

IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D1FB-D  
PRODUCT NAME: PDP-8E EXTENDED MEMORY ADDRESS  
TEST (EA8E)  
DATE: JUNE 14, 1971  
MAINTAINER: DIAGNOSTIC GROUP  
AUTHOR: VERNON FREY

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1. ABSTRACT

The PDP-8E Extended Memory Address Test is designed to detect any location that cannot be uniquely addressed. This is performed by a series of four test routines which will test systems equipped with from 8K to 32K words of core memory. Automatic program relocation is provided in order to test all memory fields from each memory field. Teletype print-outs are provided for error identification, and the operator is given a degree of control over the program by various SR settings.

2. REQUIREMENTS

2.1 Equipment

A PDP-8E computer equipped with a minimum of 8K words of core memory.

2.2 Storage

The program occupies core locations 0000 to 3777.

2.3 Preliminary Programs

The Binary Loader must be in memory. Also, all diagnostics for a basic 4K PDP-8E must have been previously run successfully.

3. LOADING PROCEDURE

Load the program with the Binary Loader (BIN). The program may be loaded into any desired core stack by having BIN in that core stack.

4. OPERATING PROCEDURE

4.1 Program and Operator Action

- A. Set the SR to the INSTRUCTION FIELD and DATA FIELD of the stack which contains the program.
- B. Press key EXTD ADDR LOAD.
- C. Set the SR for desired starting address according to the following table.

ADDRESS	TEST EXECUTION
0200	Run all tests
0201	Run only test 1
0202	Run only test 2
0203	Run only test 3
0204	Run only test 4

- D. Press keys ADDR LOAD, CLEAR, and CONT. A setup SR message will be printed.

- E. Set the SR for desired operation according to the following table.

SWITCH	0 (down)	1 (up)
SR00	continue after error	halt after error
SR01	timeout errors	inhibit error timeouts
SR02	normal	TTY bell on error
SR03	relocate program	inhibit program relocation
SR04	normal	change stack limits
SR05	normal	halt after current test
SR06-08	starting stack limit (0-7)	
SR09-11	ending stack limit (0-7)	

Set to 0002

- F. Press key CONT.

4.2 Detailed SR Explanation

- SR00-02 SR02, if set, will ring the TTY bell once for each error. SR00 and SR01 have no effect with SR02 set.
- SR03 SR03 may be set or reset at any time and the program will act accordingly
- SR04 SR04 allows the operator to change the stack limits as defined by SR06-11.
- SR05 SR05 is normal halt for program
- SR06-08 These switches define the starting stack limit (normally 0).
- SR09-11 These switches define the ending stack limit (normally 7)

4.3 Example of Selecting Stacks for Test

Example 1: SR = 0007, 28K system

Stacks selected for testing are 6,5,4,3,2,1,0

Example 2: SR = 0004, 28K System

Stacks selected for testing are 4,3,2,1,0

Example 3: SR = 0022 28K System

Stacks selected for testing are 2  
(No relocation will occur)

Example 4: SR = 0041 28K System

Stacks selected for testing are 6,5,4,1,0

NOTE 1: Stacks not in the system are automatically de-selected as is Example 1. Stack 7 is not present therefore not selected.

NOTE 2: A single stack can be selected for testing providing the program is not in that stack as in Example 3.

NOTE 3: Any stack or group of stacks can be by-passed as in Example 4. Stacks 2 and 3 are not selected, stack 7 is not present.

5. ERRORS

The contents of a given memory test location should always be equal to its address or the complement of its address. If it is not, a test error will result. A relocation error will occur if the relocation comparison check fails.

5.1 Test Error Typeouts

For the first error encountered a header will be typed out followed by the pertinent data. For all subsequent errors, only the pertinent data will be typed. The format is as follows:

PR LOC ADDR GOOD BAD TEST

PR LOC = the program address where the error JMS occurred.  
(Includes Field)

ADDR = the address of the location in error. (Includes Field)

GOOD = what the data should be.

BAD = what the data is.

TEST = the test (1-4) running when the failure occurred.

5.2 Relocation Error Typeouts

All relocation errors are in the following format:

XXXXX RELOCATION ERROR AT LOCATION\_YYYYY

XXXXX = the program address where the error JMS occurred, (Includes Field)

YYYYY = the address of the location in error (Includes Field)

NOTE: After each error print-out the program continues on with the next sequential memory location.

6. RESTRICTIONS

6.1 Starting Restrictions

The program may be restarted at any time from location  $\$2000$  of the stack the program is presently in.

6.2 Operating Restrictions

None

7. EXECUTION TIME

The time to run all 4 tests in one core stack is approximately 1/2 second.

During program execution a 5 will be typed on the TTY approximately every 5 minutes of program run time. This allows the operator to determine approximate run time before a failure occurred.

8. SCOPE LOOPS

Two special scope loops have been provided in this program.

8.1 Scope Loop 1

This scope loop writes the value equal to the address specified by the SR into the address specified by the SR. It then loops doing a write-read.

8.1

continued

The address being looped on can be changed simply by changing the switch setting.

- A. Set the SR to the INSTRUCTION FIELD that the program is in and the DATA FIELD wanted to test.
- B. Press key EXTID ADDR LOAD.
- C. Set the SR equal to 3400.
- D. Press key ADDR LOAD.
- E. Set the SR equal to the address to test.
- F. Press keys CLEAR, and CONT.

8.2

Scope Loop 2

This scope loop is the same as Scope Loop 1 except that a group of addresses may be specified. The starting address specified must be less than the ending address specified.

- A. Set the SR to the INSTRUCTION FIELD that the program is in and the DATA FIELD wanted to test.
- B. Press key EXTID ADDR LOAD.
- C. Set the SR equal to 3600.
- D. Press key ADDR LOAD
- E. Set the SR equal to the first address of the group
- F. Press keys CLEAR and CONT. A halt will occur at address 3602.
- G. Set the SR equal to the last address of the group.
- H. Press key CONT.

NOTE:1: The address(s) specified will be looped until stopped by the operator with key HALT. No error checking is done. To resume normal operation, restart program at address 0200-0204 of the current instruction field.

9. PROGRAM DESCRIPTION

9.1 General

The PDP-8E Extended Memory Address Test is intended for use with a PDP-8E equipped with the extended memory option. A total of four tests are executed by the program. (See 9.2 thru 9.5). Each test writes a unique pattern into core memory and the checks for error. The patterns were chosen to aid the operator in the event of addressing errors.

The program automatically relocates itself to each memory field under test to ensure that all fields may be correctly referenced from any field. Fields not present in the system will automatically be de-selected from testing. (See 9.6)

Control of the program is given to the operator by means of the SR. The operator may halt after error, inhibit error printouts, substitute TTY BELL for error indication, halt after test, change field test limits, select all or any one of four tests, inhibit program relocation, and at any time restart the program at location 0200 thru 0204.

9.2 Test 1

Test 1 writes the value of each location into itself in the forward direction. Then each location is read and checked in the forward direction.

9.3 Test 2

Test 2 writes the complement value of each location into itself in the forward direction. Then each location is read and checked in the forward direction.

9.4 Test 3

Test 3 writes the value of each location into itself in the reverse direction. Then each location is read and checked in the reverse direction.



9.5 Test 4

Test 4 writes the complement value of each location into itself in the reverse direction. Then each location is read and checked in the reverse direction.

9.6 Program Relocation

Program relocation is governed by the status of SR bit 3 or by the fact that only one stack is selected for testing. With SR bit 3 down (0 position) program relocation occurs each time the test pattern and its complement have been completely tested in each selected stack. The program first relocates to the highest order 4K stack under test. The program keeps relocating to the next lower stack under test until it reaches the lowest order stack under test. The testing and relocation cycle is then repeated. The contents of the entire stack are relocated which enables any other information (RIM-BIN) to be carried with the program.

The program provides a degree of protection for itself by remembering all stacks where errors occur. When a faulty stack is next in sequence to contain the program, the program will skip the faulty stack and relocate to the first lower order stack which is error free. If all other selected stacks are faulty, program relocation will not take place.

During relocation a comparison check is made to insure no program loss.

For further understanding of how the tests are performed, refer to the listing.



