IDENTIFICATION

PRODUCT CODE:	MAINDEC-08-DIGD-D
PRODUCT NAME:	PDP-8, 8I, 8S EXTENDED MEMORY CONTROL
DATE CREATED:	JULY 27, 1970
MAINTAINER:	DIAGNOSTIC PROGRAMMING GROUP
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1. ABSTRACT

THIS PROGRAM TESTS THE EXTENDED MEMORY CONTROL LOGIC FOR PROPER OPERATION. IT MAY BE USED WITH A PDP-8, 8I, OR 8S EQUIPPED WITH A MINIMUM OF 4K OF EXTENDED MEMORY. THE PROGRAM EXERCISES AND TESTS THE CONTROL IOT'S; THE ABILITY TO REFERENCE ALL FIELDS FROM 0; PROGRAM INTERRUPT AND INTERRUPT INHIBIT; AUTO-INDEXING IN EACH FIELD, AND A SPECIAL TEST FOR THE PDP-8I WHICH TESTS THE PRESENCE OF A FALSE MEMORY PULSE WHEN A NON-EXISTENT MEMORY FIELD IS REFERENCED.

ERRORS ENCOUNTERED DURING RUNNING WILL RESULT IN A PROGRAM HALT. THE HALT LOCATIONS ARE LABELED, AND THE ERROR MAY BE IDENTIFIED BY REFERENCING THE PROGRAM LISTING OR TABLE OF ERROR HALTS.

2. REQUIREMENTS

2.1 EQUIPMENT

A STANDARD PDP-8, 8I OR 8S EQUIPPED WITH AN EXTENDED MEMORY CONTROL, AND AT LEAST 4K OF EXTENDED MEMORY.

2.2 STORAGE

THE PROGRAM REQUIRES 2400(8) LOCATIONS OF CORE MEMORY. THE PROGRAM MUST RESIDE IN MEMORY FIELD 0 ONLY.

2.3 PRELIMINARY PROGRAMS

ALL PROGRAMS FOR A BASIC PDP-8, 8I OR 8S MUST HAVE BEEN PREVIOUSLY RUN SUCCESSFULLY.

3. LOADING PROCEDURE

3.1 METHOD

THE PROGRAM IS LOADED WITH THE BINARY LOADER.

4. STARTING PROCEDURE

4.1 STARTING ADDRESSES

THE STARTING ADDRESS IS 0200(8).

4.2 CONTROL SWITCH SETTINGS

SR 8 MUST BE ON A 1 IF A PDP-8I IS BEING USED, OTHERWISE, ON A 0 FOR A PDP-8 OR 8S. SR 9, 10 AND 11 MUST CONTAIN AN OCTAL VALUE EQUAL TO THE NUMBER OF EXTENDED MEMORY FIELDS AVAILABLE (1 TO 7 OCTAL). NOTE THAT FIELD 0 IS NOT TO BE INCLUDED IN THIS VALUE.

4.3 OPERATOR ACTION

WITH THE PROGRAM IN MEMORY, SET THE SWITCH REGISTER TO 0200 OCTAL. PRESS LOAD ADDRESS.

SET SR 8 TO A 1 IF A PDP-8I IS BEING USED, OTHERWISE, SET SR 8 TO A 0.

PLACE THE OCTAL NUMBER OF EXTENDED MEMORY FIELDS AVAILABLE IN SR 9, 10 AND 11. THIS VALUE MAY VARY FROM 1 TO 7 ONLY.

PRESS START.

THE PROGRAM WILL RUN UNTIL AN ERROR IS DETECTED, OR STOPPED BY THE OPERATOR.
THE TTY BELL IS RUNG ONCE AFTER ONE COMPLETE PASS OF THE PROGRAM.

5. OPERATING PROCEDURE

SEE SECTION 4.2

5.1 SUBROUTINE ABSTRACTS

REFER TO THE PROGRAM LISTING FOR DESCRIPTIONS OF EACH TEST, AND THE METHOD OF TESTING.

5.2 OPERATOR ACTION

SEE SECTION 4.3

6. ERRORS

6.1 ERROR HALTS AND DESCRIPTIONS

TABLE OF ERROR HALTS

C (MA)	TAG	DESCRIPTIONS
	CDF AND RDF TESTS	
206	E1	CDF 0 OR RDF FAILED.
217	E2	CDF 7 OR RDF FAILED.
234	E3	CDF 1 OR RDF FAILED.
245	E4	CDF 2 OR RDF FAILED.
262	E5	CDF 3 OR RDF FAILED.
273	E6	CDF 4 OR RDF FAILED.
310	E7	CDF 5 OR RDF FAILED.
321	E8	CDF 6 OR RDF FAILED.
	DF, IB AND SR TESTS	
341	E9	RIB OR ION FAILED.
351	E10	DF NOT CLEARED, OR NO INTERRUPT.
360	E11	RIB OR SF FAILED, (DF 1)
410	E12	DF NOT CLEARED, OR NO INTERRUPT.
417	E13	RIB OR SF FAILED, (DF 2)
427	E14	DF NOT CLEARED, OR NO INTERRUPT.
436	E15	RIB OR SF FAILED, (DF 3)
452	E16	DF NOT CLEARED, OR NO INTERRUPT.
461	E17	RIM OR SF FAILED, (DF 4)
471	E18	DF NOT CLEARED, OR NO INTERRUPT.
500	E19	RIB OR SF FAILED, (DF 5)
514	E20	DF NOT CLEARED, OR NO INTERRUPT.
523	E21	RIB OR SF FAILED, (DF 6)
533	E22	DF NOT CLEARED, OR NO INTERRUPT.
542	E23	RIB OR SF FAILED, (DF 7)
	DCA I AND TAD I TESTS	
653	E24	DCA I OR TAD I TO AN EXTENDED FIELD FAILED. THE DF INDICATORS EQUAL THE CURRENT FIELD UNDER TEST. THE AC CONTAINS THE DATA AS READ FROM LOCATION 7000 OF THE EXTENDED FIELD. THE HALT OCCURRED DUE TO THE DATA READ AND THE CURRENT DATA FIELD NOT BEING EQUAL. EACH EXTENDED FIELD SHOULD CONTAIN ITS FIELD NUMBER IN LOCATION 7000.

(6.1 CONT'D.)

C (MA)	TAG	DESCRIPTION
1132	E40	CIF OR INTERRUPT FAILED, THE DF AND IF SHOULD EQUAL AN EXTENDED FIELD,
1203	E41	THE DF WAS NOT CLEARED AFTER THE INTERRUPT, ALL OTHER FUNCTIONS WORKED PROPERLY,
1221	E42	RMF OR SF FAILED, THE SF REGISTER SHOULD HAVE SAVED THE EXTENDED FIELD NUMBER AFTER INTERRUPT, THE AC=C (I.B.) AFTER AN RMF?
1235	E43	ALL FUNCTIONS WORKED, BUT THE PC DID NOT EQUAL LOCATION E40+1 AFTER THE INTERRUPT IN THE EXTENDED FIELD FAILED, THE AC=CONTENTS OF LOCATION 0, FIELD 0,
4	E44	LOCATION 4 IN THE EXTENDED FIELD, THE INTERRUPT WENT TO THIS FIELD INSTEAD OF FIELD 0, OR THE JMP I 12 AT LOCATION 7777 WAS ENABLED IN LOCATION E40 IN THE EXTENDED FIELD,
10	E45	LOCATION 10 IN THE EXTENDED FIELD, THE JMP I 12 AT LOCA-TION 7777 WAS NOT EXECUTED, OR INTERRUPT FAILED,
1420	E45A	NO PROGRAM INTERRUPT OCCURRED, PRESS CONTINUE TO TRY AGAIN,
7000	-	MEMORY FIELD 1 HALT, AN INTERRUPT IN FIELD 0 WAS FOLLOWED BY A CIF 10 IOT, AND THEN AN RMF, THE RMF SHOULD HAVE RESTORED THE IB TO FIELD 0, THE SF AND IB WERE OR'D TOGETHER RESULTING IN THE IF BEING SET TO FIELD 1, AFTER THE JMP INSTRUCTION AT LOCATION 1430, RESTART FROM 1400 TO REPEAT THE TEST,

(6,1 CONT'D.)

CIF TESTS (JMP AND JMS ENABLING)

PROGRAM INTERRUPT IS ENABLED FOR THESE TESTS. A CIF IS ISSUED FOLLOWED BY AN ION AND A JMP OR JMS. AN INTERRUPT SHOULD OCCUR AFTER THE JMP OR JMS AND CONTROL TRANSFERRED TO FIELD 0. THE SAVE FIELD SHOULD CONTAIN THE FIELD COMMANDED BY THE CIF. A HLT IS PLACED IN LOCATION 1 OF EACH EXTENDED FIELD IN CASE THE IF IS NOT CLEARED AT THE TIME OF THE INTERRUPT.

C (MA)	TAG	DESCRIPTION
727	E25	NO INTERRUPT OR INTERRUPT INHIBIT FAILED.
741	E26	I.B. TO I.F. TRANSFER FAILED AFTER CIF-JMP. FAILING I.F. IN AC6-8, GOOD I.F. IN AC9-11.
1024	E27	NO INTERRUPT OR INTERRUPT INHIBIT FAILED.
1036	E30	I.B. TO I.F. TRANSFER FAILED AFTER CIF-JMS. FAILING I.F. IN AC6-8, GOOD I.F. IN AC9-11.
724	E31	I.F. CHANGED AFTER CIF BUT BEFORE JMP. HALT IS IN EXTENDED FIELD.
1020	E32	I.F. CHANGED AFTER CIF BUT BEFORE JMS. HALT IS IN EXTENDED FIELD.

INTERRUPT INHIBIT TEST

A SUBROUTINE IS PLACED IN EACH EXTENDED FIELD TO INSURE THAT PROGRAM INTERRUPT IS INHIBITED AFTER A CIF IOT, AND IS ENABLED AFTER A JMP INSTRUCTION. THE ROUTINE IS IN ONE FIELD AT A TIME; THE CONTENTS OF ALL OTHER EXTENDED FIELDS WILL EQUAL 0000. THE ROUTINE IS DESCRIBED ON THE PROGRAM LISTING AS THE "EXTENDED FIELD TEST ROUTINE", AND IS TAGGED EXFLD.

THE TEST ROUTINE IS ENTERED AT LOCATION E40-1 IN THE EXTENDED FIELD. THIS LOCATION CONTAINS A CIF XX IOT, WHERE XX EQUALS THE EXTENDED FIELD NUMBER. LOCATION E40 CONTAINS AN ION IOT, LOCATIONS E40+1 THROUGH 7776 CONTAIN ALL 0'S. LOCATION 7777 CONTAINS A JMP I 12. THE ROUTINE, THEREFORE, ISSUES A CIF, ION, AND JMP I 12 SEQUENCE. PROGRAM INTERRUPT SHOULD BE INHIBITED UNTIL AFTER THE JMP I 12 AT LOCATION 7777. AN ERROR HALT OCCURS IN FIELD 0 IF AN INTERRUPT OCCURS BETWEEN LOCATIONS E40+1 AND 7777. LOCATION 12 CONTAINS THE LOCATION OF E40 AND WILL AUTO-INDEX TO E40+1.

AUTO-INDEX TEST

THE SUBROUTINE LABELED "AUTO-INDEX TEST" ON THE LISTING IS PLACED IN EACH EXTENDED FIELD, AUTO-INDEX REGISTERS 10 THROUGH 17 IN EACH FIELD ARE TESTED. ALL OF MEMORY NOT OCCUPIED BY THE SUB-ROUTINE IS SET TO 0. THE ERROR HALTS TAGGED E46 THROUGH E53 WILL OCCUR IN THE EXTENDED FIELD IF AN AUTO-INDEX REGISTER FAILS, THE DF AND IF INDICATORS WILL DISPLAY THE CURRENT FIELD BEING TESTED.

