

IDENTIFICATION

PRODUCT CODE: MAINDEC-08-DIGD-D
PRODUCT NAME: PDP-8, 81, 8S EXTENDED MEMORY CONTROL
DATE CREATED: JULY 27, 1970
MAINTAINER: DIAGNOSTIC PROGRAMMING GROUP
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M. C. N. REQUIRED
THIS PROGRAM REQUIRES MCM(S)
IN ORDER TO WORK PROPERLY

1. ABSTRACT

THIS PROGRAM TESTS THE EXTENDED MEMORY CONTROL LOGIC FOR PROPER OPERATION; IT MAY BE USED WITH A PDP-8, 81, 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-81 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, 81 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, 81 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
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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.
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C (MA)	TAG	DESCRIPTION
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1132	E40	CIF OR INTERRUPT FAILED, THE DF AND IF SHOULD EQUAL AN EXTENDED FIELD, THE DF WAS NOT CLEARED AFTER THE INTERRUPT, ALL OTHER FUNCTIONS WORKED PROPERLY, RMF OR SF FAILED, THE SF REGISTER SHOULD HAVE SAVED, THE EXTENDED FIELD NUMBER AFTER INTERRUPT, THE AC=C (I.B.) AFTER AN RMF?
1203	E41	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,
1235	E43	LOCATION 4 IN THE EXTENDED FIELD, THE INTERRUPT WENT TO THIS FIELD INSTEAD OF FIELD 0, OR THE JMP 12 AT LOCATION 7777 WAS ENABLED IN LOCATION E40 IN THE EXTENDED FIELD,
4	E44	LOCATION 10 IN THE EXTENDED FIELD, THE JMP 12 AT LOCATION 7777 WAS NOT EXECUTED, OR INTERRUPT FAILED.
10	E45	
1420	E45A	NO PROGRAM INTERRUPT OCCURRED, PRESS CONTINUE TO TRY AGAIN, 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.
7000	"	

(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	INDEX 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 TRANSFER 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.

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 1 TO FIELDS 4 THROUGH 7 SHOULD RESULT WITH 7777 OCTAL IN THE AC. IF EQUIPPED WITH FIELDS 0,1, AND 2, A TAD 1 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
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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 LOOPEO 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

/PDP-8, 81, 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 81, 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
*1

0001 JMP 1
0002
0003

*20

JMP10: JMP 1 0
ISE0: 100 0
XTFLG: TPLG
XSTKS: NSTKS
XRMF: TRMF
XRANS: TRANS
XAUTO: TAUTO
LOOP: 0
NDF: 0 0
STKS: 0 0
DAT: 0 0
NOSTAK: 0
NOFLD: 0
KE40M: E40=1
KE40: E40
KHLT: HLT
KCDF: 6201
KCIF: 6202
XFD: EXPD
K1: 1
K7: 7
K10: 10
K7777: 7777
K7000: 7000
K7707: 7707
K7767: 7767
K7757: 7757
K7747: 7747
K7737: 7737
K7727: 7727
K7717: 7717

0020 3400
0021 2000
0022 2342
0023 2334
0024 1047
0025 1321
0026 1432
0027 0000
0030 0000
0031 0000
0032 0000
0033 0000
0034 0000
0035 1131
0036 1132
0037 7402
0040 6201
0041 6202
0042 1316
0043 0001
0044 0007
0045 0010
0046 7777
0047 7000
0050 7707
0051 7767
0052 7757
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0055 7727
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56	0057	7776	K7776,	7776
57	0060	7775	K7775,	7775
58	0061	7774	K7774,	7774
59	0062	7773	K7773,	7773
60	0063	7772	K7772,	7772
61	0064	7771	K7771,	7771
62	0065	7770	K7770,	7770
63	0066	0070	POINT,	.02

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0067	0070	K78,	001
0070	7766	K7766,	7766
0071	7755		7755
0072	7744	K7744,	7744
0073	7733		7733
0074	7722		7722
0075	7711		7711
0076	7700		7700
0077	1126	XTDF,	XTDF
0100	1127	XTDF1,	XTDF+1
0101	1302	KXFLD,	KXFLD
0102	5402	KJMP,	JMP I 2
0103	1200	KNTR,	ENTER
0104	0020	K20,	20
0105	5506	JMP2,	JMP I KFLD0
0106	1427	KFLD0,	RTRN
0107	1422	KRTN,	E49A*2
0110	1400	XFI0,	SF10

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85 /TEST CDF AND RDF
86 /
87 *200
88
89 BEGIN, CLA LOOP /LOOP COUNTER
90 0200 7200
91 0201 3027
92
93 DFD, CDF 00 /DF 0
94 0203 6214 RDF /SHOULD NOT SKIP
95 0204 7450 SNA DF7 /ERROR, CDF OR RDF FAILED
96 0205 5211 JMP DF7
97 0206 7402 HLT
98 0207 7200 CLA /REPEAT
99 0210 5202 JMP DF0
100
101 DFD, TAD K7707 /7707
102 0212 6271 CDF 70 /DF 7
103 0213 6214 RDF /AC 00
104 0214 7040 CHA /SHOULD NOT SKIP
105 0215 7450 SNA OK1 /CDF OR RDF FAILED
106 0216 5222 JMP OK1
107 0217 7402 HLT
108 0220 7200 CLA
109 0221 5211 JMP DF7
110
111 OK1, ISB LOOP /CHECK DONE
112 0222 2027 JMP DF0
113 0223 5202
114
115 CLA DGA LOOP /LOOP COUNTER
116 0224 7200
117 0225 3027
118
119 DFD, TAD K7767 /7767
120 0226 1051 CDF 10 /DF 10
121 0227 6214 RDF /AC=0
122 0230 6214 CHA
123 0231 7040 SNA DF2 /CDF1 OR RDF FAILED
124 0232 7450 JMP DF2
125 0233 5237 HLT
126 0234 7402 CLA
127 0235 7200 JMP DF1
128 0236 5226
129
130 DFD, TAD K7757 /7757
131 0237 1052 CDF 20 /DF2
132 0240 6221 RDF /AC=0
133 0241 6214 CHA
134 0242 7040 SNA OK2
135 0243 7450 JMP OK2
136 0244 5250

