

IDENTIFICATION

PRODUCT CODE:           MAINDEC-8E-D0DB-D  
PRODUCT NAME:           RANDOM AND TEST  
DATE CREATED:            JUNE 7, 1971  
MAINTAINER:             DIAGNOSTIC GROUP  
AUTHOR:                  MICHAEL DAVIS

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1. ABSTRACT

THIS PROGRAM TESTS THE AND INSTRUCTING OF THE PDP-8E, THE AND INSTRUCTION, INSTRUCTION ADDRESS, OPERAND ADDRESS AND BOTH OPERANDS ARE PRODUCED BY RANDOM NUMBER GENERATORS,

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-8E EQUIPPED WITH AT LEAST 4K OF MEMORY,  
TELETYPE,

2.2 STORAGE

THE PROGRAM IS INITIALLY LOADED INTO LOCATIONS 0000 THRU 1177. THE INITIAL TEST AREA IS 1200-7777, WHEN THE PROGRAM RELOCATES, IT OCCUPIES 6600-7777, THE TEST AREA IS THEN 0000-6577,

2.3 PRELIMINARY PROGRAMS

MAINDEC-8E-DBAA, DBBA, DBCA

3. LOADING PROCEDURE

THE STANDARD PROCEDURE FOR LOADING BINARY TAPES IS TO BE USED.

4. STARTING PROCEDURE

4.1 STARTING ADDRESS

0200

4.2 CONTROL SWITCH SETTINGS

SR00=1, SUPPRESS HALT ON ERROR  
SR01=1, HALT AT END OF PASS, RESTORE LOADERS  
SR02=1, SUPPRESS PROGRAM RELOCATION  
SR03=1, SUPPRESS END OF PASS TYPEOUT  
SR09=1, HOLD DATA 1 CONSTANT  
SR10=1, HOLD DATA 2 CONSTANT  
SR11=1, HOLD INSTRUCTION CONSTANT

4.3 OPERATOR ACTION  
-----

4.3.1 SET SR TO 0200  
-----

4.3.2 PRESS LOAD ADDRESS SWITCH  
-----

4.3.3 SET SR TO 0000  
-----

4.3.4 PRESS CLEAR AND CONTINUE SWITCHES  
-----

5. OPERATING PROCEDURE  
-----

SAME AS 4.

6. ERRORS  
-----

6.1 RELOCATION ERROR  
-----

IF AN ERROR OCCURS DURING PROGRAM RELOCATION, THE PROGRAM WILL HALT AT 234 OR 6634, DEPENDING UPON WHETHER THE PROGRAM IS LOCATED LOW OR HIGH.

6.2 DATA ERRORS  
-----

IF THE LINK IS SET AFTER COMPLETION OF THE AND INSTRUCTION, OR IF THE RESULTS OF THE AND INSTRUCTION ARE INCORRECT, THE PROGRAM WILL HALT AT 731(7331) WITH DATA1 IN THE AC.

DEPRESS CONTINUE TO DISPLAY DATA2 IN THE AC.  
DEPRESS CONTINUE TO DISPLAY AND INSTRUCTION IN AC.  
DEPRESS CONTINUE TO DISPLAY INSTRUCTION ADDRESS IN AC.  
DEPRESS CONTINUE TO DISPLAY DATA2 ADDRESS IN AC.  
DEPRESS CONTINUE TO DISPLAY INDIRECT POINTER (USED BY INDIRECT AND) IN AC.  
DEPRESS CONTINUE TO RESUME TEST

6.3 ERROR RECOVERY  
-----

6.3.1 RELOCATION ERROR  
-----

RELOAD PROGRAM

6.3.2 DATA ERROR

-----  
SEE 6.2

6.4 LOOPING

-----  
SET SR00=1 TO PREVENT HALT AFTER ERROR,  
SET SR02=1 TO PREVENT RELOCATION,  
SET SR03=1 TO SUPPRESS END OF PASS TYPEOUT,  
SET SR09=SR11=1 TO HOLD INSTRUCTION AND DATA CONSTANT.

7. RESTRICTIONS

-----  
NONE

8. EXECUTION TIME

-----  
THE PROGRAM PERFORMS 4096 RANDOM TESTS IN APPROXIMATELY 2 SECONDS AND THEN RELOCATES, THE PROGRAM WILL TYPE "A" AFTER EACH 4096 RANDOM TESTS UNLESS SR03=1.