C(MA)	TAG	DESCRIPTION
1523	E46	INDEX REGISTER 10 FAILED.
1526	E47	INDEX REGISTER 11 FAILED.
1531	E48	INDEX REGISTER 12 FAILED.
1534	E49	INDWX REGISTER 13 FAILED.
1537	E50	INDEX REGISTER 14 FAILED.
1542	E51	INDEX REGISTER 15 FAILED.
1545	E52	INDEX REGISTER 16 FAILED.
1550	E53	INDEX REGISTER 17 FAILED.

DYNAMIC RMF TEST

THIS TEST IS PERFORMED UNCONDITIONALLY JUST PRIOR TO THE NON-EXISTENT MEMORY TEST. IT CHECKS ALL SAVE FIELD TO DATA FIELD REGISTER TRANSFERS AND THOSE SAVE FIELD TO INSTRUCTION BUFFER REGISTER TRANSFERS AS APPLICABLE TO THE NUMBER OF EXTENDED FIELDS PRESENT.

THE GENERAL METHOD IS TO INTERRUPT FROM EACH EXTENDED FIELD WITH THE DF SET FROM 0 THROUGH 7. AN RMF INSTRUCTION IS THEN ISSUED AND CONTROL IS TRANSFERRED TO AN EXTENDED FIELD. THE "RMFDY" ROUTINE IN THAT FIELD THEN CHECKS THAT THE RESTORED IF AND DF ARE CORRECT. IF NOT, THE PROGRAM HALTS WITH THE FAILING IF OR DF IN THE IF OR DF REGISTER, AND THE CORRECT FIELD NUMBER IN AC BITS 6 THROUGH 8.

1706	E60	NO INTERRUPT OCCURRED.
1716	E61	SF TO DF TRANSFGR FAILED AFTER RMF, BAD DF IN DF REGISTER; CORRECT DF IN AC6-8.
1725	E62	SF TO IB TRANSFER FAILED AFTER RMF, BAD IF IN IF REGISTER; CORRECT IF IN AC6-8.

(6.1 CONT'D)

NON-EXISTENT MEMORY TEST

THIS IS THE LAST TEST PERFORMED, AND IS INCLUDED FOR PDP-8I'S ONLY. THE TEST MAKES SURE THAT A FALSE MEMORY DONE PULSE IS GENERATED WHEN THE DF IS SET TO A NON-EXISTENT MEMORY FIELD. IF THE PDP-8I BEING USED IS EQUIPPED WITH THE MAXIMUM OF 32K OF CORE MEMORY, THE PROGRAM AUTOMATICALLY SKIPS THIS TEST AND RESTARTS AT LOCATION 200. SR 8 ON A 0 WILL CAUSE THE PROGRAM TO ALWAYS SKIP THIS TEST.

THE TEST ALSO MAKES CERTAIN THAT THE CORRECT DATA IS DEPOSITED IN THE AC WHEN A NON-EXISTENT FIELD IS REFERENCED. THIS DATA MUST ALWAYS EQUAL 0000 OR 7777 OCTAL, DEPENDING ON THE NUMBER OF EXTENDED FIELDS EXISTING. FOR EXAMPLE, IF THE PDP-8I IS EQUIPPED WITH FIELDS 0,1,2 AND 3, ANY REFERENCE WITH A TAD I TO FIELDS 4 THROUGH 7 SHOULD RESULT WITH 7777 OCTAL IN THE AC. IF EQUIPPED WITH FIELDS 0,1, AND 2, A TAD I TO FIELD 3 SHOULD RESULT WITH 0000 OCTAL IN THE AC, AND REFERENCING 4 THROUGH 7 WILL RESULT WITH 7777 OCTAL IN THE AC. IN OTHER WORDS, REFERENCING THE LOWEST ORDER NON-EXISTENT FIELD, WHEN THE TOTAL NUMBER AVAILABLE IS ODD, WILL RESULT WITH 0000 IN THE AC. REFERENCING ALL OTHER NON-EXISTENT FIELDS WILL RESULT WITH 7777 IN THE AC. WHEN THE TOTAL NUMBER AVAILABLE IS EVEN, REFERENCING ANY NON-EXISTENT FIELD WILL RESULT WITH 7777 IN THE AC.

THE ONLY LEGAL HALTS IN THIS TEST, ARE AT LOCATIONS 2300 AND 2325. IF THE COMPUTER HALTS AT ANY OTHER LOCATION, THE FALSE MEMORY DONE PULSE PROBABLY WAS NOT GENERATED.

THE FALSE MEMORY DONE PULSE IS NOT GENERATED WHEN A CIF TO A NON-EXISTENT FIELD IS ATTEMPTED.

C(MA)	TAG	DESCRIPTION
2300	E54	ALL 0'S SHOULD HAVE BEEN DEPOSITED IN THE AC, OR AN EXISTING FIELD WAS REFERENCED. MAKE SURE THE PROPER VALUE IS IN SR 9-11. THE NUMBER OF EXTENDED FIELDS AVAILABLE MUST BE IN SR 9-11.
2325	E57	ALL 1'S SHOULD HAVE BEEN DEPOSITED IN THE AC, OR AN EXISTING FIELD WAS REFERENCED. MAKE SURE THE PROPER VALUE IS IN SR 9-11.

6.2 ERROR RECOVERY

PRESS CONTINUE TO REPEAT THE FAILING TEST. PLACE A NOP IN THE ERROR HALT LOCATION TO LOOP ON A FAILING TEST. RESTART FROM 1400 AFTER A HALT AT 7000 IN FIELD 1.

7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

NONE

7.2 OPERATING RESTRICTIONS

THE NUMBER OF EXTENDED MEMORY FIELDS AVAILABLE MUST BE IN SR 9-11 BEFORE STARTING FROM LOCATION 200.

8. MISCELLANEOUS

8.1 EXECUTION TIME

RUNNING TIME IS DEPENDENT ON THE AMOUNT OF EXTENDED MEMORY FOR TESTING, AND ON WHETHER THE PROCESSOR BEING USED IS A PDP-8, OR 8S. THE TTY BELL WILL RING ONCE FOR EACH PASS OF THE PROGRAM.

9. PROGRAM DESCRIPTION

THE PROGRAM EXERCISES ALL IOT'S ASSOCIATED WITH THE EXTENDED MEMORY CONTROL LOGIC, PLUS THE ABILITY TO REFERENCE EXTENDED FIELDS FROM FIELD 0, AND VICE-VERSA. EACH TEST IS LOOPED 4096 TIMES BEFORE INITIATING THE NEXT TEST. A SWITCH OPTION IS PROVIDED TO SKIP OR EXECUTE A NON-EXISTENT MEMORY TEST FOR THE PDP-8I.

THE INDIVIDUAL TEST ROUTINES AND ERROR HALTS ARE COMMENTED ON THE PROGRAM LISTING AS AN AID TO TROUBLE-SHOOTING. SECTION 6 CONTAINS A TABLE OF ERROR HALTS WHICH ALSO MAY BE REFERENCED.

10. LISTING

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                        /PDP-8, 8I, 8S EXTENDED MEMORY CONTROL TEST,
                        /
                        /COPYRIGHT 1969-1970, DIGITAL EQUIPMENT CORP.,MAYNARD,MASS.
                        /
                        /PLACE NUMBER OF EXTENDED 4K FIELDS AVAILABLE IN SR9 TO 11, (UP TO 7)
                        /IF USING AN 8I, PLACE SR8 ON A 1, OTHERWISE LEAVE 0,
                        /START PROGRAM AT 200
                        /
                        /CONSTANTS
                        /
                6201    CDF=6201
                6202    CIF=6202
                6214    RDF=6214
                6224    RIF=6224
                6244    RMF=6244
                6234    RIB=6234
                0001    *1
                        /
0001  5001                      JMP 1
0002  0002                      0002
0003  0003                      0003
                        /
                0020    *20
                        /
0020  5400      JMPI0,  JMP I 0
0021  2000      ISZ0,   ISZ 0
0022  2342      XTFLG,  TFLG
0023  2334      XSTKS,  NSTKS
0024  1047      XRMF,   TRMF
0025  1321      XRANS,  TRANS
0026  1432      XAUTO,  TAUTO
0027  0000      LOOP,   0
0030  0000      NDF,    0
0031  0000      STKS,   0
0032  0000      DAT,    0
0033  0000      NOSTAK, 0
0034  0000      NOFLD,  0
0035  1131      KE40M,  E40-1
0036  1132      KE40,   E40
0037  7402      KHLT,   HLT
0040  6201      KCDF,   6201
0041  6202      KCIF,   6202
0042  1316      XFD,    EXFD
0043  0001      K1,     1
0044  0007      K7,     7
0045  0010      K10,    10
0046  7777      K7777,  7777
0047  7000      K7000,  7000
0050  7707      K7707,  7707
0051  7767      K7767,  7767
0052  7757      K7757,  7757
0053  7747      K7747,  7747
0054  7737      K7737,  7737
0055  7727      K7727,  7727
0056  7717      K7717,  7717
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                0057  7776    K7776,  7776
                0060  7775    K7775,  7775
                0061  7774    K7774,  7774
                0062  7773    K7773,  7773
                0063  7772    K7772,  7772
                0064  7771    K7771,  7771
                0065  7770    K7770,  7770
                0066  0070    POINT,  .+2
```

```
64
65     0067  0070     K7S,     .+1
66     0070  7766     K7766,   7766
67     0071  7755              7755
68     0072  7744     K7744,   7744
69     0073  7733              7733
70     0074  7722              7722
71     0075  7711              7711
72     0076  7700              7700
73     0077  1126     XTDF,    STDF
74     0100  1127     XTDF1,   STDF+1
75     0101  1302     KXFLD,   EXFLD
76     0102  5402     KJMP,    JMP I 2
77     0103  1200     KNTR,    ENTER
78     0104  0020     K20,     20
79     0105  5506     JMP2,    JMP I KFLD0
80     0106  1427     KFLD0,   RTRN
81     0107  1422     KRTN,    E45A+2
82     0110  1400     XFIB,    SFIB
83
84
```

