IDENTIFICATION

PRODUCT CODE: MAINDEC-X8-DIRFA-A-D

PRODUCT NAME: DEC/X8 MODULE "RF08DS"
RF08 DISK SYSTEM EXERCISER

DATE CREATED: JANUARY 26, 1972

MAINTAINER: DIAGNOSTIC GROUP

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1. MODULE DESCRIPTION

"RFØ8DS" IS A DEC/X8 SOFTWARE MODULE WHICH EXERCISES AN RFØ8 DISK SYSTEM WITH UP TO FOUR DISKS. THE MAIN CHARACTERISTICS OF THIS MODULE ARE:

1. READ/WRITE TRANSFERS VARY RANDOMLY FROM 1 TO 1ØØØ (8) WORDS.
2. DISK ADDRESSES ARE SELECTED RANDOMLY BETWEEN ADDRESS ØØØØØØ OF THE LOWEST NUMBERED DISK SPECIFIED AND ADDRESS 777777 OF THE HIGHEST DISK SPECIFIED.
3. TRANSFERS WILL OCCUR ACROSS DISK BOUNDARIES AND IN THE CASE OF 4 DISK SYSTEMS WILL WRAP AROUND TO DISK Ø.
4. EACH PASS OF THE EXERCISER LOOP EXECUTES WRITE/READ/DATA CHECK STARTING AT A RANDOMLY SELECTED DISK ADDRESS.
5. THREE READS ARE DONE IN THE CASE OF A PARITY ERROR.

2. REQUIREMENTS

1. PROCESSORS: PDP-8, 8/I, 8/L, 8/E, 8/M AND PDP-12.
2. OPTIONS: RFØ8 DISK CONTROL WITH UP TO 4 DISKS.
3. SPECIAL: NONE

3. RESTRICTIONS

NONE.

4. OPERATING INFORMATION

4.1 SPECIAL CONSIDERATIONS

THIS MODULE REQUIRES EXTERNAL BUFFERS.

4.2 BUILDING

1. JOB TYPE: INTERRUPT DRIVEN
2. PRIORITY: NON-CRITICAL BUT SHOULD BE PLACED HIGH ON THE LIST TO PROVIDE GREATER INTERACTION.
3. JOB SLOTS: JF1 OR JF2 ONLY; 4 PAGES REQUIRED.
4. STANDARD DEVICE CODES: Ø6ØØ, Ø61Ø, Ø62Ø, Ø64Ø
5. STANDARD WORD COUNT: 7750
6. STANDARD CURRENT ADDRESS: 7751

4,3 INITIALIZING

AFTER THE INDICATED CODE LETTER IS PRINTED RESPOND BY TYPING THE PARAMETER IN THE MANNER SHOWN BELOW.

CODE	DEFINITION	RESPONSE	LIMITS	PRESET
A	LOWEST DISK	N	Ø-3	Ø
B	HIGHEST DISK	N	Ø-3	Ø
C	TYPE OF DATA	Ø FOR RANDOM 1 NNNN FOR CONSTANT	ANY DATA WORD	RANDOM
	DISK ADDRESS AT WHICH TRANSFER BEGINS	Ø FOR RANDOM 1 ØNNN NNNN (EMA) (DMA)	LEGAL ADDRESS	RANDOM
E	TRANSFER LENGTH	Ø FOR RANDOM 1 NNNN	ØØ1-1ØØØ	RANDOM
F	BUFFER TO USE	Ø FOR RANDOM 1 NNNN	LEGAL DESIGNATOR	RANDOM

IN ADDITION THE FOLLOWING MODULE LOCATIONS MAY BE CHANGED AS INDICATED TO ACHIEVE THE DESIRED RESULTS.

1. "RECOVR" (Ø366) MAY BE CHANGED FROM 1ØØ7 TO 1ØØ3 IN SYSTEMS WHICH HAVE HARDWARE RECOVERY FROM DATA REQUEST LATE ERRORS. THIS CHANGE ENSURES THAT THE MODULE NEVER CONSIDERS THE DRL BIT AS AN ERROR. NO SOFTWARE RECOVERY IS MADE AND NO ERROR REPORT OCCURS. DATA IS CHECKED AS USUAL.

2. "REPORT" (Ø416) MAY BE CHANGED FROM 1ØØ7 TO XØØX WHERE ANY CLEAR BITS ARE NOT REPORTED AS ERRORS. BIT ASSIGNMENT IS THE SAME AS FOR THE RFØ8 STATUS REGISTER.

3. "PARITY" (Ø711) MAY BE CHANGED FROM 1ØØ6 TO 1ØØ7 TO INHIBIT DATA CHECKING AFTER PARITY ERRORS.

4,4 DEVICE SETUP

WRITE ENABLE ALL DISKS TO BE EXERCISED.

4,5 RUNNING

1. CNTR: UPDATED AFTER A WRITE/READ/DATA CHECK OPERATION IS COMPLETED.

2. SR1Ø: WHEN SET TO A 1, THE BUFFER CURRENTLY ASSIGNED IS RETAINED.

3. SR11: WHEN SET TO A 1, THE CURRENT DISK STARTING ADDRESS IS RETAINED.

5. ERROR INFORMATION

ALL STATUS REGISTER INDICATED ERRORS ARE REPORTED AS STATUS ERRORS, DATA ERRORS IN THE DATA ERROR FORMAT.

5.1 ERROR SYMBOL DEFINITIONS

CODE: 0002 READ
0004 WRITE

0012 FALSE DATA ERROR (BAD SOFTWARE CHECKSUM BUT DATA LOOKED GOOD ON A WORD BY WORD CHECK). THIS TYPE OF ERROR MAY BE REPORTED AFTER A PARITY ERROR AND INDICATES THE FOLLOWING: 1) THE PARITY ERROR STOPPED THE TRANSFER PRIOR TO COMPLETION AND THEREBY CAUSED A SOFTWARE SUMCHECK ERROR; 2) THE DATA TRANSFERRED WAS GOOD.

