

IDENTIFICATION

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PRODUCT CODE:           MAINDEC-8E-D0EB-D  
PRODUCT NAME:           RANDOM TAD TEST  
DATE CREATED:            JUNE 7, 1971  
MAINTAINER:             DIAGNOSTIC GROUP  
AUTHOR:                 MICHAEL DAVIS

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1. ABSTRACT

-----  
THIS PROGRAM TESTS THE TAD INSTRUCTING OF THE PDP-8E, THE TAD 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

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THE PROGRAM IS LOADED INTO LOCATIONS 6600 THRU 7577, THE TEST AREA IS 0000-6577, TEMPORARY STORAGE LOCATIONS ARE LOCATED ON PAGE 0,

2.3 PRELIMINARY PROGRAMS

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MAINDEC-8E-D0AA, D0BA, D0CA, D0DA

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  
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 ERROR HALT  
-----

IF THE RESULTS OF THE TAD INSTRUCTION ARE INCORRECT,  
THAT IS IF THE ACTUAL AND SIMULATED LINKS, OR THE ACTUAL  
AND SIMULATED SUMS DO NOT AGREE, THE PROGRAM  
WILL HALT AT 7407 WITH DATA1 IN THE AC,

DEPRESS CONTINUE TO DISPLAY DATA2 IN THE AC,  
DEPRESS CONTINUE TO DISPLAY TAD 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  
TAD) IN AC,  
DEPRESS CONTINUE TO RESUME TEST

6.2 ERROR RECOVERY  
-----

SEE 6.1

6.3 LOOPING

-----

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

7. RESTRICTIONS

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NONE

8. EXECUTION TIME

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THE PROGRAM PERFORMS 4096 RANDOM TESTS IN APPROXIMATELY 5 SECONDS. THE PROGRAM WILL TYPE "T" AFTER EACH 4096 RANDOM TESTS UNLESS SR03=1.

9. PROGRAM DESCRIPTION

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THE PROGRAM IS LOADED INTO LOCATIONS 6600-7577, WITH TEMPORARY STORAGE LOCATIONS ON PAGE 0;

THE PROGRAM USES SEPARATE RANDOM NUMBER GENERATORS TO GENERATE THE TAD INSTRUCTION, INSTRUCTION AND DATA ADDRESSES, AND THE TWO ARGUMENTS TO BE "TADDED". 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 TAD INSTRUCTION IS COMPARED TO A SIMULATED TAD. THE SIMULATOR IS SIMILAR TO THE ONE USED IN MAINDEC-8E-00CA=D. NO TADS ARE USED IN THE PROGRAM ITSELF.

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

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/
/RANDOM TAD TEST
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/V 82 07552
/
/
/TEMPORARY STORAGE LOCATIONS
/

```

```

0000 0000 *0
0000 0000 RETURN, 0
0001 5001 INSTL, JMP
0002 0002 INADDL, 2
0003 0003 DATADL, 3
0004 0000 PADDL, 0
0005 0000 IFLAGL, 0

7501 MQA=7501
7421 MQL=7421
6007 CAF=6007

```

```

0200 0200 *200
0200 6007 START, CAF
0201 5602 JMP I .+1
0202 6600 STARTL

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```

/
/GENERATE TEST INSTRUCTION AND DATA
/

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```

6600 6600 *6600
6600 7300 STARTL, CLA CLL
6601 3376 DCA CNTR1 /CLEAR PASS COUNTER
6602 7604 TEST1L, LAS
6603 0371 AND SR11 /TEST SR11
6604 7640 SZA CLA /IS SR11=1
6605 5224 JMP TDAT1L /SR11=1, DO NOT GENERATE INSTRUCTION
6606 4746 JMS I TGENL /GENERATE INSTRUCTION
6607 3355 DCA TIFLGL /SAVE INDIRECT FLA
6610 7040 CMA
6611 0001 AND INSTL /GET INSTRUCTION
6612 3353 DCA TINSTL /SAVE IT
6613 7040 CMA
6614 0002 AND INADDL /GET INSTRUCTION ADDRESS
6615 3354 DCA TINADL /SAVE IT
6616 7040 CMA
6617 0003 AND DATADL /GET DATA ADDRESS
6620 3356 DCA TDATAL /SAVE IT
6621 7040 CMA
6622 0004 AND PADDL /GET INDIRECT TO DATA
6623 3357 DCA TPADDL /SAVE IT
6624 7604 TDAT1L, LAS
6625 0372 AND SR10 /TEST SR10