```
                        /TEST CDF AND RDF
                        /
                0200    *200
                        /
0200  7200      BEGIN,  CLA
0201  3027              DCA LOOP                /LOOP COUNTER
                        /
0202  6201      DF0,    CDF 00          /DF 0
0203  6214              RDF
0204  7450              SNA             /SHOULD NOT SKIP
0205  5211              JMP DF7
0206  7402      E1,     HLT             /ERROR, CDF OR RDF FAILED
0207  7200              CLA
0210  5202              JMP DF0         /REPEAT
                        /
0211  1050      DF7,    TAD K7707               /7707
0212  6271              CDF 70          /DF 7
0213  6214              RDF
0214  7040              CMA             /AC = 0
0215  7450              SNA             /SHOULD NOT SKIP
0216  5222              JMP OK1
0217  7402      E2,     HLT             /CDF OR RDF FAILED
0220  7200              CLA
0221  5211              JMP DF7
                        /
0222  2027      OK1,    ISZ LOOP                /CHECK DONE
0223  5202              JMP DF0
                        /
0224  7200              CLA
0225  3027              DCA LOOP                /LOOP COUNTER
                        /
0226  1051      DF1,    TAD K7767               /7767
0227  6211              CDF 10          /DF 10
0230  6214              RDF
0231  7040              CMA             /AC=0
0232  7450              SNA
0233  5237              JMP DF2
0234  7402      E3,     HLT             /CDF1 OR RDF FAILED
0235  7200              CLA
0236  5226              JMP DF1
                        /
0237  1052      DF2,    TAD K7757               /7757
0240  6221              CDF 20          /DF2
0241  6214              RDF
0242  7040              CMA             /AC=0
0243  7450              SNA
0244  5250              JMP OK2
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      0245  7402    E4,     HLT             /CDF 2 OR RDF FAILED
      0246  7200            CLA
      0247  5237            JMP DF2
                    /
      0250  2027    OK2,    ISZ LOOP                /DONE IF SKIP
      0251  5226            JMP DF1
      0252  7200            CLA
      0253  3027            DCA LOOP
                    /
      0254  1053    DF3,    TAD K7747               /7747
      0255  6231            CDF 30          /DF 3
      0256  6214            RDF
      0257  7040            CMA             /AC=0
      0260  7450            SNA
      0261  5265            JMP DF4
      0262  7402    E5,     HLT             /CDF 3 OR RDF FAILED
      0263  7200            CLA
      0264  5254            JMP DF3
                    /
      0265  1054    DF4,    TAD K7737               /7737
      0266  6241            CDF 40          /DF 4
      0267  6214            RDF
      0270  7040            CMA             /AC=0
      0271  7450            SNA
      0272  5276            JMP OK3
      0273  7402    E6,     HLT             /CDF 4 OR RDF FAILED
      0274  7200            CLA
      0275  5265            JMP DF4
                    /
      0276  2027    OK3,    ISZ LOOP                /DONE IF SKIP
      0277  5254            JMP DF3
                    /
      0300  7200            CLA
      0301  3027            DCA LOOP
                    /
      0302  1055    DF5,    TAD K7727               /7727
      0303  6251            CDF 50          /DF5
      0304  6214            RDF
      0305  7040            CMA             /AC=0
      0306  7450            SNA
      0307  5313            JMP DF6
      0310  7402    E7,     HLT             /CDF 5 OR RDF FAILED.
      0311  7200            CLA
      0312  5302            JMP DF5
                    /
      0313  1056    DF6,    TAD K7717               /7717
      0314  6261            CDF 60          /DF 6
      0315  6214            RDF
      0316  7040            CMA             /AC=0
      0317  7450            SNA
      0320  5324            JMP OK4
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0321  7402  E8,   HLT             /CDF 6 OR RDF FAILED
0322  7200        CLA
0323  5313        JMP DF6
                  /
0324  2027  OK4,  ISZ LOOP                /DONE WHEN SKIP
0325  5302        JMP DF5
                  /
                  /NOW TEST INTERRUPT BUFFER (IB) BITS 9-11 WITH
                  /RIB, PI IS ENABLED, TELEPRINTER FLAG IS
                  /USED FOR INTERRUPT,
                  /
0326  6201        CDF 00              /DF0
0327  1020        TAD JMPI0                   /JMP I0=JMP I 0
0330  3001        DCA 1               /C(1)=JMP I 0
0331  3027        DCA LOOP
0332  6041        TSF                 /TEST TTY FLAG
0333  4422        JMS I XTFLG         /SET FLAG
                  /
0334  6001  IB0,   ION                 /ENABLE PI
0335  7200        CLA
0336  6234        RIB                 /READ SF
0337  7450        SNA
0340  5343        JMP IB1
0341  7402  E9,    HLT                 /RIB FAILED
0342  5334        JMP IB0
                  /
0343  6211  IB1,   CDF 10              /DF 1
0344  6001        ION
0345  7200        CLA
0346  6214        RDF                 /DF SHOULD BE 0 AFTER A PI
0347  7450        SNA
0350  5353        JMP .+3
0351  7402  E10,   HLT
0352  5343        JMP IB1             /DF NOT CLEARED, OR NO PI
                  /
0353  1057        TAD K7776
0354  6234        RIB                 /READ SF
0355  7040        CMA                 /AC=0
0356  7450        SNA
0357  5362        JMP OK5
0360  7402  E11,   HLT                 /RIB OR SF FAILED
0361  5343        JMP IB1
0362  2027  OK5,   ISZ LOOP                  /DONE WHEN SKIP
0363  5334        JMP IB0
0364  5765        JMP I .+1
0365  0400        IB2=2
```

```
                0400    *400
0400  7200      CLA
0401  3027      DCA LOOP
                /
0402  6221  IB2, CDF 20          /DF 2
0403  6001      ION
0404  7200      CLA
0405  6214      RDF             /SHOULD BE 0 AFTER PI
0406  7450      SNA
0407  5212      JMP .+3
0410  7402  E12, HLT             /DF NOT CLEARED, OR NO PI
0411  5202      JMP IB2
                /
0412  1060      TAD K7775
0413  6234      RIB             /AC=7777
0414  7040      CMA             /=0
0415  7450      SNA
0416  5221      JMP IB3
0417  7402  E13, HLT             /RIB OR SF FAILED
0420  5202      JMP IB2
                /
0421  6231  IB3, CDF 30          /DF3
0422  6001      ION
0423  7200      CLA
0424  6214      RDF             /DF SHOULD BE CLEARED
0425  7450      SNA
0426  5231      JMP .+3
0427  7402  E14, HLT             /DF NOT CLEARED
0430  5221      JMP IB3
                /
0431  1061      TAD K7774
0432  6234      RIB             /AC=7777
0433  7040      CMA             /AC=0
0434  7450      SNA
0435  5240      JMP OK6
0436  7402  E15, HLT             /RIB OR SF FAILED
0437  5221      JMP IB3
                /
0440  2027  OK6, ISZ LOOP               /DONE IF SKIP
0441  5202      JMP IB2
                /
0442  7200      CLA
0443  3027      DCA LOOP
                /
0444  6241  IB4, CDF 40          /DF 3
0445  6001      ION
0446  7200      CLA
0447  6214      RDF             /DF MUST BE 000 AFTER A PI
0450  7450      SNA             /ERROR IF SKIP
0451  5254      JMP .+3
```

```
                                /
0452  7402  E16,   HLT           /DF NOT 0 AFTER PI
0453  5244         JMP IB4
                   /
0454  1062         TAD K7773              /AC=7773
0455  6234         RIB           /AC=7777
0456  7040         CMA           /AC=0
0457  7450         SNA
0460  5263         JMP IB5
0461  7402  E17,   HLT           /RIB OR SF FAILED
0462  5244         JMP IB4
                   /
0463  6251  IB5,   CDF 50        /DF5
0464  6001         ION
0465  7200         CLA
0466  6214         RDF           /DF SHOULD=000
0467  7450         SNA
0470  5273         JMP .+3
0471  7402  E18,   HLT           /DF NOT 0 AFTER PI
0472  5263         JMP IB5
                   /
0473  1063         TAD K7772              /AC= 7772
0474  6234         RIB           /   = 7777
0475  7040         CMA           /   = 0
0476  7450         SNA
0477  5302         JMP OK7
0500  7402  E19,   HLT           /RIB OR SF FAILED
0501  5263         JMP IB5
                   /
0502  2027  OK7,   ISZ LOOP             /DONE IF 0 AND SKIP
0503  5244         JMP IB4
                   /
0504  7200         CLA
0505  3027         DCA LOOP
                   /
0506  6261  IB6,   CDF 60        /DF6
0507  6001         ION
0510  7200         CLA
0511  6214         RDF           /DF MUST=0 AFTER PI
0512  7450         SNA
0513  5316         JMP .+3
0514  7402  E20,   HLT           /DF NOT 0 AFTER PI
0515  5306         JMP IB6
```

```
                        /
0516  1064              TAD K7771               /,7771
0517  6234              RIB                     /AC=7777
0520  7040              CMA
0521  7450              SNA
0522  5325              JMP IB7
0523  7402  E21,        HLT                     /RIB OR SF FAILED
0524  5306              JMP IB6
                        /
0525  6271  IB7,        CDF 70                  /DF 7
0526  6001              ION
0527  7200              CLA
0530  6214              RDF                     /DF MUST = 0 AFTER PI
0531  7450              SNA
0532  5335              JMP .+3
0533  7402  E22,        HLT                     /DF NOT 0
0534  5325              JMP IB7
                        /
0535  1065              TAD K7770
0536  6234              RIB                     /AC=7777
0537  7040              CMA
0540  7450              SNA
0541  5344              JMP OK8
0542  7402  E23,        HLT                     /RIB OR SF FAILED
0543  5325              JMP IB7
                        /
0544  2027  OK8,        ISZ LOOP                        /DONE IF 0
0545  5306              JMP IB6
0546  5747              JMP I .+1               /NEW PAGE
0547  0000              0000
```

```
                        /NOW TEST DCA I AND TAD I TO ALL STACKS, NUMBER OF
                        /EXTENDED STACKS SHOULD BE IN SR9 TO 11, EACH STACK WILL
                        /CONTAIN ITS DF# IN LOCATION 7000.
                        /
0600  3027              DCA LOOP
0601  4423  DCAI,       JMS I XSTKS       /READ SR 9-11
0602  7001              IAC
0603  3030              DCA NDF           /DF NUMBER = 1 TO START
0604  1040              TAD KCDF                  /6201
0605  1045              TAD K10
0606  3207              DCA .+1           /DF 001 TO START WITH
0607  6201  DFLD,       CDF 00            /WILL BE INCREMENTED
0610  1030              TAD NDF           /DF#
0611  3447              DCA I K7000       /PUT IN 7000 OF STACK
0612  2031              ISZ STKS                  /ALL STACKS WHEN 0
0613  7410              SKP
0614  5222              JMP TADI                  /TEST TAD I
0615  1045              TAD K10
0616  1207              TAD DFLD                  /INCR, CDF IOT
0617  3207              DCA DFLD
0620  2030              ISZ NDF
0621  5207              JMP DFLD                  /*
                        /
0622  4423  TADI,       JMS I XSTKS       /SR9-11 AGAIN
0623  7001              IAC
0624  3030              DCA NDF           /DF#=1 AGAIN
0625  1040              TAD KCDF                  /6201
0626  1045              TAD K10
0627  3230              DCA .+1
0630  6201  TFLD,       CDF 00
0631  1447              TAD I K7000       /AC=DF CONTENTS NOW
0632  3032              DCA DAT           /SAVE TEMP
0633  1032              TAD DAT
0634  7041              CIA               /2'S COMP
0635  1030              TAD NDF           /BETTER BE EQUAL
0636  7640              SZA CLA
0637  5252              JMP E24+1                 /ERROR PATH
0640  2031              ISZ STKS                  /ALL WHEN 0
0641  5245              JMP .+4
0642  2027              ISZ LOOP                  /DONE WHEN 0
0643  5201              JMP DCAI
0644  5256              JMP IBSF                  /NEXT TEST
0645  1045              TAD K10
0646  1230              TAD TFLD                  /CDF IOT + 10
0647  3230              DCA TFLD
0650  2030              ISZ NDF
0651  5230              JMP TFLD
                        /
0652  1032              TAD DAT           /DATA AS READ
0653  7402  E24,        HLT               /AC=DATA READ, DF INDICATORS
                                          /EQUAL FIELD WHERE GOT DATA,
                                          /BOTH SHOULD BE EQUAL
0654  7200              CLA
```

```
  411    0655  5230            JMP TFLD
```

```
                        /CIF TEST, CHECKS THE ABILITY OF A CIF-ION-NOP-JMP OR
                        /CIF-ION-NOP-JMS SEQUENCE TO DO THE FOLLOWING:
                        /1.  CIF ENABLE MB TO IB TRANSFER,
                        /2.  INHIBIT INTERRUPT TILL JMP OR JMS EXECUTED,
                        /3.  INTERRUPT AFTER JMP OR JMS EXECUTED,
                        /4.  JMP OR JMS ENABLES IB TO IF TRANSFER,
                        /5.  INTERRUPT ENABLES IF TO SF TRANSFER.