9. PROGRAM DESCRIPTION

-----  
THE PROGRAM IS INITIALLY LOADED INTO LOCATIONS 0200-1177, WITH TEMPORARY STORAGE LOCATIONS ON PAGE B, AFTER INITIAL KEYSTART, THE PROGRAM WILL SAVE R1M AND Q1N LOADERS IN PAGE B AND WILL THEN PROCEED TO USE LOCATIONS 1200-7777 AS A TEST AREA.

THE PROGRAM USES SEPARATE RANDOM NUMBER GENERATORS TO GENERATE THE AND INSTRUCTION, INSTRUCTION AND DATA ADDRESSES, AND THE TWO ARGUMENTS TO BE "AND'ED", THE INSTRUCTIONS AND DATA ARE STORED IN THEIR PREVIOUSLY GENERATED ADDRESSES, THE PROGRAM TRANSFERS TO THE LOCATION OF THE INSTRUCTION AND EXECUTES IT, THE PROGRAM THEN TRANSFERS TO A COMPARISON ROUTINE WHERE THE ACTUAL RESULT OF THE AND INSTRUCTION IS COMPARED TO A SIMULATED AND.

AFTER 4096 TESTS, THE PROGRAM TYPES "A", RELOCATES, AND CONTINUES TESTING.

/
   
/RANDOM AND TEST
   
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/V 82 07552
   
/
   
/
   
/TEMPORARY TRANSFER LOCATIONS ON PAGE 0
   
/

0000	0000	*0		
0000	0000	TTANDL,	0	
0001	5001	INSTL,	JMP	
0002	0002	INADDL,	2	/STORAGE FOR AND INSTRUCTION
0003	0003	DATADL,	3	/STORAGE FOR AND INSTRUCTION ADDRESS
0004	0003	IFLAGL,	3	/STORAGE FOR DATA ADDRESS
0005	0000	PADDL,	0	/STORAGE FOR INSTRUCTION INDIRECT FLAG
0006	0000	LIML,	0	/STORAGE FOR DATA INDIRECT ADDRESS
0007	0000	PAGL,	0	

0010	0010	*10		
0010	0000	PNTRL,	0	

6007	CAF=6007
7501	MQA=7501
7421	MQL=7421
0266	CNTR1L=LOHIL

0020	0020	*20		
0020	0000	TEMP3L,	0	

/
   
/INITIALIZATION AND CONTROL ROUTINES
   
/

0200	0200	*200		
0200	6007	STARTL,	CAF	
0201	1204	TAD	.+3	/SAVE RIM AND BIN IN PAGE 0
0202	3201	PNTR1L,	DCA	.-1
0203	4205	PNTR2L,	JMS	SAVBNL
0204	5274	TEMP1L,	JMP	SETLKL

/
   
/TRANSFER RIM AND BIN LOADERS TO PAGE 0
   
/

0205	0000	SAVBNL,	0	
0206	1374	TAD	C7600L	/SET AC=-200, NUMBER OF
0207	3266	DCA	CNTR1L	/LOCATIONS TO BE TRANSFERRED
0210	1374	TAD	C7600L	/FIRST "FROM"
0211	3202	DCA	PNTR1L	/LOCATION=7600
0212	3203	DCA	PNTR2L	/FIRST "TO" LOCATION=0
0213	4225	JMS	RELOL	/PERFORM TRANSFER
0214	5605	JMP I	SAVBNL	/EXIT

