004532 MOV #3,DRPCS
735 003600 004767 002434 JSR PC,T3P
736 003604 032777 020000 004514 BIT #B13,DRPER ;IS NXT CYLINDER SET?
737 003612 001001 BNE ERN4 ;IF YES - PROCEED
738 003614 104012 ERR+DD+ER ;NXT CYLINDER SET BY AN ILLEGAL ADDRESS
739 003616 004767 002452 ERF4: JSR PC,HRDR
740 003622 LOOP ERF4,ERF4P
741 003642 005267 004424 INC DATA ;ADVANCE TO NEXT ADDRESS
742 003646 032767 000400 004416 BIT #B8,DATA ;DATA=400?
743 003654 001741 BEQ ERF4 ;IF NOT RECYCLE
744
745 003656 005077 004464 ERF5: CLR DRPDA
746 003662 005067 004404 CLR DATA ;START WITH TAR=0
747 003666 005077 004434 ERF5: CLR DRPER
748 003672 116777 004374 004450 MOVB DATA,DRPDA1 ;LOAD TAR WITH DATA
749 003700 012777 000003 004424 MOV #3,DRPCS
750 003706 004767 002326 JSR PC,T3P

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|     |        |        |        |        |           |             |  |
|-----|--------|--------|--------|--------|-----------|-------------|--|
| 751 | 003712 | 032777 | 010000 | 004406 | BIT       | #B12,ORPER  | ; IS NXT TRACK SET?                    |
| 752 | 003720 | 001405 |        |        | BEG       | ERLSP       | ; NO                                   |
| 753 | 003722 | 104012 |        |        | ERR+DD+ER |             | ; YES - NXT TRACK SET B' LEGAL ADDRESS |
| 754 | 003724 |        |        |        | LOOP      | ERLS, ERLSP |  |
| 755 | 003744 | 005267 | 004322 |        | INC       | DATA        | ; ADVANCE TRACK                        |
| 756 | 003750 | 022767 | 000024 | 004314 | CMP       | #20., DATA  | ; DONE ALL LEGAL?                      |
| 757 | 003756 | 001343 |        |        | BNE       | ERLS        | ; CONTINUE                             |

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758
759 003760 005077 004342          ERF6: CLR      JRPER
760 003764 116777 004302 004356      MOVB     DATA,JRPDA1 ;LOAD TAR WITH DATA
761 003772 012777 000003 004332      MOV      #3,JRPCS ;GO
762 004000 004767 002234          JSR      PC,T3P
763 004004 032777 010000 004314      BIT      #B12,JRPER ;IS NXT TRACK SET?
764 004012 001001          BNE      ERN6 ;YES
765 004014 104012          ERR+DD+ER ;NO - NXT TRACK NOT SET BY ILLEGAL ADDRESS
766 004016 004767 002252          ERN6: JSR      PC,HRDR ;TEST INCLUSIVE ERROR FLAGS
767 004022          LOOP     ERF6,ERF6P
768 004042 005267 004224          INC      DATA ;ADVANCE TRACK
769 004046 032767 000040 004216      BIT      #B5,DATA ;DONE?
770 004054 001741          BEQ      ERF6 ;NO
771
772 004056 005077 004264          ERF7: CLR      JRPDA
773 004062 005067 004204          CLR      DATA ;START WITH SAR=0
774 004066 005077 004234          ERL7: CLR      JRPER
775 004072 016777 004174 004246      MOV      DATA,JRPDA ;LOAD SAR WITH DATA
776 004100 012777 000003 004224      MOV      #3,JRPCS ;GO
777 004106 004767 002126          JSR      PC,T3P
778 004112 032777 004000 004206      BIT      #B11,JRPER ;IS NXT SECTOR SET?
779 004120 001405          BEQ      ERL7P ;NO
780 004122 104012          ERR+DD+ER ;YES - NXT SECTOR SET BY LEGAL ADDRESS
781 004124          LOOP     ERL7,ERL7P
782 004144 005267 004122          INC      DATA ;ADVANCE SECTOR COUNT
783 004150 022767 000012 004114      CMP      #10.,DATA ;DONE ALL LEGAL?
784 004156 001343          BNE      ERL7 ;NO
785
786 004160 005077 004142          ERF10: CLR     JRPER
787 004164 016777 004102 004154      MOV      DATA,JRPDA ;LOAD SAR WITH DATA
788 004172 012777 000003 004132      MOV      #3,JRPCS ;GO
789 004200 004767 002034          JSR      PC,T3P
790 004204 032777 004000 004114      BIT      #B11,JRPER ;IS NXT SECTOR SET
791 004212 001001          BNE      ERN10 ;YES
792 004214 104012          ERR+DD+ER ;NO - NXT SECTOR NOT SET BY ILLEGAL SECTOR
793 004216 004767 002052          ERN10: JSR     PC,HRDR ;TEST INCLUSIVE ERROR FLAGS
794 004222          LOOP     ERF10,ERF10P
795 004242 005267 004024          INC      DATA ;ADVANCE SECTOR
796 004246 032767 000020 004016      BIT      #B4,DATA ;FINISHED?
797 004254 001741          BEQ      ERF10 ;NO
798

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799
800 004256 005077 004044          ERF11: CLR      JRPER
801 004262 004767 001706          JSR      PC,CLRP      ;WCOV=1
802 004266 012777 000003 004036  MOV      #3,JRPCS      ;GO
803 004274 004767 001740          JSR      PC,T3P
804 004300 032777 002000 004020  BIT      #B10,JRPER    ;IS PROGRAM ERROR SET?
805 004306 001001          BNE      ERN11        ;YES
806 004310 104010          ERR+ER    ;PRGM ERROR NOT SET BY WC=0 AND GO
807 004312 004767 001756          ERN11: JSR      PC,HRDER
808 004316          LOOP      ERF11,ERF11P
809
810 004336 000240          ERF12: NOP
811
812 004340 000240          ERF13: NOP          ;LATER, BABY. FORMAT ERR.
813
814 004342 005077 003760          ERF14: CLR      JRPER
815 004346 012777 004003 003756  MOV      #4003,JRPCS  ;WRITE HEADER IN PDP-11 MODE
816 004354 004767 001660          JSR      PC,T3P
817 004360 032777 000400 003740  BIT      #B8,JRPER    ;TEST MODE ERROR
818 004366 001001          BNE      ERN14        ;PROCEED IF SET
819 004370 104010          ERR+ER    ;MODE ERROR NOT SET BY HEADER OP IN PDP-11 MODE
820 004372 004767 001676          ERN14: JSR      PC,HRDER
821 004376          LOOP      ERF14,ERF14P
822
823 004416 000240          ERF15: NOP          ;DO LATER. L.P. ERR.
824
825 004420 000240          ERF16: NOP          ;DO LATER. WD. PAR. ERR.
826
827 004422 000240          ERF17: NOP          ;DO LATER. CHKSUM ERR.
828
829 004424 000240          ERF20: NOP          ;DO LATER. WR. CHK. ERR.
830
831 004426 000240          ERF21: NOP          ;DO LATER. NXM ERR.
832
833 004430 000240          ERF22: NOP          ;DO LATER. E.O.P. ERR.
834
835

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836
837
838
839 004432 012767 000001 003632 CSF1:  MOV  #1,DATA      ;START WITH ATTNO
840 004440 012777 000340 003736      MOV  #P7,@RPSV    ;SETUP PRIORITY
841 004446 012777 004536 003726      MOV  #CSN1,@RPIV  ;SETUP RETURN VECTOR
842 004454 004767 001514      JSR  PC,CLRP      ;CLEAR RPII
843 004460 005067 173312      CLR  PS           ;CLEAR PRIORITY
844 004464 052777 020000 003640      BIS  #B13,@RPCS  ;ENABLE ATTN PI
845 004472 016777 003574 003622      MOV  DATA,@RPDS ;SET ATTN
846 004500 000240      NOP              ;AND
847 004502 000240      NOP              ;WAIT
848 004504 012767 000340 173264      MOV  #P7,PS      ;LOCKOUT PI
849 004512 104024      ERR+CS+DS       ;NO ATTN PI WITH ATTN & ATTN PI ENABLE SET
850 004514
851 004534 000401      LOOP  CSL1,CSF1P
      BR    .+4
  
