RF11

DATA TEST

MD-11-DZRFB-B

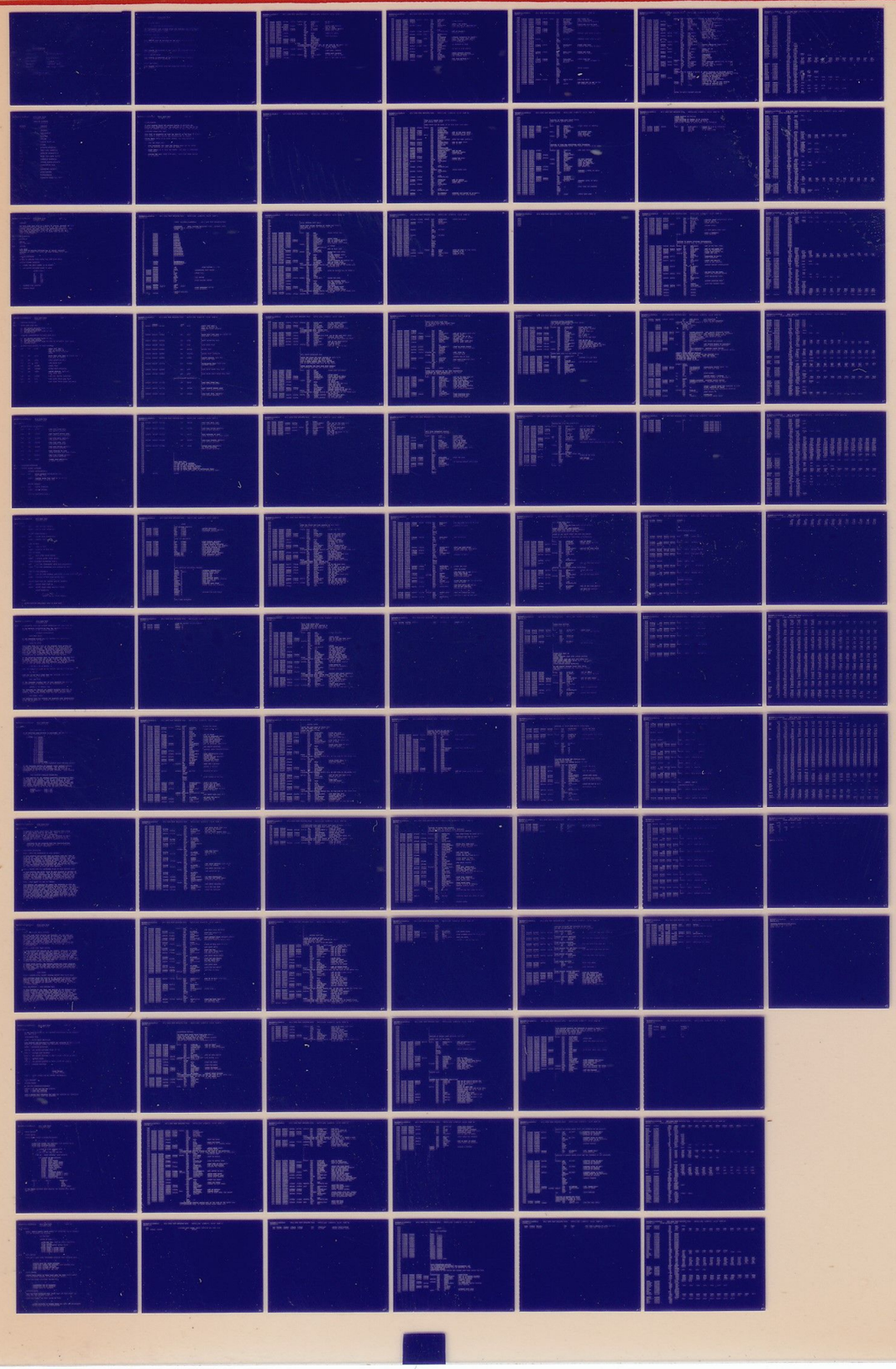
EP-DZRFB-B-DL

FICHE 1 OF 1

JUN 1978

digital

MADE IN USA



IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZRFB-B-D

PRODUCT NAME: RF11 DATA TEST

DATE CREATED: SEPTEMBER, 1973

MAINTAINED: DIAGNOSTIC GROUP

AUTHOR: EARL HAIGHT/C CASWELL

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1. ABSTRACT

THE RF11 DISK DATA TEST IS A SERIES OF STATIC, ADDRESS AND DATA RELIABILITY ROUTINES WHICH VERIFY TO THE USER THE DISK CONTROL (RF11) AND DISK (RS11) ARE OPERATING CORRECTLY. THIS TEST USED IN CONJUNCTION WITH THE RF11 DISKLESS AND RF11 MULTI DISK ASSURES THE USER OF AN ERROR FREE SYSTEM, WHEN USED IN ITS ENTIRETY.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11
RF11 AND RS11

2.2 STORAGE

DATA TEST
MAIN BODY OF PROGRAM OCCUPIES ALL OF MEMORY (MINIMUM REQUIRES 4K WORDS) THE WRITE AND READ BUFFERS FLOAT THRU MEMORY.

3. LOADING PROCEDURE

3.1 METHOD OF LOADING BOTH STATIC AND DATA TEST TAPES

PROGRAM FORMAT ABSOLUTE

A. VERIFY THE BOOT LOADER IS IN MEMORY.

B. SET SWITCH REGISTER EQUAL TO #500

MEMORY SIZE	#
4K	17
8K	37
12K	57
16K	77
20K	117
24K	137
28K	157

C. DEPRESS LOAD ADDRESS.

D. DEPRESS START.

4. STARTING PROCEDURE

4.1 WORST CASE DISK TEST

A) SET SWITCH REGISTER EQUAL TO 200
B) DEPRESS LOAD ADDRESS
C) SET SWITCH REGISTER EQUAL TO ZERO
D) DEPRESS START

4.2 OPERATOR INTERVENTION FOR DATA TEST ONLY.

A) SET SWITCH REGISTER EQUAL TO 200
B) DEPRESS LOAD ADDRESS
C) SET SWITCH REGISTER EQUAL TO MODE OF OPERATION (REF. SEC5.)
D) DEPRESS START.

4.3 ADDRESS ENTRY POINTS FOR TEST ROUTINES

600	JMP	ADT2	CHECK THAT WHEN A WORD IS WRITTEN IT DOES NOT ALTER ADJACENT WORDS
604	JMP	ADT3	WRITE EACH WORD ADDR ON ITSELF AND READ BACK TO COMPARE
610	JMP	ADT4	TRACK SELECTION TEST
614	JMP	ADT5	LOOK AHEAD TEST
620	JMP	SPIRAL	SPIRAL TEST
624	JMP	XSPIRAL	SPIRAL TEST EXTENSION
630	JMP	RANEX	RANDOM ADDRESS, DATA AND WORD COUNT TEST
634	JMP	EXTMEN	DISK EXT. MEMORY EXERCISER
640	JMP	PFT1	DISK WRITE POWER FAIL TEST
644	JMP	PFT2	DISK WRITE CHECK POWER FAIL TEST

(4.3 CONT'D)

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        ***MAINTENANCE ROUTINES***

        650     JMP     SELWC           LOAD WORD COUNT REG.
                                        WITH SWITCH REGISTER

        654     JMP     SELCMA          LOAD CURRENT MEMORY ADDR
                                        REG. WITH SWITCH REGISTER

        660     JMP     SELDAR          LOAD DISK ADDR. REGISTER
                                        WITH SWITCH REGISTER

        664     JMP     SELDAE          LOAD DISK ADDR. EXT.
                                        WITH SWITCH REGISTER

        670     JMP     SELDBR          LOAD DATA BUFFER REGISTER
                                        WITH SWITCH REGISTER

        674     JMP     MOVLK           MOVE CONTENTS OF LOOK
                                        AHEAD REGISTER INTO DATA LIGHTS

        700     JMP     SELDCS          LOAD DISK CONTROL REGISTER
                                        WITH SWITCH REGISTER

        704     JMP     STAMP           ENABLE READ AMPLIFIERS
                                        TO TRACK SELECTED
```

5. OPERATING PROCEDURE

5.1 CONTROL SWITCH SETTINGS

PROGRAM CONVERSATION *

SW15 SET — ENTER PROGRAM CONVERSATION MODE
REF. SEC. 5.2

RESET — OPERATE WORSE CASE TEST ON ALL DRIVES
BEGINNING AT DRIVE ZERO

DELETE TYPEOUT

SW14 SET — DELETE TYPEOUTS

RESET — REPORT MESSAGE

HALT ON COMPLETION FLAG *

(5.1 CONT'D)

SR13	SET	HALT ON FLAG (READY)
	RESET	EXECUTE NEXT OPERATION
	DELETE COMPARISIONS *	
SR12	SET	DELETE DATA COMPARISONS
	RESET	COMPARE DATA BUFFERS
	LOOP ON TEST	
SR11	SET	LOOP ON TEST
	RESET	CONTINUE TO NEXT TEST
	HALT ON ERROR	
SR10	SET	HALT AFTER ERROR REPORT
	RESET	CONTINUE AFTER ERROR REPORT
	ENTER INTERRUPT BACKGROUND TEST *	
SR9	SET	WAIT FOR INTERRUPTS USING WAIT INSTRUCTION
	RESET	WAIT FOR INTERRUPTS WITH BACKGROUND TEST
	LOOP ON DISK ADDRESS *	
SR8	SET	LOOP ON DISK ADDRESS (SPECIFIED BY WORD COUNT AND DAR)
	RESET	CONTINUE TO NEXT DISK BUFFER AREA.
	SELECT TRACK FROM SR (DURING DYNAMIC TESTING)	
SR7	SET	SELECT TRACK FROM SR
	RESET	SELECT TRACK UNDER PROGRAM CONTROL

TRACK SELECTION

6	5	4	3	2	1	0

SELECT ONE OF 177(8) TRACKS

NOTE:

* SWITCH SETTING APPLICABLE ONLY IN DATA TEST

5.2 CONVERSATION MODE FOR PROGRAM PARAMETERS FOR DATA TEST ONLY

IN THE PROGRAM CONVERSATION MODE THE OPERATOR CAN SPECIFY ANY ONE OR ALL OF THE PROGRAM PARAMETERS.

PROGRAM CONVERSATION

DATA TEST ONLY?

IF THE OPERATOR ANSWER YES THE PROGRAM WILL ENTER ONLY THE DATA PORTION OF TEST.

MULTI DK MODE?

MULTI DISK MODE IS A MODE IN THE PROGRAM WHICH ALLOWS THE OPERATOR TO EXECISE, ALL THE DISKS ON THE SYSTEM WITHOUT RE-STARTING THE PROGRAM. THE PROGRAM AFTER EXERCISING ONE DISK WILL REPORT A MESSAGE TELLING THE OPERATOR WHICH DISK WILL BE SELECTED NEXT, AND THEN THE PROGRAM WILL EXERCISE THAT DISK. WHEN A COMPLETE PASS IS ACCOMPLISHED, A PASS COMPLETE WILL BE REPORTED AND THE TEST WILL RECYCLE.

IF THE OPERATOR ANSWERS "YES" TO THIS QUESTION, HE WILL THEN BE ASKED HOW MANY DISKS ARE ON THE SYSTEM, AND THEN THE PRECEDING QUESTION WILL BE SKIPPED. IF THE OPERATOR ANSWERS "NO" TO THIS QUESTION, THE NEXT QUESTION WILL BE SKIPPED, AND HE WILL THEN BE ASKED WHICH DISK IS TO BE EXERCISED.

OF DKS 1 TO 10 OCTAL? X

TYPE THE NUMBER OF DISKS ON THE SYSTEM, FOR MULTI DISK MODE.

EX. DK? X

WHEN NOT IN THE MULTI DISK MODE THE OPERATOR WILL HAVE TO SPECIFY WHAT DISK IS TO BE USED.

OPT. WRD CNT?

IF THE OPERATOR ANSWERS "NO" TO THIS QUESTION THE NEXT TWO QUESTIONS WILL BE DELETED FROM THE CONVERSATION.

LENGTH (1 TO 1000)? XXX

THE OPERATOR CAN SPECIFY ANY LENGTH TRANSFER FROM 1(8) TO 1000(8) WORDS. THE NORMAL TRANSFER LENGTH IS N(8) WORDS WHERE IS THE MAXIMUM BUFFER SIZE FOR THE AVAILABLE CORE.

WRD ADDR? XXXX

THE OPERATOR MUST NOW SPECIFY THE STARTING WORD ADDRESS-THIS BEING ONE OF 2048(10). ADDRESS ENTRY MUST BE MADE IN OCTAL (0 TO 3777(8)).

(5.2 CONT'D)

OPT. DATA PAT. ?

IF NO OPTIONAL DATA PATTERN IS REQUESTED THE PROGRAM WILL EXECUTE THE FOLLOWING LIST OF DATA PATTERNS.

PATTERN	0	= 000000
"	1	= 177777
"	2	= 134510
"	3	= 043767
"	4	= 100000
"	5	= 107070
"	6	= 070707
"	7	= 052525
"	10	= 125252
"	11	= 177737
"	12	= 004102
"	13	= 136363
"	14	= 063636
"	15	= 000001
"	16	= 100005
"	17	= 000520
"	20	= 030303
"	21	= RANDOM DATA
"	22	= RUN ALL DATA PATTERNS UNDER PROGRAM CONTROL

IF THE OPERATOR DECIDES TO OPERATE UNDER PROGRAM CONTROL, THE NEXT QUESTION WILL BE SKIPPED. THE OPERATOR BY REQUESTING AN OPTIONAL DATA PATTERN HAS THE ABILITY OF SELECTING ANY ONE OF THE 21(8) DATA PATTERNS. DATA PATTERN NO. XX

DISK PROGRAM FUNCTION PARAMETERS

IN THIS SECTION OF THE PROGRAM PARAMETER CONVERSATION MODE, THE OPERATOR CAN SELECT ANYONE OR ALL THREE OF THE CONTROL FUNCTIONS TO BE EXECUTED. THE NORMAL SEQUENCE OF DISK FUNCTIONS UNDER PROGRAM CONTROL IS WRITE, WRITE CHECK, AND THEN READ. BY ENTERING THE CONVERSATION MODE THE OPERATOR HAS GAINED COMPLETE CONTROL OVER THE DISK FUNCTIONS. HE MUST SPECIFY YES OR NO TO ALL OF THE FOLLOWING QUESTIONS.

WRITE?	(YES - NO)
WRITE CHECK?	(YES - NO)
READ?	(YES - NO)

(5.2 CONT'D)

TO PERFORM A WRITE CHECK ONLY, THE OPERATOR MUST FIRST WRITE SOME KNOWN DATA ON THE DISK. THIS COURSE OF ACTION ALSO PREVAILS FOR A READ ONLY OPERATION.
* IF AN ERROR OCCURS IN THE LINE THE OPERATOR IS TYPING, DEPRESS THE RUB-OUT. THIS CAUSES THE QUESTION TO BE RETYPED AND ALLOWS THE OPERATOR TO PROPERLY ANSWER THE QUESTION.

* INDICATES TO THE OPERATOR THAT THE CARRIAGE-RETURN SHOULD BE TYPED AT THE INDICATED PLACE TO TERMINATE THE LINE OF TYPED CHARACTERS.

5.3 SUBROUTINE ABSTRACTS

ADT2 - TEST FOR ALTERATION OF WORD ADDRESS

IN THIS ADDRESS TEST, TRACK ZERO IS LOADED WITH ALL ONES IN BLOCK OF 2K. THEN THE TEST STARTING WITH ADDRESS 0 AND PROGRESSING UP THROUGH AND INCLUDING ADDRESS 3777(8), THE OCTAL VALUE OF THE ADDRESS, IS WRITTEN ON ITSELF AND ALL OTHER ADDRESSES ARE CHECKED FOR MODIFICATION. THEY SHOULD EQUAL ALL ONES. AFTER CHECK IS COMPLETED AND ALL ERRORS ARE REPORTED IF ANY, THE ROUTINE THEN RE-WRITES THE ADDRESS WITH ALL ONES AND THEN CONTINUES ON WITH THE NEXT ADDRESS.

ADT3 - VERIFY THAT ALL ADDRESSES EXIST ON DISK SURFACE TRACK

IN THIS ROUTINE THE OCTAL VALUE OF EACH ADDRESS IS WRITTEN ON ITSELF IN 2K WORD BLOCKS. THE ROUTINE THEN READS THE DISK AND VERIFIES THAT ALL ADDRESSES CAN BE ACCESSED. ERRORS MAY BE REPORTED IN THIS TEST WHICH ARE NOT ADDRESS ERRORS BUT DATA ERRORS. THE OPERATOR IS CAUTIONED TO CAREFULLY EXAMINE THE ERRORS TO DISTINGUISH BETWEEN THE ADDRESS AND DATA ERRORS.

ADT4 - TEST TRACK "X" AND "Y" MATRIX

THIS ROUTINE WAS DESIGNED TO ENABLE THE OPERATOR AN EASY AND SURE METHOD OF DETECTING DEFECTIVE MATRIX SWITCHES. IN THIS ROUTINE THE FIRST AND LAST LOCATION OF EACH TRACK (0 AND 3777(8)) ARE WRITTEN WITH ALL ONES. AFTER THE INITIAL WRITE HAS TAKEN PLACE, THE ROUTINE THEN STARTS WITH THE FIRST WORD OF THE ABOVE INDICATED LOCATION AND WRITES THE ADDRESS ON ITSELF. THE NEXT STEP OF THE ROUTINE IS TO CHECK ALL OTHER ADDRESSES TO SEE IF THEY HAVE BEEN ALTERED. AFTER ALL ERRORS HAVE BEEN REPORTED, IF ANY, THE ROUTINE RE-WRITES THE ADDRESS WITH ALL ONES AND CONTINUES ON WITH THE NEXT ADDRESS.

(5.3 CONT'D)

ADTS - TEST LOOK AHEAD FEATURE

THE DISK LOOK AHEAD FEATURE WAS DESIGNED FOR THE USER WHO WANTED OPTIMUM USE OF THE DISK, BY KNOWING AT WHAT ADDRESS THE DISK READ HEADS ARE LOCATED AT ALL TIMES. THE ADDRESS LOADED INTO THE ADS REGISTER IS THE PHYSICAL ADDRESS OF THE DISK. THE PROGRAM LOCATES THE PHYSICAL ADDRESS BY WRITE A WORD AND UPON RECEIVING THE COMPLETION FLAG THE PROGRAM READS THE ADS REGISTER. THE ADDRESS MAY BE UP TO 2 ADDRESSES OFF.

SPIRAL - TEST DISK TRACK SPIRAL

IN THIS ROUTINE THE ABILITY OF THE CONTROL (RF09/15) TO SPIRAL FROM ONE TRACK TO ANOTHER DURING A READ AND A WRITE. IN ORDER TO CHECK THE READ SPIRAL, THE LAST ADDRESS (3777(8)) OF TRACK ZERO IS WRITTEN WITH PRE-DETERMINED DATA AND THE FIRST ADDRESS (0) OF TRACK ONE, IS ALSO WRITTEN WITH PRE-DETERMINED DATA. THEN A TWO WORD READ STARTING AT LOCATION 3777(8) OF TRACK ZERO IS ACCOMPLISHED. THE TWO WORDS THEN ARE COMPARED TO THE DATA WRITTEN AND ANY ERRORS ARE REPORTED.

TO CHECK WRITE SPIRAL, THE ROUTINE WRITES TWO WORDS STARTING AT ADDRESS 3777(8) OF TRACK ZERO AND TERMINATES AT LOCATION 0 OF TRACK ONE. THE ROUTINE THEN READS THE TWO LOCATIONS WITH ONE WORD TRANSFERS, AND VERIFIES THE CORRECT DATA WAS STORED IN EACH LOCATION.

DATA TESTS

RANEX - RANDOM DATA, RANDOM ADDRESS RANDOM WORD COUNT TEST

THIS ROUTINES TESTS THE ABILITY OF THE SYSTEM TO ACCESS RANDOM ADDRESS WITH RANDOM DATA AND AN INCREMENTAL WORD COUNT. THE DATA IS FIRST WRITTEN ON THE DISK AND THEN DATA IS WRITE-CHECKED. ALL ERRORS ARE REPORTED. THE WORD COUNT RUNS FROM 1 TO 1000(8) WORDS.

DATA RELIABILITY - DATA PATTERN TEST

IN THIS PORTION OF THE TEST, THE ABILITY OF THE COMPLETE DISK SURFACE TO WRITE, WRITE-CHECK, AND READ DATA IS TESTED. THE ROUTINE FIRST WRITES THE COMPLETE SURFACE WITH A SET DATA PATTERN, THEN A WRITE CHECK OF THE COMPLETE SURFACE IS ACCOMPLISHED, THUS REPORTING ALL ERRORS BETWEEN THE DATA WRITTEN AND THE DATA IN MEMORY. THREE READS ARE ACCOMPLISHED FOR EACH BUFFER AREA ON THE DISK. THE OPERATOR AT THIS POINT HAS SEVERAL OPTIONS AS TO WHAT COURSE OF ACTION THE PROGRAM WILL TAKE NEXT. (REF. SEC. 5.1)

(5.3 CONT'D)

IN THE DATA RELIABILITY, ALL PROGRAM PARAMETERS CAN BE CHANGED.
REF. SEC. 5.2

MAINTENANCE TOOL

STAMP - STATIC TRACK SELECTION

THIS ROUTINE WAS DESIGNED TO ENABLE THE OPERATOR TO HAVE A QUICK METHOD OF SELECTING TRACKS FOR AMPLITUDE ADJUSTMENTS.

STAMP - OPERATING PROCEDURE

STEP A. SET SWITCH REGISTER EQUAL TO 704

STEP B. DEPRESS LOAD ADDRESS

STEP C. SET SWITCH REGISTER 9 THRU 7 EQUAL TO DISK #0 THRU 7

STEP D. DEPRESS START

STEP E. SET SWITCH REGISTER 6 THRU 0 EQUAL TO TRACK #

STEP F. DEPRESS CONTINUE

```
6     5     4     3     2     1     0

                  TRACK NUMBER
                  (0 THRU 177(8))
```

STEP G. TRACK NUMBER CAN BE CHANGED ARBITRARILY.

6. ERROR REPORTS

6.1 ADDRESS ERROR

XX EPR CNT XXXXXXWRD1XXXXWRD2

EPRCNT = IS THE TAG FOR THE LISTING
WRD1   = WHAT WAS EXPECTED
WRD2   = WHAT WAS RECEIVED

WHEN A REPORT ONLY CONTAINS ONE WORD THE PROGRAM WAS EXPECTING ZEROS BUT RECEIVED WHAT WAS REPORTED.

6.2 ERROR REPORTS

STATUS ERROR

STATUS ERROR XXDAE XXXXXXDAR XXXXXXDCS

A B C

A=THE DISK NUMBER AND EXTENDED DISK ADDRESS BITS.
B=THE DISK ADDRESS REGISTER
C=THE DISK CONTROL REGISTER

LAYOUT OF DISK ADDRESS BITS

DAE DAR
XXX XXX XXX XXX XXX XXX XXX

DISK NO. TRACK ADDRESS WORD ADDRESS

BIT LAYOUT OF DCS REGISTER

BIT15= ERROR
BIT14= DISK FREEZE
BIT13= WRITE CHECK ERROR
BIT12= DATA PARITY ERROR
BIT11= NON-EXISTENT DISK
BIT10= WRITE LOCKOUT
BIT9= MISSED TRANSFER
BIT8= DISK CLEAR
BIT7= READY
BIT6= INTERRUPT ENABLE
BIT5= EXTENDED MEMORY 1 (XM1)
BIT4= EXTENDED MEMORY 0 (XM0)
BIT3= MAINTENANCE
BIT2-1= FUNCTION REGISTER

BIT 2	BIT 1	OPERATION
0	0	NOP
1	0	READ
0	1	WRITE
1	1	WRITE CHECK

IF THE ERROR OCCURRED WHEN READING THE PROGRAM WILL REPORT WHICH READ.

(6.2 CONT'D)

NOTE: WHEN A FREEZE ERROR OCCURS AN ADDITIONAL ERROR MESSAGE WILL BE REPORTED, AS FOLLOWS:

XXX HRD ERR

LAYOUT OF BITS 0 - 7

BIT0= CMA INH. (NOT AN ERROR CONDITION)
BIT1= UNUSED
BIT2= NON-EXISTENT MEMORY ERROR
BIT3= UNUSED
BIT4= TRACK C TIMING ERROR
BIT5= TRACK B TIMING ERROR
BIT6= TRACK A TIMING ERROR
BIT7= ADDRESS PARITY ERROR

6.3 DATA ERRORS

DATA ERR 1 READ XXDAE XXXXXXDAR XXXXXXGD DATA XXXXXXBD DATA

A B C D E

A=WHICH READ THE ERROR OCCURRED
B=THE DISK NUMBER AND EXTENDED DISK ADDRESS BITS
C=THE DISK ADDRESS REGISTER
D=THE DATA WRITTEN ON THE DISK
E=THE DATA READ FROM THE DISK

6.4 RANEX ERRORS

ERRORS WHICH OCCUR IN RANEX ALSO HAVE THE WORD COUNT REPORT WITH THE ERROR MESSAGE IN THE FOLLOWING MANNER.

RANEX ERR XXDAE XXXXXXDAR XXXXWRD CNT.

A B C

A=STARTING DAE OF TRANSFER
B=STARTING DAR OF TRANSFER
C=WORD COUNT OF TRANSFER

6.5 OVERFLOW ERROR

WHEN THE DISK TRANSFERS MORE WORDS THEN ITS WORD COUNT WAS EQUAL TO, THE PROGRAM FLAGS IT.

EXTRA BKS XXXXXX WRD ADDR XXXXXX BD DATA

A B

A=THE LOCATION IN MEMORY WHERE THE DATA WAS TRANSFERRED
B=THE DATA THAT WAS TRANSFERRED

M1

6.6 DISK ADDRESS ERROR

DK ADDR ERR XXDAFXXXXXXDAR

THE TERMINATING DISK ADDRESS AFTER THE TRANSFER WAS NOT CORRECT THE DAE AND DAR SHOULD EQUAL WHAT WAS REPORTED. CHECK THE RF11 PANEL FOR THE ERROR ADDRESS.

6.7 PROCESSOR TIME OUT

CPU BKGRND TIMED OUT

THIS MESSAGE WILL BE REPORTED IF THE DISK FAILS TO RAISE A BR REQUEST AFTER EXTENDED PERIOD OF TIME.

6.8 END

END

THIS MESSAGE IS REPORTED AT THE END OF ONE COMPLETE PASS OF THE DISK SYSTEM.

6.9 MEMORY PARITY ERROR

THIS MESSAGE IS REPORTED IF THE PROGRAM DETECTS A PARITY ERROR DURING PROGRAM EXECUTION.

6.10 POWER HAS FAILED

THIS MESSAGE INDICATES THAT THE POWER HAS FAILED AND THE TEST RESTORED.

7. MISCELLANEOUS

IN SOME ADDRESS TESTS THE PROGRAM DEPENS ON WRITTING AND READING DATA CORRECTLY FROM THE DISK,AND IF IT DOES NOT IT MAY REPORT AN ADDRESS FAILURE, WHEN IN FACT IT WAS A DATA FAILURE.

7.1 SUGGESTED POWER FAIL TEST

THIS TEST IS SUGGESTED SO THAT THE ABILITY OF THE DISK TO RETAIN DATA AFTER A POWER FAILURE HAS OCCURRED MAY BE TESTED.

FOLLOW THESE STEPS IF NO ERROR OCCURS, ONE PASS SHOULD BE SUFFICIENT:

A) LOAD AND START PFT1

B) UPON RECEIVING "OK" FROM THE PROGRAM TURN OFF THE POWER TO THE MACHINE AND THEN BACK ON AGAIN.

C) THERE SHOULD BE AT MOST ONE ERROR. ANY MORE IS CONSIDERED UNRELIABLE.

D) PERFORM THE SAME STEPS WITH PFT2. THIS TIME THERE SHOULD BE NO ERRORS.