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133												
134	E4,	0245	7402	HLT								
135		0246	7200	CLA								
136		0247	5237	JMP	DF2				/GDF 2 OR RDF FAILED			
137												
138	/OK2,	0250	2027	ISE	LOOP							
139		0251	5226	JMP	DF1				/DONE IF SKIP			
140		0252	7200	CLA								
141		0253	3027	DCA	LOOP							
142												
143	/DF3,	0254	1053	TAD	K7747				/7747			
144		0255	6231	GDF	30				/DF 3			
145		0256	6214	RDF					/AC=0			
146		0257	7040	CMA								
147		0260	7450	SNA	DF4							
148		0261	5205	JMP	DF4							
149	E5,	0262	7402	HLT								
150		0263	7200	CLA					/GDF 3 OR RDF FAILED			
151		0264	5234	JMP	DF3							
152												
153	/DF4,	0265	1054	TAD	K7737				/7737			
154		0266	6241	GDF	40				/DF 4			
155		0267	6214	RDF					/AC=0			
156		0270	7040	CMA								
157		0271	7450	SNA	OK3							
158		0272	5276	JMP	OK3							
159	E6,	0273	7402	HLT								
160		0274	7200	CLA					/GDF 4 OR RDF FAILED			
161		0275	5265	JMP	DF4							
162												
163	/OK3,	0276	2027	ISE	LOOP							
164		0277	5234	JMP	DF3				/DONE IF SKIP			
165												
166		0300	7200	CLA								
167		0301	3027	DCA	LOOP							
168												
169	/DF5,	0302	1055	TAD	K7727				/7727			
170		0303	6251	GDF	50				/DF5			
171		0304	6214	RDF					/AC=0			
172		0305	7040	CMA								
173		0306	7450	SNA	DF6							
174		0307	5313	JMP	DF6							
175	E7,	0310	7402	HLT								
176		0311	7200	CLA					/GDF 5 OR RDF FAILED.			
177		0312	5302	JMP	DF5							
178												
179	/DF6,	0313	1056	TAD	K7717				/7717			
180		0314	6261	GDF	60				/DF 6			
181		0315	6214	RDF					/AC=0			
182		0316	7040	CMA								
183		0317	7450	SNA	OK4							
184		0320	5324	JMP	OK4							

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185 0321 7402      HLT
186 0322 7200      CLA
187 0323 5313      JMP DF6
188
189 0324 2027      /OK4, ISE LOOP /DONE WHEN SKIP
190 0325 5302      JMP DF5
191
192 /NOW TEST INTERRUPT BUFFER (IB) BITS 9-11 WITH
193 /RIB. PI IS ENABLED. TELEPRINTER FLAG IS
194 /USED FOR INTERRUPT.
195 /
196
197 0326 6201      CDF 00 /DF0
198 0327 1020      TAD JMP10 /JMP I0=JMP I 0
199 0330 3001      DCA I /C(I)=JMP I 0
200 0331 3027      DCA LOOP
201 0332 6041      TSP /TEST TTY FLAG
202 0333 4422      JMS I XTFLG /SET FLAG
203
204 0334 6001      /ION /ENABLE PI
205 0335 7200      CLA /READ SF
206 0336 6234      RIB
207 0337 7450      SNA IB1
208 0340 5343      JMP IB1
209 0341 7402      HLT /RIB FAILED
210 0342 5334      JMP IB0
211
212 0343 6211      /IB1, CDF 10 /DF 1
213 0344 6001      ION
214 0345 7200      CLA
215 0346 6214      RDF /DF SHOULD BE 0 AFTER A PI
216 0347 7450      SNA /+3
217 0350 5353      JMP /+3
218 0351 7402      HLT
219 0352 5343      JMP IB0 /DF NOT CLEARED, OR NO PI
220
221 0353 1057      /TAD K7776
222 0354 6234      RIB /READ SF
223 0355 7040      CHA /AC00
224 0356 7450      SNA OK5
225 0357 5362      JMP OK5
226 0360 7402      HLT
227 0361 5343      JMP IB1 /RIB OR SP FAILED
228 0362 2027      /ISE LOOP /DONE WHEN SKIP
229 0363 5334      JMP IB0
230 0364 5765      JMP I ,+1
231 0365 0400      102-2

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231	0400	*400			
232	0400	7200	CLA		
233	0401	3027	DCA	LOOP	
234					
235					
236	0402	6221	ODF	20	/DF 2
237	0403	6001	ION		
238	0404	7200	CLA		
239	0405	6214	ODF		/SHOULD BE 0 AFTER PI
240	0406	7450	SNA	.+3	
241	0407	5212	JMP		/DF NOT CLEARED, OR NO PI
242	0410	7402	HLT		
243	0411	5202	JMP	1B2	
244					
245	0412	1060	TAD	K7775	
246	0413	6234	RIB		/ACB7777
247	0414	7040	CMA		/B0
248	0415	7450	SNA		
249	0416	5221	JMP	1B3	/RIB OR SF FAILED
250	0417	7402	HLT		
251	0420	5202	JMP	1B2	
252					
253	0421	6231	ODF	30	/DF3
254	0422	6001	ION		
255	0423	7200	CLA		
256	0424	6214	ODF		/DF SHOULD BE CLEARED
257	0425	7450	SNA	.+3	
258	0426	5231	JMP		/DF NOT CLEARED
259	0427	7402	HLT		
260	0430	5221	JMP	1B3	
261					
262	0431	1061	TAD	K7774	
263	0432	6234	RIB		/ACB7777
264	0433	7040	CMA		/ACB0
265	0434	7450	SNA		
266	0435	5240	JMP	OK6	/RIB OR SF FAILED
267	0436	7402	HLT		
268	0437	5221	JMP	1B3	
269					
270	0440	2027	ISE	LOOP	/DONE IF SKIP
271	0441	5202	JMP	1B2	
272					
273	0442	7200	CLA		
274	0443	3027	DCA	LOOP	
275					
276	0444	6241	ODF	40	/DF 3
277	0445	6001	ION		
278	0446	7200	CLA		
279	0447	6214	ODF		/DF MUST BE 000 AFTER A PI
280	0450	7450	SNA		/ERROR IF SKIP
281	0451	5254	JMP	.+3	

282	0452	7402	E16,	HLT		/DF NOT 0 AFTER PI
283	0453	5244	/	JMP I84		
284						
285	0454	1062	/	TAD K7773	/AC=7773	
286	0455	6234		RIB	/AC=7777	
287	0456	7040		CMA	/AC=0	
288	0457	7490		SNA		
289	0460	5263		JMP I85		
290	0461	7402	E17,	HLT I84	/RIB OR SF FAILED	
291	0462	5244	/	JMP I84		
292						
293	0463	6251	/	COF 50	/DFS	
294	0464	6001	E18,	ION		
295	0465	7200	/	CLA	/DF SHOULD=000	
296	0466	6214		ROF		
297	0467	7490		SNA		
298	0470	5273		JMP I+3		
299	0471	7402	E18,	HLT	/DF NOT 0 AFTER PI	
300	0472	5263	/	JMP I85		
301						
302	0473	1063	/	TAD K7772	/AC= 7772	
303	0474	6234		RIB	/ 7777	
304	0475	7040		CMA	/ 0	
305	0476	7490		SNA		
306	0477	5302		JMP OK7		
307	0500	7402	E19,	HLT I85	/RIB OR SF FAILED	
308	0501	5263	/	JMP I85		
309						
310	0502	2027	/	I83 LOOP	/DONE IF 0 AND SKIP	
311	0503	5244	OK7,	JMP I84		
312			/			
313	0504	7200	/	CLA		
314	0505	3027		DCA LOOP		
315						
316	0506	6261	/	COF 60	/DF6	
317	0507	6001	E18,	ION		
318	0510	7200	/	CLA	/DF MUST=0 AFTER PI	
319	0511	6214		ROF		
320	0512	7490		SNA		
321	0513	5316		JMP I+3		
322	0514	7402	E20,	HLT I84	/DF NOT 0 AFTER PI	
323	0515	5306	/	JMP I84		
324						