/EXTENDED ADDRESS TEST FOR K8-E EXTENDED MEMORY (VER )  
 /COPYRIGHT 1971, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS. 01754  
 /PROGRAMMER, VERNON FREY

/SW0=1 HALT AFTER ERROR  
 /SW1=1 INHIBIT ERROR TYPEOUT  
 /SW2=1 BELL ON ERROR (USEFUL FOR MAINTENANCE)  
 /SW3=1 INHIBIT PROGRAM RELOCATION  
 /SW4=1 CHANGE STACK LIMITS  
 /SW5=1 HALT AFTER CURRENT TEST  
 /SW6-SW8 STARTING STACK LIMIT (0-7)  
 /SW9-SW11 ENDING STACK LIMIT (0-7)

/PROGRAM STARTING ADDRESS  
 /0200 RUN ALL TESTS  
 /0201 RUN ONLY TEST 1  
 /0202 RUN ONLY TEST 2  
 /0203 RUN ONLY TEST 3  
 /0204 RUN ONLY TEST 4

/NOT COMMANDS FOR THE K8-E EXTENDED MEMORY & INTERRUPT

6004	GTF=6004	/GET INTERRUPT FLAGS	/AC0 LINK
		/AC1 GREATER THAN FLAG	/AC2 INTERRUPT BUS
		/AC3 INTERRUPT INHIBIT FLIP-FLOP	/AC4 INTERRUPT ON
		/AC5 USER FLAG	/AC6-8 INSTRUCTION FIELD
		/AC9-11 DATA FIELD	/RESTORE INTERRUPT FLAGS
6005	RTF=6005	/AC0 LINK	/AC1 GREATER THAN FLAG
		/1 INTERRUPT INHIBIT FLIP-FLOP	/1 INTERRUPT ON
		/AC5 USER FLAG	/AC6-8 INSTRUCTION BUFFER
		/AC9-11 DATA FIELD	/CHANGE TO DATA FIELD 0
		/CHANGE TO DATA FIELD 1	/CHANGE TO DATA FIELD 2
		/CHANGE TO DATA FIELD 3	/CHANGE TO DATA FIELD 4
		/CHANGE TO DATA FIELD 5	/CHANGE TO DATA FIELD 6
6201	CDF0=6201		
6211	CDF1=6211		
6221	CDF2=6221		
6231	CDF3=6231		
6241	CDF4=6241		
6251	CDF5=6251		
6261	CDF6=6261		

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6271 CDF7=6271 /CHANGE TO DATA FIELD 7
6202 C1F0=6202 /CHANGE TO INSTRUCTION FIELD 0
6212 C1F1=6212 /CHANGE TO INSTRUCTION FIELD 1
6222 C1F2=6222 /CHANGE TO INSTRUCTION FIELD 2
6232 C1F3=6232 /CHANGE TO INSTRUCTION FIELD 3
6242 C1F4=6242 /CHANGE TO INSTRUCTION FIELD 4
6252 C1F5=6252 /CHANGE TO INSTRUCTION FIELD 5
6262 C1F6=6262 /CHANGE TO INSTRUCTION FIELD 6
6272 C1F7=6272 /CHANGE TO INSTRUCTION FIELD 7
6203 CBF0=6203 /CHANGE TO DATA AND INSTRUCTION FIELD 0
6213 CBF1=6213 /CHANGE TO DATA AND INSTRUCTION FIELD 1
6223 CBF2=6223 /CHANGE TO DATA AND INSTRUCTION FIELD 2
6233 CBF3=6233 /CHANGE TO DATA AND INSTRUCTION FIELD 3
6243 CBF4=6243 /CHANGE TO DATA AND INSTRUCTION FIELD 4
6253 CBF5=6253 /CHANGE TO DATA AND INSTRUCTION FIELD 5
6263 CBF6=6263 /CHANGE TO DATA AND INSTRUCTION FIELD 6
6273 CBF7=6273 /CHANGE TO DATA AND INSTRUCTION FIELD 7
6204 CINT=6204 /CLEAR USER INTERRUPT (TIME SHARE)
6214 RIF=6214 /READ DATA FIELD INTO AC BITS 6-8
6224 RIF=6224 /READ INSTRUCTION FIELD INTO AC BITS 6-8
6234 RIB=6234 /READ INTERRUPT BUFFER
6244 RMF=6244 /AC6-8 INSTRUCTION FIELD IN USE BEFORE LAST
        /PROGRAM INTERRUPT.
        /AC9-11 DATA FIELD IN USE BEFORE LAST
        /PROGRAM INTERRUPT.
        /RESTORE MEMORY FIELD
        /INSTRUCTION FIELD LOADED FROM SAVE FIELD 0-2
        /DATA FIELD LOADED FROM SAVE FIELD 3-5
        /SKIP ON USER INTERRUPT (TIME SHARE)
        /CLEAR USER FLAG (TIME SHARE)
        /SET USER FLAG (TIME SHARE)

0020 *20
/ /CONSTANTS AND POINTERS
/
0020 SW0, 4000 /HALT AFTER ERROR
0021 SW1, 2000 /INHIBIT ERROR TYPEOUT
0022 SW2, 1000 /BELL ON ERROR
0023 SW3, 400 /INHIBIT PROGRAM RELOCATION
0024 SW4, 200 /CHANGE STACK LIMITS
0025 SW5, 100 /HALT AFTER CURRENT TEST
0026 SW6, 70 /STARTING STACK LIMIT (0-7)
0027 SW911, 7 /ENDING STACK LIMIT (0-7)
0030 STACK0, 0 /
0031 STACK1, 0 /
0032 STACK2, 0 /
0033 STACK3, 0 /
0034 STACK4, 0 /
0035 STACK5, 0 /
0036 STACK6, 0 /
0037 STACK7, 0 /
0040 STK0, 0 /

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STACKS CONTAIN 0 IF SELECTED FOR TESTING



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0130 0707 K707, 707 /SIXTY
0131 4060 K4060, 4060 /CODERR - ERR
0132 6000 K6000, 6000 /LINK IS A 0 - PROG FIELD TYPEOUT
0133 6003 K6003, 6003 /ALL TESTS
0134 6060 K6060, 6060 /SIXTY
0135 6100 K6100, 6100 /TEST 1
0136 6200 K6200, 6200 /TEST 2
0137 6300 K6300, 6300 /TEST 3
0140 6400 K6400, 6400 /TEST 4
0141 6201 K6201, 6201 /CDF 0
0142 6203 K6203, 6203 /CBF 0
0143 2042 XTYPE, TYPE /TYPEOUT AC ROUTINE POINTER
0144 2050 XMESAG, MESSAGE /TTY ROUTINE POINTER
0145 2000 XSIXTY, SIXTY /SIXTY ROUTINE POINTER
0146 2201 XCODER, CODERR /ERROR ROUTINE POINTER
0147 2200 XRETUR, RETURN /ERROR RETURN POINTER
0150 2242 XSTOP, STOP /STOP ROUTINE POINTER
0151 2241 XADDER, ADDE /ADDRESS OF ERROR TYPEOUT POINTER
0152 0000 FIVE, 0 /FIVE MINUTE TIMER
0153 0000 MIN5, 0 /FIVE MINUTE CONTROL
0154 7100 MIN50, -700 /ALL TESTS FIVE MIN
0155 3500 MIN51, -4300 /TEST 1 FIVE MIN
0156 3500 MIN52, -4300 /TEST 2 FIVE MIN
0157 6000 MIN53, -2000 /TEST 3 FIVE MIN
0160 6000 MIN54, -2000 /TEST 4 FIVE MIN

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*0
0000
0001 0 JMP
0002 2
0003 3
*200
/
/KM8-E EXTENDED MEMORY ADDRESS TEST (EA8E)
/

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0200 5777' EXTAD, JMP /ALL TESTS
0201 5776' JMP /TEST 1
0202 5775' JMP /TEST 2
0203 5774' JMP /TEST 3
0204 5773' JMP /TEST 4
0205 3056 DCA RUNTST /TEST CONTROL
0206 6002 IOF
0207 6224 RIF
0210 1141 TAD K6201
0211 3212 DCA ,+1
0212 6201 CDF 0
0213 4772' JMS TITLE /MAKE DATA FIELD=INST FIELD
0214 4771' JMS SETSW /TYPEOUT PROGRAM TITLE
0215 7240 STA /TYPEOUT TO SETUP SWITCHES
0216 3050 DCA NORELO /CLEAR INH RELOCATION
0217 3057 DCA TESTAD /CLEAR TEST ADDR COUNTER
0220 7240 STA /RESET ERROR HEADING
0221 3053 DCA HEAD1
0222 1153 TAD MIN5
0223 3152 DCA FIVE /SETUP COUNTER

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0224	4770'	JMS	DOWN+2	/CLEAR STACK SELECTION CONTROLS
0225	7604	LAS	SW68	/STARTING STACK LIMIT
0226	0026	AND	SSL	/ENDING STACK LIMIT
0227	3061	DCA	SSL	/OBTAIN -SSL IN AC BITS 9-11
0230	7604	LAS	SW911	/SKIP IF SSL EQUALS ESL
0231	0027	AND	ESL	/CONTINUE CHECK
0232	3062	DCA	MSSL	/READ INSTRUCTION FIELD
0233	4767'	JMS	ESL	
0234	1062	TAD	ESL	
0235	7640	SZA	CLA	
0236	5262	JMP	CLAX	
0237	6224	RIF	CLAX	
0240	7041	CIA	CLAX	
0241	1061	TAD	SSL	
0242	7650	SNA	CLAX	
0243	5766'	JMP	PINF	
0244	3050	DCA	NORELO	
0245	1365	TAD	(CHEXB	
0246	3764'	DCA	ABOVE-1	
0247	1062	TAD	ESL	
0250	1051	TAD	KABOVE	
0251	3071	DCA	TEMP	
0252	5471	JMP	TEMP	
0253	1363	TAD	(CHEXE	
0254	3762'	DCA	BELOW+1	
0255	1062	TAD	ESL	
0256	7041	CIA	KBELOW	
0257	1052	TAD	TEMP	
0260	3071	DCA	TEMP	
0261	5471	JMP	TEMP	
0262	4767'	JMS	MSSL	
0263	1062	TAD	ESL	
0264	7710	SPA	CLAX	
0265	5302	JMP	CHEXD	
0266	1361	TAD	(CHEXC1	
0267	3764'	DCA	ABOVE-1	
0270	1062	TAD	ESL	
0271	1051	TAD	KABOVE	
0272	3071	DCA	TEMP	
0273	5471	JMP	TEMP	
0274	1363	TAD	(CHEXE	
0275	3762'	DCA	BELOW+1	
0276	4767'	JMS	MSSL	
0277	1052	TAD	KBELOW	
0300	3071	DCA	TEMP	
0301	5471	JMP	TEMP	
0302	1360	TAD	(CHEXD1	
0304	3762'	DCA	BELOW+1	
0305	1052	JMS	MSSL	
0306	3071	TAD	KBELOW	
0307	5471	DCA	TEMP	
0310	1363	JMP	TEMP	
0311	3770'	TAD	(CHEXE	
0312	1062	DCA	DOWN+2	
		TAD	ESL	