```
                                .TITLE  MAINDEC-11-DZRFB-B      RF11 DATA TEST REPLACES D50A

                                ;COPYRIGHT      1973, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
                                ;PROGRAM BY E. HAIGHT/C. CASWELL
                                .ENABL  ABS

                    000001      BIT0=1
                    000002      BIT1=2
                    000004      BIT2=4
                    000010      BIT3=10
                    000020      BIT4=20
                    000040      BIT5=40
                    000100      BIT6=100
                    000200      BIT7=200
                    000400      BIT8=400
                    001000      BIT9=1000
                    002000      BIT10=2000
                    004000      BIT11=4000
                    010000      BIT12=10000
                    020000      BIT13=20000
                    040000      BIT14=40000
                    100000      BIT15=100000
                                ;
                                ;
                                ;
                    104403      WRITE=TRAP+3
                    104407      WRCHECK=TRAP+7
                    104405      READ=TRAP+5

                    000000      .=0                         ;TRAP CATCHER 0 - 776
                    000020      .=20
000020  011052                  XWAIT                       ;BACKGROUND TEST VECTOR
000022  000000                  0
000024  011376                  DOWN                        ;POWER FAIL
000026  000340                  340
                    000030      .=30
000030  012464                  EMTRP                       ;TTY VECTOR
000032  000340                  340
000034  006344                  DISK                        ;DISK CALLING VECTOR
000036  000340                  340

                    000200      .=200
000200  000167  000712          JMP     START
000204  006436                  DKINT                       ;DISK INTERRUPT VECTOR
000206  000200                  200                         ;DISK PRIORITY

                                ;STATIC ROUTINES
                    000300      .=300
```

```
                000600                          .=600
000600  000167  001344                  JMP     ADT2            ;CHECK THAT WHEN A
                                                                ;WORD IS WRITTEN IT
                                                                ;DOES NOT ALTER ADJACENT
                                                                ;WORDS
                                                                ;
                                                                ;
000604  000167  002204                  JMP     ADT3            ;WRITE EACH WORD ADDR ON ITSELF AND
                                                                ;READ BACK TO COMPARE
                                                                ;
                                                                ;
000610  000167  002554                  JMP     ADT4            ;TRACK SELECTION TEST
                                                                ;
                                                                ;
000614  000167  003176                  JMP     ADT5            ;LOOK AHEAD TEST
                                                                ;
                                                                ;
000620  000167  003406                  JMP     SPIRAL          ;SPIRAL TEST
                                                                ;
                                                                ;
000624  000167  003752                  JMP     XSPIRAL         ;SPIRAL TEST EXTENSION
                                                                ;
                                                                ;
000630  000167  004730                  JMP     RANEX           ;RANDOM ADDRESS, DATA AND
                                                                ;WORD COUNT TEST
                                                                ;
                                                                ;
000634  000167  007774                  JMP     EXTMEN          ;WRITE/WRITE CHECK DISK WITH
                                                                ;EXTENDED MEMORY
                                                                ;
                                                                ;
000640  000167  010340                  JMP     PFT1            ;DISK WRITE POWER FAIL TEST
                                                                ;
                                                                ;
000644  000167  010572                  JMP     PFT2            ;DISK WRITE CHECK POWER FAIL TEST
                                                                ;
                                                                ;
                                ;***MAINTENANCE ROUTINES***
                                ;
                                                                ;
000650  000167  011130                  JMP     SELWC           ;LOAD WORD COUNT REG,
                                                                ;WITH SWITCH REGISTER
                                                                ;
                                                                ;
000654  000167  011134                  JMP     SELCMA          ;LOAD CURRENT MEMORY ADDR
                                                                ;REG, WITH SWITCH REGISTER
                                                                ;
                                                                ;
000660  000167  011140                  JMP     SELDAR          ;LOAD DISK ADDR, REGISTER
                                                                ;WITH SWITCH REGISTER
                                                                ;
                                                                ;
```

```
                                                JMP     SELDAE          ;LOAD DISK ADDR. EXT.
                                                                        ;WITH SWITCH REGISTER
                                                                        ;
                                                                        ;
                                                JMP     SELDBR          ;LOAD DATA BUFFER REGISTER
                                                                        ;WITH SWITCH REGISTER
                                                                        ;
                                                                        ;
                                                JMP     MOVLK           ;MOVE CONTENTS OF LOOK
                                                                        ;AHEAD REGISTER INTO DATA LIGHTS
                                                                        ;
                                                                        ;
                                                JMP     SELDCS          ;LOAD DISK CONTROL REGISTER
                                                                        ;WITH SWITCH REGISTER
                                                                        ;
                                                                        ;
                                                JMP     STAMP           ;ENABLE READ AMPLIFIERS
                                                                        ;TO TRACK SELECTED
                                                                        ;FROM SWITCH REGISTER
                                                                        ;
                                                                        ;
                                        ;
                                        ;
                                        ;
                                        ;
                                        ;
                                        ;RF11 DATA TEST
                                        ;VECTORS USED IN PROGRAM
                                        ;#1 LOC 204 DISK INTERRUPT
                                        ;#2 LOC 30 EMT (TELETYPE OUTPUT)
                                        ;#3 LOC 34 TRAP (DISK HANDLERS)
                                        ;#4 LOC 14 TRACE TRAP (USED IN BACKGROUND TEST)
                                        ;#5 LOC 20 IOT TRAP (USED IN CALLING BACKGROUND TEST)

        001000                          .=1000
```

```
                                        .EVEN
                                ;
                                ;I/O ADDRESS POINTERS
001000  177570                  SWR:    177570          ;SWITCH REGIISTER
001002  177776                  PS:     177776          ;PROCESSOR STATUS REGISTER
001004  177566                  TPB:    177566          ;TELETYPE REGISTERS
001006  177562                  TKB:    177562
001010  177564                  TPS:    177564
001012  177560                  TKS:    177560
                                ;
                                ;DISK I/O REGISTERS
                                ;
001014  177460                  DCS:    177460          ;DISK CONTROL REGISTER
001016  177462                  WC:     177462          ;WORD COUNT REGISTER
001020  177464                  CMA:    177464          ;CURRENT ADDRESS REGISTER
001022  177466                  DAR:    177466          ;LOWER 16 BITS OF DISK ADDRESS
001024  177470                  DAE:    177470          ;EXTENSION ADDRESS REGISTER
001026  177472                  DBR:    177472          ;DATA BUFFER REGISTER
001030  177474                  MA:     177474          ;MAINTENANCE REGISTER
001032  177476                  ADS:    177476          ;LOOK AHEAD REGISTER
001034  000204                  VECTOR: 204             ;INTERRUPT VECTOR ADDRESS
001036  000206                  STATUS: 206             ;DISK INTERRUPT STATUS
001040  000200                  PRIORITY:BIT7           ;DISK PRIORITY LEVEL

                                ;
                                ;
                                ;
                                ;
                                ;
                                ;RF11 DEDICATE REGISTERS (MEMORY)
                                ;
001042  000000                  FLAG:   0               ;INTERNAL PROGRAM FLAG
001044  146723                  RANNU:  146723          ;RANDOM NUMBER PRIME
001046  000000                  WRDCT:  0               ;WORKING WORD COUNT
001050  000000                  TRACK:  0               ;WORKING DAE
001052  000000                  DMA:    0               ;WORKING DAR
001054  000000                  PATNU:  0               ;DATA PATTERN INDEX
001056  000000                  BUF:    0               ;WORKING DATA BUFFER (OUT-IN)
001060  000000                  TWRDCT: 0               ;TEMP WORD COUNT
001062  000000                  TDMA:   0               ;TEMP DAR
001064  000000                  SWRDCT: 0               ;STANDARD WORD COUNT
001066  000000                  ERCOUNT:0               ;ERROR COUNT FOR MESSAGES.
001070  000000                  SAVE:   0
001072  000000                  SAV1:   0
001074  000000                  PASS:   0
001076  000000                  DSKNOR: 0
001100  000000                  HRDER:  0               ;POINTER FOR HARD ERROR
001102  000000                  PASSC:  0
001104  000000                  INPUT:  0

                                ;
                                ;RF11 WORK REGISTERS
```

```
   196                                  ;(CAN BE CHANGED IN ANY ROUTINE)
   197  001106  000000                  WORK:   0
   198  001110  000000                  WORK1:  0
   199  001112  000000                  WORK2:  0
   200  001114  000000                  WORK3:  0
```

```
001116  000005                  START:  RESET                   ;CLEAR THE WORLD
001120  012767  000010  177760          MOV     #10,WORK
001126  012700  013426          CLRTAB: MOV     #TABLE,%0       ;CLEAR ERROR TABLE
001132  005020                          CLR     (0)+
001134  005367  177746                  DEC     WORK
001140  001372                          BNE     CLRTAB
001142  012706  001000                  MOV     #1000,%6        ;SET UP STACK
001146  012777  000340  177626          MOV     #340,@PS        ;LOCK UP INTERRUPT LEVELS
001154  005067  177662                  CLR     FLAG            ;CLEAR PROGRAM FLAG
001160  005067  177664                  CLR     TRACK           ;CLEAR TRACK REGISTERS
001164  005067  177662                  CLR     DMA             ;CLEAR DAR REGISTERS
001170  005067  177660                  CLR     PATNU           ;CLEAR PATTER COUNT
001174  012767  000400  177662          MOV     #400,SWRDCT     ;SET UP STANDARD WORD COUNT
001202  016767  177656  177636          MOV     SWRDCT,WRDCT
001210  004767  012012                  JSR     7,MAMF          ;SET PARITY SWITCHES
001214  005777  177560                  TST     @SWR
001220  100464                          BMI     CONM            ;OPERATE UNDER PROGRAM CONTROL
001222  052767  070000  177612          BIS     #70000,FLAG
001230  005067  012212                  CLR     TEXBUF
001234  032777  004000  177552  SPECOR: BIT     #BIT11,@DCS     ;TEST NON-EXISTENT DISK
001242  001013                          BNE     RCNODV          ;NO DEVICE!
001244  022767  000010  012174          CMP     #10,TEXBUF      ;TESTED FOR ALL DEVICES?
001252  001407                          BEQ     RCNODV          ;REPORT NUMBER
001254  062767  000001  012164          ADD     #1,TEXBUF       ;INC. DEVICE COUNT
001262  062777  000004  177534          ADD     #4,@DAE         ;ADDRESS NEXT DISK
001270  000761                          BR      SPECOR
001272  005767  012150          RCNODV: TST     TEXBUF          ;TEST FOR 0 DEVICES
001276  001003                          BNE     REPDRV
001300  104001                          EMT+1                   ;REPORT 0 DEVICES
001302  014417                          NODRV
001304  000000                          HALT
001306  004567  011422          REPDRV: JSR     %5,CONV         ;CONVERT TO ASCII
001312  013446                          TEXBUF
001314  014444                          RKNUM
001316  000001                          1
001320  104000                          EMT+0                   ;TYPE NUMBER OF DEVICES
001322  013534                          HEDSA
001324  014444                          RKNUM
001326  177777                          -1
001330  016767  012112  177540          MOV     TEXBUF,DSKNOR   ;SAVE # OF DISKS
001336  162767  000001  177532          SUB     #1,DSKNOR       ;FIRST DISK IS ZERO
001344  006167  177526                  ROL     DSKNOR          ;SHIFT LEFT TO MATCH
001350  006167  177522                  ROL     DSKNOR          ;FLAG POSITION
001354  052767  004000  177460          BIS     #BIT11,FLAG     ;SET PROGRAM MODE IN FLAG
001362  005077  177436                  CLR     @DAE            ;RESET TO DISK 0
001366  000167  000464                  JMP     ADTST
                                ;ENTER OPERATOR CONVERSATION MODE
001372  104001                  CONM:   EMT     +1              ;ASK ABOUT DATA TEST ONLY
001374  014062                          CON1
001376  004767  011424                  JSR     %7,ALPHA        ;GO WAIT FOR ANSWER
001402  022767  000153  012036          CMP     #153,TEXBUF     ;TEST FOR YES
001410  001003                          BNE     .+10            ;BRANCH IF NO
001412  052767  002000  177422          BIS     #BIT10,FLAG
```

```
255  001420  104001                          EMT     #1
256  001422  014104                          CON2                    ;ASK ABOUT MULTI DISK MODE
257  001424  004767  011376                  JSR     %7,ALPHA        ;GO WAIT FOR ANSWER
258  001430  022767  000153  012010          CMP     #153,TEXBUF     ;TEST FOR YES
259  001436  001026                          BNE     DATTES          ;DO NOT ENTER STATIC TEST
260  001440  052767  004000  177374          BIS     #BIT11,FLAG     ;SET FLAG TO ENTER STATIC TEST
261  001446  104001                  DSKDR:  EMT     #1
262  001450  014124                          CON3
263  001452  004767  011340                  JSR     %7,NOCHA
264  001456  162767  000001  011762          SUB     #1,TEXBUF
265  001464  022767  000010  011754          CMP     #10,TEXBUF
266  001472  101765                          BLOS    DSKDR
267  001474  016767  011746  177374          MOV     TEXBUF,DSKNOR
268  001502  006167  177370                  ROL     DSKNOR
269  001506  006167  177364                  ROL     DSKNOR
270  001512  000420                          BR      ASKWC
271  001514  104001                  DATTES: EMT     #1
272  001516  014155                          CON4                    ;ASK UNIT NUMBER
273  001520  004767  011272                  JSR     %7,NOCHA        ;WAIT FOR NO.
274  001524  022767  000010  011714          CMP     #10,TEXBUF      ;IS NO = 0>10
275  001532  101770                          BLOS    DATTES          ;NO
276  001534  000241                          CLC
277  001536  006167  011704                  ROL     TEXBUF
278  001542  006167  011700                  ROL     TEXBUF
279  001546  056767  011674  177266          BIS     TEXBUF,FLAG
280  001554  104001                  ASKWC:  EMT     #1
281  001556  014166                          CON5                    ;ASK ABOUT OPTIONAL WORD COUNT
282  001560  004767  011242                  JSR     %7,ALPHA        ;WAIT FOR ANSWER
283  001564  022767  000153  011654          CMP     #153,TEXBUF
284  001572  001021                          BNE     OPDAR           ;ASK ABOUT OPTIONAL DAR
285  001574  104001                  WCCON:  EMT     #1
286  001576  014205                          CON6                    ;ASK LENGTH OF WC
287  001600  004767  011212                  JSR     %7,NOCHA
288  001604  005767  011636                  TST     TEXBUF
289  001610  001771                          BEQ     WCCON
290  001612  022767  001001  011626          CMP     #1001,TEXBUF    ;IS WORD COUNT>1000
291  001620  101765                          BLOS    WCCON           ;YES ASK FOR COUNT AGAIN
292  001622  016767  011620  177234          MOV     TEXBUF,SWRDCT   ;OPERATING WORD COUNT
293  001630  016767  177230  177210          MOV     SWRDCT,WRDCT
294  001636  104001                  OPDAR:  EMT     #1
295  001640  014232                          CON7                    ;ASK ABOUT OPTIONAL DAR
296  001642  004767  011150                  JSR     %7,NOCHA
297  001646  022767  004000  011572          CMP     #4000,TEXBUF    ;3777 MAX DAR ADDR
298  001654  101770                          BLOS    OPDAR
299  001656  016767  011564  177166          MOV     TEXBUF, DMA     ;TEMP DAR REGISTER
```

```
                                                OPPAT:  EMT     +1
                                                        CON8                    ;ASK ABOUT DATA PATTERNS
                                                        JSR     %7,NOCHA
                                                        CMP     #23,TEXBUF      ;TEST FOR CORRECT NO
                                                        BLOS    OPPAT           ;ASK AGAIN
                                                        CMP     #22,TEXBUF
                                                        BEQ     OPWRT           ;DATA PATTERN UNDER PROGRAM CONTROL
                                                        BIS     #BIT15,FLAG     ;SET PROGRAM FLAG
                                                        MOV     TEXBUF, PATNU   ;OPERATOR WANTS TO SELECT DATA
                                                        CLC
                                                        ROL     PATNU
                                                        BIC     #70000,FLAG     ;CLEAR OP MODE BITS IN FLAG
                                                OPWRT:  EMT     +1
                                                        CON9                    ;ASK ABOUT WRITE
                                                        JSR     %7,ALPHA
                                                        CMP     #153,TEXBUF     ;TEST FOR YES
                                                        BNE     OPWCK           ;ASK ABOUT WRITE CHECK
                                                        BIS     #BIT14,FLAG     ;YES SET FLAG BIT
                                                OPWCK:  EMT     +1
                                                        CON10                   ;ASK ABOUT WRITE CHECK
                                                        JSR     %7,ALPHA
                                                        CMP     #153,TEXBUF     ;TEST FOR YES ANSWER
                                                        BNE     OPRD            ;GO ASK ABOUT READ
                                                        BIS     #BIT13,FLAG     ;YES SET FLAG BIT
                                                OPRD:   EMT     +1
                                                        CON11                   ;ASK ABOUT READ
                                                        JSR     %7,ALPHA
                                                        CMP     #153,TEXBUF     ;TEST FOR YES ANSWER
                                                        BNE     CHKFLG
                                                        BIS     #BIT12,FLAG     ;SET FLAG TO READ
                                                CHKFLG: BIT     #70000,FLAG
                                                        BEQ     OPWRT
                                                ;
                                                ;
                                                ;
                                                ADTST:  BIT     #BIT11,FLAG     ;ARE WE IN MULTI DISK MODE
                                                        BEQ     EXMFLG          ;BRANCH IF NO.
                                                        EMT     +1
                                                        MES11
                                                        MOV     FLAG,ACNVX
                                                        ROR     ACNVX
                                                        ROR     ACNVX
                                                        BIC     #177770,ACNVX   ;FETCH DISK #
                                                        JSR     %5,CONV
                                                        ACNVX
                                                        MES12
                                                        1
                                                        EMT     +1
                                                        MES12
                                                EXMFLG: BIT     #BIT10,FLAG     ;TEST FOR DATA TEST ONLY
                                                        BEQ     .+6             ;DO COMPLETE TEST
                                                        JMP     DATAT           ;DO DATA TEST ONLY
```

```
                                        ;***ADDRESS ADT2***
                                        ;
                                        ;IN THIS TEST WRITE TRACK ZERO WITH ZERO'S
                                        ;THEN WRITE ALL ONES IN AN ADDRESS
                                        ;CHECK IF WRITING ONES IN THAT ADDRESS ALTERED
                                        ;ANY OTHER ADDRESS IN THE TRACK
                                        ;FOLLOW THIS PROCEDURE FOR ADDRESSES 0 TO 3777
                                        ;
                                        ;
002150  012706  001000          ADT2:   MOV     #1000,%6        ;SET UP STACK
002154  012767  001000  176664          MOV     #1000,WRDCT     ;SET UP WORD COUNT
002162  012767  014466  176666          MOV     #OUTBUF,BUF     ;SET UP CURRENT ADDRESS
002170  016767  176660  176672          MOV     PATNU,SAVE
002176  005067  176652                  CLR     PATNU
002202  005067  176642                  CLR     TRACK
002206  005067  176640                  CLR     DMA
002212  004567  005402                  JSR     %5,PASEL        ;SET UP DATA BUFFER
002216  016767  176646  176630          MOV     SAVE,PATNU
                                        ;****WRITE DISK ADDR, 0 TO 3777 WITH ZEROES ****
002224  052777  000400  176562  RFADT:  BIS     #BIT8,@DCS
002232  104403                          WRITE
002234  105777  176554                  TSTB    @DCS            ;TEST FOR READY
002240  100375                          BPL     .-4
002242  005777  176546                  TST     @DCS            ;TEST FOR ERROR
002246  100016                          BPL     RDMORE
002250  012767  000001  176610          MOV     #1,ERCOUNT      ;ERROR OCCURRED
002256  017767  176532  176624          MOV     @DCS,WORK1      ;FETCH DCS REGISTER
002264  017767  176532  176614          MOV     @DAR,WORK
002272  005367  176610                  DEC     WORK
002276  004567  010070          ER1:    JSR     %5,STAER1       ;REPORT ERROR OCURRED
                                        ;****WRD1=CONTROL STATUS REG, AT THE THE TIME OF THE ERROR ****
                                        ;****WRD2=DISK ADDR, AT THE TIME OF THE ERROR ****
002302  000750                          BR      RFADT           ;LOOP ON ERROR
002304  022767  003000  176540  RDMORE: CMP     #3000,DMA
002312  001404                          BEQ     RFRD-4
002314  062767  001000  176530          ADD     #1000,DMA
002322  000740                          BR      RFADT
002324  005067  176542                  CLR     SAV1
002330  005067  176534          RFRD:   CLR     SAVE
```

K2