325	0516	1064	/	TAD K7771		
326	0517	6234		RIB	/AC=7777	/.7771
327	0520	7840		CMA		
328	0521	7450		SNA		
329	0522	5325		JMP 107		
330	0523	7402	E21.	HLT	/RIB OR SF FAILED	
331	0524	5306		JMP 106		
332			/	COF 70	/OF 7	
333	0525	6271	107.	ION		
334	0526	6001		CLA		
335	0527	7208		RDF	/OF MUST = 0 AFTER PJ	
336	0530	6214		SNA		
337	0531	7450		JMP 103		
338	0532	5335		HLT	/OF NOT 0	
339	0533	7402	E22.	JMP 107		
340	0534	5325	/	TAD K7770		
341	0535	1065		RIB	/AC=7777	
342	0536	6234		CMA		
343	0537	7840		SNA		
344	0540	7450		JMP OK0		
345	0541	5344		HLT	/RIB OR SF FAILED	
346	0542	7402	E23.	JMP 107		
347	0543	5325	/	ISS LOOP	/DONE IF 0	
348	0544	2027	OK0.	JMP 106		
349	0545	5306		JMP 103	/NEW PAGE	
350	0546	5747		000		
351	0547	0600				

```

356 0600
357 0601 DCA LOOP
358 0602 JMS I XSTKS /READ SR 9=11
359 0603 IAC /DF NUMBER = 1 TO START
360 0604 DCA NDF /6201
361 0605 TAD KCDF
362 0606 TAD K10
363 0607 DCA :+1 /DF 001 TO START WITH
364 0608 CDF 00 /WILL BE INCREMENTED
365 0609 TAD NDF /DF#
366 0610 DCA I K7000 /PUT IN 7000 OF STACK
367 0611 ISZ STKS /ALL STACKS WHEN 0
368 0612 SKP /TEST TAD I
369 0613 JMP TAD I /INCR. CDF IOT
370 0614 TAD K10
371 0615 TAD DFLO
372 0616 DCA DFLO
373 0617 ISZ NDF
374 0618 JMP DFLO /%
375 0619
376 0620
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410 0660

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```

*600
/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.
/
DCAI.
DCA LOOP
JMS I XSTKS /READ SR 9=11
IAC /DF NUMBER = 1 TO START
DCA NDF /6201
TAD KCDF
TAD K10
DCA :+1 /DF 001 TO START WITH
CDF 00 /WILL BE INCREMENTED
TAD NDF /DF#
DCA I K7000 /PUT IN 7000 OF STACK
ISZ STKS /ALL STACKS WHEN 0
SKP /TEST TAD I
JMP TAD I /INCR. CDF IOT
TAD K10
TAD DFLO
DCA DFLO
ISZ NDF
JMP DFLO /%

TADI.
JMS I XSTKS /SR9=11 AGAIN
IAC /DF#1 AGAIN
DCA NDF /6201
TAD KCDF
TAD K10
DCA :+1
CDF 00 /ADD CONTENTS NOW
TAD I K7000 /SAVE TEMP
DCA DAT /2'S COMP
TAD DAT /BETTER BE EQUAL
CIA /ERROR PATH
TAD NDF /ALL WHEN 0
SBA E24=1 /DONE WHEN 0
JMP :+4 /NEXT TEST
ISZ LOOP
JMP DCAI /CDF IOT + 10
JMP ISZF
TAD K10
TAD TFLD
DCA TFLD
ISZ NDF
JMP TFLD

/
E24.
TAD DAT
HLT
CLA

```

```

/ DATA AS READ
/ A60 DATA READ, DF INDICATORS
/ EQUAL FIELD WHERE GOT DATA.
/ BOTH SHOULD BE EQUAL

```

411 0655 5230

JMP TFLO

412 /CIF TEST, CHECKS THE ABILITY OF A CIF=ION=NOP=JMP OR
 413 /CIF=ION=NOP=JMS SEQUENCE TO DO THE FOLLOWING:
 414 /1: CIF ENABLE MB TO IB TRANSFER;
 415 /2: INHIBIT INTERRUPT TILL JMP OR JMS EXECUTED.
 416 /3: INTERRUPT AFTER JMP OR JMS EXECUTED;
 417 /4: JMP OR JMS ENABLES IB TO IF TRANSFER;
 418 /5: INTERRUPT ENABLES IF TO SP TRANSFER;

```

0656 6201 /SET UP FOR CIF=ION=NOP=JMP CHECK.
0657 1021 IBSF,
0660 3001 TAD DCA
0661 1352 TAD DCA
0662 3002 DCA
0663 1020 TAD DCA
0664 3003 DCA
  
```

```

/ NOW STORE HALTS IN LOC1, CIFJMP+1,
/ AND CIFJMS+1 OF ALL EXTENDED FIELDS.
  
```

```

4423 JMS I XSTKS
4424 TAD KCDP
4425 TAD K10
4426 DCA +1
4427 CDF 10
4428 TAD KHLT
4429 DCA I K1
4430 TAD KHLT
4431 DCA I E31
4432 DCA I E32
4433 ISE STKS
4434 SKP +3
4435 JMP HLTS
4436 TAD HLTS=2
4437 CDF 00
4438 TSP
  
```

```

/ENSURE ITO FLAG SET.
/SET COUNTER FOR 4096 PASSES.
/INITIALIZE TO CIF 00.
/INITIALIZE I.P. CHECK TO 0.
/READ SR9=11.
  
```

```

XTELG
LOOP
KCIF
CIFJMP
CIFCK
XSTKS
CIFJMP
K10
CIFJMP
CIFCK
K10
CIFCK
00
  
```

```

/ MODIFIED TO CURRENT FIELD
/ UNDER TEST.
  