                        /SET UP FOR CIF-ION-NOP-JMP CHECK.
0656  6201  IBSF,      CDF     00              /SET LOCS 1-2 TO ISZ 0,
0657  1021              TAD     ISZ0            /JMP I 0 RESPECTIVELY,
0660  3001              DCA     1
0661  1352              TAD     KNOP
0662  3002              DCA     2
0663  1020              TAD     JMPI0
0664  3003              DCA     3
                        /
                        /NOW STORE HALTS IN LOC1, CIFJMP+1,
                        /AND CIFJMS+1 OF ALL EXTENDED FIELDS.
                        /
0665  4423              JMS I   XSTKS
0666  1040              TAD     KCDF
0667  1045              TAD     K10
0670  3271              DCA     .+1
0671  6211  HLTS,       CDF     10
0672  1037              TAD     KHLT
0673  3443              DCA I   K1
0674  1037              TAD     KHLT
0675  3756              DCA I   E31
0676  1037              TAD     KHLT
0677  3755              DCA I   E32
0700  2031              ISZ     STKS
0701  7410              SKP
0702  5305              JMP     .+3
0703  1271              TAD     HLTS
0704  5267              JMP     HLTS-2
0705  6201              CDF     00
0706  6041              TSF                     /ENSURE TTO FLAG SET,
0707  4422              JMS I   XTFLG
0710  3027              DCA     LOOP            /SET COUNTER FOR 4096 PASSES,
0711  1041  AGAIN1,     TAD     KCIF            /INITIALIZE TO CIF 00,
0712  3323              DCA     CIFJMP
0713  3353              DCA     CIFCK           /INITIALIZE I.F. CHECK TO 0,
0714  4423              JMS I   XSTKS           /READ SR9-11,
0715  1323  CIFJPL,     TAD     CIFJMP
0716  1045              TAD     K10
0717  3323              DCA     CIFJMP
0720  1353              TAD     CIFCK
0721  1045              TAD     K10
0722  3353              DCA     CIFCK
0723  6202  CIFJMP,     CIF     00              /MODIFIED TO CURRENT FIELD
                                                /UNDER TEST,
```

```

0724  6001             ION
0725  7000             NOP
0726  5327             JMP     .+1
0727  7402    E25,     HLT                  /ERROR,  NO PI OR INHIBIT PI.
0730  6234             RIB
0731  7041             CIA
0732  1353             TAD     CIFCK
0733  7650             SNA CLA
0734  5344             JMP     E26+3
0735  1353             TAD     CIFCK
0736  7110             CLL RAR
0737  7012             RTR
0740  6234             RIB
0741  7402    E26,     HLT                  /ERROR,  I.B. TO I.F. TRANSFER
0742  7200             CLA                  /FAILED AFTER CIF-JMP. BAD
0743  5323             JMP     CIFJMP       /I.F. IN AC6-8, GOOD I.F. IN
                                            /AC9-11.  REPEAT UPON CONTINUE.
0744  2031             ISZ     STKS         /DONE?
0745  5315             JMP     CIFJPL       /NO. DO NEXT FIELD
0746  2027             ISZ     LOOP         /4096 TIMES?
0747  5311             JMP     AGAIN1       /NO.  DO IT ALL AGAIN.
0750  5751             JMP I   .+1          /YES.  GO TEST CIF-JMS.
0751  1000             IBSF1
0752  7000    KNOP,    NOP
0753  0000    CIFCK,   0
0754  0724    E31,     CIFJMP+1
0755  1020    E32,     CIFJMS+1
```

```
                        1000    *1000
1000    7200    IBSF1,  CLA
1001    6201            CDF     00
1002    6041            TSF                     /ENSURE TTO FLAG SET.
1003    4422            JMS I   XTFLG
1004    3027            DCA     LOOP            /SET UP FOR 4096 PASSES.
1005    1041    AGAIN2, TAD     KCIF            /INIT. TO CIF 00.
1006    3217            DCA     CIFJMS
1007    3246            DCA     CIFCK1          /INIT. I.F. CHECK TO 0.
1010    4423            JMS I   XSTKS           /READ SR9-11.
1011    1217    CIFJSL, TAD     CIFJMS
1012    1045            TAD     K10
1013    3217            DCA     CIFJMS
1014    1246            TAD     CIFCK1
1015    1045            TAD     K10
1016    3246            DCA     CIFCK1
1017    6202    CIFJMS, CIF     00              /MODIFIED TO CURRENT FIELD
                                                /UNDER TEST.
1020    6001            ION
1021    7000            NOP
1022    4223            JMS     .+1
1023    0000            0
1024    7402    E27,    HLT                     /ERROR,  NO PI OR INHIBIT PI.
1025    6234            RIB
1026    7041            CIA
1027    1246            TAD     CIFCK1
1030    7650            SNA CLA
1031    5241            JMP     E30+3
1032    1246            TAD     CIFCK1
1033    7110            CLL RAR
1034    7012            RTR
1035    6234            RIB
1036    7402    E30,    HLT                     /ERROR,  I.B. TO I.F. TRANSFER
1037    7200            CLA                     /FAILED AFTER CIF-JMS, BAD
1040    5217            JMP     CIFJMS          /I.F. IN AC6-8, GOOD I.F.
                                                /IN AC9-11,  REPEAT UPON CONTINUE
1041    2031            ISZ     STKS            /DONE?
1042    5211            JMP     CIFJSL          /NO,  DO NEXT FIELD.
1043    2027            ISZ     LOOP            /4096 TIMES?
1044    5205            JMP     AGAIN2          /NO,  DO IT ALL AGAIN,
1045    5247            JMP     TRMF            /YES,  GO ON TO NEXT TEST
1046    0000    CIFCK1, 0
```

```
                        /
                        /TEST INTERRUPT INHIBIT
                        /FROM EACH FIELD, REFER TO HEADING TITLED "EXTENDED
                        /FIELD TEST ROUTINE", THIS ROUTINE IS PLACED IN
                        /EACH TESTED FIELD AT THE ADDRESSES SPECIFIED, THE
                        /INDICATED ERROR HALTS WILL BE IN THE EXTENDED
                        /FIELD.  PRESS CONT, TO RECOVER, ONLY 1 FIELD WILL
                        /CONTAIN THE ROUTINE AT ANY ONE TIME, OTHER FIELDS
                        /WILL CONTAIN ALL0'S.  THE ROUTINE IS REPLACED WITH
                        /HALTS AFTER COMPLETION, THE PORTIONS OF THE FIELD
                        /WHICH DO NOT CONTAIN THE ROUTINE ARE SET TO 0000
                        /BEFOREHAND.
                        /
                        /
                        /SETUP FIELDS TO TEST, POINTERS, ETC.,
                        /
1047  4423  TRMF,       JMS I XSTKS     /READ SR9-11
1050  1040              TAD KCDF                /6201
1051  3257              DCA .+6
1052  1257              TAD .+5
1053  1045              TAD K10
1054  3257              DCA .+3
1055  7040              CMA
1056  3010              DCA 10
1057  6201              CDF 00
1060  3410              DCA I 10                /PLACE 0'S IN EACH FIELD FROM
1061  1010              TAD 10          /LOC. 0 TO 7777.
1062  7040              CMA
1063  7640              SZA CLA
1064  5268              JMP .+4
1065  2031              ISZ STKS
1066  5252              JMP TRMF+3
```

```
                        /
                        /NOW PUT A HLT IN EACH FIELD IN THE SAME
                        /LOCATION AS E40, BELOW.
                        /
1067  4423              JMS I XSTKS       /READ SR 9-11
1070  1040              TAD KCDF
1071  1045              TAD K10
1072  3273              DCA .+1
1073  6201    CHDF,     CDF 00
1074  1036              TAD KE40                /KE40 = ADDRESS OF E40,
1075  3027              DCA LOOP                /SAVE TEMPORARILY
1076  1037              TAD KHLT                /KHLT = 7402 (HLT)
1077  3427              DCA I LOOP
1100  2031              ISZ STKS                /DONE ALL STACKS WHEN SKIP
1101  7410              SKP
1102  5305              JMP .+3
1103  1273              TAD CHDF
1104  5271              JMP CHDF-2
                        /
1105  6201              CDF 00
1106  6041    STRMF,    TSF               /CHECK TTY FLAG
1107  4422              JMS I XTFLG       /GO SET IT
1110  1050              TAD K7707
1111  3027              DCA LOOP
1112  1066              TAD POINT
1113  3067              DCA K7S           /POINTER FOR K7700 TO K7766
1114  4423              JMS I XSTKS       /READ SR 9-11
1115  1040              TAD KCDF                  /6201
1116  1045              TAD K10           /10
1117  3326              DCA STDF
1120  1041              TAD KCIF                  /6202
1121  1045              TAD K10           /10
1122  3327              DCA STDF+1
1123  1327              TAD STDF+1
1124  3442              DCA I XFD
1125  4425              JMS I XRANS       /PUT TEST ROUTINE INTO FIELD X
                        /
1126  6211    STDF,     CDF 10            /FIELD 1 TO START WITH
1127  6212              CIF 10
1130  5331              JMP .+1           /SHOULD ENTER EXTENDED FIELD
                                          /AFTER THIS JMP, HLT IF NOT
1131  7000              NOP
1132  7402    E40,      HLT               /ERROR, PI FAILED
                                          /C(AC) = C(I.S.)
1133  5326              JMP STDF                  /REPEAT SAME TEST.
                        /
```

```
                        /ENTER HERE AFTER PI FROM EXTENDED BANK
          1200          *1200
                        /
1200      6214  ENTER,  RDF             /DF SHOULD BE 000
1201      7450          SNA             /ERROR IF SKIP
1202      5206          JMP .+4         /CHECK C(SF)
1203      7402  E41,    HLT             /AC=C(DF)
1204      7200          CLA
1205      5477          JMP I XTDF      /REPEAT TEST
1206      6212          CIF 10          /SET I.B. TO FIELD 1
1207      6244          RMF             /I.B. NOW EQUAL TO SF
1210      6234          RIB             /READ IB
1211      6202          CIF 00
1212      6201          CDF 00
1213      1467          TAD I K7S
1214      7040          CMA
1215      7650          SNA CLA         /ERROR IF SKIP
1216      5226          JMP CKPC
1217      6244          RMF
1220      6234          RIB
1221      7402  E42,    HLT             /ERROR RMF AND PI WORKED, BUT
                                        /I.B. NOT CORRECT AFTER RMF,
1222      7200          CLA             /AC=C(IB)
1223      6201          CDF 00
1224      6202          CIF 00
1225      5477          JMP I XTDF      /BACKUP A PAGE AND REPEAT
                        /
1226      1036  CKPC,   TAD KE40                /KE40=ADDRESS OF E40
1227      7001          IAC             /MAKE E40+1
1230      7041          CIA
1231      1000          TAD 0           /COMPARE TO C(0)
1232      7650          SNA CLA         /SHOULD NOT SKIP
1233      5246          JMP .+5         /ALL OK SETUP FOR NEXT FIELD
1234      1000          TAD 0
1235      7402  E43,    HLT             /ERROR, ALL WORKED, BUT
                                        /C(PC) WAS NOT=TO E40+1
                                        /AFTER PI IN EXTENDED
                                        /FIELD, C(AC)=C(0),F0,
                                        /CHECK FOR PI NOT INHIBITED,
                                        /OR AUTO-INDEX REG,
                                        /12 FAILING IN THE EXTENDED FIELD,
1236      7200          CLA
1237      5477          JMP I XTDF              /BACKUP AND REPEAT
                        /
                        /SETUP FOR NEXT FIELD
                        /
1240      2031          ISZ STKS                /DONE ALL IF SKIP
1241      5246          JMP .+5
1242      2027          ISZ LOOP                /DONE LOOPING IF SKIP
1243      5645          JMP I .+2               /REPEAT ALL AGAIN
1244      5510          JMP I XFIB      /EXIT TO NEXT TEST
1245      1112          STRMF+4         /BACK TO LAST PAGE
```