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) 0215 0000 RESBNL, 0
0216 1374 TAD C7600L /SET AC=-200, NUMBER OF
0217 3266 DCA CNTR1L /LOCATIONS TO BE TRANSFERRED
0220 3202 DCA PNTR1L /FIRST "FROM" ADDRESS=0
0221 1374 TAD C7600L /FIRST "TO"
0222 3203 DCA PNTR2L /ADDRESS=7600
0223 4225 JMS RELOL /PERFORM TRANSFER
0224 5615 JMP I RESBNL /EXIT
/
/ DATA TRANSFER ROUTINE
/
0225 0000 RELOL, 0
0226 1602 TAD I PNTR1L /GET DATA
0227 3603 DCA I PNTR2L /TRANSFER
0230 1602 TAD I PNTR1L /GET DATA
0231 7041 CIA
0232 1603 TAD I PNTR2L /COMPARE
0233 7640 SZA CLA
0234 7402 HLT /TRANSFER ERROR
0235 2202 ISZ PNTR1L /NEXT "FROM" LOCATION
0236 7000 NOP
0237 2203 ISZ PNTR2L /NEXT "TO" LOCATION
0240 7000 NOP
0241 2266 ISZ CNTR1L
0242 5226 JMP RELOL+1
0243 5625 JMP I RELOL
/
/ TRANSFER PROGRAM TO UPPER MEMORY
/
0244 4215 REHL, JMS RESBNL /TRANSFER RIM AND BIN LOADERS
0245 1373 TAD C7000L /SET AC=-1000, NUMBER OF
0246 3266 DCA CNTR1L /LOCATIONS TO BE TRANSFERRED
0247 1365 TAD C200L /FIRST "FROM"
0250 3202 DCA PNTR1L /ADDRESS=200
0251 1372 TAD C6600L /FIRST "TO"
0252 3203 DCA PNTR2L /ADDRESS=6600
0253 4225 JMS RELOL /PERFORM TRANSFER
0254 5772 JMP I C6600L /GO TO PROGRAM START
/
/ TRANSFER PROGRAM TO LOWER MEMORY
/
0255 4205 REHL, JMS SAVBNL /TRANSFER RIM AND BIN LOADERS
0256 1373 TAD C7000L /SET AC=-1000, NUMBER OF
0257 3266 DCA CNTR1L /LOCATIONS TO BE TRANSFERRED
0260 1372 TAD C6600L /FIRST "FROM"
0261 3202 DCA PNTR1L /ADDRESS=6600
0262 1365 TAD C200L /FIRST "TO"
0263 3203 DCA PNTR2L /ADDRESS=200
/
/ PAL10 V141 17-JUN-71 7:23 PAGE 2-1
0264 4225 JMS RELOL /PERFORM TRANSFER
0265 5765 JMP I C200L /GO TO PROGRAM START
/
/ PAL10 V141 17-JUN-71 7:23 PAGE 3

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/
/ DETERMINE IF PROGRAM IS IN LOWER OR UPPER MEMORY
/
0266 0000 LOHIL, 0 /PC
0267 7330 CLA CLL CML RAR /SET AC=4000
0270 1266 TAD .-2 /ADD PC
0271 7630 SZL CLA /IS LINK=0
0272 1371 TAD C6400L /NO, HIGH CORE
0273 5666 JMP I LOHIL /RETURN
/
/ TRANSFER TO LINKAGE GENERATION
/
0274 7300 SETLKL, CLA CLL
0275 3202 DCA PNTR1L /CLEAR PASS COUNTER
0276 4266 JMS LOHIL /DETERMINE IF PROGRAM IS HIGH OR LOW
0277 5377 JMP GOSETL /GO TO TEST WITH ADDRESS MODIFIER IN AC
/
/ SIMULATE LOGICAL AND WITH A AND B=NOT((NOTA)OR(NOTB))
/
0300 0000 SANDL, 0
0301 7040 CMA /NOTA
0302 3204 DCA TEMP1L /SAVE NOTA
0303 7501 MQA /GET B
0304 7040 CMA /NOTB
0305 7421 MQL /SAVE NOTB
0306 1204 TAD TEMP1L /GET NOTA
0307 7501 MQA /OR WITH NOTB
0310 7040 CMA /COMPLEMENT
0311 5700 JMP I SANDL /EXIT WITH RESULT IN AC
/
/ TEST SWITCHES
/
0312 0000 SWITCL, 0
0313 7421 MQL /SAVE TEST BIT
0314 7604 LAB /GET SWITCHES
0315 4300 JMS SANDL /AND SWITCHES WITH TEST BIT
0316 7650 SNA CLA /IS SWITCH 0
0317 2312 ISE SWITCL /NO SKIP INSTRUCTION AFTER RETURN
0320 5712 JMP I SWITCL
/
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/
/ END OF PASS
/
0321 0000 EPASL, 0
0322 2202 ISZ PNTR1L /END OF PASS ?
0323 5721 JMP I EPASL /NO, RETURN
0324 7332 CLA CLL CML RTR
0325 7012 RTR /SET AC=400
0326 4312 JMS SWITCL /TEST SR03
0327 5336 JMP .+7 /SUPPRESS END OF PASS TYPEOUT
0330 1366 TAD C215L
0331 4337 JMS TYPEL /TYPE CARRIAGE RETURN
0332 1367 TAD C212L
0333 4337 JMS TYPEL /TYPE LINEFEED
0334 1370 TAD A
0335 4337 JMS TYPEL /TYPL )
)

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0336 5345      JMP      HALTL      /TEST FOR HALT, RELOCATION
                /
                /OUTPUT CHARACTER
                /
0337 0000      TYPEL,  0
0340 6046      TLS
0341 6041      TSF
0342 5341      JMP      .-1
0343 7200      CLA
0344 5737      JMP I   TYPEL