```

```

0656 6201
0657 1021
0660 3001
0661 1352
0662 3002
0663 1020
0664 3003
4423 4423
4424 1040
4425 1045
4426 3271
4427 0211
4428 1037
4429 3443
4430 1037
4431 3790
4432 1037
4433 3755
4434 2031
4435 7410
4436 5305
4437 1271
4438 5267
4439 6201
4440 6041
4441 4422
4442 3027
4443 1041
4444 3323
4445 3353
4446 4423
4447 1045
4448 3323
4449 1045
4450 3027
4451 1041
4452 3323
4453 3353
4454 4423
4455 1045
4456 3323
4457 1045
4458 3323
4459 1045
4460 3353
4461 6202
4462 0723
  
```

```

AGAIN1:
CIFJPL:
CIFJMP:
  
```

464	0724	6001	ION		
465	0725	7000	NOP		
466	0726	5327	JMP	.+1	
467	0727	7402	HLT		/ERROR, NO PI OR INHIBIT PI.
468	0727	7402	RIB		
469	0730	6234	RIB		
470	0731	7041	CIA		
471	0732	1353	TAD	CIFCK	
472	0733	7650	SNA	CLA	
473	0734	5344	JMP	E26+3	
474	0735	1353	TAD	CIFCK	
475	0736	7110	CLL	RAR	
476	0737	7012	RTR		
477	0740	6234	RIB		
478	0741	7402	HLT		
479	0742	7200	CLA		
480	0743	5323	JMP		
481			CIFJMP		
482	0744	2031	ISZ		/ERROR: I.B. TO I.F. TRANSFER
483	0745	5315	JMP		/FAILED AFTER CIF-JMP; BAD
484	0746	2027	ISZ		/I.F. IN AC6=0; GOOD I.F. IN
485	0747	5311	JMP		/AC9=11. REPEAT UPON CONTINUE.
486	0750	5751	JMP	I	/DONE?
487	0751	1000	JMP	I	/NO. DO NEXT FIELD
488	0752	7000	NOP		/4094 TIMES?
489	0753	0000	0		/NO. DO IT ALL AGAIN.
490	0754	0724	CIFJMP+1		/YES. GO TEST CIF-JMS.
491	0755	1020	CIFJMS+1		

E25.
E26.
KNOP:
CIFCK:
E31.
E32.


```

535 /TEST INTERRUPT INHIBIT
536 /FROM EACH FIELD; REFER TO HEADING TITLED "EXTENDED
537 /FIELD TEST ROUTINE". THIS ROUTINE IS PLACED IN
538 /EACH TESTED FIELD AT THE ADDRESSES SPECIFIED. THE
539 /INDICATED ERROR HALTS WILL BE IN THE EXTENDED
540 /FIELD. PRESS CONT. TO RECOVER. ONLY 1 FIELD WILL
541 /CONTAIN THE ROUTINE AT ANY ONE TIME. OTHER FIELDS
542 /WILL CONTAIN ALLOIS. THE ROUTINE IS REPLACED WITH
543 /HALTS AFTER COMPLETION. THE PORTIONS OF THE FIELD
544 /WHICH DO NOT CONTAIN THE ROUTINE ARE SET TO 0000
545 /BEFOREHAND.
546
547
548
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550

```

/SETUP FIELDS TO TEST; POINTERS, ETC.:

```

551 TRMF: JMS I XSTKS /READ SR9=11
552 TAD KODP /6201
553 DCA :+6
554 TAD :+9
555 TAD K10
556 DCA :+3
557 CMA
558 DCA 10
559 DCP 00
560 DCA I 10 /PLACE 0'S IN EACH FIELD FROM
561 TAD 10 /LOC: 0 TO 7777.
562 CMA CLA
563 SZA :+4
564 JMP :+4
565 ISB STKS
566 JMP TRMF=3

```

```

1047 4423
1050 1040
1051 3257
1052 1257
1053 1045
1054 3257
1055 7040
1056 3010
1057 6201
1060 3+10
1061 1010
1062 7040
1063 7040
1064 5200
1065 2031
1066 5252

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/ NOW PUT A HLT IN EACH FIELD IN THE SAME
/ LOCATION AS E40, BELOW.
/
JMS I XSTKS /READ SR 9=11
TAD KCDF
TAD K10
TAD K10
DCA I+1
CDF 00
TAD KE40 /KE40 = ADDRESS OF E40.
DCA LOOP /SAVE TEMPORARILY
TAD KHLT /KHLT = 7402 (HLT)
DCA I LOOP /DONE ALL STACKS WHEN SKIP
ISE SYKS
SKP I+3
JMP CHDF
TAD CHDF
JMP CHDF-2

CDF 00
TSP /CHECK TTY FLAG
JMS I XTFLG /GO SET IT
TAD K7707
DCA LOOP
TAD POINT
DCA K75
JMS I XSTKS /POINTER FOR K7700 TO K7766
TAD KCDF /READ SR 9=11
TAD K10 /0
DCA STOP /0002
TAD K10 /10
DCA STOP+1
TAD STOP+1
DCA I XPD
JMS I XTRANS /PUT TEST ROUTINE INTO FIELD X
CDF 10 /FIELD 1 TO START WITH
CIV 10 /SHOULD ENTER EXTENDED FIELD
JMP I+1 /AFTER THIS JMP. HLT IF NOT
NOP /ERROR: PI FAILED
HLT /C(I.0) = C(I.0;)
JMP STDF /REPEAT SAME TEST.

STDF.
E40.
JMP STDF

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1234
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/ENTER HERE AFTER PI FROM EXTENDED BANK
*1200
ENTER, RDF
SNA
JMP +4
HLT
CLA
JMP I XTDF
CIF 10
RMP
RIB 00
CDF 00
TAD I K7S
CMA
SNA CLA
JMP CKPC
RIB
HLT
E41,
/DF SHOULD BE 000
/ERROR IF SKIP
/CHECK C(SF)
/AC=C(DF)
/REPEAT TEST
/SET I.B. TO FIELD 1
/I.B. NOW EQUAL TO SF
/READ IB
/ERROR IF SKIP
/ERROR RMP AND PI WORKED, BUT
/I.B. NOT CORRECT AFTER RMP.
/AC=C(1B)
/BACKUP A PAGE AND REPEAT
/MAKE E40+1
/COMPARE TO C(0)
/SHOULD NOT SKIP
/FALL OK SETUP FOR NEXT FIELD
/ERROR: ALL WORKED, BUT
/C(0) WAS NOT TO E40+1
/AFTER PI IN EXTENDED
/FIELD, C(AC)C(0);F0.
/CHECK FOR PI NOT INHIBITED.
/FOR AUTO-INDEX REG.
/I2 FAILING IN THE EXTENDED FIELD.
E42,
CKPC, TAD KE40
IAC
CIA 0
TAD 0
SNA CLA
JMP +0
HLT
E43,
CLA
JMP I XTDF
/SETUP FOR NEXT FIELD
/
ISE STKS
JMP +0
ISE LOOP
JMP I +2
JMP I XFI8
STRMF+4
/BACKUP AND REPEAT
/DONE ALL IF SKIP
/DONE LOOPING IF SKIP
/REPEAT ALL AGAIN
/EXIT TO NEXT TEST
/BACK TO LAST PAGE

