

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DQNB-D
PRODUCT NAME: T14 TRAP TEST
DATE CREATED: REVISED FEB 1971
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: JOHN HITTELL

1. ABSTRACT

THIS IS A TEST OF ALL OPERATION AND INSTRUCTION THAT CAUSE TRAPS. ALSO TESTED ARE TRAP OVERFLOW CONDITIONS, ODDITIES OF REGISTER 6, INTERRUPTS AND THE RESET INSTRUCTIONS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11/20 STANDARD COMPUTER

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES MEMORY FROM 0000 TO 17500.

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTING

THE PROGRAM STARTS AND RESTARTS AT 200 FOR A 4K SYSTEM

4.2 STARTING ADDRESS OR ADDRESSES

(A) 200 = STARTING ADDRESS FOR 4K

202 = STARTING ADDRESS FOR 8K

204 = STARTING ADDRESS FOR 12K

206 = STARTING ADDRESS FOR 16K

210 = STARTING ADDRESS FOR 20K

212 = STARTING ADDRESS FOR 24K ←

214 = STARTING ADDRESS FOR 28K

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY. (BOTTOM 4K)
SET SWITCH REGISTER TO STARTING ADDRESS.
LOAD ADDRESS.
PRESS START.
THE PROGRAM WILL LOOP.
AND RING A BELL AFTER EACH ITERATIONS

OPERATION PROCEDURE

OPERATIONAL SWITCH SETTINGS

SWITCHES ARE USED

SUBROUTINE ABSTRACTS

2.2.1 BEGIN SA 200

2.2.2 SCOPE

 IS A "NOP THAT IS PLACED BETWEEN EACH SUBTEST
 IN THE INSTRUCTION SECTION. IF A SCOPE LOOP IS NEEDED,
 INSERT A BRANCH TO THE PREVIOUS SCOPE LOCATION AT
 THE CURRENT SCOPE LOCATION. (NOTE NOP=240)

2.2.3 HLT

 INDICATES THE UNIQUE ADDRESS THAT TAGS THE FAILING
 SUBTEST. THE INCORRECT DATA AT THE TIME OF THE FAIL-
 URE MAY OR MAY NOT BE DISPLAYED IN REGISTER ZERO, WHICH
 IS THE DATA REGISTER ON A HALT.

2.2.4 TRAPCATCHER

 THIS IS A SERIES OF INSTRUCTIONS DESIGNED TO DETECT AND
 ISOLATE UNEXPECTED TRAPS AND INTERRUPTS, THAT OCCUR IN THE
 TRAP AND INTERRUPT VECTOR AREA OF MEMORY.

THE PRINCIPAL OF THIS ROUTINE IS: THE VECTOR ENTRANCE
 ADDRESS POINTS TO THE NEXT SEQUENTIAL WORD WHICH WILL CON-
 TAIN A HALT (000000) (THIS LOCATION IS ALSO THE STATUS
 WORD FOR THAT VECTOR ENTRANCE. BUT THIS WILL HAVE NO EFFECT
 ON IT ALSO BEING THE NEXT INSTRUCTION).

IF A HALT OCCURES IN THE TRAP OR INTERRUPT VECTOR AREA,
 REGISTER SIX SHOULD BE EXAMINED TO DETERMINE ITS CONTENTS,
 THEN USE REGISTER SIX CONTENTS AS AN ADDRESS TO DETERMINE
 THE LOCATION THE PROGRAM WAS AT, WHEN THE INTERRUPT OR
 TRAP OCCURRED. (MEMORY AS SPECIFIED BY R6 CONTAINS THE
 PC OF THE INSTRUCTION FOLLOWING THE INSTRUCTION WHERE THE
 TRAP OCCURRED)

PROGRAM AND/OR OPERATOR ACTION

1. LOADING AND STARTING AT 200 STARTS THE TEST. IF
 AN ERROR IS DETECTED, THERE WILL BE A HALT.
 WHEN A HALT OCCURS AND IT IS NECESSARY TO SCOPE ON
 IT, PLACE INSERT A BRANCH INSTRUCTION IN THE SCOPE
 LOCATION FOLLOWING THE HALT. THE BRANCH INSTRUCTION
 SHOULD BRANCH YOU TO THE PREVIOUS SCOPE LOCATION.

ERRORS

ALL ERRORS WILL CAUSE A HALT.

ERROR RECOVERY

ON TRAP ERRORS - RESTART AT STARTING ADDRESS
DEPRESS CONTINUE TO CONTINUE TEST

RESTRICTIONS

STARTING RESTRICTION

NONE

OPERATIONAL RESTRICTION

NONE

MISCELLANEOUS

EXECUTION TIME

FOR THE TEST ABOUT 45 SECONDS

PROGRAM DESCRIPTION

THIS PROGRAM CHECKS THAT ON ALL TRAP OPERATIONS REGISTER 6 IS DECREMENTED THE CORRECT AMOUNT, THAT THE CORRECT PC IS SAVED ON THE STACK, THAT THE OLD CONDITION CODES AND PRIORITY ARE PLACED ON THE STACK AND THAT THE NEW STATUS AND CONDITION CODES ARE CORRECT. BOTH THE "TRAP" AND "EMT" TRAP INSTRUCTIONS ARE TESTED THAT ALL COMBINATION WILL TRAP. CHECKED ALSO IS THAT ALL RESTRICTED INSTRUCTIONS WILL TRAP. VERIFICATION OF THE "TR" INSTRUCTION (00003) WHICH IS USED FOR SOFTWARE DEBUG ROUTINES: ODT,DDT. ALSO, THE TRACE BIT IS CHECK TO SEE IF IT CAUSES A TRAP. THERE IS INCLUDED OF A SPECIAL REGISTER TEST TO SEE IF ANY AUTO DECREMENT OF REGISTER WILL CAUSE A TRAP OVERFLOW WHEN REGISTER 6 IS LESS THAN 400. TRAP OVERFLOW SHOULD ALSO OCCURE WITH TRAPS AND INTERRUPTS WHEN REGISTER 6 IS LESS THAN 400. SPECIAL CHECKS ARE MADE TO SEE IF BUS ERROR TRAPS OCCURE ON ODD ADDRESS WITH WORD INSTRUCTION AND NON EXISTENT MEMORY.

LISTING

FLOW CHART(S)

000044	000046	,+2
000046	000000	HALT
000050	000052	,+2
000052	000000	HALT
000054	000056	,+2
000056	000000	HALT
000060	000062	,+2
000062	000000	HALT
000064	000066	,+2
000066	000000	HALT
000070	000072	,+2
000072	000000	HALT
000074	000076	,+2
000076	000000	HALT
000100	000102	,+2
000102	000000	HALT
000104	000106	,+2
000106	000000	HALT
000110	000112	,+2
000112	000000	HALT
000114	000116	,+2
000116	000000	HALT
000120	000122	,+2
000122	000000	HALT
000124	000126	,+2
000126	000000	HALT
000130	000132	,+2
000132	000000	HALT
000134	000136	,+2
000136	000000	HALT
000140	000142	,+2
000142	000000	HALT
000144	000146	,+2
000146	000000	HALT
000150	000152	,+2
000152	000000	HALT
000154	000156	,+2
000156	000000	HALT
000160	000162	,+2
000162	000000	HALT
000164	000166	,+2
000166	000000	HALT
000170	000172	,+2
000172	000000	HALT
000174	000176	,+2
000176	000000	HALT
	000200	,+200
000200	000410	BR
000202	000414	BR
000204	000420	BR
000206	000424	BR
000210	000430	BR
000212	000434	BR
000214	000440	BR
000216	000167	JMP

ITRAPPED TO PREVIOUS ADDRESS

ITRAPPED TO PREVIOUS ADDRESS

ITRAPPED TO PREVIOUS ADDRESS

ITRAPPED TO PREVIOUS ADDRESS

ITRAPPED TO PREVIOUS ADDRESS

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ITRAPPED TO PREVIOUS ADDRESS

ITRAPPED TO PREVIOUS ADDRESS

ST4K

14K

ST8K

18K

ST12K

112K

ST16K

116K

ST20K

120K

ST24K

124K

ST28K

128K

JONT.

IERROR ON ERROR

004224

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000222 012767 020000 006000 ST4K1 MOV #20000,CORH
000230 000167 000144 JMP BEGIN
000234 012767 040000 005766 ST8K1 MOV #40000,CORH
000242 000167 000132 JMP BEGIN
000246 012767 060000 005754 ST12K1 MOV #60000,CORH
000254 000167 000120 JMP BEGIN
000260 012767 100000 005742 ST16K1 MOV #100000,CORH
000266 000167 000106 JMP BEGIN
000272 012767 120000 005730 ST20K1 MOV #120000,CORH
000300 000167 000074 JMP BEGIN
000304 012767 140000 005716 ST24K1 MOV #140000,CORH
000312 000167 000062 JMP BEGIN
000316 012767 160000 005704 ST28K1 MOV #160000,CORH
000324 000167 000050 JMP BEGIN
000400 #400
    
```

ITEST THAT A TRAP OCCURS ON ALL RESTRICTED INSTRUCTION

```

000400 010700 BEGIN1 SCOPE
000402 012706 007700 MOV #BUFF,LP I LINK POINTER SETUP
000406 012767 000420 177374 MOV #RETA,RTRAP I RETURN LOCATION
000414 070000 TRAPA I RESERVED INSTRUCTION, SHOULD TRAP
000416 000000 HLT
000420 010700 RETA1 SCOPE
    
```

ITEST DECREMENT OF LINK POINTER ON A TRAP OPERATION

```

000422 012706 007700 MOV #BUFF,LP I LINK POINTER SETUP
000426 012767 000436 177354 MOV #RETB,RTRAP I RETURN POINTER
000434 070000 TRAPA I RESERVED INSTRUCTION
000436 020627 007674 RETB1 CMP LP,#BUFF-4 I TEST DECREMENT OF LP
000442 001401 BEQ .+4
000444 000000 HLT
000446 010700 SCOPE I NOT DECREMENTED TWO WORDS
    
```

ITEST THAT PROPER P.C. IS SAVED

```

000450 012706 007700 MOV #BUFF,LP I LINK POINTER SETUP
000454 012767 000464 177326 MOV #RETC,RTRAP I RETURN FROM TRAP POINTER
000462 070000 TRAPA I TRAP ON THIS INSTRUCTION
000464 022767 000464 007202 RETC1 CMP #,BUFF-4 I CHECK FOR INCREMENTED P.C.
000472 001401 BEQ .+4
000474 000000 HLT
000476 010700 SCOPE I INCORRECT P.C.
    