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/ PAL10 V141 17-JUN-71 7:23 PAGE 5

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                /
                /CHECK FOR HALT
                /
0345 7332      HALTL,  CLA CLL CML RTR      /SET AC=2000
0346 4312      JMS      SWITCL      /TEST SR01
0347 7410      SKP
                /SR01=1, HALT
0350 5355      JMP      RRELL      /CHECK FOR RELOCATION
0351 4266      JMS      LOHIL      /DETERMINE IF PROGRAM IS HIGH OR LOW
0352 7650      SNA CLA
                /AC=0, PROGRAM LOW
0353 4215      JMS      RESBNL      /PROGRAM LOW, RESTORE LOADERS
0354 7402      HLT

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                /
                /CHECK FOR RELOCATION
                /
0355 7332      RRELL,  CLA CLL CML RTR
0356 7010      RAR      /SET AC=1000
0357 4312      JMS      SWITCL      /TEST SR02
0360 5721      JMP I   EPASL      /SR02=1, DO NOT RELOCATE PROGRAM
0361 4266      JMS      LOHIL      /DETERMINE IF PROGRAM IS HIGH OR LOW
0362 7650      SNA CLA
                /AC=0, PROGRAM LOW
0363 5244      JMP      REHL      /PROGRAM LOW, RELOCATE TO HIGH CORE
0364 5255      JMP      RELL      /PROGRAM HIGH, RELOCATE TO LOW CORE
0365 0200      C200L,  200
0366 0215      C215L,  215
0367 0212      C212L,  212
0370 0301      A,      301
0371 6400      C6400L, 6400
0372 6600      C6600L, 6600
0373 7000      C7000L, 7000
0374 7600      C7600L, 7600

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0377 7000      G0SETL, NOP

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                /
                /SET UP ADDRESS POINTERS AND CONSTANTS AND TRANSFER TO NEXT PAGE
                /
0400 3237      SETAL,  DCA      TEMPL      /SAVE ADDRESS MODIFIER
0401 1242      TAD      LISTL      /GET POINTER FOR TRANSFER
0402 1237      TAD      TEMPL      /MODIFY FOR LOW OR HIGH CORE

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0403	3010	DCA	PNTRL	/SET UP AUTO-INDEX REGISTER
0404	1243	TAD	LGENL	/GET POINTER TO INSTRUCTION GENERATION
0405	1237	TAD	TEMPL	/MODIFY FOR LOW OR HIGH CORE
0406	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0407	1245	TAD	LSANDL	/GET POINTER TO AND SIMULATOR
0410	1237	TAD	TEMPL	/MODIFY FOR LOW OR HIGH CORE
0411	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0412	1246	TAD	LRETUL	/GET POINTER FOR EXECUTION RETURN
0413	1237	TAD	TEMPL	/MODIFY FOR LOW OR HIGH CORE
0414	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0415	1247	TAD	LSWITL	/GET POINTER TO SWITCH SENSING
0416	1237	TAD	TEMPL	/MODIFY FOR LOW OR HIGH CORE
0417	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0420	1244	TAD	LEPASL	/GET POINTER TO END OF PASS
0421	1237	TAD	TEMPL	/MODIFY FOR LOW OR HIGH CORE
0422	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0423	1237	TAD	TEMPL	/GET ADDRESS MODIFIER
0424	7640	SZA	CLA	/IS TEST IN LOW CORE
0425	5233	JMP	LHICOL	/NO,SET UP FOR HIGH CORE
0426	1240	TAD	L200L	/SET PAGE 0 EXCLUSION BIT
0427	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0430	1250	TAD	L6600L	/GET LOW CORE ADDRESS LIMIT
0431	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0432	5377	JMP	GOTSTL	/GO TO TEST
0433	3410	LHICOL, DCA I	PNTRL	/CLERA PAGE 0 EXCLUSION BIT
0434	1251	TAD	L1201L	/GET HIGH CORE ADDRESS LIMIT
0435	3410	DCA I	PNTRL	/TRANSFER TO NEXT PAGE
0436	5377	JMP	GOTSTL	/GO TO TEST

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0437	0000	TEMPL,	0
0440	0200	L200L,	200
0441	7000	L7000L,	7000
0442	0753	LISTL,	TGENL-1
0443	1000	LGENL,	GENL
0444	0321	LEPASL,	EPASL
0445	0300	LSANDL,	SANDL
0446	0712	LRETUL,	TRETUL
0447	0312	LSWITL,	SWITCL
0450	6600	L6600L,	6600
0451	1201	L1201L,	1201
	0577	*577	
0577	7000	GOTSTL,	NOP