```

667 /
 668 /SET LAST TESTED FIELD TO ALL 0'S AND PUT A
 669 /HLT IN RESPECTIVE ADDRESS OF E40
 670 /
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1246 7240
 1247 3010
 1250 1477
 1251 3252
 1252 6211
 1253 3410
 1254 1010
 1255 7040
 1256 7640
 1257 5253
 1260 6201
 1261 1477
 1262 3263
 1263 6211
 1264 1037
 1265 3436
 1266 6201

CLA CMA
 DCA 10 /CDF X0 AT STDF
 TAD I XTDF /F1 TO START WITH
 DCA :+1 /CLEAR IF SKIP
 CDF 10 /CDF X0 AT STDF
 DCA I 10 /KE40=ADDRESS OF E40
 TAD 10 /RESTORE DF
 CMA CLA
 SEA CLA /E7402 (HLT)
 JMP :+4 /KE40=ADDRESS OF E40
 CDF 00 /RESTORE DF
 TAD I XTDF
 DCA :+1
 CDF 10
 TAD KHLT
 DCA I KE40
 CDF 00

/INCREMENT CDF AND CIF 10T'S AT STDF, STDF+1
 /TO NEXT FIELD.
 /

1267 1477
 1270 1045
 1271 3477
 1272 1500
 1273 1045
 1274 3900
 1275 1500
 1276 3216
 1277 2067
 1300 4321
 1301 5477

TAD I XTDF /CDF X0 AT STDF
 TAD K10
 DCA I XTDF /CIF X0 AT STDF
 TAD I XTDF1
 TAD K10
 DCA I XTDF1
 TAD I XTDF1
 DCA EXPD
 ISB K7S
 JMS TRANS /PUT ROUTINE IN NEW FIELD
 JMP I XTDF /TEST NEW FIELD

694
 695
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 703

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 FIELD. 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 I

EXPLO: 0 /0
TAD 0 /1
SNA /IF LOC. 0 NOT = 0 PI DIDN'T
ENTER FIELD 0
JMP ,+5 /3
HLT /4. INTERRUPTED TO THIS FIELD
E44, /INSTEAD OF FIELD 0, C(AC)5C(0)
WHICH SHOULD BE E40+1
/IF NOT, CHECK LOC. 7777, IT
MUST # 5412 (JMP I 12).

CLA 0 /5
DCA 0 /6
JMP I 20 /7. C(20) #E40
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.
JMP ,+4 /11. REPEAT IN THIS FIELD
E40 /12. AUTO-INDEXS TO E40+1
/IN F 0 IF THE JMP I 12
WORKS.

LOCS. 13 TO 17 ARE ALL 0'S

E40 /20. EQUALS E40 IN F0.

LOCS. 21 TO E40-2 ARE ALL 0'S

EXPLO: CIF 10 /FIELD 1 TO START WITH
ION /LOC. E40. SEE SYMBOL TABLE
FOR E40.
/LOCS. E40+1 TO 7776 ARE ALL 0'S

JMP I 12

/7777, PI SHOULD OCCUR,
/AFTER THIS INSTRUCTION,
/TO FIELD 0.

Table with 3 columns: Address (704-755), Field Number (EXPLO, E44, E45, 1313-1314, 1315, 1316-1317, 1320), and Instruction/Comment text.

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/ROUTINE TO TRANSFER TEST ROUTINE TO PROPER FIELD
/TRANS, 0
1321 0000 TAD KJMP /KJMP=JMP I 2
1322 1102 DCA 1 /IN FIELD 0
1323 3001 TAD KNTR /KNTR = LOC. ENTER
1324 1103 DCA 2 /OF FIELD 0
1325 3002 TAD KXFLD /KXFLD = LOC. EXFLD
1326 1101 DCA 10
1327 3010 DCA 11
1330 3011 TAD K7766 /1=10 DECIMAL
1331 1070 DCA 0 /SAVE
1332 3000 TAD I XTDF /CDF X0 IN STDF
1333 1477 DCA 03
1334 3337 CDF 00
1335 6201 TAD I 10
1336 1410 CDF 10
1337 6211 DCA I 11 /P1 TO START WITH
1340 3411 DCA I 11 /PUT IN EXTENDED FIELD
1341 2000 ISE 0 /DONE LOC8 1 TO 12 IF SKIP
1342 5335 JMP 05
1343 1337 TAD TRFLD
1344 3347 DCA 03
1345 6201 CDF 00
1346 1410 TAD I 10
1347 6211 CDF 10
1350 3504 DCA I K20
1351 6201 CDF 00
1352 1337 TAD TRFLD
1353 3355 DCA 03
1354 1410 TAD I 10
1355 6211 CDF 10
1356 3435 DCA I KE40H
1357 6201 CDF 00 /PUT CIF X0 IN E40=1
1360 1337 TAD TRFLD
1361 3363 DCA 02
1362 1410 TAD I 10
1363 6211 CDF 10
1364 3436 DCA I KE40
1365 6201 CDF 00 /10N TO LOC. 540
1366 1337 TAD TRFLD
1367 3371 DCA 02
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

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/TEST SF WITH AN RMF JOT, 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.

      TSF
      JMS I XTFLG
      TAD K7000
      DCA LOOP
      CDF IB
      TAD KHLT
      DCA I K7000
      CDF 00
      TAD JMP2
      DCA I K7000

      TAD KJMP
      DCA 1
      TAD KRTRN
      DCA 2

      ION
      NOP
      HLT
      JMP SFIB

      CLA 10
      CIP 10
      RMF I K7000
      JMP I K7000

      IS3 LOOP
      JMP E45A=2
      JMP TAUTO

      /SEE IF FLAG IS SET.
      /SET IT
      /7000
      /DF=FIELD 1
      /HLT
      /7000, FIELD 1=HLT
      /DF=0
      /JMP2=JMP I KFLD0
      /7000, FIELD 0=JMP I KFLD0
      /KFLD0=LOC, RTRN
      /KJMP=JMP I 2
      /KRTRN=LOC, E45A=2
      /ENABLE PI
      /ERROR NO PI
      /REPEAT TEST