0313	7041	CIA	
0314	1070	TAD	KDOWN
0315	3071	DCA	TEMP
0316	5471	JMP I	TEMP
0317	4757	JMS	HIGHST
0320	1060	TAD	KBINT
0321	1117	TAD	K260
0322	3060	DCA	KBINT
0323	4756	JMS	TSTSYS
0324	1355	TAD	(CHEXE2
0325	3764	DCA	ABOVE-1
0326	1060	TAD	KBINT
0327	0101	AND	K7
0330	1051	TAD	KABOVE
0331	3071	DCA	TEMP
0332	5471	JMP I	TEMP
0355	0400		
0356	3017		
0397	2737		
0360	0310		
0361	0274		
0362	1726		
0363	0317		
0364	1705		
0365	0253		
0366	2712		
0367	1742		
0370	1740		
0371	2621		
0372	2600		
0373	1624		
0374	1617		
0375	1612		
0376	1605		
0377	1600		
0400	0400		
0400	4777	PAGE	TOSEL
0401	4210	JMS	LEGAL
0402	1050	TAD	NORELO
0403	7050	SNA CLA	
0404	5276	JMP	CHEXM
0405	4776	JMS	CHKSW3
0406	5775	JMP	CHEX0
0407	5327	JMP	CHEXM

/RESTORE LOWER FIELDS TESTED  
/FIND SYSTEMS HIGHEST STACK

/MAKE HIGHEST STACK 0-7 FOR TYPEOUT  
/TYPEOUT # OF STACKS IN SYSTEM

/STORE RETURN ADDRESS

/INCREMENT UPPER STACKS NOT IN SYSTEM

/TYPEOUT STACK TEST SELECTION

/CHECK PROG RELO SW  
/RELOCATE PROGRAM  
/INHIBIT PROGRAM RELOCATION

/CHECK FOR LEGAL STACK SELECTION

0410	0000	LEGAL,	0
0411	7300	CLA	CLL
0412	3054	DCA	INSAME
0413	1075	TAD	M2
0414	3055	DCA	LEGAL0
0415	3064	DCA	STKTST
			/CLEAR SAME CONTROL
			/SETUP LEGAL CONTROL



0416	1030	TAD	STACK0
0417	4263	JMS	LEGALA
0420	1102	TAD	K10
0421	3064	DCA	STKTST
0422	1031	TAD	STACK1
0423	4263	JMS	LEGALA
0424	1103	TAD	K20
0425	3064	DCA	STKTST
0426	1032	TAD	STACK2
0427	4263	JMS	LEGALA
0430	1104	TAD	K30
0431	3064	DCA	STKTST
0432	1033	TAD	STACK3
0433	4263	JMS	LEGALA
0434	1105	TAD	K40
0435	3064	DCA	STKTST
0436	1034	TAD	STACK4
0437	4263	JMS	LEGALA
0440	1106	TAD	K50
0441	3064	DCA	STKTST
0442	1035	TAD	STACK5
0443	4263	JMS	LEGALA
0444	1107	TAD	K60
0445	3064	DCA	STKTST
0446	1036	TAD	STACK6
0447	4263	JMS	LEGALA
0450	1110	TAD	K70
0451	3064	DCA	STKTST
0452	1037	TAD	STACK7
0453	4263	JMS	LEGALA
0454	2055	ISZ	LEGAL0
0455	9774	JMP	NOSTK
0456	1054	TAD	INSAME
0457	7640	SEA	CLA
0460	9773	JMP	PINF
0461	3050	DCA	NORELO
0462	5610	JMP	LEGAL

/NO STACK SELECTION

/PROG IN SELECTED FIELD  
/ONLY 1 STACK SELECTED

/LEGAL STACK SELECTION SUBROUTINE

0463	0000	LEGALA, 0
0464	7640	SEA
0465	5663	JMP I
0466	2055	ISZ
0467	7410	SKP
0470	5610	JMP I
0471	6224	RIF
0472	3063	DCA
0473	4772	JMS
0474	2054	ISZ
0475	5663	JMP I

/NOT SELECTED

/PROG IN SEL STACK  
/YES

/NO PROGRAM RELOCATION AND TEST ONLY 1 STACK

```

0476 6224 CHEXM, RIF
0477 3063 DCA
0500 1371 TAD
0501 3017 DCA
0502 3071 DCA
0503 1417 TAD I
0504 7650 SNA CLA
0505 5310 JMP
0506 2071 ISZ
0507 5303 JMP
0510 1071 TAD
0511 7104 CLL RAL
0512 7006 RTL
0513 3064 DCA
0514 4770 JMS
0515 4767 JMS
0516 7604 LAS
0517 0025 AND
0520 7640 SZA CLA
0521 7402 HLT
0522 7604 LAS
0523 0024 AND
0524 7640 SZA CLA
0525 5766 JMP
0526 5315 JMP

```

```

/STACK PROGRAM IS IN
/FIND STACK SEL FOR TEST
/STACK SEL FOR TEST
/TYPEOUT NO RELOCATION
/TEST THE SELECTED STACK
/NO PROGRAM RELOCATION BUT TEST ALL SELECTED STACKS
/CHANGE STACK LIMITS?
/YES
/NO
/CHANGE STACK LIMITS?
/YES
/NO
/RELOCATE
/CONTINUE

```

```

0527 4770 CHEXN, JMS
0530 4765 CHEXN0, JMS
0531 7604 LAS
0532 0025 AND
0533 7640 SZA CLA
0534 7402 HLT
0535 7604 LAS
0536 0024 AND
0537 7640 SZA CLA
0540 5766 JMP
0541 4776 JMP
0542 5775 JMP
0543 5330 JMP
0565 0600
0566 0214
0567 1200
0570 2636
0571 0027
0572 1631
0573 2712
0574 2732
0575 1000
0576 1640
0577 3074

```

```

/NO PROGRAM RELOCATION BUT TEST ALL SELECTED STACKS
/TYPEOUT NO RELOCATION
/TEST SEL'D STACKS
/CHANGE STACK LIMITS?
/YES
/NO
/RELOCATE
/CONTINUE

```

0600 PAGE

/TEST STACKS CONTROL

```

0600 0000 /CHEXN1, 0
0601 7200 CLA
0602 6224 RIF
0603 3063 DCA
0604 1037 TAD
0605 7640 SZA CLA
0606 5222 JMP CHEXN2
0607 1110 TAD K70
0610 3064 DCA STKTST
0611 3072 DCA COUNT
0612 4777 JMS SAME
0613 5222 JMP CHEXN2
0614 4776 JMS TEST
0615 1072 TAD COUNT
0616 7640 SZA CLA
0617 2047 ISE STK7
0620 7410 SKP
0621 5217 JMP
0622 1036 CHEXN2, TAD
0623 7640 SZA CLA
0624 5240 JMP
0625 1107 TAD
0626 3064 DCA
0627 3072 DCA
0630 4777 JMS
0631 5240 JMP
0632 4776 JMS
0633 1072 TAD
0634 7640 SZA CLA
0635 2046 ISE
0636 7410 SKP
0637 5235 JMP
0640 1035 CHEXN3, TAD
0641 7640 SZA CLA
0642 5256 JMP
0643 1106 TAD
0644 3064 DCA
0645 3072 DCA
0646 4777 JMS
0647 5256 JMP
0650 4776 JMS
0651 1072 TAD
0652 7640 SZA CLA
0653 2045 ISE
0654 7410 SKP
0655 5253 JMP
0656 1034 CHEXN4, TAD
0657 7640 SZA CLA
0660 5274 JMP
0661 1105 TAD
0662 3064 DCA

```

/STACK PROGRAM IS IN

/STACK SEL FOR TEST

/PROG IN SEL STACK?

/YES

/NO - TEST THE SEL STACK

/STACK SEL FOR TEST

/PROG IN SEL STACK?

/YES

/NO - TEST THE SEL STACK

/STACK SEL FOR TEST

/PROG IN SEL STACK?