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/  
/GENERATE TEST INSTRUCTION AND DATA  
/

0600	0600	*600	
0600	7300	TEST1L,	CLA CLL
0601	1355	TAD	TANDL
0602	3000	DCA	TTANDL
0603	7001	IAC	
0604	4757	JMS I	TSWITL

/GET POINTER TO SIMULATED AND  
/PLACE IN TRANSFER LOCATION  
/SET  
/TEST 1

0605	5224	JMP	TDAT1L	/SR	DO NOT GENERATE INSTRUCTION
0606	1362	TAD	TLIML	/NO	ADDRESS LIMIT
0607	3026	DCA	LIML	/SAVE	
0610	1361	TAD	TPAGBL	/GET	PAGE EXCLUSION BIT
0611	3027	DCA	PAGL		
0612	4754	JMS I	TGENL	/GENERATE	INSTRUCTION
0613	3365	DCA	TIFLGL	/SAVE	INDIRECT FLA
0614	1001	TAD	INSTL	/GET	INSTRUCTION
0615	3363	DCA	TINSTL	/SAVE	IT
0616	1002	TAD	INADDL	/GET	INSTRUCTION ADDRESS
0617	3364	DCA	TINADDL	/SAVE	IT
0620	1003	TAD	DATADL	/GET	DATA ADDRESS
0621	3366	DCA	TDATAL	/SAVE	IT
0622	1005	TAD	PADDL	/GET	INDIRECT TO DATA
0623	3367	DCA	TPADDL	/SAVE	IT
0624	7105	TDAT1L, CLL	IAC RAL	/SET	AC=2
0625	4757	JMS I	TSWITL	/TEST	SR10
0626	5234	JMP	TDAT2L	/SR10=1,	DO NOT GENERATE DATA1
0627	1370	TAD	TDA1L	/GENERATE	RANDOM NUMBER
0630	7104	CLL	RAL		
0631	7430	SZL			
0632	1374	TAD	T3L		
0633	3370	DCA	TDA1L		
0634	7307	TDAT2L, CLA	CLL IAC RTL	/SET	AC=4
0635	4757	JMS I	TSWITL	/TEST	SR09
0636	5244	JMP	SETTL	/SR09=1,	DO NOT GENERATE DATA2
0637	1371	TAD	TDA2L	/GENERATE	RANDOM NUMBER
0640	7104	CLL	RAL		
0641	7430	SZL			
0642	1374	TAD	T3L		
0643	3371	DCA	TDA2L		

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/  
 /SET UP INSTRUCTION AND DATA AT TEST ADDRESS  
 /ALONG WITH RETURN TO THIS ROUTINE  
 /

0644	7300	SETTL, CLA	CLL	/GET	INSTRUCTION
0645	1363	TAD	TINSTL	/STORE	IN TEST LOCATION
0646	3764	DCA I	TINADDL	/GET	INDIRECT FLAG
0647	1365	TAD	TIFLGL	/IS	INSTRUCTION INDIRECT
0650	7650	SNA	CLA	/NO,	GET DATA
0651	5267	JMP	DIRL	/INDIRECT,	IS ADDRESS
0652	1366	TAD	TDATAL	/AUTO-INDEX	REGISTER
0653	1375	TAD	T7760		
0654	7630	SZL	CLA		
0655	5262	JMP	.,+5	/NO,	USE POINTER AS IS
0656	1366	TAD	TDATAL		
0657	1376	TAD	T7770		
0660	7630	SZL	CLA		
0661	7040	CMA		/ADDRESS	IS AUTO-INDEX REGISTER
0662	1367	TAD	TPADDL	/GET	INDIRECT ADDRESS
0663	3766	DCA I	TDATAL	/STORE	IN TEST LOCATION
0664	1370	TAD	TDA1L	/GET	DATA
0665	3767	DCA I	TPADDL	/STORE	IN TEST LOCATION
0666	5271	JMP	DOTSTL		
0667	1370	DIRL, TAD	TDAIL	/GET	DATA

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0670 3766      DCA I  TDATAL      /STORE IN TEST LOCATION
/
/SIMULATE "AND"
/

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0671 7300      DOTSTL, CLA CLL
0672 1370      TAD      TDA1L      /GET DATA1
0673 7421      MQL              /SAVE IN MQ
0674 1371      TAD      TDA2L      /GET DATA2
0675 4755      JMS I  TANDL      /DO SIMULATION
0676 3372      DCA      TSIML      /SAVE ANSWER
/
/GO TO TEST
/