      /RETURN HERE AFTER PI

      /BEGIN TEST

      1400 6041
      1401 4422
      1402 1047
      1403 3027
      1404 6211
      1405 1037
      1406 3047
      1407 6201
      1410 1105
      1411 3447

      1412 1102
      1413 3001
      1414 1107
      1415 3002

      1416 6001
      1417 7000
      1420 7402
      1421 5200

      1422 7200
      1423 6211
      1424 6212
      1425 6244
      1426 5447

      1427 2027
      1430 5216
      1431 5232
  
```

849 /
 850 /
 851 /TEST ALL AUTO=INDEX REGISTERS IN EACH EXTENDED FIELD.
 852 /IDENTICAL TEST ROUTINES ARE PERFORMED FROM EACH FIELD.
 853 /AND ERROR HALTS OCCUR IN THE FIELD CURRENTLY RUNNING
 854 /THE ROUTINE, PRESS CONT, TO RESUME TESTING, EACH
 855 /FIELD CONTAINS ALL 0'S EXCEPT FOR THE AREA OCCUPIED
 856 /BY THE TEST ROUTINE. FIELD 0 IS RE-ENTERED
 857 /AFTER EACH TEST, AND THE NEXT SEQUENTIAL FIELD
 858 /IS THEN ENTERED. REFER TO THE HEADING "AUTO=
 859 /INDEX TEST" FOR THE SEQUENCE OF OPERATIONS.
 860 /

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 /0201
 1437 3246 DCA DFN
 1440 1246 TAD DFN
 1441 1045 TAD K10 /INCREMENT DF
 1442 3246 DCA DFN

1443 7040 /CLEAR ONE FIELD TO 0
 1444 3010 /
 1445 3000 CMA
 1446 6211 DCA 10
 1447 3410 DCA 0
 1450 2000 CDF 10 /USE LOC. 0 FOR A COUNTER
 1451 5247 DCA I 10 /FIELD 1 TO START WITH
 1452 6201 I82 0
 JMP =2
 CDF 00

1453 1317 /NOW PUT TEST ROUTINE IN THE EXTENDED FIELD
 1454 3010 TAD 00AUTO
 1455 1072 DCA 10 /1ST LOC. OF ROUTINE MINUS 1
 1456 3000 TAD K7744 /SOURCE
 1457 1317 DCA 0 /USE LOC. 0 AS COUNTER
 1460 3011 TAD 00AUTO /DESTINATION
 1461 1246 DCA 11 /CDF X0
 1462 3265 DCA 03
 1463 6201 CDF 00
 1464 1410 TAD I 10
 1465 6211 CDF 10 /FIELD 1 TO START
 1466 3411 DCA I 11 /MOVE WHEN SKIP
 1467 2000 I82 0
 1470 5265 JMP MOVE

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/ NOW SET AUTO=I REGS 10 TO 17 TO 7777,
/
1471 1065 TAD K7770
1472 3000 DCA 0
1473 1044 TAD K7
1474 3010 DCA 10
1475 7040 CMA I 10
1476 3410 DCA I 10
1477 2000 ISZ 0
1500 5275 JMP .=3
1501 7040 CMA I K7777
1502 3446 DCA I K7777
1503 6214 ROP
1504 1041 TAD KCIF
1505 3306 DCA I=1
1506 6212 CIP 10
1507 4716 JMS I FILOX

1510 2031
1511 5240
1512 2027
1513 5235
1514 5715
1515 1600

1516 1002

/ ENTER FIELD 0 FROM EXTENDED FIELD HERE.
/
GOTO0, ISZ STKS /DONE ALL WHEN SKIP
JMP NENDF /SETUP FOR NEXT
ISZ LOOP /ALL DONE IF SKIP
JMP NENDF=3 /REPEAT ALL
JMP I LBTP
LBTP: RMTST
/ FILOX, DOAUTO=515

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932 /
933 /
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935 /
936 /THE ROUTINE WILL BE PLACED IN THE SAME RESPECTIVE
937 /LOCATIONS IN EACH EXTENDED FIELD; ANY ERROR
938 //HALTS WILL OCCUR IN THE EXTENDED FIELD. PRESS
939 /CONTINUE TO PROCEED WITH TESTING. THE INDEX
940 /REGISTERS 10 TO 17 INITIALLY CONTAIN 7777, AND
941 /ARE AUTO-INDEXXED TO 0000 BY A TAD I INSTRUCTION.
942 /A HALT OCCURS IF THE REG. IS NOT INCREMENTED TO 0.
943 /THE TAD I WOULD HAVE THEN REFERENCED LOC. 7777.
944 /WHICH CONTAINS 7777.
945 /
946 DOAUTO, .
947
948 1517 1517
949 1520 7200 CLA
950 1521 1410 TAD I 10
951 1522 7440 SEA
952 1523 7402 HLT
953 1524 1411 TAD I 11
954 1525 7440 SEA
955 1526 7402 HLT
956 1527 1412 TAD I 12
957 1530 7440 SEA
958 1531 7402 HLT
959 1532 1413 TAD I 13
960 1533 7440 SEA
961 1534 7402 HLT
962 1535 1414 TAD I 14
963 1536 7440 SEA
964 1537 7402 HLT
965 1540 1415 TAD I 15
966 1541 7440 SEA
967 1542 7402 HLT
968 1543 1416 TAD I 16
969 1544 7440 SEA
970 1545 7402 HLT
971 1546 1417 TAD I 17
972 1547 7440 SEA
973 1550 7402 HLT
974 1551 6201 GDF 00
975 1552 6202 CIP 00
976 1553 5310 JMP GOTO0
977 /
978 /

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/THIS LOC. IS NOT MOVED TO
/THE EXTENDED FIELD.

/ERROR, INDEX REG. 10 FAILED

/INDEX REG. 11 FAILED

/12 FAILED

/13 FAILED

/14 FAILED

/15 FAILED

/16 FAILED

/17 FAILED
/SET OF TO FIELD 0
/SET I.B. TO FIELD 0
/EXIT TO FIELD 0

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/END OF TEST ROUTINE
/
/