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|     |        |        |        |        |       |           |            |  |  |                                      |
|-----|--------|--------|--------|--------|-------|-----------|------------|--|--|--------------------------------------|
| 852 |        |        |        |        |       |           |            |  |  |                                      |
| 853 | 004536 | 022626 |        |        | CSN1: | POPPOP    |            |  |  | ;RESTORE STACK POINTER BECAUSE OF PI |
| 854 | 004540 | 000241 |        |        |       | CLC       |            |  |  | ;CLEAR LINK                          |
| 855 | 004542 | 006167 | 003524 |        |       | ROL       | DATA       |  |  | ;SHIFT ATTN BIT                      |
| 856 | 004546 | 032767 | 000400 | 003516 |       | BIT       | #B8,DATA   |  |  | ;FINISHED?                           |
| 857 | 004554 | 001737 |        |        |       | BEQ       | CSL1       |  |  | ;RECYCLE IF NO                       |
| 859 |        |        |        |        |       |           |            |  |  |                                      |
| 859 | 004556 | 004767 | 001412 |        | CSF2: | JSR       | PC,CLRP    |  |  | ;CLEAR RP11                          |
| 860 | 004562 | 012777 | 004620 | 003612 |       | MOV       | #CSE2,RP1V |  |  | ;ERROR RETURN ON PI                  |
| 861 | 004570 | 005067 | 173202 |        |       | CLR       | PS         |  |  | ;ALLOW INTERRUPTS                    |
| 862 | 004574 | 012777 | 000377 | 003520 |       | MOV       | #377,RPDS  |  |  | ;SET ALL ATTNS                       |
| 863 | 004602 | 000240 |        |        |       | NOP       |            |  |  | ;AND                                 |
| 864 | 004604 | 000240 |        |        |       | NOP       |            |  |  | ;WAIT                                |
| 865 | 004606 | 000240 |        |        |       | NOP       |            |  |  | ;AWHILE                              |
| 866 | 004610 | 012767 | 000340 | 173160 |       | MOV       | #P7,PS     |  |  | ;LOCKOUT PI AND                      |
| 867 | 004616 | 000411 |        |        |       | BR        | CSF2P      |  |  | ;SKIP ERROR                          |
| 868 | 004620 | 012767 | 000340 | 173150 | CSE2: | MOV       | #P7,PS     |  |  | ;LOCKOUT PI                          |
| 869 | 004626 | 022626 |        |        |       | POPPOP    |            |  |  | ;RESTORE STACK POINTER               |
| 870 | 004630 | 104024 |        |        |       | ERR+DS+CS |            |  |  | ;ATTN PI WITH ATTN PI ENABLE=0       |
| 871 | 004632 |        |        |        |       | LOOP      | CSF2,CSF2P |  |  |                                      |
| 872 |        |        |        |        |       |           |            |  |  |                                      |
| 873 | 004652 | 004767 | 001316 |        | CSF3: | JSR       | PC,CLRP    |  |  | ;CLEAR RP11                          |
| 874 | 004656 | 012777 | 004734 | 003516 |       | MOV       | #CSN3,RP1V |  |  | ;RETURN VECTOR                       |
| 875 | 004664 | 005067 | 173106 |        |       | CLR       | PS         |  |  | ;ALLOW PI                            |
| 876 | 004670 | 052777 | 000100 | 003434 |       | BIS       | #B6,RPDPC  |  |  | ;ENABLE READY PI                     |
| 877 | 004676 | 000240 |        |        |       | NOP       |            |  |  | ;WAIT FOR                            |
| 878 | 004700 | 000240 |        |        |       | NOP       |            |  |  | ;PI                                  |
| 879 | 004702 | 012767 | 000340 | 173066 |       | MOV       | #P7,P      |  |  | ;LOCKOUT PI                          |
| 880 | 004710 | 104020 |        |        |       | ERR+CS    |            |  |  | ;NO PI ON READY WITH RDY PI ENABLE=1 |
| 881 | 004712 |        |        |        |       | LOOP      | CSF3,CSF3P |  |  |                                      |
| 882 | 004732 | 000401 |        |        |       | BR        | CSF4       |  |  |                                      |
| 883 | 004734 | 022626 |        |        | CSN3: | POPPOP    |            |  |  | ;RESTORE SP                          |
| 884 | 004736 | 004767 | 001232 |        | CSF4: | JSR       | PC,CLRP    |  |  | ;RESET RP11                          |
| 885 | 004742 | 012777 | 004772 | 003432 |       | MOV       | #CSE4,RP1V |  |  | ;ERROR RETURN                        |
| 886 | 004750 | 005067 | 173022 |        |       | CLR       | PS         |  |  | ;ALLOW PI                            |
| 887 | 004754 | 000240 |        |        |       | NOP       |            |  |  | ;AND                                 |
| 888 | 004756 | 000240 |        |        |       | NOP       |            |  |  | ;WAIT                                |
| 889 | 004760 | 000240 |        |        |       | NOP       |            |  |  | ;FOR IT                              |
| 890 | 004762 | 012767 | 000340 | 173006 |       | MOV       | #P7,PS     |  |  | ;LOCKOUT PI                          |
| 891 | 004770 | 000406 |        |        |       | BR        | CSF4P      |  |  | ;SKIP ERROR                          |
| 892 | 004772 | 022626 |        |        | CSE4: | POPPOP    |            |  |  | ;RESTORE SP                          |
| 893 | 004774 | 104020 |        |        |       | ERR+CS    |            |  |  | ;READY PI WITH RDY PI ENABLE=0       |
| 894 | 004776 |        |        |        |       | LOOP      | CSF4,CSF4P |  |  |                                      |
| 895 |        |        |        |        |       |           |            |  |  |                                      |
| 896 | 005016 | 004767 | 001152 |        | CSF5: | JSR       | PC,CLRP    |  |  | ;RESET RP11                          |
| 897 | 005022 | 012777 | 005106 | 003352 |       | MOV       | #CSN5,RP1V |  |  | ;PI RETURN VECTOR                    |
| 898 | 005030 | 052777 | 000100 | 003274 |       | BIS       | #B6,RPDPC  |  |  | ;ENABLE ERROR PI                     |
| 899 | 005036 | 005067 | 172734 |        |       | CLR       | PS         |  |  | ;LOWER PRIORITY                      |
| 900 | 005042 | 052777 | 100000 | 003262 |       | BIS       | #B15,RPDPC |  |  | ;SET ERROR                           |
| 901 | 005050 | 000240 |        |        |       | NOP       |            |  |  | ;AND                                 |
| 902 | 005052 | 000240 |        |        |       | NOP       |            |  |  | ;WAIT                                |
| 903 | 005054 | 012767 | 000340 | 172714 |       | MOV       | #P7,PS     |  |  | ;LOCKOUT PI                          |

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004 005062 104020 ERR+CS ;NO PI ON ERROR WITH ERROR PI ENABLE=1
005 005064 LOOP CSF5,CSF5P
006 005104 000401 BR .+4 ;SKIP STACK POP
007 005106 022626 CSNS: POPPOP ;RESTORE STACK
008 005110 004767 001060 CSFS: JSR PC,CLRP ;CLEAR RP11
009 005114 012777 005152 003260 MOV #CSE6,RP1V ;ERROR VECTOR
010 005122 005067 172650 CLR PS ;ALLOW FI
011 005126 052777 100000 003176 BIS #B15,RP1V ;SET ERROR
012 005134 000240 NOP ;AND
013 005136 000240 NOP ;WAIT
014 005140 000240 NOP ;FOR PI
015 005142 012767 000340 172626 MOV #P7,PS ;RESTORE LOCKOUT
016 005150 000406 BR CSF6P ;SKIP ERROR
017 005152 022626 CSE6: POPPOP ;RESTORE SP
018 005154 104020 ERR+CS ;ERROR PI WITH PI ENABLE=0
019 005156 LOOP CSF6,CSF6P

020 005176 004767 000772 CSF7: JSR PC,CLRP ;RESET RP11
021 005202 012767 000200 172556 MOV #P4,PS ;ALLOW PI ON LEVEL 5
022 005210 012777 005262 003164 MOV #CSN7,RP1V ;VECTOR
023 005216 052777 000100 003106 BIS #B6,RP1V ;ENABLE INTERRUPT
024 005224 000240 NOP ;AND
025 005226 000240 NOP ;WAIT
026 005230 012767 000340 172540 MOV #P7,PS ;RESTORE LOCKOUT
027 005236 104024 ERR+CS+DS ;NO PI ON LEVEL 5
028 005240 LOOP CSF7,CSF7P
029 005260 000401 BR .+4 ;SKIP POP
030 005262 022626 CSN7: POPPOP ;RESTORE SP
031 005264 012767 000340 172504 MOV #P7,PS ;RESTORE LOCKOUT
032 005272 004737 007202 JSR PC,#LUPCHK
033 005276 000167 177674 JMP CSF7

034 005302 004767 000666 CSF10: JSR PC,CLRP ;RESET RP11
035 005306 012777 000377 003006 MOV #377,RP1V ;LOAD ATTN7-0
036 005314 012777 005360 003060 MOV #CSE10,RP1V ;PI VECTOR
037 005322 052777 100000 003002 BIS #B15,RP1V ;ERROR BIT
038 005330 012767 000240 172440 MOV #P5,PS ;CP=LEVEL 5
039 005336 052777 020100 002766 BIS #B6+B13,RP1V ;ENABLE PI
040 005344 000240 NOP ;AND
041 005346 000240 NOP ;WAIT
042 005350 012767 000340 172420 MOV #P7,PS ;RESTORE LOCKOUT AND
043 005356 000406 BR CSF10P ;SKIP ERROR
044 005360 CSE10: POPPOP ;RESTORE SP
045 005362 022626 ERR+DS+CS ;PI ON LEVEL 6. IT SHOULD BE LEVEL 5.
046 005364 104024 LOOP CSF10,CSF10P

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953
954
955          :RPCA FUNCTION TEST
956
957 005404 004767 000564 CAF1: JSR PC,CLRP          :RESET
958 005410 005067 002652          CLR GOOD          :START DATA AT CYLINDER 0
959 005414 116777 002646 002736 CAL1: MOVB GOOD,ARPM21 :LOAD M. C.A.
960 005422 117767 002716 002640          MOVB ARPCAI,BAD :READ CURRENT CYLINDER
961 005430 026767 002632 002632          CMP GOOD,BAD      :OK?
962 005436 001405          BEQ CAF1P          :SKIP IF YES
963 005440 104001          ERR+GB          :CURRENT CYLINDER NOT= TO MAINT. CYL. ADD.
964 005442          LOOP CAF1,CAF1P
965 005462 005267 002600          INC GOOD          :ADVANCE CYL. COUNT
966 005466 026727 002574 000001          CMP GOOD,#1      :FINISHED?
967 005474 001347          BNE CAL1          :NO
968
969          :RPDA FUNCTION TEST
970
971 005476 004767 000472 DAF1: JSR PC,CLRP          :RESET
972 005502 005067 002560          CLR GOOD          :START DATA AT SECTOR 0
973 005506 012700 000001          MOV #1,R0
974 005512 004767 000532          JSR PC,INDEXP    :1 INDEX PULSE
975 005516 052777 000400 002636 DAL1: BIS #B8,ARPM3    :1 SECTOR PULSE
976 005524 042777 000400 002630          BIC #B8,ARPM3
977 005532 017767 002610 002530          MOV ARPDA,BAD   :READ SECTOR
978 005540 006067 002524          ROR BAD          :RIGHT-
979 005544 006067 002520          ROR BAD          :JUSTIFY
980 005550 006067 002514          ROR BAD          :S.O.T.
981 005554 006067 002510          ROR BAD          :REGISTER
982 005560          ANDI 17,BAD
983 005566 026767 002476 002472          CMP BAD,GOOD    :CHECK SOT
984 005574 001405          BEQ DAL1P        :SKIP IF OK
985 005576 104001          ERR+GB          :SECTORS INDEX PULSES NOT COUNTING SOT
986 005600          LOOP DAL1,DAL1P
987 005620 005267 002442          INC GOOD          :ADVANCE SECTOR
988 005624 022767 000012 002434          CMP #12,GOOD    :DONE?
989 005632 001331          BNE DAL1          :NO
990
991 005634 012700 000001 DAF2: MOV #1,R0          :1 INDEX PULSE
992 005640 004767 000404          JSR PC,INDEXP    :1 SECTOR PULSE
993 005644 052777 000400 002510          BIS #B8,ARPM3
994 005652 042777 000400 002502          BIC #B8,ARPM3
995 005660 005067 002402          CLR GOOD
996 005664 017767 002456 002376          MOV ARPDA,BAD
997 005672 006067 002372          ROR BAD
998 005676 006067 002366          ROR BAD
999 005702 006067 002362          ROR BAD
1000 005706 006067 002356          ROR BAD
1001          ANDI 17,BAD
1002 005720 026767 002344 002340          CMP BAD,GOOD    :SOT=0?
1003 005726 001405          BEQ DAF2P        :SKIP IF YES
1004 005730 104001          ERR+GB          :INDEX PULSE DID NOT CLEAR SOT
1005          LOOP DAF1,DAF2P
1006
1007
1008 005752 005367 002332          DEC BT0G

```

|      |        |        |        |        |     |           |
|------|--------|--------|--------|--------|-----|-----------|
| 1009 | 005756 | 001007 |        |        | BNE | TSTND     |
| 1010 | 005760 | 012700 | 007672 |        | MOV | #PMS,RO   |
| 1011 | 005764 | 004767 | 002234 |        | JSR | PC,TYP0UT |
| 1012 | 005770 | 012767 | 000062 | 002312 | MOV | #50,BTOG  |
| 1013 | 005776 | 012706 | 000600 |        | MOV | #START,SP |
| 1014 | 006002 | 012767 | 000340 | 171766 | MOV | #P7,CC    |
| 1015 | 006010 | 000167 | 172604 |        | JMP | Tf        |
| 1016 |        |        |        |        |     |           |
| 1017 |        |        |        |        |     |           |
| 1018 |        |        |        |        |     |           |
| 1019 |        |        |        |        |     |           |