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```

0020 /040 SZA CLA /IS SR10=1
6627 5234 JMP TDATA2L /SR10=1, DO NOT GENERATE DATA1
6630 7040 CMA
6631 0360 AND TDA1L /GENERATE RANDOM NUMBER
6632 4752 JMS I TRANDL
6633 3360 DCA TDA1L
6634 7624 TDATA2L, LAS
6635 0373 AND SR09 /TEST SR09
6636 7640 SZA CLA /IS SR09=1
6637 5244 JMP SETTL /SR09=1, DO NOT GENERATE DATA2
6640 7040 CMA
6641 0361 AND TDA2L /GENERATE RANDOM NUMBER
6642 4752 JMS I TRANDL
6643 3361 DCA TDA2L

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```

/
/SET UP INSTRUCTION AND DATA AT TEST ADDRESS
/ALONG WITH RETURN TO THIS ROUTINE
/
6644 7340 SETTL, CLA CLL CMA
6645 0353 AND TINSTL /GET INSTRUCTION
6646 3754 DCA I TINADL /STORE IN TEST LOCATION
6647 7040 CMA
6650 0355 AND TIFLGL /GET INDIRECT FLAG
6651 7650 SNA CLA /IS INSTRUCTION INDIRECT
6652 5302 JMP DURL /NO, GET DATA
6653 7040 CMA
6654 0356 AND TDATA1L /ADDRESS IS INDIRECT
6655 0367 AND T7760 /IS ADDRESS AUTO-INDEX REGISTER
6656 7640 SZA CLA
6657 5276 JMP NOTAUT /NO
6660 7040 CMA
6661 0356 AND TDATA1L
6662 0375 AND K10
6663 7650 SNA CLA
6664 5276 JMP NOTAUT
6665 7040 CMA
6666 0357 AND TPADDL /ADDRESS IS AUTO-INDEX REGISTER
6667 7041 CIA /DECREMENT POINTER TO DATA
6670 7040 CMA
6671 3756 DCA I TDATA1L /STORE IN TEST LOCATION
6672 7040 CMA
6673 0360 AND TDA1L /GET DATA
6674 3757 DCA I TPADDL /STORE IN TEST LOCATION
6675 5305 JMP DOTSTL
6676 7040 NOTAUT, CMA
6677 0357 AND TPADDL
6700 3756 DCA I TDATA1L
6701 5272 JMP .-7
6702 7040 DURL, CMA
6703 0360 AND TDA1L /GET DATA
6704 3756 DCA I TDATA1L /STORE IN TEST LOCATION
/
/SIMULATE "TAD"
/
7340 DOTSTL, CLA CLL CMA

```

706	0360	AND	TDA1L	/GET TA1
6707	7421	SQL		/SAVE IN MQ
6710	7040	CMA		
6711	0361	AND	TDA2L	/GET DATA2
6712	4751	JMS I	TSIMAD	/DO SIMULATION
6713	3363	DCA	TSIMAC	/SAVE ANSWER
6714	7010	RAR		
6715	3362	DCA	TSIML	/SAVE LINK

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/  
/GO TO TEST

6716	7040	DOANDL, CMA		
6717	0347	AND	TRETTL	/GET RETURN ADDRESS
6720	3000	DCA	RETURN	/SAVE
6721	7040	CMA		
6722	0354	AND	TINADL	/GET INSTRUCTION ADDRESS
6723	7001	IAC		/INCREMENT
6724	7450	SNA		/IS IT 0
6725	5202	JMP	TEST1L	/YES, GENERATE NEW INFORMATION
6726	3345	DCA	TEMP2L	/NO, SAVE
6727	7040	CMA		
6730	0366	AND	T5400L	/GET RETURN INSTRUCTION
6731	3745	DCA I	TEMP2L	/PUT IN TEST LOCATION
6732	7140	CLL CMA		
6733	0361	AND	TDA2L	/GET DATA2
6734	5754	JMP I	TINADL	/EXECUTE "TAD"

/  
/RETURN HERE AFTER EXECUTION

6735	3364	TRETUL, DCA	TAC	/SAVE AC
6736	7010	RAR		
6737	3365	DCA	TLINK	/SAVE LINK
6740	4774	JMS I	TCOMAD	/COMPARE REAL AND SIMULATED ADDITIONS
6741	2376	ISZ	CNTR1	
6742	5202	JMP	TEST1L	
6743	4750	JMS I	TEPASL	/END OF PASS, 4096 TEST COMPLETE
6744	5202	JMP	TEST1L	

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6745	0000	TEMP2L, 0		
6746	7000	TGENL, GENL		
6747	6735	TRETTL, TRETUL		
		TERROR,		
6750	7442	TEPASL, EPASL		
6751	7200	TSIMAD, RSIMAD		
6752	7430	TRANDL, RANDL		
6753	0000	TINSTL, 0		
6754	0000	TINADL, 0		
6755	0000	TIFLGL, 0		
6756	0000	TDATAL, 0		
6757	0000	TPADDL, 0		

6760	0021	TDA1L,	21
6761	0037	TDA2L,	37