/YES

/NO - TEST THE SEL STACK

/STACK SEL FOR TEST

0663	3072	DCA	COUNT		
0664	4777	JMS	SAME	/PROG IN SEL STACK?	
0665	5274	JMP	CHEXN5	/YES	
0666	4776	JMS	TEST	/NO - TEST THE SEL STACK	
0667	1072	TAD	COUNT		
0670	7640	SEA	CLA		
0671	2044	ISE	STK4		
0672	7410	SKP			
0673	5271	JMP	.-2		
0674	1033	TAD	STACK3		
0675	7640	SEA	CLA		
0676	5312	JMP	CHEXN6		
0677	1104	TAD	K30		
0700	3064	DCA	STKTST	/STACK SEL FOR TEST	
0701	3072	DCA	COUNT		
0702	4777	JMS	SAME	/PROG IN SEL STACK?	
0703	5312	JMP	CHEXN6	/YES	
0704	4776	JMS	TEST	/NO - TEST THE SEL STACK	
0705	1072	TAD	COUNT		
0706	7640	SEA	CLA		
0707	2043	ISE	STK3		
0710	7410	SKP			
0711	5307	JMP	.-2		
0712	1032	TAD	STACK2		
0713	7640	SEA	CLA		
0714	5330	JMP	CHEXN7		
0715	1103	TAD	K20	/STACK SEL FOR TEST	
0716	3064	DCA	STKTST		
0717	3072	DCA	COUNT	/PROG IN SEL STACK?	
0720	4777	JMS	SAME	/YES	
0721	5330	JMP	CHEXN7	/NO - TEST THE SEL STACK	
0722	4776	JMS	TEST		
0723	1072	TAD	COUNT		
0724	7640	SEA	CLA		
0725	2042	ISE	STK2		
0726	7410	SKP			
0727	5325	JMP	.-2		
0730	1031	TAD	STACK1		
0731	7640	SEA	CLA		
0732	5346	JMP	CHEXN8	/STACK SEL FOR TEST	
0733	1102	TAD	K10		
0734	3064	DCA	STKTST	/PROG IN SEL STACK?	
0735	3072	DCA	COUNT	/YES	
0736	4777	JMS	SAME	/NO - TEST THE SEL STACK	
0737	5346	JMP	CHEXN8		
0740	4776	JMS	TEST		
0741	1072	TAD	COUNT		
0742	7640	SEA	CLA		
0743	2041	ISE	STK1		
0744	7410	SKP			
0745	5343	JMP	.-2		
0746	1030	TAD	STACK0		
0747	7640	SEA	CLA		
0750	5361	JMP	CHEXN9		
0751	3064	DCA	STKTST	/STACK SEL FOR TEST	

```

0752 3072 DCA COUNT
0753 4777 JMS SAME
0754 5361 JMP CHEXN9
0755 4776 JMS TEST
0756 1072 TAD COUNT
0757 7640 SZA CLA
0760 2040 ISZ STK0
0761 5600 JMP I CHEXN1
0762 5360 JMP .-2

```

```

0776 1200
0777 1631
0778 1000

```

PAGE

```

/ CHECK ALL SELECTED STACKS FROM EACH SELECTED STACK
/
CHEX0, 1000 4777 JMS PREL /TYPEOUT RELOCATION
1001 4776 JMS RESTK /RESTORE STK(S)
1002 4775 JMS CHEXN1 /TEST FROM PRESENT STACK
1003 4774 JMS CHKSW3
1004 7410 SKP CHEXN
1005 5773 JMP CHEXN /STACK PROGRAM IS IN
1006 6224 RIF
1007 3063 DCA STKPIN
1010 1047 TAD STK7
1011 7640 SZA CLA CHEX00
1012 5224 JMP K70
1013 1110 TAD STKTST
1014 3064 DCA STKTST
1015 4772 JMS SAME
1016 7410 SKP RELO
1017 4771 JMS CHEXN1
1020 4775 JMS CHEXN1
1021 4774 JMS CHKSW3
1022 7410 SKP
1023 5773 JMP CHEXN
1024 1046 TAD STK6
1025 7640 SZA CLA CHEX00,
1026 5240 JMP CHEX01
1027 1107 TAD K60
1030 3064 DCA STKTST
1031 4772 JMS SAME
1032 7410 SKP
1033 4771 JMS RELO
1034 4775 JMS CHEXN1
1035 4774 JMS CHKSW3
1036 7410 SKP
1037 5773 JMP CHEXN
1040 1045 TAD STK5
1041 7640 SZA CLA CHEX01,
1042 5254 JMP CHEX02
1043 1106 TAD K50
1044 3064 DCA STKTST

```

```

/PROG IN SEL STACK?
/YES
/NO - TEST THE SEL STACK

```

```

/TYPEOUT RELOCATION
/RESTORE STK(S)
/TEST FROM PRESENT STACK

```

/STACK PROGRAM IS IN

```

/STACK SEL FOR MOVE TO
/PROG IN MOVE STACK?
/YES
/NO - RELOCATE PROGRAM
/TEST ALL SEL STACKS

```

```

/STACK SEL FOR MOVE TO
/PROG IN MOVE STACK?
/YES
/NO - RELOCATE PROGRAM
/TEST ALL SEL STACKS

```

1045	4772'	JMS	SAME
1046	7410	SKP	
1047	4771'	JMS	RELO
1050	4775'	JMS	CHEXN1
1051	4774'	JMS	CHKSW3
1052	7410	SKP	
1053	5773'	JMP	CHEXN
1054	1044	TAD	STK4
1055	7640	JMP	CHEX03
1056	5270	JMP	SEA CLA
1057	1105	TAD	K40
1060	3064	DCA	STKTST
1061	4772'	JMS	SAME
1062	7410	SKP	
1063	4771'	JMS	RELO
1064	4775'	JMS	CHEXN1
1065	4774'	JMS	CHKSW3
1066	7410	SKP	
1067	5773'	JMP	CHEXN
1070	1043	TAD	STK3
1071	7640	JMP	SEA CLA
1072	5304	JMP	CHEX04
1073	1104	TAD	K30
1074	3064	DCA	STKTST
1075	4772'	JMS	SAME
1076	7410	SKP	
1077	4771'	JMS	RELO
1100	4775'	JMS	CHEXN1
1101	4774'	JMS	CHKSW3
1102	7410	SKP	
1103	5773'	JMP	CHEXN
1104	1042	TAD	STK2
1105	7640	JMP	SEA CLA
1106	5320	JMP	CHEX05
1107	1103	TAD	K20
1110	3064	DCA	STKTST
1111	4772'	JMS	SAME
1112	7410	SKP	
1113	4771'	JMS	RELO
1114	4775'	JMS	CHEXN1
1115	4774'	JMS	CHKSW3
1116	7410	SKP	
1117	5773'	JMP	CHEXN
1120	1041	TAD	STK1
1121	7640	JMP	SEA CLA
1122	5334	JMP	CHEX06
1123	1102	TAD	K10
1124	3064	DCA	STKTST
1125	4772'	JMS	SAME
1126	7410	SKP	
1127	4771'	JMS	RELO
1130	4775'	JMS	CHEXN1
1131	4774'	JMS	CHKSW3
1132	7410	SKP	
1133	5773'	JMP	CHEXN

1134 1040  
 1135 7640  
 1136 5344  
 1137 3064  
 1140 4772  
 1141 7410  
 1142 4771  
 1143 4775  
 1144 7604  
 1145 0025  
 1146 7640  
 1147 7402  
 1150 7604  
 1151 0024  
 1152 7640  
 1153 9770  
 1154 4774  
 1155 5206  
 1156 9773  
 1170 0214  
 1171 1646  
 1172 1631  
 1173 0527  
 1174 1640  
 1175 0600  
 1176 3051  
 1177 2672  
 1200 1200

CHEX06, TAD STK0  
 SEA CLA CHEX07  
 JMP STKTST  
 DCA SAME  
 JMS RELO  
 JMS CHEXN1  
 JMS CHEXN1  
 LAS AND SWS  
 CHEX07, AND SWS  
 SEA CLA  
 HLT  
 LAS  
 AND SW4  
 SEA CLA CHEXA  
 JMP CHKSW3  
 JMS CHEX0A  
 JMP CHEXN  
 JMP

/HALT AFTER TEST

/CHANGE STACK LIMITS?