```
                                                                                
                                                                                
002334  012727  177777  177777  WONWD:  MOV     #-1,#-1
002342  012767  002340  176506          MOV     #WONWD+4,BUF
002350  012767  000001  176470          MOV     #1,WRDCT
002356  016767  176510  176466          MOV     SAV1,DMA
002364  052777  000400  176422          BIS     #BIT8,@DCS
002372  104403                          WRITE
002374  105777  176414                  TSTB    @DCS            ;TEST FOR READY
002400  100375                          BPL     .-4
002402  005777  176406                  TST     @DCS            ;TEST FOR ERROR
002406  100014                          BPL     SUADB           ;BRANCH IF NO CONTROL ERROR
002410  017767  176400  176472          MOV     @DCS,WORK1
002416  016767  176450  176462          MOV     SAV1,WORK
002424  012767  000003  176434          MOV     #3,ERCOUNT      ;SETUP ERROR COUNT
002432  004567  007734          ER3:    JSR     %5,STAER1       ;REPORT ERROR
                                ;****WRD1=DISK CONTROL STATUS AT THE TIME OF THE ERROR****
                                ;****WRD2=DISK ADDR. IN ERROR WHEN TRYING TO WRITE ALL ONES ****
002436  000736                          BR      WONWD           ;RE-WRITE WORD
002440  016767  176426  176440  SUADB:  MOV     SAV1,WORK
002446  042767  000777  176432          BIC     #777,WORK       ;MASK TO BLOCKS
002454  016700  176412                  MOV     SAV1,%0
002460  006100                          ROL     %0
002462  042700  176001                  BIC     #176001,%0      ;MASK TO BUFFER SIZE
002466  026767  176376  176412          CMP     SAVE,WORK
002474  001407                          BEQ     1$              ;TEST WORD IN THIS BLOCK
002476  005060  014466  -               CLR     OUTBUF(0)       ;NOT IN BLOCK-CLEAR
002502  022767  004000  176360          CMP     #4000,SAVE      ;WRITTEN ALL TRACKS?
002510  001463                          BEQ     ZEROAD
002512  000403                          BR      WRCADT
002514  012760  177777  014466  1$:     MOV     #-1,OUTBUF(0)   ;SET BUFFER WD TO-1
002522  052777  000400  176264  WRCADT: BIS     #BIT8,@DCS
002530  012767  001000  176310          MOV     #1000,WRDCT     ;SETUP WORD COUNT
002536  012767  014466  176312          MOV     #OUTBUF,BUF     ;SETUP CURRENT ADDR
002544  016767  176320  176300          MOV     SAVE,DMA        ;SETUP DISK ADDRESS
002552  104407                          WRCHECK
002554  105777  176234                  TSTB    @DCS            ;CHECK FOR READY
002560  100375                          BPL     .-4
002562  005777  176226                  TST     @DCS            ;TEST FOR ERROR
002566  100030                          BPL     CHKBUF          ;BRANCH NO DISK ERROR
002570  017767  176220  176312          MOV     @DCS,WORK1
002576  016767  176270  176302          MOV     SAV1,WORK
002604  005367  176276                  DEC     WORK
002610  012767  000004  176250          MOV     #4,ERCOUNT      ;SET UP ERCOUNT
002616  004567  007550          ER4:    JSR     %5,STAER1       ;REPORT ERROR
002622  017767  176174  010164          MOV     @DAR,ACNVX      ;SET UP DISK ADDR. FOR REPORT
002630  004567  010100                  JSR     %5,CONV
002634  013014                          ACNVX
002636  013663                          MES4
002640  000006                          6
002642  104001                          EMT     +1
002644  013663                          MES4
                                ;****WRD1=DISK CONTROL STATUS REG. AT THE TIME OF THE ERROR ****
                                ;****WRD2=DISK ADDR. IN ERROR DURING WRITE CHECK ****
```

```
   450                                  ;****WRD ADDR,=ADDR, WHICH CONTAINS ALL ONES ****
   451  002646  000725                          BR      WRCADT
```

```
                                                                    
                                                                    
002650  062767  001000  176212  CHKBUF: ADD     #1000,SAVE          ;GO TO NEXT
002656  000670                          BR      SUADB               ;BLOCK
002660  005067  176204          ZEROAD: CLR     SAVE                ;
002664  016767  176202  176160          MOV     SAV1,DMA            ;SETUP DISK ADDRESS
002672  005027  000000                  CLR     #0                  ;SET UP DATA
002676  012767  002674  176152          MOV     #.-2,BUF            ;SETUP CURRENT ADDRESS
002704  012767  000001  176134          MOV     #1,WRDCT            ;SETUP WORD COUNT
002712  104403                          WRITE
002714  105777  176074                  TSTB    @DCS                ;CHECK FOR READY
002720  100375                          BPL     .-4
002722  005777  176066                  TST     @DCS                ;TEST FOR ERROR
002726  100014                          BPL     INDADT
002730  012767  000005  176130          MOV     #5,ERCOUNT
002736  017767  176052  176144          MOV     @DCS,WORK1
002744  017767  176052  176134          MOV     @DAR,WORK
002752  004567  007414          ER5:    JSR     %5,STAER1
                                ;****WRD1=CONTROL STATUS REG. AT THE TIME OF THE ERROR ****
                                ;****WRD2=DISK ADDR. AT THE TIME OF THE ERROR ****
002756  000740                          BR      ZEROAD              ;LOOP ON ERROR
002760  022767  003777  176104  INDADT: CMP     #3777,SAV1
002766  001404                          BEQ     LP2ADT              ;LAST ADDR. CHECKED
002770  005267  176076                  INC     SAV1
002774  000167  177330                  JMP     RFRD                ;CHECK NEXT ADDRESS
003000  032777  004000  175772  LP2ADT: BIT     #BIT11,@SWR         ;IS BIT 11 SET IN SWR
003006  001402                          BEQ     .+6
003010  000167  177134                  JMP     ADT2                ;BIT 11 SET LOOP ON TEST
                                ;
                                ;
                                ;
                                
                                
```

```
   485
```

```
                                        ;
                                        ;***** ADDRESS TEST *****
                                        ;
                                        ;WRITE EACH UNIQUE ADDRESS ON ITSELF FOR TRACK 0
                                        ;THEN READ IT BACK AND COMPARE FOR THE
                                        ;CORRECT DATA
                                        ;
                                        ;
003014  005067  176032          ADT3:   CLR     DMA             ;CLEAR ACTIVE REG
003020  005067  176024                  CLR     TRACK
003024  005067  176056                  CLR     WORK
003030  005067  176054                  CLR     WORK1
003034  012706  001000                  MOV     #1000,%6        ;SETUP STACK
003040  012767  014466  176010          MOV     #OUTBUF,BUF     ;SET UP CURRENT ADDRESS
003046  012767  001000  175772          MOV     #1000,WRDCT     ;SET UP WORD COUNT
003054  012700  014466                  MOV     #OUTBUF,%0      ;FILL BUFFER WITH COUNT
003060  016720  176022          INADB:  MOV     WORK,(0)+
003064  005267  176016                  INC     WORK            ;+1 COUNT
003070  022700  016466                  CMP     #OUTBUF+2000,%0
003074  001371                          BNE     INADB           ;SET UP NEXT WORD
003076  016767  176004  175764          MOV     WORK,SAVE
003104  052777  000400  175702  WRABF:  BIS     #BIT8,@DCS      ;CLEAR THE DISK WORLD
003112  104403                          WRITE                   ;WRITE
003114  105777  175674                  TSTB    @DCS            ;IS THE CONTROL READY
003120  100375                          BPL     .-4             ;CONTROL READY
003122  005777  175666                  TST     @DCS            ;IS THERE AN ERROR
003126  100011                          BPL     TFBL            ;NO ERROR
003130  017767  175660  175750          MOV     @DCS,WORK       ;FETCH CONTENTS OF CONTROL REG
003136  012767  000006  175722          MOV     #6,ERCOUNT      ;SET UP ERROR COUNT
003144  004567  007154          ER6:    JSR     %5,STAER        ;REPORT CONTROL ERROR
                                        ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE ERROR ****
003150  000755                          BR      WRABF           ;RE-WRITE DATA
003152  016767  175712  175726  TFBL:   MOV     SAVE,WORK
003160  062767  001000  175664          ADD     #1000,DMA
003166  022767  004000  175712          CMP     #4000,WORK      ;HAVE WE WRITTEN ALL OF TRACK 0
003174  001327                          BNE     INADB-4
003176  005067  175704                  CLR     WORK
003202  005067  175644                  CLR     DMA
003206  005067  175676                  CLR     WORK1
003212  052777  000400  175574  RDTDN:  BIS     #BIT8,@DCS      ;CLEAR THE DISK
003220  104405                          READ
003222  105777  175566                  TSTB    @DCS            ;IS THE CONTROL READY
003226  100375                          BPL     .-4             ;YES THE CONTROL IS READY
003230  005777  175560                  TST     @DCS            ;IS THERE AN ERROR
003234  100011                          BPL     ADRCMP          ;NO ERROR
003236  012767  000007  175622          MOV     #7,ERCOUNT      ;SET UP ERROR COUNT
003244  017767  175544  175634          MOV     @DCS,WORK       ;FETCH CONTROL REG.
003252  004567  007046          ER7:    JSR     %5,STAER        ;REPORT CONTROL ERROR
                                        ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE ERROR ****
003256  000755                          BR      RDTDN           ;RE-READ
003260  012767  014466  175602  ADRCMP: MOV     #OUTBUF,SAVE
```

```
                                ;
003266  027767  175576  175614  CMPNEX: CMP     @SAVE,WORK1     ;IS THE ADDRESS CORRECT
003274  001410                          BEQ     INCCMP          ;COMPARE NEXT WORD
003276  017767  175566  175602          MOV     @SAVE,WORK      ;FETCH LOAD ADDRESS
003304  012767  000010  175554          MOV     #10,ERCOUNT     ;SET UP ERROR COUNT
003312  004567  007054          ER10:   JSR     %5,STAER1       ;REPORT COMPARISON ERROR
                                ;****WRD1=DISK ADDR, WANTED ****
                                ;****WRD2=DISK ADDR, RECEIVED ****
003316  062767  000002  175544  INCCMP: ADD     #2,SAVE
003324  005267  175560                  INC     WORK1
003330  022767  016466  175532          CMP     #OUTBUF+2000,SAVE ;IS IT THE LAST ADDR INBUF
003336  001353                          BNE     CMPNEX          ;COMPARE NEXT WORD
003340  022767  004000  175542          CMP     #4000,WORK1     ;IS IT THE LAST ADDR, OF TRACK
003346  001404                          BEQ     LPADT3
003350  062767  001000  175474          ADD     #1000,DMA       ;SET UP FOR NEXT BUFFER
003356  000715                          BR      RDTDN           ;GO READ BUFFER
003360  032777  004000  175412  LPADT3: BIT     #BIT11,@SWR     ;LOOP ON TEST?
003366  001212                          BNE     ADT3            ;YES BIT 11 SET IN SWR
                                ;
                                ;
                                ;
                                ;
                                ;
                                ;RF11 TRACK SELECTION TEST
                                ;
                                ;WRITE THE FIRST AND LAST ADDRESS OF EACH TRACK
                                ;WITH THE OCTAL VALUE OF EACH TRACK
                                ;BITS 0 THRU 6 EQUAL THE TRACK NUMBER
                                ;BIT 15 RESET EQUALS ADDR 0 OF THE TRACK
                                ;BIT 15 SET EQUALS ADDR 3777 OF THE TRACK
                                ;
                                ;AFTER WRITING THE DISK READ EACH ADDRESS
                                ;AND COMPARE DATA FOR THE CORRECT VALUE
                                ;
003370  005067  175456          ADT4:   CLR     DMA             ;CLEAR WORK REGISTERS
003374  005067  175450                  CLR     TRACK
003400  005067  011062                  CLR     OUTBUF
003404  012706  001000                  MOV     #1000,%6        ;SETUP STACK
003410  052777  000400  175376          BIS     #BIT8,@DCS      ;CLEAR THE DISK WORLD
003416  012767  014466  175432          MOV     #OUTBUF,BUF     ;SET CURRENT ADDRESS
003424  012767  000001  175414          MOV     #1,WRDCT        ;SET UP WORD COUNT
003432  104403                  INSWT:  WRITE                   ;GO WRITE
003434  105777  175354                  TSTB    @DCS            ;IS READY SET
003440  100375                          BPL     .-4             ;YES! WAIT FOR NOT BUSY
003442  005777  175346                  TST     @DCS            ;TEST FOR ERROR
003446  100011                          BPL     TSTTK           ;NO ERROR GO ON
003450  012767  000011  175410          MOV     #11,ERCOUNT     ;SET UP ERROR COUNT
003456  017767  175332  175422          MOV     @DCS,WORK       ;REPORT CONTENTS OF DCS REG
003464  004567  006634          ER11:   JSR     %3,STAER        ;REPORT ERROR OCCURRED
                                ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE ERROR ****
003470  000760                          BR      INSWT           ;GO RE-WRITE
003472  022767  100177  010766  TSTTK:  CMP     #100177,OUTBUF  ;TEST FOR LAST ADDR,
003500  001427                          BEQ     INSRD           ;GO READ THE DATA
003502  032767  100000  010756          BIT     #BIT15,OUTBUF   ;IS IT ADDR ZERO
```

```
   592  003510  001007                          BNE     MVNEM           ;NO
   593  003512  052767  100000  010746          BIS     #BIT15,OUTBUF   ;YES! SET UP FOR LAST ADDR
   594  003520  062767  003777  175324          ADD     #3777,DMA       ;SET UP FOR LAST ADDR
   595  003526  000741                          BR      INSWT           ;GO WRITE
   596  003530  042767  100000  010730  MVNEM:  BIC     #BIT15,OUTBUF   ;SET UP FOR ADDR ZERO
   597  003536  005267  010724                  INC     OUTBUF          ;INC. TO NEXT TRACK
   598  003542  062767  000001  175302          ADD     #1,DMA          ;INC. BAR
   599  003550  103330                          BCC     INSWT           ;GO WRITE NO CARRY TO DAE
   600  003552  005267  175272                  INC     TRACK           ;INC. DAE REG.
   601  003556  000725                          BR      INSWT           ;GO WRITE
```

```
                                        ;
                                        ;READ THE FIRST AND LAST ADDRESS OF EACH TRACK
                                        ;AND VERIFY IT HAS THE CORRECT DATA
                                        
003560  005067  175266        INSRD:  CLR     DMA             ;CLEAR WORK REG.
003564  005067  175260                CLR     TRACK
003570  005067  175274                CLR     SAVE
003574  052777  000400  175212        BIS     #BIT8,@DCS      ;CLEAR THE DISK WORLD
003602  012767  015070  175246        MOV     #INBUF,BUF      ;SET UP CURRENT ADDR
003610  012767  000001  175230        MOV     #1,WRDCT        ;SET UP WORD COUNT
003616  104405                RDTKS:  READ                    ;READ DATA
003620  105777  175170                TSTB    @DCS            ;CHECK FOR READY
003624  100375                        BPL     .-4             ;CONTROL NOT READY
003626  005777  175162                TST     @DCS            ;IS THERE AN ERROR
003632  100011                        BPL     CMPDTK          ;NO ERROR
003634  012767  000012  175224        MOV     #12,ERCOUNT     ;SET UP ERROR COUNT
003642  017767  175146  175236        MOV     @DCS,WORK       ;FETCH CONTENTS OF DCS
003650  004567  006450        ER12:   JSR     %5,STAER        ;REPORT CONTROL ERROR
                                        ;****WRD1=DISK CONTROL STATUS REG. AT THE TIME OF THE ERROR ****
003654  000760                        BR      RDTKS           ;GO RE-READ
003656  026767  175206  011204  CMPDTK: CMP     SAVE,INBUF      ;IS DATA CORRECT
003664  001413                        BEQ     CMNETK          ;YES SETUP FOR NEXT WORD
003666  016767  175176  175214        MOV     SAVE,WORK1      ;CORRECT ADDRESS
003674  016767  011170  175204        MOV     INBUF,WORK      ;INCORRECT DATA
003702  012767  000013  175156        MOV     #13,ERCOUNT     ;SET UP ERROR COUNT
003710  004567  006456        ER13:   JSR     %5,STAER1       ;REPORT SELECTION ERROR
                                        ;****WRD1=TRACK ADDR. WANTED ****
                                        ;****WRD2=TRACK ADDR. RECEIVED ****
003714  022767  100177  175146  CMNETK: CMP     #100177,SAVE    ;IS IT THE LAST ADDR
003722  001427                        BEQ     LPTSK           ;END OF TEST
003724  032767  100000  175136        BIT     #BIT15,SAVE     ;IS IT ADDR 0 OF THE TRACK
003732  001414                        BEQ     ZRBIT           ;NO; SETUP FOR LAST ADDR
003734  042767  100000  175126        BIC     #BIT15,SAVE     ;SET UP FOR ADDR ZERO
003742  005267  175122                INC     SAVE            ;INC FOR TRACK NO.
003746  062767  000001  175076        ADD     #1,DMA          ;SET UP DAR
003754  103320                        BCC     RDTKS           ;GO READ NEXT TRACK ADDR
003756  005267  175066                INC     TRACK           ;INC TRACK
003762  000715                        BR      RDTKS           ;GO READ
003764  052767  100000  175076  ZRBIT: BIS     #BIT15,SAVE     ;SET UP FOR LAST ADDR
003772  062767  003777  175052        ADD     #3777,DMA       ;SET UP FOR LAST WORD
004000  000706                        BR      RDTKS           ;GO READ LAST ADDR OF TK
004002  032777  004000  174770  LPTSK: BIT     #BIT11,@SWR     ;IS BIT 11 SET IN SWR
004010  001402                        BEQ     .+6             ;YES LOOP ON TEST
004012  000167  177352                JMP     ADT4
```

```
                                        ;
                                        ;RF11 LOOK AHEAD TEST
                                        ;WRITE ONE WORD UPON RECEIPT OF
                                        ;NOT READY READ THE LOOK AHEAD
                                        ;REGISTER IT SHOULD CONTAIN THE
                                        ;ADDRESS +1
                                        ;
004016  005067  175030          ADT5:   CLR     DMA             ;CLEAR REGISTERS
004022  005067  175022                  CLR     TRACK
004026  005067  175036                  CLR     SAVE
004032  012706  001000                  MOV     #1000,%6        ;SETUP STACK
004036  012767  000001  175002          MOV     #1,WRDCT        ;SET UP FOR ONE WORD X-FER
004044  012767  014466  175004          MOV     #OUTBUF,BUF     ;SET UP CURRENT ADDRESS
004052  052777  000400  174734  WRADT5: BIS     #BIT8,@DCS      ;CLEAR THE DISK
004060  016700  174746                  MOV     ADS,%0
004064  016701  174724                  MOV     DCS,%1
004070  104403                          WRITE                   ;WRITE
004072  011037  001106          1$:     MOV     (0),@#WORK      ;FETCH LOOK AHEAD
004076  105711                          TSTB    (1)             ;IS THE CONTROL BUSY
004100  100374                          BPL     1$              ;CONTROL STILL BUSY
004102  005777  174706                  TST     @DCS            ;IS THERE AN ERROR
004106  100011                          BPL     LPADT5          ;NO DISK ERRORS
004110  012767  000014  174750          MOV     #14,ERCOUNT     ;SET UP ERROR COUNT
004116  017767  174672  174762          MOV     @DCS,WORK       ;FETCH DCS FOR REPORT
004124  004567  006174          ER14:   JSR     %5,STAER        ;REPROT CONTROL ERROR
                                        ;****WRD1=DISK CONTROL REG AT THE TIME OF THE ERROR ****
004130  000750                          BR      WRADT5          ;LOOP ON ERROR
004132  016767  174714  174750  LPADT5: MOV     DMA,WORK1       ;IS LOOK AHEAD CORRECT
004140  026767  174744  174740          CMP     WORK1,WORK
004146  001416                          BEQ     INCADS          ;LOOK AHEAD OK
004150  005367  174732                  DEC     WORK            ;COMPARE FOR ADDRESS+1
004154  026767  174730  174724          CMP     WORK1,WORK      ;
004162  001410                          BEQ     INCADS          ;BRANCH IF EQUAL
004164  005267  174716                  INC     WORK
004170  012767  000015  174670          MOV     #15,ERCOUNT
004176  004567  006170          ER15:   JSR     %5,STAER1       ;REPORT LOOK AHEAD INCORRECT
                                        ;****WRD1=DISK ADDR. WANTED FROM LOOK AHEAD REG. ****
                                        ;****WRD2=DISK ADDR. RECEIVED FROM DISK LOOK AHEAD REG. ****
004202  000723                          BR      WRADT5          ;LOOP ON ERROR
004204  022767  003777  174640  INCADS: CMP     #3777,DMA       ;IS IT THE LAST ADDR.
004212  001403                          BEQ     XLPADT5         ;LAST ADDRESS EXIT
004214  005267  174632                  INC     DMA             ;+1 DMA
004220  000714                          BR      WRADT5          ;CHECK NEXT ADDRESS
004222  032777  004000  174550  XLPADT5:BIT     #BIT11,@SWR     ;LOOP ON TEST
004230  001272                          BNE     ADT5            ;YES LOOP ON TEST BIT 11 SET
```

```
                                        ;       SPIRAL TESTS
                                        ;
                                        ;WRITE THE LAST WORD OF TRACK ZERO
                                        ;AND THE FIRST WORD OF TRACK ONE
                                        ;USING ONE WORD X-FERS
                                        ;DATE = 52525
004232  052777  000400  174554  SPIRAL: BIS     #BIT8,@DCS      ;CLEAR THE DISK
004240  012777  000340  174534          MOV     #340,@PS        ;LOCK UP PROCESSING
004246  012706  001000                  MOV     #1000,%6        ;SETUP STACK
004252  012767  000001  174566          MOV     #1,WRDCT        ;SET WORD COUNT TO 1
004260  005067  174564                  CLR     TRACK
004264  012767  003777  174560          MOV     #3777,DMA       ;LAST WORD OF TRACK ZERO
004272  012767  052525  010166          MOV     #52525,OUTBUF   ;SET UP DATA
004300  012767  014466  174550          MOV     #OUTBUF,BUF .
004306  104403                          WRITE                   ;WRITE LAST ADDR TK ZERO
004310  105777  174500                  TSTB    @DCS            ;TEST FOR READY
004314  100375                          BPL     .-4             ;CONTROL STILL BUSY
004316  005777  174472                  TST     @DCS
004322  100011                          BPL     SPIL1
004324  012767  000016  174534          MOV     #16,ERCOUNT
004332  017767  174456  174546          MOV     @DCS,WORK
004340  004567  005760          ER16:   JSR     %5,STAER
                                        ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE ERROR ****
004344  000732                          BR      SPIRAL
004346  005267  174500          SPIL1:  INC DMA
004352  104403                          WRITE                   ;WRITE FIRST ADDR, TK 1
004354  105777  174434                  TSTB    @DCS            ;WAIT FOR READY
004360  100375                          BPL     .-4             ;CONTROL STILL BUSY
004362  005777  174426                  TST     @DCS
004366  100011                          BPL     SPIL2
004370  012767  000017  174470          MOV     #17,ERCOUNT
004376  017767  174412  174502          MOV     @DCS,WORK
004404  004567  005714          ER17:   JSR     %5,STAER
                                        ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE ERROR ****
004410  000710                          BR      SPIRAL
004412  005267  174430          SPIL2:  INC     WRDCT           ;SET UP FOR TWO WORD X-FER
004416  012767  003777  174426          MOV     #3777,DMA       ;START AT ADDR 3777
004424  012767  015070  174424          MOV     #INBUF,BUF      ;
004432  104405                          READ                    ;READ DATA
004434  105777  174354                  TSTB    @DCS            ;TEST FOR READY
004440  100375                          BPL     .-4             ;CONTROL STILL BUSY
004442  005777  174346                  TST     @DCS
004446  100011                          BPL     SPIL3
004450  012767  000020  174410          MOV     #20,ERCOUNT
004456  017767  174332  174422          MOV     @DCS,WORK
004464  004567  005634          ER20:   JSR     %5,STAER
                                        ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE ERROR ****
004470  000660                          BR      SPIRAL
004472  022767  052525  010370  SPIL3:  CMP     #52525,INBUF    ;CMP ADDR DAR 3777
004500  001414                          BEQ     CMPX1           ;COMPARE SECOND WORD
004502  012767  000021  174356          MOV     #21,ERCOUNT     ;SETUP ERROR COUNT
004510  016767  010354  174370          MOV     INBUF,WORK      ;INCORRECT DATA
004516  012767  052525  174364          MOV     #52525,WORK1    ;CORRECT DATA
004524  004567  005642          ER21:   JSR     %5,STAER1       ;REPORT ADDR 377 HAE BAD DATA
```