```

1019
1020           ;SUBROUTINES
1021
1022 006014 012567 002274 BITST: MOV (R5)+,MASK ;FETCH DATA MASK
1023 006020 012504          MOV (R5)+,R4 ;FETCH REGISTER UNDER TEST
1024 006022 010567 002272          MOV R5,LERR ;FETCH ERROR CALL POINTER
1025 006026 062705 000004          ADD #4,R5 ;ADVANCE RETURN VECTOR OVER ERROR CALL
1026 006032 012703 000001          MOV #1,R3 ;INITIALIZE DATA WORD
1027 006036 004767 000016 BTL1: JSR PC,BTL2 ;TEST WITH WALKING 0
1028 006042 004767 000012          JSR PC,BTL2 ;TEST WITH WALKING 1
1029 006046 000241          CLC ;CLEAR LINK
1030 006050 006103          ROL R3 ;SHIFT TEST BIT
1031 006052 005703          TST R3 ;SEE IF IT PASSED INTO C-BIT
1032 006054 001370          BNE BTL1 ;IF NOT TEST AGAIN
1033 006056 000205          RTS R5 ;IF SO - EXIT
1034 006060 005103 BTL2: COM R3 ;MAKE WALKING 1 INTO WALKING 0 AND VICE VERSA
1035 006062 010367 002200          MOV R3,GOOD ;PUT PATTERN INTO GOOD
1036 006066          AND GOOD,MASK
1037 006104 016774 002156 000000          MOV GOOD,(R4) ;SEND DATA TO RELEVANT REGISTER
1038 006112 017467 000000 002150          MOV (R4),BAD ;READ DATA INTO BAD FROM RELEVANT REGISTER
1039 006120          AND BAD,MASK
1040 006136 026767 002124 002124          CMP GOOD,BAD ;COMPARE SEND VS. RECEIVE
1041 006144 001406          BEQ BTN2 ;SKIP OVER ERROR ON GOOD COMPARE
1042 006146 004777 002146          JSR PC,(LERR) ;CALL RELEVANT ERROR
1043 006152          LOOP BTL2+2,BTN2
1044 006172 000207          RTS ;IF NOT- EXIT
1045
1046
1047
1048 006174 012700 000002 CLRP: MOV #2,RO
1049 006200 012777 000001 002124          MOV #1,(RPM3) ;RESET RP11
1050 006206 004767 000010          JSR PC,TIMEP ;GENERATE 2 TIME PULSES
1051 006212 052777 020000 002142          BIS #B13,(RPM3) ;SET UNIT ON-LINE
1052 006220 000207          RTS ;EXIT
1053
1054 006222 052777 160001 002132 TIMEP: BIS #B15+B14+B13+B0,(RPM3) ;GENERATE A TIME PULSE
1055 006230 005300          DEC RO ;DEFLATE COUNT
1056 006232 005700          TST RO ;DONE?
1057 006234 001372          BNE TIMEP ;O=YES
1058 006236 000207          RTS PC
1059 006240 012700 000003 *3P: MOV #3,RO
1060 006244 000167 177752          JMP TIMEP ;3 TIME PULSES
1061
1062
1063

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1099
1100           ;SEEK ROUTINE.   SR7=0=CYLINDER. SR12=8= TRACK
1101
1102 006414 012777 000001 001710 SS:   MOV   #1,ARPC5
1103 006422 116777 171142 001712   MOVB  SR,ARPCA
1104 006430 116777 171135 001712   MOVB  SR+1,ARPD1
1105 006436 012777 000011 001666   MOV   #11,ARPCS
1106 006444 012767 100000 001624   MOV   #815,TOG1
1107 006452 032777 000001 001642 SL:   BIT   #80,ARPD5
1108 006460 001404           BEQ   SSG0
1109 006462 005267 001610           INC   TOG1
1110 006466 001371           BNE   SL
1111 006470 000751           BR    SS
1112 006472 017767 001644 001566 SSG0: MOV   ARPCA,GOOD
1113 006500 017767 001542 001562   MOV   ARPD1,BAD
1114 006506 104041           ERR+GB+DA
1115 006510 000240           NOP
1116 006512 000740           BR    SS
1117
1118           ;READ/WRITE ROUTINE
1119
1120 006514 016767 171050 001570 SRW:  MOV   SR,TEMP1           ;START WITH # OF WORDS IN SR.(1-5777)
1121 006522 005467 001564           NEG   TEMP1
1122 006526 000000           XX           ;PUT DATA PATTERN IN SR AND CONTINUE
1123 006530 016700 001556           MOV   TEMP1,RO
1124 006534 012701 012000           MOV   #12000,R1
1125 006540 016721 171024 DL1:  MOV   SR,(R1)+
1126 006544 005200           INC   RO
1127 006546 001374           BNE   DL1
1128 006550 012777 000001 001554 WGO:  MOV   #1,ARPCS
1129 006556 012777 012000 001554   MOV   #12000,ARPBA
1130 006564 016777 001522 001544   MOV   TEMP1,ARPC
1131 006572 012777 000003 001532   MOV   #3,ARPCS
1132 006600 000240           NOP
1133 006602 000240           NOP
1134 006604 000240           NOP
1135 006606 000240           NOP
1136 006610 000240           NOP
1137 006612 000240           NOP
1138 006614 032777 000200 001510 WL1:  BIT   #87,ARPCS
1139 006622 001774           BEQ   WL1
1140 006624 016777 001462 001504   MOV   TEMP1,ARPC
1141 006632 012777 020000 001500   MOV   #20000,ARPBA
1142 006640 012777 000005 001464   MOV   #5,ARPCS
1143 006646 000240           NOP
1144 006650 000240           NOP
1145 006652 000240           NOP
1146 006654 000240           NOP
1147 006656 000240           NOP
1148 006660 000240           NOP
1149 006662 032777 000200 001442 RL1:  BIT   #87,ARPCS
1150 006670 001774           BEQ   RL1
1151 006672 000240           NOP
1152 006674 000240           NOP
1153 006676 000240           NOP
1154 006700 012701 012000   MOV   #12000,R1

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H03

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|      |        |        |        |        |        |            |
|------|--------|--------|--------|--------|--------|------------|
| 1155 | 006704 | 012702 | 020000 |        | MOV    | #20000,R2  |
| 1156 | 006710 | 016703 | 001376 |        | MOV    | TEMP1,R3   |
| 1157 | 006714 | 012167 | 001346 | CL1:   | MOV    | (R1)+,GOOD |
| 1158 | 006720 | 012267 | 001344 |        | MOV    | (R2)+,BAD  |
| 1159 | 006724 | 026767 | 001336 | 001336 | CMP    | GOOD,BAD   |
| 1160 | 006732 | 001401 |        |        | BEQ    | .+4        |
| 1161 | 006734 | 104001 |        |        | ERR+GB |            |
| 1162 | 006736 | 005203 |        |        | INC    | R3         |
| 1163 | 006740 | 001365 |        |        | SNE    | CL1        |
| 1164 | 006742 | 000702 |        |        | BR     | WGO        |
| 1165 |        |        |        |        |        |            |