```

TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK

000500	010700								
000502	012706	007700							
000506	012767	000324	177274						
000514	000067	177256							
000520	000257								
000522	070000								
000524	026727	007146	000000	RETDI	TRAPA				
000532	001401				CHP	BUFF-2,#0			
000534	000000				BEQ	.+4			
000536	010700				HLT				
000540	012706	007700			SCOPE				
000544	012767	000564	177236		MOV	#BUFF,LP			
000552	012767	000357	177216		MOV	#RETE,RTRAP			
000560	000277				MOV#357,CC				
000562	070000				SCC				
000564	026727	007106	000357	RETEI	TRAPA				
000572	001401				CHP	BUFF-2,#357			
000574	000000				BEQ	.+4			
000576	010700				HLT				

TEST THAT "NEW" STATUS IS CORRECT

000600	012706	007700							
000604	012767	000620	177176						
000612	000067	177174							
000616	070000								
000620	100001			RETFI	TRAPA				
000622	000000				BPL	.+4			
000624	001001				HLT				
000626	000000				ONE	.+4			
000630	102001				HLT				
000632	000000				BVC	.+4			
000634	103001				HLT				
000636	000000				BCG	.+4			
000640	032767	000340	177130		HLT				
000646	001401				BIT	#340,CC			
000650	000000				BEQ	.+4			
000652	010700				HLT				
000654	012706	007700			SCOPE				
000660	012767	000676	177122		MOV	#BUFF,LP			
000666	012767	000357	177116		MOV	#RETG,RTRAP			
000674	070000				MOV#357,RTRAP*2				
000676	100401			RETCI	TRAPA				
000700	000000				BMI	.+4			
000702	001401				HLT				
000704	000000				BEQ	.+4			
000706	102401				HLT				
000710	000000				BVS	.+4			
000712	103401				HLT				
000714	000000				BCS	.+4			
000716	016706	177054			HLT				
000722	042706	000017			MOV	CC,LP			
000726	022706	000340			BIC	#17,LP			
000732	001401				CMP	#340,LP			
000734	000000				BEQ	.+4			
000736	010700				HLT				
					SCOPE				

PRIORITY WAS CHANGED

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1105

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000740 012767 000012 177042
000746 005067 177040

MOV *12,10

CLR 12

TEST THAT A TRAP OCCURES FOR A "TRAP" INSTRUCTION

```

000752 010700          SCOPE
000754 012706 007700  MOV    #BUFF,LP          LINK POINTER SETUP
000760 012767 000772 177046  MOV    #RETA1,RTRAP1     RETURN LOCATION
000766 104400          TRAP                      RESERVED INSTRUCTION, SHOULD TRAP
000770 000000          HLT
000772 010700          RETA1: SCOPE

```

TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION

```

000774 012706 007700  MOV    #BUFF,LP          LINK POINTER SETUP
001000 012767 001010 177026  MOV    #RETB1,RTRAP1     RETURN POINTER
001006 104400          TRAP                      RESERVED INSTRUCTION
001010 020627 007674  RETB1: CMP    LP,#BUFF-4    TEST DECREMENT OF LP
001014 001401          BEQ    ,+4
001016 000000          HLT                      NOT DECREMENTED TWO WORDS
001020 010700          SCOPE

```

TEST THAT PROPER P.C. IS SAVED

```

001022 012706 007700  MOV    #BUFF,LP          LINK POINTER SETUP
001026 012767 001036 177000  MOV    #RETC1,RTRAP1     RETURN FROM TRAP POINTER
001034 104400          TRAP                      TRAP ON THIS INSTRUCTION
001036 022767 001036 006630  RETC1: CMP    #.,BUFF-4    CHECK INCREMENTED P.C.
001044 001401          BEQ    ,+4
001046 000000          HLT                      INCORRECT P.C.
001050 010700          SCOPE

```

ITEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK

001052	010700				SCOPE		
001054	012706	007700			MOV	#BUFF,LP	ISSET UP
001060	012767	001076	176746		MOV	#RETD1,RTRAP1	ISSET UP
001066	005067	176704			CLR	CC	ICLEAR CC AND PRIORITY
001072	000257				CCC		
001074	104400				TRAP		ITRAP
001076	026727	006574	000000	RETD1:	CMP	BUFF-2,#0	ITEST THAT OLD STATUS WENT TO STACK
001104	001401				BEQ	.*4	ITEST FOR ALL ZEROS
001106	000000				HLT		INCORRECT STATUS
001110	010700				SCOPE		
001112	012706	007700			MOV	#BUFF,LP	ISSET UP
001116	012767	001134	176710		MOV	#RETE1,RTRAP1	ISSET UP
001124	012767	000357	176644		MOV	#357,CC	ISSET PRIORITY
001132	104400				TRAP		ISSET CC
001134	026727	006536	000357	RETE1:	CMP	BUFF-2,#357	ICOMPARES STATUS ON STACK
001142	001401				BEQ	.*4	ITEST FOR ALL ONES
001144	000000				HLT		INCORRECT STATUS ON STACK

ITEST THAT "NEW" STATUS IS CORRECT

001146	012706	007700			MOV	#BUFF,LP	
001152	012767	001166	176654		MOV	#RETF1,RTRAP1	
001160	005067	176652			CLR	RTRAP1+2	ICLEAR FUTURE PRIORITY AND CC
001164	104400				TRAP		
001166	100001			RETF1:	BPL	.*4	ITEST FOR "C" CLEARED
001170	000000				HLT		IC NOT CLEARED
001172	001001				BNE	.*4	
001174	000000				HLT		IC NOT CLEARED
001176	102001				BVC	.*4	
001200	000000				HLT		IV NOT CLEARED
001202	103001				BCC	.*4	
001204	000000				HLT		IC NOT CLEARED
001206	032767	000340	176562		BIT	#340,CC	ITEST PRIORITY
001214	001401				BEQ	.*4	
001216	000000				HLT		IPRIORITY NOT ZERO
001220	010700				SCOPE		
001222	012706	007700			MOV	#BUFF,LP	
001226	012767	001244	176600		MOV	#RETC1,RTRAP1	
001234	012767	000357	176574		MOV	#357,RTRAP1+2	ISSET NEW "CC" AND PRIORITY
001242	104400				TRAP		ITRAP HERE
001244	100401			RETC1:	BMI	.*4	
001246	000000				HLT		IN NOT SET
001250	001401				BEQ	.*4	
001252	000000				HLT		IC NOT SET
001254	102401				BVS	.*4	
001256	000000				HLT		IV NOT SET
001260	103401				BOS	.*4	
001262	000000				HLT		IC NOT SET
001264	016706	176506			MOV	CC,LP	
001270	042706	000017			BIT	#17,LP	
001274	022706	000340			CMP	#340,LP	
001300	001401				BEQ	.*4	
001302	000000				HLT		IPRIORITY WAS CHANGED
001304	010700				SCOPE		

ITEST THAT ALL COMBINATION OF "TRAP" WILL CAUSE A TRAP

001306	012767	104400	000012		MOV	#TRAP,RB1	INITIALIZE BASE TRAP INSTRUCTION
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001314	012767	001332	176512		MOV	#RA1,34
001322	012706	007700		RC1:	MOV	#BUFF,LP
001326	104400			RB1:	TRAP	
001330	000000				HLT	
001332	005267	177770		RA1:	INC	RB1
001336	022767	104777	177762		CMP	#124777,RB1
001344	103366				BHIS	RC1
001346	010700				SCOPE	
001350	012767	000036	176456		MOV	#36,34
001356	005067	176454			CLR	36

```

I RETURN FROM TRAP TO RA1
I SET UP STACK POINTER
I TRAP INST WILL BE MODIFIED TO TRAP+377
I PREVIOUS INST FAILED TO TRAP
I INCREMENT TRAP INSTRUCTION
I TRAP+377 TO UPPER LIMIT
I HAVE WE TESTED ALL
I YES
    
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TEST THAT A TRAP OCCURES ON AN "IOT" INSTRUCTION
001362 010700          SCOPE
001364 012706 007700  MOV      #BUFF,LP          I LINK POINTER SETUP
001370 012767 001402 176422  MOV      #RETA2,RTRAP2    I RETURN LOCATION
001376 000004          IOT                          I RESERVED INSTRUCTION, SHOULD TRAP
001400 000000          HLT
001402 010700          RETA2: SCOPE

TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
001404 012706 007700  MOV      #BUFF,LP          I LINK POINTER SETUP
001410 012767 001420 176402  MOV      #RETB2,RTRAP2    I RETURN POINTER
001416 000004          IOT                          I RESERVED INSTRUCTION
001420 020627 007674  RETB2:  CMP      LP,#BUFF-4  I TEST DECREMENT OF LP
001424 001401          BEQ      .+4
001426 000000          HLT                          I NOT DECREMENTED TWO WORDS
001430 010700          SCOPE

TEST THAT PROPER P.C. IS SAVED
001432 012706 007700  MOV      #BUFF,LP          I LINK POINTER SETUP
001436 012767 001446 176354  MOV      #RETC2,RTRAP2    I RETURN FROM TRAP POINTER
001444 000004          IOT                          I TRAP ON THIS INSTRUCTION
001446 022767 001446 006220  RETC2:  CMP      #,;BUFF=4  I CHECK FOR INCREMENTED P.C.
001454 001401          BEQ      .+4
001456 000000          HLT                          I INCORRECT P.C.
001460 010700          SCOPE

TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK
001462 010700          SCOPE
001464 012706 007700  MOV      #BUFF,LP          I SET UP
001470 012767 001506 176322  MOV      #RETO2,RTRAP2    I SET UP
001476 005067 176274  CLR      CC                I CLEAR CC AND PRIORITY
001502 000257          CCC
001504 000004          IOT
001506 026727 006164 000000  RETO2:  CMP      BUFF=2,#0  I TRAP
001514 001401          BEQ      .+4                I TEST THAT OLD STATUS WENT TO STACK
001516 000000          HLT                          I TEST FOR ALL ZEROS
001520 010700          I INCORRECT STATUS
001522 012706 007700  MOV      #BUFF,LP          I SET UP
001526 012767 001546 176264  MOV      #RETE2,RTRAP2    I SET UP
001534 012767 000357 176234  MOV      #357,CC          I SET PRIORITY
001542 000277          SCC
001544 000004          IOT
001546 026727 006124 000357  RETE2:  CMP      BUFF=2,#357  I TRAP
001554 001401          BEQ      .+4                I COMPARES STATUS ON STACK
001556 000000          HLT                          I TEST FOR ALL ONES
001560 010700          I INCORRECT STATUS ON STACK
SCOPE

```

ITEST THAT "NEW" STATUS IS CORRECT

001562	012706	007700		MOV	#BUFF,LP	
001566	012767	001602	176224	MOV	#RETF2,RTRAP2	
001574	005067	176222		CLR	RTRAP2+2	JCLEAR FUTURE PRIORITY AND CC
001600	000004			IOT		
001602	100001			RETF2:	SPL	.+4
001604	000000			HLT		ITEST FOR "0" CLEARED
001606	001001			BNE	.+4	IC NOT CLEARED
001610	000000			HLT		
001612	102001			BVC	.+4	IZ NOT CLEARED
001614	000000			HLT		IV NOT CLEARED
001616	103001			BCC	.+4	
001620	000000			HLT		IC NOT CLEARED
001622	032767	000340	176146	BIT	#340,CC	ITEST PRIORITY
001630	001401			BEQ	.+4	
001632	000000			HLT		IPRIORITY NOT ZERO
001634	010700			SCOPE		
001636	012706	007700		MOV	#BUFF,LP	
001642	012767	001660	176150	MOV	#RETF2,RTRAP2	
001650	012767	000357	176144	MOV	#357,RTRAP2+2	JSET NEW "CC" AND PRIORITY
001656	000004			IOT		ITRAP HERE
001660	100401			RETF2:	BMI	.+4
001662	000000			HLT		IN NOT SET
001664	001401			BEQ	.+4	IZ NOT SET
001666	000000			HLT		IV NOT SET
001670	102401			BVS	.+4	
001672	000000			HLT		IC NOT SET
001674	103401			BCC	.+4	
001676	000000			HLT		
001700	016706	176072		MOV	CC,LP	
001704	042706	000017		BIC	#17,LP	
001710	022706	000340		CMP	#340,LP	
001714	001401			BEQ	.+4	
001716	000000			HLT		IPRIORITY WAS CHANGED
001720	010700			SCOPE		
001722	012767	000022	176070	MOV	#22,20	J,+2
001730	005067	176066		CLR	22	HALT

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ITEST THAT A TRAP OCCURES ON AN EMT RESTRICTED INSTRUCTION
001734 010700          SCOPE
001736 012706 007700  MOV      #BUFF,LP          I LINK POINTER SETUP
001742 012767 001704 170060  MOV      #RETA3,RTRAP3    I RETURN LOCATION
001750 104000          EMT                      I RESERVED INSTRUCTION, SHOULD TRAP
001752 000000          HLT
001754 010700          RETA3: SCOPE
ITEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
001756 012706 007700  MOV      #BUFF,LP          I LINK POINTER SETUP
001762 012767 001772 176040  MOV      #RETB3,RTRAP3    I RETURN POINTER
001770 104000          EMT                      I RESERVED INSTRUCTION
001772 020627 007674  RETB3:  CMP      LP,#BUFF-4  I TEST DECREMENT OF LP
001776 001401          BEQ      .+4
002000 000000          HLT                      I NOT DECREMENTED TWO WORDS
ITEST THAT PROPER P.C IS SAVED
002002 012706 007700  MOV      #BUFF,LP          I LINK POINTER SETUP
002006 012767 002016 176014  MOV      #RETC3,RTRAP3    I RETURN FROM TRAP POINTER
002014 104000          EMT                      I TRAP ON THIS INSTRUCTION
002016 022767 002016 005650  RETC3:  CMP      #.,BUFF-4  I CHECK FOR INCREMENTED P.C.
002024 001401          BEQ      .+4
002026 000000          HLT                      I INCORRECT P.C.
002030 010700          SCOPE
ITEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK
002032 010700          SCOPE
002034 012706 007700  MOV      #BUFF,LP          I SET UP
002040 012767 002056 175762  MOV      #RETD3,RTRAP3    I SET UP
002046 005067 175724  CLR      CC                I CLEAR CC AND PRIORITY
002052 000257          CCC
002054 104000          EMT
002056 026727 005614 000000  RETD3:  CMP      BUFF=2,#0  I TRAP
002064 001401          BEQ      .+4          I TEST THAT OLD STATUS WENT TO STACK
002066 000000          HLT                      I TEST FOR ALL ZEROS
002070 010700          SCOPE          I INCORRECT STATUS
002072 012706 007700  MOV      #BUFF,LP          I INCORRECT STATUS
002076 012767 002110 175724  MOV      #RETE3,RTRAP3    I SET UP
002104 012767 000357 175664  MOV      #357,CC          I SET UP
002112 000277          SCC                I SET PRIORITY
002114 104000          EMT                      I SET CC
002116 026727 005534 000357  RETE3:  CMP      BUFF=2,#357 I TRAP
002124 001401          BEQ      .+4          I COMPARES STATUS ON STACK
002126 000000          HLT                      I TEST FOR ALL ONES
002130 010700          SCOPE          I INCORRECT STATUS ON STACK
ITEST THAT "NEW" STATUS IS CORRECT
002132 012706 007700  MOV      #BUFF,LP
002136 012767 002152 175664  MOV      #RETF3,RTRAP3
002144 005067 175662  CLR      RTRAP3+2          I CLEAR FUTURE PRIORITY AND CC
002150 104000          EMT
002152 100001  RETF3:  BPL      .+4          I TEST FOR "C" CLEARED
002154 000000          HLT                      I C NOT CLEARED
002156 001001          BNE      .+4
002160 000000          HLT                      I Z NOT CLEARED
002162 102001          BVC      .+4
002164 000000          HLT                      I V NOT CLEARED
002166 103001          BCC      .+4
002170 000000          HLT                      I C NOT CLEARED

```

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002172 032767 000340 175576

002200 001401

002202 000000

002204 010700

BIT #340,CC

BEQ .04

HLT

SCOPE

I TEST PRIORITY

I PRIORITY NOT ZERO


```

002206 012706 007700      MOV      #BUFF,LP
002212 012707 002230 175610  MOV      #RETC3,RTRAP3
002220 012767 000357 175604  MOV      #337,RTRAP3+2      ISET NEW "CC" AND PRIORITY

002226 104032      EMT
002230 100401      RETG3I  BMI      .+4          ITRAP HERE
002232 000000      HLT
002234 001401      BEQ      .+4          IN NOT SET
002236 000000      HLT
002240 102401      BVS      .+4          IZ NOT SET
002242 000000      HLT
002244 103401      BCS      .+4          IV NOT SET
002246 000000      HLT
002250 016706 175522      MOV      CC,LP           IC NOT SET
002254 042706 000017      BIC      #17,LP
002256 002706 000340      CMP      #340,LP
002264 001401      BEQ      .+4
002266 000000      HLT
002270 010700      SCOPE
I TEST THAT ALL COMBINATION OF EMT WILL CAUSE A TRAP

002272 010700      SCOPE
002274 012767 104000 000012  MOV      #EMT,RB        I INITIALIZE BASE EMT INSTRUCTION
002302 012767 002320 175520  MOV      #RA,30        I RETURN FROM TRAP TO RA
002310 012706 007700      RCI      MOV      #BUFF,LP  I SET UP STACK POINTER
002314 104000      RBI      EMT
002316 000000      HLT
I TRAP INST. WILL BE MODIFIED TO EMT+377
I PREVIOUS INST FAILED TO TRAP
002320 005267 177770      RAI      INC      RB        I INCREMENT TRAP INSTRUCTION
002324 022767 104377 177762  CMP      #104377,RB    I EMT+377 TO EMT?
002332 103366      BHIS     RC
I HAVE WE TESTED ALL
002334 010700      SCOPE
I YES
002336 012767 000032 175464  MOV      #32,30
I /?
002344 005067 175462      CLR      32
I HALT

I TEST THAT A TRAP OCCURES ON AN "TRACE-RT" INSTRUCTION
002350 010700      SCOPE
002352 012706 007700      MOV      #BUFF,LP      I LINK POINTER SETUP
002356 012767 002370 175430  MOV      #RETA4,RTRAP4  I RETURN LOCATION
002364 000003      TRT
I RESERVED INSTRUCTION, SHOULD TRAP
002366 000000      HLT
002370 010700      RETA4I  SCOPE

I TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
002372 012706 007700      MOV      #BUFF,LP      I LINK POINTER SETUP
002376 012767 002406 175410  MOV      #RETB4,RTRAP4  I RETURN POINTER
002404 000003      TRT
I RESERVED INSTRUCTION
002406 020627 007674      RETB4I  CMP      LP,#BUFF-4    I TEST DECREMENT OF LP
002412 001401      BEQ      .+4
002414 000000      HLT
I NOT DECREMENTED TWO WORDS
002416 010700      SCOPE

I TEST THAT PROPER P.C. IS SAVED
002420 012706 007700      MOV      #BUFF,LP      I LINK POINTER SETUP
002424 012767 002434 175362  MOV      #RETC4,RTRAP4  I RETURN FROM TRAP POINTER
002432 000003      TRT
I TRAP ON THIS INSTRUCTION
002434 022767 002434 005232  RETC4I  CMP      #.,BUFF-4
I CHECK FOR INCREMENTED P.C.
002442 001401      BEQ      .+4
002444 000000      HLT
I INCORRECT P.C.

```

002446 010700

SCOPE

TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK

002450 010700

SCOPE

002452 012706 007700

MOV #BUFF,LP

ISET UP

002456 012767 002474 178330

MOV #RETD4,RTAP4

ISET UP

002464 005067 175306

CLR CC

ICLEAR CC AND PRIORITY

002470 000257

CCC

002472 000003

TRT

ITRAP

```

002474 026727 005176 000000 RETD41 CMP      BUFF=2,#0
002502 001401          BEQ      .+4
002504 000000          HLT
002506 010700          SCOPE
002510 012706 007700    MOV      #BUFF,LP
002514 012767 002534 175272  MOV     #R154,R154
002522 012767 000357 175246  MOV     #357,CC
002530 000277          SCC
002532 000003          TRT
002534 026727 005136 000357 RETE41 CMP      BUFF=2,#357
002542 001401          BEQ      .+4
002544 000000          HLT
    
```

```

ITEST THAT OLD STATUS WENT TO STACK
ITEST FOR ALL ZEROS
INCORRECT STATUS

ISET UP
ISET UP
ISET PRIORITY
ISET-SET CC
ITRAP
ICOMPARES STATUS ON STACK
ITEST FOR ALL ONES
INCORRECT STATUS ON STACK
    
```

002546 010700

SCOPE

ITEST THAT "NEW" STATUS IS CORRECT

002550 012706 007700
 002554 012767 002570 175232
 002560 005267 175230
 002566 000003
 002570 100001
 002572 000000
 002574 001001
 002576 000000
 002600 102001
 002602 000000
 002604 103001
 002606 000000
 002610 032767 000340 175160
 002612 001401
 002620 000000
 002622 010700
 002624 012706 007700
 002630 012767 002646 175156
 002636 012767 000357 175152
 002644 000003
 002646 100401
 002650 000000
 002652 001401
 002654 000000
 002656 102401
 002660 000000
 002662 103401
 002664 000000
 002666 016706 175104
 002672 042706 000017
 002676 022706 000340
 002702 001401
 002704 000000
 002706 010700
 002710 012767 000016 175076
 002716 005067 175074

RETF4:

RETC4:

MOV #BUFF,LP
 MOV #RETF4,RTRAP4
 CLR RTRAP4+2
 TRT
 BPL .+4
 HLT
 BNE .+4
 HLT
 BVC .+4
 HLT
 BCC .+4
 HLT
 BIT #340,CC
 BCC .+4
 HLT
 SCOPE
 MOV #BUFF,LP
 MOV #RETC4,RTRAP4
 MOV #357,RTRAP4+2
 TRT
 BMI .+4
 HLT
 BEQ .+4
 HLT
 BVS .+4
 HLT
 BCS .+4
 HLT
 MOV CC,LP
 BIC #17,LP
 ORP #340,LP
 BEQ .+4
 HLT
 SCOPE
 MOV #16,14
 CLR 16

ICLEAR FUTURE PRIORITY AND CC

ITEST FOR "C" CLEARED

IC NOT CLEARED

I2 NOT CLEARED

IV NOT CLEARED

IC NOT CLEARED

ITEST PRIORITY

IPRIORITY NOT ZERO

ISET NEW "CC" AND PRIORITY

ITRAP HERE

IN NOT SET

I2 NOT SET

IV NOT SET

IC NOT SET

IPRIORITY WAS CHANGED

;PDP-11 ILLEGAL AND ADDRESS INSTRUCTION TEST
 ;ALL INSTRUCTIONS THAT ARE RESERVED
 ;SHOULD TRAP TO LOCATION 4, AND THE
 ;PC THAT POINTS TO THE TRAPPING INSTRUCTION
 ;SHOULD BE PLACED ON THE STACK

;TEST THAT A TRAP OCCURS ON AN ILLEGAL INSTRUCTION

002722	010700			SCOPE	
002724	012706	007700		MOV	#BUFF,LP ;LINK POINTER SETUP
002730	012767	002742	175046	MOV	#RETA5,RTRAPS ;RETURN LOCATION
002736	000100			JMP	X0 ;ILLEGAL INSTRUCTION, SHOULD TRAP
002740	000000			HLT	
002742	010700			RETA5:	SCOPE

;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION

002744	012706	007700		MOV	#BUFF,LP ;LINK POINTER SETUP
002750	012767	002760	175026	MOV	#RETB5,RTRAPS ;RETURN POINTER
002756	000100			JMP	X0 ;RESERVED INSTRUCTION
002760	020627	007674		RETB5:	CMP LP,#BUFF-4 ;TEST DECREMENT OF LP
002764	001401			BEQ	,*4
002766	000000			HLT	
002770	010700			SCOPE	;NOT DECREMENTED TWO WORDS

;TEST THAT PROPER P.C. IS SAVED

002772	012706	007700		MOV	#BUFF,LP ;LINK POINTER SETUP
002776	012767	003006	175000	MOV	#RETC5,RTRAPS ;RETURN FROM TRAP POINTER
003004	000100			JMP	X0 ;TRAP ON THIS INSTRUCTION
003006	022767	003006	004660	RETC5:	CMP #,BUFF-4 ;CHECK FOR INCREMENTED P.C.
003014	001401			BEQ	,*4
003016	000000			HLT	
003020	010700			SCOPE	;INCORRECT P.C.

TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK

003022	010700				SCOPE		
003024	012706	007700			MOV	#BUFF,LP	!SET UP
003030	012767	003046	174746		MOV	#RETD0,RTRAP5	!SET UP
003036	005067	174734			CLR	CC	!CLEAR CC AND PRIORITY
003042	000257				CCC		
003044	000100				JMP	X0	!TRAP
003046	026727	004624	000000	RETD5:	CMP	BUFF=2,#0	!TEST THAT OLD STATUS WENT TO STACK
003054	001401				BEQ	.*4	!TEST FOR ALL ZEROS
003056	000000				HLT		!INCORRECT STATUS
003060	010700				SCOPE		
003062	012706	007700			MOV	#BUFF,LP	!SET UP
003066	012767	003106	174710		MOV	#RETE5,RTRAP5	!SET UP
003074	012767	000357	174674		MOV	#357,CC	!SET PRIORITY
003102	000277				SCC		!SET CC
003104	000100				JMP	X0	!TRAP
003106	026727	004564	000357	RETE5:	CMP	BUFF=2,#357	!COMPARES STATUS ON STACK
003114	001401				BEQ	.*4	!TEST FOR ALL ONES
003116	000000				HLT		!INCORRECT STATUS ON STACK
003120	010700				SCOPE		

TEST THAT "NEW" STATUS IS CORRECT

003122	012706	007700			MOV	#BUFF,LP	
003126	012767	003142	174650		MOV	#RETF5,RTRAP5	
003134	005067	174646			CLR	RTRAP5*2	!CLEAR FUTURE PRIORITY AND CC
003140	000100				JMP	X0	
003142	100001			RETF5:	SPL	.*4	!TEST FOR "C" CLEARED
003144	000000				HLT		!C NOT CLEARED
003146	001001				SNE	.*4	
003150	000000				HLT		!Z NOT CLEARED
003152	102001				BVC	.*4	
003154	000000				HLT		!V NOT CLEARED
003156	103001				SCC	.*4	
003160	000000				HLT		!C NOT CLEARED
003162	032767	000357	174600		BIT	#357,CC	!TEST PRIORITY
003170	001401				BEQ	.*4	
003172	000000				HLT		!PRIORITY NOT ZERO
003174	010700				SCOPE		
003176	012706	007700			MOV	#BUFF,LP	
003202	012767	003220	174574		MOV	#RETG5,RTRAP5	
003210	012767	000357	174570		MOV	#357,RTRAP5+2	!SET NEW "CC" AND PRIORITY
003216	000100				JMP	X0	!TRAP HERE
003220	100401			RETG5:	BNI	.*4	
003222	000000				HLT		!N NOT SET
003224	001401				BEQ	.*4	
003226	000000				HLT		!Z NOT SET
003230	102401				BVS	.*4	
003232	000000				HLT		!V NOT SET
003234	103401				CCC	.*4	
003236	000000				HLT		!C NOT SET
003240	016706	174532			MOV	CC,LP	
003244	022706	000357			CMP	#357,LP	
003250	001401				BEQ	.*4	
003252	000000				HLT		!PRIORITY WAS CHANGED

ITEST THAT A TRAP OCCURES ON ALL ILLEGAL INSTRUCTION

```

003254 010700          SCOPE
003256 012706 007700  MOV      #BUFF,LP          ;LINK POINTER SETUP
003262 012767 003274 174514  MOV      #RETH5,RTRAP5    ;RETURN LOCATION
003270 004000          JSR      X0,X0             ;RESERVED INSTRUCTION, SHOULD TRAP
003272 000000          HLT
003274 010700          RETH5:  SCOPE

```

ITEST DECREMENT OF LINK POINTER ON A TRAP OPERATION

```

003276 012706 007700  MOV      #BUFF,LP          ;LINK POINTER SETUP
003302 012767 003312 174474  MOV      #RETI,RTRAP5    ;RETURN POINTER
003310 004000          JSR      X0,X0             ;RESERVED INSTRUCTION
003312 020627 007674  RETI:   CMP      LP,#BUFF-4  ;TEST DECREMENT OF LP
003316 001401          BEQ      .+4
003320 000000          HLT
003322 010700          ;NOT DECREMENTED TWO WORDS
          SCOPE

```

ITEST THAT PROPER P.C. IS SAVED

```

003324 012706 007700  MOV      #BUFF,LP          ;LINK POINTER SETUP
003330 012767 003340 174446  MOV      #RETI,RTRAP5    ;RETURN FROM TRAP POINTER
003336 004000          JSR      X0,X0             ;TRAP ON THIS INSTRUCTION
003340 022767 003340 004326  RETKI:  CMP      #INSTK+2,BUFF-4 ;CHECK FOR INCREMENTED P.C.
003346 001401          BEQ      .+4
003350 000000          HLT
003352 010700          ;INCORRECT P.C.
          SCOPE

```

ITEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK

```

003354 010700          SCOPE
003356 012706 007700  MOV      #BUFF,LP          ;SET UP
003362 012767 003400 174414  MOV      #RETI,RTRAP5    ;SET UP
003370 003067 174402  CLR      CC                ;CLEAR CC AND PRIORITY
003374 000257          CCC
003376 004000          JSR      X0,X0             ;TRAP
003400 026727 004272 000000  REYLI:  CMP      BUFF-2,#0      ;TEST THAT OLD STATUS WENT TO STACK
003406 001401          BEQ      .+4
003410 000000          HLT
003412 010700          ;INCORRECT STATUS
          SCOPE

```

ITEST THAT "NEW" STATUS IS CORRECT

```

003414 012706 007700  MOV      #BUFF,LP          ;SET UP
003420 012767 003440 174356  MOV      #RETI,RTRAP5    ;SET UP
003426 012767 000357 174342  MOV      #357,CC          ;SET PRIORITY
003434 000277          SCC                        ;SET CC
003436 004000          JSR      X0,X0             ;TRAP
003440 026727 004232 000357  RETMI:  CMP      BUFF-2,#357  ;COMPARES STATUS ON STACK
003446 001401          BEQ      .+4
003450 000000          HLT
003452 010700          ;INCORRECT STATUS ON STACK
          SCOPE

```

ITEST THAT "NEW" STATUS IS CORRECT

```

003454 012706 007700  MOV      #BUFF,LP          ;SET UP
003460 012767 003474 174316  MOV      #RETI,RTRAP5    ;SET UP
003466 003067 174314  CLR      RTRAP5+2        ;CLEAR FUTURE PRIORITY AND CC
003472 004000          JSR      X0,X0             ;TRAP
003474 100001  RETNI:  BPL      .+4
003476 000000          ;TEST FOR "C" CLEARED
003500 001001          BNE      .+4
003502 000000          HLT
003504 102001          ;NOT CLEARED
          BVC      .+4

```

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003506 000000
003510 103001
003512 000000

HLT
BCC .04
HLT

IV NOT CLEARED

IC NOT CLEARED


```

003514 010700 174200      MOV      CC,X0      ;TEMP STORAGE
003520 001401      BEQ      .+4
003522 000000      HLT
003524 010700      SCOPE
003526 012706 007700      MOV      #BUFF,LP
003532 012767 003550 174244  MOV      #RETO,RTRAP5
003540 012767 000357 174240  MOV      #357,RTRAP5+2 ;SET NEW "CC" AND PRIORITY
003546 004000      JSR
003550 100401      RETOI  BMI      .+4      ;TRAP HERE
003552 000000      HLT
003554 001401      BEQ      .+4      ;N NOT SET
003556 000000      HLT
003560 102401      BVS      .+4      ;Z NOT SET
003562 000000      HLT
003564 103401      BCS      .+4      ;V NOT SET
003566 000000      HLT
003570 016700 174202      MOV      CC,X0
003574 022700 000357      CMP      #357,X0
003600 001401      BEQ      .+4
003602 000000      HLT
003604 010700      SCOPE

```

TEST THAT A TRAP OCCURES ON AN ILLEGAL ADDRESS

```

003606 010700      SCOPE
003610 012706 007700      MOV      #BUFF,LP      ;LINK POINTER SETUP
003614 012767 003630 174162  MOV      #RETP,RTRAP5 ;RETURN LOCATION
003622 005767 174153      TST 1      ;ILLEGAL ADDRESS INSTRUCTION, SHOULD TRAP
003626 000000      HLT
003630 010700      RETP: SCOPE ;ILLEGAL ADDRESS DID NOT TRAP

```

TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION

```

003632 012706 007700      MOV      #BUFF,LP      ;LINK POINTER SETUP
003636 012767 003650 174140  MOV      #RETR,RTRAP5 ;RETURN POINTER
003644 005767 174131      TST 1      ;RESERVED INSTRUCTION
003650 020627 007674      RETRI  CMP      LP,#BUFF-4 ;TEST DECREMENT OF LP
003654 001401      BEQ      .+4
003656 000000      HLT
003660 010700      SCOPE ;NOT DECREMENTED TWO WORDS

```

TEST THAT PROPER P.C. IS SAVED

```

003662 012706 007700      MOV      #BUFF,LP      ;LINK POINTER SETUP
003666 012767 003700 174110  MOV      #RETR,RTRAP5 ;RETURN FROM TRAP POINTER
003674 005767 174101      TST 1      ;TRAP ON THIS INSTRUCTION
003700 022767 003700 003766  RETRI  CMP      #,BUFF-4 ;CHECK FOR INCREMENTED P.C.
003706 001401      BEQ      .+4
003710 000000      HLT
003712 010700      SCOPE ;INCORRECT P.C.