```
                        /
                        /SET LAST TESTED FIELD TO ALL 0'S AND PUT A
                        /HLT IN RESPECTIVE ADDRESS OF E40
                        /
1246  7240              CLA CMA
1247  3010              DCA 10
1250  1477              TAD I XTDF        /CDF X0 AT STDF
1251  3252              DCA .+1
1252  6211              CDF 10            /F1 TO START WITH
1253  3410              DCA I 10
1254  1010              TAD 10
1255  7040              CMA
1256  7640              SZA CLA           /CLEARD IF SKIP
1257  5253              JMP .-4
1260  6201              CDF 00
1261  1477              TAD I XTDF        /CDF X0 AT STDF
1262  3263              DCA .+1
1263  6211              CDF 10
1264  1037              TAD KHLT                  /=7402 (HLT)
1265  3436              DCA I KE40        /KE40=ADDRESS OF E40
1266  6201              CDF 00            /RESTORE DF
                        /
                        /INCREMENT CDF AND CIF IOT'S AT STDF, STDF+1
                        /TO NEXT FIELD.
                        /
1267  1477              TAD I XTDF        /CDF X0 AT STDF
1270  1045              TAD K10
1271  3477              DCA I XTDF
1272  1500              TAD I XTDF1       /CIF X0 AT STDF
1273  1045              TAD K10
1274  3500              DCA I XTDF1
1275  1500              TAD I XTDF1
1276  3316              DCA EXFD
1277  2067              ISZ K7S
1300  4321              JMS TRANS                 /PUT ROUTINE IN NEW FIELD
1301  5477              JMP I XTDF        /TEST NEW FIELD
```

```
                        /EXTENDED FIELD TEST ROUTINE
                /
                /THE FOLLOWING INSTRUCTIONS ARE PLACED IN
                /EACH EXTENDED FIELD TESTED. THE NUMBERS IN THE
                /COMMENTS FIELD CORRESPOND TO THE
                /MEMORY LOCATIONS IN THE TESTED FIELLD. LOCATIONS
                /0 THRU 11 ARE USED FOR AN ERROR ROUTINE
                /IN CASE FIELD 0 IS NOT ENTERED AFTER AN
                /INTERRUPT, THE EXTENDED FIELD SHOULD BE
                /ENTERED AT LOCATION E40+1 WHICH CORRESPONDS
                /TO E40+1 IN FIELD 0.
                /
                /EXTENDED FIELD INSTRUCTIONS:
                /
1302  0000      EXFLD,  0         /0
1303  1000              TAD 0     /1
1304  7450              SNA       /IF LOC. 0 NOT =0 PI DIDN'T
                                  /ENTER FIELD 0
1305  5312              JMP .+5   /3
1306  7402      E44,    HLT       /4, INTERRUPTED TO THIS FIELD
                                  /INSTEAD OF FIELD 0,C(AC)=C(0)
                                  /WHICH SHOULD BE E40+1
                                  /IF NOT, CHECK LOC. 7777,IT
                                  /MUST = 5412 (JMP I 12).
1307  7200              CLA       /5
1310  3000              DCA 0     /6
1311  5420              JMP I 20          /7, C(20) =E40
1312  7402      E45,    HLT       /10, THE JMP I 12 AT LOC.
                                  /7777 WAS NOT EXECUTED,
                                  /OR INTERRUPT FAILED, IF
                                  /NO INTERRUPT, LOCATION 12
                                  /NOW CONTAINS 0 INSTEAD
                                  /OF ADDRESS E40,
1313  5307              JMP .-4   /11, REPEAT IN THIS FIELD
1314  1132              E40       /12, AUTO-INDEXS TO E40+1
                                  /IN F 0 IF THE JMP I 12
                                  /WORKS.
                /LOCS, 13 TO 17 ARE ALL 0'S
                /
1315  1132              E40       /20, EQUALS E40 IN F0.
                /
                /LOCS, 21 TO E40-2 ARE ALL 0'S
                /
1316  6212      EXFD,   CIF 10    /FIELD 1 TO START WITH
1317  6001              ION       /LOC, E40, SEE SYMBOL TABLE
                                  /FOR E40.
                /LOCS, E40+1 TO 7776 ARE ALL 0'S
                /
1320  5412              JMP I 12          /7777, PI SHOULD OCCUR,
                                          /AFTER THIS INSTRUCTION,
                                          /TO FIELD 0.
```

```
                        /
                        /ROUTINE TO TRANSFER TEST ROUTINE TO PROPER FIELD
                        /
1321  0000  TRANS,  0
1322  1102          TAD KJMP                /KJMP=JMP I 2
1323  3001          DCA 1             /IN FIELD 0
1324  1103          TAD KNTR                /KNTR = LOC, ENTER
1325  3002          DCA 2             /OF FIELD 0
1326  1101          TAD KXFLD               /KXFLD = LOC, EXFLD
1327  3010          DCA 10
1330  3011          DCA 11
1331  1070          TAD K7766               /1-10 DECIMAL
1332  3000          DCA 0             /SAVE
1333  1477          TAD I XTDF        /CDF X0 IN STDF
1334  3337          DCA .+3
1335  6201          CDF 00
1336  1410          TAD I 10
1337  6211  TRFLD,  CDF 10            /F1 TO START WITH
1340  3411          DCA I 11                /PUT IN EXTENDED FIELD
1341  2000          ISZ 0             /DONE LOCS 1 TO 12 IF SKIP
1342  5335          JMP .+5
1343  1337          TAD TRFLD
1344  3347          DCA .+3
1345  6201          CDF 00
1346  1410          TAD I 10
1347  6211          CDF 10
1350  3504          DCA I K20               /PUT E40 IN LOC, 20
1351  6201          CDF 00
1352  1337          TAD TRFLD
1353  3355          DCA .+2
1354  1410          TAD I 10
1355  6211          CDF 10
1356  3435          DCA I KE40M       /PUT CIF X0 IN E40+1
1357  6201          CDF 00
1360  1337          TAD TRFLD
1361  3363          DCA .+2
1362  1410          TAD I 10
1363  6211          CDF 10
1364  3436          DCA I KE40        /ION TO LOC, E40
1365  6201          CDF 00
1366  1337          TAD TRFLD
1367  3371          DCA .+2
1370  1410          TAD I 10
1371  6211          CDF 10
1372  3446          DCA I K7777       /PUT JMP I 12 IN 7777
1373  6201          CDF 00
1374  5721          JMP I TRANS       /EXIT
```

```
                1400    *1400
                        /
                        /TEST SF WITH AN RMF IOT, AN INTERRUPT IN FIELD 0 IS CREATED, AFTER
                        /WHICH, THE DF AND IB REGISTERS ARE SET TO FIELD 1.
                        /THE SF SHOULD CONTAIN FIELD 0, THE TEST
                        /THEN MAKES SURE THE IB IS CLEARED, THEN SET BY ISSUING AN RMF,
                        /FOLLOWED BY A JMP I K7000, IF THE IB IS CLEARED, THE JMP GOES TO 7000 IN FIELD 0,
                        /IF THE IB AND SF ARE INCLUSIVE OR'D, THE JMP GOES TO 7000 IN FIELD 1, AND
                        /A HALT OCCURS THERE. RESTART FROM 1400 AFTER AN ERROR, THE TEST IS LOOPED
                        /512 TIMES.
                        /
1400    6041    SFIB,   TSF             /SEE IF FLAG IS SET,
1401    4422            JMS I XTFLG     /SET IT
1402    1047            TAD K7000       /7000
1403    3027            DCA LOOP
1404    6211            CDF 10          /DF=FIELD 1
1405    1037            TAD KHLT                /HLT
1406    3447            DCA I K7000     /7000, FIELD 1=HLT
1407    6201            CDF 00          /DF=0
1410    1105            TAD JMP2                /JMP2=JMP I KFLD0
1411    3447            DCA I K7000     /7000, FIELD 0=JMP I KFLD0
                                        /KFLD0=LOC, RTRN
1412    1102            TAD KJMP                /KJMP=JMP I 2
1413    3001            DCA 1
1414    1107            TAD KRTN        /KRTN=LOC, E45A+2
1415    3002            DCA 2
                        /
                        /BEGIN TEST
                        /
1416    6001            ION             /ENABLE PI
1417    7000            NOP
1420    7402    E45A,   HLT             /ERROR NO PI
1421    5200            JMP SFIB                /REPEAT TEST
                        /
                        /RETURN HERE AFTER PI
                        /
1422    7200            CLA
1423    6211            CDF 10          /DF=FIELD1
1424    6212            CIF 10          /IB=FIELD1
1425    6244            RMF             /IB SHOULD=FIELD0
1426    5447            JMP I K7000     /IF SHOULD=FIELD0
                        /
1427    2027    RTRN,   ISZ LOOP                /WORKED OK
1430    5216            JMP E45A+2      /LOOP
1431    5232            JMP TAUTO               /DONE, GO TO NEXT TEST
```

```
                        /
                        /
                        /TEST ALL AUTO-INDEX REGISTERS IN EACH EXTENDED FIELD,
                        /IDENTICAL TEST ROUTINES ARE PERFORMED FROM EACH FIELD,
                        /AND ERROR HALTS OCCUR IN THE FIELD CURRENTLY RUNNING
                        /THE ROUTINE, PRESS CONT, TO RESUME TESTING, EACH
                        /FIELD CONTAINS ALL 0'S EXCEPT FOR THE AREA OCCUPIED
                        /BY THE TEST ROUTINE, FIELD 0 IS RE-ENTERED
                        /AFTER EACH TEST, AND THE NEXT SEQUENTIAL FIELD
                        /IS THEN ENTERED, REFER TO THE HEADING "AUTO-
                        /INDEX TEST" FOR THE SEQUENCE OF OPERATIONS.
                        /
1432  6201  TAUTO,  CDF 00
1433  1050        TAD K7707
1434  3027        DCA LOOP                /LOOP COUNTER
1435  4423        JMS I XSTKS     /READ SR 9-11
1436  1040        TAD KCDF                /6201
1437  3246        DCA DFN
1440  1246  NEWDF,  TAD DFN
1441  1045        TAD K10         /INCREMENT DF
1442  3246        DCA DFN
                        /
                        /CLEAR ONE FIELD TO 0
                        /
1443  7040        CMA
1444  3010        DCA 10
1445  3000        DCA 0           /USE LOC. 0 FOR A COUNTER
1446  6211  DFN,    CDF 10          /FIELD 1 TO START WITH
1447  3410        DCA I 10
1450  2000        ISZ 0
1451  5247        JMP .-2
1452  6201        CDF 00
                        /
                        /NOW PUT TEST ROUTINE IN THE EXTENDED FIELD
                        /
1453  1317        TAD DOAUTO      /1ST LOC. OF ROUTINE MINUS 1
1454  3010        DCA 10          /SOURCE
1455  1072        TAD K7744               /-28 DECIMAL
1456  3000        DCA 0           /USE LOC. 0 AS COUNTER
1457  1317        TAD DOAUTO
1460  3011        DCA 11          /DESTINATION
1461  1246        TAD DFN         /CDF X0
1462  3265        DCA .+3
1463  6201  MOVE,   CDF 00
1464  1410        TAD I 10
1465  6211        CDF 10          /FIELD 1 TO START
1466  3411        DCA I 11
1467  2000        ISZ 0           /MOVE WHEN SKIP
1470  5263        JMP MOVE
```