003X TRANSFER INCOMPLETE (WORD COUNT NON-ZERO BUT NO STATUS REGISTER ERROR BIT IS SET).

0042 THIS ERROR MAY FOLLOW CODE 0032 REPORTS AND INDICATES THAT ALTHOUGH A TRANSFER WAS INCOMPLETE THE DATA THAT WAS TRANSFERRED WAS GOOD.

SA: FINAL CONTENTS OF THE STATUS REGISTER

SB: CURRENT BUFFER DESIGNATOR

SC: INITIAL WORD COUNT

SD: FINAL WORD COUNT

SE: INITIAL CURRENT ADDRESS

SF: FINAL CURRENT ADDRESS

SG: INITIAL EMA

SH: INITIAL DMA

SI: FINAL EMA

SJ: FINAL DMA

DA: BUFFER ADDRESS

DB: GOOD DATA WORD

DC: BAD DATA WORD

6. LISTING (ATTACHED)

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/

/DEC/X8 EXTERNAL SYMBOL TABLE "EXTSYM"
/FOR USE IN ASSEMBLING DEC/X8 SOFTWARE MODULES.

/COPYRIGHT 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
        XLIST
        PAUSE
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/MAINDEC-X8-DIRFA-A-L "DEC/X8" RF08DS

/RF08 DISK SYSTEM MODULE FOR DEC/X8

/COPYRIGHT 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.

/THIS MODULE OPERATIONAL ON PDP-8,8/I,8/L,8/E AND PDP-I2.

        /PRG: LEN BEYERSDORFER (X2537)


/BUILDER INSTRUCTIONS:

        /1,PRIORITY: NOT CRITICAL, BUT SHOULD BE ASSIGNED NEAR LEVEL 0
/TO PROVIDE MAXIMUM DATA BREAK INTERACTION.
        /2,JOB SLOT: 4 PAGES REQUIRED, SLOT JX1 OR JX2.

/INITIALIZER INSTRUCTIONS:

/CODE   DEFINED                 RESPONSE                                PRESET

/A:     LOWEST DISK TO USE      0=3                                     0
/B:     HIGHEST DISK TO USE     0=3                                     0
/C:     TYPE OF DATA            0=RANDOM; 1  NNNN=CONSTANT              RANDOM
/D:     ADDRESSING              0=RANDOM; 1  NNNN  NNNN=CONSTANT        RANDOM
/E:     LENGTH OF TRANSFER      0=RANDOM; 1  NNNN=CONSTANT              RANDOM
/F:     BUFFER ASSIGNMENT       0=RANDOM; 1  NNNN=CONSTANT              RANDOM


/SPECIAL USER MODIFICATIONS VIA RELATIVE "+0" FACILITY.

        /1,"RECOVR" MAY BE CHANGED FROM 1007 TO 1003 IN SYSTEMS
/WHICH HAVE AUTOMATIC RECOVERY FROM DATA REQUEST LATE.  THIS CHANGE
/ALLOWS CHECKING DATA EVEN IF DRL IS SET AND GENERATES NO STATUS
/ERROR REPORT FOR DRL.

        /2,"REPORT" MAY BE CHANGED FROM 1007 TO X00X WHERE ANY
/CLEAR BITS INHIBIT AN ERROR REPORT FOR THAT CONDITION.
                /BIT    ERROR
                /2      WLS
                /9      DRL
                /10     NXD
                /11     PER

        /3,"PARITY" MAY BE CHANGED FROM 1006 TO 1007 TO INHIBIT
/DATA CHECKING AFTER A PARITY ERROR.


/REPORT SYMBOL  DEFINITIONS:

        /1,REFER TO MODULE TABLE IN THIS LISTING FOR DESCRIPTION
/OF CNTR,SA:=SJ:,AND DA:=DC:
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                        /2,"CODE" DEFINITIONS:

                                /CODE   DEFINED
                                /0002   READ
                                /0004   WRITE
                                /001X   FALSE DATA ERROR (BAD CHECKSUM BUT
                                /       DATA LOOKED GOOD ON WORD BY WORD CHECK.)
                                /0012   THIS TYPE OF ERROR MAY BE REPORTED AFTER
                                /       A PARITY ERROR AND INDICATES THE FOLLOWING:
                                /       1. THE PARITY ERROR STOPPED THE TRANSFER PRIOR TO
                                /       COMPLETION AND THEREBY CAUSED A SOFTWARE
                                /       SUMCHECK ERROR. 2. THE DATA THAT WAS READ IN
                                /       WAS GOOD.
                                /003X   TRANSFER INCOMPLETE (WC NON-ZERO,
                                /       BUT NO STATUS ERROR BIT WAS SET.)
                                /0042   THIS CODE MAY FOLLOW A CODE 0032 REPORT AND
                                /       INDICATES THAT ALTHOUGH A TRANSFER WAS INCOMPLETE
                                /       THE DATA THAT WAS TRANSFERRED WAS GOOD.

                        /RF08 STANDARDS:

                                /WORD COUNT:7750
                                /CURRENT ADDRESS:7751
                                /DEVICE CODES:60,61,62,64.