```

TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK

003714	010700			SCOPE		
003716	012700	007700		MOV	#BUFF,LP	ISSET UP
003722	012767	003742	174034	MOV	#RETS,RTRAP5	ISSET UP
003730	005067	174042		CLR	CC	ICLEAR CC AND PRIORITY
003734	000257			CCC		
003736	005767	174037		TST	1	ITRAP
003742	026727	003730	000000	RETSI	CMP	BUFF-2,#0
003750	001401			BEQ	,+4	ITEST THAT OLD STATUS WENT TO STACK
003752	000000			HLT		ITEST FOR ALL ZEROS
003754	010700			SCOPE		INCORRECT STATUS
003756	012700	007700		MOV	#BUFF,LP	ISSET UP
003762	012767	004004	174014	MOV	#RETI,RTRAP5	ISSET UP
003770	012767	000357	174000	MOV	#357,CC	ISSET PRIORITY
003776	000277			SCC		ISSET CC
004000	005767	173775		TST	1	ITRAP
004004	026727	003660	000357	RETI	CMP	BUFF-2,#357
004012	001401			BEQ	,+4	ICOMPARES STATUS ON STACK
004014	000000			HLT		ITEST FOR ALL ONES
004016	010700			SCOPE		INCORRECT STATUS ON STACK

TEST THAT "NEW" STATUS IS CORRECT

004020	012700	007700		MOV	#BUFF,LP	
004024	012767	004042	173752	MOV	#RETI,RTRAP5	
004032	005067	173750		CLR	RTRAP5+2	ICLEAR FUTURE PRIORITY AND CC
004036	005767	173737		TST	1	ITRAP HERE
004042	100001			RETI	BPL	,+4
004044	000000			HLT		ITEST FOR "CC" CLEARED
004046	001001			BNE	,+4	IC NOT CLEARED
004050	000000			HLT		IC NOT CLEARED
004052	102001			BVC	,+4	IC NOT CLEARED
004054	000000			HLT		IC NOT CLEARED
004056	103001			BCC	,+4	IC NOT CLEARED
004060	000000			HLT		IC NOT CLEARED
004062	032767	000357	173700	BIT	#357,CC	ITEST PRIORITY FOR ZERO
004070	001401			BEQ	,+4	
004072	000000			HLT		IPRIORITY NOT ZERO
004074	010700			SCOPE		
004076	012700	007700		MOV	#BUFF,LP	
004102	012767	004122	173674	MOV	#RETI,RTRAP5	
004110	012767	000357	173670	MOV	#357,RTRAP5+2	ISSET NEW "CC" AND PRIORITY
004116	005767	173657		TST	1	ITRAP HERE
004122	100401			RETI	BMI	,+4
004124	000000			HLT		IN NOT SET
004126	001401			BEQ	,+4	IC NOT SET
004130	000000			HLT		IC NOT SET
004132	102401			BVS	,+4	IV NOT SET
004134	000000			HLT		IV NOT SET
004136	103401			BCS	,+4	IC NOT SET
004140	000000			HLT		
004142	016700	173630		MOV	CC,X0	
004146	022700	000357		CMP	#357,X0	
004152	001401			BEQ	,+4	
004154	000000			HLT		
004156	010700			SCOPE		

```

004160 010700
004162 012706 007700
004166 012767 004206 173620
004174 052767 000020 173574
004202 000240
004204 000000
004206 010700
    SCOPE
    MOV #BUFF,LP
    MOV #RETAT,RTRAP4 ;SET UP TO TRAP TO 14
    BIS #20,CC ;SET TRACE BIT
    NOP ;TRAP HERE
    HLT ;TRACE BIT DOES NOT TRAP
RETAT: SCOPE
;TEST LINK POINTER DECREMENTS
004210 012706 007700
004214 012767 004230 173572
004222 052767 000020 173546
004230 020627 007674
004234 001401
004236 000000
004238 010700
    RETBT: CMP LP,#BUFF+4
    BEQ .+4
    HLT ;STACK POINTER WAS NOT PUSHED BY TRAP
    SCOPE
;TEST FOR PROPER PC ON STACK
004242 012706 007700
004246 012767 004264 173540
004254 052767 000020 173514
004262 000240
004264 022767 004264 003402
004272 001401
004274 000000
004276 010700
    RETCT: CMP #,;BUFF+4
    BEQ .+4
    HLT ;CORRECT PC WAS NOT SAVED ON STACK
    SCOPE
;TEST THAT DECREMENT R6 TO A VALUE LESS THAN 400 TRAPS
004300 012706 000150
004304 012767 004316 173472
004312 005746
004314 000000
004316 010700
    MOV #150,%6 ;R6 = 150
    MOV #TDEC1,4 ;STACK OVERFLOW TRAP POINTER
    TST -(6) ;WITH R6 = 150 SHOULD TRAP
    HLT ;AUTO DECREMENT WITH R6 LESS THAN 400
    TDEC1: SCOPE ;DID NOT TRAP
;TEST FOR DECREMENT OF R6 ON OVERFLOW TRAP
004320 012706 000150
004324 012767 004334 173452
004332 005746
    MOV #150,%6 ;R6 = 150
    MOV #TDEC2,4 ;TRAP POINTER
    TST -(6) ;WITH R6 = 150 SHOULD TRAP

```

```

004334 020627 000142 TDEC21 CMP #6,#142 IDID R6 DECREMENT
004340 001401 BEQ .04 IR6 NOT = 142
004342 000000 HLT
004344 010700 SCOPE
    
```

```

;TEST THAT OVERFLOW TRAP DOES NOT LOSE INFORMATION
004346 012706 000150 MOV #100,#6
004352 005067 173370 CLR 146 ;STATUS WORD OF LOC 10
004356 012767 004366 173420 MOV #TDEC3,4 ;RETURN TO LOC 4
004364 005246 INC -(6)
004366 005767 173554 TDEC31 YST 146
004372 001001 SNE .04
004374 000000 HLT ;INCREMENT OPERATION NOT INHIBITED
004376 010700 SCOPE
004400 012705 001000 MOV #1000,#5
004404 012706 000400 MOV #400,#6
004410 012707 001420 173361 MOV #TDEC4,4
004416 124645 CMPB -(6),=(5)
004420 000000 HLT ;STACK = 400 AND DECREMENTED, SHOULD TRAP
004422 010700 TDEC41 SCOPE
    
```

```

004424 012706 000400 MOV #400,#6
004430 012767 004442 173346 MOV #TDEC5,4
004436 134546 BITB -(5),=(6)
004440 000000 HLT ;NO STACK OVERFLOW TRAP
004442 010700 TDEC51 SCOPE
004444 000407 BR TDEC6
004446 010700 TONT1 SCOPE ;TEST TRAP ON TRAP = SHOULD CAUSE A HALT
    
```

```

004450 005006 CLR #6
004452 012767 004464 173324 MOV #TDEC6,4
004460 000146 JMP -(6)
004462 000000 HLT ;TRAP ON TRAP SHOULD HALT
004464 010700 TDEC61 SCOPE
    
```

```

;MACR VTRP INST, A, B,DEST
;TEST THAT AN INST CAUSES AN OVERFLOW TRAP
MOV #400,#6 ;SET UP STACK TO OVERFLOW
MOV #VDEC'B,DEST ;SET UP INST VECTOR
MOV #VDEC'A,4 ;SET UP OVERFLOW VECTOR
INST ;THIS TRAP SHOULD CAUSE OVERFLOW
HLT ;NO TRAP OCCURRED
VDEC'B':HLT ;TRAP FLAG OVERFLOW DID NOT OCCUR
VDEC'A':SCOPE ;NORMAL OVERFLOW RETURN
;ENOM
    
```

```

VTRP 70000,1,2,10
;TEST THAT AN 70000 CAUSES AN OVERFLOW TRAP
    
```

```

004466 012706 000400 MOV #400,#6 ;SET UP STACK TO OVERFLOW
004472 012767 004512 173310 MOV #VDEC2,10 ;SET UP 70000 VECTOR
004500 012767 004514 173276 MOV #VDEC1,4 ;SET UP OVERFLOW VECTOR
004506 070000 70000 ;THIS TRAP SHOULD CAUSE OVERFLOW
004510 000000 HLT ;NO TRAP OCCURRED
004512 000000 VDEC21HLT ;TRAP FLAG OVERFLOW DID NOT OCCUR
    
```

```

004514 010700 VDECI1SCOPE INORMAL OVERFLOW RETURN
          VTRP  IOT,3,4,20
          ITEST THAT AN IOT CAUSES AN OVERFLOW TRAP

004516 012706 000400 MOV #400,%6 ISET UP STACK TO OVERFLOW
004522 012767 004542 173270 MOV #VDEC4,20 ISET UP IOT VECTOR
004530 012767 004544 173246 MOV #VDEC3,4 ISET UP OVERFLOW VECTOR
004536 000004 IOT ITHIS TRAP SHOULD CAUSE OVERFLOW
004540 000000 HLT INO TRAP OCCURRED
004542 000000 VDEC4IHLT ITRAP FLAG OVERFLOW DID NOT OCCUR
004544 010700 VDEC3ISCOPE INORMAL OVERFLOW RETURN
          VTRP  EMT,5,6,30
          ITEST THAT AN EMT CAUSES AN OVERFLOW TRAP

004546 012706 000400 MOV #400,%6 ISET UP STACK TO OVERFLOW
004552 012767 004572 173250 MOV #VDEC6,30 ISET UP EMT VECTOR
004560 012767 004574 173216 MOV #VDEC5,4 ISET UP OVERFLOW VECTOR
004566 104000 EMT ITHIS TRAP SHOULD CAUSE OVERFLOW
004570 000000 HLT INO TRAP OCCURRED
004572 000000 VDEC6IHLT ITRAP FLAG OVERFLOW DID NOT OCCUR
004574 010700 VDEC5ISCOPE INORMAL OVERFLOW RETURN
          VTRP  TRAP,7,8,34
          ITEST THAT AN TRAP CAUSES AN OVERFLOW TRAP

004576 012706 000400 MOV #400,%6 ISET UP STACK TO OVERFLOW
004602 012767 004622 173224 MOV #VDEC8,34 ISET UP TRAP VECTOR
004610 012767 004624 173166 MOV #VDEC7,4 ISET UP OVERFLOW VECTOR
004616 104400 TRAP ITHIS TRAP SHOULD CAUSE OVERFLOW
004620 000000 HLT INO TRAP OCCURRED
004622 000000 VDEC8IHLT ITRAP FLAG OVERFLOW DID NOT OCCUR
004624 010700 VDEC7ISCOPE INORMAL OVERFLOW RETURN
          VTRP  TRT,9,10,14
          ITEST THAT AN TRT CAUSES AN OVERFLOW TRAP

004626 012706 000400 MOV #400,%6 ISET UP STACK TO OVERFLOW
004632 012767 004652 173154 MOV #VDEC10,14 ISET UP TRT VECTOR
004640 012767 004654 173136 MOV #VDEC9,4 ISET UP OVERFLOW VECTOR
004646 000003 TRT ITHIS TRAP SHOULD CAUSE OVERFLOW
004650 000000 HLT INO TRAP OCCURRED
004652 000000 VDEC10IHLT ITRAP FLAG OVERFLOW DID NOT OCCUR
004654 010700 VDEC9ISCOPE INORMAL OVERFLOW RETURN
          VTRP  ILLA,12,11,4
          ITEST THAT AN ILLA CAUSES AN OVERFLOW TRAP

004656 012706 000400 MOV #400,%6 ISET UP STACK TO OVERFLOW
004662 012767 004702 173114 MOV #VDEC11,4 ISET UP ILLA VECTOR
004670 012767 004704 173106 MOV #VDEC12,4 ISET UP OVERFLOW VECTOR
004676 004700 ILLA ITHIS TRAP SHOULD CAUSE OVERFLOW
004700 000000 HLT INO TRAP OCCURRED
004702 000000 VDEC11IHLT ITRAP FLAG OVERFLOW DID NOT OCCUR
004704 010700 VDEC12ISCOPE INORMAL OVERFLOW RETURN
004706 020627 000370 CMP #6,#370 ISTACK PUSHED FOUR WORDS?
004712 001401 BEQ .+4
004714 000000 HLT
          VTRP  ILLB,14,13,4
          ITRAP OVERFLOW DID NOT OCCUR

