

IDENTIFICATION  
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PRODUCT CODE: MAINDEC-8E-D0HC-D  
PRODUCT NAME: RANDOM JMP TEST  
DATE CREATED: JUNE 11, 1971  
MAINTAINER: DIAGNOSTIC GROUP  
AUTHOR: BRUCE HANSEN

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1. ABSTRACT

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THIS PROGRAM TESTS THE JMP INSTRUCTION OF THE PDP-8E. MOST OF  
MEMORY IS USED AS A JUMP FIELD WITH A RANDOM NUMBER GENERATOR  
SELECTING EACH JUMP FROM AND JUMP TO LOCATION,

2. REQUIREMENTS

2.1 EQUIPMENT

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PDP-8E EQUIPPED WITH TELETYPE,

2.2 STORAGE

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0000,0421, THE BINARY LOADER MUST BE STORED IN THE LAST MEMORY  
PAGE,

2.3 PRELIMINARY PROGRAMS

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IT IS ASSUMED THAT MAINDEC=8E-D0A(N), AND MAINDEC=8E-D0B(N) HAVE  
RUN SUCCESSFULLY,

3. LOADING PROCEDURE

3.1 METHOD

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USE STANDARD BINARY LOADER,

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

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SR0(0) HALT ON ERROR,

SR2 HOLD JUMP FROM ADDRESSES CONSTANT, (1)  
SELECT RANDOM JUMP FROM ADDRESSES, (0)

SR3 HOLD JUMP TO ADDRESSES CONSTANT, (1)  
SELECT RANDOM JUMP TO ADDRESSES, (0)

4.2 STARTING ADDRESS

-----  
0200

RESTART ADDRESS

-----  
0214

#### 4.3 OPERATOR ACTION

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A, SET SR TO 0200 AND PRESS LOAD ADDRESS,

B, SET SR TO DESIRED MODE, IF A PARTICULAR MEMORY LOCATION IS DESIRED FOR EITHER A "CONSTANT FROM" OR "CONSTANT TO", THIS MEMORY ADDRESS IS ENTERED INTO ONE OF THE LOCATIONS SHOWN BELOW:

FROM 1 ADDRESS = 0120

FROM ADDRESS = 0117

TO ADDRESS = 0116

NOTE: ALWAYS MAKE (FROM 1) = (FROM) -1

IF SR2 OR SR3 IS SET AFTER THE PROGRAM HAS BEEN STARTED, THE LAST ADDRESS TAKEN FROM THE RANDOM NUMBER GENERATOR IS USED REPEATEDLY,

C, PRESS CLEAR THEN CONTINUE,

#### 5. OPERATING PROCEDURE

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SAME AS SECTION 4,

#### 6. ERRORS

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#### 6.1 ERROR HALTS

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ALL UNUSED MEMORY LOCATIONS ARE LOADED WITH HLT ORDERS, IF THE PROGRAM EXECUTES ONE OF THESE BACKGROUND HLTS, IT IS PROBABLE THAT THE INTERRUPT FAILED TO OCCUR FOLLOWING THE JMP INSTRUCTION.

## 6.2 ERROR PRINTOUTS

F WWW TO XXXX

Z = YYYY

(FROM) F WWW:WWW = THE ADDRESS OF THE JMP INSTRUCTION.  
(TO) T XXXX: XXXX = THE ADDRESS THAT THE JMP INSTRUCTION IS JUMPING TO.  
(LOC 0000) Z = YYYY: YYYY = THE ADDRESS STORED IN LOCATION 0000 DURING THE INTERRUPT.

NOTE THAT YYYY SHOULD EQUAL XXXX.

EXAMPLE: THE FOLLOWING IS A TYPICAL ERROR PRINTOUT:

F 4252 TO 7020  
Z = 7000

LINE 1 OF THE PRINTOUT IS A STATEMENT OF THE PROBLEM. A JMP INSTRUCTION IS PLACED AT LOCATION 4252. THIS JMP INSTRUCTION IS TRYING TO JUMP TO LOCATION 7020. LINE 2 OF THE PRINTOUT INDICATES THE ERROR. THE TO ADDRESS (7020) WAS TO HAVE BEEN STORED IN LOCATION 0000 BUT INSTEAD A 7000 WAS STORED. THUS BIT 7 WAS DROPPED.