                        /RF08 IOT DEFINITIONS:

                6601    DCMA=6601               /SYSTEM CLEAR:0->DMA,PER,DRL,PRESET LOGIC.

                6603    DMAR=6603               /DCMA: AC->DMA,0->AC:READ

                6605    DMAW=6605               /DCMA:AC->DMA,0->AC:WRITE

                6611    DCIM=6611               /0->DIE,MAER

                6615    DIML=6615               /DCIM:AC->DIE,MAER,0->AC

                6616    DIMA=6616               /0->AC:SR->AC

                6621    DFSE=6621               /PC+=->PC IF DRL,PER,WLS OR NXD

                6622    DFSC=6622               /PC+1->PC IF DCF

                6623    DISK=6623               /DFSE+DFSC:NEVER PC+2=>PC)

                6626    DMAC=6626               /0->AC:DMA=>AC

                6641    DCXA=6641               /0->EMA

                6643    DXAL=6643               /DCXA:AC4-11->EMA,0->AC:AC0-3 IGNORED)

                6645    DXAC=6645               /0->AC:EMA->AC4-11
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                        /MODULE TABLE
                0200    *200
0200    0000    JOB,    0                       /JOB NUMBER
0201    2206    TEXT1,  TEXT    "RF08DS"        /DEVICE NAME
0202    6070
0203    0423
0204    0000
0205    0411            TEXT    "DIRFA-A"       /MODULE DESIGNATOR
0206    2206
0207    0155
0210    0100
0211    0000    HOMEDF, 0                       /DF-IF
0212    7402            HLT/CDF
0213    5611            JMP I   HOMEDF
0214    6202    INTACK, CIF     00              /ACKNOWLEDGE INTERRUPT.
0215    4426            JMS I   IHRETP
0216    7777            -1                      /PRIORITY
0217    7777    KILL,   -1                      /COMMAND TO KILL JOB.
0220    7777    KILLED, -1                      /MODULE SETS TO -1 WHEN JOB KILLED.
0221    0000    CNTR,   0                       /NUMBER OF EXERCISER LOOP PASSES.
0222    0000    ERROR,  0                       /ERROR CALL.
0223    3234            DCA     .+11
0224    7604            LAS
0225    0073            AND Z   K4
0226    7440            SZA
0227    3217            DCA     KILL
0230    4211            JMS     HOMEDF
0231    6002            IOF
0232    6202            CIF     00
0233    4461            JMS I   ERRP
0234    0000            0
0235    5622            JMP I   ERROR
0236    0000    CODE,   0                       /ERROR CODE.
0237    7766            -12                     /STATUS ERROR ENTRY TALLY.
0240    0000    ERRSA,  0                       /STATUS REG.
0241    0000    ERRSB,  0                       /BUFFER WORD
0242    0000    ERRSC,  0                       /INIT WC
0243    0000    ERRSD,  0                       /FINAL WC
0244    0000    ERRSE,  0                       /INIT CA
0245    0000    ERRSF,  0                       /FINAL CA
0246    0000    ERRSG,  0                       /INIT EMA
0247    0000    ERRSH,  0                       /INIT DMA
0250    0000    ERRSI,  0                       /FINAL EMA
0251    0000    ERRSJ,  0                       /FINAL DMA
0252    7775            -3                      /DATA ERROR ENTRY TALLY.
0253    0000    ERRDA,  0                       /BUFFER ADDRESS
0254    0000    ERRDB,  0                       /GOOD DATA
0255    0000    ERRDC,  0                       /BAD DATA

                        /END OF MODULE TABLE
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                    /INTERRUPT SERVICE-IMMEDIATE ONLY!
                                                                    /"INT" IS INT SERV ADDR,
                                                                    /SKIP CHAIN DOES JMS TO HERE,
0256  0000    INT,    0
0257  2304            ISZ     RENTRY
0260  5276            JMP     .+16
0261  4211            JMS     HOMEDF
0262  6616    DC61A,  DIMA                                        /NO, SAVE STATUS,
0263  3240            DCA     ERRSA
0264  6645    DC64A,  DXAC                                        /SAVE EMA
0265  3250            DCA     ERRSI
0266  6626    DC62A,  DMAC                                        /SAVE DMA
0267  3251            DCA     ERRSJ
0270  6601    DC60A,  DCMA                                        /SYSTEM CLEAR
0271  6641    DC64B,  DCXA                                        /CLEAR EMA
0272  6611    DC61B,  DCIM                                        /CLEAR INT ENABLES,MAER
0273  6601    DC60B,  DCMA                                        /SYSTEM CLEAR AGAIN,
0274  1377            TAD     (DEFSRV                             /GET DEFERRED SERVICE ADDR',
0275  5214            JMP     INTACK                              /ACKNOWLEDGE INTERRUPT',
0276  3304            DCA     RENTRY
0277  6214            RDF
0300  1020            TAD I   KCIFDF
0301  3302            DCA     .+1
0302  7402            HLT/CIF CDF
0303  5656            JMP I   INT
0304  0000    RENTRY, 0                                           /=1 ALLOWS INTERRUPTS,

                    /ROUTINE TO SET UP RF08 TO READ OR WRITE (UNLESS "KILL"=-1)
                            /CALL MUST BE!
                    /1,     SET UP ERRSB, ERRSC,ERRSE,ERRSG AND ERRSH',
                    /2,     ENSURE DF=IF
                    /3,     PUT 0002 IN AC IF READ, 0004 IF WRITE',
                    /4,     JMS I (GO
                    /5,     DMAR OR DMAW (READ OR WRITE,)
                    /6,     RETURNS HERE IF STATUS ERROR (ALREADY REPORTED)
                    /7,     RETURNS HERE IF NO STATUS ERRORS',
0305  0000    GO,     0                                           /ENTER
0306  3236            DCA     CODE                                /SAVE CODE 2 OR 4',
0307  1217            TAD     KILL                                /COMMAND TO KILL JOB?
0310  7450            SNA
0311  5315            JMP     .+4
0312  3220            DCA     KILLED                              /YES',  SET JOB KILLED FLAG
0313  4776            JMS I   (RELEAS                             /RELEASE ASSIGNED BUFFER
0314  5004            SERVEX                                      /EXIT WITH AC CLEAR
0315  6201            CDF     00                                  /DF=0
0316  1242            TAD     ERRSC                               /GET INITIAL WORD COUNT,
0317  3742            DCA I   RF08WC                              /STASH IT',
0320  1244            TAD     ERRSE                               /GET CA
0321  3743            DCA I   RF08CA                              /STASH IT',
0322  4211            JMS     HOMEDF                              /DF=IF
0323  1705            TAD I   GO                                  /GET DMAR OR DMAW
0324  2305            ISZ     GO                                  /UPDATE TO GOOD EXIT,
0325  3340            DCA     .+13                                /SAVE',
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0326  1241            TAD     ERRSB                               /COMPUTE BREAK FIELD
0327  0105            AND Z   K70                                 /FROM BUFFER WORD',
0330  1344            TAD     K500A                               /ADD INT ENA FOR ERROR AND DONE',
0331  6002            IOF                                         /INTERRUPT SYSTEM OFF',
0332  6615    DC61C,  DIML                                        /LOAD DIE AND MAER
0333  7040            CMA                                         /SET RENTRY FLAG TO ALLOW
0334  3304            DCA     RENTRY                              /INTERRUPT',
0335  1246            TAD     ERRSG                               /GET INITIAL EMA
0336  6643    DC64C,  DXAL                                        /LOAD IT',
0337  1247            TAD     ERRSH                               /GET INITIAL DMA
0340  7402            HLT/DMAR OR DMAW                            /LOAD IT AND READ OR WRITE',
0341  5004            SERVEX                                      /EXIT WITH AC CLEAR,
0342  7750    RF08WC, 7750
0343  7751    RF08CA, 7751
0344  0500    K500A,  500