```

;TEST THAT AN ILLB CAUSES AN OVERFLOW TRAP

004716	012700	000400	MOV	#400,%6	;SET UP STACK TO OVERFLOW
004722	012767	004742 173054	MOV	#VDEC13,4	;SET UP ILLB VECTOR
004730	012767	004744 173046	MOV	#VDEC14,4	;SET UP OVERFLOW VECTOR
004736	000100		ILLB		;THIS TRAP SHOULD CAUSE OVERFLOW
004740	000000		HLT		;NO TRAP OCCURRED
004742	000000		VDEC13;HLT		;TRAP FLAG OVERFLOW DID NOT OCCUR
004744	010700		VDEC14;SCOPE		;NORMAL OVERFLOW RETURN

ITEST THAT AN ILLB CAUSES AN OVERFLOW TRAP

004716	012706	000400	MOV	#400,%6	ISET UP STACK TO OVERFLOW
004722	012767	004742 173034	MOV	#VDEC13,4	ISET UP ILLB VECTOR
004730	012767	004744 173046	MOV	#VDEC14,4	ISET UP OVERFLOW VECTOR
004736	000100		ILLB		.THIS TRAP SHOULD CAUSE OVERFLOW
004740	000000		HLT		!NO TRAP OCCURRED
004742	000000		VDEC13!HLT		!TRAP FLAG OVERFLOW DID NOT OCCUR
004744	010700		VDEC14!SCOPE		!NORMAL OVERFLOW RETURN

TEST FOR FALSE OVERFLOW TRAP
 PROGRAM MAY HAVE RELOADED IF OVERFLOW FAILS

004746	012767	005014	173030	MOV	#FOVER,4	ISSET UP OVERFLOW POINTER
004754	012706	001002		MOV	#1002,X6	
004760	005746			TST	-(6)	ISHOULD NOT OVERFLOW
004762	012706	002002		MOV	#2002,X6	
004766	005746			TST	-(6)	ISHOULD NOT OVERFLOW
004770	012706	004002		MOV	#4002,X6	
004774	005746			TST	-(6)	ISHOULD NOT OVERFLOW
004776	012706	010002		MOV	#10002,X6	
005002	005746			TST	-(6)	
005004	012706	020000		MOV	#20000,X6	ISHOULD NOT OVERFLOW
005010	005746			TST	-(6)	
005012	000401			BR	,04	
005016	010700			FOVER: BIT		IFALSE OVERFLOW OCCURRED
				SCOPE		ICHECK STACK TO FIND WHERE
				ITEST THAT A TTY INTERRUPT CAUSES AN OVERFLOW TRAP		
005020	012767	003340	172750	MOV	#340,STATUS	IBLOCK OUT INTERRUPT
005026	012706	000400		MOV	#400,X6	ISSET UP STACK TO OVERFLOW
005032	012767	005064	172744	MOV	#TDEC7,4	ISSET UP OVERFLOW TRAP
005040	012767	005062	173016	MOV	#TDEC8,64	ISSET UP INTERRUPT VECTOR
005046	012767	000100	172510	MOV	#100,TTYCSR	ISSET INTERRUPT ENABLE
005054	005067	172716		CLR	STATUS	IALLOW INTERRUPT TO OCCUR
005060	000000			HLT		INO INTERRUPT OCCURRED
005062	000000			TDEC8: HLT		ITRAP FLAG OVERFLOW DID NOT OCCUR
005064	005067	172474		TDEC7: CLR	TTYCSR	ICLEAR INTERRUPT ENABLE
005070	010700			SCOPE		
005072	012706	007700		MOV	#BUFF,LP	ISCOPE PROTECTION
005076	012767	000004	172700	MOV	#6,4	
005104	005067	172674		CLR	4	
005110	012767	005262	172666	MOV	#ATRAP,RTRAP5	
005116	000167	000034		JMP	R7TRX	IGO TO ILLEGAL ADDRESS TEST
005122	012706	007700		MOV	#BUFF,LP	ISCOPE PROTECTION
005126	012767	000006	172650	MOV	#6,4	
005134	005067	172644		CLR	4	
005140	012767	006262	172636	MOV	#ATRAP,RTRAP5	
005146	000167	000004		JMP	R7TRX	IGO TO ILLEGAL ADDRESS TEST


```

005152 000000      MAF: 0
005154 000000      MAF: 0
000000      HERE=0
      IDOES THE PROCESSOR TRAP WHEN X7 IS ODD?
005156 010700      SCOPE
005160 012706 007700  MOV      #BUFF,X6      ISET UP STACK POINTER
005164 012767 005202 172612  MOV      #R7TR1,4     IRETURN FROM TRAP
005172 012707 000001      MOV      #1,X7        IPC EQUALS ONE
005176 000000      HLT
005200 000000      HLT
005202 022767 000001 002904  R7TR1:  CMP      #1,BUFF-4
005210 001401      BEQ      .+4          ICORRECT PC WAS NOT SAVED ON STACK
005212 000000      HLT

005214 010700      SCOPE
005222 012706 007700  MOV      #BUFF,X6      ISTACK POINTER
005226 012767 005236 172554  MOV      #R7TR2,4     IPC BECOMES ODD
005230 005207      INC      X7
005232 000000      R7TR2A: HLT
005234 000000      HLT
005236 022767 005233 002430  R7TR2:  CMP      #R7TR2A+1,BUFF-4
005244 001401      BEQ      .+4          ICORRECT PC NOT ON STACK
005246 000000      HLT
005250 010700      SCOPE
005252 012706 007700  MOV      #BUFF,X6
005256 012767 005270 172520  MOV      #R7TR3,4
005264 005307      DEC      X7          IMAKE PC ODD
005266 000000      HLT          I SHOULD TRAP
005270 022767 005265 002376  R7TR3:  CMP      #,-3,BUFF-4  ICHECK VALUE OF PC ON STACK
005272 001401      BEQ      .+4
005300 000000      HLT          IWRONG VALUE ON STACK

005302 010700      SCOPE
005304 012706 007700  MOV      #BUFF,X6
005310 012767 005326 172466  MOV      #R7TR4,4
005312 000261      SEC
005320 006107      ROL      X7          ICARRY EQUALS A 1
005322 000000      TR4A:  HLT          IPC BECOMES ODD
005324 000000      HLT
005326 022767 012645 002340  R7TR4:  CMP      #TR4A+TR4A+1,BUFF-4
005334 001401      BEQ      .+4          ICHECK FOR VALUE ON STACK
005336 000000      HLT          IWRONG VALUE ON STACK
005340 012767 000006 172436  MOV      #6,4        IRESET UP A HALT FOR TRAP

```

ITEST TRAP ON TRAP
 ITEST THAT TRACE BIT TRAPS ARE INHIBITED ON TRAP INST

```

005346 010700          SCOPE
005350 012706 007700    MOV      #BUFF,%6
005354 012767 005434 172432  MOV      #TRACE,14          ITRACE TRAP
005362 005027 000016    CLR      #16
005366 012767 005410 172424  MOV      #TONT1,20        I IOT TRAP
005374 005067 000054    CLR      FLAG              ISET ON TRACE TRAP
005400 052767 000020 172370  BIS      #20,STATUS        ISET TRACE BIT
005420 000024          IOT                          ITRAP; NEW CC HAVE TRACE RESET
005410 100001  TONT1:  SPL      .+4        :IF TRACE TRAP OCCURRED WILL BRANCH
005412 000000          HLT                          I NO TRACE TRAP AT END OF IOT INST.
005414 010700          SCOPE
005416 012767 000016 172370  MOV      #16,14
005424 012767 000022 172366  MOV      #22,20
005432 000411          OR       FLAG+2
005434 012767 177777 000012 TRACE:  MOV      #-1,FLAG        ISET FLAG DURING TRACE
005442 005767 000006    TST      FLAG
005446 001401          BEQ      .+4
005450 000000          HLT
005452 000002          RTI                          ITRACE TRAP NOT INHIBITED
005454 000000          FLAG:  0                      ITRAP
    
```

ITEST THAT THE TRACE BIT WILL CAUSE A TRAP

```

005456 010700          SCOPE
005460 012706 007700    MOV      #BUFF,%6          ISET UP STACK POINTER
005464 012767 005510 172322  MOV      #TRC1,14        ITRACE TRAP RETURN
005472 005067 172320    CLR      16
005476 012767 000020 172272  MOV      #20,CC          ISET THE Y BIT
005500 000240          NOP
005506 000000          HLT
005510 030727 002162 000020 TRC1:  BIT      BUFF+2,%20    I CHECK FOR Y BIT ON STACK
005516 001001          BNE      .+4
005520 000000          HLT                          I Y BIT NOT SAVED ON STACKED
005522 010700          SCOPE
    
```

ITEST THAT AN RTI POPS THE Y BIT

```

005524 012706 007700    MOV      #BUFF,%6          ISET UP THE STACK
005530 012746 000020    MOV      #20,=(6)         IFUTURE Y BIT ON STACK
005534 012746 005550    MOV      #TRC2,=(6)       IRTI RETURN
005540 012767 005554 172246  MOV      #TRC3,14        ITRACE TRAP INTERRUPT POINTER
005546 000002          RTI
005550 000240          TRC2:  NOP
005552 000000          HLT
005554 010700          TRC3:  SCOPE
    
```

ITEST THAT INTERRUPT OCCURS BEFORE TRAP

```

005556 010700          SCOPE
005560 012706 007700    MOV      #BUFF,%6
005564 012767 000340 172204  MOV      #340,STATUS      I HIGHEST PRIORITY LEVEL
005572 012767 000100 171764  MOV      #100,ITCSR        I INTERRUPT FOR TTY PUNCH/PRINTER
005600 012767 005630 172226  MOV      #TR1,34          ITRAP" VECTOR
005606 012767 005632 172250  MOV      #TR2,64          I TTY VECTOR
005614 012767 000340 172214  MOV      #340,36         IIF TRAP TRAPS; MOVE 340 TO PRIORITY
    
```

005622	005627	172140	
005626	104400		
005630	005000		
005632	005067	172200	
005636	010700		
005640	012706	007700	
005644	012767	000340	172124
005652	012767	000100	171704
005660	012767	005712	172146
005666	012767	005714	172170
005674	012767	005710	172116
005702	012767	000340	172112
005710	104400		

```

CLR      STATUS
TRAP
TR1:    HLT
TR2:    CLR      36
        SCOPE
IWILL INTERRUPTS OCCURE BETWEEN TRAPS
MOV      #BUFF,%6
MOV      #340,STATUS
MOV      #100,TTCSR
MOV      #TR3,34
MOV      #TR5,64
MOV      #TR4,20
MOV      #340,22
TRAP