```
  746                                   ;****WRD1=THE DATA THAT SHOULD HAVE BEEN IN ADDR, 3777****
  747                                   ;****WRD2=THE DATA READ FROM ADDR, 3777****
  748  004530  000640                          BR      SPIRAL          ;LOOP ON ERROR
  749  004532  022767  052525  010332  CMPX1:  CMP     #52525,INBUF+2  ;COMPARE NEXT WORD
  750  004540  001414                          BEQ     LPSPI1          ;BRANCH IF DATA OK
  751  004542  012767  000022  174316          MOV     #22,ERCOUNT     ;SETUP ERROR COUNT
  752  004550  012767  052525  174332          MOV     #52525,WORK1    ;CORRECT DATA
  753  004556  016767  010310  174322          MOV     INBUF+2,WORK    ;DATA READ FROM ADDRO TK1
  754  004564  004567  005602          ER22:   JSR     %5,STAER1       ;REPORT ERROR
  755                                   ;****WRD1=THE DATA THAT SHOULD BE IN ADDR, 0 OF TRACK 1 ****
  756                                   ;****WDR2=THE DATA READ FROMADDR,0 OF TRACK 1 ****
  757  004570  000620                          BR      SPIRAL          ;LOOP ON ERROR
  758  004572  032777  004000  174200  LPSPI1: BIT     #BIT11,@SWR     ;LOOP ON TEST?
  759  004600  001214                          BNE     SPIRAL          ;YES BIT 11 SET IN SWR
```

```
                                        ;
                                        ;
                                        ;
                                        ;
                                        ;
                                        ;
                                        ;       SPIRAL TEST EXT.
                                        ;
                                        ;WRITE TWO WORDS OF DATA
                                        ;STARTING WITH THE LAST ADDRESS OF TRACK0
                                        ;DATA PATTERN = 25252
                                        ;THEN READ THE DATA DOING ONE WORD
                                        ;X-FERS
004602  052777  000400  174204  XSPIRAL:       BIS     #BIT8,@DCS      ;CLEAR THE DISK
004610  012777  000340  174164            MOV     #340,@PS        ;LOCK UP PROCESSING
004616  012706  001000                    MOV     #1000,%6        ;SET UP STACK
004622  012767  025252  007636            MOV     #25252,OUTBUF   ;SET UP DATA WORD 1
004630  012767  025252  007632            MOV     #25252,OUTBUF+2 ;SET UP DATA WORD 2
004636  012767  000002  174202            MOV     #2,WRDCT        ;SET UP WORD COUNT
004644  012767  014466  174204            MOV     #OUTBUF,BUF     ;SET UP CMA
004652  005067  174172                    CLR     TRACK           ;SET UP DISK ADDR.
004656  012767  003777  174166            MOV     #3777,DMA
004664  104403                            WRITE                   ;WRITE DATA
004666  105777  174122                    TSTB    @DCS            ;TEST FOR READY
004672  100375                            BPL     .-4             ;CONTROL STILL BUSY
004674  005777  174114                    TST     @DCS            ;TEST FOR ERROR
004700  100011                            BPL     X1SPIL          ;BRANCH IF NO ERROR
004702  017767  174106  174176            MOV     @DCS,WORK
004710  012767  000023  174150            MOV     #23,ERCOUNT     ;SET UP ERROR COUNT
004716  004567  005402            ER23:   JSR     %5,STAER        ;REPORT CONTROL ERROR
                                        ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE ERROR ****
004722  000727                            BR      XSPIRAL
004724  005367  174116            X1SPIL: DEC     WRDCT           ;SET UP FOR 1 WORD X-FER
004730  012767  003777  174114            MOV     #3777,DMA       ;SET UP DAR
004736  012767  015070  174112            MOV     #INBUF,BUF      ;SET UP CMA
004744  104405                            READ                    ;READ DAR 3777
004746  105777  174042                    TSTB    @DCS            ;TEST FOR NOT READY
004752  100375                            BPL     .-4             ;CONTROL STILL BUSY
004754  005777  174034                    TST     @DCS            ;TEST FOR ERROR
004760  100011                            BPL     X2SPIL          ;BRANCH IF NO ERROR
004762  012767  000024  174076            MOV     #24,ERCOUNT     ;SET UP ERROR COUNT
004770  017767  174020  174110            MOV     @DCS,WORK       ;REPORT CONTROL REG
004776  004567  005322            ER24:   JSR     %5,STAER
                                        ;****WRD1=DISK CONTROL STATUS REG, AT THE TIME OF THE THE ERROR ****
005002  000677                            BR      XSPIRAL         ;LOOP ON ERROR
005004  022767  025252  010056  X2SPIL: CMP     #25252,INBUF    ;IS ADDR 3777 CORRECT
005012  001414                            BEQ     X3SPIL          ;BRANCH IF NOT EQUAL
005014  012767  000025  174044            MOV     #25,ERCOUNT     ;SET UP ERROR COUNT
005022  012767  025252  174060            MOV     #25252,WORK1    ;GOOD DATA
005030  016767  010034  174050            MOV     INBUF,WORK      ;DATA DATA
005036  004567  005330            ER25:   JSR     %5,STAER1       ;REPORT ERROR
                                        ;****WRD1=THE DATA THAT SHOULD BE IN ADDR,3777 OF TRACK 0 ****
                                        ;****WRD2=THE DATA THAT WAS READ FROM ADDR, 3777 OF TRACK 0 ****
005042  000657                            BR      XSPIRAL         ;LOOP ON ERROR
```

```
  814  005044  005267  174002          X3SPIL: INC     DMA             ;SET UP TO READ ADDR 4000
  815  005050  104405                          READ                    ;READ DATA
  816  005052  105777  173736                  TSTB    @DCS            ;TEST FOR READY
  817  005056  100375                          BPL     .-4             ;CONTROL STILL BUSY
  818  005060  005777  173730                  TST     @DCS            ;TEST FOR ERROR
  819  005064  100011                          BPL     X4SPIL          ;BRANCH IF NO ERROR
  820  005066  012767  000026  173772          MOV     #26,ERCOUNT     ;SET UP ERROR COUNT
  821  005074  017767  173714  174004          MOV     @DCS,WORK       ;REPORT CONTROL REG.
  822  005102  004567  005216          ER26:   JSR     %5,STAER        ;REPORT ERROR
  823                                  ;****WRD1=DISK CONTROL STATUS REG. AT THE TIME OF THE ERROR ****
  824  005106  000635                          BR      XSPIRAL         ;LOOP ON ERROR
```

```

  005110  022767  025252  007752  X4SPIL: CMP     #25252,INBUF      ;CMP DATA
  005116  001414                          BEQ     LPXSPIL           ;BRANCH IF DATA OK
  005120  012767  000027  173740          MOV     #27,ERCOUNT       ;SET UP ERROR COUNT
  005126  012767  025252  173754          MOV     #25252,WORK1      ;GOOD DATA
  005134  016767  007730  173744          MOV     INBUF,WORK        ;DATA DATA
  005142  004567  005224          ER27:   JSR     %5,STAER1         ;REPORT ERROR
                                  ;****WRD1=THE DATA THAT SHOULD BE IN ADDR. 0 OF TRACK 1 ****
                                  ;****WRD2=THE DATA THAT WAS READ FROM ADDR. 0 OF TRACK 1 ****
  005146  000615                          BR      XSPIRAL           ;LOOP ON ERROR
  005150  032777  004000  173622  LPXSPIL:BIT     #BIT11,@SWR       ;LOOP ON TEST?
  005156  001211                          BNE     XSPIRAL           ;YES BIT11 SET IN SWR.
  005160  005067  173666          CLRREG: CLR     DMA               ;CLEAR WORD ADDRESS
  005164  005067  173660                  CLR     TRACK             ;CLEAR TRACK ADDRESS
                                  ;
                                  ;
                                  ;
                                  ;
                                  ;
                                  ;
                                  ;
                                  ;
                                  ;
  005170  012706  001000          DATAT:  MOV     #1000,%6          ;SET UP STACK
  005174  012777  000340  173600          MOV     #340,@PS          ;LOCK UP PROCESSOR
  005202  004567  003426                  JSR     %5,EXTMEN         ;SET UP BUFFER SIZES
  005206  016767  173652  173632          MOV     SWRDCT,WRDCT
  005214  012767  005234  173656          MOV     #LDAT,HRDER       ;SETUP FOR HARD ERROR
  005222  012777  000340  173552          MOV     #340,@PS          ;LOCK UP PROCESSOR PRIORITY
  005230  004567  002364                  JSR     %5,PASEL          ;SET UP DATA BUFFERS
  005234  004567  001614          LDAT:   JSR     %5,OPDSEL         ;SET UP DISK ADDRESS
  005240  032767  040000  173574          BIT     #BIT14,FLAG       ;TEST FOR WRITE
  005246  001416                          BEQ     SLH               ;TEST FOR WRITE CHECK
  005250  012767  014466  173600          MOV     #OUTBUF,BUF       ;SETUP OUTPUT BUFFER
  005256  104503                          WRITE   +100              ;WRITE WITH INT. ENABLED
  005260  032777  001000  173512          BIT     #BIT9,@SWR        ;FIND OUT HOW TO WAIT FOR INT
  005266  001002                          BNE     WRWAIT            ;WAIT WITH WAIT INSTRUCTION
  005270  000004                          IOT                       ;WAIT IN BACKGROUND TEST
  005272  000404                          BR      SLH
  005274  016777  173540  173500  WRWAIT: MOV     PRIORITY,@PS
  005302  000001                          WAIT                      ;WAIT FOR FLAG
  005304  032767  020000  173530  SLH:    BIT     #BIT13,FLAG       ;TEST FOR WRITE CHECK
  005312  001421                          BEQ     ESH               ;TEST FOR READ
  005314  012767  014466  173534          MOV     #OUTBUF,BUF       ;SETUP  OUTPUT BUFFER
  005322  012777  000340  173452          MOV     #340,@PS
  005330  104507                          WRCHECK +100              ;WRITE CHECK WITH INT. ENABLE
  005332  032777  001000  173440          BIT     #BIT9,@SWR        ;FINDOUT HOW TO WAIT FOR INT.
  005340  001002                          BNE     WCWAIT            ;WAIT WITH WAIT INSTRUCTION
  005342  000004                          IOT                       ;WAIT IN BACKGROUND TEST
  005344  000404                          BR      ESH
  005346  016777  173466  173426  WCWAIT: MOV     PRIORITY,@PS
  005354  000001                          WAIT                      ;WAIT FOR FLAG
  005356  032767  010000  173456  ESH:    BIT     #BIT12,FLAG       ;TEST FOR READ
  005364  001452                          BEQ     REH               ;CHECK BUFFER
```

```
   879  005366  016767  173512  173462          MOV     INPUT,BUF       ;SETUP INPUT BUFFER
   880  005374  042767  000003  173440          BIC     #3,FLAG         ;CLEAR RE-READ COUNT
```

```
881
882  005402  012777  000340  173372  DSKRD:  MOV     #340,@PS
883  005410  004567  003014          JSR     %5,ZBUF         ;CLEAR BUFFER
884  005414  005267  173422          INC     FLAG
885  005420  104505                  READ    +100            ;READ + INT ENABLE
886  005422  032777  001000  173350  BIT     #BIT9,@SWR      ;FIND OUT HOW TO WAIT FOR INT.
887  005430  001002                  BNE     RDWAIT          ;WAIT WITH WAIT INSTRUCTION
888  005432  000004                  IOT
889  005434  000404                  BR      ELH
890  005436  016777  173376  173336  RDWAIT: MOV     PRIORITY,@PS    ;SET UP PRIORITY
891  005444  000001                  WAIT                    ;WAIT FOR FLAG
892  005446  032777  010000  173324  ELH:    BIT     #BIT12,@SWR
893  005454  001002                  BNE     ADRD
894  005456  004567  002430          JSR     %5,COMPARE      ;COMPARE OUTBUFFER TO INBUFFER
895  005462  004567  003000          ADRD:   JSR     %5,OVRFLO       ;TEST FOR EXTRA DATE BREAKS
896  005466  016767  173350  173412  MOV     FLAG,WORK       ;CHECK DISK RE-READ COUNT
897  005474  042767  177774  173404  BIC     #177774,WORK    ;DO 3 RE-READS.
898  005502  022767  000003  173376  CMP     #3,WORK
899  005510  001334                  BNE     DSKRD           ;DO ANOTHER RE-READ
900  005512  032777  000400  173260  REH:    BIT     #BIT8,@SWR
901  005520  001223                  BNE     DATAT
902  005522  004767  001514          JSR     %7,DISBUF       ;GO SET UP DISK BUFFER.
903  005526  000642                  BR      LDAT
904  005530  005767  173306          MSTR:   TST     FLAG
905  005534  100002                  BPL     .+6             ;UNDER PROGRAM CONTROL
906  005536  000167  000576          JMP     EXTPP           ;OPERATOR SELECTED PATTERN
907  005542  062767  000002  173304  ADD     #2,PATNU        ;INC PATTERN INDEX
908  005550  022767  000044  173276  CMP     #44,PATNU
909  005556  001204                  BNE     DATAT           ;NOT LAST PATTERN EXIT
910  005560  005067  173270          CLR     PATNU           ;LAST PATTERN EXIT
```

```
                                        ;
                                        ;THIS IS A RANDOM DATA, RANDOM ADDRESS
                                        ;AND RANDOM WORD COUNT
                                        ;
                                        ;WORD COUNT CAN BE EQUAL TO OR LESS THAN 1000 WORDS
                                        ;
005564  012767  177000  173310  RANEX:  MOV     #-1000,PASSC
005572  012706  001000                  MOV     #1000,%6
005576  042767  001000  173236          BIC     #BIT9,FLAG
005604  012767  006072  173266          MOV     #RANER,HRDER    ;SET UP FOR HARD ERROR
005612  016777  173222  173162          MOV     PRIORITY,@PS    ;SET PRIORITY TO LEVEL 5
005620  012767  000003  173260  WRLG:   MOV     #3,WORK         ;GENERATE RANDOM WORD
005626  012701  014466                  MOV     #OUTBUF,%1
005632  004567  002062                  JSR     %5,RANDOM
005636  042767  177000  006622          BIC     #177000,OUTBUF  ;MASK FOR WORD LENGTH=1K
005644  001765                          BEQ     WRLG
005646  016767  006614  173172          MOV     OUTBUF,WRDCT    ;SET UP WORD COUNT
005654  016767  006610  173170          MOV     OUTBUF+2,DMA    ;SET UP DAR
005662  066767  173160  173162          ADD     WRDCT,DMA
005670  103753                          BCS     WRLG
005672  016767  006572  173152          MOV     OUTBUF+2,DMA
005700  042767  177774  006564          BIC     #177774,OUTBUF+4
005706  016767  006560  173134          MOV     OUTBUF+4,TRACK  ;SET UP DAE
005714  016767  173126  173164          MOV     WRDCT,WORK      ;GENERATE RANDOM
005722  012701  014466                  MOV     #OUTBUF,%1      ;DATA BUFFER
005726  004567  001766                  JSR     %5,RANDOM
005732  012767  014466  173116          MOV     #OUTBUF,BUF
005740  052777  000400  173046          BIS     #BIT8,@DCS      ;CLEAR THE DISK
005746  104503                          WRITE   +100            ;WRITE DATA
005750  032777  001000  173022          BIT     #BIT9,@SWR
005756  001002                          BNE     .+6
005760  000004                          IOT
005762  000404                          BR      .+12
005764  016777  173050  173010          MOV     PRIORITY,@PS
005772  000001                          WAIT
005774  104507                          WRCHECK +100            ;WRITE CHECK DATA
005776  032777  001000  172774          BIT     #BIT9,@SWR
006004  001002                          BNE     .+6
006006  000004                          IOT
006010  000404                          BR      .+12
006012  016777  173022  172762          MOV     PRIORITY,@PS
006020  000001                          WAIT
006022  016767  173056  173026          MOV     INPUT,BUF       ;SET UP BUFFER
006030  004567  002374                  JSR     %5,ZBUF         ;CLEAR BUFFER AREA
006034  104505                          READ    +100            ;READ DATA
006036  032777  001000  172734          BIT     #BIT9,@SWR
006044  001002                          BNE     .+6
006046  000004                          IOT
006050  000404                          BR      .+12
006052  016777  172762  172722          MOV     PRIORITY,@PS
006060  000001                          WAIT
006062  004567  002024                  JSR     %5,COMPARE      ;COMPARE OUT BUFFER TO IN BUFFER
006066  004567  002374                  JSR     %5,OVRFLO       ;TEST FOR EXTRA DATA BREAKS
```

```
  965  006072  032767  001000  172742  RANER:  BIT     #BIT9,FLAG      ;CHECK FOR ERROR
  966  006100  001430                  BEQ     EXRAX
  967  006102  042767  001000  172732          BIC     #BIT9,FLAG
  968  006110  004567  004620                  JSR     %5,CONV
  969  006114  001052                          DMA
  970  006116  013567                          MES1
  971  006120  000006                          6
  972  006122  004567  004606                  JSR     %5,CONV
  973  006126  001050                          TRACK
  974  006130  013603                          MES1A
  975  006132  000002                          2
  976  006134  004567  004574                  JSR     %5,CONV
  977  006140  001046                          WRDCT
  978  006142  013646                          MES3
  979  006144  000004                          4
  980  006146  104000                          EMT+0
  981  006150  013553                          MED6
  982  006152  013603                          MES1A
  983  006154  013567                          MES1
  984  006156  013646                          MES3
  985  006160  177777                          -1
  986  006162  005267  172714          EXRAX:  INC     PASSC           ;HAVE WE DONE IT 1000 TIMES
  987  006166  001214                  BNE     WRLG            ;BRANCH IF NO
  988  006170  032777  004000  172602          BIT     #BIT11,@SWR     ;LOOP ON TEST
  989  006176  001402                  BEQ     .+6             ;BRANCH IF YES
  990  006200  000167  177360                  JMP     RANEX
```

```
                                        ;
                                        ;CHECK FOR MULTI DISK MODE
                                        ;IF IN MULTI DISK MODE REPORT "END"
                                        ;IF LAST DISK ON SYSTEM HAS BEEN
                                        ;EXERCISED.
                                        ;
                                        ;
006204  005067  172642                  CLR     DMA
006210  005067  172634                  CLR     TRACK
006214  032767  004000  172620          BIT     #BIT11,FLAG     ;ARE WE IN MULTI DISK MODE
006222  001432                          BEQ     REPOEN          ;REPORT "END"
006224  016767  172612  172654  CHKDOS: MOV     FLAG,WORK       ;WHAT DISK ARE WE ON
006232  042767  177743  172646          BIC     #177743,WORK    ;IF LAST DISK ON SYSTEM
006240  026767  172642  172630          CMP     WORK,DSKNOR     ;REPORT END
006246  001420                          BEQ     REPOEN          ;REPORT "END" LAST DISK
006250  016703  172632                  MOV     WORK,R3         ;SET UP INDEX POINTER
006254  000241                          CLC
006256  006003                          ROR     R3
006260  022763  000020  013426          CMP     #20,TABLE(3)    ;WHAT IS ERROR COUNT?
006266  101004                          BHI     DRVEROK         ;LESS THAN 20(8)-CONTINUE
006270  062767  000004  172544          ADD     #4,FLAG
006276  000752                          BR      CHKDOS
006300  062767  000004  172534  DRVEROK: ADD    #4,FLAG         ;INC. DISK NO.
006306  000414                          BR      EXTPP           ;EXERCISE DISK
006310  104001                  REPOEN: EMT     +1
006312  014347                          END                     ;REPORT END OF PASS
006314  042767  000034  172520          BIC     #34,FLAG
006322  013700  000042                  MOV     @#42,R0         ;WAS THIS A MONITOR LOAD?
006326  001404                          BEQ     EXTPP           ;NO - RECYCLE
006330  004710                  LOGICAL: JSR    R7,(0)
006332  000240                          NOP
006334  000240                          NOP
006336  000240                          NOP
006340  000167  173512          EXTPP:  JMP     ADTST           ;RECYCLE
                                        ;
                                        ;ENTER DISK HANDLER BY THE TRAP INSTRUCTION
                                        ;ARGUMENT TO TRAP INSTRUCTION IS TWO ORDER
                                        ;BYTE OF THE CONTROL REGISTER.
                                        ;
006344  016705  172456          DISK:   MOV     DBR,R5          ;SET UP TO LOAD DISK REG
006350  016745  172474                  MOV     TRACK,-(5)      ;LOAD TRACK NUMBER
006354  016767  172462  172524          MOV     FLAG,WORK       ;SET UP DISK NO.
006362  042767  177743  172516          BIC     #177743,WORK    ;MASK FORM PROGRAM FLAG
006370  056715  172512                  BIS     WORK,(5)        ;LOAD UNIT INTO DAE
006374  016745  172452                  MOV     DMA,-(5)        ;LOAD WORD ADDRESS
006400  016745  172452                  MOV     BUF,-(5)        ;SET UP CURRENT ADDRESS
006404  016745  172436                  MOV     WRDCT,-(5)      ;LOAD WORD COUNT
006410  005115                          COM     (5)             ;SET UP TWO'S COMPLEMENT
006412  005215                          INC     (5)
006414  011604                          MOV     (6),R4
006416  014467  172464                  MOV     -(4),WORK       ;
006422  042767  177600  172456          BIC     #177600,WORK    ;MASK FUNCTION BITS
006430  016745  172452                  MOV     WORK,-(5)       ;LOAD FUNCTION REG.
006434  000002                          RTI                     ;RETURN FROM TRAP
```

```
1045                                    ;
1046                                    ;
1047                                    ;
1048                                    ;
1049                                    ;
1050                                    ;
1051                                    ;
1052                                    ;RF11 DISK INTERRUPT HANDLER
1053                                    ;ROUTINE CONTINUES ON ERRORS
1054                                    ;
1055  006436  005046                    DKINT:  CLR     -(6)            ;CLEAR STACK
1056  006440  012746  006446                    MOV     #1$,-(6)        ;SET RETURN
1057  006444  000002                            RTI                     ;CLEAR T BIT
1058  006446  005777  172342            1$:     TST     @DCS            ;TEST FOR ERROR
1059  006452  100164                            BPL     INTEXT          ;BR IF NO ERROR.
1060  006454  004767  004724                    JSR     %7,INCTAB       ;INC. ERROR COUNT
1061  006460  052767  001000  172354            BIS     #BIT9,FLAG      ;SET ERROR BIT
1062  006466  017767  172332  172412            MOV     @DAE,WORK       ;REPORT ERROR
1063  006474  042767  177700  172404            BIC     #177700,WORK    ;MASK ADDRESS EXT. BITS.
1064  006502  004567  004226                    JSR     %5,CONV         ;CONVERT TO ASCII
1065  006506  001106                            WORK
1066  006510  013603                            MES1A
1067  006512  000002                            2
1068  006514  104001                            EMT+1
1069  006516  013465                            MED2
1070  006520  017767  172270  172360            MOV     @DCS,WORK       ;TEST FOR READ
1071  006526  042767  177770  172352            BIC     #177770,WORK
1072  006534  022767  000004  172344            CMP     #4,WORK
1073  006542  001015                            BNE     DELMES          ;IF READING REPORT WHICH READ
1074  006544  016767  172272  172334            MOV     FLAG,WORK
1075  006552  042767  177774  172326            BIC     #177774,WORK
1076  006560  004567  004150                    JSR     %5,CONV
1077  006564  001106                            WORK
1078  006566  014017                            MES13
1079  006570  000001                            1
1080  006572  104001                            EMT+1
1081  006574  014017                            MES13
```