```

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979 /PD. 61: 8S EXTENDED MEMORY CONTROL TEST. PAL10 /NEXT
980 /CHECK SR 0. IF AN 81 IS BEING USED SR 8 MUST BE
981 /ON A 1. OTHERWISE, 0.
982 /
983 CSR8. LAS 7604 AND K10
984 1554 0045 SZA CLA
985 1555 7640 JMP I XMEM /NEXT TEST
986 1556 5767 AND 7
987 1557 0007 TAD 01
988 BELL. 1561 1360 /RING BELL
989 1562 6046 TLS
990 1563 6041 TSF
991 1564 5363 JMP 01
992 1565 5766 JMP I X8GN /START OVER AT 200
993 /
994 X8GN: 0200 BEGIN
XMEM: 2200 NOMEM

```


1050 1647 6201 /PD. , 81. 88 EXTENDED MEMORY CONTROL TEST, PAL10 V.L.1 28JUL70 22140 PAGE 24-1

CDP 00


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/ROUTINE TO CHECK CORRECT TRANSFERS FOR SAVE FIELD TO DATA FIELD AND
/SAVE FIELD TO INST. BUFFER TO INSTRUCTION FIELD AFTER
/RMF.
/STORED IN ALL EXTENDED FIELDS.

1703 6001 RMFDY: ION /THIS IS NOT TRANSFERRED.
1704 7000 NOP
1705 6002 IOP
1706 7402 HLT /INTERRUPT FAILURE.
1707 5333 JMP REPEAT
1710 7200 RMFDY1: CLA /CHECK FOR CORRECT DATA FIELD
1711 6214 ROP MDPSHB
1712 1340 TAD SNA CLA
1713 7650 JMP :+4
1714 5320 TAD KDFSHB
1715 1337 TAD
1716 7402 HLT
1717 5333 JMP REPEAT
1720 6224 RIF
1721 1342 TAD MIFSHB
1722 7650 SNA CLA
1723 5327 JMP :+4
1724 1341 TAD KIFSHB
1725 7402 HLT
1726 5333 JMP REPEAT
1727 6201 CDF
1730 5732 CIF
1731 1665 JMP I
1732 RMFE1
1733 6201 REPEAT: CDF
1734 6202 CIF
1735 5736 JMP I
1736 RMFE2
1737 1656
1740 0000 KDFSHB: 0
1741 0000 MDFSHB: 0
1742 0000 KIFSHB: 0
0000 MIFSHB: 0

/ROUTINE TO TRANSFER N1 WORDS STARTING AT P IN FIELD 0 TO P IN THE
/NEXT N2 EXTENDED FIELDS.
/THE CALLING SEQUENCE IS:
/JMS I XPERP
/BN2
/BN1
/PC1

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1136 2000 0000 / *2000
1137 2001 7200 / XFER,
1138 2002 1600 CLA I
1139 2003 3242 DCA XFER
1140 2004 2200 ISZ N2
1141 2005 1600 TAD I XFER
1142 2006 3243 DCA N1
1143 2007 2200 ISZ XFER
1144 2010 1600 TAD I XFER
1145 2011 3244 DCA P
1146 2012 2200 ISZ XFER
1147 2013 1040 TAD KCOF
1148 2014 3232 DCA XFERIN
1149 2015 1242 TAD N2
1150 2016 3245 DCA XFERC2
1151 2017 1244 TAD P
1152 2020 3010 DCA 10
1153 2021 1244 TAD P
1154 2022 3011 DCA 11
1155 2023 1243 TAD N1
1156 2024 3246 DCA XFERC1
1157 2025 1232 TAD XFERIN
1158 2026 1045 TAD K10
1159 2027 3232 DCA XFERIN
1160 2030 6201 XFERL1: COF 00
1161 2031 1410 TAD I 10
1162 2032 6201 XFERIN: COF
1163 2033 3411 DCA I
1164 2034 2246 ISZ XFERC1
1165 2035 5230 JMP XFERL1
1166 2036 2245 ISZ XFERC2
1167 2037 5217 JMP XFERL2
1168 2040 6201 COF 00
1169 2041 5600 JMP I XFER
1170 2042 0000 N2,
1171 2043 0000 N1,
1172 2044 0000 P,
1173 2045 0000 XFERC2: 0
1174 2046 0000 XFERC1: 0
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1177
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/GET =N2
/GET =N1
/GET P=1

/UPDATE TO RETURN ADDRESS,
/INITIALIZE COF INST.

/PUT POINTER IN AUTO 10 AND 11.

/SET COUNTER 1 TO =N1

/UPDATE COF INST.

/TRANSFER

/DONE WITH CURRENT FIELD?
/NO, CONTINUE.
/DONE WITH ALL FIELDS?
/NO, DO NEXT FIELD
/ALL DONE. SET DF=0.
/EXIT.


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2200
*2200
/
/REFERENCE ALL 4K FIELDS NOT PRESENT. IF 32K
/IS PRESENT, THE TEST IS BY-PASSED, AND PROGRAM IS
/RESTARTED AT 200, EACH FIELD NOT PRESENT IS
/REFERENCED BY THE PROGRAM WITH JMP, DCA AND TAD.
//THE PROGRAM MUST CONTINUE IN SEQUENCE/ THE TTY
/BELL WILL SIGNAL A SUCCESSFUL TEST, AND THE PRO-
/GRAM IS THEN RESTARTED AT 200.
/
NOMEM:
2200 CLA
2201 TAD K7770
2202 DCA LOOP
2203 LAS
2204 AND K7
2205 CIA
2206 TAD K7
2207 SNA
2208 JMP I XBELL
2209 DCA NOSTAK
2210 DCA I XELL
2211
2212

7604
0844
7001
7100
7006
7004
3034
1033
7041
3033

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2221
2222
2223
2224

LAS AND K7
IAC
CLL
RTL
RAL
DCA NOFLD
TAD NOSTAK
CIA
DCA NOSTAK

/TEST LOOP COUNTER
/READ SR9=11
/SUBTRACT MAX. POSSIBLE
/32K PRESENT. CAN'T TEST
/SAVE NO. MISSING
/CLEAR THE TLS IOT AT
/BELL*1 TO PROHIBIT
/FALSE INDICATION: TLS
/IS RESTORED LATER WRONG
/ENTRY FROM NON-EXISTENT
/MEMORY MAY CAUSE A
/HANG-UP AT BELL*2 AND *3.
/*1 TO GET 1ST MISSING
/POSITION TO AC 6=0.
/1ST MISSING
/* STACKS NOT HERE
/USED AS COUNTER

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2225 1040
2226 1034
2227 3262
2230 1040
2231 1034
2232 3307

2233 1033
2234 7041
2235 7010
2236 7020

2237 5257
2240 4261
2241 2033
2242 5254
2243 2027
2244 5650
2245 1253
2246 3651
2247 5652

2250 2203
2251 1962
2252 1561
2253 6046

2254 1307
2255 1045
2256 3307
2257 4306
2260 5241

TAD KCDF
TAD NOFLD
DCA CDF0S
TAD KCDF
TAD NOFLD
DCA CDF1S

/6201
/MISSING STACK

/
/

/ NOW SEE IF AN ODD OR EVEN NUMBER IS MISSING
/

TAD NOSTAK
CIA
RAR
SNL CLA

JMP POS+3
JMS ALL0
ISE NOSTAK
JMP POS
ISE LOOP
JMP I XNOM
TAD TT0
DCA I XELL
JMP I XBELL

NOMEM+3
BELL+1
BELL
TTS

TAD CDF1S
TAD K10
DCA CDF1S
JMS ALL1
JMP CNSTK

CNSTK:
/

POS:
/

/DF PLUS 1
/READ ALL 1'S
/CHECK DONE

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/ROUTINE TO READ ALL 0'S.
/
ALL0:      CDF 00          /SET DF TO 1ST MISSING
CDF0S,    CLA CMA
           DCA 10        /10 AND 11 USED FOR ADDRESS
           CMA 11
           DCA 11
           DCA 2         /USE AS COUNTER
           CMA
           DCA I 10     /WRITE 1'S INTO NON-EXIS=
                       /TENT FIELD.
           ISZ 2
           JMP I=3
           TAD I 11
           SNA CLA
           JMP I=3
           TAD 11
           HLT
E94.
           ISZ 2
           JMP EP4=4
           /READ NEXT
/
DONE0,    CDF 00
           CIF 00
           JMP I ALL0   /EXIT
/