/YES

/NO

/RELOCATE THE PROGRAM

/INHIBIT PROGRAM RELOCATION

PAGE

/RUN THE SELECTED TEST(S) ON THE SELECTED FIELD (STKTST)

TEST, 0  
 CLA CLL STKTST /UPDATE CDF TEST DATA FIELDS  
 TAD K6201  
 DCA TDF1  
 TAD TDF1  
 DCA TDF2  
 TAD TDF2  
 DCA TDF3  
 TAD TDF3  
 DCA TDF4  
 TAD TDF4  
 DCA COUNT /CLEAR ERROR COUNT  
 TAD RUNTST  
 RAR SEL CLA /EXECUTE TEST 1  
 JMS TEST1  
 TAD RUNTST  
 RTR SEL CLA /EXECUTE TEST 2  
 JMS TEST2  
 TAD RUNTST

```

1225 7006          RTL
1226 7630          SZL CLA
1227 4773'        JMS TEST3
1230 1056          TAD RUNTST
1231 7004          RAL
1232 7630          SZL CLA
1233 4772'        JMS TEST4
1234 7604          LAS
1235 0024          AND SW4
1236 7640          SZA CLA
1237 5771'        JMP CHEXA
1240 2192          ISZ FIVE
1241 5600          JMP I TEST
1242 1153          TAD MINS
1243 3152          DCA FIVE
1244 4544          JMS I XMESAG
1245 4543          4543
1246 6500          6500
1247 5600          JMP I TEST
    
```

```

/EXECUTE TEST 3
/EXECUTE TEST 4
/CHANGE STACK LIMITS?
/YES
/NOT 5 MINUTES YET
/RESTORE TIMER
    
```

```

/TEST 1
/
/WRITE THE VALUE OF EACH LOCATION INTO ITSELF AND CHECK
    
```

```

1250 0000          TEST1, 0
1251 3057          DCA TESTAD
1252 6201          CDF0 TESTAD
1253 1057          TAD TESTAD
1254 3457          DCA I TESTAD
1255 2057          ISZ TESTAD
1256 5253          JMP TEST1A
1257 1057          TAD TESTAD
1260 7041          CIA TESTAD
1261 1457          TAD I TESTAD
1262 7640          SZA CLA
1263 5273          JMP ADDR1
1264 2057          ISZ TESTAD
1265 9257          JMP TEST1B
1266 1063          TAD STKPIN
1267 1141          TAD K6201
1270 3271          DCA .+1
1271 6201          CDF0 TEST1
1272 5650          JMP I TEST1

1273 1057          ADDR1, TAD TESTAD
1274 3066          DCA GDATA
1275 1457          TAD I TESTAD
1276 3065          DCA BDATA
1277 1063          TAD STKPIN
1300 1141          TAD K6201
1301 3302          DCA .+1
1302 6201          CDF0 TEST1
1303 4770'        JMS ERR1
1304 1064          TAD STKTST

/CLEAR TEST ADDRESS COUNTER
/CHANGE TO TEST DATA FIELD
/WRITE MEMORY
/4096 TIMES
/READ AND CHECK
/ADDRESS ERROR
/CONTINUE READ AND CHECK
/CHANGE TO PROGRAM DATA FIELD
/DONE
/GOOD
/BAD
/CHANGE TO PROGRAM DATA FIELD
/ADDRESS ERROR TEST1
    
```



1305	1141	TAD	K6201	
1306	3307	DCA	.+1	
1307	6201	COF0		/CHANGE TO TEST DATA FIELD
1310	5264	JMP	ADDR1	

1370	2256			
1371	0214			
1372	1514			
1373	1443			
1374	1400			
1375	1516			
1376	1445			
1377	1402			
	1400			

PAGE

/TEST 2

/WRITE THE COMPLEMENT VALUE OF EACH LOCATION INTO ITSELF AND CHECK

1400	0000	TEST2,	0	TESTAD	/CLEAR TEST ADDRESS COUNTER
1401	3057	DCA			/CHANGE TO TEST DATA FIELD
1402	6201	COF0			
1403	1057	TEST2A,	TAD	TESTAD	
1404	7040	GMA			
1405	3437	DCA	I	TESTAD	/WRITE MEMORY
1406	2057	ISE		TESTAD	/4096 TIMES
1407	5203	JMP	TEST2A	TESTAD	/READ AND CHECK
1410	1057	TEST2B,	TAD	TESTAD	
1411	7001	IAC			
1412	1457	TAD	I	TESTAD	
1413	7640	SEA	CLA		
1414	5224	JMP		ADDR2	/ADDRESS ERROR
1415	2057	ISE		TESTAD	/CONTINUE READ AND CHECK
1416	5210	JMP	TEST2B		
1417	1063	TAD	STKPIN		
1420	1141	TAD	K6201		
1421	3222	DCA	.+1		
1422	6201	COF0			/CHANGE TO PROGRAM DATA FIELD
1423	5600	JMP	I	TEST2	/DONE

1424	1057	ADDR2,	TAD	TESTAD	
1425	7040	GMA			
1426	3066	DCA		GDATA	/GOOD
1427	1457	TAD	I	TESTAD	
1430	3065	DCA		BOATA	/BAD
1431	1063	TAD	STKPIN		
1432	1141	TAD	K6201		
1433	3234	DCA	.+1		
1434	6201	COF0			/CHANGE TO PROGRAM DATA FIELD
1435	4777	JMS	ERR2		/ADDRESS ERROR TEST 2
1436	1064	TAD	STKST		
1437	1141	TAD	K6201		
1440	3241	DCA	.+1		
1441	6201	COF0			/CHANGE TO TEST DATA FIELD



```

1516 6201 TOF4, CDF0
1517 1057 TEST4A, TAD TESTAD
1520 1074 TAD M1
1521 3057 DCA TESTAD
1522 1057 TAD TESTAD
1523 7040 CMA
1524 3457 DCA I TESTAD
1525 1057 TAD TESTAD
1526 7640 SZA CLA
1527 5317 JMP TEST4A
1530 1057 TAD TESTAD
1531 1074 TAD M1
1532 3057 DCA TESTAD
1533 1057 TAD TESTAD
1534 7001 IAC
1535 1457 TAD I TESTAD
1536 7640 SZA CLA
1537 5350 JMP ADDER4
1540 1057 TAD TESTAD
1541 7640 SZA CLA
1542 5330 JMP TEST4B
1543 1063 TAD STKPIN
1544 1141 TAD K6201
1545 3346 DCA .+1
1546 6201 CDF0
1547 5714 JMP I TEST4

1550 1057 ADDER4, TAD TESTAD
1551 7040 CMA
1552 3066 DCA GDATA
1553 1457 TAD I TESTAD
1554 3065 DCA BDATA
1555 1063 TAD STKPIN
1556 1141 TAD K6201
1557 3360 DCA .+1
1560 6201 CDF0
1561 4775 JMS ERR4
1562 1064 TAD STKTST
1563 1141 TAD K6201
1564 3365 DCA .+1
1565 6201 CDF0
1566 5340 JMP ADDR4

1575 2416
1576 2400
1577 2342
1600 7200
1601 1154
1602 3153

```

/CHANGE TO TEST DATA FIELD

/WRITE MEMORY

/4096 TIMES

/READ AND CHECK

/ADDRESS ERROR

/CONTINUE READ AND CHECK

/CHANGE TO PROGRAM DATA FIELD

/DONE

/GOOD

/BAD

/CHANGE TO PROGRAM DATA FIELD

/ADDRESS ERROR TEST 4

/CHANGE TO TEST DATA FIELD

PAGE

/SETUP 5 MINUTE TIMER & TEST SELECTED TO RUN

```

RUN0, CLA
TAD MIN50
DCA MINS
/RUN ALL TESTS

```

```

1603 1133 TAD K6003
1604 5777 JMP EXTAD0
1605 7200 CLA
1606 1155 TAD MIN51
1607 3153 DCA MIN5
1610 7001 IAC
1611 5777 JMP EXTAD0
1612 7300 CLA CLL
1613 1156 TAD MIN52
1614 3153 DCA MIN5
1615 7005 IAC RAL
1616 5777 JMP EXTAD0
1617 7200 CLA
1620 1157 TAD MIN53
1621 3153 DCA MIN5
1622 7132 STL RTR
1623 5777 JMP EXTAD0
1624 7200 CLA
1625 1160 TAD MIN54
1626 3153 DCA MIN5
1627 7130 STL RAR
1630 5777 JMP EXTAD0
    
```

/RUN ONLY TEST 1

/RUN ONLY TEST 2

/RUN ONLY TEST 3

/RUN ONLY TEST 4

/RETURN IF PROGRAM IS IN SELECTED STACK  
 /RETURN+1 IF PROGRAM IS NOT IN SELECTED STACK

```

1631 0000 SAME, 0
1632 1063 TAD STKPIN
1633 7041 CIA
1634 1064 TAD STKTST
1635 7640 SZA CLA
1636 2231 ISZ SAME
1637 5631 JMP I SAME
    
```

/PROG NOT IN SEL STACK

/CHECK PROGRAM RELOCATION SWITCH  
 /RETURN IF RELOCATE, RETURN+1 IF INHIBIT RELOCATION

```

1640 0000 CHKSW3, 0
1641 7604 LAS
1642 0023 AND SW3
1643 7640 SZA CLA
1644 2240 ISZ CHKSW3
1645 5640 JMP I CHKSW3
    
```

/INHIBIT RELOCATION

/RELOCATE THE PROGRAM

```

1646 0000 RELO, 0
1647 7200 CLA
1650 3072 DCA COUNT
1651 3067 DCA MOVE
1652 1141 TAD K6201
1653 1063 TAD STKPIN
1654 3265 DCA RELO2
1655 1141 TAD K6201
    
```

/CLEAR ERROR COUNTER

```

1656 1064 STKTST
1657 3267 DCA RELO3
1660 1265 TAD RELO2
1661 3272 DCA RELO4
1662 1142 TAD K6203
1663 1064 TAD STKTST
1664 3303 DCA RELO5
1665 6201 RELO2, CDF0 /MOVE FROM DATA FIELD
1666 1467 TAD I MOVE
1667 6201 RELO3, CDF0 /MOVE TO DATA FIELD
1670 3467 DCA I MOVE
1671 1467 TAD I MOVE
1672 6201 RELO4, CDF0 /MOVE FROM DATA FIELD
1673 7041 CIA
1674 1467 TAD I MOVE
1675 7640 SZA CLA
1676 4776 JMS ERRM /MOVE ERROR
1677 2067 ISZ MOVE
1700 5265 JMP RELO2
1701 1072 TAD COUNT
1702 7650 SNA CLA
1703 6203 CBFO /SKIP IF MOVE ERROR
1704 5646 JMP I RELO /CHANGE TO NEW PROG FIELD