```
                        /
                        /NOW SET AUTO-I REGS 10 TO 17 TO 7777,
                        /
1471  1065                      TAD K7770               /-8 DECIMAL
1472  3000                      DCA 0
1473  1044                      TAD K7          /7
1474  3010                      DCA 10
1475  7040                      CMA
1476  3410                      DCA I 10        /7777
1477  2000                      ISZ 0
1500  5275                      JMP .-3         /10 TO 17 = 7777 WHEN SKIP
1501  7040                      CMA
1502  3446                      DCA I K7777     /PUT 7777 IN LOC. 7777 OF EXTENDED FIELD
1503  6214                      RDF             /READ D.F.
1504  1041                      TAD KCIF                /6202
1505  3306                      DCA .+1
1506  6212                      CIF 10          /FIELD 1 TO START
1507  4716                      JMS I FILDX     /ENTER EXTENDED FIELD
                                                /515 OCTAL LOCS. BEFORE THE
                                                /TAD I 10 INSTRUCTION.
                                                /THIS IS A TEST OF THE
                                                /DEFER BIT. 500 US DELAY
                        /
                        /ENTER FIELD 0 FROM EXTENDED FIELD HERE.
                        /
1510  2031      GOTO0,  ISZ STKS        /DONE ALL WHEN SKIP
1511  5240              JMP NEWDF               /SETUP FOR NEXT
1512  2027              ISZ LOOP                /ALL DONE IF SKIP
1513  5235              JMP NEWDF-3     /REPEAT ALL
1514  5715              JMP I LBTP
1515  1600      LBTP,   RMPTST
                        /
1516  1002      FILDX,  DOAUTO-515
```

```
                        /
                        /       AUTO-INDEX TEST
                        /
                        /THE ROUTINE WILL BE PLACED IN THE SAME RESPECTIVE
                        /LOCATIONS IN EACH EXTENDED FIELD, ANY ERROR
                        //HALTS WILL OCCUR IN THE EXTENDED FIELD, PRESS
                        /CONTINUE TO PROCEED WITH TESTING, THE INDEX
                        /REGISTERS 10 TO 17 INITIALLY CONTAIN 7777, AND
                        /ARE AUTO-INDEXED TO 0000 BY A TAD I INSTRUCTION,
                        /A HALT OCCURS IF THE REG. IS NOT INCREMENTED TO 0,
                        /THE TAD I WOULD HAVE THEN REFERENCED LOC. 7777,
                        /WHICH CONTAINS 7777.
                        /

 1517  1517    DOAUTO, .                       /THIS LOC. IS NOT MOVED TO
                                               /THE EXTENDED FIELD.
 1520  7200            CLA
 1521  1410            TAD I 10
 1522  7440            SZA
 1523  7402    E46,    HLT                     /ERROR, INDEX REG. 10 FAILED
 1524  1411            TAD I 11
 1525  7440            SZA
 1526  7402    E47,    HLT                     /INDEX REG. 11 FAILED
 1527  1412            TAD I 12
 1530  7440            SZA
 1531  7402    E48,    HLT                     /12 FAILED
 1532  1413            TAD I 13
 1533  7440            SZA
 1534  7402    E49,    HLT                     /13 FAILED
 1535  1414            TAD I 14
 1536  7440            SZA
 1537  7402    E50,    HLT                     /14 FAILED
 1540  1415            TAD I 15
 1541  7440            SZA
 1542  7402    E51,    HLT                     /15 FAILED
 1543  1416            TAD I 16
 1544  7440            SZA
 1545  7402    E52,    HLT                     /16 FAILED
 1546  1417            TAD I 17
 1547  7440            SZA
 1550  7402    E53,    HLT                     /17 FAILED
 1551  6201            CDF 00                  /SET DF TO FIELD 0
 1552  6202            CIF 00                  /SET I.B. TO FIELD 0
 1553  5310            JMP GOTO0                       /EXIT TO FIELD 0
                        /END OF TEST ROUTINE
                        /
                        /
```

```
                        /CHECK SR 8. IF AN 8I IS BEING USED SR 8 MUST BE
                        /ON A 1, OTHERWISE, 0.
                        /
1554  7604    CSR8,     LAS
1555  0045              AND K10
1556  7640              SZA CLA
1557  5767              JMP I XMEM              /NEXT TEST
1560  0007              AND 7
1561  1360    BELL,     TAD .-1
1562  6046              TLS                     /RING BELL
1563  6041              TSF
1564  5363              JMP .-1
1565  5766              JMP I XBGN      /START OVER AT 200
                        /
1566  0200    XBGN,     BEGIN
1567  2200    XMEM,     NOMEM
```

```
                        /DYNAMIC RMF TEST,
                                /TESTS ALL SF TO DF TRANSFERS AND THOSE SF TO IB TRANSFERS
                        /AS APPLICABLE TO THE NUMBER OF EXTENDED FIELDS PRESENT,
                                /THE GENERAL METHOD IS TO INTERRUPT FROM EACH EXTENDED FIELD
                        /WITH THE DF=FROM 0 THROUGH 7,  AN RMF INSTRUCTION IS THEN ISSUED
                        /AND CONTROL TRANSFERRED TO AN EXTENDED FIELD,  THE RMFDY ROUTINE
                        /IN THAT FIELD THEN CHECKS THAT THE IF AND DF ARE CORRECT,  IF NOT,
                        /THE FAILING IF OR DF IS IN THE IF OR DF REG, AND THE CORRECT FIELD
                        /NUMBER IS IN AC BITS 6 THRU 8,
                        /
                        /
                        /
                1600    *1600
                        /
                        /
1600  7604      RMFTST, LAS                     /CHECK HOW MANY EXTENDED FIELDS
1601  0044              AND     K7              /ARE PRESENT
1602  7041              CIA                     /NEGATE AND SAVE,
1603  3205              DCA     IFCN
1604  4700              JMS I   XFERP           /TRANSFER RMFDY ROUTINE TO ALL
1605  0000      IFCN,   0                       /EXTENDED FIELDS,
1606  7744              -34
1607  1702              RMFDY-1
1610  3275              DCA     LBTSTC          /SET RMFTST COUNTER FOR 4096 PASSES
1611  1302              TAD     JMPI4           /SET INTERRUPT LINK,
1612  3001              DCA     1
1613  1274              TAD     INTEP
1614  3004              DCA     4
1615  6201      RMFL3,  CDF     00              /INITIALIZE IF TO 0,
1616  3341              DCA     KIFSHB
1617  1205              TAD     IFCN            /INITIALIZE TEST COUNTER
1620  3276              DCA     RMFCN1
1621  1341      RMFL2,  TAD     KIFSHB          /UPDATE CURRENT IF,
1622  1045              TAD     K10
1623  3341              DCA     KIFSHB
1624  1341              TAD     KIFSHB
1625  7041              CIA
1626  3342              DCA     MIFSHB
1627  1065              TAD     K7770           /INITIALIZE DF COUNTER TO -10,
1630  3277              DCA     DFCN
1631  1065              TAD     K7770           /INITIALIZE DF TO -10,
1632  3337              DCA     KDFSHB
1633  1337      RMFL1,  TAD     KDFSHB          /UPDATE DF,
1634  1045              TAD     K10
1635  3337              DCA     KDFSHB
1636  1337              TAD     KDFSHB
1637  7041              CIA
1640  3340              DCA     MDFSHB
1641  1205              TAD     IFCN            /TRANSFER DF AND IF INFORMATION
1642  3244              DCA     .+2             /TO EXTENDED FIELDS,
1643  4700              JMS I   XFERP
1644  0000              0
1645  7774              -4
1646  1736              KDFSHB-1
```

```
1050    1647  6201          CDF     00
```

```
1051
1052    1650  1040          TAD     KCDF            /UPDATE CDF INST.
1053    1651  1337          TAD     KDFSHB
1054    1652  3260          DCA     RMFI1
1055    1653  1041          TAD     KCIF            /UPDAT CIF INST.
1056    1654  1341          TAD     KIFSHB
1057    1655  3261          DCA     RMFI2
1058    1656  6041  RMFE2,  TSF                     /ENSURE TTO FLAG SET.
1059    1657  4422          JMS I   XTFLG
1060    1660  6201  RMFI1,  CDF                     /SET DF AND IF TO CURRENT FIELD.
1061    1661  6202  RMFI2,  CIF
1062    1662  5303          JMP     RMFDY           /GO TO RMFDY IN CURRENT IF.
1063    1663  6244  INTE,   RMF                     /ENTER FROM INTERRUPT FROM EX. FLD.
1064    1664  5310          JMP     RMFDY1          /GO BACK TO EXTENDED FIELD.
1065    1665  2277  RMFE1,  ISZ     DFCN            /ALL DF'S USED WITH CURRENT IF.
1066    1666  5233          JMP     RMFL1           /NO. DO NEXT DF.
1067    1667  2276          ISZ     RMFCN1          /ONE PASS OF RMFTST COMPLETE?
1068    1670  5221          JMP     RMFL2           /NO. DO NEXT IF.
1069    1671  2275          ISZ     LBTSTC          /RMFTST DONE?
1070    1672  5215          JMP     RMFL3           /NO.  DO AGAIN.
1071    1673  5701          JMP I   CSR8P           /YES.
1072    1674  1663  INTEP,  INTE
1073    1675  0000  LBTSTC, 0
1074    1676  0000  RMFCN1, 0
1075    1677  0000  DFCN,   0
1076    1700  2000  XFERP,  XFER
1077    1701  1554  CSR8P,  CSR8
1078    1702  5404  JMPI4,  JMP I 4
1079                /
1080                /
1081                /
1082                /
1083                /
```