## 6.3 ERROR RECOVERY

THE PROGRAM CONTINUES TESTING FOLLOWING AN ERROR PRINTOUT. WHEN ENOUGH INFORMATION HAS BEEN GATHERED FROM THE ERROR PRINTOUTS, A FROM AND TO ADDRESS IS SELECTED FOR USE IN THE SCOPE MODE LOOP. ENTER THE CHOSEN ADDRESSES INTO PROPER LOCATIONS (SEE SECTION 4.3.8). RESTART THE PROGRAM WITH SR2 AND SR3 SET. AFTER ALLOWING IT TO RUN FOR A MOMENT PUSH HALT, ENTER (5520) INTO LOCATION 1, AND RESTART THE PROGRAM AT LOCATION 0027 WITH SR2 AND SR3 SET. THE SCOPE MODE LOOP IS

LOCATION	CODING
0000	
0001	JMP I FROM 1
XXXX	A, ION
XXXX	JMP I TO
0120	FROM 1, A

WHEN IT IS DESIRED TO DISCONTINUE THE SCOPE MODE LOOP, RESTORE THE ORIGINAL CONTENT 1116 INTO LOCATION 1, AND RESTART THE PROGRAM.

## 7. RESTRICTIONS

(NONE)

8. MISCELLANEOUS  
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8.1 EXECUTION TIME  
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7200 RANDOM TEST/SECOND

9. PROGRAM DESCRIPTION  
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THE JMP INSTRUCTION IS CHECKED THROUGH THE USE OF THE INTERRUPT FUNCTION. A RANDOM NUMBER GENERATOR SELECTS A FROM AND A TO ADDRESS. AN ION INSTRUCTION IS THEN PLACED AT FROM-1 AND THE JMP INSTRUCTION AT FROM. THE JMP INSTRUCTION JUMPS TO THE ADDRESS SPECIFIED BY TO. AFTER EXECUTING THESE TWO ORDERS, AN INTERRUPT OCCURS STARTING THE PROGRAM COUNTER AT LOCATION 1. A CHECKING ROUTINE LOCATED HERE VERIFIES THAT THE OPERATION WAS SUCCESSFUL BEFORE STARTING THE NEXT TEST.

RANDOM ADDRESSES ARE RESTRICTED AS FOLLOWS:  $0400 < \text{RANDOM ADDRESS} < 7600$ . THE AREA BETWEEN 0400 AND 7600 IS FILLED WITH HLT INSTRUCTIONS IN CASE THE INTERRUPT FAILS. A "HC" IS PRINTED AFTER EACH GROUP OF 72,000 TESTS.

/RANDOM JMP TEST  
 /SR0(0)=HALT ON ERROR  
 /SR2(1)=CONSTANT FROM ADDRESS  
 /SR3(1)=CONSTANT TO ADDRESS

0000	0000	*0	
0000	0000	0	/FOR SCOPE MODE INSERT
0001	5001	JMP 1	/JMP 1 FROM1 (5520) INTO LOC. 1
0002	0002	2	
0003	0003	3	
0004	0000	0	
0005	0000	0	
0006	7640	SZA CLA	
0007	5534	JMP 1 AER	
0010	1115	TAD HALT	
0011	3517	DCA 1 FROM	
0012	1115	TAD HALT	
0013	3520	DCA 1 FROM1	
0014	3000	DCA 0	
0015	7001	IAC	
0016	1140	TAD CT	
0017	3140	DCA CT	
0020	1140	TAD CT	
0021	7640	SZA CLA	
0022	5027	JMP LOOP	
0023	5424	JMP 1 ,+1	
0024	0316	SUP	
0025	1142	TAD M17	
0026	3141	DCA CT1	

/CHECK FOR CONSTANT FROM

0027	7604	LOOP, LAS
0030	7004	RAL
0031	7006	RTL
0032	7630	SZL CLA
0033	5057	JMP LOOP1

/SELECT RANDOM FROM

0034	1121	GETRAN, TAD RANUM
0035	7104	RAL CLL
0036	7430	SZL
0037	1122	TAD THREE
0040	3121	DCA RANUM
0041	7100	CLL
0042	1121	TAD RANUM
0043	1124	TAD LIMHI
0044	7630	SZL CLA
0045	5034	JMP GETRAN
0046	1121	TAD RANUM
0047	1123	TAD LIMLO
0050	7620	SNL CLA
0051	5034	JMP GETRAN