```
1082
1083  006576  017767  172220  172302  DELMES: MOV     @DAR,WORK       ;SET UP LOWER 16 BITS OF ADDR.
1084  006604  005367  172276                  DEC     WORK
1085  006610  004567  004120                  JSR     %5,CONV         ;CONVERT TO ASCII
1086  006614  001106                          WORK
1087  006616  013567                          MES1
1088  006620  000006                          6
1089  006622  104000                          EMT+0
1090  006624  013603                          MES1A
1091  006626  013567                          MES1
1092  006630  177777                          -1
1093  006632  017767  172156  172246          MOV     @DCS,WORK       ;SET UP STATUS
1094  006640  004567  004070                  JSR     %5,CONV
1095  006644  001106                          WORK
1096  006646  013613                          MES2
1097  006650  000006                          6
1098  006652  104001                          EMT+1
1099  006654  013613                          MES2
1100  006656  032777  040000  172130          BIT     #BIT14,@DCS     ;TEST FOR HARD ERROR
1101  006664  001435                          BEQ     SOFTER          ;GO AND CONTINUE SOFT ERROR
1102  006666  017767  172132  172212          MOV     @DAE,WORK       ;FETCH ERROR EXT. BITS
1103  006674  000367  172206                  SWAB    WORK
1104  006700  042767  177400  172200          BIC     #177400,WORK
1105  006706  004567  004022                  JSR     %5,CONV         ;CONVERT TO ASCII
1106  006712  001106                          WORK
1107  006714  013627                          MES2A
1108  006716  000003                          3
1109  006720  104000                          EMT+0
1110  006722  013534                          MED5A
1111  006724  013627                          MES2A
1112  006726  177777                          -1
1113  006730  052777  000400  172056          BIS     #BIT8,@DCS      ;CLEAR THE DISK
1114  006736  012706  001000                  MOV     #1000,%6
1115  006742  032777  002000  172030          BIT     #BIT10,@SWR     ;HALT ON ERROR
1116  006750  001401                          BEQ     .+4
1117  006752  000000                          HALT                    ;YES HALT BIT 10 SET IN SWR
1118  006754  000177  172120                  JMP     @HRDER          ;EXIT HARD ERROR
1119  006760  005777  172032          SOFTER: TST     @WC             ;CHECK FOR X-FER DONE
1120  006764  001417                          BEQ     INTEXT          ;EXIT FROM ROUTINE
1121  006766  032777  001000  172004          BIT     #BIT9,@SWR
1122  006774  001402                          BEQ     .+6
1123  006776  162716  000002                  SUB     #2,(6)          ;X-FER NOT DONE SET UP FOR RETURN
1124  007002  032777  002000  171770          BIT     #BIT10,@SWR     ;HALT ON ERROR
1125  007010  001401                          BEQ     .+4
1126  007012  000000                          HALT                    ;YES HALT BIT10 SET IN SWR
1127  007014  052777  000001  171772          BIS     #BIT0,@DCS      ;SET GO AND CONTINUE
1128  007022  000002                          RTI                     ;RETURN TO WAIT INSTR.
1129                                  ;
1130                                  ;
1131  007024  032777  020000  171746  INTEXT: BIT     #BIT13,@SWR     ;HALT ON COMPLETION FLAG
1132  007032  001401                          BEQ     .+4
1133  007034  000000                          HALT                    ;YES BIT 13 SET IN SWR HALT
1134  007036  032777  001000  171734          BIT     #BIT9,@SWR
1135  007044  001002                          BNE     .+6
```

```
1136  007046  012706  000774                    MOV     #774,%6         ;RESET STACK
1137  007052  000002                            RTI                     ;EXIT
```

```
1138
1139                                    ;
1140                                    ;
1141                                    ;
1142                                    ;
1143                                    ;ROUTINE TO SET UP DAR AND DAE
1144                                    ;FROM SWR AND CONVERSATION
1145                                    ;ENTER FROM JSR %5,OPDSEL
1146  007054  032777  000200  171716  OPDSEL: BIT     @#BIT7,@#SWR        ;DOES SWR CONTAIN TRACK #
1147  007062  001001                          BNE     .+4
1148  007064  000205                          RTS     %5
1149  007066  017767  171706  172012          MOV     @#SWR,WORK          ;FETCH SWR
1150  007074  006067  172006                  ROR     WORK
1151  007100  006067  172002                  ROR     WORK
1152  007104  006067  171776                  ROR     WORK
1153  007110  006067  171772                  ROR     WORK
1154  007114  006067  171766                  ROR     WORK
1155  007120  042767  177774  171760          BIC     #177774,WORK        ;MASK AIGL ORDER 2 BITS
1156  007126  016767  171754  171714          MOV     WORK,TRACK
1157  007134  017767  171640  171744          MOV     @#SWR,WORK
1158  007142  006167  171740                  ROL     WORK
1159  007146  006167  171734                  ROL     WORK
1160  007152  006167  171730                  ROL     WORK
1161  007156  006167  171724                  ROL     WORK
1162  007162  006167  171720                  ROL     WORK
1163  007166  006167  171714                  ROL     WORK
1164  007172  006167  171710                  ROL     WORK
1165  007176  006167  171704                  ROL     WORK
1166  007202  006167  171700                  ROL     WORK
1167  007206  006167  171674                  ROL     WORK
1168  007212  006167  171670                  ROL     WORK
1169  007216  042767  003777  171662          BIC     #003777,WORK
1170  007224  042767  174000  171620          BIC     #174000,DMA
1171  007232  066767  171650  171612          ADD     WORK,DMA            ;SET UP LOWER 16 BITS OF ADDRESS
1172  007240  000205                          RTS     %5                  ;EXIT
```

```
1173
1174                                    ;
1175                                    ;ROUTINE TO SETUP DISK BUFFERS
1176                                    ;ADD WORD COUNT TO STARTING DISK ADDRESSES
1177                                    ;COMPARE CALCULATED ADDRESS TO TERMINATING ADDRESS
1178                                    ;
1179  007242  066767  171600  171602  DISBUF: ADD     WRDCT,DMA       ;ADD WORD COUNT TO LOWER 16 BITS
1180  007250  103002                         BCC     COMDAR
1181  007252  005267  171572                INC     TRACK           ;OVERFLOW ADD ONE TO TRACK
1182  007256  026777  171570  171536  COMDAR: CMP     DMA,@DAR        ;COMPARE LOWER 16 BITS
1183  007264  001403                         BEQ     CMDAE
1184  007266  052767  000100  171546        BIS     #BIT6,FLAG
1185                                    ;
1186  007274  017767  171524  171606  CMDAE:  MOV     @DAE,WORK1      ;FETCH EXT. ADDR BITS
1187  007302  042767  177740  171600        BIC     #177740,WORK1   ;MASK TRACK AND DISK ADDR
1188  007310  016767  171526  171570        MOV     FLAG,WORK       ;SET UP DISK ADDRESS
1189  007316  042767  177743  171562        BIC     #177743,WORK
1190  007324  066767  171520  171554        ADD     TRACK,WORK
1191  007332  042767  177740  171546        BIC     #177740,WORK
1192  007340  026767  171542  171542        CMP     WORK,WORK1      ;ARE THEY EQUAL
1193  007346  001066                         BNE     ERADR           ;ERROR IN DAE REG
1194  007350  105767  171466                TSTB    FLAG            ;CHECK FOR LAST DISK BUFFER
1195  007354  100015                         BPL     EXTCME
1196  007356  005067  171470                CLR     DMA             ;CLEAR LOWER 16 BITS
1197  007362  005067  171462                CLR     TRACK           ;CLEAR EXT. ADDR. BITS.
1198  007366  042767  000200  171446        BIC     #200,FLAG
1199  007374  062716  000002                ADD     #2,(6)          ;INC STOCK POINTER
1200  007400  016767  171460  171440        MOV     SWRDCT,WRDCT
1201  007406  000445                         BR      EXTDR           ;EXIT
1202  007410  042767  177774  171472  EXTCME: BIC     #177774,WORK1   ;MASK EXT. TRACK BITS
1203  007416  022767  000003  171464        CMP     #3,WORK1        ;COMPARE FOR LAST TRACK
1204  007424  001021                         BNE     AKH             ;NOT LAST TRACK EXIT
1205  007426  017767  171370  171452        MOV     @DAR,WORK       ;FETCH LOWER 16 BITS OF ADDRESS
1206  007434  066767  171406  171444        ADD     WRDCT,WORK      ;WILL DISK OVERFLOW
1207  007442  103012                         BCC     AKH
1208  007444  052767  000200  171370        BIS     #200,FLAG
1209  007452  017767  171344  171366        MOV     @DAR,WRDCT      ;DISK WILL OVERFLOW
1210  007460  005167  171362                COM     WRDCT           ;SET UP NEW WORD COUNT
1211  007464  005267  171356                INC     WRDCT           ;MAKE TWO'S COMP.
1212  007470  017767  171330  171352  AKH:    MOV     @DAE,TRACK
1213  007476  042767  177774  171344        BIC     #177774,TRACK   ;MASK TRACK BITS
1214  007504  017767  171312  171340        MOV     @DAR,DMA        ;LOWER 16 BITS OF ADDRESS
1215  007512  032767  000100  171322        BIT     #BIT6,FLAG      ;REPORT ADDRESS ERROR
1216  007520  001001                         BNE     .+4
1217  007522  000207                 EXTDR:  RTS     %7              ;EXIT
1218  007524  004567  003204         ERADR:  JSR     %5,CONV         ;CONVERT DMA REG COUNT TO ASCII
1219  007530  001052                         DMA
1220  007532  013567                         MES1
1221  007534  000006                         6
1222  007536  004567  003172                JSR     %5,CONV         ;CONVERT TRACK REG COUNT TO ASCII
1223  007542  001110                         WORK1
1224  007544  013603                         MES1A
1225  007546  000002                         2
1226  007550  104000                         EMT     +0              ;REPORT ERROR
```

```
 1227  007552  013516                        HED4
 1228  007554  013603                        MES1A
 1229  007556  013567                        MES1
 1230  007560  177777                        -1
 1231  007562  004767  003616                JSR     %7,INCTAB       ;INC ERROR COUNT
 1232  007566  042767  000100  171246        BIC     #BIT6,FLAG
 1233  007574  005067  171252                CLR     DMA             ;DISK ADDRESS ERROR RE-START PROG.
 1234  007600  005067  171244                CLR     TRACK
 1235  007604  032777  002000  171166        BIT     #BIT10,@SWR     ;HALT ON ERROR
 1236  007612  001401                        BEQ     .+4
 1237  007614  000000                        HALT                    ;SWITCH 10 SET IN SWR HALT
 1238  007616  000207                        RTS     %7
```

```
1239
1240                                    ;
1241                                    ;
1242                                    ;
1243                                    ;
1244                                    ;
1245                                    ;
1246                                    ;ROUTINE TO SELECT DATA PATTERNS FOR TEST
1247                                    ;
1248                                    ;ENTER FROM JSR %5 PASEL
1249                                    ;
1250  007620  016767  171230  003166    PASEL:  MOV     PATNU,ACNVX     ;SET UP PATTERN NUMBER
1251  007626  006067  003162                    ROR     ACNVX           ;NORMALIZE
1252  007632  004567  003076                    JSR     %5,CONV         ;CONVERT TO ASCII
1253  007636  013014                            ACNVX
1254  007640  014401                            PATMES
1255  007642  000002                            2                       ;PRINT CURRENT PATTERN
1256  007644  104000                            EMT+0
1257  007646  014405                            PATHED
1258  007650  014401                            PATMES
1259  007652  177777                            -1
1260  007654  016700  171174                    MOV     PATNU,%0
1261  007660  016767  171162  171220          MOV     WRDCT,WORK      ;SET UP WORK
1262  007666  012701  014466                    MOV     #OUTBUF,%1      ;LOC. OF OUTBUFFER
1263  007672  022700  000042                    CMP     #42,%0          ;TEST FOR RANDOM DATA NUMBER
1264  007676  001410                            BEQ     RANDOM          ;GO GENERATE RANDOM DATA
1265  007700  016021  010050          FILDAT: MOV     PAT0(0),(1)+    ;FILL BUFFER
1266  007704  005367  171176                    DEC     WORK            ;DEC. WORK COUNT
1267  007710  005767  171172                    TST     WORK            ;TEST FOR LAST WORK
1268  007714  001371                            BNE     FILDAT          ;LOAD NEXT WORD
1269  007716  000205                            RTS     %5              ;BUFFER FULL
1270                                  ;
1271                                  ;RANDOM DATA
1272                                  ;
1273                                  ;
1274                                  ;
1275                                  ;
1276                                  ;RANDOM DATA GENERATOR SUBROUTINE
1277  007720  016700  000120          RANDOM: MOV     LONUM,%0        ;SET UP R0 WITH 5 DIGITS LOW
1278  007724  016704  000116                  MOV     HINUM,%4        ;SET UP R1 WITH 5 DIGITS HIGH
1279  007730  012703  000007                  MOV     #7,%3           ;SET UP SHIFT COUNT
1280  007734  005002                          CLR     %2              ;CLEAR R2
1281  007736  006300                  SHIFT:  ASL     %0              ;SHIFT R0 LEFT AND
1282  007740  006104                          ROL     %4              ;ROTATE CARRY INTO LSB OF R1 INTO
1283  007742  006102                          ROL     %2              ;ROTATE CARRY OUT OF R1 INTO R2
1284  007744  005303                          DEC     %3              ;DECREMENT R3
1285  007746  001373                          BNE     SHIFT           ;CONTINUE SHIFT LOOP
1286  007750  066700  000070                  ADD     LONUM,%0        ;ADDN IN NUMBER TO MAKE X 129
1287  007754  005504                          ADC     %4              ;PROPOGATE CARRY
1288  007756  066704  000064                  ADD     HINUM,%4        ;ADDN IN NUMBER TO MAKE X 129
1289  007762  005502                          ADC     %2              ;PROPOGATE CARRY
1290  007764  062700  001057                  ADD     #1057,%0        ;ADDN LOW CONSTANT
1291  007770  005504                          ADC     %4              ;PROPOGATE CARRIES
1292  007772  005502                          ADC     %2              ;PROPOGATE AGAN
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1293  007774  062704  047401                  ADD     #47401,%4       ;ADDN HIGH CONSTANT
1294  010000  005502                          ADC     %2              ;PROPOGATE CARRY
1295  010002  062702  000006                  ADD     #6,%2           ;ADDN HIGHEST CONSTANT
1296  010006  060200                          ADD     %2,%0           ;REPRIME R0 WITH HIGH DIGIT
1297  010010  005504                          ADC     %4              ;PROPOGATE CARRY
1298  010012  010067  000026                  MOV     %0,LONUM        ;PUT R0 BACK IN LONUM
1299
1300  010016  010021                          MOV     %0,(1)+         ;HOLD LONUM FOR PROGRAM
1301  010020  005367  171062                  DEC     WORK
1302  010024  001406                          BEQ     EXGEN
1303  010026  010467  000014                  MOV     %4,HINUM        ;PUT R1 BACK IN HINUM
1304  010032  010421                          MOV     %4,(1)+         ;HOLD HINUM FOR PROGRAM
1305  010034  005367  171046                  DEC     WORK
1306  010040  001327                          BNE     RANDOM
1307  010042  000205                  EXGEN:  RTS     %5              ;RETURN T PROGRAM
1308  010044  000000                  LONUM:  0
1309  010046  000000                  HINUM:  0
1310                                  ;
1311                                  ;
1312                                  ;
1313                                  ;
1314                                  ;
1315                                  ;
1316                                  ;
```

```
1317
1318                                            .EVEN
1319                                    ;
1320                                    ;RF11 DATA PATTERNS
1321                                    ;
1322  010050  000000                   PAT0:   0
1323  010052  177777                   PAT1:   177777
1324  010054  134510                   PAT2:   134510
1325  010056  043267                   PAT3:   043267
1326  010060  100000                   PAT4:   100000
1327  010062  107070                   PAT5:   107070
1328  010064  070707                   PAT6:   070707
1329  010066  052525                   PAT7:   052525
1330  010070  125252                   PAT10:  125252
1331  010072  177737                   PAT11:  177737
1332  010074  004102                   PAT12:  004102
1333  010076  136363                   PAT13:  136363
1334  010100  063636                   PAT14:  063636
1335  010102  000001                   PAT15:  000001
1336  010104  100005                   PAT16:  100005
1337  010106  000520                   PAT17:  000520
1338  010110  030303                   PAT20:  030303
1339                                    ;PAT21  RANDOM DATA
1340                                    ;
1341                                    ;
1342                                    ;
1343                                    ;DATA COMPARISON ROUTINE
1344                                    ;IF AN ERROR OCCURS BETWEEN THE OUT-BUFFER AND
1345                                    ;THE IN-BUFFER AN ERROR WILL BE REPORTED IN THE
1346                                    ;FOLLOWING MANNER
1347                                    ;DATA ERROR XX DAE XXXXXX DAR XXXXXX GOOD DATA XXXXXX BAD DATA
1348                                    ;
1349                                    ;
1350  010112  005067  170774            COMPARE:CLR     WORK2           ;WORD COUNT
1351  010116  012767  014466  170744            MOV     @OUTBUF,SAVE    ;SET UP OUTBUFFER POINTER
1352  010124  016767  170754  170740            MOV     INPUT,SAV1      ;SET UP IN BUFFER POINTER
1353  010132  027777  170732  170732  WRDCMP:   CMP     @SAVE,@SAV1     ;COMPARE BUFFERS
1354  010140  001016                            BNE     WDERR           ;WORD IN ERROR
1355  010142  005267  170744          WRDINC:   INC     WORK2           ;+1 WORD COUNT
1356  010146  026767  170674  170736            CMP     WRDCT,WORK2     ;IS COMPLETE BUFFER CHECKED
1357  010154  001407                            BEQ     ADAM            ;EXIT ROUTINE
1358  010156  062767  000002  170704            ADD     #2,SAVE
1359  010164  062767  000002  170700            ADD     #2,SAV1
1360  010172  000757                            BR      WRDCMP          ;COMPARE NEXT WORD
1361  010174  000205                    ADAM:   RTS     R5              ;EXIT THIS ROUTINE
1362                                    ;
```

```
1363
1364  010176  052767  001000  170636  WDERR:  BIS     #BIT9,FLAG      ;SET ERROR BIT
1365  010204  004767  003174                  JSR     %7,INCTAB       ;INC. ERROR COUNT
1366  010210  016767  170636  170670          MOV     DMA,WORK        ;FETCH STARTING DISK ADDR
1367  010216  016767  170626  170664          MOV     TRACK,WORK1     ;
1368  010224  066767  170662  170654          ADD     WORK2,WORK      ;CALCULATE FAILING ADDR
1369  010232  103002                          BCC     .+6             ;SHOULD DAE BE INCREMENTED
1370  010234  005267  170650                  INC     WORK1
1371  010240  016767  170576  170646          MOV     FLAG,WORK3
1372  010246  042767  177743  170640          BIC     #177743,WORK3
1373  010254  056767  170634  170626          BIS     WORK3,WORK1
1374  010262  004567  002446                  JSR     %5,CONV         ;CONVERT WORD ADDR TO ASCII
1375  010266  001106                          WORK
1376  010270  013567                          MES1
1377  010272  000006                          6
1378  010274  004567  002434                  JSR     %5,CONV         ;CONVERT TRACK ADDR TO ASCII
1379  010300  001110                          WORK1
1380  010302  013603                          MES1A
1381  010304  000002                          2
1382  010306  017767  170556  170572          MOV     @SAVE,WORK      ;FETCH GOOD DATA
1383  010314  004567  002414                  JSR     %5,CONV         ;CONVERT GOOD DATA TO ASCII
1384  010320  001106                          WORK
1385  010322  013704                          MES5
1386  010324  000006                          6
1387  010326  017767  170540  170552          MOV     @SAV1,WORK      ;FETCH BAD DATA
1388  010334  004567  002374                  JSR     %5,CONV         ;CONVERT TO ASCII
1389  010340  001106                          WORK
1390  010342  013724                          MES6
1391  010344  000006                          6
1392  010346  016767  170470  170532          MOV     FLAG,WORK       ;WHICH READ THE
1393  010354  042767  177774  170524          BIC     #177774,WORK            ;ERROR OCCURRED ON
1394  010362  004567  002346                  JSR     %5,CONV
1395  010366  001106                          WORK
1396  010370  014017                          MES13
1397  010372  000001                          1
1398  010374  104000                          EMT     +0              ;PRINT MESSAGE
1399  010376  013452                          HED1
1400  010400  014017                          MES13
1401  010402  013603                          MES1A
1402  010404  013567                          MES1
1403  010406  013704                          MES5
1404  010410  013724                          MES6
1405  010412  177777                          -1
1406  010414  032777  002000  170356          BIT     #BIT10,@SWR     ;HALT ON ERROR
1407  010422  001401                          BEQ     .+4
1408  010424  000000                          HALT                    ;YES HALT BIT 10 SET IN SWR
1409  010426  000645                          BR      WRDINC          ;GO COMPARE NEXT WORD
1410                                  ;
1411                                  ;
1412                                  ;
1413                                  ;
1414                                  ;
1415                                  ;
```

```
1416
1417                                    ;
1418                                    ;ROUTINE TO ZERO DATA INPUT BUFFER
1419                                    ;ZERO BUFFER BEFORE READING
1420                                    ;
1421                                    ;
1422  010430  016704  170450           ZBUF:   MOV     INPUT,%4        ;FETCH START OF INBUFFER
1423  010434  016767  170424  170452           MOV     SWRDCT,WORK3
1424  010442  006167  170446                   ROL     WORK3
1425  010446  060467  170442                   ADD     %4,WORK3
1426  010452  020467  170436           NZUF:   CMP     %4,WORK3        ;IS ROUTINE COMP.
1427  010456  001001                           BNE     CLEAR           ;ZERO NEXT WORD
1428  010460  000205                           RTS     %5              ;EXIT ROUTINE
1429  010462  005024                   CLEAR:  CLR     (4)+            ;CLEAR THE WORD
1430  010464  000772                           BR      NZUF
1431                                    ;
1432                                    ;
1433                                    ;
1434                                    ;
1435                                    ;ROUTINE TO TEST FOR ADDITIONAL DATA TRANSFERS
1436                                    ;ANY DATA TRANSFERRED AFTER WORD COUNT OVERFLOW IS AN ERROR
1437                                    ;
1438                                    ;
1439  010466  016704  170354           OVRFLO: MOV     WRDCT,%4        ;ADD WORD COUNT
1440  010472  006104                           ROL     %4
1441  010474  066704  170404                   ADD     INPUT,%4
1442  010500  016767  170360  170406           MOV     SWRDCT,WORK3
1443  010506  006167  170402                   ROL     WORK3
1444  010512  066767  170366  170374           ADD     INPUT,WORK3
1445  010520  020467  170370           CHWRD:  CMP     %4,WORK3        ;IS TEST COMPLETE
1446  010524  001001                           BNE     CKNEX           ;CHECK NEXT WORD
1447  010526  000205                           RTS     %5              ;TEST IS COMPLETE
1448  010530  005724                   CKNEX:  TST     (4)+            ;TEST FOR ZERO WORD
1449  010532  001772                           BEQ     CHWRD           ;WORD IS ZERO
1450  010534  052767  001000  170300           BIS     #BIT9,FLAG      ;SET ERROR BIT
1451  010542  010467  002246                   MOV     %4,ACNVX
1452  010546  162767  000002  002240           SUB     #2,ACNVX
1453  010554  004567  002154                   JSR     %5,CONV         ;CONVERT 1 OCTAL TO ASCII
1454  010560  013014                           ACNVX                   ;ADDRESS
1455  010562  013663                           MES4
1456  010564  000006                           6
1457  010566  010467  002222                   MOV     %4,ACNVX
1458  010572  162767  000002  002214           SUB     #2,ACNVX
1459  010600  017767  002210  002206           MOV     @ACNVX,ACNVX
1460  010606  004567  002122                   JSR     %5,CONV         ;CONVERT OCTAL TO ASCII
1461  010612  013014                           ACNVX                   ;DATA
1462  010614  013724                           MES6
1463  010616  000006                           6
1464  010620  104000                           EMT     +0              ;CALL TYPE OUT ROUTINE
1465  010622  013502                           HED3
1466  010624  013663                           MES4
1467  010626  013724                           MES6
1468  010630  177777                           -1
1469  010632  000732                           BR      CHWRD           ;FETCH NEXT WORD
```

```
1470                                    ;
1471                                    ;
1472                                    ;
1473                                    ;
1474                                    ;
1475                                    ;
```