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0677 1356      DOANDL, TAD      TRETTL      /GET RETURN ADDRESS
0700 3000      DCA      TTANDL      /SAVE
0701 1364      TAD      TINADL      /GET INSTRUCTION ADDRESS
0702 7001      IAC              /INCREMENT
0703 7450      SNA              /IS IT 0
0704 5200      JMP      TEST1L      /YES, GENERATE NEW INFORMATION
0705 3353      DCA      TEMP2L      /NO, SAVE
0706 1373      TAD      T5400L      /GET RETURN INSTRUCTION
0707 3753      DCA I  TEMP2L      /PUT IN TEST LOCATION
0710 1371      TAD      TDA2L      /GET DATA2
0711 5764      JMP I  TINADL      /EXECUTE "AND"

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/
/RETURN HERE AFTER EXECUTION
/

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0712 3377      TRETUL, DCA      TRACL      /SAVE AC
0713 7430      SEL              /IS LINK=1
0714 4324      JMS      ERROR      /LINK=1, ERROR
0715 1372      TAD      TSIML      /GET SIMULATION RESULT
0716 7041      CIA              /ADD REAL RESULT
0717 1377      TAD      TRACL      /ARE THEY THE SAME
0720 7640      SEA CLA      /NO, ERROR
0721 4324      JMS      ERROR      /END OF PASS
0722 4760      JMS I  TEPASL
0723 5200      JMP      TEST1L
/

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/ERROR HANDLER
/

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0724 0000      ERROR,  0
0725 7330      CLA CLL CML RAR      /SET AC=4000
0726 4757      JMS I  TSWITL      /TEST SR00
0727 5351      JMP      TEXITL      /SR00=1, DO NOT HALT ON ERROR
0730 1370      TAD      TDA1L      /DISPLAY DATA1 IN AC
0731 7402      HLT
0732 7200      CLA
0733 1371      TAD      TDA2L      /DISPLAY DATA2 IN AC
0734 7402      HLT
0735 7200      CLA
0736 1001      TAD      INSTL      /DISPLAY INSTRUCTION IN AC
0737 7402      HLT
0740 7200      CLA
0741 1364      TAD      TINADL      /DISPL ) INSTRUCTION ADDRESS IN AC

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0742	7422	HLT		
0743	7200	CLA		
0744	1366	TAD	TDATAL	/DSI. LAY DATA ADDRESS IN AC
0745	7422	HLT		
0746	7200	CLA		
0747	1367	TAD	TPADDL	/DSIPLAY INDIRECT IN AC
0750	7422	HLT		
0751	7322	TEXTL, CLA CLL		
0752	5724	JMP I	ERROR	

0753	0000	TEMP2L, 0		
0754	0000	TGENL, 0		
0755	0000	TANDL, 0		
0756	0000	TRETYL, 0		
0757	0000	TSWITL, 0		
0760	0000	TEPASL, 0		
0761	0000	TPAGBL, 0		
0762	0000	TLIML, 0		
0763	0000	TINSTL, 0		
0764	0000	TINADL, 0		
0765	0000	TIFLGL, 0		

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0766	0000	TDATAL, 0		
0767	0000	TPADDL, 0		
0770	0021	TDA1L, 21		
0771	0037	TDA2L, 37		
0772	0000	TSIML, 0		
0773	5400	T5400L, 5400		
0774	0003	T3L, 3		
0775	7760	T7760, 7760		
0776	7770	T7770, 7770		
0777	0000	TRACL, 0		

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/  
/GENERATE INSTRUCTIONS AND ADDRESSES  
/

1000	1000	*1000		
1000	0000	GENL, 0		

/  
/GENERATE "AND" INSTRUCTION  
/

1001	1367	GANDL, TAD	R1L	
1002	4340	JMS	RANDL	/GENERATE RANDOM NUMBER
1003	3367	DCA	R1L	/SAVE NUMBER
1004	1367	TAD	R1L	
1005	7421	MQL		
1006	1007	TAD	PAGL	
1007	7501	MQA		/OR RANDOM NUMBER WITH EXCLUSION BIT
1010	7421	MQL		
1011	1371	TAD	K0777	/MASK OFF 3MSB
1012	4400	JMS I	TTANDL	/TO GET "0" OP CODE
1013	3001	DCA	INSTL	/SAVE INSTRUCTION
1014	1001	TAD	INSTL	/GET INSTRUCTION