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1166
1167 006744 032767 040000 170616 ERROR: BIT      #B14,SR      ;TEST T10 DELETE SWITCH
1168 006752 001076      BNE      ERXIT1 ;EXIT NOW IF T10 DELETE SWITCH IS UP
1169 006754 004567 001042      JSR      RS,SAVOS ;SAVE ACO-5
1170 006760 012700 007612      MOV      #ERMS1,RO ;MESSAGE POINTER TO KO
1171 006764 004767 001234      JSR      PC,TYP0UT ;PRINT MESSAGE
1172 006770 016600 000014      MOV      14(SP),RO ;FETCH SAVED PC
1173 006774 162700 000002      SUB      #2,RO    ;FIND ADDRESS OF ERROR CALL
1174 007000 010005      MOV      RO,RS   ;PUT POINTER IN RS
1175 007002 004767 001054      JSR      PC,OCTPNT ;PRINT PC
1176 007006 012700 010002      MOV      #STMS,RO ;MESSAGE POINTER
1177 007012 004767 001206      JSR      PC,TYP0UT ;PRINT "PS="
1178 007016 016600 000016      MOV      16(SP),RO ;FETCH SAVED STATUS
1179 007022 004767 001034      JSR      PC,OCTPNT ;AND PRINT IT
1180 007026 032715 000400      BIT      #B2,(RS) ;TRAP?
1181 007032 001402      BEQ      GOGO    ;NO
1182 007034 004767 000420      JSR      PC,SUBER ;SUBROUTINE ERROR
1183 007040 032715 000020      GOGO: BIT      #B4,(RS) ;RPCS?
1184 007044 001402      BEQ      .+6     ;NO
1185 007046 004767 000210      JSR      PC,CSTYPE ;YES
1186 007052 032715 000010      BIT      #B3,(RS) ;RPER?
1187 007056 001402      BEQ      .+6     ;NO
1188 007060 004767 000242      JSR      PC,ERTYPE ;YES
1189 007064 032715 000004      BIT      #B2,(RS) ;RPDS?
1190 007070 001402      BEQ      .+6     ;NO
1191 007072 004767 000252      JSR      PC,DSTYPE ;YES
1192 007076 032715 000040      BIT      #B5,(RS) ;RPDA & RPCA?
1193 007102 001402      BEQ      .+6     ;NO
1194 007104 004767 000262      JSR      PC,ADTYPE ;YES
1195 007110 032715 000001      BIT      #B0,(RS) ;B0(1) FOR GOOD/BAD
1196 007114 001402      BEQ      .+6     ;SKIP IF=0
1197 007116 004767 000076      JSR      PC,GBTYPE ;GOOD/BAD
1198 007122 032715 000002      BIT      #B1,(RS) ;B1(1) FOR DATA
1199 007126 001402      BEQ      .+6     ;SKIP IF=0
1200 007130 004767 000150      JSR      PC,DATYPE ;DATA
1201 007134 004567 000676      ERXIT: JSR      RS,RESTOS ;RESTORE ACO-5
1202 007140 012700 000015      MOV      #CR,RO  ;PRINT
1203 007144 004767 000742      JSR      PC,T10  ;CR & LF
1204 007150 032767 100000 170412 ERXIT1: BIT      #B15,SR ;SR15(1)=DELETE ERROR HALT
1205 007156 001001      BNE      .+4     ;SKIP IF Z=0
1206 007160 000000      EHALT1: XX      ;ERROR HALT. CONTINUE
1207 007162 000002      RTI           ;EXIT ERROR ROUTINE
1208