```

```

/INCREMENT CONTROL OF UPPER STACKS NOT TESTED AND/OR
/STACKS NOT IN THE SYSTEM

```

```

1705 0000
1706 2031 ABOVE, ISZ STACK1 /RETURN ADDRESS
1707 2032 ISZ STACK2
1710 2033 ISZ STACK3
1711 2034 ISZ STACK4
1712 2035 ISZ STACK5
1713 2036 ISZ STACK6
1714 2037 ISZ STACK7
1715 5705 JMP I ABOVE-1

```

```

/INCREMENT CONTROL OF LOWER STACKS NOT TESTED

```

```

1716 2036 ISZ STACK6
1717 2035 ISZ STACK5
1720 2034 ISZ STACK4
1721 2033 ISZ STACK3
1722 2032 ISZ STACK2
1723 2031 ISZ STACK1
1724 2030 ISZ STACK0
1725 5726 JMP I .+1
1726 0000

```

```

/CLEAR ALL STACKS OR STACKS TO BE TESTED

```

```

1727 3037 DCA STACK7
1730 3036 DCA STACK6
1731 3035 DCA STACK5

```

1732	5034	DCA	STACK4	
1733	3033	DCA	STACK3	
1734	3032	DCA	STACK2	
1735	3031	DCA	STACK1	
1736	3030	DCA	STACK0	
1737	5740	JMP I	.*+1	/RETURN ADDRESS
1740	0000	0		/CLEAR ALL STACK SELECTION CONTROLS
1741	5527	JMP	.-12	
		/		
		/OBTAIN	-SSL (MINUS STARTING STACK LIMIT)	
		/		
1742	0000	MSSL,	0	
1743	1061	TAD	SSL	
1744	7112	CLL	RTR	
1745	7010	RAR		
1746	7041	CIA		
1747	5742	JMP I	MSSL	
1776	2434			
1777	0205			
	2000			

2000	0000	/	CONVERT OCTAL NUMBERS FOR TYPEOUT	
2001	7300	/	SIXTY, 0	
2002	1600	CLA	CLL	/GET ADDRESS OF OPERAND
2003	3237	TAD	I	
2004	2200	DCA	SIXTY0	/GET STORAGE ADDRESS
2005	1600	ISE	SIXTY	/CORRECT RETURN ADDRESS
2006	3240	TAD	I	
2007	2200	DCA	SIXTY1	/AC=7700
2010	1111	ISE	SIXTY	/AND OPERAND FIRST 2 DIGITS
2011	7040	TAD	K77	
2012	0637	CMA	I	
2013	7112	AND	I	
2014	7012	CLL	RTR	
2015	7012	RTR		
2016	4224	JMS	CNV	/POSITION FIRST 2 DIGITS
2017	2240	ISE	SIXTY1	/CONVERT DIGITS FOR TYPEOUT
2020	1111	TAD	K77	/INCREMENT STORAGE ADDRESS
2021	0637	AND	I	
2022	4224	JMS	CNV	/AND OPERAND SECOND 2 DIGITS
2023	5600	JMP	I	/CONVERT DIGITS FOR TYPEOUT
2024	0000	0		
2025	3241	DCA	SIXTY2	/SAVE DIGITS
2026	1241	TAD	SIXTY2	
2027	7106	CLL	RTL	
2030	7004	RAL		
2031	0130	AND	K707	/AND LEFT DIGIT
2032	1241	TAD	SIXTY2	
2033	0130	AND	K707	/AND RIGHT DIGIT
2034	1134	TAD	K6060	
2035	3640	DCA	I	/STORE CONVERTED DIGITS

2036 5624 JMP I CNV

2037 0000 SIXTY0, 0 /ADDRESS OF OPERAND  
2040 0000 SIXTY1, 0 /STORAGE ADDRESS  
2041 0000 SIXTY2, 0 /TEMPORARY STORAGE

/TYPEOUT CHARACTER IN AC AND RETURN

2042 0000 TYPE, 0 /TYPEOUT CHARACTER IN AC AND RETURN  
2043 6046 TLS /TRANSMIT CHARACTER  
2044 6041 TSF /TRANSMIT CHARACTER  
2045 5244 JMP .-1 /WAIT FOR FLAG  
2046 7300 CLA CLL /WAIT FOR FLAG  
2047 5642 JMP I TYPE

/TELETYPE OUTPUT ROUTINE WITH BELL

2050 0000 MESSAGE, 0 /TELETYPE OUTPUT ROUTINE WITH BELL  
2051 7240 STA /FIRST WORD -1  
2052 1250 TAD MESSAGE /FIRST WORD -1  
2053 3010 DCA 10 /FIRST WORD -1  
2054 1410 TAD I /FIRST WORD -1  
2055 3266 DCA MSRGHT /FIRST WORD -1  
2056 1266 TAD MSRGHT /FIRST WORD -1  
2057 7112 CLL RTR /FIRST WORD -1  
2060 7012 RTR /FIRST WORD -1  
2061 7012 RTR /FIRST WORD -1  
2062 4267 JMS /FIRST WORD -1  
2063 1266 TAD /FIRST WORD -1  
2064 4267 JMS /FIRST WORD -1  
2065 5254 JMP MESSAGE+4 /FIRST WORD -1  
2066 0000 MSRGHT, 0 /FIRST WORD -1  
2067 0000 TYPECH, 0 /FIRST WORD -1  
2070 0111 AND /FIRST WORD -1  
2071 7490 SNA /FIRST WORD -1  
2072 5410 JMP I /FIRST WORD -1  
2073 1100 TAD /FIRST WORD -1  
2074 7440 SZA /FIRST WORD -1  
2075 5300 JMP .+3 /FIRST WORD -1  
2076 1112 TAD /FIRST WORD -1  
2077 5320 JMP MTP /FIRST WORD -1  
2100 1077 TAD M4 /FIRST WORD -1  
2101 7500 SMA /FIRST WORD -1  
2102 5305 JMP .+3 /FIRST WORD -1  
2103 1127 TAD K340 /FIRST WORD -1  
2104 5320 JMP MTP /FIRST WORD -1  
2105 1076 TAD M3 /FIRST WORD -1  
2106 7440 SZA /FIRST WORD -1  
2107 5312 JMP .+3 /FIRST WORD -1  
2110 1113 TAD K212 /FIRST WORD -1  
2111 5320 JMP MTP /FIRST WORD -1  
2112 1075 TAD M2 /FIRST WORD -1  
2113 7440 SZA /FIRST WORD -1

/IS IT END OF MESSAGE?  
/RETURN TO PROGRAM  
/SUBTRACT 34

/CODE IS BELL

/SUBTRACT 4  
/CODE LESS THAN 40?  
/NO  
/YES, ADD 300, CODE IS ALPHA

/SUBTRACT 3

/CODE IS LINE FEED

/SUBTRACT 2

```

2114 5317 JMP .+3
2115 1114 TAD K215
2116 7410 SKP
2117 1116 TAD K245
2120 4242 JMS TYPE
2121 5667 JMP I TYPECH
2200 PAGE
    
```

```

/ERROR ROUTINE (BELL ON ERROR HAS PRIORITY)
/
    
```

```

2200 0000 RETURN, 0
2201 6002 CODERR, IOF
2202 7604 LAS
2203 0022 AND SW2
2204 7650 SNA CLA
2205 5211 JMP .+4
    
```

```

2206 1112 RBELL, TAD K207
2207 4543 JMS I XTYPE
2210 5600 JMP I RETURN
2211 7604 LAS
2212 0021 AND SW1
2213 7640 SEA CLA
2214 5242 JMP STOP
2215 6224 RIF
2216 7012 RTR
2217 7010 RAR
2220 0101 AND
2221 1131 TAD K4060
2222 3233 DCA ERROR0
2223 1200 TAD RETURN
2224 1074 TAD M1
2225 3073 DCA ERRLOC
2226 4545 JMS I XSIXTY
2227 0073 ERRLOC
2230 2234 ERROR1
2231 4544 JMS I XMESAG
2232 4543 4543
    
```

```

2233 0000 ERROR0, 0
2234 0000 ERROR1, 0
2235 0000 0
2236 4040 4040
2237 0000 0000
2240 5641 JMP I .+1
2241 0000 ADDER, 0
2242 7604 STOP, LAS
2243 0020 AND SW0
2244 7650 SNA CLA
2245 5251 JMP LIMIT
2246 1200 TAD RETURN
2247 1074 TAD M1
2250 7402 HLT
2251 7604 LAS
2252 0024 AND SW4
    
```

```

/PROGRAM RETURN ADDRESS
/CHECK FOR BELL ON ERROR
/BELL CODE
/RING BELL
/CHECK FOR INHIBIT TYPEOUT
/INHIBIT TYPEOUT
/READ INST FIELD
/TYPEOUT ERROR LOCATION
/FIELD
/PROGRAM LOCATION OF ERROR JMS
/TYPEOUT ERROR
/ADDRESS OF ERROR TYPEOUT
/HALT AFTER ERROR
/INHIBIT ERROR HALT
/HALT WITH AC=ERROR LOC
/CHANGE STACK LIMITS?
    
```



2253 7640 SZA CLA  
 2254 5777 JMP CHEXA  
 2255 5600 JMP I RETURN

/YES  
 /NO

/ADDRESS ERROR TEST 1  
 /ADDRESS ERROR TEST 1  
 ERR1,  
 0  
 ISZ COUNT  
 SKP  
 JMP -2  
 CLA  
 TAD ERR1  
 DCA I XRETUR  
 TAD +3  
 DCA I XADDER  
 SKP  
 PERR1  
 TAD K6100  
 DCA Z24  
 LAS SW2  
 AND RBELL  
 SZA CLA  
 JMP RBELL  
 LAS  
 AND SW1  
 SZA CLA XSTOP  
 JMP I HEAD1  
 ISZ  
 SKP  
 JMS HEAD12  
 JMP I XCODER

/ADDRESS ERROR OCCURRED  
 /STORE RETURN ADDRESS  
 /STORE ERROR TYPEOUT ADDRESS

/TEST 1

/BELL ON ERROR?