```

```

ISHOULD TRAP AT IND OF CLR INST
ITTY INTERRUPT SHOULD OVERRIDE TRAP
ITRAP DID NOT OCCUR FIRST

```

```

ITRAP
ITTY OUTPUT
ILOT
ILOT PRIORITY
ITHE ACT OF TRAPPING LOWER PRIORITY

```

```

005712 000000 TRG, IOT ;INTERRUPT SHOULD OCCURE INPLACE OF IOT TRAP
005714 000000 TRB1 HLT ;NO INTERRUPT BETWEEN TRAPS
005716 005067 172100 TR41 CLR 22 ;CLR IOT PRIORITY
005722 010700 SCOPE
    
```

ITEST THAT "RESET" GOES TO OUTSIDE WORLD

```

005724 010700 SCOPE
005726 012767 000100 171630 MOV #100,TTCSR ;SET INTERRUPT ENABLE
005734 012767 000100 171616 MOV #100,TRCSR ;SET INTERRUPT ENABLE
005742 000005 RESET ;SHOULD CLEAR INTERRUPT ENABLE
005744 032767 000100 171612 BIT #100,TTCSR ;TEST FOR CLEAR
005752 001401 BEQ ,*4
005754 000000 HLT ;RESET FAILED TO CLEAR TTCSR
005756 032767 000100 171574 BIT #100,TRCSR ;TEST FOR CLEAR
005764 001401 BEQ ,*4
005766 000000 HLT ;RESET FAILED TO CLEAR TRCSR
    
```

ITEST THAT RESET DOES NOT HANG THE SYSTEM

```

005770 010700 SCOPE
005772 012706 007700 MOV #BUFF,X6 ;SET STACK
005776 005067 171774 CLR STATUS ;ALLOW INTERRUPT
006002 012767 006016 172054 MOV #RESET1,64 ;TTY INTERRUPT VECTOR
006010 032767 000100 171546 BIS #100,TTCSR ;SET INTERRUPT ENABLE
006016 000005 RESET11 RESET ;IF THIS HANGS CHECK SACK
006020 012767 000066 172036 MOV #66,64 ;FOR FALSE INTERRUPT
    
```

ITEST RESET WITH TRACE ON

```

006026 010700 SCOPE
006030 012706 007700 MOV #BUFF,X6 ;SET STACK
006034 012767 006056 171752 MOV #RESET2,14 ;SET UP TRACE VECTOR
006042 012767 000020 171726 MOV #20,STATUS ;SET T BIT IN STATUS REGISTER
006050 000005 RESET ;SHOULD HAVE NO EFFECT
006052 000005 RESET ;NO EFFECT
006054 000000 HLT ;TRACE TRAP FAILED
006056 005067 171714 RESET21 CLR STATUS ;CLEAR TRACE
006062 005067 171730 CLR 16 ;TRACE STATUS
    
```

ITEST THAT WHEN TTY INTERRUPTS IT POPS NEW STATUS

```

006066 000005 RESET
006070 012706 007700 MOV #BUFF,X6 ;SET UP STACK
006074 012767 006120 171762 MOV #TTY3,64 ;INTERRUPT VECTOR
006102 005067 171670 CLR STATUS ;DROP PROCESSOR PRIORITY
006106 012767 000357 171752 MOV #357,66 ;HIGH PRIORITY ON INTERRUPT
006114 005167 171444 COM TTCSR ;SHOULD SET INTERRUPT ENABLE & INTERRUPT
    
```

```

006120 016727 171652 000000 TTY31 MOV STATUS,#HERE ISAVE PROCESSOR STATUS
006126 022767 000357 177770 CMP #357,,-2
006134 001401 BEQ .+4
006136 000000 HLT IINTERRUPT DID NOT POP CORRECT STATUS
006140 000000 RENEW ICLR INTERRUPT ENABLE
006142 010700 SCOPE
006144 012706 007700 MOV #BUFF,%6 ISTACK SET UP
006150 012767 006174 171706 MOV #TTY4,%4 IINTERRUPT VECTOR
006156 005067 171704 CLR 66 ICLR NEW STATUS
006162 012767 000157 171606 MOV #157,STATUS IPROCESSOR STATUS
006170 005167 171370 COM ITCR
006174 016727 171376 000000 TTY41 MOV STATUS:#HERE ISET INTERRUPT ENABLE
006202 005767 177772 TST .-2 ISAVE NEW STATUS
006206 001401 BEQ .+4
006210 000000 HLT IINTERRUPT DID NOT POP CORRECT STATUS
006216 000167 000010 CLR TTEST
JMP ADALL

```

ILLEGAL ADDRESS AND INSTRUCTION TEST FOR PDP11
 THIS ROUTINE TEST THAT NO LEGAL ADDRESS
 TRAPS AND THAT AN ILLEGAL ADDRESS TRAPS TO LOCATION 4

```

006222 160000 TSH 160000
006224 000000 TSL 0
006226 000000 CORL 0
006230 020000 CORH 20000 ICHANGE TO 40000 FOR BK
006232 016700 177770 ADALL1 MOV CORL,%2 ILL OF CORE TO REG ZERO
006236 012767 006262 171540 MOV #ATRAP,4 ISET UP ADDRESS TRAP ENTRANCE
006244 012706 007700 NOR1 MOV #BUFF,LP
006250 105720 TSTB (%),
006252 020067 177752 CMP %0,CORH IIT OUT SIDE OF CORE. TRAP TO 4
006256 101772 BLOS NOR IIS POINTER IN SIDE CORE
006260 000000 HLT ITEST THE REST OF CORE
RETURN HERE ON AN ADDRESS TRAP IOUTSIDE OF HIGH CORE. DID YOU USE CORRECT STARTING ADDRESS?
006262 020067 177742 ATRAP1 CMP %0,CORH I SHOULD WE HAVE TRAPPED
006266 101001 BK: TRAP
006270 000000 HLT I NO, FALSE ADDRESS TRAP
006272 020067 177724 TRAPB1 CMP %0,TSH
006276 001362 BNE NOR I SHOULD TRAP, NON EXISTANT CORE
ILOOP PROGRAM
006300 010700 SCOPE
006302 012767 000606 171474 MOV #6,4
006310 005067 171472 CLR 6

```

SPECIAL CASE OF ODD, EVEN BYTE AND REGISTER 6

HERE#0

000000

006314	000167	000024
006320	000000	
006322	000000	
006324	000000	
006326	000000	
006330	000000	
006332	000000	
006334	052525	
006336	052400	
006340	000000	
006342	000000	

	JMP	R0TST
K1:	0	
K2:	0	
K3:	0	
K4:	0	
K5:	0	
K6:	0	
K7:	052525	
K10:	052400	
K11:	0	
K12:	0	

TEST AUTO INCREMENT AND DECREMENT OF R6 FOR ,WORD AND ,BYTES

006344	005006		R6TST: CLR	%6	
006346	112667	171426	MOVW	(6)+,HERE	;R6 SHOULD INCREMENT BY TWO
006352	020627	000002	CMP	%6,#2	
006356	001401		BEQ	.,+4	
006360	000000		HLT		;R6 DID NOT AUTO INCREMENT BY TWO
006362	010700		SCOPE		
006364	012706	001000	MOV	#1000,%6	
006370	114627	000000	MOVW	-(6),#HERE	;R6 SHOULD DECREMENT BY TWO
006374	020627	000776	CMP	%6,#776	
006400	001401		BEW	.,**	
006402	000000		HLT		;R6 DID NOT AUTO DECREMENT BY 2
006404	010700		SCOPE		
006406	005006		CLR	%6	
006412	020627	000004	CMP	%6,#4	;R6 SHOULD AUTO INCREMENT OF R6
006416	001401		BEQ	.,+4	
006420	000000		HLT		;WRONG AUTO INCREMENT OF R6
006422	010700		SCOPE		
006424	005006		CLR	%6	
006426	005004		CLR	%4	
006430	122624		CMPB	(6)+,(4)+	;TEST INCREMENT OF R6
006432	020627	000002	CMP	%6,#2	
006436	001401		BEQ	.,+4	
006440	000000		HLT		;WRONG INCREMENT OF R6
006442	010700		SCOPE		
006444	005006		CLR	%6	
006446	005004		CLR	%4	
006450	122426		CMPB	(4)+,(6)+	;TEST INCREMENT OF R6
006452	020627	000002	CMP	%6,#2	
006456	001401		BEQ	.,+4	
006460	000000		HLT		;WRONG INCREMENT OF R6
006462	010700		SCOPE		
006464	005006		CLR	%6	
006466	005004		CLR	%4	
006470	122624		CMPB	(6)+,(4)+	;TEST INCREMENT OF R4
006472	020427	000001	CMP	%4,#1	
006476	001401		BEQ	.,+4	
006520	000000		HLT		;WRONG INCREMENT OF R4
006502	010700		SCOPE		

006504	005006		CLR	%6	
006506	005004		CLR	%4	
006510	122426		CMPB	(4)+,(6)+	TEST INCREMENT OF R6
006512	020627	000002	CMP	%6,%2	
006516	001401		BEQ	+.4	
006520	000000		HLT		WRONG INCREMENT OF R6
006522	010700		SCOPE		
006524	005006		CLR	%6	
006526	005004		CLR	%4	
006530	122426		CMPB	(4)+,(6)+	TEST INCREMENT OF R4
006532	020627	000001	CMP	%4,%1	
006536	001401		BEQ	+.4	
006540	000000		HLT		WRONG INCREMENT OF R4
006542	010700		SCOPE		
006544	012706	001000	MOV	#1000,%6	
006550	124027	000000	CMPB	#100,%6	TEST DECREMENT OF R6
006554	022706	000776	CMP	#776,%6	
006560	001401		BEQ	+.4	
006562	000000		HLT		WRONG DECREMENT OF R6
006564	010700		SCOPE		

ITEST TRANSFER OF ,BYTE USING R6

006566	012767	123456	177534	MOV	#123456,K5	
006574	012767	050505	177516	MOV	#050505,K1	
006602	012705	006320		MOV	#K1,X5	;X5=(050505)K1
006606	012706	006330		MOV	#K5,X6	;X6(123456)K5
006612	112625			MOVSB	(6)+,(5)+	ILOW ,BYTE OF R6 TO R5
006614	022767	050456	177476	CMP	#050456,K1	
006622	001401			BEQ	,*4	
006624	000000			HLT		IFALSE TRANSFER OF ,BYTE
006626	010700			SCOPE		
006630	012767	123456	177472	MOV	#123456,K5	
006636	012767	050505	177454	MOV	#050505,K1	
006644	012705	006320		MOV	#K1,X5	;X5(050505)K1
006650	012706	006332		MOV	#K6,X6	;X6(123456)K5
006654	114625			MOVSB	-(6),(5)+	ILOW ,BYTE OF R6 TO R5 (DECREMENT)
006664	001401			CMP	#050456,K1	
006666	000000			BEQ	,*4	
006670	010700			HLT		IFALSE R6 ,BYTE TRANSFER
				SCOPE		
006672	012767	123456	177420	MOV	#123456,K1	
006700	012767	050505	177422	MOV	#050505,K5	
006706	012705	006320		MOV	#K1,X5	;1(123456)
006712	012706	006330		MOV	#K5,X6	;1(050505)
006716	112526			MOVSB	(5)+,(6)+	ILOW OF R5 TO LOW OF R6
006720	022767	050456	177402	CMP	#050456,K5	
006726	001401			BEQ	,*4	
006730	000000			HLT		IFALSE R6 ,BYTE TRANSFER
006732	010700			SCOPE		
006734	012767	123456	177356	MOV	#123456,K1	
006742	012767	050505	177360	MOV	#050505,K5	
006750	012705	006321		MOV	#K1,X5	;123456
006754	012706	006330		MOV	#K5,X6	;050505
006760	112526			MOVSB	(5)+,(6)+	IHIGH OF R5 TO LOW OF R6
006762	026727	177342	050647	CMP	#050456,K5	
006770	001401			BEQ	,*4	
006772	000000			HLT		IFALSE R6 ,BYTE TRANSFER
006774	010700			SCOPE		
006776	012767	123456	177314	MOV	#123456,K1	
007004	012767	050505	177316	MOV	#050505,X5	
007012	012705	006321		MOV	#K1+1,X5	;R5=123456--ODD ADDRESS
007015	012706	006330		MOV	#K5,X6	;R6=050505--EVEN ADDRESS
007022	112625			MOVSB	(6)+,(5)+	ILOW OF R6 TO HIGH OF R5
007024	022767	042456	177266	CMP	#042456,K1	
007032	001401			BEQ	,*4	
007034	000000			HLT		IFALLO LOW OF 6 TO HIGH OF 5
007036	010700			SCOPE		