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1209
1210
1211 007164 032767 020000 170376 LERCHK: BIT      #B13,SR      ;SR13(1)=LOOP ON ERROR
1212 007172 001002          BNE      .+6      ;EXIT IF 1
1213 007174 062716 000004          ADD      #4,(SP) ;ADVANCE RETURN VECTOR OVER LOOP JUMP
1214 007200 000207          LERXT:  RTS      PC      ;EXIT
1215
1216 007202 032767 010000 170360 LUPCHK: BIT      #B12,SR      ;SR12(1)=LOOP ALWAYS
1217 007210 001002          BNE      .+6      ;EXIT IF 1
1218 007212 062716 000004          ADD      #4,(SP) ;ADVANCE RETURN VECTOR OVER LOOP JUMP
1219 007216 000207          RTS      PC      ;EXIT
1220
1221 007220 012700 007761          GBTYPE: MOV      #GDMS,RO      ; POINTER TO "GOOD"
1222 007224 004767 000774          JSR      PC,TYPOUT ;PRINT MESSAGE
1223 007230 016700 001032          MOV      GOOD,RO      ;FETCH C(GOOD)
1224 007234 004767 000246          JSR      PC,PNT OCT ;PRINT OCTAL NUMBER
1225 007240 012700 007771          MOV      #BDMS,RO      ; POINTER TO "BAD"
1226 007244 004767 000754          JSR      PC,TYPOUT ;PRINT MESSAGE
1227 007250 016700 001014          MOV      BAD,RO      ;FETCH C(BAD)
1228 007254 004767 000226          JSR      PC,PNT OCT ;PRINT OCTAL NUMBER
1229 007260 000207          RTS      PC      ;EXIT
1230
1231 007262 012700 007702          CSTYPE: MOV      #CSMS,RO      ; POINTER TO "STATUS"
1232 007266 004767 000732          JSR      PC,TYPOUT ;PRINT TEXT
1233 007272 017700 001034          MOV      @RPCS,RO      ;FETCH C(RPCS)
1234 007276 004767 000204          JSR      PC,PNT OCT ;PRINT OCTAL NUMBER
1235 007302 000207          RTS      PC      ;EXIT
1236 007304 012700 010011          DATYPE: MOV      #DAMS,RO      ; POINTER TO "DATA"
1237 007310 004767 000710          JSR      PC,TYPOUT ;PRINT TEST
1238 007314 016700 000752          MOV      DATA,RO      ;FETCH C(DATA)
1239 007320 004767 000162          JSR      PC,PNT OCT ;PRINT OCTAL NUMBER
1240 007324 000207          RTS      PC      ;EXIT
1241 007326 012700 007712          ERTYPE: MOV      #ERMS,RO      ;PRINT
1242 007332 004767 000666          JSR      PC,TYPOUT ;"RPER="
1243 007336 017700 000764          MOV      @RPER,RO      ;PRINT
1244 007342 004767 000140          JSR      PC,PNT OCT ;RPER
1245 007346 000207          RTS      PC      ;EXIT
1246 007350 012700 007722          DSTYPE: MOV      #DSMS,RO      ;PRINT
1247 007354 004767 000644          JSR      PC,TYPOUT ;"RPDS="
1248 007360 017700 000736          MOV      @RPDS,RO      ;PRINT
1249 007364 004767 000116          JSR      PC,PNT OCT ;RPDS
1250 007370 000207          RTS      PC      ;EXIT
1251 007372 012700 007732          ADTYPE: MOV      #CYMS,RO      ;PRINT
1252 007376 004767 000622          JSR      PC,TYPOUT ;"CAR="
1253 007402 117700 000734          MOV      @RPCA,RO      ;PRINT
1254 007406 004767 000450          JSR      PC,OCTPNT ;CAR
1255 007412 012700 007741          MOV      #TAMS,RO      ;PRINT
1256 007416 004767 000602          JSR      PC,TYPOUT ;"TAR="
1257 007422 117700 000722          MOV      @RPA1,RO      ;PRINT
1258 007426 004767 000430          JSR      PC,OCTPNT ;TAR
1259 007432 012700 007751          MOV      #SEMS,RO      ;PRINT
1260 007436 004767 000562          JSR      PC,TYPOUT ;"SAR="
1261 007442 117700 000700          MOV      @RPA,RO      ;PRINT
1262 007446          ANDI      17,RO
1263 007452 004767 000404          JSR      PC,OCTPNT ;SAR
1264 007456 000207          RTS      PC      ;EXIT

```

|      |        |        |        |        |         |      |            |  |  |
|------|--------|--------|--------|--------|---------|------|------------|--|--|
| 1265 |        |        |        |        |         |      |            |  |  |
| 1266 | 007460 | 012700 | 007636 |        | SUBER:  | MOV  | #SUBRMS,RO |  |  |
| 1267 | 007464 | 004767 | 000534 |        |         | JSR  | PC,TYPOUT  |  |  |
| 1268 | 007470 | 016600 | 000022 |        |         | MOV  | 22(SP),RO  |  |  |
| 1269 | 007474 | 162700 | 000004 |        |         | SUB  | #4,RO      |  |  |
| 1270 | 007500 | 004767 | 000356 |        |         | JSR  | PC,OCTPNT  |  |  |
| 1271 | 007504 | 000207 |        |        |         | RTS  | PC         |  |  |
| 1272 | 007506 | 012767 | 000006 | 000570 | PNTOCT: | MOV  | #6,TOG4    |  |  |
| 1273 | 007514 | 010067 | 000566 |        | OLUP:   | MOV  | RO,WORK    |  |  |
| 1274 | 007520 |        |        |        |         | ANDI | 7,WORK     |  |  |
| 1275 | 007526 | 062767 | 000060 | 000552 |         | ADD  | #60,WORK   |  |  |
| 1276 | 007534 | 016746 | 000546 |        |         | MOV  | WORK,-(SP) |  |  |
| 1277 | 007540 | 006000 |        |        |         | ROR  | RO         |  |  |
| 1278 | 007542 | 006000 |        |        |         | ROR  | RO         |  |  |
| 1279 | 007544 | 006000 |        |        |         | ROR  | RO         |  |  |
| 1280 | 007546 | 005367 | 000532 |        |         | DEC  | TOG4       |  |  |
| 1281 | 007552 | 003360 |        |        |         | BGT  | OLUP       |  |  |
| 1282 | 007554 | 012767 | 000005 | 000522 |         | MOV  | #5,TOG4    |  |  |
| 1283 | 007562 | 012600 |        |        |         | MOV  | (SP)+,RO   |  |  |
| 1284 | 007564 |        |        |        |         | ANDI | 61,RO      |  |  |
| 1285 | 007570 | 004767 | 000316 |        |         | JSR  | PC,TTO     |  |  |
| 1286 | 007574 | 012600 |        |        | TOLUPO: | MOV  | (SP)+,RO   |  |  |
| 1287 | 007576 | 004767 | 000310 |        |         | JSR  | PC,TTO     |  |  |
| 1288 | 007602 | 005367 | 000476 |        |         | DEC  | TOG4       |  |  |
| 1289 | 007606 | 003372 |        |        |         | BGT  | TOLUPO     |  |  |
| 1290 | 007610 | 000207 |        |        |         | RTS  | PC         |  |  |

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|      |        |        |        |        |         |        |                                |
|------|--------|--------|--------|--------|---------|--------|--------------------------------|
| 1291 |        |        |        |        |         |        |                                |
| 1292 | 007612 | 023046 | 051105 | 047522 | ERMS1:  | .ASCII | /&ERROR AT ADDRESS @/          |
| 1293 | 007620 | 020122 | 052101 | 040440 |         |        |                                |
| 1294 | 007626 | 042104 | 042522 | 051523 |         |        |                                |
| 1295 | 007E34 | 040040 |        |        |         |        |                                |
| 1296 |        |        |        |        |         |        |                                |
| 1297 | 007636 | 041446 | 046101 | 042514 | SUBRMS: | .ASCII | /&CALLED FROM SUBROUTINE AT @/ |
| 1298 | 007644 | 020104 | 051106 | 046517 |         |        |                                |
| 1299 | 007652 | 051440 | 041125 | 047522 |         |        |                                |
| 1300 | 007660 | 052125 | 047111 | 020105 |         |        |                                |
| 1301 | 007666 | 052101 | 040040 |        |         |        |                                |
| 1302 |        |        |        |        |         |        |                                |
| 1303 | 007672 | 207    |        |        | PASMS:  | .BYTE  | 207                            |
| 1304 | 007673 | 046    | 047504 | 042516 |         | .ASCII | /&DONE&@/                      |
| 1305 | 007700 | 040046 |        |        |         |        |                                |
| 1306 |        |        |        |        |         |        |                                |
| 1307 | 007702 | 051046 | 041520 | 036523 | CSMS:   | .ASCII | /&RPCS= @/                     |
| 1308 | 007710 | 040040 |        |        |         |        |                                |
| 1309 |        |        |        |        |         |        |                                |
| 1310 | 007712 | 051046 | 042520 | 036522 | ERMS:   | .ASCII | /&RPER= @/                     |
| 1311 | 007720 | 040040 |        |        |         |        |                                |
| 1312 |        |        |        |        |         |        |                                |
| 1313 | 007722 | 051046 | 042120 | 036523 | DSMS:   | .ASCII | /&RPDS= @/                     |
| 1314 | 007730 | 040040 |        |        |         |        |                                |
| 1315 |        |        |        |        |         |        |                                |
| 1316 | 007732 | 041446 | 051101 | 020075 | CYMS:   | .ASCII | /&CAR= @/                      |
| 1317 | 007740 | 100    |        |        |         |        |                                |
| 1318 |        |        |        |        |         |        |                                |
| 1319 | 007741 | 040    | 052040 | 051101 | TAMS:   | .ASCII | / TAR= @/                      |
| 1320 | 007746 | 020075 | 100    |        |         |        |                                |
| 1321 |        |        |        |        |         |        |                                |
| 1322 | 007751 | 040    | 051440 | 051101 | SEMS:   | .ASCII | / SAR= @/                      |
| 1323 | 007756 | 020075 | 100    |        |         |        |                                |
| 1324 |        |        |        |        |         |        |                                |
| 1325 | 007761 | 046    | 047507 | 042117 | GDMS:   | .ASCII | /&GOOD= @/                     |
| 1326 | 007766 | 020075 | 100    |        |         |        |                                |
| 1327 |        |        |        |        |         |        |                                |
| 1328 | 007771 | 040    | 041040 | 042101 | BDMS:   | .ASCII | / BAD= @/                      |
| 1329 | 007776 | 020075 | 040040 |        |         |        |                                |
| 1330 |        |        |        |        |         |        |                                |
| 1331 | 010002 | 020040 | 051520 | 020075 | STMS:   | .ASCII | / PS= @/                       |
| 1332 | 010010 | 100    |        |        |         |        |                                |
| 1333 |        |        |        |        |         |        |                                |
| 1334 | 010011 | 046    | 040504 | 040524 | DAMS:   | .ASCII | /&DATA= @/                     |
| 1335 | 010016 | 020075 | 100    |        |         |        |                                |
| 1336 |        |        |        |        |         |        |                                |

|      |        |        |        |             |      |           |  |  |   |
|------|--------|--------|--------|-------------|------|-----------|--|--|---|