                    /DEFERRED SERVICE ENTRY,

0345  6201    DEFSRV, CDF     00                                  /DF=0
0346  1742            TAD I   RF08WC                              /GET FINAL WORD COUNT
0347  3243            DCA     ERRSD                               /SAVE
0350  1743            TAD I   RF08CA                              /SAVE FINAL CA',
0351  3245            DCA     ERRSF
0352  4211            JMS     HOMEDF                              /DF=IF
0353  1240            TAD     ERRSA                               /GET STATUS AND CHECK RECOVERY',
0354  0366            AND     RECOVR                              /NOTE!IF BIT NOT SPECIFIED IN
                                                                  /RECOVR, IT WILL NOT BE REPORTED
                                                                  /EITHER,  NO REAL ERROR SHOULD
                                                                  /BE OMITTED-PRESENTLY ONLY
                                                                  /DRL MAY BE OMITTED ON CERTAIN
                                                                  /RF08 SYSTEMS',  IN THESE SYSTEMS,
                                                                  /THE DISK RECOVERS AUTOMATICALLY,
0355  7450            SNA                                         /A BIT SET?
0356  5775            JMP I   (GO2                                /NO,  CHECK TRANSFER DONE',
0357  7112            CLL RTR                                     /YES,  IS IT ONLY NXD?
0360  7640            SZA CLA                                     /IF IT IS, AC=0
0361  5774            JMP I   (GO1                                /NO',
0362  1243            TAD     ERRSD           /WC=0?
0363  7640            SZA CLA
0364  5774            JMP I   (GO1                                /NO',  REAL NXD ERROR,
0365  5775            JMP I   (GO2                                /OK',  NOW CHECK TRANSFER DONE',
0366  1007    RECOVR, 1007    /RECOVER MASK=MAY BE CHANGED BY USER TO 1003
                              /IF THE SYSTEM UNDER TEST HAS AUTOMATIC DISK
                              /RECOVERY FOR DRL,
0367  7701    K7701A, 7701
0370  5705    GO3,    JMP I   GO
0371  0000    DATCON, 0
0372  1254            TAD     ERRDB
0373  5771            JMP I   DATCON

                    /END OF PAGE
      0374    *,
0374  0411
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0375  0400
0376  0417
0377  0345
      0400    *400



0400  1777    GO2,    TAD I   (ERRSD                  /CHECK TRANSFER DONE,
0401  7650            SNA CLA                         /FINAL WC=0?
0402  5207            JMP     .+5
0403  1776            TAD I   (CODE                   /NO, MAKE CODE=003X
0404  1103            TAD Z   K30
0405  3776            DCA I   (CODE
0406  5214            JMP     GO1+3                   /UNCONDITIONAL REPORT',
0407  2775            ISZ I   (GO                     /THERE ARE ABSOLUTELY NO
0410  5774            JMP I   (GO3                    /STATUS ERRORS',
0411  1773    GO1,    TAD I   (ERRSA                  /REPORT ERROR?
0412  0216            AND     REPORT
0413  7640            SZA CLA
0414  4772            JMS I   (ERROR                  /YES', GENERATE STATUS ERROR REPORT
0415  5774            JMP I   (GO3                    /EXIT',
0416  1007    REPORT, 1007    /ANY OF THESE BITS MAY BE DELETED

0417  0000    RELEAS, 0                       /ROUTINE TO RELEASE EXTERNAL BUFFER',
0420  1771            TAD I   (ERRSB
0421  6002            IOF
0422  6202            CIF     00
0423  4457            RLBUFF
0424  5617            JMP I   RELEAS
                      /BY THE USER TO INHIBIT REPORTING OF CERTAIN ERRORS',


                /RANDOM NUMBER GENERATOR

0425  0000    RANDOM, 0
0426  2261            ISZ     RAN1
0427  7000            NOP
0430  1262            TAD     RAN2
0431  1265            TAD     K1111A
0432  7104            CLL RAL
0433  7420            SNL
0434  7001            IAC
0435  3262            DCA     RAN2
0436  1261            TAD     RAN1
0437  1262            TAD     RAN2
0440  5625            JMP I   RANDOM
0441  0000    SAVRAN, 0                       /PRESET
0442  6201            CDF     00
0443  1466            TAD I Z K0
0444  3262            DCA     RAN2
0445  4770            JMS I   (HOMEDF
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0446  1261            TAD     RAN1
0447  3263            DCA     SAV1
0450  1262            TAD     RAN2
0451  3264            DCA     SAV2
0452  5641            JMP I   SAVRAN
0453  0000    RESRAN, 0                       /RESTORE
0454  1263            TAD     SAV1
0455  3261            DCA     RAN1
0456  1264            TAD     SAV2
0457  3262            DCA     RAN2
0460  5653            JMP I   RESRAN
0461  0000    RAN1,   0
0462  0000    RAN2,   0
0463  0000    SAV1,   0
0464  0000    SAV2,   0
0465  1111    K1111A, 1111