/YES

/INHIBIT ERROR TYPEOUT?

/YES

/TYPEOUT ERROR HEADING  
 /GO TO ERROR ROUTINE

/FIELD OF ERROR

/FAILING ADDRESS

/GOOD

/BAD

/FAILING ADDRESS

/GOOD

2256 0000  
 2257 2072  
 2260 7410  
 2261 5257  
 2262 7200  
 2263 1256  
 2264 3547  
 2265 1270  
 2266 3551  
 2267 7410  
 2270 2307  
 2271 1135  
 2272 3340  
 2273 7604  
 2274 0022  
 2275 7640  
 2276 5206  
 2277 7604  
 2300 0021  
 2301 7640  
 2302 5550  
 2303 2053  
 2304 7410  
 2305 4776  
 2306 5546  
 2307 1064  
 2310 7112  
 2311 7010  
 2312 1131  
 2313 3326  
 2314 4545  
 2315 0057  
 2316 2327  
 2317 4545  
 2320 0066  
 2321 2332  
 2322 4545  
 2323 0065  
 2324 2335  
 2325 4544  
 2326 0000  
 2327 0000  
 2330 0000  
 2331 4040  
 2332 0000  
 2333 0000

PERR1,  
 TAD STKTST  
 CLL RTR  
 RAR  
 TAD K4060  
 DCA Z20  
 JMS I XSIXTY  
 TESTAD  
 Z21 XSIXTY  
 JMS I XSIXTY  
 GDATA  
 Z22 XSIXTY  
 JMS I XSIXTY  
 BDATA  
 Z23 XMESAG  
 JMS I XMESAG  
 0  
 0  
 0  
 4040  
 0  
 0

Z20,  
 Z21,  
 Z22,  
 0  
 0

2334	4040	4040	
2335	0000	0	
2336	0000	0	/BAD
2337	4040	4040	
2340	0000	0	/TEST
2341	5550	JMP I	XSTOP

/ADDRESS ERROR TEST 2

```

ERR2,
2342 0000
2343 2072
2344 7410
2345 5343
2346 7200
2347 1342
2350 3547
2351 1354
2352 3551
2353 7410
2354 2307
2355 1136
2356 3340
2357 5273
2376 2477
2377 0214
2400

COUNT
.-2
ERR2
XRETUR
.+3
XADDER
K6200
Z24
ERR1A

/ADDRESS ERROR OCCURRED
/STORE RETURN ADDRESS
/STORE ERROR TYPEOUT ADDRESS
/TEST 2
PAGE

```

```

/ADDRESS ERROR TEST 3
ERR3,
2400 0000
2401 2072
2402 7410
2403 5201
2404 7200
2405 1200
2406 3547
2407 1212
2410 3551
2411 7410
2412 2307
2413 1137
2414 3777
2415 5776

COUNT
.-2
ERR3
XRETUR
.+3
XADDER
K6300
Z24
ERR1A

/ADDRESS ERROR TEST 3
/ADDRESS ERROR OCCURRED
/STORE RETURN ADDRESS
/STORE ERROR TYPEOUT ADDRESS
/TEST 3

```

```

/ADDRESS ERROR TEST 4
ERR4,
2416 0000
2417 2072
2420 7410
2421 5217
2422 7200
2423 1216
2424 3547
2425 1250
2426 3551
2427 7410
2430 2307
2431 1140
2432 3777
2433 5776

COUNT
.-2
ERR4
XRETUR
.+3
XADDER
K6400
Z24
ERR1A

/ADDRESS ERROR TEST 4
/ADDRESS ERROR OCCURRED
/STORE RETURN ADDRESS
/STORE ERROR TYPEOUT ADDRESS
/TEST 4

```



2512 0717  
 2513 1704  
 2514 4040  
 2515 0201  
 2516 0440  
 2517 4024  
 2520 0523  
 2521 2400  
 2522 5677

JMP I HEAD12

2576 2273  
 2577 2340  
 2600

PAGE

/TYPEOUT PROGRAM TITLE  
 /

2600 0000  
 2601 4544  
 2602 4543  
 2603 4305  
 2604 0170  
 2605 5505  
 2606 4005  
 2607 3024  
 2610 4015  
 2611 0515  
 2612 4001  
 2613 0404  
 2614 2240  
 2615 2405  
 2616 2324  
 2617 4300  
 2620 5600

TITLE, 0  
 JMS I XMESAG  
 TEXT "X#EA8-E EXT MEM ADDR TEST#"

JMP I TITLE

/TYPEOUT TO SET SWITCHES  
 /

2621 0000  
 2622 4544  
 2623 4543  
 2624 2305  
 2625 2425  
 2626 2040  
 2627 2322  
 2630 4046  
 2631 4003  
 2632 1716  
 2633 2400  
 2634 7402  
 2635 5621

SETSW, 0  
 JMS I XMESAG  
 TEXT "%SETUP SR & CONT"

HLT  
JMP I SETSW

/WAIT FOR SWITCH SETTING

/TYPEOUT 'NO PROGRAM RELOCATION WILL OCCUR'  
 /

PNOREL, 0

2637 4544 JMS I XMESAG "%#NO RELOCATION, PROG IN STACK "  
2640 4543 TEXT  
2641 1617  
2642 4022  
2643 0514  
2644 1703  
2645 0124  
2646 1117  
2647 1654  
2650 4020  
2651 2217  
2652 0740  
2653 1116  
2654 4023  
2655 2401  
2656 0313  
2657 4000  
2660 6224  
2661 7106  
2662 7004  
2663 1132  
2664 3266  
2665 4544  
2666 0000  
2667 7240  
2670 3053  
2671 5636

RIF  
CLL RTL  
RAL  
TAD K6000  
DCA Z8  
JMS I XMESAG  
0  
STA  
DCA HEAD1  
JMP I PNOREL  
Z8, /RESET ERROR HEADING

/PROGRAM RELOCATION WILL OCCUR

PREL, 0 JMS I XMESAG "%#PROG WILL RELOCATE"  
TEXT

STA  
DCA HEAD1  
JMP I PREL  
/RESET ERROR HEADING

/TYPEOUT 'PROGRAM IS IN SELECTED FIELD'

PINF, JMS I XMESAG "%#PROGRAM IN SELECTED FIELD"  
TEXT

2712 4544  
2713 4543  
2714 2022  
2715 1707  
2716 2201  
2717 1540

2720 1116  
 2721 4023  
 2722 0514  
 2723 0503  
 2724 2405  
 2725 0440  
 2726 0611  
 2727 0514  
 2730 0400  
 2731 5777'

JMP CHEXA /SETUP SWITCHES AGAIN

/TYPEOUT 'NONE' FOR NO LEGAL STACK SELECTION

2732 4544  
 2733 1617  
 2734 1605  
 2735 0000  
 2736 5777'

NOSTK, JMS I XMESAG  
 TEXT "NONE"

JMP CHEXA

/FIND HIGHEST STACK NUMBER IN THIS SYSTEM

2737 0000  
 2740 7300  
 2741 3060  
 2742 6211  
 2743 4776'  
 2744 6221  
 2745 4776'  
 2746 6231  
 2747 4776'  
 2750 6241  
 2751 4776'  
 2752 6251  
 2753 4776'  
 2754 6261  
 2755 4776'  
 2756 6271  
 2757 4776'  
 2760 5737  
 2776 3000  
 2777 3000

HIGHST, 0  
 CLA CLL  
 DCA KBINT /CLEAR HIGH STACK COUNTER  
 CDF1  
 JMS CSS /CHECK FOR FIELD 1  
 CDF2 CSS /CHECK FOR FIELD 2  
 JMS CSS /CHECK FOR FIELD 3  
 CDF3 CSS /CHECK FOR FIELD 4  
 JMS CSS /CHECK FOR FIELD 5  
 CDF4 CSS /CHECK FOR FIELD 6  
 JMS CSS /CHECK FOR FIELD 7  
 CDF5  
 JMS  
 CDF6  
 JMS  
 CDF7  
 JMS  
 JMP I HIGHST