| 1337 |        |        |        |             |      |           |  |  |   |
| 1338 |        | 010022 |        |             |      |           |  |  |   |
| 1339 |        |        |        |             |      |           |  |  | .EVEN                                     |
| 1340 | 010022 | 010446 |        | SAVOS:      | MOV  | R4,-(SP)  |  |  | ;SAVE R0-R5 ON THE STACK                  |
| 1341 | 010024 | 010346 |        |             | MOV  | R3,-(SP)  |  |  | ;R5 WAS STACKED BY THE JSR                |
| 1342 | 010026 | 010246 |        |             | MOV  | R2,-(SP)  |  |  | ;R4-R3 ARE STACKED ABOVE IT               |
| 1343 | 010030 | 010146 |        |             | MOV  | R1,-(SP)  |  |  | ;WITH R0 ON TOP                           |
| 1344 | 010032 | 010046 |        |             | MOV  | R0,-(SP)  |  |  | ;R5 HOLDS THE RETURN PC, BUT AN           |
| 1345 | 010034 | 000115 |        |             | JMP  | (R5)      |  |  | ;RTS WOULD POP THE STACK-SO JUMP OUT      |
| 1346 |        |        |        |             |      |           |  |  |   |
| 1347 | 010036 | 005726 |        | RESTOS:     | TST  | (SP)+     |  |  | ;MOVE SP OVER WORD SAVED BY JSR           |
| 1348 | 010040 | 012600 |        |             | MOV  | (SP)+,R0  |  |  | ;R0-4                                     |
| 1349 | 010042 | 012601 |        |             | MOV  | (SP)+,R1  |  |  | ;ARE POPPED                               |
| 1350 | 010044 | 012602 |        |             | MOV  | (SP)+,R2  |  |  | ;IN LIFO                                  |
| 1351 | 010046 | 012603 |        |             | MOV  | (SP)+,R3  |  |  | ;SEQUENCE                                 |
| 1352 | 010050 | 012604 |        |             | MOV  | (SP)+,R4  |  |  | ;R5 IS POPPED BY THE RTS AND              |
| 1353 | 010052 | 000205 |        |             | RTS  | R5        |  |  | ;THE PC IS TAKEN FROM R5                  |
| 1354 |        |        |        |             |      |           |  |  |   |
| 1355 | 010054 | 012702 | 000012 | DECPNT:     | MOV  | #10,R2    |  |  | ;DIVISOR OF 10 FOR DECIMAL PRINT          |
| 1356 | 010060 | 000402 |        |             | BR   | DECREM    |  |  | ;PROCESS AND PRINT NUMBER                 |
| 1357 | 010062 | 012702 | 000010 | OCTPNT:     | MOV  | #8,R2     |  |  | ;DIVISOR OF 8 FOR OCTAL PRINT             |
| 1358 | 010066 | 004767 | 000060 | DECREM:     | JSR  | PC,IDIVR  |  |  | ;DIVIDE (R0) BY (R2) WITH REMAINDER IN R1 |
| 1359 | 010072 | 010146 |        |             | MOV  | R1,-(SP)  |  |  | ;STACK REMAINDER                          |
| 1360 | 010074 | 005700 |        |             | TST  | R0        |  |  | ;HAS NUMBER DEFLATED BELOW RADIX?         |
| 1361 | 010076 | 001402 |        |             | BEQ  | POPTT     |  |  | ;YES - POP AND PRINT                      |
| 1362 | 010100 | 004767 | 177762 |             | JSR  | PC,DECREM |  |  | ;NO - DIVIDE NUMBER BY RADIX              |
| 1363 | 010104 | 012600 |        | POPTT:      | MOV  | (SP)+,R0  |  |  | ;POP NUMBER FROM STACK                    |
| 1364 | 010106 | 062700 | 000060 |             | ADD  | #60,R0    |  |  | ;MAKE ASCII                               |
| 1365 | 010112 | 032767 | 040000 | 167450 TTO: | BIT  | #B14,SR   |  |  | ;IF SR14=1,DELETE TYPEOUT                 |
| 1366 | 010120 | 001010 |        |             | BNE  | TTOLF-2   |  |  | ;EXIT                                     |
| 1367 | 010122 | 010067 | 167440 |             | MOV  | R0,TPB    |  |  | ;PRINT CONTENTS OF R0                     |
| 1368 | 010126 | 105767 | 167432 | TTOLF:      | TSTB | TPS       |  |  | ;DONE YET?                                |
| 1369 | 010132 | 100375 |        |             | BPL  | TTOLF     |  |  | ;NO - KEEP LOOPING                        |
| 1370 | 010134 | 022700 | 000015 |             | CMF  | #CR,R0    |  |  | ;WAS CHARACTER A CR?                      |
| 1371 | 010140 | 001401 |        |             | BEQ  | TTOLF     |  |  | ;YES - PRINT LINE FEED                    |
| 1372 | 010142 | 000207 |        |             | RTS  | PC        |  |  | ;RETURN TO POPTT OR MAIN PROGRAM          |
| 1373 | 010144 | 012700 | 000012 | TTOLF:      | MOV  | #LF,R0    |  |  | ;PRINT LF                                 |
| 1374 | 010150 | 000760 |        |             | BR   | TTO       |  |  | ;EXECUTE PRINT                            |
| 1375 |        |        |        |             |      |           |  |  |   |
| 1376 | 010152 | 010067 | 000116 | IDIVR:      | MOV  | R0,DIVID  |  |  | ;SAVE DIVIDEND                            |
| 1377 | 010156 | 005000 |        |             | CLR  | R0        |  |  | ;CLEAR QUOTIENT AREA                      |
| 1378 | 010160 | 005001 |        |             | CLR  | R1        |  |  | ;CLEAR ACCUM.                             |
| 1379 | 010162 | 060201 |        | DIVLP:      | ADD  | R2,R1     |  |  | ;ADD DIVISOR TO ACCUM.                    |
| 1380 | 010164 | 020167 | 000104 |             | CMF  | R1,DIVID  |  |  | ;COMPARE TO DIVIDEND                      |
| 1381 | 010170 | 100002 |        |             | BPL  | DVEND     |  |  | ;WHEN ACCUM PASSES DIVIDEND - EXIT        |
| 1382 | 010172 | 005200 |        |             | INC  | R0        |  |  | ;INCREMENT QUOTIENT THEN                  |
| 1383 | 010174 | 000772 |        |             | BR   | DIVLP     |  |  | ;ADD AGAIN                                |
| 1384 | 010176 | 001003 |        | DVEND:      | BNE  | DIVN1     |  |  | ;JUMP TO GET REMAINDER                    |
| 1385 | 010200 | 005200 |        |             | INC  | R0        |  |  | ;NO REMAINDER - INCREMENT QUOTIENT        |
| 1386 | 010202 | 005001 |        |             | CLR  | R1        |  |  | ;REMAINDER OF 0                           |
| 1387 | 010204 | 000207 |        |             | RTS  | PC        |  |  | ;EXIT                                     |
| 1388 | 010206 | 160167 | 000062 | DIVN1:      | SUB  | R1,DIVID  |  |  | ;FANCY FINAGLING TO                       |
| 1389 | 010212 | 060267 | 000056 |             | ADD  | R2,DIVID  |  |  | ;DETERMINE THE REMAINDER                  |
| 1390 | 010216 | 016701 | 000052 |             | MOV  | DIVID,R1  |  |  | ;REMAINDER TO R1                          |
| 1391 | 010222 | 000207 |        |             | RTS  | PC        |  |  | ;EXIT WITH QUOTIENT IN R0                 |

|      |        |        |        |         |              |           |
|------|--------|--------|--------|---------|--------------|-----------|
| 1392 |        |        |        |         |              |           |
| 1393 | 010224 | 010046 |        | TYP0UT: | MOV          | RO, -(SP) |
| 1394 | 010226 | 117600 | 000000 | TPOFCH: | MOV          | 3(SP), RO |
| 1395 | 010232 | 022700 | 000100 |         | CMP          | #100, RO  |
| 1396 | 010236 | 001411 |        |         | BEQ          | TPOUTX    |
| 1397 | 010240 | 022700 | 000046 |         | CMP          | #46, RO   |
| 1398 | 010244 | 001002 |        |         | BNE          | .+6       |
| 1399 | 010246 | 012700 | 000015 |         | MOV          | #CR, RO   |
| 1400 | 010252 | 004767 | 177634 |         | JSR          | PC, ↑0    |
| 1401 | 010256 | 005216 |        |         | INC          | (SP)      |
| 1402 | 010260 | 000762 |        |         | BR           | TPOFCH    |
| 1403 | 010262 | 005726 |        | TPOUTX: | POP          |           |
| 1404 | 010264 | 000207 |        |         | RTS          | PC        |
| 1405 |        |        |        |         |              |           |
| 1406 | 010266 | 000000 |        | GOOD:   | XX           |           |
| 1407 | 010270 | 000000 |        | BAD:    | XX           |           |
| 1408 | 010272 | 000000 |        | DATA:   | XX           |           |
| 1409 | 010274 | 000000 |        | DIVID:  | XX           |           |
| 1410 | 010276 | 000000 |        | TOG1:   | XX           |           |
| 1411 | 010300 | 000000 |        | TOG2:   | XX           |           |
| 1412 | 010302 | 000000 |        | TOG3:   | XX           |           |
| 1413 | 010304 | 000000 |        | TOG4:   | XX           |           |
| 1414 | 010306 | 000000 |        | WORK:   | XX           |           |
| 1415 | 010310 | 000000 |        | BTOG:   | XX           |           |
| 1416 | 010312 | 000000 |        | TEMP1:  | XX           |           |
| 1417 | 010314 | 000000 |        | MASK:   | XX           |           |
| 1418 | 010316 | 000000 |        | ROTOG:  | XX           |           |
| 1419 | 010320 | 000000 |        | LERR:   | XX           |           |
| 1420 | 010322 | 176710 |        | RPDS:   | 176710       |           |
| 1421 | 010324 | 176711 |        | RPDS1:  | 176711       |           |
| 1422 | 010326 | 176712 |        | RPER:   | 176712       |           |
| 1423 | 010330 | 176713 |        | RPER1:  | 176713       |           |
| 1424 | 010332 | 176714 |        | RPCS:   | 176714       |           |
| 1425 | 010334 | 176715 |        | RPCS1:  | 176715       |           |
| 1426 | 010336 | 176716 |        | RPWC:   | 176716       |           |
| 1427 | 010340 | 176720 |        | RPBA:   | 176720       |           |
| 1428 | 010342 | 176722 |        | RPCA:   | 176722       |           |
| 1429 | 010344 | 176723 |        | RPCA1:  | 176723       |           |
| 1430 | 010346 | 176724 |        | RPDA:   | 176724       |           |
| 1431 | 010350 | 176725 |        | RPDA1:  | 176725       |           |
| 1432 | 010352 | 176726 |        | RPM1:   | 176726       |           |
| 1433 | 010354 | 176727 |        | RPM11:  | 176727       |           |
| 1434 | 010356 | 176730 |        | RPM2:   | 176730       |           |
| 1435 | 010360 | 176731 |        | RPM21:  | 176731       |           |
| 1436 | 010362 | 176732 |        | RPM3:   | 176732       |           |
| 1437 | 010364 | 176733 |        | RPM31:  | 176733       |           |
| 1438 | 010366 | 176734 |        | RPB1:   | 176734       |           |
| 1439 | 010370 | 176735 |        | RPB11:  | 176735       |           |
| 1440 | 010372 | 176736 |        | RPB2:   | 176736       |           |
| 1441 | 010374 | 176737 |        | RPB21:  | 176737       |           |
| 1442 | 010376 | 176740 |        | RPB3:   | 176740       |           |
| 1443 | 010400 | 176741 |        | RPB31:  | 176741       |           |
| 1444 | 010402 | 000254 |        | RPIV:   | .WORD        | 254       |
| 1445 | 010404 | 000256 |        | RPSV:   | .WORD        | 256       |
| 1446 | 010406 | 000000 |        | DEBUG:  | XX           |           |
| 1447 |        | 010606 |        |         | . =DEBUG+200 |           |