```
1476
1477                                    ;EXTENDED MEMORY EXERCISER
1478                                    ;THE PROGRAM DETERMINES HOW MUCH MEMORY
1479                                    ;IS ON THE SYSTEM THEN IT
1480                                    ;
1481  010634  052777  000400  170152    EXTMEN: BIS     #BIT8,@DCS      ;CLEAR THE DISK
1482  010642  013767  000042  170220            MOV     @#42,SAVE       ;GET MONITOR ADDRESS
1483  010650  001410                            BEQ     1$              ;SKIP IF 0
1484  010652  100432                            BMI     LGMEM           ;GREATER THAN 16K
1485  010654  162767  000020  170206            SUB     #20,SAVE        ;DEC IT
1486  010662  022767  014466  170200            CMP     #OUTBUF,SAVE    ;IS IT ACT 11
1487  010670  100432                            BMI     GOTMEM          ;NO - SKIP
1488  010672  012767  010750  167104  1$:       MOV     #MAXREF,4       ;SET UP I/O BUS TRAP
1489  010700  012767  000340  167100            MOV     #340,6
1490  010706  012767  017446  170154            MOV     #17446,SAVE     ;SET UP FOR 4K
1491  010714  005777  170150          EXREF:    TST     @SAVE           ;REFERENCE MEMORY
1492  010720  022767  177446  170142            CMP     #177446,SAVE    ;TEST FOR GREATER THAN 28K
1493  010726  001410                            BEQ     MAXREF          ;LAST REFERENCE MADE TO I/O REG.
1494  010730  062767  020000  170132            ADD     #20000,SAVE     ;SET UP FOR NEXT MEMORY REF.
1495  010736  000766                            BR      EXREF           ;GO REFERENCE MEMORY
1496  010740  162767  000020  170122  LGMEM:    SUB     #20,SAVE        ;DEC IT
1497  010746  000403                            BR      GOTMEM
1498                                    ;
1499                                    ;ENTER HERE WHEN I/O BUS ERROR OCCURS
1500                                    ;
1501  010750  162767  020000  170112  MAXREF: SUB     #20000,SAVE
1502  010756  012767  000006  167020  GOTMEM: MOV     #6,4            ;RESTORE I/O BUS TRAP
1503  010764  005067  167016                  CLR     6
1504  010770  012706  000776                  MOV     #776,%6
1505  010774  162767  014466  170066          SUB     #OUTBUF,SAVE    ;SET UP NEW WORD COUNT
1506  011002  006067  170062                  ROR     SAVE
1507  011006  042767  000001  170054          BIC     #BIT0,SAVE
1508  011014  016767  170050  170042          MOV     SAVE,SWRDCT
1509  011022  006067  170036                  ROR     SWRDCT
1510  011026  016767  170032  170012          MOV     SWRDCT,WRDCT
1511  011034  012767  014466  170042          MOV     #OUTBUF,INPUT
1512  011042  066767  170022  170034          ADD     SAVE,INPUT
1513  011050  000205                          RTS     %5
```

```
1514
1515                                    ;
1516                                    ;BACKGROUND TEST FOR INTERRUPTS
1517                                    ;
1518  011052  012767  011202  166734  XWAIT:  MOV     #RTIX,14        ;SET UP TRACE TRAP
1519  011060  005067  166732                 CLR     16
1520  011064  012767  177000  170002         MOV     #-1000,PASS     ;SET UP TIME BASE
1521  011072  012737  011114  000010         MOV     #18,@#10        ;SET ILLEGAL INST
1522  011100  006727  000000                 SXT     #0              ;TEST FOR 11/45
1523  011104  012767  000006  000070         MOV     #6,RTIX         ;MAKE IT AN RTT
1524  011112  000401                 BR      2$              ;SKIP JUNK
1525  011114  022626                 1$:     CMP     (6)+,(6)+       ;CLEAR STACK
1526  011116  012737  000012  000010  2$:     MOV     #12,@#10        ;RESET I/O
1527  011124  012746  000020                 MOV     #BIT4,-(6)      ;SET TRACE TRAP BIT
1528  011130  012746  011136                 MOV     #.+6,-(6)
1529  011134  000002                 RTI                             ;RETURNS TO NEXT LOCATION EITH T BIT SET
1530  011136  005027  000000                 CLR     #0
1531  011142  005267  177772         XINCW:  INC     XINCW-2
1532  011146  105767  177766                 TSTB    XINCW-2
1533  011152  100373                 BPL     XINCW
1534  011154  005267  167714                 INC     PASS
1535  011160  001401                 BEQ     .+4
1536  011162  000765                 BR      XINCW-4
1537                                  ;REPORT BACKGROUND TEST TIMED OUT
1538  011164  005046                 CLR     -(6)            ;CLEAR PS ON STACK
1539  011166  012746  011174                 MOV     #18,-(6)
1540  011172  000002                 RTI                             ;SET RETURN
1541  011174  104001                 1$:     EMT+1                   ;CLEAR TRACE BIT
1542  011176  014027                 TIMO
1543  011200  000000                 HALT
1544                                  ;
1545  011202  000002                 RTIX:   RTI
```

```
1546
1547                                    ;RF11 POWER FAIL TEST "1
1548                                    ;       DISK ZERO
1549                                    ;       WRITE COMPLETE DISK WITH 125252 PATTERN
1550                                    ;       REPORT "OK"
1551                                    ;START WRITING THE SAME PATTERN
1552                                    ;WHEN POWER FAIL OCCURS ABORT TRANSFER
1553                                    ;SETUP NEW ENTRY POINT AND HALT
1554                                    ;
1555                                    ;POWER UP AND WRITE CHECK THE DISK FOR ERRORS
1556                                    ;
1557                                    ;***ONLY ONE ERROR IS CONSIDERED ACCEPTABLE***
1558                                    ;
1559                                    ;
1560  011204  012706  001000           PFT1:   MOV     #1000,%6        ;SET UP STACK
1561  011210  004767  000406                   JSR     %7,POWFAL       ;WRITE 125252 ON DISK
1562  011214  052777  000400  167572   PFWAT:  BIS     #BIT8,@DCS      ;CLEAR DISK
1563  011222  005067  167624                   CLR     DMA
1564  011226  005067  167616                   CLR     TRACK
1565  011232  012767  011214  167640           MOV     #PFWAT,HRDER    ;SET UP FOR HARD ERROR
1566  011240  012767  011376  166556           MOV     #DOWN,24        ;SET UP POWER FAIL VEC.
1567  011246  012767  000340  166552           MOV     #340,26
1568  011254  104503                   MYBYWR: WRITE   +100
1569  011256  032777  001000  167514           BIT     #BIT9,@SWR
1570  011264  001002                           BNE     .+6
1571  011266  000004                           IOT
1572  011270  000404                           BR      .+12
1573  011272  016777  167542  167502           MOV     PRIORITY,@PS
1574  011300  000001                           WAIT
1575  011302  004767  175734                   JSR     %7,DISBUF       ;SET UP NEW DISK BUFFER
1576  011306  000762                           BR      MYBYWR
1577  011310  000741                           BR      PFWAT
1578                                  ;ROUTINE TO CHECK DATA AFTER POWER FAIL
1579                                  ;
1580  011312  052777  000400  167474   UPCHK:  BIS     #BIT8,@DCS      ;CLEAR THE DISK
1581  011320  005067  167526                   CLR     DMA
1582  011324  005067  167520                   CLR     TRACK
1583  011330  012767  011312  167542           MOV     #UPCHK,HRDER    ;SET UP FOR HARD ERROR
1584  011336  104507                   CHKDAT: WRCHECK +100
1585  011340  032777  001000  167432           BIT     #BIT9,@SWR
1586  011346  001002                           BNE     .+6
1587  011350  000004                           IOT
1588  011352  000404                           BR      .+12
1589  011354  016777  167460  167420           MOV     PRIORITY,@PS
1590  011362  000001                           WAIT
1591  011364  004767  175652                   JSR     %7,DISBUF       ;SET UP NEW DISK BUFFER
1592  011370  000762                           BR      CHKDAT
1593  011372  000167  177616                   JMP     PFWAT           ;GO WAIT FOR ANOTHER
1594                                                                    ;POWER FAIL
```

```
1595
1596                                    ;
1597                                    ;POWER DOWN ROUTINE
1598                                    ;ABORT DISK AND HALT
1599                                    ;
1600                                    ;
1601  011376  052777  000400  167410    DOWN:   BIS     #BIT8,@DCS      ;ABORT DISK
1602  011404  012767  011414  166412            MOV     #UP,24          ;SET POWER FAIL VECTOR
1603  011412  000000                            HALT
1604                                    ;
1605  011414  012767  011376  166402    UP:     MOV     #DOWN,24
1606  011422  012706  001000                    MOV     #1000,%6
1607  011426  104001                            EMT+1
1608  011430  014325                            PWRF
1609  011432  004767  000142                    JSR     %7,DELAY
1610  011436  000167  177650                    JMP     UPCHK           ;GO CHECK DISK
1611                                    ;
1612                                    ;
1613                                    ;
1614                                    ;
1615                                    ;
1616                                    ;
1617                                    ;POWER FAIL TEST #2
1618                                    ;DISK ZERO
1619                                    ;WRITE COMPLETE DISK WITH 125252 PATTERN
1620                                    ;REPORT "OK"
1621                                    ;WRITE CHECK DISK AND WAIT FOR POWER FAIL
1622                                    ;WHEN POWER COMES BACK WRITE CHECK DISK AGAIN
1623                                    ;AND CHECK FOR ERRORS
1624                                    ;***NO ERRORS SHOULD OCCUR.***
1625                                    ;
1626                                    ;DO NOT CREATE ANOTHER POWER FAIL UNTIL
1627                                    ;THE ADDRESS REGISTER HAS COMPLETELY CYCLED
1628                                    ;THROUGH.
1629                                    ;
1630  011442  012706  001000            PFT2:   MOV     #1000,%6        ;SET UP STACK
1631  011446  004767  000150                    JSR     %7,POWFAL       ;WRITE 125252 ON DISK
1632  011452  005067  167374            PWRFL:  CLR     DMA
1633  011456  005067  167366                    CLR     TRACK
1634  011462  012767  011452  167410            MOV     #PWRFL,HRDER    ;SET UP HARD ERROR
1635  011470  012767  011542  166326            MOV     #PWRDN,24       ;SET UP POWER FAIL VEC.
1636  011476  012767  000340  166322            MOV     #340,26
1637  011504  104507                    CHKDSK: WRCHECK +100
1638  011506  032777  001000  167264            BIT     #BIT9,@SWR
1639  011514  001002                            BNE     .+6
1640  011516  000004                            IOT                     ;WAIT IN BACKGROUND
1641  011520  000404                            BR      .+12
1642  011522  016777  167312  167252            MOV     PRIORITY,@PS
1643  011530  000001                            WAIT
1644  011532  004767  175504                    JSR     %7,DISBUF       ;CHECK NEXT BUFFER
1645  011536  000762                            BR      CHKDSK
1646  011540  000744                            BR      PWRFL
```

```
1647
1648                                    ;
1649                                    ;ROUTINE TO ABORT DISK DURING POWER FAIL
1650                                    ;
1651  011542  052777  000400  167244  PWRDN:  BIS     #BIT8,@DCS      ;CLEAR THE DISK
1652  011550  012767  011560  166246          MOV     #PWRUP,24       ;SET UP RESTART
1653  011556  000000                         HALT
1654                                    ;
1655  011560  012767  011542  166236  PWRUP:  MOV     #PWRDN,24       ;RESET POWER FAIL VECTOR
1656  011566  012706  001000                 MOV     #1000,%6
1657  011572  004767  000002                 JSR     %7,DELAY
1658  011576  000725                         BR      PWRFL           ;GO CHECK DISK
1659                                    ;
1660                                    ;
1661  011600  012700  177633          DELAY:  MOV     #-145,%0
1662  011604  005002                         CLR     %2
1663  011606  000005                  1$:    RESET
1664  011610  005202                         INC     %2
1665  011612  001375                         BNE     1$
1666  011614  005200                         INC     %0
1667  011616  001373                         BNE     1$
1668  011620  000207                         RTS     %7
1669                                    ;
1670                                    ;
1671                                    ;
1672                                    ;ROUTINE TO WRITE THE COMPLETE DISK
1673                                    ;WITH 125252 PATTERN
1674                                    ;WRITE CHECK AND REPORT ERRORS IF THEY
1675                                    ;OCCUR
1676                                    ;REPORT "OK" AT COMPLETION
1677  011622  052777  000400  167164  POWFAL: BIS     #BIT8,@DCS      ;CLEAR THE DISK
1678  011630  011667  167246                 MOV     (6),PASSC
1679  011634  012706  001000                 MOV     #1000,%6
1680  011640  012767  000020  167206         MOV     #20,PATNU       ;SET UP PATTERN
1681  011646  005067  167200                 CLR     DMA
1682  011652  005067  167172                 CLR     TRACK
1683  011656  012767  002000  167200         MOV     #2000,SWRDCT    ;SETUP WORD COUNT
1684  011664  016767  167174  167154         MOV     SWRDCT,WRDCT
1685  011672  004567  175722                 JSR     %5,PASEL        ;GENERATE DATA BUFFER
1686  011676  012767  014466  167152         MOV     #OUTBUF,BUF     ;SET UP CURRENT ADDRESS
1687  011704  012767  011622  167166         MOV     #POWFAL,MRDER
1688  011712  104503                  WRDNW$: WRITE   +100
1689  011714  032777  001000  167056         BIT     #BIT9,@SWR      ;CHECK ON HOW TO WAIT
1690  011722  001002                         BNE     .+6
1691  011724  000004                         IOT                     ;BACKGROUND TEST
1692  011726  000404                         BR      .+12
1693  011730  016777  167104  167044         MOV     PRIORITY,@PS
1694  011736  000001                         WAIT
1695  011740  104507                  WRCHECK +100
1696  011742  032777  001000  167030         BIT     #BIT9,@SWR      ;
1697  011750  001002                         BNE     .+6
1698  011752  000004                         IOT
1699  011754  000404                         BR      .+12
1700  011756  016777  167056  167016         MOV     PRIORITY,@PS
```

```
 1701  011764  000001                        WAIT
 1702  011766  004767  175250                JSR     %7,DISBUF       ;SET UP NEW DISK BUFFER
 1703  011772  000747                        BR      WRDNW           ;WRITE NEW BUFFER
 1704  011774  104001                        EMT     +1
 1705  011776  014055                        OK
 1706  012000  000177  167076                JMP     @PASSC
```

```
1707
1708                                    ;ROUTINE TO ALLOW THE OPERATOR TO SET BITS
1709                                    ;IN THE I/O REGISTERS VIA THE SWITCH REGISTER
1710                                    ;
1711                                    ;WORD COUNT REGISTER
1712  012004  017777  166770  167004    SELWC:  MOV     @SWR,@WC                ;MOV SWR INTO WORD COUNT REG
1713  012012  000774                            BR      SELWC
1714                                    ;
1715                                    ;CURRENT ADDRESS REGISTER
1716  012014  017777  166760  166776    SELCMA: MOV     @SWR,@CMA       ;MOV SWR INTO CURRENT ADDR REG
1717  012022  000774                            BR      SELCMA
1718                                    ;
1719                                    ;DISK ADDRESS REGISTER
1720  012024  017777  166750  166770    SELDAR: MOV     @SWR,@DAR       ;MOV SWR INTO DISK ADDR REG
1721  012032  000774                            BR      SELDAR
1722                                    ;
1723                                    ;DISK ADDRESS EXT AND ERROR REGISTER
1724  012034  017777  166740  166762    SELDAE: MOV     @SWR,@DAE       ;MOV SWR INTO DISK ADDR EXT REG
1725  012042  000774                            BR      SELDAE
1726                                    ;
1727                                    ;DATA BUFFER REGISTER
1728  012044  017777  166730  166754    SELDBR: MOV     @SWR,@DBR       ; MOV SWR INTO DATA BUFFER
1729  012052  000774                            BR      SELDBR
1730                                    ;
1731                                    ;
1732                                    ;LOOK AHEAD REGISTER
1733  012054  017700  166752            MOVLK:  MOV     @ADS,%0         ;MOVE LOOK AHEAD
1734  012060  000005                            RESET
1735  012062  000005                            RESET
1736  012064  000773                            BR      MOVLK           ;INTO REGISTER 0
1737                                  ;
1738                                  ;
1739                                  ;DISK CONTROL STATUS REGISTER
1740  012066  012777  000340  166706  SELDCS: MOV     #340,@PS        ;LOCK UP INTERRUPTS
1741  012074  012777  177777  166714           MOV     #177777,@WC     ;SET WORD COUNT =1 WORD
1742  012102  012777  014466  166710           MOV     #OUTBUF,@CMA    ;SET UP CURRENT ADDRESS
1743  012110  017777  166664  166676           MOV     @SWR,@DCS       ;MOV SWR INTO CONTROL REG
1744  012116  032777  000001  166670           BIT     #BIT0,@DCS      ;IS FUNCTION BITS SET
1745  012124  001760                           BEQ     SELDCS          ;FUNCTION BITS NOT SET
1746  012126  105777  166662            DKBUSY: TSTB    @DCS            ;TEST FOR DISK NOT READY
1747  012132  100375                           BPL     DKBUSY          ;DISK STILL READY
1748  012134  000754                           BR      SELDCS          ;DISK NOT BUSY SELECT NEW CR
1749                                  ;
1750                                  ;
1751                                  ;
1752                                  ;
1753                                  ;
1754                                  ;
1755                                  ;
```

```
                                        ;
                                        ;THIS ROUTINE ENABLES THE OPERATOR TO SELECT A TRACK STATICLY
                                        ;THE ROUTINE DOES A ONE WORD READ TO SELECT THE TRACK
                                        ;THE OPERATOR MAY CHANGE THE SWITCH REGISTER AT ANY TIME
                                        ;SWR6-0 EQUALS THE TRACK NUMBER
                                        ;SWR9-7 EQUALS THE DISK NUMBER
                                        ;
012136  052777  000400  166650  STAMP:  BIS     #BIT8,@DCS
012144  017767  166630  166736          MOV     @SWR,WORK1      ;FETCH SWR
012152  016767  166732  166726          MOV     WORK1,WORK
012160  042767  176000  166720          BIC     #176000,WORK    ;MASK THE TRACK AND DISK NO.
012166  006067  166714                  ROR     WORK
012172  006067  166710                  ROR     WORK
012176  006067  166704                  ROR     WORK
012202  006067  166700                  ROR     WORK
012206  006067  166674                  ROR     WORK
012212  016777  166670  166604          MOV     WORK,@DAE       ;DISK EXT. ADDR. REG. LOADED
012220  017767  166554  166660          MOV     @SWR,WORK
012226  000367  166654                  SWAB    WORK
012232  006167  166650                  ROL     WORK
012236  006167  166644                  ROL     WORK
012242  006167  166640                  ROL     WORK
012246  042767  003777  166632          BIC     #3777,WORK
012254  016777  166626  166540          MOV     WORK,@DAR       ;DISK ADDRESS REG LOADED
012262  012777  015070  166530          MOV     #INBUF,@CMA     ;LOAD CURRENT ADDRESS
012270  012777  177777  166520          MOV     #177777,@WC     ;LOAD WORD COUNT
012276  052777  000005  166510          BIS     #5,@DCS         ;GO AND READ
012304  105777  166504          CTBUSY: TSTB    @DCS            ;TEST FOR CONTROL NOT READY
012310  100375                          BPL     CTBUSY          ;WAIT FOR CONTROL NOT READY
012312  026777  166572  166460  SWRCHG: CMP     WORK1,@SWR
012320  001306                          BNE     STAMP           ;SWR HAS CHANGED
012322  000773                          BR      SWRCHG          ;SWR HAS NOT CHANGED
                                        ;
                                        ;
                                        ;
                                        ;
                                        ;
                                        ;
```

K5

```
1795
1796                                    ;
1797                                    ;ROUTINE TO REPORT ERROR COUNT AND CONTENTS OF ONE REGISTER
1798                                    ;
1799  012324  004567  000404            STAER:  JSR     %5,CONV         ;CONVERT OCTAL TO ASCII
1800  012330  001106                            WORK                    ;DATA TO BE CONVERTED
1801  012332  013750                            MES10                   ;ADDRESS OF MESSAGE
1802  012334  000006                            6
1803  012336  004567  000372                    JSR     %5,CONV         ;CONVERT OCTAL TO ASCII
1804  012342  001066                            ERCOUNT                 ;ERROR COUNT TO BE CONVERTED
1805  012344  013536                            MED5                    ;ADDRESS OF MESSAGE
1806  012346  000003                            3
1807  012350  104000                            EMT     +0              ;REPORT MESSAGE
1808  012352  013534                            MED5A
1809  012354  013536                            MED5
1810  012356  013750                            MES10
1811  012360  177777                            -1
1812  012362  004767  001016                    JSR     %7,INCTAB       ;INC. ERROR COUNT
1813  012366  000167  000056                    JMP     EREXT           ;EXIT ROUTINE
1814                                    ;
1815                                    ;ROUTINE TO REPORT ERROR COUNT AND THE CONTENTS OF TWO REGISTERS
1816                                    ;
1817                                    ;
1818                                    ;
1819  012372  004567  000336            STAER1: JSR     %5,CONV         ;CONVERT OCTAL TO ASCII
1820  012376  001106                            WORK                    ;DATA TO BE CONVERTED
1821  012400  013750                            MES10                   ;ADDRESS OF MESSAGE
1822  012402  000006                            6
1823  012404  004567  000324                    JSR     %5,CONV         ;CONVERT OCTAL TO ASCII
1824  012410  001110                            WORK1                   ;DATA TO BE CONVERT
1825  012412  013765                            MES10A                  ;ADDRESS OF MESSAGE
1826  012414  000006                            6
1827  012416  004567  000312                    JSR     %5,CONV         ;CONVERT OCTAL TO ASCII
1828  012422  001066                            ERCOUNT                 ;ERROR COUNT TO BE CONVERTED
1829  012424  013536                            MED5                    ;ADDRESS OF MESSAGE
1830  012426  000003                            3
1831  012430  104000                            EMT     +0              ;REPORT MESSAGE
1832  012432  013534                            MED5A
1833  012434  013536                            MED5
1834  012436  013765                            MES10A
1835  012440  013750                            MES10
1836  012442  177777                            -1
1837  012444  004767  000734                    JSR     %7,INCTAB       ;INC. ERROR COUNT
1838  012450  032777  002000  166322  EREXT:   BIT     @BIT10,@SWR     ;HALT ON ERROR
1839  012456  001401                            BEQ     1$
1840  012460  000000                            HALT
1841  012462  000205                    1$:     RTS     %5              ;EXIT ROUTINE
1842                                    ;
1843                                    ;
1844                                    ;ROUTINE TO DECODE EMT CALLS
1845                                    ;EMT+1=TYPE ONE LINE OF TEXT
1846                                    ;EMT+0=TYPE A SERIES OF LINES
1847  012464  011600                    EMTRP:  MOV     (6),%0
1848  012466  022740  104001                    CMP     @EMT+1,-(0)     ;WAS THE CALL EMT+1
```

```
 1849  012472  001103                        BNE     TYPS            ;NO! TYPE A SERIES OF LINES OF TEXT
 1850  012474  000400                        BR      TYP             ;YES TYPE ONE LINE OF TEXT
```

MS