0466  0000    DATCHK, 0                               /CHECK DATA,
0467  1777            TAD I   (ERRSD                  /GET FINAL WC',
0470  4767            JMS I   (SUMCHK                 /SUMCHECK',
0471  7041            CIA
0472  1766            TAD I   (SUMSAV                 /GOOD?
0473  7650            SNA CLA
0474  5666            JMP I   DATCHK                  /YES', OUT',
0475  4253            JMS     RESRAN                  /NO, RESTORE DATA GENERATOR,
0476  1777            TAD I   (ERRSD                  /PRESET TO CHECK DATA',
0477  4327            JMS     DATSET
0500  3305            DCA     .+5                     /SAVE CDF TO BUFFER FIELD',
0501  1765            TAD I   (DATGEV                 /MOVE DATA GENERATOR POINTER TO THIS
0502  3327            DCA     DATSET                  /PAGE
0503  4727            JMS I   DATSET                  /GENERATE I WORD',
0504  3764            DCA I   (ERRDB                  /SAVE IN GOOD',
0505  7402            HLT/CDF                         /DF TO BUFFER FIELD,
0506  1417    AUA,    TAD I   AUTO                    /GET WORD IN BUFFER,
0507  4770            JMS I   (HOMEDF                 /DF=IF
0510  3763            DCA I   (ERRDC                  /SAVE IN BAD',
0511  1017    AUB,    TAD     AUTO                    /GET ADDR AND SAVE,
0512  3762            DCA I   (ERRDA
0513  1763            TAD I   (ERRDC                  /GOOD=BAD?
0514  7041            CIA
0515  1764            TAD I   (ERRDB
0516  7440            SZA
0517  4772            JMS I   (ERROR                  /NO, DATA ERROR (AC NOT 0)
0520  2761            ISZ I   (BUFTAL                 /DONE?
0521  5303            JMP     .+16                    /NO,
0522  1776            TAD I   (CODE                   /YES', SET CODE=001X
0523  1076            TAD Z   K10
0524  3776            DCA I   (CODE
0525  4772            JMS I   (ERROR                  /CLOSE ERROR ROUTINE,
0526  5666            JMP I   DATCHK                  /OUT',
0527  0000    DATSET, 0                               /SET UP FOR DATA GENERATE OR CHECK',
0530  7041            CIA                             /COMPUTE LENGTH TO FILL OR CHECK',
0531  1760            TAD I   (ERRSC
0532  7450            SNA
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0533  5666          JMP I   DATCHK
0534  3761          DCA I   (BUFTAL                  /SAVE IT,
0535  1757          TAD I   (ERRSE                   /PUT CA IN AUTO INDEX,
0536  3017  AUC,    DCA     AUTO
0537  1771          TAD I   (ERRSB                   /COMPUTE CDF TO BUFFER FIELD,
0540  0105          AND Z   K70
0541  1064          TAD Z   KCDF
0542  5727          JMP I   DATSET                   /EXIT WITH IT IN AC,
0543  0000  LGTCON, 0
0544  1760          TAD I   (ERRSC
0545  5743          JMP I   LGTCON

0546  0000  ADRCON, 0
0547  5756          JMP I   (DSKART
                    /END OF PAGE

      0550  *.
0556  0613
0557  0244
0560  0242
0561  0706
0562  0253
0563  0255
0564  0254
0565  0734
0566  0707
0567  0715
0570  0211
0571  0241
0572  0222
0573  0240
0574  0370
0575  0305
0576  0236
0577  0243
      0600  *600


                    /RUNNER
                                                     /"RUN" IS THE RUNNING ADDRESS,
0600  3777  RUN,    DCA I   (ERRSB                   /CLEAR BUFFER ASSIGNED WORD,
0601  3776          DCA I   (CNTR

                    /THIS IS THE START OF THE EXERCISER LOOP,

0602  7604  EXER,   LAS                              /CHANGE DISK ADDRESS?
0603  7010          RAR
0604  7630          SZL CLA
0605  5213          JMP     DSKART                   /NO, BY PASS,
0606  4731          JMS I   ADRGEV                   /YES, EMA,
0607  0312          AND     K377A
0610  3775          DCA I   (ERRSG
0611  4731          JMS I   ADRGEV                   /DMA
0612  3774          DCA I   (ERRSH
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0613  1775  DSKART, TAD I   (ERRSG                   /EMA IN LIMITS?
0614  4773          JMS I   (BTWEEN
0615  4732  LGTGEN, JMS I   LGTGEV                   /YES, TRANSFER LENGTH,
0616  0313          AND     K777A
0617  1272          TAD     K7000A
0620  3772          DCA I   (ERRSC
0621  1772          TAD I   (ERRSC                   /COMPUTE FINAL EMA,
0622  7140          CLL CMA
0623  1774          TAD I   (ERRSH
0624  7204          CLA RAL
0625  1775          TAD I   (ERRSG                   /IN LIMITS?
0626  4773          JMS I   (BTWEEN
0627  4733  BUFGEN, JMS I   BUFGEV                   /YES, GENERATE BUFFER,
0630  1777          TAD I   (ERRSB                   /COMPUTE CA START,
0631  0131          AND Z   K7600
0632  1314          TAD     M1A
0633  3771          DCA I   (ERRSE
0634  4770  DATGEN, JMS I   (SAVRAN                  /SAVE RANDOM GEN STUFF,
0635  4767          JMS I   (DATSET                  /PRESET TO FILL BUFFER,
0636  3237          DCA     .+1
0637  7402          HLT/CDF
0640  4734          JMS I   DATGEV
0641  3417  AUD,    DCA I   AUTO             /FILL BUFFER
0642  2306          ISZ     BUFTAL
0643  5240          JMP     .-3
0644  4766          JMS I   (HOMEDF
0645  4315          JMS     SUMCHK                   /YES, SUMCHECK,
0646  3307          DCA     SUMSAV                   /SAVE IT,
0647  1141          TAD Z   M3                       /SET FOR 3 RE-READS ON
0650  3310          DCA     PARTAL                   /PARITY ERROR,
0651  1073          TAD Z   K4                       /4 IN AC FO WRITE
0652  4765          JMS I   (GO                      /WRITE IT,
0653  6605  DC60C,  DMAW
0654  5202          JMP     EXER                     /ERROR, AGAIN
0655  4767  DSKRD,  JMS I   (DATSET                  /OK, CLEAR BUFFER,
0656  3257          DCA     .+1
0657  7402          HLT/CDF
0660  3417  AUE,    DCA I   AUTO
0661  2306          ISZ     BUFTAL
0662  5260          JMP     .-2
0663  4766          JMS I   (HOMEDF
0664  7126          STL RTL                          /2 IN AC FOR READ,
0665  4765          JMS I   (GO                      /READ IT,
0666  6603  DC60D,  DMAR