```
1084
1085                    /ROUTINE TO CHECK CORRECT TRANSFERS FOR SAVE FIELD TO DATA FIELD AND
1086                            /SAVE FIELD TO INST. BUFFER TO INSTRUCTION FIELD AFTER
1087                            /RMF.
1088                    /STORED IN ALL EXTENDED FIELDS.
1089
1090    1703  6001      RMFDY.  ION                     /THIS IS NOT TRANSFERRED.
1091    1704  7000              NOP
1092    1705  6002              IOF
1093    1706  7402      E60.    HLT                     /INTERRUPT FAILURE.
1094    1707  5333              JMP     REPEAT
1095    1710  7200      RMFDY1, CLA
1096    1711  6214              RDF                     /CHECK FOR CORRECT DATA FIELD
1097    1712  1340              TAD     MDFSHB
1098    1713  7650              SNA CLA
1099    1714  5320              JMP     .+4
1100    1715  1337              TAD     KDFSHB          /DATA FIELD INCORRECT
1101    1716  7402      E61,    HLT                     /SF TO DF TRANSFER FAILED AFTER RMF.
1102    1717  5333              JMP     REPEAT          /REPEAT THIS TEST.
1103    1720  6224              RIF                     /CHECK FOR CORRECT INSTRUCTION FIELD.
1104    1721  1342              TAD     MIFSHB
1105    1722  7650              SNA CLA
1106    1723  5327              JMP     .+4
1107    1724  1341              TAD     KIFSHB          /INSTRUCTION FIELD INCORRECT.
1108    1725  7402      E62,    HLT                     /SF TO IB TRANSFER FAILED AFTER RMF
1109    1726  5333              JMP     REPEAT          /REPEAT THIS TEST.
1110    1727  6201              CDF     00              /GO BACK AND RUN NEXT TEST.
1111    1730  6202              CIF     00
1112    1731  5732              JMP I   .+1
1113    1732  1665              RMFE1
1114    1733  6201      REPEAT, CDF     00              /GO BACK AND REPEAT FAILING
1115    1734  6202              CIF     00              /TEST.
1116    1735  5736              JMP I   .+1
1117    1736  1656              RMFE2
1118    1737  0000      KDFSHB, 0                       /DATA FIELD SHOULD BE
1119    1740  0000      MDFSHB, 0                       /TWO'S COMPLEMENT OF ABOVE.
1120    1741  0000      KIFSHB, 0                       /INSTRUCTION FIELD SHOULD BE
1121    1742  0000      MIFSHB, 0                       /TWO'S COMPLEMENT OF ABOVE
1122                    /
1123                    /
1124                    /
1125                    /
1126                    /
1127                    /
1128                    /ROUTINE TO TRANSFER N1 WORDS STARTING AT P IN FIELD 0 TO P IN THE
1129                            /NEXT N2 EXTENDED FIELDS.
1130                            /THE CALLING SEQUENCE IS:
1131                            /JMS I  XFERP
1132                            /-N2
1133                            /-N1
1134                            /P-1
1135
```

```
1136
1137                        /
1138                2000    *2000
1139                        /
1140    2000  0000  XFER,   0
1141    2001  7200          CLA
1142    2002  1600          TAD I   XFER            /GET -N2
1143    2003  3242          DCA     N2
1144    2004  2200          ISZ     XFER            /GET -N1
1145    2005  1600          TAD I   XFER
1146    2006  3243          DCA     N1
1147    2007  2200          ISZ     XFER            /GET P-1
1148    2010  1600          TAD I   XFER
1149    2011  3244          DCA     P
1150    2012  2200          ISZ     XFER            /UPDATE TO RETURN ADDRESS.
1151    2013  1040          TAD     KCDF            /INITIALIZE CDF INST.
1152    2014  3232          DCA     XFERIN
1153    2015  1242          TAD     N2
1154    2016  3245          DCA     XFERC2
1155    2017  1244  XFERL2, TAD     P               /PUT POINTER IN AUTO 10 AND 11.
1156    2020  3010          DCA     10
1157    2021  1244          TAD     P
1158    2022  3011          DCA     11
1159    2023  1243          TAD     N1              /SET COUNTER 1 TO -N1
1160    2024  3246          DCA     XFERC1
1161    2025  1232          TAD     XFERIN          /UPDATE CDF INST.
1162    2026  1045          TAD     K10
1163    2027  3232          DCA     XFERIN
1164    2030  6201  XFERL1, CDF     00              /TRANSFER
1165    2031  1410          TAD I   10
1166    2032  6201  XFERIN, CDF
1167    2033  3411          DCA I   11
1168    2034  2246          ISZ     XFERC1          /DONE WITH CURRENT FIELD?
1169    2035  5230          JMP     XFERL1          /NO, CONTINUE.
1170    2036  2245          ISZ     XFERC2          /DONE WITH ALL FIELDS?
1171    2037  5217          JMP     XFERL2          /NO, DO NEXT FIELD
1172    2040  6201          CDF     00              /ALL DONE,  SET DF-0.
1173    2041  5600          JMP I   XFER            /EXIT.
1174    2042  0000  N2,     0
1175    2043  0000  N1,     0
1176    2044  0000  P,      0
1177    2045  0000  XFERC2, 0
1178    2046  0000  XFERC1, 0
1179
1180
```

```
1181
1182                    /
1183          2200      *2200
1184                    /
1185                    /REFERENCE ALL 4K FIELDS NOT PRESENT. IF 32K
1186                    /IS PRESENT, THE TEST IS BY-PASSED, AND PROGRAM IS
1187                    /RESTARTED AT 200, EACH FIELD NOT PRESENT IS
1188                    /REFERENCED BY THE PROGRAM WITH JMP, DCA AND TAD.
1189                    //THE PROGRAM MUST CONTINUE IN SEQUENCE/ THE TTY
1190                    /BELL WILL SIGNAL A SUCCESSFUL TEST, AND THE PRO-
1191                    /GRAM IS THEN RESTARTED AT 200.
1192                    /
1193    2200  7200      NOMEM,  CLA
1194    2201  1065              TAD K7770
1195    2202  3027              DCA LOOP                /TEST LOOP COUNTER
1196    2203  7604              LAS             /READ SR9-11
1197    2204  0044              AND K7
1198    2205  7041              CIA
1199    2206  1044              TAD K7          /SUBTRACT MAX. POSSIBLE
1200    2207  7450              SNA
1201    2210  5652              JMP I XBELL             /32K PRESENT, CAN'T TEST
1202    2211  3033              DCA NOSTAK      /SAVE NO. MISSING
1203    2212  3651              DCA I XELL      /CLEAR THE TLS IOT AT
1204                            /BELL+1 TO PROHIBIT
1205                            /FALSE INDICATION. TLS
1206                            /IS RESTORED LATER WRONG
1207                            /ENTRY FROM NON-EXISTENT
1208                            /MEMORY MAY CAUSE A
1209                            /HANG-UP AT BELL+2 AND +3.
1210    2213  7604              LAS             /# OF FIELDS PRESENT
1211    2214  0044              AND K7
1212    2215  7001              IAC             /+1 TO GET 1ST MISSING
1213    2216  7100              CLL
1214    2217  7006              RTL             /POSITION TO AC 6-8.
1215    2220  7004              RAL
1216    2221  3034              DCA NOFLD               /1ST MISSING
1217    2222  1033              TAD NOSTAK      /# STACKS NOT HERE
1218    2223  7041              CIA
1219    2224  3033              DCA NOSTAK      /USED AS COUNTER
```

```
1220
1221                    /
1222                    /
1223    2225  1040              TAD KCDF                /6201
1224    2226  1034              TAD NOFLD               /MISSING STACK
1225    2227  3262              DCA CDF0S
1226    2230  1040              TAD KCDF
1227    2231  1034              TAD NOFLD
1228    2232  3307              DCA CDF1S
1229                    /
1230                    /NOW SEE IF AN ODD OR EVEN NUMBER IS MISSING
1231                    /
1232    2233  1033              TAD NOSTAK
1233    2234  7041              CIA
1234    2235  7010              RAR
1235    2236  7620              SNL CLA             /L=1, FIRST READ 0'S, THEN ALWAYS
1236                                                /ALL 1'S
1237    2237  5257              JMP POS+3                   /L=0, ALWAYS READ ALL 1'S
1238    2240  4261              JMS ALL0                    /READ ALL 0 FROM 1ST
1239    2241  2033    CNSTK,    ISZ NOSTAK          /DONE ALL MISSING IF SKIP
1240    2242  5254              JMP POS             /READ ALL 1'S FROM HERE ON
1241    2243  2027              ISZ LOOP                    /DONE LOOPING IF SKIP
1242    2244  5650              JMP I XNOM          /REPEAT
1243    2245  1253              TAD TTB
1244    2246  3651              DCA I XELL          /RESTORE TLS
1245    2247  5652              JMP I XBELL         /RING BELL
1246                    /
1247    2250  2203    XNOM,     NOMEM+3
1248    2251  1562    XELL,     BELL+1
1249    2252  1561    XBELL,    BELL
1250    2253  6046    TTB,      TLS
1251                    /
1252    2254  1307    POS,      TAD CDF1S
1253    2255  1045              TAD K10             /DF PLUS 1
1254    2256  3307              DCA CDF1S
1255    2257  4306              JMS ALL1                    /READ ALL 1'S
1256    2260  5241              JMP CNSTK                   /CHECK DONE
```

```
1257
1258                    /
1259                    /ROUTINE TO READ ALL 0'S.
1260                    /
1261    2261  0000      ALL0,   0
1262    2262  6201      CDF0S,  CDF 00          /SET DF TO 1ST MISSING
1263    2263  7240              CLA CMA
1264    2264  3010              DCA 10          /10 AND 11 USED FOR ADDRESS
1265    2265  7040              CMA
1266    2266  3011              DCA 11
1267    2267  3002              DCA 2           /USE AS COUNTER
1268    2270  7040              CMA
1269    2271  3410              DCA I 10                /WRITE 1'S INTO NON-EXIS-
1270                            /TENT FIELD.
1271    2272  2002              ISZ 2
1272    2273  5270              JMP .-3
1273    2274  1411              TAD I 11                /READ NON-EXIST. FIELD
1274    2275  7650              SNA CLA         /SHOULD = 0000
1275    2276  5301              JMP .+3
1276    2277  1011              TAD 11
1277    2300  7402      E54,    HLT             /ERROR, AN EXISTING FIELD
1278                            /WAS REFERENCED. C(AC)=
1279                            /ADDRESS REFERENCED
1280    2301  2002              ISZ 2
1281    2302  5274              JMP E54-4               /READ NEXT
1282                    /
1283    2303  6201      DONE0,  CDF 00
1284    2304  6202              CIF 00
1285    2305  5661              JMP I ALL0      /EXIT
1286                    /
```

```
1287                    /ROUTINE TO READ ALL 1'S
1288                    /
1289    2306  0000      ALL1,   0
1290    2307  6201      CDF1S,  CDF 00          /SET DF TO MISSING FIELD
1291    2310  7240              CLA CMA
1292    2311  3010              DCA 10          /10 AND 11 USED FOR ADDRESSING
1293    2312  7040              CMA
1294
1295    2313  3011              DCA 11
1296    2314  3002              DCA 2           /USED AS COUNTER
1297    2315  3410              DCA I 10                /WRITE 0'S
1298    2316  2002              ISZ 2
1299    2317  5315              JMP .-2
1300    2320  1411              TAD I 11                /READ 1'S FROM NO MEMORY
1301    2321  7040              CMA
1302    2322  7450              SNA
1303    2323  5327              JMP .+4
1304    2324  7040              CMA
1305    2325  7402      E57,    HLT             /7777 NOT READ, C(AC)= DATA
1306                            /READ, C(11)= ADDRESS.
1307    2326  7200              CLA
1308    2327  2002              ISZ 2
1309    2330  5320              JMP E57-5
1310    2331  6201              CDF 00
1311    2332  6202              CIF 00
1312    2333  5706              JMP I ALL1      /EXIT
1313                    /
```

```
1314                    /READ SR9-11
1315                    /
1316    2334  0000      NSTKS,  0
1317    2335  7604              LAS
1318    2336  0044              AND K7
1319    2337  7041              CIA
1320    2340  3031              DCA STKS
1321    2341  5734              JMP I NSTKS
1322                    /
1323                    /SET TTY FLAG
1324                    /
1325    2342  0000      TFLG,   0
1326    2343  7200              CLA
1327    2344  0015              AND 15
1328    2345  1344              TAD .-1
1329    2346  6046              TLS
1330    2347  6041              TSF
1331    2350  5347              JMP .-1
1332    2351  7200              CLA
1333    2352  5742              JMP I TFLG      /EXIT
1334                    /
1335                    $
```

```
0000  01110000  00000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  10000000  00000000  00000000  00000000  00000000  00000000  00000000

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111100  00000000

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  00000000  00000000  00000000

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111100  00000000  00000000

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11110000  00000000  00000000  00000000  00000000