007040	126767	177270	177267	CMPB	K7,K7*1	ISAME ,WORD LOW TO HIGH
007046	001401			BEG	,*4	
007050	000000			HLT		ISHOULD COMPARE LOW TO HIGH
007052	010700			SCOPE		
007054	126767	177255	177252	CMPB	K7*1,K7	ICOMPARE ODD TO ,EVEN SAME ,WORD
007062	001401			BEG	,*4	
007064	000000			HLT		IODD TO ,EVEN ,BYTE FAILURE
007066	010700			SCOPE		
007070	126767	177243	177236	CMPB	K10*1,K7	ISEQUENTIAL ,BYTES
007076	001401			BEG	,*4	IDIFFERENT ,WORDS
007100	000000			HLT		IODD TO ,EVEN FAILED
007102	010700			SCOPE		
007104	126767	177220	177220	CMPB	K10,K0	
007112	001401			BEG	,*4	
007114	000000			HLT		IEVEN TO EVEN FAILED
007116	010700			SCOPE		
007120	126767	177211	177211	CMPB	K7*1,K10*1	
007126	001401			BEG	,*4	
007130	000000			HLT		IODD TO ODD FAILED
007132	010700			SCOPE		
007134	126767	177176	177175	CMPB	K10,K10*1	
007142	001001			BNE	,*4	
007144	000000			HLT		ILOW TO HIGH IN SAME ,WORD FAILED
007146	010700			SCOPE		
007150	126767	177163	177160	CMPB	K10*1,K10	
007156	001001			BNE	,*4	
007160	000000			HLT		IHIGH TO LOW IN SAME ,WORD FAILED
007162	010700			SCOPE		
007164	126767	177146	177146	CMPB	K10,K7*1	
007172	001001			BNE	,*4	
007174	000000			HLT		IEVEN TO ODD FAILED
007176	010700			SCOPE		

TEST SPECIAL CASE CR.(R)*1

007200	012700	006340		MOV	#K11,X0	ISOURCE AND DESTINATION BOTH R0
007204	010020			MOV	X0,(0)*	ISOURCE NO MEMORY REFERENCE
007206	026727	177126	006342	CMP	K11,#K11*2	IDESTINATION IS MEMORY REFERENCE
007214	001401			BEG	,*4	
007216	000000			HLT		IFAILED X(0),(0)*
007220	010700			SCOPE		

007222	012700	006340		MOV	#K11,X0	
007226	110020			MOVB	X0,(0)+	
007230	026727	177104	006341	CMP	K11,#K11+1	
007230	001401			BEQ	.+4	
007240	000000			HLT		IF AILED MOVB X0,(0)+
007242	010700			SCOPE		
007244	012700	006340		MOV	#K11,X0	
007250	110620			MOVB	X0,(0)+	
007252	026727	177012	006342	CMP	K11,#K11+2	
007260	001401			BEQ	.+4	
007262	000000			HLT		IF AILED MOVB X0,(0)+
007264	010700			SCOPE		
007266	012700	006340		MOV	#K11,X0	
007272	110620			MOVB	X0,(0)+	
007274	026727	177040	006342	CMP	K11,#K11+2	
007302	001401			BEQ	.+4	
007304	000000			HLT		IF AILED MOV X0,(0)+
007306	010700			SCOPE		
007310	000277			SCC		IF SET STATUS
007312	005067	170460		CLR	STATUS	IF CLEAR STATUS
007316	103001			BCC	.+4	
007320	000000			HLT		IF C NOT CLEAR
007322	102001			BVC	.+6	
007324	000000			HLT		IF V NOT CLEAR
007326	001001			BNE	.+4	
007328	000000			HLT		IF Z NOT CLEAR
007332	100001			BPL	.+0	
007334	000000			HLT		IF N NOT CLEAR
007336	010700			SCOPE		
007340	000257			CCC		IF CLEAR CONDITION CODES
007342	052767	000017	170426	BIS	#17,STATUS	IF SET STATUS TO ONES
007350	103401			BCS	.+0	
007352	000000			HLT		IF C NOT SET
007354	102401			BVS	.+4	
007356	000000			HLT		IF V NOT SET
007360	001401			BEQ	.+4	
007362	000000			HLT		IF Z NOT SET
007364	100401			BMI	.+4	
007366	000000			HLT		IF N NOT SET
007370	010700			SCOPE		

```

;TEST THAT ALL RESERVED INSTRUCTIONS TRAP
007372 012700 007530      MOV      #TABLE, TAB      ;TABLE POINTER
007376 012802      GIN1:  MOV      (TAB)*, FIRST ;FIRST OR CURRENT INSTRUCTION
007400 012801      MOV      (TAB)*, LAST    ;LAST INSTRUCTION OR GROUP
007402 020267 000156      CMP      FIRST, FINISH  ;TESTED ALL
007406 001413      BEQ      GIN3           ;YES BRANCH
007410 010267 000152      GIN2:  MOV      FIRST, INST ;SET UP INST
007414 012767 007454 170364      MOV      #RET, LP      ;SET UP RETURN FROM TRAP
007422 012706 007700      MOV      #BUFF, LP     ;SET UP LINK POINTER
007426 005067 170344      CLR      CC            ;CLEAR PRIORITY
007430 020107 000150      JMP      INST          ;EXECUTE RESERVED INSTRUCTION
007436 012737 000207 177564      GIN3:  MOV      #207, #177564 ;WELL ON PASS COMPLETE
007444 105737 177564      TSTB    #177564
007450 100375      BPL      .+4           ;WAIT FOR FLAG
007452 000167 170722      JMP      BEGIN         ;LOOP

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;TRAPPING SHOULD SEND YOU HERE
007456 020627 007674      RET1:  CMP      LP, #BUFF-4 ;TEST DECREMENT OF LP
007462 001401      BEQ      RET1
007464 000000      HLT
007466 026727 000202 007570      RET1:  CMP      BUFF-4, #INST+2 ;WRONG DECREMENT
007474 001401      BEQ      RET2          ;LOC OF INST UNINCREMENTED
007476 000000      HLT
007500 005767 000172      RET2:  TST      BUFF-2    ;INST INC ON TRAP
007504 001401      BEQ      .+4
007506 000000      HLT
007510 005267 000052      INC      INST          ;CONDITION CODES SET ON TRAP
007514 005202      INC      FIRST
007516 026701 000044      CMP      INST, LAST
007520 011725      RPO
007524 000167 177660      JMP      GIN2

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```

;TABLE 1
007532 000006      TABLE 1 4
007534 000077      77
007536 000210      210
007538 000237      240-1
007540 005400      6400
007542 007777      7777
007544 070000      70000
007546 077777      77777

```

```

;SET UP NEW GROUP
;FINISH OLD GROUP
;END OF INSTRUCTION GROUP
;END OF OPERATE

;RTS, RT1, JMP

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ADJ	006932	RESET1	006014	RETK	003340	TRY	000003
ATRAP	006262	RESET2	000000	RETL	003400	TSR	003222
BEGIN	000400	REY	007456	RETH	003440	TSL	006224
BEIL	000240	REY1	007466	RETN	003474	TTOSR	177564
RUFF	007700	REY2	007500	RETO	003550	TTY3	006120
CC	177776	REYA	000420	RETP	003630	TTY4	006174
CORH	006230	REYA1	000772	REYQ	003650	VDEC1	004514
CORL	006226	REYA2	001402	RETR	003700	VDEC10	004652
FINISH	007564	REYA3	001734	RETS	003742	VDEC11	004702
FIRST	000002R	REYA4	002370	RETT	004004	VDEC12	004704
FLAG	005454	REYA5	002742	RETV	004042	VDEC13	004742
FOVER	000014	REYAT	004200	RETV	004122	VDEC14	004744
GIN1	007376	REYB	000436	RTRAP	000004	VDEC2	004512
GIN2	007410	REYB1	001010	RTRAP1	000034	VDEC3	004544
GIN3	007436	REYB2	001420	RTRAP2	000020	VDEC4	004542
HERE	000000	REYB3	001772	RTRAP3	000030	VDEC5	004574
		REYB4	002100	RTRAP4	000014	VDEC6	004572
ILLA	004700	REYB5	002760	RTRAP5	000004	VDEC7	004624
ILLB	000100	REYBT	004230	SCOPE	010700	VDEC8	004622
INST	007566	REYC	000464	ST12K	000246	VDEC9	004654
INSTC	000462	REYC1	001036	ST16K	000260		
INSTK	003336	REYC2	001446	ST20K	000272		
ITRAP5	000004	REYC3	002016	ST24K	000304		
K1	006320	REYC4	002434	ST28K	000316		
K10	006336	REYC5	003006	ST4K	000222		
K11	006340	REYCT	004264	ST8K	000234		
K12	006342	REYD	000524	STATUS	177776		
K2	006322	REYD1	001076	TAB	000000R		
K3	006324	REYD2	001506	TABLF	007530		
K4	006326	REYD3	002056	TDEC1	006316		
K5	006332	REYD4	002174	TDEC2	006324		
K6	006332	REYD5	003046	TDEC3	004366		
K7	006334	REYE	000564	TDEC4	004422		
LAST	000001R	REYE1	001104	TDEC5	004442		
LP	000000R	REYE2	001046	TDEC6	004464		
MAP	005152	REYE3	002116	TDEC7	005064		
MAPT	205154	REYE4	002534	TDEC8	005062		
NOP	000240	REYE5	003106	TONY	004446		
NOR	006244	REYF	000620	TONY1	005410		
R6YST	006344	REYF1	001166	TR1	005630		
R7YR1	005208	REYF2	001602	TR2	005632		
R7YR2	005236	REYF3	002152	TR3	005712		
R7YR2A	005232	REYF4	002570	TR4	005716		
R7YR3	005270	REYF5	003142	TR4A	005322		
R7YR4	005326	REYG	000676	TR5	005714		
R7YRX	005156	REYG1	001244	TRACE	005434		
RA	002320	REYG2	001660	TRAPA	070000		
RA1	001332	REYG3	002230	TRAPB	006272		
RD	000000	REYD4	000444	TRP1	005510		
RB1	001326	REYG5	003220	TRC2	005550		
RC	002310	REYH5	003274	TRC3	005554		
RC1	001322	REYJ	003312	TRCSR	177560		

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ERRORS DETECTED: 0

W-TIME: 19 SECONDS

CORE USED