```
1851
1852                                        ;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE PRINTER.
1853  012476  011600                  TYP:   MOV     @%6,%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
1854  012500  062716  000002                ADD     #2,@%6          ;SET UP EXIT.
1855  012504  011000                        MOV     @%0,%0          ;ADDRESS OF MESSAGE TO R0.
1856  012506  112067  000164          TYPA: MOVB    (0)+,TYPDAT     ;GET CHARACTER
1857  012512  122767  000100  000156        CMPB    #100,TYPDAT     ;CHECK FOR "@" CHARACTER
1858  012520  001005                        BNE     TYPC            ;BRANCH IF NOT "@".
1859  012522  005067  000150                CLR     TYPDAT          ;OUTPUT NULL
1860  012526  004767  000030                JSR     %7,TYPD         ;TO CLEAR BUFFER
1861  012532  000002                        RTI                     ;TERMINATOR CHAR. DONE. EXIT.
1862  012534  122767  000045  000134  TYPC: CMPB    #45,TYPDAT      ;CHECK FOR "%".
1863  012542  001442                        BEQ     TYPF            ;BRANCH IF "%".
1864  012544  122767  000042  000124        CMPB    #42,TYPDAT      ;NOT "%". CHECK FOR "*".
1865  012552  001443                        BEQ     TYPG            ;BRANCH IF "*"
1866  012554  004767  000002                JSR     %7,TYPD         ;TYPE CHAR IN TYPDAT
1867  012560  000752                        BR      TYPA
1868  012562  032777  040000  166210  TYPD: BIT     #BIT14,@SWR
1869  012570  001026                        BNE     TYEXIT
1870  012572  116777  000100  166204        MOVB    TYPDAT,@TPB     ;OUTPUT CHARACTER TO PRINTER
1871  012600  105777  166204                TSTB    @TPS            ;WAIT FOR DONE FLAG.
1872  012604  100375                        BPL     .-4
1873  012606  122767  000015  000062        CMPB    #15,TYPDAT      ;CHECK FOR CR
1874  012614  001003                        BNE     1$              ;NO-SKIP
1875  012616  012767  000011  000054        MOV     #9.,NULL        ;SET NULL COUNTER
1876  012624  005767  000050          1$:   TST     NULL
1877  012630  001406                        BEQ     TYEXIT          ;ZERO-EXIT
1878  012632  005367  000042                DEC     NULL            ;DECREMENT
1879  012636  112767  000000  000032        MOVB    #0,TYPDAT       ;ZERO OUTPUT
1880  012644  000746                        BR      TYPD            ;OUTPUT NULL
1881  012646  000207                TYEXIT: RTS     %7              ;EXIT
1882  012650  112767  000015  000020  TYPF: MOVB    #15,TYPDAT      ;MOVE CARRIAGE RETURN CODE TO TYPDAT
1883  012656  004767  177700                JSR     %7,TYPD         ;GO TYPE CHAR.
1884  012662  112767  000012  000006  TYPG: MOVB    #12,TYPDAT      ;MOVE LF CODE TO TYPDAT.
1885  012670  004767  177666                JSR     %7,TYPD         ;GO TYPE CHAR.
1886  012674  000704                        BR      TYPA
1887  012676  000000                TYPDAT: 0
1888  012700  000000                NULL:   0
1889                                        ;SUBROUTINE TO OUTPUT A SERIES OF ASCII MESSAGES ON TELETYPE PRINTER
1890  012702  011600                  TYPS: MOV     @%6,%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
1891  012704  062716  000002                ADD     #2,@%6          ;UPDATE TO NEXT MESSAGE ADDRESS
1892  012710  011067  000014                MOV     @%0,TYPSB       ;ADDRESS OF MESSAGE TO TYPSB
1893  012714  022767  177777  000006        CMP     #-1,TYPSB       ;CHECK FOR TERMINATOR
1894  012722  001001                        BNE     TYPSA           ;BRANCH IF NOT TERMINATOR.
1895  012724  000002                        RTI                     ;TERMINATOR. EXIT
1896  012726  104001                TYPSA:  EMT     +1              ;CALL ON TYP SUB TO TYPE MESSAGE
1897  012730  000000                TYPSB:  0                       ;ADDRESS OF MESSAGE GOES HERE
1898  012732  000763                        BR      TYPS            ;GO PROCESS NEXT MESSAGE
1899                                        ;
1900                                        ;
1901                                        ;
1902                                        ;
1903                                        ;OCTAL TO ASCII CONVERT ROUTINE
1904                                        ;
```

```
1905                                    ;ENTER ROUTINE AS FOLLOWS
1906                                    ;JSR%5,CONV
1907                                    ;ADDR#=ADDRESS OF NUMBER TO BE CONVERTED
1908                                    ;ADDR BYTE=LSB OF WHERE ASCII IS GOING
1909                                    ;ASCII#=THE NUMBER OF ASCII CHAR. TO BE CONVERTED
1910                                    ;
1911                                    ;
1912  012734  013567  000054           CONV:   MOV     @(5)+,ACNVX     ;VALUE OF # TO BE CONVERTED
1913  012740  012501                            MOV     (5)+,%1         ;ASCII ADDR
1914  012742  012502                            MOV     (5)+,%2         ;# OF ASCII CHAR
1915  012744  060201                            ADD     %2,%1
```

```
1916  012746  016703  000042          ACVN:   MOV     ACNVX,%3
1917  012752  042703  177770                  BIC     #177770,%3      ;ISOLATE LEAST SIGNIFICANT OCTAL#
1918  012756  062703  000060                  ADD     #60,%3          ;SET UP ASCII#
1919  012762  110341                          MOVB    %3,-(1)         ;STORE ASCII CHAR
1920  012764  042767  000007  000022          BIC     #7,ACNVX
1921  012772  006067  000016                  ROR     ACNVX           ;ROTATE OCTAL#
1922  012776  006067  000012                  ROR     ACNVX
1923  013002  006067  000006                  ROR     ACNVX
1924  013006  005302                          DEC     %2              ;-1 FROM ASCII CHAR COUNT
1925  013010  001356                          BNE     ACVN
1926  013012  000205                          RTS     %5              ;EXIT # CONVERTED
1927  013014  000000                  ACNVX:  0                       ;WORK REGISTER
1928                                  ;
1929                                  ;
1930                                  ;
1931                                  ;
1932                                  ;ROUTINE TO HANDLE KEYBOARD CONVERSATION
1933                                  ;ROUTINE ACCEPTS NUM, OR ALPHA CHARACTERS
1934                                  ;
1935  013016  012767  000040  000424  NOCHA:  MOV     #40,TSTCH       ;SET UP FOR NUM, CHAR,
1936  013024  000403                          BR      TYST
1937  013026  012767  000100  000414  ALPHA:  MOV     #100,TSTCH      ;SET UP FOR ALPHA CHAR
1938  013034  012777  000340  165740  TYST:   MOV     #340,@PS        ;LOCK UP INTERRUPTS
1939  013042  005067  000400                  CLR     TEXBUF          ;CLEAR TEXT BUFFER REG
1940  013046  105777  165740          TSTFLG: TSTB    @TKS            ;CHECK FOR FLAG
1941  013052  100375                          BPL     TSTFLG          ;
1942  013054  017777  165726  165722          MOV     @TKB,@TPB       ;CHARACTER IN BUFFER
1943  013062  105777  165722                  TSTB    @TPS            ;ECHO CHARACTER
1944  013066  100375                          BPL     .-4
1945  013070  022777  000377  165710          CMP     #377,@TKB       ;CHECK FOR RUB-OUT
1946  013076  001014                          BNE     CKCH            ;EXIT IF NOT RUB-OUT
1947  013100  104001                          EMT     +1
1948  013102  013746                          MES8                    ;REPORT RUB-OUT ACKNOWLEDGED
1949  013104  042767  000007  000334          BIC     #7,TEXBUF
1950  013112  006067  000330                  ROR     TEXBUF
1951  013116  006067  000324                  ROR     TEXBUF
1952  013122  006067  000320                  ROR     TEXBUF
1953  013126  000747                          BR      TSTFLG          ;GO WAIT FOR NEW CHAR,
1954  013130  022777  000215  165650  CKCH:   CMP     #215,@TKB       ;CHECK FOR CARRIAGE RETURN
1955  013136  001001                          BNE     .+4
1956  013140  000207                          RTS     %7              ;EXIT DELIMITER TYPED
1957  013142  036777  000302  165636          BIT     TSTCH,@TKB
1958  013150  001003                          BNE     CHOK
1959  013152  104001                          EMT     +1              ;REPORT QUESTION MARK
1960  013154  013744                          MES7
1961  013156  000733                          BR      TSTFLG          ;WAIT FOR CORRECT CHAR,
1962  013160  017767  165622  165720  CHOK:   MOV     @TKB,WORK
1963  013166  042767  177770  165712          BIC     #177770,WORK
1964  013174  000241                          CLC
1965  013176  006167  000244                  ROL     TEXBUF
1966  013202  000241                          CLC
1967  013204  006167  000236                  ROL     TEXBUF
1968  013210  000241                          CLC
1969  013212  006167  000230                  ROL     TEXBUF
```

```
 1970  013216  066767  165664  000222          ADD     WORK,TEXBUF     ;ADD CHARACTER
 1971  013224  000710                          BR      TSTFLG          ;WAIT FOR NEW CHARACTER
 1972                                  ;ROUTINE TO SET ACTION ANABLE ON MA/MF PARITY MEMORIES
 1973                                  ;CALL JSR PC, MAMF
 1974          172100                          PARCSR = 172100
 1975          000114                          PARVEC = 114
 1976          000004                          ERRVEC = 4
 1977          000006                          SP = %6
 1978
 1979  013226  012737  013320  000114  MAMF:   MOV     #PARSRV,@#PARVEC  ;SET PARITY INTERRUPT VECTOR
 1980  013234  012737  000340  000116          MOV     #340,@#PARVEC+2 ;AND PRIORITY LEVEL 1 ON INTERRUPT
 1981  013242  013746  000004                  MOV     @#ERRVEC,-(SP)  ;SAVE CURRENT ERROR VECTOR
 1982  013246  013746  000006                  MOV     @#ERRVEC+2,-(SP)  ;AND PRIORITY LEVEL
 1983  013252  012737  000006  000004          MOV     #ERRVEC+2,@#ERRVEC
 1984  013260  012737  000002  000006          MOV     #RTI,@#ERRVEC+2
 1985  013266  012700  172100                  MOV     #PARCSR,%0      ;GET FIRST CSR ADDRESS
 1986  013272  012702  000001                  MOV     #1,%2
 1987  013276  012720  000001          18:     MOV     #1,(0)+         ;SET ACTION ENABLE IF AVAILABLE
 1988  013302  006302                          ASL     %2              ;SHIFT AVAILABILITY INDICATOR
 1989  013304  103374                          BCC     18
 1990  013306  012637  000006                  MOV     (SP)+,@#ERRVEC+2  ;RESTORE ERROR VECTOR
 1991  013312  012637  000004                  MOV     (SP)+,@#ERRVEC  ;PRIORITY LEVEL AND INTERRUPT VECTOR
 1992  013316  000207                          RTS     %7
 1993                                  ;PARITY ERROR SERVICE ROUTINE
 1994                                  ;WHEN A PARITY ERROR IS DETECTED THE ROUTINE SCANS
 1995                                  ;MEMORY FOR THE PARITY ERROR.  WHEN THE ERROR
 1996                                  ;IS DETECTED THE PROGRAM HALTS WITH THE ADDRESS
 1997                                  ;CAUSING THE ERROR IN R0
 1998                                  ;TO CONTINUE PRESS CONTINUE
 1999
 2000
 2001  013320  104001          PARSRV: EMT+1
 2002  013322  014354                  PARERR
 2003  013324  012737  013352  000114          MOV     #28,@#PARVEC    ;REPOSITION PARITY ERROR INT.
 2004  013332  012737  013400  000004          MOV     #48,@#ERRVEC    ;SET TIME OUT TRAP
 2005  013340  005037  000006                  CLR     @#ERRVEC+2
 2006  013344  005000                          CLR     %0
 2007  013346  005720                  18:     TST     (0)+            ;SCAN MEMORY
 2008  013350  000776                          BR      18
 2009  013352  000000                  28:     HALT                    ;PARITY ERROR - ADDRESS
 2010                                                                  ;CAUSING ERROR IS IN REGISTER 0
 2011  013354  000005                  38:     RESET
 2012  013356  012737  013320  000114          MOV     #PARSRV,@#PARVEC  ;RESTORE PARITY VECTOR
 2013  013364  012737  000006  000004          MOV     #ERRVEC+2,@#ERRVEC  ;RESTORE TIME OUT HALT
 2014  013372  004767  177630                  JSR     %7,MAMF
 2015  013376  000002                          RTI
 2016  013400  000000                  48:     HALT                    ;ERROR - PARITY ERROR NOT DETECTED ON SCAN
 2017  013402  000764                          BR      38              ;4(SP) CONTAINS PC SHERE
 2018                                                                  ;PARITY ERROR WAS ORIGINALLY DETECTED
 2019  013404  016703  165432          INCTAB: MOV     FLAG,%3
 2020  013410  042703  177743                  BIC     #177743,%3      ;MASK DEVICE NO
 2021  013414  000241                          CLC
 2022  013416  006003                          ROR     %3              ;NORMALIZE
 2023  013420  005263  013426                  INC     TABLE(3)        ;INCREMENT ERROR COUNT
```

```
  2024  013424  000207                          RTS     %7
  2025  013426  000000                  TABLE:  0               ;ERROR COUNT DRIVE 0
  2026  013430  000000                          0               ;ERROR COUNT DRIVE 1
  2027  013432  000000                          0               ;ERROR COUNT DRIVE 2
  2028  013434  000000                          0               ;ERROR COUNT DRIVE 3
  2029  013436  000000                          0               ;ERROR COUNT DRIVE 4
  2030  013440  000000                          0               ;ERROR COUNT DRIVE 5
  2031  013442  000000                          0               ;ERROR COUNT DRIVE 6
  2032  013444  000000                          0               ;ERROR COUNT DRIVE 7
```

```
2033  013446  000000                  TEXBUF: 0
2034  013450  000000                  TSTCH:  0
2035                                  ;
2036                                  ;
2037                                  ;
2038                                  ;
2039                                  ;
2040                                  ;ERROR MESSAGE HEADERS
2041                                  ;
2042
2043                                        .EVEN
2044  013452  042045  052101  020101  HED1:   .ASCII  /%DATA ERR @/
2045  013460  051105  020122     100
2046                                  ;
2047                                  ;
2048  013465     045  052123  052101  HED2:   .ASCII  /%STATUS ERR @/
2049  013472  051525  042440  051122
2050  013500  040040
2051                                  ;
2052                                  ;
2053  013502  042445  052130  040522  HED3:   .ASCII  /%EXTRA BKS @/
2054  013510  041040  051513  040040
2055                                  ;
2056  013516  042045  020113  042101  HED4:   .ASCII  /%DK ADDR ERR @/
2057  013524  051104  042440  051122
2058  013532  040040
2059                                  ;
2060                                  ;
2061  013534  040045                  HED5A:  .ASCII  /%@/
2062                                  ;
2063                                  ;
2064  013536  020040  020040  051105  HED5:   .ASCII  /    ERR CNT @/
2065  013544  020122  047103  020124
2066  013552     100
2067                                  ;
2068                                  ;
2069  013553     045  040522  042516  HED6:   .ASCII  /%RANEX ERR @/
2070  013560  020130  051105  020122
2071  013566     100
2072                                  ;
2073                                  ;
2074                                  ;MESSAGE TRAILERS
2075                                  ;
2076                                  ;
2077  013567     040  020040  020040  MES1:   .ASCII  /       DAR @/
2078  013574  020040  040504  020122
2079  013602     100
2080                                  ;
2081                                  ;
2082                                  ;
2083  013603     040  020040  040504  MES1A:  .ASCII  /   DAE @/
2084  013610  020105     100
2085                                  ;
2086                                  ;
```

```
 2087                                        ;
 2088  013613     040  020040  020040  MES2:   .ASCII  /       DCS @/
 2089  013620  020040  041504  020123
 2090  013626     100
 2091                                        ;
 2092  013627     040  020040  020040  MES2A:  .ASCII  /       HRD ERR@/
 2093  013634  020040  051110  020104
 2094  013642  051105  040122
 2095                                        ;
 2096                                        ;
 2097  013646  020040  020040  053440  MES3:   .ASCII  /     WRD CNT@/
 2098  013654  042122  041440  052116
 2099  013662     100
 2100                                        ;
 2101                                        ;
 2102                                        ;
 2103  013663     040  020040  020040  MES4:   .ASCII  /       WRD ADDR,@/
 2104  013670  020040  051127  020104
 2105  013676  042101  051104  040056
 2106                                        ;
 2107                                        ;
 2108                                        ;
 2109  013704  020040  020040  020040  MES5:   .ASCII  /       GD DATA @/
 2110  013712  043440  020104  040504
 2111  013720  040524  040040
 2112                                        ;
 2113                                        ;
 2114                                        ;
```

```
2115
2116  013724  020040  020040  020040  MES6:   .ASCII  /       BD DATA @/
2117  013732  041040  020104  040504
2118  013740  040524  040040
2119                                  ;
2120                                  ;
2121                                  ;MO:
2122  013744  040077                  MES7:   .ASCII  /?@/
2123                                  ;
2124                                  ;
2125                                  ;
2126                                  ;
2127  013746  040057                  MES8:   .ASCII  '/@'
2128                                  ;
2129                                  ;
2130  013750  020040  020040  020040  MES10:  .ASCII  /       WRD1 @/
2131  013756  053440  042122  020061
2132  013764     100
2133                                  ;
2134                                  ;
2135  013765     040  020040  020040  MES10A: .ASCII  /       WRD2 @/
2136  013772  020040  051127  031104
2137  014000  040040
2138                                  ;
2139  014002  052445  044516  020124  MES11:  .ASCII  /%UNIT NO.@/
2140  014010  047516  040056
2141                                  ;
2142                                  ;
2143  014014  020040     100          MES12:  .ASCII  /  @/
2144                                  ;
2145                                  ;
2146  014017     040  051040  040505  MES13:  .ASCII  /  READ @/
2147  014024  020104     100
2148                                  ;
2149                                  ;
2150  014027     045  050103  020125  TIMO:   .ASCII /%CPU BKGRND TIMED OUT@/
2151  014034  045502  051107  042116
2152  014042  052040  046511  042105
2153  014050  047440  052125     100
2154                                  ;
2155                                  ;
2156  014055     045  045517  040041  OK:     .ASCII  /%OK!@/
2157
2158                                  ;CONVERSATION TEXT
2159                                  ;
2160                                  ;
2161  014062  042045  052101  020101  CON1:   .ASCII  /%DATA TEST ONLY? @/
2162  014070  042524  052123  047440
2163  014076  046116  037531  040040
2164                                  ;
2165                                  ;
2166                                  ;
2167  014104  046445  046125  044524  CON2:   .ASCII  /%MULTI DK MODE?@/
2168  014112  042040  020113  047515
```

```
 2169  014120  042504  040077
 2170                                  ;
 2171                                  ;
 2172  014124  021445  047440  020106  CON3:   .ASCII  /%# OF DKS 1 TO 10 OCTAL?@/
 2173  014132  045504  020123  020061
 2174  014140  047524  030440  020060
 2175  014146  041517  040524  037514
 2176  014154     100
 2177                                  ;
 2178                                  ;
 2179  014155     045  054105  020056  CON4:   .ASCII  /%FX, DK?@/
 2180  014162  045504  040077
 2181                                  ;
 2182                                  ;
 2183  014166  047445  052120  053440  CON5:   .ASCII  /%OPT WRD CNT? @/
 2184  014174  042122  041440  052116
 2185  014202  020077     100
 2186                                  ;
 2187                                  ;
 2188  014205     045  042514  043516  CON6:   .ASCII  /%LENGTH (1 TO 1000)?@/
 2189  014212  044124  024040  020061
 2190  014220  047524  030440  030060
 2191  014226  024460  040077
 2192                                  ;
 2193                                  ;
 2194  014232  053445  042122  040440  CON7:   .ASCII  /%WRD ADDR?@/
 2195  014240  042104  037522     100
 2196                                  ;
 2197                                  ;
 2198  014245     045  050117  027124  CON8:   .ASCII  /%OPT, DATA PAT, #?@/
 2199  014252  042040  052101  020101
 2200  014260  040520  027124  021440
 2201  014266  040077
 2202                                  ;
 2203                                  ;
 2204  014270  053445  044522  042524  CON9:   .ASCII  /%WRITE?@/
 2205  014276  040077
 2206                                  ;
 2207                                  ;
 2208  014300  053445  044522  042524  CON10:  .ASCII  /%WRITE CHECK?@/
 2209  014306  041440  042510  045503
 2210  014314  040077
 2211                                  ;
 2212                                  ;
 2213  014316  051045  040505  037504  CON11:  .ASCII  /%READ?@/
 2214  014324     100
 2215                                  ;
 2216                                  ;
 2217  014325     045  047520  042527  PWRF:   .ASCII  /%POWER HAS FAILED@/
 2218  014332  020122  040510  020123
 2219  014340  040506  046111  042105
 2220  014346     100
 2221
 2222                                  ;
```

```
 2223  014347     045  047105  040104  END:    .ASCII  /%END@/
 2224  014354  046445  046505  051117  PARERR: .ASCII  /%MEMORY PARITY ERROR@/
 2225  014362  020131  040520  044522
 2226  014370  054524  042440  051122
 2227  014376  051117     100
 2228  014401     040  020040     100  PATMES: .ASCII  /   @/
 2229  014405     045  040520  052124  PATHED: .ASCII  /%PATTERN @/
 2230  014412  051105  020116     100
 2231  014417     045  051104  053111  NODRV:  .ASCII  /%DRIVE ZERO OFF LINE@/
 2232  014424  020105  042532  047522
 2233  014432  047440  043106  046040
 2234  014440  047111  040105
 2235  014444  042045  044522  042526  RKNUM:  .ASCII  /%DRIVE(S) ON LINE@/
 2236  014452  051450  020051  047117
 2237  014460  046040  047111  040105
 2238
 2239                                   .EVEN
```

```
 2240
 2241  014466  000000                  OUTBUF: 0
 2242          015070                  .=.+400
 2243  015070  000000                  INBUF:  0
 2244                                  ;
 2245                                  ;
 2246                                  ;
 2247                                  ;
 2248          000001                  .END
```

DZRFBB.P11 CROSS REFERENCE TABLE

```
ACNVX    013014          340#   341#   342#   343#   345    441#   443    1250#  1251#  1253   1451#  1452#  1454
                        1457#  1458#  1459#  1461   1912#  1916   1920#  1921#  1922#  1923#  1927#
ACVN     012746         1916#  1925
ADAM     010174         1357   1361#
ADRCMP   003260          531    537#
ADRD     005462          893    895#
ADS      001032          162#   661    1733
ADTST    002056          247    336#   1024
ADT2     002150           55    366#    479
ADT3     003014           61    495#    555
ADT4     003370           65    572#    646
ADT5     004016           68    654#    691
AKH      007470         1204   1207   1212#
ALPHA    013026          251    257    282    315    321    327    1937#
ASKWC    001554          270    280#
BIT0   = 000001           10#  1127   1507   1744
BIT1   = 000002           11#
BIT10  = 002000           20#   254    350   1115   1124   1235   1406   1838
BIT11  = 004000           21#   221    245    260    336    477    554    644    690    758    835    988   1000
BIT12  = 010000           22#   330    877    892
BIT13  = 020000           23#   324    866   1131
BIT14  = 040000           24#   318    856   1100   1868
BIT15  = 100000           25#   308    591    593    596    633    635    641
BIT2   = 000004           12#
BIT3   = 000010           13#
BIT4   = 000020           14#  1527
BIT5   = 000040           15#
BIT6   = 000100           16#  1184   1215   1232
BIT7   = 000200           17#   165   1146
BIT8   = 000400           18#   376    402    427    508    526    576    610    660    698    773    900    939
                        1113   1481   1562   1580   1601   1651   1677   1764
BIT9   = 001000           19#   860    871    886    920    941    948    957    965    967   1061   1121   1134
                        1364   1450   1569   1585   1638   1689   1696
BUF      001056          181#   368#   399#   429#   459#   500#   577#   611#   659#   705#   729#   779#   794#
                         858#   868#   879#   938#   954#   1036   1686#
CHKBUF   002650          435    454#
CHKDAT   011336         1584#  1592
CHKDOS   006224         1002#  1012
CHKDSK   011504         1637#  1645
CHKFLG   002046          329    331#
CHOK     013160         1958   1962#
CHWRD    010520         1445#  1449   1469
CKCH     013130         1946   1954#
CKNEX    010530         1446   1448#
CLEAR    010462         1427   1429#
CLRREG   005160          837#
CLRTAB   001126          204#   207
CMA      001020          157#  1716#  1742#  1781#
CMDAE    007274         1183   1186#
CMNETK   003714          624    631#
CMPDTK   003656          617    623#
CMPNEX   003266          539#   549
CMPX1    004532          741    749#
COMDAR   007256         1180   1182#
```

DZRFBB.P11 CROSS REFERENCE TABLE