1015	4354	JMS	AND17L	/EXTRACT PAGE ADDRESS OF INSTRUCTION
1016	3020	DCA	TEMP3L	/SAVE PAGE ADDRESS OF INSTRUCTION
		/		
		/	GENERATE ADDRESS FOR INSTRUCTION	
		/		
1017	1372	GANADL,	TAD R2L	
1020	4340	JMS	RANDL	/GENERATE RANDOM NUMBER
1021	3372	DCA	R2L	/SAVE NUMBER
1022	4345	JMS	CLIML	/SET UP TO TEST ADDRESS LIMITS
1023	1372	TAD	R2L	
1024	7620	SNL	CLA	/IS ADDRESS WITHIN LIMITS
1025	5217	JMP	GANADL	/NO, GENERATE NEW ADDRESS
1026	1372	TAD	R2L	
1027	1373	TAD	P0L	
1030	7620	SNL	CLA	/IS ADDRESS ON PAGE 0
1031	5246	JMP	PAGADL	/NO
1032	1020	TAD	TEMP3L	/GET PAGE ADDRESS OF INSTRUCTION
1033	7041	CIA		
1034	1372	TAD	R2L	/SUBTRACT ADDRESS
1035	4361	PAGAL,	JMS ABSL	
1036	7700	SMA	CLA	/IS DIFFERENCE >2
1037	5217	JMP	GANADL	/NO
1040	1020	PAL,	TAD TEMP3L	/GET PAGE ADDRESS OF INSTRUCTION
1041	7650	SNA	CLA	/DOES INSTRUCTION REFERENCE LOCATION 0
1042	5201	JMP	GANDL	/YES, GENERATE NEW INSTRUCTION
1043	1372	TAD	R2L	/YES, USE ADDRESS
1044	3002	DCA	INADDL	
1045	5261	JMP	DAADL	/GENERATE ADDRESS FOR DATA
1046	1001	PAGADL,	TAD INSTL	/GET INSTRUCTION
1047	7421	MQL		
1050	1376	TAD	K200L	
1051	4400	JMS	I TTANDL	/MASK CURRENT PAGE BIT
1052	7650	SNA	CLA	/IS PAGE BIT SET
1053	5240	JMP	PAL	/NO, USE ADDRESS AS IS

/ PAL10 V141 17-JUN-71 7:23 PAGE 11-1

1054	1372	TAD	R2L
1055	4354	JMS	AND17L
1056	7041	CIA	
1057	1020	TAD	TEMP3L
1060	5235	JMP	PAGAL

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/

/GENERATE ADDRESS FOR DATA

/

1061	1001	DAADL,	TAD INSTL	/GET INSTRUCTION
1062	7421	MQL		
1063	1376	TAD	K200L	
1064	4400	JMS	I TTANDL	/DOES INSTRUCTION REFERENCE PAGE 0
1065	7650	SNA	CLA	
1066	5306	JMP	P0AL	/YES
1067	1002	TAD	INADDL	
1070	7421	MQL		
1071	1373	TAD	P0L	

```

1072 4400 JMS I TTANDL /EX( T PAGE OF ADDRESS
1073 7421 MQL
1074 1020 TAD TEMP3L
1075 7501 MQA
1076 3003 DCA DATADL /"OR" TOGETHER TO GET
1077 1001 INDIRL, TAD INSTL /DATA ADDRESS
1100 7421 MQL
1101 1375 TAD K400L
1102 4400 JMS I TTANDL
1103 7640 SZA CLA /IS INSTRUCTION INDIRECT
1104 5311 JMP PADL /YES, INSTRUCTION IS INDIRECT
1105 5600 JMP I GENL /EXIT
1106 1020 P0AL, TAD TEMP3L
1107 3003 DCA DATADL
1110 5277 JMP INDIRL

```

```

/
/GENERATE INDIRECT ADDRESS FOR DATA
/
1111 1377 PADL, TAD R3L /GENERATE RANDOM NUMBER
1112 4340 JMS RANDL
1113 3377 DCA R3L
1114 4345 JMS CLIML
1115 1377 TAD R3L
1116 7620 SNL CLA /IS ADDRESS WITHIN LIMITS
1117 5311 JMP PADL /NO, TRY AGAIN
1120 1002 TAD INADDL /GET INSTRUCTION ADDRESS
1121 7041 CIA
1122 1377 TAD R3L /SUBSTRACT INDIRECT
1123 4361 JMS ABSL /GENERATE -ABSOLUTE VALUE
1124 7700 SMA CLA /DO INSTRUCTION AND ADDRESS INTERFERE
1125 5311 JMP PADL /YES
1126 1003 TAD DATADL
1127 7041 CIA
1130 1377 TAD R3L
1131 4361 JMS ABSL
1132 7700 SMA CLA
1133 5311 JMP PADL
1134 1377 TAD R3L /NO
1135 3005 DCA PADDL
1136 7040 CMA