6762	0000	TSIML,	0
6763	0000	TSIMAC,	0
6764	0000	TAC,	0
6765	0000	TLINK,	0
6766	5400	T5400L,	5422
6767	7760	T7760,	7762
6770	7770	T7770,	7772
6771	0001	SR11,	1
6772	0002	SR10,	2
6773	0004	SR09,	4
6774	7313	TCOMAD,	COMAD
6775	0010	K10,	10
6776	0000	CNTR1,	0

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/  
/GENERATE INSTRUCTIONS AND ADDRESSES  
/

7000 7000  
7000 0000 PAGE  
GENL, 0

/GENERATE "AND" INSTRUCTION  
/

7001	7040	GANDL,	CMA		
7002	0350		AND	R1L	
7003	4762		JMS I	SRANDL	/GENERATE RANDOM NUMBER
7004	3350		DCA	R1L	/SAVE NUMBER
7005	7040		CMA		
7006	0350		AND	R1L	
7007	7421		MQL		/GENERATE OP CODE
7010	7040		CMA		
7011	0365		AND	K1000	
7012	7501		MQA		
7013	0352		AND	K1777	
7014	3001		DCA	INSTL	/SAVE INSTRUCTION
7015	7040		CMA		
7016	0001		AND	INSTL	/GET INSTRUCTION
7017	0355		AND	K0177L	/EXTRACT PAGE ADDRESS OF INSTRUCTION
7020	3361		DCA	TEMP3L	/SAVE PAGE ADDRESS OF INSTRUCTION

/GENERATE ADDRESS FOR INSTRUCTION  
/

7021	7040	GANADL,	CMA		
7022	0353		AND	R2L	
7023	4762		JMS I	SRANDL	/GENERATE RANDOM NUMBER
7024	3353		DCA	R2L	/SAVE NUMBER
7025	7040		CMA		
7026	0353		AND	R2L	
7027	4777		JMS	LIMIT	/IS ADDRESS WITHIN LIMITS
7030	5221		JMP	GANADL	/NO, GENERATE NEW ADDRESS
7031	7040		CMA		
7032	0353		AND	R2L	
7033	0354		AND	P0L	
7034	7640		SZA CLA		/IS ADDRESS ON PAGE 0
7035	5244		JMP	PAGADL	/NO
	7040		CMA		

037 0353  
7040 4776  
7041 7700  
7042 5221  
7043 5255

PAGAL, AND R2L  
JMS ABS\_  
SMA CLA  
JMP GANADL  
JMP PAL

/GET PAGE ADDRESS OF INSTRUCTION  
/GET DIFFERENCE BETWEEN PAGE ADDRESSES  
/IS DIFFERENCE >2  
/NO

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7044 7040  
7045 0001  
7046 0357  
7047 7650  
7050 5255  
7051 7040  
7052 0353  
7053 0355  
7054 5240  
7055 7040  
7056 0361  
7057 7650  
7060 5201  
7061 7040  
7062 0353  
7063 3002

PAGADL, CMA  
AND INSTL  
AND K200L  
SNA CLA  
JMP PAL  
CMA  
AND R2L  
AND K0177L  
JMP PAGAL  
PAL, CMA  
AND TEMP3L  
SNA CLA  
JMP GANDL  
CMA  
AND R2L  
DCA INADDL

/GET INSTRUCTION  
/IS PAGE BIT SET  
/NO, USE ADDRESS AS IS  
/PAGE BIT SET, EXTRACT PAGE ADDRESS FOR INSTRUCTION  
/TEST FOR INTERFERENCE  
/MAKE SURE DATA WILL  
/NOT BE STORED IN LOCATION 0  
/LOCATION ZERO, TRY AGAIN  
/USE ADDRESS AS IS

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/  
/GENERATE ADDRESS FOR DATA  
/

7064 7040  
7065 0001  
7066 0357  
7067 7650  
7070 5307  
7071 7040  
7072 0002  
7073 0354  
7074 7421  
7075 7040  
7076 0361  
7077 7501  
7100 3003  
7101 7040  
7102 0001  
7103 0356  
7104 7640  
7105 5313  
7106 5600  
7107 7040  
7110 0361  
7111 3003  
7112 5301

DAADL, CMA  
AND INSTL  
AND K200L  
SNA CLA  
JMP P0AL  
CMA  
AND INADDL  
AND P0L  
MQL  
CMA  
AND TEMP3L  
MQA  
DCA DATADL  
INDIRL, CMA  
AND INSTL  
AND K400L  
SZA CLA  
JMP PADL  
JMP I GENL  
P0AL, CMA  
AND TEMP3L  
DCA DATADL  
JMP INDIRL

/GET INSTRUCTION  
/IS PAGE BIT OF INSTRUCTION SET  
/NO, USE PAGE ADDRESS BITS OF INSTRUCTION FOR DATA ADDRESS  
/EXTRACT PAGE OF INSTRUCTION ADDRESS  
/"OR" TOGETHER TO GET  
/DATA ADDRESS  
/IS INSTRUCTION INDIRECT  