```
COMPAR    010112            894     963    1350#
CONM      001372            218     249#
CONV      012734            233     344     442     968     972     976    1064    1076    1085    1094    1105    1218    1222
                           1252    1374    1378    1383    1388    1394    1453    1460    1799    1803    1819    1823    1827
                           1912#
CON1      014062            250    2161#
CON10     014300            320    2208#
CON11     014316            326    2213#
CON2      014104            256    2167#
CON3      014124            262    2172#
CON4      014155            272    2179#
CON5      014166            281    2183#
CON6      014205            286    2188#
CON7      014232            295    2194#
CON8      014245            302    2198#
CON9      014270            314    2204#
CTBUSY    012304           1784#   1785
DAE       001024            159#    226*    246*    1062    1102    1186    1212    1724*   1773*
DAR       001022            158#    384     441     468    1083    1182    1205    1209    1214    1720*   1780*
DATAT     005170            352     848#    901     909
DATTES    001514            259    2718    275
DBR       001026            160#   1030    1728*
DCS       001014            155#    221     376*    378     380     383     402*    404     406     408     427*    432     434
                            436     462     464     467     508*    510     512     514     526*    528     530     533     576*
                            580     582     585     610*    614     616     619     660*    662     667     670     698*    707
                            709     712     718     720     723     731     733     736     773*    783     785     787     796
                            798     801     816     818     821     939*   1058    1070    1093    1100    1113*   1127*   1481*
                           1562*   1580*   1601*   1651*   1677*   1743*   1744    1746    1764*   1783*   1784
DELAY     011600           1609    1657    1661#
DELMES    006576           1073   1083#
DISBUF    007242            902   1179#    1575    1591    1644    1702
DISK      006344             42   1030#
DKBUSY    012126           1746#   1747
DKINT     006436             47   1055#
DMA       001052            179#    212*    299*    372*    390     392*    401*    430*    457*    495*    520*    524*    552*
                            572*    594*    598*    607*    637*    642*    654*    674     686     688*    703*    716*    728*
                            781*    793*    814*    837*    929*    930*    932*    969     998*   1035    1170*   1171*   1179*
                           1182    1196*   1214*   1219    1233*   1366    1563*   1581*   1632*   1681*
DOWN      011376             37   1566    1601#    1605
DRVERO    006300           1010   1013#
DSKDR     001446            261#    266
DSKNOR    001076            189#    241*    242*    243*    244*    267*    268*    269*    1004
DSKRD     005402            882#    899
ELH       005446            889     892#
EMTRP     012464             40   1847#
END       014347           1016   2223#
ERADR     007524           1193   1218#
ERCOUN    001066            185#    382*    410*    439*    466*    515*    532*    542*    584*    618*    627*    669*    681*
                            711*    722*    735*    742*    751*    788*    800*    807*    820*    828*   1804    1828
EREXT     012450           1813   1838#
ERRVEC =  000004           1976#   1981    1982    1983*   1984*   1990*   1991*   2004*   2005*   2013*
ER1       002276            386#
ER10      003312            543#
ER11      003464            586#
```

M6

```
ER12     003650           620#
ER13     003710           628#
ER14     004124           671#
ER15     004176           682#
ER16     004340           713#
ER17     004404           724#
ER20     004464           737#
ER21     004524           745#
ER22     004564           754#
ER23     004716           789#
ER24     004776           802#
ER25     005036           810#
ER26     005102           822#
ER27     005142           831#
ER3      002432           411#
ER4      002616           440#
ER5      002752           469#
ER6      003144           516#
ER7      003252           534#
ESH      005356           867     874     877#
EXGEN    010042          1302    1307#
EXMFLG   002134           337     350#
EXRAX    006162           966     986#
EXREF    010714          1491#   1495
EXTCME   007410          1195    1202#
EXTDR    007522          1201    1217#
EXTMEN   010634            81     850    1481#
EXTPP    006340           906    1014    1019    1024#
FILDAT   007700          1265#   1268
FLAG     001042           175#    210*    219*    245*    254*    260*    279*    308*    312*    318*    324*    330*    331
                          336     340     350     856     866     877     880*    884*    896     904     920*    965     967*
                         1000    1002    1011*   1013*   1017*   1032    1061*   1074    1184*   1188    1194    1198*   1208*
                         1215    1232*   1364*   1371    1392    1450*   2019
GOTMEM   010756          1487    1497    1502#
HED1     013452          1399    2044#
HED2     013465          1069    2048#
HED3     013502          1465    2053#
HED4     013516          1227    2056#
HED5     013536          1805    1809    1829    1833    2064#
HED5A    013534           238    1110    1808    1832    2061#
HED6     013553           981    2069#
HINUM    010046          1278    1288    1303*   1309#
HRDER    001100           190#    852*    921*   1118    1565*   1583*   1634*   1687*
INADB    003060           503#    506     522
INBUF    015070           611     623     626     729     740     743     749     753     794     805     809     826     830
                         1781    2243#
INCADS   004204           676     679     686#
INCCMP   003316           540     546#
INCTAB   013404          1060    1231    1365    1812    1837    2019#
INDADT   002760           465     473#
INPUT    001104           192#    879     954    1352    1422    1441    1444    1511*   1512*
INSRD    003560           590     607#
INSWT    003432           579#    588     595     599     601
INTEXT   007024          1059    1120    1131#
```

DZRFBB,P11 CROSS REFERENCE TABLE

```
LDAT     005234            852     855#    903
LGMEM    010740           1484    1496#
LOGICA   006330           1020#
LONUM    010044           1277    1286    1298*   1308#
LPADT3   003360            551     554#
LPADT5   004132            668     674#
LPSPI1   004572            750     758#
LPTSK    004002            632     644#
LPXSPI   005150            827     835#
LP2ADT   003000            474     477#
MA       001030            161#
MAMF     013226            216    1979#   2014
MAXREF   010750           1488    1493    1501#
MES1     013567            970     983    1087    1091    1220    1229    1376    1402    2077#
MES1A    013603            974     982    1066    1090    1224    1228    1380    1401    2083#
MES10    013750           1801    1810    1821    1835    2130#
MES10A   013765           1825    1834    2135#
MES11    014002            339    2139#
MES12    014014            346     349    2143#
MES13    014017           1078    1081    1396    1400    2146#
MES2     013613           1096    1099    2088#
MES2A    013627           1107    1111    2092#
MES3     013646            978     984    2097#
MES4     013663            444     447    1455    1466    2103#
MES5     013704           1385    1403    2109#
MES6     013724           1390    1404    1462    1467    2116#
MES7     013744           1960    2122#
MES8     013746           1948    2127#
MOVLK    012054            114    1733#   1736
MSTR     005530            904#
MVNEM    003530            592     596#
MYBYWR   011254           1568#   1576
NOCHA    013016            263     273     287     296     303    1935#
NODRV    014417            231    2231#
NULL     012700           1875*   1876    1878*   1888#
NZUF     010452           1426#   1430
OK       014055           1705    2156#
OPDAR    001636            284     294#    298
OPDSEL   007054            855    1146#
OPPAT    001664           3018     305
OPRD     002020            323     325#
OPWCK    001772            317     319#
OPWRT    001744            307     313#    332
OUTBUF   014466            368     422*    426*    429     500     502     505     537     548     574*    577     589     591
                           593*    596*    597*    659     704*    705     776*    777*    779     858     868     924     926*
                           928     929     932     933*    934     936     938    1262    1351    1486    1505    1511    1686
                          1742    2241#
OVRFLO   010466            895     964    1439#
PARCSR = 172100           1974#   1985
PARERR   014354           2002    2224#
PARSRV   013320           1979    2001#   2012
PARVEC = 000114           1975#   1979*   1980*   2003*   2012*
PASEL    007620            373     854    1250#   1685
PASS     001074            188#   1520*   1534*
```

```
PASSC     001102          191#    918*    986*   1678*   1706
PATHED    014405         1257    2229#
PATMES    014401         1254    1258    2228#
PATNU     001054          180#    213*    309*    311*    369     370*    374*    907*    908     910*    1250    1260    1680*
PAT0      010050         1265    1322#
PAT1      010052         1323#
PAT10     010070         1330#
PAT11     010072         1331#
PAT12     010074         1332#
PAT13     010076         1333#
PAT14     010100         1334#
PAT15     010102         1335#
PAT16     010104         1336#
PAT17     010106         1337#
PAT2      010054         1324#
PAT20     010110         1338#
PAT3      010056         1325#
PAT4      010060         1326#
PAT5      010062         1327#
PAT6      010064         1328#
PAT7      010066         1329#
PFT1      011204           85    1560#
PFT2      011442           88    1630#
PFWAT     011214         1562#   1565    1577    1593
POWFAL    011622         1561    1631    1677#   1687
PRIORI    001040          165#    864     875     890     922     945     952     961    1573    1589    1642    1693    1700
PS        001002          147#    209*    699*    774*    849*    853*    864*    869*    875*    882*    890*    922*    945*
                          952*    961*   1573*   1589*   1642*   1693*   1700*   1740*   1938*
PWRDN     011542         1635    1651#   1655
PWRF      014325         1608    2217#
PWRFL     011452         1632#   1634    1646    1658
PWRUP     011560         1652    1655#
RANDOM    007720          925     937    1264    1277#   1306
RANER     006072          921     965#
RANEX     005564           77     918#    990
RANNU     001044          176#
RCNODV    001272          222     224     228#
RDMORE    002304          381     390#
RDTDN     003212          526#    536     553
RDTKS     003616          613#    622     638     640     643
RDWAIT    005436          887     890#
READ    = 104405           31#    527     613     730     795     815     885     956
REH       005512          878     900#
REPDRV    001306          229     233#
REPOEN    006310         1001    1005    1015#
RFADT     002224          376#    389     393
RFRD      002330          391     395#    476
RKNUM     014444          235     239    2235#
RTIX      011202         1518    1523*   1545#
SAVE      001070          186#    369*    374     395*    420     423     430     454*    456*    507*    519     537*    539
                          541     546*    548     609*    623     625     631     633     635*    636*    641*    656*   1351*
                         1353    1358*   1382    1482*   1485*   1486    1490*   1491    1492    1494*   1496*   1501*   1505*
                         1506*   1507*   1508    1512
SAV1      001072          187#    394*    401     409     415     417     437     457     473     475*   1352*   1353    1359*
```

C1

DZRFBB.P11 CROSS REFERENCE TABLE

```
                    1387
SELCMA   012014       98    1716#   1717
SELDAE   012034      106    1724#   1725
SELDAR   012024      102    1720#   1721
SELDBR   012044      110    1728#   1729
SELDCS   012066      118    1740#   1745    1748
SELWC    012004       94    1712#   1713
SHIFT    007736     1281#   1285
SLH      005304      857     863     866#
SOFTER   006760     1101    1119#
SP       =%000006   1977#   1981*   1982*   1990    1991
SPECOR   001234     221#     227
SPIL1    004346      710     716#
SPIL2    004412      721     727#
SPIL3    004472      734     740#
SPIRAL   004232       71     698#    715     726     739     748     757     759
STAER    012324      516     534     586     620     671     713     724     737     789     802     822     1799#
STAER1   012372      386     411     440     469     543     628     682     745     754     810     831     1819#
STAMP    012136      122    1764#   1787
START    001116       46     202#
STATUS   001036     164#
SUADB    002440      407     415#    455
SWR      001000     146#     217     477     554     644     690     758     835     860     871     886     892     900
                    941     948     957     988    1115    1121    1124    1131    1134    1146    1149    1157    1235
                   1406    1569    1585    1638    1689    1696    1712    1716    1720    1724    1728    1743    1765
                   1774    1786    1838    1868
SWRCHG   012312    1786#   1788
SWRDCT   001064     184#    214*     215    292*     293     851    1200    1423    1442    1508*   1509*   1510    1683*
                   1684
TABLE    013426      204    1009    2023*   2025#
TDMA     001062     183#
TEXBUF   013446     220*     223     225*    228     234     241     252     258     264*    265     267     274     277*
                    278*    279     283     288     290     292     297     299     304     306     309     316     322
                    328    1939*   1949*   1950*   1951*   1952*   1965*   1967*   1969*   1970*   2033#
TFBL     003152     513     519#
TIMO     014027    1542    2150#
TKB      001006     149#   1942    1945    1954    1957    1962
TKS      001012     151#   1940
TPB      001004     148#   1870*   1942*
TPS      001010     150#   1871    1943
TRACK    001050     178#    211*    371*    496*    573*    600*    608*    639*    655*    702*    780*    838*    934*
                    973     999*   1031    1156*   1181*   1190    1197*   1212*   1213*   1234*   1367    1564*   1582*
                   1633*   1682*
TSTCH    013450    1935*   1937*   1957    2034#
TSTFLG   013046    1940#   1941    1953    1961    1971
TSTTK    003472     583     589#
TWRDCT   001060     182#
TYEXIT   012646    1869    1877    1881#
TYP      012476    1850    1853#
TYPA     012506    1856#   1867    1886
TYPC     012534    1858    1862#
TYPD     012562    1860    1866    1868#   1880    1883    1885
TYPDAT   012676    1856*   1857    1859*   1862    1864    1870    1873    1879*   1882*   1884*   1887#
TYPF     012650    1863    1882#
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DZRFBB,P11 CROSS REFERENCE TABLE

```
TYPG      012662          1865    1884#
TYPS      012702          1849    1890#   1898
TYPSA     012726          1894    1896#
TYPSB     012730          1892*   1893    1897#
TYST      013034          1936    1938#
UP        011414          1602    1605#
UPCHK     011312          1580#   1583    1610
VECTOR    001034           163#
WC        001016           156#   1119    1712*   1741*   1782*
WCCON     001574           285#    289     291
WCWAIT    005346           872     875#
WDERR     010176          1354    1364#
WONWD     002334           398#    399     414
WORK      001106           197#    203*    206*    384*    385*    409*    415*    416*    420     437*    438*    468*    497*
                           503     504*    507     514*    519*    521     523*    533*    541*    585*    619*    626*    664*
                           670*    675     677*    678     680*    712*    723*    736*    743*    753*    787*    801*    809*
                           821*    830*    896*    897*    898     923*    935*   1002*   1003*   1004    1006    1032*   1033*
                          1034    1041*   1042*   1043    1062*   1063*   1065    1070*   1071*   1072    1074*   1075*   1077
                          1083*   1084*   1086    1093*   1095    1102*   1103*   1104*   1106    1149*   1150*   1151*   1152*
                          1153*   1154*   1155*   1156    1157*   1158*   1159*   1160*   1161*   1162*   1163*   1164*   1165*
                          1166*   1167*   1168*   1169*   1171    1188*   1189*   1190*   1191*   1192    1205*   1206*   1261*
                          1266*   1267    1301*   1305*   1366*   1368*   1375    1382*   1384    1387*   1389    1392*   1393*
                          1395    1766*   1767*   1768*   1769*   1770*   1771*   1772*   1773    1774*   1775*   1776*   1777*
                          1778*   1779*   1780    1800    1820    1962*   1963*   1970
WORK1     001110           198#    383*    408*    436*    467*    498*    525*    539     547*    550     625*    674*    675
                           678     744*    752*    808*    829*   1186*   1187*   1192    1202*   1203    1223    1367*   1370*
                          1373*   1379    1765*   1766    1786    1824
WORK2     001112           199#   1350*   1355*   1356    1368
WORK3     001114           200#   1371*   1372*   1373    1423*   1424*   1425*   1426    1442*   1443*   1444*   1445
WRABF     003104           508#    518
WRADT5    004052           660#    673     685     689
WRCADT    002522           425     427#    451
WRCHEC  = 104407            30#    431     870     947    1584    1637    1695
WRDCMP    010132          1353#   1360
WRDCT     001046           177#    215*    293*    367*    400*    428*    460*    501*    578*    612*    658*    701*    727*
                           778*    792*    851*    928*    930     935     977    1037    1179    1200*   1206    1209*   1210*
                          1211*   1261    1356    1439    1510*   1684*
WRDINC    010142          1355#   1409
WRDNW     011712          1688#   1703
WRITE   = 104403            29#    377     403     461     509     579     663     706     717     782     859     940    1568
                          1688
WRLG      005620           923#    927     931     987
WRWAIT    005274           861     864#
XINCW     011142          1531#*  1532    1533    1536
XLPADT    004222           687     690#
XSPIRA    004602            74     773#    791     804     813     824     834     836
XWAIT     011052            35    1518#
X1SPIL    004724           786     792#
X2SPIL    005004           799     805#
X3SPIL    005044           806     814#
X4SPIL    005110           819     826#
ZBUF      010430           883     955    1422#
ZEROAD    002660           424     456#    472
ZRBIT     003764           634     641#
```

```
.     = 015072          33#     34#     39#     45#     51#     54#    141#    253     351     379     405     433     459
                        463     478     511     529     581     615     645    708     719     732     784     797     817
                        905     942     944     949     951     958     960    989    1116    1122    1125    1132    1135
                       1147    1216    1236    1369    1407    1528    1535   1570    1572    1586    1588    1639    1641
                       1690    1692    1697    1699    1872    1944    1955   2242#
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DZRFBB,P11 CROSS REFERENCE TABLE

```
ADC     1287  1289  1291  1292  1294  1297
ADD      225   226   392   454   520   546   552   594   598   637   642   907   930  1011  1013
        1171  1179  1190  1199  1206  1286  1288  1290  1293  1295  1296  1358  1359  1368  1425
        1441  1444  1494  1512  1854  1891  1915  1918  1970
ASL     1281  1988
BCC      599   638  1180  1207  1369  1989
BCS      931
BEQ      224   289   307   332   337   351   391   421   424   474   478   540   551   590   624
         632   634   645   676   679   687   741   750   806   827   857   867   878   927   966
         989  1001  1005  1019  1101  1116  1120  1122  1125  1132  1183  1236  1264  1302  1357
        1407  1449  1483  1493  1535  1745  1839  1863  1865  1877
BHI     1010
BIC      312   343   416   419   596   635   880   897   920   926   933   967  1003  1017  1033
        1042  1063  1071  1075  1104  1155  1169  1170  1187  1189  1191  1198  1202  1213  1232
        1372  1393  1507  1767  1779  1917  1920  1949  1963  2020
BIS      219   245   254   260   279   308   318   324   330   376   402   427   508   526   576
         593   610   641   660   698   773   939  1034  1061  1113  1127  1184  1208  1364  1373
        1450  1481  1562  1580  1601  1651  1677  1764  1783
BIT      221   331   336   350   477   554   591   633   644   690   758   835   856   860   866
         871   877   886   892   900   941   948   957   965   988  1000  1100  1115  1121  1124
        1131  1134  1146  1215  1235  1406  1569  1585  1638  1689  1696  1744  1838  1868  1957
BLOS     266   275   291   298   305
BMI      218  1484  1487
BNE      207   222   229   253   259   284   317   323   329   506   522   549   555   592   691
         759   836   861   872   887   893   899   901   909   942   949   958   987  1073  1135
        1147  1193  1204  1216  1268  1285  1306  1354  1427  1446  1570  1586  1639  1665  1667
        1690  1697  1787  1849  1858  1869  1874  1894  1925  1946  1955  1958
BPL      379   381   405   407   433   435   463   465   511   513   529   531   581   583   615
         617   666   668   708   710   719   721   732   734   784   786   797   799   817   819
         905  1059  1195  1533  1747  1785  1872  1941  1944
BR       227   270   389   393   414   425   451   455   472   518   536   553   588   595   601
         622   640   643   673   685   689   715   726   739   748   757   791   804   813   824
         834   863   874   889   903   944   951   960  1012  1014  1201  1360  1409  1430  1469
        1495  1497  1524  1536  1572  1576  1577  1588  1592  1641  1645  1646  1658  1692  1699
        1703  1713  1717  1721  1725  1729  1736  1748  1788  1850  1867  1880  1886  1898  1936
        1953  1961  1971  2008  2017
CLC      276   310  1007  1964  1966  1968  2021
CLR      205   210   211   212   213   220   246   370   371   372   394   395   422   456   458
         495   496   497   498   523   524   525   572   573   574   607   608   609   654   655
         656   702   780   837   838   910   998   999  1055  1196  1197  1233  1234  1280  1350
        1429  1503  1519  1530  1538  1563  1564  1581  1582  1632  1633  1662  1681  1682  1859
        1939  2005  2006
CMP      223   252   258   265   274   283   290   297   304   306   316   322   328   390   420
         423   473   505   521   539   548   550   589   623   631   675   678   686   740   749
         805   826   898   908  1004  1009  1072  1182  1192  1203  1263  1353  1356  1426  1445
        1486  1492  1525  1786  1848  1893  1945  1954
CMPB    1857  1862  1864  1873
COM     1038  1210
DEC      206   385   438   677   792  1084  1266  1284  1301  1305  1878  1924
EMT      230   237   249   255   261   271   280   285   294   301   313   319   325   338   348
         446   980  1015  1068  1080  1089  1098  1109  1226  1256  1398  1464  1541  1607  1704
        1807  1831  1848  1896  1947  1959  2001
HALT      34   232  1117  1126  1133  1237  1408  1543  1603  1653  1840  2009  2016
INC      475   504   547   597   600   636   639   680   688   716   727   814   884   986  1039
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DZRFBB,P11 CROSS REFERENCE TABLE

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        1181  1211  1355  1370  1531  1534  1664  1666  2023
IOT      862   873   888   943   950   959  1571  1587  1640  1691  1698
JMP       46    55    61    65    68    71    74    77    81    85    88    94    98   102   106
         110   114   118   122   247   352   476   479   646   906   990  1024  1118  1593  1610
        1706  1813
JSR      216   233   251   257   263   273   282   287   296   303   315   321   327   344   373
         386   411   440   442   469   516   534   543   586   620   628   671   682   713   724
         737   745   754   789   802   810   822   831   850   854   855   883   894   895   902
         925   937   955   963   964   968   972   976  1020  1060  1064  1076  1085  1094  1105
        1218  1222  1231  1252  1365  1374  1378  1383  1388  1394  1453  1460  1561  1575  1591
        1609  1631  1644  1657  1685  1702  1799  1803  1812  1819  1823  1827  1837  1860  1866
        1883  1885  2014
MOV      203   204   208   209   214   215   241   267   292   293   299   309   340   366   367
         368   369   374   382   383   384   398   399   400   401   408   409   410   415   417
         426   428   429   430   436   437   439   441   457   459   460   466   467   468   499
         500   501   502   503   507   514   515   519   532   533   537   541   542   575   577
         578   584   585   611   612   618   619   625   626   627   657   658   659   661   662
         664   669   670   674   681   699   700   701   703   704   705   711   712   722   723
         728   729   735   736   742   743   744   751   752   753   774   775   776   777   778
         779   781   787   788   793   794   800   801   807   808   809   820   821   828   829
         830   848   849   851   852   853   858   864   868   869   875   879   882   890   896
         918   919   921   922   923   924   928   929   932   934   935   936   938   945   952
         954   961  1002  1006  1018  1030  1031  1032  1035  1036  1037  1040  1041  1043  1056
        1062  1070  1074  1083  1093  1102  1114  1136  1149  1156  1157  1186  1188  1200  1205
        1209  1212  1214  1250  1260  1261  1262  1265  1277  1278  1279  1298  1300  1303  1304
        1351  1352  1366  1367  1371  1382  1387  1392  1422  1423  1439  1442  1451  1457  1459
        1482  1488  1489  1490  1502  1504  1508  1510  1511  1518  1520  1521  1523  1526  1527
        1528  1539  1560  1565  1566  1567  1573  1583  1589  1602  1605  1606  1630  1634  1635
        1636  1642  1652  1655  1656  1661  1678  1679  1680  1683  1684  1686  1687  1693  1700
        1712  1716  1720  1724  1728  1733  1740  1741  1742  1743  1765  1766  1773  1774  1780
        1781  1782  1847  1853  1855  1875  1890  1892  1912  1913  1914  1916  1935  1937  1938
        1942  1962  1979  1980  1981  1982  1983  1984  1985  1986  1987  1990  1991  2003  2004
        2012  2013  2019
MOVB    1856  1870  1879  1882  1884  1919
NOP     1021  1022  1023
RESET    202  1663  1734  1735  2011
ROL      243   244   268   269   277   278   311   418  1158  1159  1160  1161  1162  1163  1164
        1165  1166  1167  1168  1282  1283  1424  1440  1443  1776  1777  1778  1965  1967  1969
ROR      341   342  1008  1150  1151  1152  1153  1154  1251  1506  1509  1768  1769  1770  1771
        1772  1921  1922  1923  1950  1951  1952  2022
RTI     1044  1057  1128  1137  1529  1540  1545  1861  1895  1984  2015
RTS     1148  1172  1217  1238  1269  1307  1361  1428  1447  1513  1668  1841  1881  1926  1956
        1992  2024
SUB      242   264  1123  1452  1458  1485  1496  1501  1505
SWAB    1103  1775
SXT     1522
TRAP      29    30    31
TST      217   228   288   380   406   434   464   512   530   582   616   667   709   720   733
         785   798   818   904  1058  1119  1267  1448  1491  1876  2007
TSTB     378   404   432   462   510   528   580   614   665   707   718   731   783   796   816
        1194  1532  1746  1784  1871  1940  1943
WAIT     865   876   891   946   953   962  1574  1590  1643  1694  1701
.ASCII  2044  2048  2053  2056  2061  2064  2069  2077  2083  2088  2092  2097  2103  2109  2116
        2122  2127  2130  2135  2139  2143  2146  2150  2156  2161  2167  2172  2179  2183  2188
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          2194    2198    2204    2208    2213    2217    2223    2224    2228    2229    2231    2235
.ENABL       7
.END      2248
.EVEN      143    1318    2043    2239
.LIST        5      34
.NLIST       5      34
.REPT       34
.TITLE       2


 ERRORS DETECTED:  0
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 *DZRFBB,DZRFBB/SOL/CRF_DZRFBB
 RUN-TIME:  6 14 3 SECONDS
 CORE USED:  8K
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