0052	1121	TAD RANUM
0053	3117	DCA FROM
0054	7040	CMA
0055	1117	TAD FROM
0056	3120	DCA FROM1

## /CHECK FOR CONSTANT TO ADDRESS

0057	7604	LOOP1, LAS
0060	7006	RTL
0061	7006	RTL
0062	7630	SZL CLA
0063	5104	JMP JPLP

## /SELECT RANDOM TO ADDRESS

0064	1121	GTRAN1, TAD RANUM
0065	7104	RAL CLL
0066	7430	SZL
0067	1122	TAD THREE
0070	3121	DCA RANUM
0071	7100	CLL
0072	1121	TAD RANUM
0073	1124	TAD LIMHI
0074	7630	SZL CLA
0075	5064	JMP GTRAN1
0076	1121	TAD RANUM
0077	1123	TAD LIMLO
0100	7620	SNL CLA
0101	5064	JMP GTRAN1
0102	1121	TAD RANUM
0103	3116	DCA TO

## /PLACE INSTRUCTIONS

0104	1125	JPLP, TAD JMP1
0105	3517	DCA I FROM
0106	1126	TAD ITON
0107	3520	DCA I FROM1

## /RAISE FLAG

0110	6041	TSF
0111	6046	TLS
0112	6041	TSF
0113	5112	JMP , -1

## /DO IT

0114	5520	JMP I FROM1
0115	7402	HALT, HLT

/JUMP FAILED

/CONSTANTS, VARIABLES, AND SUCH



/RANDOM JMP TEST

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0116	0000	TO,	0
0117	0000	FROM,	0
0120	0000	FROM1,	0
0121	2525	RANUM,	2525
0122	0003	THREE,	3
0123	7400	LIMLO,	-400
0124	0200	LIMHI,	-7600
0125	5516	JMP1,	JMP I TO
0126	6001	ITON,	ION
0127	0260	TW6,	260
0130	0007	MSK7,	7
0131	0000	SAVE,	0
0132	0000		0
0133	0000		0
0134	0220	AER,	ER
0135	0000	WORK,	0
0136	7571	M207,	-207
0137	0143	AMSG1,	MSG1
0140	0000	CT,	0
0141	0000	CT1,	0
0142	7761	M17,	-17

/TTY MESSAGE

0143	0215	MSG1,	215	/CR
0144	0212		212	/LF
0145	0212		212	/LF
0146	0306		306	/F FROM ADDRESS
0147	0240		240	/SPACE
0150	0000	INS1,	0	/X
0151	0000	INS2,	0	/X
0152	0000	INS3,	0	/X
0153	0000	INS4,	0	/X
0154	0240		240	/SPACE
0155	0324		324	/T JMP TO
0156	0240		240	/SPACE
0157	0000	INS5,	0	/X
0160	0000	INS6,	0	/X
0161	0000	INS7,	0	/X
0162	0000	INS8,	0	/X
0163	0215		215	/CR
0164	0212		212	/LF
0165	0377		377	/RUBOUT
0166	0332		332	/Z LOCATION ZERO
0167	0240		240	/SPACE
0170	0275		275	/=
0171	0240		240	/SPACE
0172	0000	INS9,	0	/X
0173	0000	INS10,	0	/X
0174	0000	INS11,	0	/X
0175	0000	INS12,	0	/X
0176	0207		207	/STOPPER

0200 \*200

## /SPREAD HALTS THROUGH MEMORY

0200	5770		JMP I PATCH	/TAD LIMLO
0201	7041		CIA	
0202	3116		DCA TO	
0203	1115	GON,	TAD HALT	
0204	3516		DCA I TO	
0205	1116		TAD TO	
0206	7001		IAC	
0207	3116		DCA TO	
0210	1116		TAD TO	
0211	1124		TAD LIMHI	
0212	7640		SZA CLA	
0213	5203		JMP GON	
0214	1367		TAD M15	
0215	3141		DCA CT1	
0216	3140		DCA CT	
0217	5027		JMP LOOP	