/YES, INSTRUCTION IS INDIRECT  
/EXIT  
/USE PAGE ADDRESS OF INSTRUCTION  
/AS DTAT ADDRESS

/  
/GENERATE INDIRECT ADDRESS FOR DATA  
/

7113	7040	PADL,	CMA		
7114	0360		AND	R3L	/GENERATE RANDOM NUMBER
7115	4762		JMS I	SRANDL	
7116	3360		DCA	R3L	
7117	7040		CMA		
7120	0360		AND	R3L	
7121	4777'		JMS	LIMIT	/IS ADDRESS WITHIN LIMITS
7122	5313		JMP	PADL	/NO, TRY AGAIN
7123	7040		CMA		
7124	0002		AND	INADDL	/GET INSTRUCTION ADDRESS
7125	4775'		JMS	ABSL1	/GENERATE DIFFERENCE BETWEEN ADDRESSES
7126	7700		SMA CLA		/DO INSTRUCTION AND ADDRESS INTERFERE
7127	5313		JMP	PADL	/YES
7130	7040		CMA		/NO, TEST DATA ADDRESS AS ABOVE
7131	0003		AND	DATADL	
7132	4775'		JMS	ABSL1	
7133	7700		SMA CLA		
7134	5313		JMP	PADL	
7135	7040		CMA		
7136	0360		AND	R3L	/ADDRESSES DO NOT INTERFERE
7137	7041		CIA		/WILL LOCATION BE 0 IF DECREMENTED
7140	7040		CMA		
7141	7050		SNA CLA		

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7142	5313		JMP	PADL	/YES, GENERATE NEW POINTER
7143	7040		CMA		
7144	0360		AND	R3L	
7145	3004		DCA	PADDL	
7146	7040		CMA		
7147	5600		JMP I	GENL	/EXIT

/

7150	0001	R1L,	1		
7151	0003	K3L,	3		
7152	1777	K1777,	1777		
7153	0005	R2L,	5		
7154	7600	P0L,	7600		
7155	0177	K0177L,	177		
7156	0400	K400L,	400		
7157	0200	K200L,	200		
7160	0015	R3L,	15		
7161	0000	TEMP3L,	0		
7162	7430	SRANDL,	RANDL		
7163	7200	SRIMAD,	RSIMAD		
7164	1201	LIML,	1201		
7165	1000	K1000,	1000		

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/

/

/SIMULATED ADDITION

/

7 7507

176 7474  
7177 7303  
7200 7200  
7200 0000  
7201 3344  
7202 7501  
7203 3343

PAGE  
RSIMAD, 0

DCA ARG2 /SAVE ARGUMENTS

MQA

DCA ARG1

/

/

/SIMULATE ADDITION BY SIMULATED GENERATION OF SUM  
/AND CARRY BITS

/

/

/FORM OR OF ARG1 WITH ARG2

/

7204 7340

SIMAD,

CLA CLL CMA

AND ARG1

/LOAD AC WITH ARG1

7205 0343

7206 7421

7207 7040

7210 0344

7211 7501

7212 3345

MQL /PLACE IN MQ

CMA

AND ARG2

/LOAD AC WITH ARG2

MQA /FORM ARG1 OR ARG2

DCA A10RA2 /SAVE ARG1 OR ARG2

/

/FORM XOR(EXCLUSIVE OR) OF ARG1 WITH ARG2  
/BY A XOR B=(A AND NOTB)OR(NOTA AND B)

/

7213 7501

7214 7040

7215 0344

7216 7421

7217 7040

7220 0344

7221 7040

7222 0343

7223 7501

7224 3346

7225 3347

MQA /GET ARG1 FROM MQ

CMA /FORM NOTARG1

AND ARG2 /AND WITH ARG2 TO GET ARG2 AND NOTARG1

MQL /SAVE IN MQ

CMA

AND ARG2 /LOAD AC WITH ARG2

CMA /FORM NOTARG2

AND ARG1 /AND WITH ARG1 TO GET ARG1 AND NOTARG2

MQA /OR WITH ARG2 AND NOTARG1

DCA SIMAC /TO GET ARG1 XOR ARG2

DCA SIMLNK

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/

/AND ARG1 WITH ARG2  
/TEST FOR CARRIES  
/IF THERE ARE NO BITS IN COMMON BETWEEN ARG1 AND ARG2  
/THERE WILL BE NO CARRIES GENERATED

/

7226 7040

7227 0343

7230 0344

7231 7450

7232 5274

CMA

AND ARG1 /LOAD AC WITH ARG1

AND ARG2 /AND WITH ARG2

SNA /ARE THERE ANY CARRIES

JMP ENDSIM /NO, TERMINATE SIMULATION

/

/GENERATE CARRIES

/

7233 7421

7234 7521

7235 0345

7236 7450

NXTCAR,

MQL

MQA MQL /SAVE FIRST CARRIES

AND A10RA2 /GET CARRIES FROM MQ

SNA /AND WITH A10RA2 TO SEE IF MORE CARRIES ARE GENERATED

/ARE THERE ANY MORE CARRIES