```

```

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1137 5600 JMP I GENL /EXIT

```

```

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```

```

1140 0000 RANDL, 0
1141 7104 CLL RAL
1142 7430 SZL
1143 1370 TAD K3L
1144 5740 JMP I RANDL
/
/
1145 0000 CLIML, 0
1146 1007 TAD PAGL
1147 7100 CLL

```

1150	7650	SNA CLA		
1151	7020		CML	
1152	1006		TAD	LIML
1153	5745		JMP I	CLIML
			/	
			/	
			/	
1154	0000	AND17L,	0	
1155	7421		MQL	
1156	1374		TAD	K0177L
1157	4400		JMS I	TTANDL
1160	5754		JMP I	AND17L
			/	
			/	
			/	
1161	0000	ABSL,	0	
1162	7500		SMA	
1163	7041		CIA	
1164	7001		IAC	
1165	7001		IAC	
1166	5761		JMP I	ABSL
			/	
			/	
			/	
1167	0001	R1L,	1	
1170	0003	K3L,	3	
1171	0777	K0777,	777	
1172	0005	R2L,	5	
1173	7600	P0L,	7600	
1174	0177	K0177L,	177	
1175	0400	K400L,	400	
1176	0200	K200L,	200	
1177	0015	R3L,	15	

S

/ PAL10 V141 17-JUN-71 7:23 PAGE 13-1

0000	11111111	10000000	10000000	00000000	00000000	00000000	00000000	00000000
0100	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
0200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111001
0400	11111111	11111111	11111111	11111111	11111111	11000000	00000000	00000000
0500	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000001
0600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

1200  
1300



1400  
1500

1600  
1700

2000  
2100

2200  
2300

2400  
2500

2600  
2700

3000  
3100

3200  
3300

3400  
3500

3600  
3700

/ PAL10 V141 17-JUN-71 7:23 PAGE 13-2

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

/	PAL10	V141	17-JUN-71	7123	PAGE 13-3	
A	0370		PADDL	0005	TSIML	0772
ABSL	1161		PADL	1111	TSWITL	0757
AND17L	1154		PAGADL	1046	TTANDL	0000
C200L	0365		PAGAL	1035	TYPEL	0337
C212L	0367		PAGL	0007		
C215L	0366		PAL	1040		
C6400L	0371		PNTR1L	0202		
C6600L	0372		PNTR2L	0203		
C7000L	0373		PNTRL	0010		
C7600L	0374		R1L	1167		
CAF	6007		R2L	1172		
CLIML	1145		R3L	1177		
CNTR1L	0266		RANDL	1140		
DAADL	1061		REHL	0244		
DATADL	0003		RELL	0255		
DIRL	0667		RELOL	0225		
DOANDL	0677		RESBNL	0215		
DOTSTL	0671		RRELL	0355		
EPASL	0521		SANDL	0300		
ERROR	0724		SAVBNL	0205		
GANADL	1017		SETAL	0400		
GANDL	1001		SETLKL	0274		
GENL	1000		SETTL	0644		
GOSETL	0377		STARTL	0200		
GOTSTL	0577		SWITCL	0312		
HALTL	0345		T3L	0774		
IFLAGL	0004		T5400L	0773		
INADDL	0002		T7760	0775		
INDIRL	1077		T7770	0776		
INSTL	0001		TANDL	0755		
)77L	1174		TDA1L	0770		
)77	1171		TDA2L	0771		

K7 1176  
KL 1170  
K400L 1175  
L1201L 0451  
L200L 0440  
L6600L 0450  
L7000L 0441  
LEPASL 0444  
LGENL 0443  
LHICOL 0433  
LIML 0006  
LISTL 0442  
LOHIL 0266  
LRETUL 0446  
LSANDL 0445  
LSWITL 0447  
MQA 7501  
MQL 7421  
P0AL 1106  
P0L 1173

T0AT1L 0624  
T0AT2L 0634  
T0ATAL 0766  
TEMP1L 0204  
TEMP2L 0753  
TEMP3L 0020  
TEMPL 0437  
TEPASL 0760  
TEST1L 0600  
TEXTL 0751  
TGENL 0754  
TIFLGL 0765  
TINADL 0764  
TINSTL 0763  
TLIML 0762  
TPADDL 0767  
TPAGBL 0761  
TRACL 0777  
TRETTL 0756  
TRETUL 0712

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ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 3 SECONDS

2K CORE USED