0667  5274          JMP     .+5                      /ERROR,
0670  4764          JMS I   (DATCHK                  /OK, CHECK DATA,
0671  2776  DSKOUT, ISZ I   (CNTR                    /UPDATE PASS COUNTER,
0672  7000  K7000A, 7000/NOP
0673  5202          JMP     EXER                     /LOOP,
0674  1763          TAD I   (ERRSA                   /PARITY ERROR-CHECK DATA
0675  0311          AND     PARITY                   /ANYWAY?
0676  7650          SNA CLA
0677  4764          JMS I   (DATCHK                  /YES,
0700  1763          TAD I   (ERRSA                   /PARITY ERROR?
```

```
0701  7010          RAR
0702  7630          SZL CLA
0703  2310          ISZ     PARTAL                  /YES,3 RE-READS.
0704  5255          JMP     DSKRD
0705  5271          JMP     DSKOUT
0706  0000  BUFTAL, 0
0707  0000  SUMSAV, 0
0710  0000  PARTAL, 0
0711  1006  PARITY, 1006
0712  0377  K377A,  377
0713  0777  K777A,  777
0714  7777  M1A,    -1
0715  0000  SUMCHK, 0                               /SUMCHECK BUFFER
0716  4767          JMS I   (DATSET
0717  3320          DCA     .+1
0720  7402          HLT/CDF
0721  7100          CLL
0722  1417  AUF,    TAD I   AUTO
0723  7430          SZL
0724  7001          IAC
0725  2306          ISZ     BUFTAL
0726  5321          JMP     .+5
0727  4766          JMS I   (HOMEDF
0730  5715          JMP I   SUMCHK

                    /END OF PAGE

      0731          *.
                    /NOTE!  THESE LOC'S ARE SPECIFIED BELOW THE *, SO THAT THE ADDRESSES
                    /INDICATED ARE MODIFIED PROPERLY BY THE DEC-X8 LOADER.
0731  0425  ADRGEV, RANDOM  /ADRCON
0732  0425  LGTGEV, RANDOM  /LGTCON
0733  1011  BUFGEV, BUFRAN  /BUFCON
0734  0425  DATGEV, RANDOM  /DATCON
0763  0240
0764  0466
0765  0305
0766  0211
0767  0527
0770  0441
0771  0244
0772  0242
0773  1027
0774  0247
0775  0246
0776  0221
0777  0241
      1000          *1000


                    /ROUTINE TO ASSIGN AND HOLD A SPECIFIED BUFFER WHICH MUST BE
                    /LEGALLY SPECIFIED IN CONBUF (STANDARD BUFFER DESIGNATOR)

1000  0000  BUFCON, 0
```



```
1001  1777'         TAD     ERRSB                   /GET CURRENT BUFFER WORD.
1002  7041          CIA
1003  1210          TAD     CONBUF
1004  7650          SNA CLA                         /SPECIFIED BUFFER ASSIGNED?
1005  5600          JMP I   BUFCON                  /YES, EXIT.
1006  4211          JMS     BUFRAN                  /NO, GET NEW BUFFER.
1007  5201          JMP     BUFCON+1                /CHECK IT
1010  0000  CONBUF, 0                               /MUST CONTAIN LEGAL BUFFER DESIGNATOR.

                    /ROUTINE TO ASSIGN A BUFFER OBSERVING SR 10.

1011  0000  BUFRAN, 0
1012  7604          LAS                             /PUT SR 10 (NOT) IN LINK.
1013  7012          RTR
1014  7220          CLA CML
1015  1777'         TAD     ERRSB                   /BUFFER WORD IN AC.
1016  7460          SNL SZA
1017  5225          JMP     .+6                     /EXIT IF AC NON ZERO AND LINK SET.
1020  7640          SZA CLA
1021  4776'         JMS     RELEAS                  /RELEASE BUFFER IF AC NON ZERO.
1022  6002          IOF                             /ASSIGN A BUFFER
1023  6202          CIF     00
1024  4460          ASBUFF
1025  3777'         DCA     ERRSB                   /SAVE BUFFER DESIGNATOR.
1026  5611          JMP I   BUFRAN                  /EXIT.