```

7237 5244 JMP ENCAR /NO, END SIMULATION OF CARRIES
7240 7104 CLL RAL /PROPIGATE CARRIES
7241 7521 MQA MQL /GET PREVIOUS CARRIES FROM MQ, SAVE NEW CARRIES
7242 7501 MQA /OR NEW CARRIES WITH PREVIOUS CARRIES
7243 5234 JMP NXTCAR /CONTINUE
/
/TEST FOR CARRY INTO LINK
/
7244 7501 ENCAR, MQA /GET CARRIES
7245 0345 AND A10RA2 /AND WITH A10RA2
7246 0350 AND K4000 /TEST BIT 00
7247 7450 SNA /IS BIT 00 1
7250 5253 JMP ENCAR1 /NO, CARRIES DID NOT PROPIGATE INTO LINK
7251 3347 DCA SIMLNK /YES, SAVE CARRY INTO LINK
7252 5260 JMP XORALL /COMPLETE SIMULATION
7253 7130 ENCAR1, CLL CML RAR /SET AC=4000
7254 0343 AND ARG1 /AND WITH ARG1
7255 0344 AND ARG2 /AND WITH ARG2 TO SEE IF ORIGINAL
7256 7440 SZA /NUMBERS GENERATED CARRY INTO LINK
7257 3347 DCA SIMLNK /SAVE SIMULATED LINK

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/
/FORM XOR OF ARG1, ARG2, AND CARRIES
/TO GET FINAL SIMULATED SUM
/
7260 7501 XORALL, MQA /SAVE SIMULATED CARRIES
7261 3351 DCA CARRY
7262 7501 MQA
7263 7040 CMA
7264 0346 AND SIMAC /FORM A10RA2 AND NOTCARRY
7265 7421 MQL /SAVE IN MQ
7266 7040 CMA
7267 0346 AND SIMAC
7270 7040 CMA
7271 0351 AND CARRY /FORM CARRY AND NOTA10RA2
7272 7501 MQA /OR WITH CONTENTS OF MQ
7273 3346 DCA SIMAC
7274 7340 ENDSIM, CLA CLL CMA
7275 0347 AND SIMLNK
7276 7640 SZA CLA
7277 7020 CML
7300 7040 CMA
7301 0346 AND SIMAC
7302 5600 JMP I RSIMAD /TO GET FINAL SIMULATED SUM
/
/TEST ADDRESS
/
7303 0000 LIMIT, 0
7304 7421 MQL /SAVE ARGUMENT IN MQ
7305 7040 CMA
7306 0777 AND LIML /LOAD AC WITH LIMIT
7307 4200 JMS RSIMAD /DO ADDITION
7310 7620 SNL CLA /LINK SET IF NUMBER TO LARGE
7311 2303 ISZ LIMIT /NUMBER OK
7312 5700 JMP I LIMIT