## /ERROR ROUTINES

0220	1117	ER,	TAD FROM	
0221	4341		JMS SLOC	
0222	3150		DCA INS1	
0223	1131		TAD SAVE	
0224	0130		AND MSK7	
0225	1127		TAD TW6	
0226	3151		DCA INS2	
0227	1132		TAD SAVE+1	
0230	0130		AND MSK7	
0231	1127		TAD TW6	
0232	3152		DCA INS3	
0233	1133		TAD SAVE+2	
0234	0130		AND MSK7	
0235	1127		TAD TW6	
0236	3153		DCA INS4	
0237	1116		TAD TO	
0240	4341		JMS SLOC	
0241	3157		DCA INS5	
0242	1131		TAD SAVE	
0243	0130		AND MSK7	
0244	1127		TAD TW6	
0245	3160		DCA INS6	
0246	1132		TAD SAVE+1	
0247	0130		AND MSK7	
0250	1127		TAD TW6	
0251	3161		DCA INS7	
0252	1133		TAD SAVE+2	
0253	0130		AND MSK7	
0254	1127		TAD TW6	
0255	3162		DCA INS8	
0256	1000		TAD 0	
0257	4341		JMS SLOC	
0	3172		DCA INS9	

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0261	1131	TAD	SAVE
0262	0130	AND	MSK7
0263	1127	TAD	TW6
0264	3173	DCA	INS10
0265	1132	TAD	SAVE+1
0266	0130	AND	MSK7
0267	1127	TAD	TW6
0270	3174	DCA	INS11
0271	1133	TAD	SAVE+2
0272	0130	AND	MSK7
0273	1127	TAD	TW6
0274	3175	DCA	INS12

/PRINT ERROR MESSAGE

0275	1137	TAD	AMSG1
0276	3135	DCA	WORK
0277	1535	LP,	TAD I WORK
0300	6046		TLS
0301	6041		TSF
0302	5301		JMP , -1
0303	7201		CLA IAC
0304	1135		TAD WORK
0305	3135		DCA WORK
0306	1535		TAD I WORK
0307	1136		TAD M207
0310	7640		SZA CLA
0311	5277		JMP LP
0312	7604		LAS
0313	7700		SMA CLA
0314	7402		HLT
0315	5010		JMP 10

/HALT ON ERROR

0316	1141	SUP,	TAD CT1
0317	7001		IAC
0320	3141		DCA CT1
0321	1141		TAD CT1
0322	7640		SZA CLA
0323	5027		JMP LOOP

0324	1361		TAD MSG2
0325	3135		DCA WORK
0326	1135	LP1,	TAD WORK
0327	7001		IAC
0330	3135		DCA WORK
0331	1535		TAD I WORK
0332	6046		TLS
0333	6041		TSF
0334	5333		JMP , -1
0335	1366		TAD M303
0336	7640		SZA CLA
0337	5326		JMP LP1
0340	5025		JMP LOOP-2

0341 0000 SLOC, 0

0342	3133	DCA	SAVE+2
0343	1133	TAD	SAVE+2
0344	7012	RTR	
0345	7010	RAR	
0346	3132	DCA	SAVE+1
0347	1132	TAD	SAVE+1
0350	7012	RTR	
0351	7010	RAR	
0352	3131	DCA	SAVE
0353	1131	TAD	SAVE
0354	7012	RTR	
0355	7010	RAR	
0356	0130	AND	MSK7
0357	1127	TAD	TW4
0360	5741	JMP	I SLOC

0361	0361	AMSG2,	:
0362	0215		215 /CR
0363	0212		212 /LF
0364	0310		310 /H
0365	0303		303 /C

0366	7475	M303,	-303
0367	7743	M15,	-15
0370	0400	PATCH,	XPATCH

0400	0400	*400	
0400	3000	XPATCH,	DCA 0
0401	1215		TAD X1
0402	3001		DCA 1
0403	1216		TAD X2
0404	3002		DCA 2
0405	1217		TAD X3
0406	3003		DCA 3
0407	1220		TAD X4
0410	3621		DCA I X5
0411	7300		CLA CLL
0412	3004		DCA 4
0413	3005		DCA 5
0414	5621		JMP I X5

/RESTORE 0,1,2,3 AND GO  
/AWAY

0415	1116	X1,	1116	/TAD TO
0416	7041	X2,	CIA	
0417	1000	X3,	1000	/TAD 0
0420	1123	X4,	TAD LIMLO	
0421	0200	X5,	200	