1027  0000  BTWEEN, 0                                       /ROUTINE TO CHECK EMA IN LIMITS.
1030  0245          AND     K300A                           /ENTER WITH EMA IN AC, MASK
1031  3211          DCA     BUFRAN                          /TO DISK SELECT.
1032  1211          TAD     BUFRAN                          /EMA>OR=LOW LIMIT?
1033  1243          TAD     LODSK
1034  7710          SPA CLA
1035  5775          JMP I   (EXER                           /NO, BACK TO TOP OF EXER LOOP.
1036  1211          TAD     BUFRAN                          /EMA <OR= HIGH LIMIT?
1037  1244          TAD     HIDSK
1040  7740          SMA SZA CLA
1041  5775          JMP I   (EXER                           /NO, BACK TO TOP OF EXER LOOP
1042  5627          JMP I   BTWEEN                          /OK, EMA IN LIMITS.
1043  0000  LODSK,  0                                       /LOW DISK SELECT (BITS 4-5 NEGATE)
1044  0000  HIDSK,  0                                       /SAME FOR HIGH DISK SELECT.
1045  0300  K300A,  300                                     /


                    /INITIALIZER
                                                          /"INIT" IS INITIALIZING ADDRESS.
1046  1374  INIT,   TAD     (TEXT1
1047  3251          DCA     LTRCOD
1050  4444          MESAGE
1051  0000  LTRCOD, 0
1052  1117  INITLP, TAD Z   K301                          /SET CODE TO "A"
1053  3251          DCA     LTRCOD
1054  4322          JMS     INISR1                  /GET LOW DISK.
1055  3243          DCA     LODSK                   /SAVE IN BITS 4-5 NEGATED
1056  4322          JMS     INISR1                  /SAME FOR HIGH DISK.
```

```
1057  3244            DCA     HIDSK
1060  4331            JMS     INISR2                  /TYPE OF DATA,
1061  5265            JMP     .+4                     /RANDOM
1062  3773            DCA I   (ERRDB                  /CONSTANT=SAVE IN GOOD DATA,
1063  1372            TAD     (DATCON                 /PRESET POINTERS,
1064  7410            SKP
1065  1371            TAD     (RANDOM
1066  3770            DCA I   (DATGEV
1067  4331            JMS     INISR2                  /TYPE OF ADDRESSING:
1070  5300            JMP     .+10                    /RANDOM
1071  3767            DCA I   (ERRSC                  /CONSTANT=SAVE EMA PART,
1072  4455            SPACE2                          /2 SPACES
1073  4443            FOROCT                          /GET EMA PART,
1074  5252            JMP     INITLP
1075  3766            DCA I   (ERRSH                  /SAVE IT,
1076  1365            TAD     (ADRCON                 /PRESET POINTERS
1077  7410            SKP
1100  1371            TAD     (RANDOM
1101  3764            DCA I   (ADRGEV
1102  4331            JMS     INISR2                  /LENGTH OF TRANSFER:
1103  5310            JMP     .+5                     /RANDOM
1104  7041            CIA                             /CONSTANT=NEGATE AND SAVE

1105  3763            DCA I   (ERRSC                  /AS INITIAL WC,
1106  1362            TAD     (LGTCON                 /PRESET POINTERS,
1107  7410            SKP
1110  1371            TAD     (RANDOM
1111  3761            DCA I   (LGTGEV
1112  4331            JMS     INISR2                  /BUFFER ASSIGNMENT:
1113  5317            JMP     .+4                     /RANDOM
1114  3210            DCA     CONBUF                  /CONSTANT=SAVE IN HOLDER,
1115  1360            TAD     (BUFCON                 /PRESET POINTERS,
1116  7410            SKP
1117  1357            TAD     (BUFRAN
1120  3756            DCA I   (BUFGEV
1121  5020            INITEX                          /OUT,
1122  0000    INISR1, 0                               /SERVICE 1,
1123  4342            JMS     INISR3                  /DO SERVICE 3,
1124  7106            CLL RTL                         /MOVE TO BITS 4-5,
1125  7006            RTL
1126  7006            RTL
1127  7041            CIA                             /NEGATE,
1130  5722            JMP I   INISR1                  /OUT,

1131  0000    INISR2, 0                               /SERVICE 2
1132  4342            JMS     INISR3                  /DO SERVICE 3,
1133  7650            SNA CLA
1134  5731            JMP I   INISR2                  /0=RANDOM OUT
1135  2331            ISZ     INISR2                  /NOT 0 IS CONSTANT,
1136  4455            SPACE2                          /2 SPACES,
1137  4443            FOROCT                          /GET 4 OCTAL NUMBERS
1140  5252            JMP     INITLP                  /ERROR,
1141  5731            JMP I   INISR2                  /OUT

1142  0000    INISR3, 0                               /SERVICE 3,
```



```
1143  4454            CRLF                            /CARRIAGE RET-LINE FEED,
1144  1251            TAD     LTRCOD                  /GET LETTER CODE,
1145  4450            TYPE                            /PRINT IT
1146  4455            SPACE2                  /2 SPACES
1147  4442            ONEOCT                          /GET ONE OCTAL NUMBER,
1150  5252            JMP     INITLP                  /ERROR,
1151  0072            AND Z   K3                      /MAKE <OR=3 ARBITRARILY,
1152  2251            ISZ     LTRCOD                  /UPDATE LETTER CODE,
1153  5742            JMP I   INISR3                  /OUT,

                /END OF PAGE AND END OF PROGRAM CODE

      1154      *.
1156  0733
1157  1011
1160  1000
1161  0732
1162  0543
1163  0242
1164  0731
1165  0546
1166  0247
1167  0246
1170  0734
1171  0425
1172  0371
1173  0254
1174  0201
1175  0602
1176  0417
1177  0241
```

```
0000
0100

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  00000011  11111111  11111111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111000  00000000  00000000  00011111  11111111

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11110011  11111111  11111111

1200
1300

1400
1500

1600
1700

2000
2100

2200
2300

2400
2500

2600
2700

3000
3100

3200
3300

3400
3500

3600
3700
```



```
4000
4100

4200
4300

4400
4500

4600
4700

5000
5100

5200
5300

5400
5500

5600
5700

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700
```

```
                0001    FIELD   1

                        /LOADER CALL

        1200  1046              INIT                    /INITIALIZING ADDRESS
        1201  0600              RUN                     /RUNNING ADDRESS
        1202  0256              INT                     /INTERRUPT ADDRESS

        1203  6623              DISK                    /SKIP CHAIN
        1204  0000              0
        1205  0001              1
        1206  7402              HLT
        1207  7402              HLT
        1210  7402              HLT