```

; STACK ADDRESS POINTER FOR MESSAGE
; FETCH ASCII BYTE
; IS IT 3(TERMINATOR)?
; YES - EXIT
; IS IT CRLF FLAG?
; NO
; YES - CHANGE DATA TO CRLF
; PRINT
; MOVE POINTER TO NEXT BYTE
; FETCH NEXT CHARACTER
; POP STACK TO REACH RETURN VECTOR
; EXIT
    
```



804

MAIN. MACY11 27(732) 09-SEP-76 09:58 PAGE 40  
DIRPER.P11

1448  
1449  
1450

00000!

.END

;THAT'S ALL FOLKS!





|        |        |       |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
|--------|--------|-------|-------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|--|--|
| DSF5   | 002656 | 637#  | 645   |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DSF5P  | 002724 | 642   | 645#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DSF6   | 002734 | 646#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DSF7   | 002736 | 648#  | 655   |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DSF7P  | 022776 | 652   | 655#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DSL13  | 003220 | 683#  | 691   | 694  |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DSMS   | 007722 | 1246  | 1313# |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DSTYPE | 007350 | 1191  | 1246# |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| DVEND  | 010176 | 1381  | 1384# |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ER =   | 007160 | 1206# |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ER     | 000010 | 323#  | 407   | 547  | 704  | 714 | 726 | 738 | 753 | 765 | 780 | 792 | 806 | 919 |  |  |  |  |  |  |
| ERBT   | 001450 | 495#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF1   | 003316 | 699#  | 707   |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF1P  | 003364 | 707#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF10  | 004160 | 786#  | 795   | 797  |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF10P | 004232 | 795#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF11  | 004256 | 800#  | 809   |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF11P | 004326 | 809#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF12  | 004336 | 810#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF13  | 004340 | 812#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF14  | 004342 | 814#  | 822   |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF14P | 004406 | 822#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF15  | 004416 | 823#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF16  | 004420 | 825#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF17  | 004422 | 827#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF2   | 003374 | 708#  | 717   |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF2P  | 003446 | 717#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF20  | 004424 | 829#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF21  | 004426 | 831#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF22  | 004430 | 833#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF3   | 003456 | 718#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF4   | 003560 | 732#  | 741   | 743  |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF4P  | 003632 | 741#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF5   | 003636 | 745#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF6   | 003760 | 759#  | 768   | 770  |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF6P  | 004032 | 768#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERF7   | 004056 | 772#  |       |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERL3   | 003466 | 720#  | 728   | 730  |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERL3P  | 003534 | 725   | 728#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERL5   | 003666 | 747#  | 755   | 757  |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERL5P  | 003734 | 752   | 755#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERL7   | 004066 | 774#  | 782   | 784  |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERL7P  | 004134 | 779   | 782#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERM =  | 104400 | 319#  | 1074  | 1078 | 1082 |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERMS   | 007712 | 1241  | 1310# |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERMS1  | 007612 | 1170  | 1292# |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERN1   | 003350 | 703   | 705#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERN10  | 004216 | 791   | 793#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERN11  | 004312 | 805   | 807#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERN14  | 004372 | 818   | 820#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERN2   | 003432 | 713   | 715#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERN4   | 003616 | 737   | 739#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERN6   | 004016 | 764   | 766#  |      |      |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |
| ERP =  | 104000 | 318#  | 401   | 407  | 413  | 420 | 427 | 434 | 441 | 448 | 455 | 462 | 469 | 476 |  |  |  |  |  |  |
|        |        | 482   | 492   | 496  | 500  | 504 | 508 | 512 | 516 | 520 | 524 | 528 | 540 | 546 |  |  |  |  |  |  |
|        |        | 554   | 562   | 570  | 578  | 586 | 596 | 605 | 625 | 634 | 643 | 653 | 662 | 670 |  |  |  |  |  |  |



|        |   |        |       |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
|--------|---|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|
| P2     | = | 000100 | 296#  |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| P3     | = | 000140 | 297#  |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| P4     | = | 000200 | 298#  | 923   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| P5     | = | 000240 | 299#  | 941   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| P6     | = | 000300 | 300#  |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| P7     | = | 000340 | 301#  | 840   | 848   | 866   | 868   | 879   | 890   | 903   | 916   | 928   | 933   | 945   | 1014  |  |  |  |
| RESBA  |   | 002066 | 565#  | 572   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESBAP |   | 002126 | 568#  | 572#  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESCA  |   | 002136 | 573#  | 580   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESCAP |   | 002176 | 576#  | 580#  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESCS  |   | 001752 | 550#  | 556   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESCSP |   | 002006 | 553#  | 556#  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESDA  |   | 002206 | 581#  | 588   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESCAP |   | 002250 | 584#  | 588#  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESDS  |   | 001624 | 533#  | 542   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESDSP |   | 001700 | 539#  | 542#  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESER  |   | 001710 | 543#  | 549   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESERP |   | 001742 | 546#  | 549#  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESTOS |   | 010036 | 1201  | 1347# |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESWC  |   | 002016 | 557#  | 564   |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RESWCP |   | 002056 | 560#  | 564#  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RLUP   |   | 006400 | 1093# | 1096  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RL1    |   | 006662 | 1149# | 1150  |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| ROTOG  |   | 010316 | 1084# | 1088# | 1091* | 1095* | 1418# |       |       |       |       |       |       |       |       |  |  |  |
| RPBA   |   | 010340 | 424   | 426   | 508   | 565*  | 567   | 569   | 1129* | 1141* | 1427# |       |       |       |       |  |  |  |
| RPBT   |   | 001500 | 503#  |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPB1   |   | 010366 | 466   | 468   | 520   | 1438# |       |       |       |       |       |       |       |       |       |  |  |  |
| RPB11  |   | 010370 | 1439# |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPB2   |   | 010372 | 473   | 475   | 524   | 1440# |       |       |       |       |       |       |       |       |       |  |  |  |
| RPB21  |   | 010374 | 1441# |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPB3   |   | 010376 | 480   | 528   | 1442# |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPB31  |   | 010400 | 1443# |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPCA   |   | 010342 | 431   | 433   | 512   | 573*  | 575   | 577   | 718*  | 721*  | 733*  | 1103* | 1112  | 1253  | 1428# |  |  |  |
| RPCA1  |   | 010344 | 960   | 1429# |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPCS   |   | 010332 | 411   | 500   | 550*  | 552   | 616*  | 700*  | 710*  | 712   | 722*  | 734*  | 749*  | 761*  | 776*  |  |  |  |
|        |   |        | 788*  | 802*  | 815*  | 844*  | 876*  | 898*  | 900*  | 912*  | 925*  | 940*  | 942*  | 1049* | 1072  |  |  |  |
|        |   |        | 1075  | 1080  | 1102* | 1105* | 1128* | 1131* | 1138  | 1142* | 1149  | 1233  | 1424# |       |       |  |  |  |
| RPCS1  |   | 010334 | 1425# |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPDA   |   | 010346 | 438   | 440   | 516   | 581*  | 583   | 585   | 609   | 612*  | 745*  | 772*  | 775*  | 787*  | 977   |  |  |  |
|        |   |        | 996   | 1113  | 1261  | 1430# |       |       |       |       |       |       |       |       |       |  |  |  |
| RPCA1  |   | 010350 | 748*  | 760*  | 1104* | 1257  | 1431# |       |       |       |       |       |       |       |       |  |  |  |
| RPDS   |   | 010322 | 399   | 492   | 538   | 592*  | 594   | 600*  | 603   | 613*  | 623   | 630*  | 632   | 638*  | 641   |  |  |  |
|        |   |        | 649*  | 651   | 657*  | 660   | 666*  | 668   | 674*  | 677   | 684*  | 686   | 699   | 845*  | 862*  |  |  |  |
|        |   |        | 938*  | 1107  | 1248  | 1420# |       |       |       |       |       |       |       |       |       |  |  |  |
| RPDS1  |   | 010324 | 1421# |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPER   |   | 010326 | 405   | 496   | 543*  | 545   | 702   | 708*  | 720*  | 724   | 732*  | 736   | 747*  | 751   | 759*  |  |  |  |
|        |   |        | 763   | 774*  | 778   | 786*  | 790   | 800*  | 804   | 814*  | 817   | 1243  | 1422# |       |       |  |  |  |
| RPER1  |   | 010330 | 1423# |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPIV   |   | 010402 | 841*  | 860*  | 874*  | 885*  | 897*  | 910*  | 924*  | 939*  | 1444# |       |       |       |       |  |  |  |
| RPM1   |   | 010352 | 445   | 447   | 1432# |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPM11  |   | 010354 | 1433# |       |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPM2   |   | 010356 | 452   | 454   | 533*  | 685*  | 1434# |       |       |       |       |       |       |       |       |  |  |  |
| RPM21  |   | 010360 | 959*  | 1435# |       |       |       |       |       |       |       |       |       |       |       |  |  |  |
| RPM3   |   | 010362 | 459   | 461   | 534*  | 535*  | 537*  | 591*  | 593*  | 599*  | 601   | 602*  | 609*  | 615*  | 618*  |  |  |  |
|        |   |        | 619*  | 620*  | 629*  | 631*  | 637*  | 639*  | 640*  | 648*  | 650*  | 656*  | 658*  | 659*  | 665*  |  |  |  |
|        |   |        | 667*  | 673*  | 675*  | 676*  | 683*  | 699*  | 709*  | 975*  | 976*  | 993*  | 994*  | 1051* | 1054* |  |  |  |



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 DZRPEA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

|        |          |       |       |       |       |      |       |      |       |      |      |      |       |      |
|--------|----------|-------|-------|-------|-------|------|-------|------|-------|------|------|------|-------|------|
| TTOLF  | 010144   | 1366  | 1371  | 1373* |       |      |       |      |       |      |      |      |       |      |
| TTJLP  | 010126   | 1368* | 1369  |       |       |      |       |      |       |      |      |      |       |      |
| TYPOUT | 010224   | 1011  | 1171  | 1177  | 1222  | 1226 | 1232  | 1237 | 1242  | 1247 | 1252 | 1256 | 1260  | 1267 |
|        |          | 1393* |       |       |       |      |       |      |       |      |      |      |       |      |
| T1     | 000620   | 398*  | 403   | 1015  |       |      |       |      |       |      |      |      |       |      |
| T1P    | 000642   | 400   | 403*  |       |       |      |       |      |       |      |      |      |       |      |
| T1C    | 001242   | 458*  | 464   |       |       |      |       |      |       |      |      |      |       |      |
| T1OP   | 001272   | 460   | 464*  |       |       |      |       |      |       |      |      |      |       |      |
| T11    | 001302   | 465*  | 471   |       |       |      |       |      |       |      |      |      |       |      |