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```

/
/COMPARE SIMULATED AND REAL RESULT
/
7313 0000 COMAD, 0
7314 7340 CLA CLL CMA
7315 0776' AND TSIML /GET SIMULATED RESULTANT LINK
7316 7640 SZA CLA
7317 7020 CML
7320 7040 CMA
7321 0775' AND TLINK /COMPARE TO REAL LINK
7322 7640 SZA CLA
7323 7020 CML
7324 7430 SZL /IF SAME, LINK=0
7325 5341 JMP ERROR1 /NOT THE SAME, ERROR
7326 7340 CLA CLL CMA
7327 0774' AND TAC /GET ADDITION RESULT
7330 7040 CMA
7331 0773' AND TSIMAC /COMPARE TO COMPLEMENT OF SIMULATION RESULT

7332 7440 SZA
7333 5341 JMP ERROR1 /NOT 0, ERROR
7334 7040 CMA
7335 0773' AND TSIMAC /GET SIMULATION RESULT
7336 7040 CMA
7337 0774' AND TAC /COMPARE TO COMPLEMENT OF REAL ADDITION
7340 7640 SZA CLA
7341 4752 ERROR1, JMS I ERRORS
7342 5713 JMP I COMAD
7343 0000 ARG1, 0
7344 0000 ARG2, 0
7345 0000 A10RA2, 0
7346 0000 SIMAC, 0
7347 0000 SIMLNK, 0
7350 4000 K4000, 4000
7351 0000 CARRY, 0
7352 7400 ERRORS, ERROR

```

```

/
/ERROR HANDLER
/
7373 6763
7374 6764
7375 6765
7376 6762
7377 7164
7400 7400 PAGE
7401 7604 ERROR, 0
7402 0267 AND SR00 /TEST SR00
7403 7640 SZA CLA /IS SR00=1
7404 5600 JMP I ERROR /YES, DO NOT HALT
7405 7240 CLA CMA

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7406 0777' AND TDA1L /HALT WITH DATA1 IN AC
7407 7402 HLT
7410 7240 CLA CMA
7411 0776' AND TDA2L /HALT WITH DATA2 IN AC
7412 7402 HLT
7413 7240 CLA CMA
7414 0775' AND TINSTL /HALT WITH INSTRUCTION IN AC
7415 7402 HLT
7416 7240 CLA CMA
7417 0774' AND TINADL /HALT WITH INSTRUCTION ADDRESS IN AC
7420 7402 HLT
7421 7240 CLA CMA
7422 0773' AND TDATA1L /HALT WITH DATA ADDRESS IN AC
7423 7402 HLT
7424 7240 CLA CMA
7425 0772' AND TPADDL /HALT WITH INDIRECT IN AC
7426 7402 HLT
7427 5600 JMP I ERROR

```

```

/
/RANDOM NUMBER GENERATOR
/

```

```

7430 0000 RANDL, 0
7431 7104 CLL RAL
7432 7420 SNL
7433 5240 JMP ENRAN
7434 7421 MQL
7435 7040 CMA
7436 0241 AND K3
7437 4771' JMS RSIMAD
7440 5630 ENRAN, JMP I RANDL
7441 0003 K3, 3

```

```

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```

```

/
/END OF PASS
/

```

```

7442 0000 EPASL, 0
7443 7604 LAS
7444 0270 AND SR03
7445 7640 SZA CLA
7446 5642 JMP I EPASL
7447 7040 CMA
7450 0271 AND C215
7451 4261 JMS TYPE
7452 7040 CMA
7453 0272 AND C212
7454 4261 JMS TYPE
7455 7040 CMA
7456 0273 AND C324
7457 4261 JMS TYPE
7460 5642 JMP I EPASL