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000000

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11100000  00000000  00000000  00000000

2000  11111111  11111111  11111111  11111111  11111110  00000000  00000000  00000000
2100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11100000  00000000  00000000

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
```

AGAIN1	0711	E24	0653	INTEP	1674	NOMEM	2200
AGAIN2	1005	E25	0727	ISZ0	0021	NOSTAK	0033
ALL0	2261	E26	0741	JMP2	0105	NSTKS	2334
ALL1	2306	E27	1024	JMPI0	0020	OK1	0222
BEGIN	0200	E3	0234	JMPI4	1702	OK2	0250
BELL	1561	E30	1036	K1	0043	OK3	0276
CDF	6201	E31	0754	K10	0045	OK4	0324
CDF0S	2262	E32	0755	K20	0104	OK5	0362
CDF1S	2307	E4	0245	K7	0044	OK6	0440
CHDF	1073	E40	1132	K7000	0047	OK7	0502
CIF	6202	E41	1203	K7707	0050	OK8	0544
CIFCK	0753	E42	1221	K7717	0056	P	2044
CIFCK1	1046	E43	1235	K7727	0055	POINT	0066
CIFJMP	0723	E44	1306	K7737	0054	POS	2254
CIFJMS	1017	E45	1312	K7744	0072	RDF	6214
CIFJPL	0715	E45A	1420	K7747	0053	REPEAT	1733
CIFJSL	1011	E46	1523	K7757	0052	RIB	6234
CKPC	1226	E47	1526	K7766	0070	RIF	6224
CNSTK	2241	E48	1531	K7767	0051	RMF	6244
CSR8	1554	E49	1534	K7770	0065	RMFCN1	1676
CSR8P	1701	E5	0262	K7771	0064	RMFDY	1703
DAT	0032	E50	1537	K7772	0063	RMFDY1	1710
DCAI	0601	E51	1542	K7773	0062	RMFE1	1665
DF0	0202	E52	1545	K7774	0061	RMFE2	1656
DF1	0226	E53	1550	K7775	0060	RMFI1	1660
DF2	0237	E54	2300	K7776	0057	RMFI2	1661
DF3	0254	E57	2325	K7777	0046	RMFL1	1633
DF4	0265	E6	0273	K78	0067	RMFL2	1621
DF5	0302	E60	1706	KCDF	0040	RMFL3	1615
DF6	0313	E61	1716	KCIF	0041	RMFTST	1600
DF7	0211	E62	1725	KDFSHB	1737	RTRN	1427
DFCN	1677	E7	0310	KE40	0036	SFIB	1400
DFLD	0607	E8	0321	KE40M	0035	STDF	1126
DFN	1446	E9	0341	KFLD0	0106	STKS	0031
DOAUTO	1517	ENTER	1200	KHLT	0037	STRMF	1106
DONE0	2303	EXFD	1316	KIFSHB	1741	TADI	0622
E1	0206	EXFLD	1302	KJMP	0102	TAUTO	1432
E10	0351	FILDX	1516	KNOP	0752	TFLD	0630
E11	0360	GOTO0	1510	KNTR	0103	TFLG	2342
E12	0410	HLTS	0671	KRTN	0107	TRANS	1321
E13	0417	IB0	0334	KXFLD	0101	TRFLD	1337
E14	0427	IB1	0343	LBTP	1515	TRMF	1047
E15	0436	IB2	0402	LBTSTC	1675	TTB	2253
E16	0452	IB3	0421	LOOP	0027	XAUTO	0026
E17	0461	IB4	0444	MDFSHB	1740	XBELL	2252
E18	0471	IB5	0463	MIFSHB	1742	XBGN	1566
E19	0500	IB6	0506	MOVE	1463	XELL	2251
E2	0217	IB7	0525	N1	2043	XFD	0042
E20	0514	IBSF	0656	N2	2042	XFER	2000
E21	0523	IBSF1	1000	NDF	0030	XFERC1	2046
E22	0533	IFCN	1605	NEWDF	1440	XFERC2	2045
E23	0542	INTE	1663	NOFLD	0034	XFERIN	2032

```
        XFERL1  2030
        XFERL2  2017
        XFERP   1700
        XFIB    0110
        XMEM    1567
        XNOM    2250
        XRANS   0025
        XRMF    0024
        XSTKS   0023
        XTDF    0077
        XTDF1   0100
        XTFLG   0022


ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME:  11 SECONDS

3K CORE USED
```

AGAIN1 452# 485
AGAIN2 499# 532
ALL0 1238 1261# 1285
ALL1 1255 1289# 1312
BEGIN 90# 993
BELL 987# 1248 1249
CDF 11# 93 102 118 128 144 154 170 180 196 211 236 253 276
294 317 334 369 387 421 436 448 495 559 576 587 605 628
638 676 682 685 688 772 774 780 782 784 788 790 794 796
800 802 819 822 841 861 876 880 892 894 973 1024 1050 1060
1110 1114 1164 1166 1172 1262 1283 1290 1310
CDF0S 1225 1262#
CDF1S 1228 1252 1254 1290#
CHDF 576# 584 585
CIF 12# 462 509 606 624 627 639 748 842 915 974 1061 1111 1115
1284 1311
CIFCK 454 459 461 471 474 489#
CIFCK1 501 506 508 518 521 534#
CIFJMP 453 456 458 462# 480 490
CIFJMS 491 500 503 505 509# 527
CIFJPL 456# 483
CIFJSL 503# 530
CKPC 632 642#
CNSTK 1239# 1256
CSR8 982# 1077
CSR8P 1071 1077#
DAT 35# 389 390 406
DCAI 363# 398
DF0 93# 99 112
DF1 117# 125 139
DF2 122 127# 136
DF3 143# 151 164
DF4 148 153# 161
DF5 169# 177 190
DF6 174 179# 187
DF7 96 101# 109
DFCN 1035 1065 1075#
DFLD 369# 376 377 379
DFN 866 867 869 876# 890
DOAUTO 884 888 931 946#
DONE0 1283#
E1 97#
E10 217#
E11 225#
E12 242#
E13 250#
E14 259#
E15 267#
E16 283#
E17 291#
E18 300#
E19 308#
E2 107#

```
E20          323#
E21          331#
E22          340#
E23          348#
E24          394      407#
E25          468#
F26          473      478#
E27          515#
E3           123#
F30          520      525#
E31          440      490#
E32          442      491#
E4           134#
E40           38       39      610#     739      744
E41          621#
E42          635#
E43          649#
E44          724#
E45          732#
E45A          81      835#     847
E46          951#
E47          954#
E48          957#
E49          960#
E5           149#
E50          963#
E51          966#
E52          969#
E53          972#
E54         1277#    1281
E57         1305#    1309
E6           159#
E60         1093#
E61         1101#
E62         1108#
E7           175#
E8           185#
E9           208#
ENTER         77      618#
EXFD          43      708      748#
FXFLD         75      719#
FILOX        916      931#
GOTO0        924#     975
HLTS         436#     446      447
IB0          203#     209      228
IB1          207      211#     218      226
IB2          230      236#     243      251      271
IB3          249      253#     260      268
IB4          276#     284      292      312
IB5          290      294#     301      309
IB6          317#     324      332      353
IB7          330      334#     341      349
IBSF         399      421#
```

IBSF1 487 494#
IFCN 1014 1016# 1026 1044
INTE 1063# 1072
INTEP 1022 1072#
ISZ0 26# 422
JMP2 79# 823
JMPI0 25# 197 426
JMPI4 1020 1078#
K1 44# 438
K10 46# 367 375 385 400 434 457 460 504 507 555 574 596 599
694 697 868 983 1029 1039 1162 1253
K20 78# 783
K7 45# 904 1012 1197 1199 1211 1318
K7000 48# 371 388 817 821 824 844
K7707 49# 101 590 862
K7717 55# 179
K7727 54# 169
K7737 53# 153
K7744 68# 886
K7747 52# 143
K7757 51# 127
K7766 66# 768
K7767 50# 117
K7770 62# 343 902 1034 1036 1194
K7771 61# 326
K7772 60# 303
K7773 59# 286
K7774 58# 262
K7775 57# 245
K7776 56# 220
K7777 47# 801 911
K7S 65# 593 629 701
KCDF 41# 366 384 433 552 573 595 865 1052 1151 1223 1226
KCIF 42# 452 499 598 913 1055
KDFSHB 1037 1038 1040 1041 1049 1053 1100 1118#
KE40 39# 577 642 687 795
KE40M 38# 789
KFLD0 79 80#
KHLT 40# 437 439 441 579 686 820
KIFSHB 1025 1028 1030 1031 1056 1107 1120#
KJMP 76# 761 826
KNOP 424 488#
KNTR 77# 763
KRTN 81# 828
KXFLD 75# 765
LBTP 928 929#
LBTSTC 1019 1069 1073#
LOOP 32# 91 111 115 138 141 163 167 189 199 227 233 270 274
311 315 352 362 397 451 484 498 531 578 580 591 663 818
846 863 926 1195 1241
MDFSHB 1043 1097 1119#
MIFSHB 1033 1104 1121#
MOVE 892# 897

N1 1146 1159 1175#
N2 1143 1153 1174#
NDF 33# 365 370 378 383 392 403
NEWDF 867# 925 927
NOFLD 37# 1216 1224 1227
NOMEM 994 1193# 1247
NOSTAK 36# 1202 1217 1219 1232 1239
NSTKS 28 1316# 1321
OK1 106 111#
OK2 132 138#
OK3 158 163#
OK4 184 189#
OK5 224 227#
OK6 266 270#
OK7 307 311#
OK8 347 352#
P 1149 1155 1157 1176#
POINT 63# 592
POS 1237 1240 1252#
RDF 13# 94 103 119 129 145 155 171 181 214 239 256 279 297
320 337 618 912 1096
REPEAT 1094 1102 1109 1114#
RIB 16# 205 221 246 263 287 304 327 344 469 477 516 524 626
634
RIF 14# 1103
RMF 15# 625 633 843 1063
RMFCN1 1027 1067 1074#
RMFDY 1018 1062 1090#
RMFDY1 1064 1095#
RMFE1 1065# 1113
RMFE2 1058# 1117
RMFI1 1054 1060#
RMFI2 1057 1061#
RMFL1 1038# 1066
RMFL2 1028# 1068
RMFL3 1024# 1070
RMFTST 929 1011#
RTRN 80 846#
SFIB 82 815# 836
STDF 73 74 597 600 601 605# 612
STKS 34# 372 395 443 482 529 565 581 661 924 1320
STRMF 588# 666
TADI 374 381#
TAUTO 31 848 861#
TFLD 387# 401 402 404 411
TFLG 27 1325# 1333
TRANS 30 702 760# 803
TRFLD 774# 778 785 791 797
TRMF 29 533 551# 566
TTB 1243 1250#
XAUTO 31#
XBELL 1201 1245 1249#
XBGN 991 993#

XELL 1203 1244 1248#
XFD 43# 602
XFER 1076 1140# 1142 1144 1145 1147 1148 1150 1173
XFERC1 1160 1168 1178#
XFERC2 1154 1170 1177#
XFERIN 1152 1161 1163 1166#
XFERL1 1164# 1169
XFERL2 1155# 1171
XFERP 1015 1046 1076#
XFIB 82# 665
XMEM 985 994#
XNOM 1242 1247#
XRANS 30# 603
XRMF 29#
XSTKS 28# 363 381 432 455 502 551 572 594 864
XTDF 73# 623 640 657 674 683 693 695 703 770
XTDF1 74# 696 698 699
XTFLG 27# 201 450 497 589 816 1059