| T11P   | 001332   | 467   | 471*  |       |       |      |       |      |       |      |      |      |       |      |
| T12    | 001342   | 472*  | 478   |       |       |      |       |      |       |      |      |      |       |      |
| T12P   | 001372   | 474   | 478*  |       |       |      |       |      |       |      |      |      |       |      |
| T13    | 001402   | 479*  | 484   |       |       |      |       |      |       |      |      |      |       |      |
| T13P   | 001424   | 481   | 484*  |       |       |      |       |      |       |      |      |      |       |      |
| T2     | 000652   | 404*  | 409   |       |       |      |       |      |       |      |      |      |       |      |
| T2P    | 000674   | 406   | 409*  |       |       |      |       |      |       |      |      |      |       |      |
| T3     | 000704   | 410*  | 415   |       |       |      |       |      |       |      |      |      |       |      |
| T3P    | 006240   | 617   | 701   | 711   | 723   | 735  | 750   | 762  | 777   | 789  | 803  | 816  | 1059* |      |
| T3PP   | 000730   | 412   | 415*  |       |       |      |       |      |       |      |      |      |       |      |
| T4     | 000740   | 416*  | 422   |       |       |      |       |      |       |      |      |      |       |      |
| T4P    | 000770   | 418   | 422*  |       |       |      |       |      |       |      |      |      |       |      |
| T5     | 001000   | 423*  | 429   |       |       |      |       |      |       |      |      |      |       |      |
| T5P    | 001030   | 425   | 429*  |       |       |      |       |      |       |      |      |      |       |      |
| T6     | 001040   | 430*  | 436   |       |       |      |       |      |       |      |      |      |       |      |
| T6P    | 001070   | 432   | 436*  |       |       |      |       |      |       |      |      |      |       |      |
| T7     | 001100   | 437*  | 443   |       |       |      |       |      |       |      |      |      |       |      |
| T7P    | 001132   | 439   | 443*  |       |       |      |       |      |       |      |      |      |       |      |
| T8     | 001142   | 444*  | 450   |       |       |      |       |      |       |      |      |      |       |      |
| T8P    | 001172   | 446   | 450*  |       |       |      |       |      |       |      |      |      |       |      |
| T9     | 001202   | 451*  | 457   |       |       |      |       |      |       |      |      |      |       |      |
| T9P    | 001232   | 453   | 457*  |       |       |      |       |      |       |      |      |      |       |      |
| WGC    | 006550   | 1128* | 1164  |       |       |      |       |      |       |      |      |      |       |      |
| WL1    | 006614   | 1138* | 1139  |       |       |      |       |      |       |      |      |      |       |      |
| WORK   | 010306   | 1273* | 1275* | 1276  | 1414* |      |       |      |       |      |      |      |       |      |
| XX     | = 000000 | 291*  | 1122  | 1206  | 1406  | 1407 | 1408  | 1409 | 1410  | 1411 | 1412 | 1413 | 1414  | 1415 |
|        |          | 1416  | 1417  | 1418  | 1419  | 1446 |       |      |       |      |      |      |       |      |
|        | = 010606 | 378*  | 383   | 384*  | 392*  | 851  | 907   | 931  | 1076  | 1160 | 1194 | 1187 | 1190  | 1193 |
|        |          | 1196  | 1199  | 1205  | 1212  | 1217 | 1338* | 1398 | 1447* |      |      |      |       |      |





# K04

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 DZRPEA.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| ADD  | 1025 | 1095 | 1092 | 1213 | 1218 | 1275 | 1364 | 1379 | 1389 |      |      |      |      |      |      |
| BEQ  | 400  | 406  | 412  | 418  | 425  | 432  | 439  | 446  | 453  | 460  | 467  | 474  | 481  | 539  | 546  |
|      | 553  | 560  | 568  | 576  | 584  | 604  | 642  | 661  | 678  | 687  | 694  | 725  | 743  | 752  | 770  |
|      | 779  | 797  | 857  | 962  | 984  | 1003 | 1041 | 1076 | 1081 | 1108 | 1139 | 1150 | 1160 | 1181 | 1184 |
|      | 1187 | 1190 | 1193 | 1196 | 1199 | 1361 | 1371 | 1396 |      |      |      |      |      |      |      |
| BGT  | 1281 | 1289 |      |      |      |      |      |      |      |      |      |      |      |      |      |
| BIC  | 537  | 602  | 609  | 618  | 620  | 640  | 659  | 676  | 976  | 983  | 994  | 1002 | 1037 | 1040 | 1066 |
|      | 1263 | 1275 | 1285 |      |      |      |      |      |      |      |      |      |      |      |      |
| BIS  | 593  | 609  | 615  | 619  | 631  | 639  | 650  | 659  | 667  | 675  | 699  | 709  | 844  | 876  | 898  |
|      | 900  | 912  | 925  | 940  | 942  | 975  | 993  | 1051 | 1054 | 1065 |      |      |      |      |      |
| BIT  | 439  | 583  | 594  | 601  | 603  | 623  | 632  | 641  | 651  | 660  | 668  | 677  | 693  | 702  | 712  |
|      | 724  | 735  | 742  | 751  | 763  | 769  | 778  | 790  | 796  | 804  | 817  | 856  | 1072 | 1075 | 1080 |
|      | 1107 | 1138 | 1149 | 1167 | 1180 | 1183 | 1186 | 1189 | 1192 | 1195 | 1198 | 1204 | 1211 | 1216 | 1365 |
| BNE  | 595  | 624  | 633  | 652  | 669  | 703  | 713  | 730  | 737  | 757  | 754  | 784  | 791  | 805  | 818  |
|      | 967  | 989  | 1009 | 1032 | 1057 | 1069 | 1073 | 1089 | 1096 | 1110 | 1127 | 1163 | 1168 | 1205 | 1212 |
|      | 1217 | 1366 | 1384 | 1398 |      |      |      |      |      |      |      |      |      |      |      |
| BPL  | 1369 | 1381 |      |      |      |      |      |      |      |      |      |      |      |      |      |
| BR   | 851  | 867  | 882  | 891  | 907  | 917  | 931  | 946  | 1083 | 1111 | 1116 | 1164 | 1356 | 1374 | 1383 |
|      | 1402 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| CLC  | 691  | 854  | 1029 | 1086 | 1093 |      |      |      |      |      |      |      |      |      |      |
| CLR  | 591  | 592  | 599  | 600  | 613  | 629  | 630  | 637  | 638  | 648  | 649  | 656  | 657  | 665  | 666  |
|      | 673  | 674  | 683  | 684  | 708  | 718  | 719  | 720  | 732  | 745  | 746  | 747  | 759  | 772  | 773  |
|      | 774  | 786  | 800  | 814  | 843  | 861  | 875  | 886  | 899  | 911  | 958  | 972  | 995  | 1377 | 1378 |
|      | 1386 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| CMP  | 411  | 552  | 729  | 756  | 783  | 961  | 966  | 983  | 988  | 1002 | 1040 | 1159 | 1370 | 1380 | 1395 |
|      | 1397 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| CMPB | 686  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| COM  | 1034 | 1037 | 1040 |      |      |      |      |      |      |      |      |      |      |      |      |
| DEC  | 1008 | 1055 | 1067 | 1088 | 1095 | 1280 | 1288 |      |      |      |      |      |      |      |      |
| EMT  | 318  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| HALT | 291  | 383  |      |      |      |      |      |      |      |      |      |      |      |      |      |
| INC  | 611  | 728  | 741  | 755  | 768  | 782  | 795  | 965  | 987  | 1109 | 1126 | 1162 | 1382 | 1385 | 1401 |
| JMP  | 403  | 409  | 415  | 422  | 429  | 436  | 443  | 450  | 457  | 464  | 471  | 478  | 484  | 542  | 549  |
|      | 556  | 564  | 572  | 580  | 588  | 598  | 607  | 628  | 636  | 645  | 655  | 664  | 672  | 681  | 691  |
|      | 707  | 717  | 728  | 741  | 755  | 768  | 782  | 795  | 809  | 922  | 851  | 872  | 882  | 895  | 907  |
|      | 921  | 931  | 935  | 950  | 965  | 987  | 1006 | 1015 | 1044 | 1060 | 1345 |      |      |      |      |
| JSR  | 403  | 409  | 415  | 422  | 429  | 436  | 443  | 450  | 457  | 464  | 471  | 478  | 484  | 492  | 496  |
|      | 500  | 504  | 508  | 512  | 516  | 520  | 524  | 528  | 536  | 542  | 544  | 549  | 551  | 556  | 558  |
|      | 564  | 566  | 572  | 574  | 580  | 582  | 588  | 598  | 607  | 609  | 611  | 617  | 622  | 626  | 628  |
|      | 636  | 645  | 655  | 664  | 672  | 681  | 691  | 701  | 705  | 707  | 711  | 715  | 717  | 723  | 728  |
|      | 735  | 739  | 741  | 750  | 755  | 762  | 766  | 768  | 777  | 782  | 789  | 793  | 795  | 801  | 803  |
|      | 807  | 809  | 816  | 820  | 822  | 842  | 851  | 859  | 872  | 873  | 882  | 884  | 895  | 896  | 907  |
|      | 909  | 921  | 922  | 931  | 934  | 937  | 950  | 957  | 965  | 971  | 974  | 987  | 992  | 1006 | 1011 |
|      | 1027 | 1028 | 1042 | 1044 | 1050 | 1169 | 1171 | 1175 | 1177 | 1179 | 1182 | 1185 | 1188 | 1191 | 1194 |
|      | 1197 | 1200 | 1201 | 1203 | 1222 | 1224 | 1226 | 1228 | 1232 | 1234 | 1237 | 1239 | 1242 | 1244 | 1247 |
|      | 1249 | 1252 | 1254 | 1256 | 1258 | 1260 | 1263 | 1267 | 1270 | 1285 | 1287 | 1358 | 1362 | 1400 |      |
| MOV  | 394  | 395  | 396  | 419  | 426  | 433  | 440  | 447  | 454  | 461  | 468  | 475  | 533  | 534  | 543  |
|      | 550  | 557  | 561  | 565  | 569  | 573  | 577  | 581  | 585  | 609  | 614  | 616  | 621  | 682  | 685  |
|      | 721  | 722  | 733  | 734  | 749  | 761  | 775  | 776  | 787  | 788  | 902  | 915  | 939  | 940  | 841  |
|      | 845  | 848  | 860  | 862  | 866  | 868  | 874  | 879  | 885  | 890  | 897  | 903  | 910  | 916  | 923  |
|      | 924  | 928  | 933  | 938  | 939  | 941  | 945  | 973  | 977  | 991  | 996  | 1010 | 1012 | 1013 | 1014 |
|      | 1022 | 1023 | 1024 | 1026 | 1035 | 1037 | 1038 | 1048 | 1049 | 1059 | 1084 | 1091 | 1102 | 1105 | 1106 |
|      | 1112 | 1113 | 1120 | 1123 | 1124 | 1125 | 1128 | 1129 | 1130 | 1131 | 1140 | 1141 | 1142 | 1154 | 1155 |
|      | 1156 | 1157 | 1158 | 1170 | 1172 | 1174 | 1176 | 1178 | 1202 | 1221 | 1223 | 1225 | 1227 | 1231 | 1233 |
|      | 1236 | 1238 | 1241 | 1243 | 1246 | 1248 | 1251 | 1255 | 1259 | 1266 | 1268 | 1272 | 1273 | 1276 | 1282 |
|      | 1283 | 1286 | 1340 | 1341 | 1342 | 1343 | 1344 | 1348 | 1349 | 1350 | 1351 | 1352 | 1355 | 1357 | 1359 |

|   |  |                             |                             |                     |              |             |             |             |             |             |              |              |              |              |              |
|---|--|-----------------------------|-----------------------------|---------------------|--------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|
| MOV8  | 1363<br>535<br>1394  | 1367<br>609                 | 1373<br>612                 | 1376<br>688         | 1390<br>700  | 1393<br>710 | 1399<br>748 | 760         | 959         | 960         | 1103         | 1104         | 1253         | 1257         | 1261         |
| NEG<br>NOP  | 1121<br>646<br>878   | 810<br>887                  | 812<br>888                  | 823<br>889          | 825<br>901   | 827<br>902  | 829<br>913  | 831<br>914  | 833<br>915  | 846<br>926  | 847<br>927   | 863<br>543   | 864<br>944   | 865<br>1115  | 877<br>1132  |
| RESET   | 1133<br>398  | 1134<br>404                 | 1135<br>410                 | 1136<br>416         | 1137<br>423  | 1143<br>430 | 1144<br>437 | 1145<br>444 | 1146<br>451 | 1147<br>458 | 1148<br>465  | 1151<br>472  | 1152<br>479  | 1153<br>698  |              |
| ROL<br>ROR<br>RTI<br>RTS  | 692<br>978<br>1207<br>492  | 855<br>979                  | 1030<br>980                 | 1094<br>981         | 997          | 998         | 999         | 1000        | 1000        | 1277        | 1278         | 1279         |              |              |              |
|   | 492<br>1077<br>1372<br>1173  | 496<br>1079<br>1387<br>1269 | 500<br>1090<br>1391<br>1388 | 504<br>1097<br>1404 | 508<br>1214  | 512<br>1219 | 516<br>1229 | 520<br>1235 | 524<br>1240 | 528<br>1245 | 1033<br>1250 | 1044<br>1264 | 1052<br>1271 | 1058<br>1290 | 1070<br>1353 |
| SUB<br>TRAP<br>TST  | 319<br>399   | 405                         | 417                         | 424                 | 431          | 445         | 452         | 459         | 466         | 473         | 480          | 538          | 545          | 559          | 567          |
| TSTB<br>.ABS<br>.ASCII<br>.BYTE<br>.END<br>.EVEN<br>.MACR<br>.REM<br>.REPT<br>.WORD | 1031<br>575<br>265<br>1292<br>1303<br>1450<br>1338<br>329<br>1<br>379<br>385<br>1444 | 1056<br>1368<br>1297        | 1068<br>1304                | 1347<br>1307        | 1360<br>1310 | 445<br>1313 | 452<br>1316 | 459<br>1319 | 466<br>1322 | 473<br>1325 | 480<br>1328  | 538<br>1331  | 545<br>1334  |              |              |
|   |  | 333                         | 339                         | 348                 | 353          | 359         | 367         |             |             |             |              |              |              |              |              |
|   |  | 386<br>1445                 | 387                         | 388                 | 492          | 496         | 500         | 504         | 508         | 512         | 516          | 520          | 524          | 528          | 611          |

ERRORS DETECTED: 0  
DEFAULT GLOBALS GENERATED: 0

\*DZRPEA, DZRPEA, SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DZRPEA.P11  
RUN-TIME: 5 9 3 SECONDS  
RUN-TIME RATIO: 29/18=1.5  
CORE USED: 9K (18 PAGES)