        1211  7772              -6                      /AUTO INDEX

        1212  0506              AUA
        1213  0511              AUB
        1214  0536              AUC
        1215  0641              AUD
        1216  0660              AUE
        1217  0722              AUF
        1220  7774              -4                      /# OF DEVICE CODES

        1221  0600              0600
        1222  7774              -4
        1223  0270              DC60A
        1224  0273              DC60B
        1225  0653              DC60C
        1226  0666              DC60D

        1227  0610              0610
        1230  7775              -3
        1231  0262              DC61A
        1232  0272              DC61B
        1233  0332              DC61C

        1234  0620              0620
        1235  7776              -2
        1236  0001              1
        1237  0266              DC62A

        1240  0640              0640
        1241  7775              -3
        1242  0264              DC64A
        1243  0271              DC64B
        1244  0336              DC64C

        1245  7777              -1                      /WORD COUNT
        1246  7750              7750
        1247  7777              -1

        1250  0342              RF08WC
```



```
        1251  7777              -1                      /CURRENT ADDRESS
        1252  7751              7751
        1253  7777              -1
        1254  0343              RF08CA

                $$
```

```
0000
0100

0200
0300

0400
0500

0600
0700


1000
1100

1200  11111111  11111111  11111111  11111111  11111111  11111000  00000000  00000000
1300  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

1400
1500

1600
1700


2000
2100

2200
2300

2400
2500

2600
2700


3000
3100

3200
3300

3400
3500

3600
3700
```



```
4000
4100

4200
4300

4400
4500

4600
4700


5000
5100

5200
5300

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```

```
ADRCON  0546        DSKRD   0655        K2000   0122        LODSK   1043
ADRGEV  0731        DXAC    6645        K212    0111        LTRCOD  1051
ASBUFF  4460        DXAL    6643        K215    0112        M1A     0714
ASBUFP  0060        ERRDA   0253        K240    0113        M20     0135
AUA     0506        ERRDB   0254        K260    0114        M200    0131
AUB     0511        ERRDC   0255        K272    0115        M240    0127
AUC     0536        ERROR   0222        K277    0116        M260    0126
AUD     0641        ERRP    0061        K3      0072        M270    0125
AUE     0660        ERRSA   0240        K30     0103        M3      0141
AUF     0722        ERRSB   0241        K300A   1045        M30     0134
AUTO    0017        ERRSC   0242        K301    0117        M4      0140
BTWEEN  1027        ERRSD   0243        K32     0067        M40     0133
BUFCON  1000        ERRSE   0244        K323    0120        M43     0132
BUFGEN  0627        ERRSF   0245        K377A   0712        M5      0137
BUFGEV  0733        ERRSG   0246        K4      0073        M7      0136
BUFRAN  1011        ERRSH   0247        K40     0104        MESAGE  4444
BUFTAL  0706        ERRSI   0250        K400    0121        MESAGP  0044
CNTR    0221        ERRSJ   0251        K5      0074        MUL26P  0065
CODE    0236        EXER    0602        K500A   0344        ONEOCP  0042
CONBUF  1010        EXINIT  0020        K5200   0123        ONEOCT  4442
CRLF    4454        EXSERV  0004        K540    0124        PARITY  0711
CRLFP   0054        EXTMEM  0161        K5402   0003        PARTAL  0710
DATCHK  0466        FOROCP  0043        K64     0070        PRNT1   4451
DATCON  0371        FOROCT  4443        K7      0075        PRNT1P  0051
DATGEN  0634        GO      0305        K70     0105        PRNT2   4452
DATGEV  0734        GO1     0411        K7000A  0672        PRNT2P  0052
DATSET  0527        GO2     0400        K7510   0125        PRNT4   4453
DC60A   0270        GO3     0370        K7520   0126        PRNT4P  0053
DC60B   0273        HIDSK   1044        K7540   0127        RAN1    0461
DC60C   0653        HOMEDF  0211        K7600   0131        RAN2    0462
DC60D   0666        IHRETP  0026        K77     0106        RANDOM  0425
DC61A   0262        INISR1  1122        K7701A  0367        RECOVR  0366
DC61B   0272        INISR2  1131        K7735   0132        RELEAS  0417
DC61C   0332        INISR3  1142        K7740   0133        RENTRY  0304
DC62A   0266        INIT    1046        K7750   0134        REPORT  0416
DC64A   0264        INITEX  5020        K7760   0135        RESRAN  0453
DC64B   0271        INITLP  1052        K7771   0136        RF08CA  0343
DC64C   0336        INT     0256        K7773   0137        RF08HC  0342
DCIM    6611        INTACK  0214        K7774   0140        RLBUFF  4457
DCMA    6601        IOFMSP  0056        K7775   0141        RLBUFP  0057
DCXA    6641        JOB     0200        K777A   0713        RUN     0600
DEFSRV  0345        K0      0066        KCDF    0064        SAV1    0463
DFSC    6622        K10     0076        KCIF    0005        SAV2    0464
DFSE    6621        K100    0107        KCIFDF  0020        SAVRAN  0441
DIMA    6616        K11     0077        KILL    0217        SERVEX  5004
DIML    6615        K1111A  0465        KILLED  0220        SPACE2  4455
DISK    6623        K116    0071        KIOF    0004        SPACEP  0055
DMAC    6626        K13     0100        LGTCON  0543        SUMCHK  0715
DMAR    6603        K17     0101        LGTGEN  0615        SUMSAV  0707
DMAW    6605        K177    0130        LGTGEV  0732        TEXT1   0201
DSKART  0613        K20     0102        LISN    4440        TWOOCP  0041
DSKOUT  0671        K200    0110        LISNP   0040        TWOOCT  4441
```



```
TYPE    4450
TYPEP   0050

ERRORS DETECTED: 0

LINKS GENERATED: 4

RUN-TIME:  9 SECONDS

3K CORE USED
```