```

2261 0000
2262 6201
2263 7240
2264 3010
2265 7040
2266 3011
2267 3002
2268 7040
2271 3410

2272 2002
2273 5270
2274 1411
2275 7650
2276 5301
2277 1011
2300 7402

2301 2002
2302 5274

2303 6201
2304 6202
2305 5661

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1287 /ROUTINE TO READ ALL 1'S
1288 /
1289 ALL1, CDF1S,
1290 0000 /SET DF TO MISSING FIELD
1291 2306 2307 6201
1292 2310 2310 7240
1293 2311 3010
1294 2312 7040
1295
1296 DCA 11
1297 DCA 2 /USED AS COUNTER
1298 DCA I 10 /WRITE 0'S
1299 ISE 2
1300 JMP I=2 /READ 1'S FROM NO MEMORY
1301 TAD I 11
1302 CMA
1303 SNA
1304 JMP I=4
1305 CMA
1306 HLT
1307
1308 E57.
1309
1310 CLA 2
1311 ISE 2
1312 JMP E57=5
1313 CDF 00
1314 CIF 00
1315 JMP I ALL1 /EXIT

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

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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	NOHEM	22140	PAGE	2200
AGAIN2	1005	E25	0727	ISEZ	0021	NOSTAK			0033
ALL0	2261	E26	0741	JMP2	0105	NSYKS			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
CDP0S	2262	E32	0755	K20	0104	OK5			0362
CDP1S	2307	E4	0245	K7	0044	OK6			0440
CHDF	1073	E40	1132	K7000	0047	OK7			0502
CIF	6202	E41	1203	K7707	0050	OK8			0544
CYCK	0753	E42	1221	K7717	0056	P			2044
CIPCK1	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
CRPC	1226	E47	1526	K7766	0070	RIF			6224
CNSTK	2241	E48	1531	K7767	0051	RMP			6244
CSR0	1594	E49	1534	K7770	0065	RMP0N1			1676
CSR0P	1701	E5	0262	K7771	0064	RMPDY			1703
DAT	0032	E50	1537	K7772	0063	RMPDY1			1710
DCAI	0601	E51	1542	K7773	0062	RMPE1			1665
DF0	0202	E52	1545	K7774	0061	RMPE2			1656
DF1	0226	E53	1550	K7775	0060	RMPI1			1660
DF2	0237	E54	2300	K7776	0057	RMPI2			1661
DF3	0234	E57	2325	K7777	0046	RMPL1			1633
DF4	0265	E6	0273	K78	0067	RMPL2			1621
DF5	0302	E60	1706	K0DF	0040	RMPL3			1615
DF6	0313	E61	1716	K0IF	0041	RMPTST			1600
DF7	0211	E62	1725	K0FSHB	1737	RTRN			1427
DF8	1677	E7	0310	KE40	0036	SF1B			1400
DF9	0607	E8	0321	KE00H	0035	STDF			1126
DFN	1446	E9	0341	KFLD0	0106	STKS			0031
DOAUTO	1517	ENTER	1200	KHLT	0037	STRMF			1106
DONE0	2303	EXPD	1316	K1PSHB	1741	TADI			0622
E1	0206	EXFLD	1302	KJMP	0102	TAUTO			1432
E10	0351	F1LDX	1516	KNOP	0752	TFLD			0630
E11	0360	CO700	1510	KNR	0103	TFLG			2342
E12	0410	H1TS	0671	KRYN	0107	TRANS			1321
E13	0417	I80	0334	KXFLD	0101	TRPLD			1337
E14	0427	I81	0343	L8TP	1515	TRMF			1047
E15	0436	I82	0402	L8YSG	1675	YTB			2253
E16	0452	I83	0421	LOOP	0027	XAUTO			0026
E17	0461	I84	0444	M0FSHB	1740	XBELL			2252
E18	0471	I85	0463	M1FSHB	1742	XBGN			1566
E19	0500	I86	0506	MOVE	1463	XBLL			2251
E2	0217	I87	0525	N1	2043	XFO			0042
E20	0514	I8SF	0656	N2	2042	XFER			2000
E21	0523	I8SF1	1000	NDF	0030	XFERC1			2046
E22	0533	IFCN	1605	NEWOF	1440	XFERC2			2045
E23	0542	INTE	1663	NOFLD	0034	XFERIN			2032

XFERL1 2030
XFERL2 2017
XPERP 1700
XFIB 0110
XMEM 1967
XNOM 2250
XRANS 0025
XRHF 0024
XSTKS 0023
XTDF 0077
XTDF1 0100
XTFLG 0022

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 11 SECONDS

3K CORE USED

E20
E21
E22
E23
E24
E25
E26
E27
E3
E30
E31
E32
E4
E40
E41
E42
E43
E44
E45
E49A
E46
E47
E48
E49
E5
E50
E51
E52
E53
E54
E57
E6
E60
E61
E62
E7
E8
E9
ENTER
EXFD
EXPLD
FILOX
GOTO0
HLTS
I80
I81
I82
I83
I84
I85
I86
I87
I8SF

323#
331#
340#
348#
394
468#
473
515#
123#
520
440
442
134#
38
621#
635#
649#
724#
732#
61
951#
954#
957#
960#
149#
963#
966#
969#
972#
1277#
1305#
1309#
159#
1893#
1101#
1109#
1175#
185#
208#
77
43
75
916
924#
436#
203#
207
230
249
276#
290
317#
330
339

407#
478#
525#
490#
491#
39
610#
739
766
835#
847
1281
1309
618#
700
719#
931#
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446
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211#
236#
253#
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294#
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748#
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