```

```

7461 0000 TYPE, 0
7462 6046 TLS
7463 6041 TSF

```

```

7464 5263      JMP      .-1
7465 7200      CLA
7466 5661      JMP I   TYPE
/
/
/
7467 4000      SR00,   4000
7470 0400      SR03,   0400
7471 0215      C215,   215
7472 0212      C212,   212
7473 0324      C324,   324

```

/TEST FOR PROPER DIFFERENCE

```

7474 0000      ABSL,   0
7475 7041      CIA
7476 7421      MQL
7477 7040      CMA
7500 0770'     AND      TEMP3L
7501 4771'     JMS      RSIMAD
7502 7500      SMA
7503 7041      CIA
7504 7001      IAC
7505 7001      IAC
7506 5674      JMP I   ABSL

```

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```

/
/
/
7507 0000      ABSL1, 0
7510 7041      CIA
7511 7421      MQL
7512 7040      CMA
7513 0767'     AND      R3L
7514 4771'     JMS      RSIMAD
7515 7500      SMA
7516 7041      CIA
7517 7001      IAC
7520 7001      IAC
7521 5707      JMP I   ABSL1
$

```

```

7567 7160
7570 7161
7571 7200
7572 6757
7573 6756
7574 6754
7575 6753
7576 6761
7577 6760

```

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0000	11111100	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
0100	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
0200	11100000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
0300	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000

0400  
0500

0600  
0700

1000  
1100

1200  
1300

1400  
1500

1600  
1700

2000  
2100

2200  
2300

2400  
2500

2600  
2700

3000  
3100

3200  
3300

3400  
3500

3600  
3700

4000  
4100

4200  
4300

4400  
 4500  
 4600  
 4700  
 5000  
 5100  
 5200  
 5300  
 5400  
 5500  
 5600  
 5700  
 6000  
 6100  
 6200  
 6300  
 6400  
 6500  
 6600  
 6700  
 7000  
 7100  
 7200  
 7300  
 7400  
 7500  
 7600  
 7700

6600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111110
7000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
7100	11111111	11111111	11111111	11111111	11111111	11111111	11111100	00000111	
7200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
7300	11111111	11111111	11111111	11111111	11111111	11100000	00000000	00011111	
7400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
7500	11111111	11111111	11000000	00000000	00000000	00000000	00000001	11111111	

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A10RA2	7345	PAGAL	7040
ABSL	7474	PAL	7055
ABSL1	7507	R1L	7150
ARG1	7343	R2L	7153
ARG2	7344	R3L	7160
C212	7472	RANDL	7430
C215	7471	RETURN	0000
C324	7473	RSIMAD	7200
CAF	6007	SETTL	6644
CARRY	7351	SIMAC	7346
CNTR1	6776	SIMAD	7204
COMAD	7313	SIMLNK	7347
DAADL	7064	SR00	7467

DATADL	0003	SR03	7470
DIRL	6702	SR09	6773
DOANDL	6716	SR10	6772
DOTSTL	6705	SR11	6771
ENCAR	7244	SRANDL	7162
ENCAR1	7253	SRIMAD	7163
ENDSIM	7274	START	0200
ENRAN	7440	STARTL	6600
EPASL	7442	T5400L	6766
ERROR	7400	T7760	6767
ERROR1	7341	T7770	6770
ERRORS	7352	TAC	6764
GANADL	7021	TCOMAD	6774
GANDL	7001	TDA1L	6760
GENL	7000	TDA2L	6761
IFLAGL	0005	TDAT1L	6624
INADDL	0002	TDAT2L	6634
INDIRL	7101	TDATAL	6756
INSTL	0001	TEMP2L	6745
K0177L	7155	TEMP3L	7161
K10	6775	TEPASL	6750
K1000	7165	TERROR	6750
K1777	7152	TEST1L	6602
K200L	7157	TGENL	6746
K3	7441	TIFLGL	6755
K3L	7151	TINADL	6754
K4000	7350	TINSTL	6753
K400L	7156	TLINK	6765
LIMIT	7303	TPADDL	6757
LIML	7164	TRANDL	6752
MGA	7501	TRETTL	6747
MQL	7421	TRETUL	6735
NOTAUT	6676	TSIMAC	6763
NXTCAR	7234	TSIMAD	6751
P0AL	7107	YSIML	6762
P0L	7154	TYPE	7461
PADDL	0004	XORALL	7260
PADL	7113		
PAGADL	7044		

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ERRORS DETECTED: 0  
LINKS GENERATED: 23  
RUN-TIME: 5 SECONDS  
2K CORE USED