KHIGH, JMP I HIGHST

PAGE

/CHECK IF SELECTED STACK IS IN SYSTEM

3000 0000  
 3001 7300  
 3002 6224  
 3003 1141  
 3004 3210  
 3005 1074  
 3006 3615

CSS,  
 0  
 CLA CLL  
 RIF  
 TAD K6201  
 DCA CSSB  
 TAD M1  
 DCA I CHECK

```

3007 1615 TAD I CHECK
3010 6201 CSSB, CDF 00 /PROGRAM DATA FIELD
3011 7650 SNA CLA KHIGH /SKIP IF STACK IS IN SYSTEM
3012 5777 JMP ISZ KBINT /INCREMENT STACK COUNTER
3013 2060 ISZ KBINT
3014 5600 JMP I CSS

```

```

3015 3016 CHECK, CHECK0
3016 0000 CHECK0, 0

```

/TYPEOUT NUMBER OF STACKS IN SYSTEM

```

/ TSTSYS, 0
3017 0000 JMS I XMESAG
3020 4544 4543
3021 4543 0000
3022 0000 TAD
3023 1060 IAC
3024 7001 JMS I XTYPE /TYPEOUT NUMBER
3025 4543 JMS I XMESAG " STACKS IN THIS SYSTEM"
3026 4544 TEXT
3027 4023
3030 2401
3031 0315
3032 2340
3033 1116
3034 4024
3035 1011
3036 2340
3037 2351
3040 2524
3041 0515
3042 0000
3043 5617

```

```

JMP I TSTSYS

```

/TYPEOUT CHARACTER IN THE AC AND A SPACE

```

/ TYPEPSP, 0
3044 0000 JMS I XTYPE /TYPEOUT CHAR IN AC
3045 4543 TAD K240
3046 1115 JMS I XTYPE /TYPE A SPACE
3047 4543 JMP I TYPEPSP
3050 5644

```

/RESTORE STACKS FOR RELOCATION

```

/ RESTK, 0
3051 0000 CLA
3052 7200 TAD
3053 1030 DCA STACK0
3054 3040 TAD STK0
3055 1031 TAD STACK1
3056 3041 DCA STK1
3057 1032 TAD STACK2

```



3060 3042  
 3061 1033  
 3062 3043  
 3063 1034  
 3064 3044  
 3065 1035  
 3066 3045  
 3067 1036  
 3070 3046  
 3071 1037  
 3072 3047  
 3073 5651

DCA STK2  
 TAD STACK3  
 DCA STK3  
 TAD STACK4  
 DCA STK4  
 TAD STACK5  
 DCA STK5  
 TAD STACK6  
 DCA STK6  
 TAD STACK7  
 DCA STK7  
 JMP I RESTK

3074 0000  
 3075 4544  
 3076 4543  
 3077 2324  
 3100 0103  
 3101 1323  
 3102 4023  
 3103 0514  
 3104 4704  
 3105 4001  
 3106 2205  
 3107 4000  
 3110 1037  
 3111 7640  
 3112 5315  
 3113 1126  
 3114 4244  
 3115 1036  
 3116 7640  
 3117 5322  
 3120 1125  
 3121 4244  
 3122 1035  
 3123 7640  
 3124 5327  
 3125 1124  
 3126 4244  
 3127 1034  
 3130 7640  
 3131 5334  
 3132 1123  
 3133 4244  
 3134 1033  
 3135 7640  
 3136 5341  
 3137 1122  
 3140 4244  
 3141 1032

/TYPEOUT STACKS SELECTED FOR TESTING

TOSEL, 0

JMS I XMESAG  
 TEXT

"%#STACKS SEL'D ARE "

TAD STACK7  
 SEA CLA .+3  
 JMP K267  
 TAD TYPESP  
 JMS STACK6  
 TAD SEA CLA .+3  
 JMP K266  
 TAD TYPESP  
 JMS STACK5  
 TAD SEA CLA .+3  
 JMP K265  
 TAD TYPESP  
 JMS STACK4  
 TAD SEA CLA .+3  
 JMP K264  
 TAD TYPESP  
 JMS STACK3  
 TAD SEA CLA .+3  
 JMP K263  
 TAD TYPESP  
 JMS STACK2

/STACK 7 IS SELECTED

/STACK 6 IS SELECTED

/STACK 5 IS SELECTED

/STACK 4 IS SELECTED

/STACK 3 IS SELECTED

```

3142 7640 SZA CLA
3143 5346 JMP .+3
3144 1121 TAD K262
3145 4244 JMS TYPESP
3146 1031 TAD STACK1
3147 7640 SZA CLA
3150 5353 JMP .+3
3151 1120 TAD K261
3152 4244 JMS TYPESP
3153 1030 TAD STACK0
3154 7640 SZA CLA
3155 5360 JMP .+3
3156 1117 TAD K260
3157 4244 JMS TYPESP
3160 5674 JMP I TOSEL
    
```

/STACK 2 IS SELECTED

/STACK 1 IS SELECTED

/STACK 0 IS SELECTED

/TWO SPECIAL SCOPE LOOPS

```

3177 2760
3400 3400 LAS
3400 7604 LOOP1,
3401 3206 DCA SWAD
3402 1206 TAD SWAD
3403 3606 DCA I SWAD
3404 1606 TAD I SWAD
3405 5200 JMP LOOP1
    
```

/SWITCH ADDRESS

SWAD, 0

```

3600 3600
3600 7604 LAS
3601 3224 DCA FIRST
3602 7402 HLT
3603 7604 LAS
3604 3225 DCA LAST
3605 1224 TAD FIRST
3606 3226 DCA SWAD0
3607 1226 TAD SWAD0
3610 3626 DCA I SWAD0
3611 1626 TAD I SWAD0
3612 7200 CLA
3613 1226 TAD SWAD0
3614 7041 CIA
3615 1225 TAD LAST
3616 7650 SNA CLA
3617 5205 JMP LOOP2A
3620 2226 ISE SWAD0
3621 5207 JMP LOOP2B
3622 7402 HLT
3623 5200 JMP LOOP2
    
```

/READ LOWER LIMIT

/READ UPPER LIMIT

/HALT RESULTED IN ILLEGAL LIMITS

FIRST, 0

/EXTENDED ADDRESS TEST FOR K8-E EXTENDED MEMORY (VER 1)

3625 0000 LAST, 0  
3626 0000 SWADD, 0

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4000  
4100  
4200  
4300  
4400  
4500  
4600  
4700  
  
5000  
5100  
5200  
5300  
5400  
5500  
5600  
5700  
  
6000  
6100  
6200  
6300  
6400  
6500  
6600  
6700  
  
7000  
7100  
7200  
7300  
7400  
7500  
7600  
7700

ABOVE	1706	CHEXN9	0761	K215	0114	MIN51	0155
ADDER	2241	CHEX0	1000	K240	0115	MIN52	0156
ADDER1	1273	CHEX00	1024	K245	0116	MIN53	0157
ADDER2	1424	CHEX01	1040	K260	0117	MIN54	0160
ADDER3	1476	CHEX02	1054	K261	0120	MOVE	0067
ADDER4	1550	CHEX03	1070	K262	0121	MSRGT	2066
ADDR1	1264	CHEX04	1104	K263	0122	MSSL	1742
ADDR2	1415	CHEX05	1120	K264	0123	MTP	2120
ADDR3	1466	CHEX06	1134	K265	0124	NORELO	0050
ADDR4	1540	CHEX07	1144	K266	0125	NOSTK	2732
BDATA	0065	CHEX0A	1006	K267	0126	PERR1	2307
BELOW	1725	CHKSW3	1640	K30	0104	PERRM	2447
CBF0	6203	CIF0	6202	K340	0127	PINF	2712
CBF1	6213	CIF1	6212	K40	0105	PNOREL	2636
CBF2	6223	CIF2	6222	K4060	0131	PREL	2672
CBF3	6233	CIF3	6232	K50	0106	RBELL	2206
CBF4	6243	CIF4	6242	K60	0107	RDF	6214
CBF5	6253	CIF5	6252	K6000	0132	RELO	1646
CBF6	6263	CIF6	6262	K6003	0133	RELO2	1665
CBF7	6273	CIF7	6272	K6060	0134	RELO3	1667
CF0	6201	CINT	6204	K6100	0135	RELO4	1672
CF1	6211	CNV	2024	K6200	0136	RELO5	1703
CF2	6221	CODERR	2201	K6201	0141	RESTK	3051
CF3	6231	COUNT	0072	K6203	0142	RETURN	2200
CF4	6241	CSS	3000	K6300	0137	RIB	6234
CF5	6251	CSSB	3010	K6400	0140	RIF	6224
CF6	6261	CUF	6264	K7	0101	RIF	6244
CF7	6271	DOWN	1736	K70	0110	RTF	6005
CHECK	3015	ERR1	2256	K707	0130	RUN0	1600
CHECK0	3016	ERR1A	2273	K77	0111	RUN1	1605
CHEXA	0214	ERR2	2342	KABOVE	0051	RUN2	1612
CHEXB	0253	ERR3	2400	KBELOW	0052	RUN3	1617
CHEXC	0262	ERR4	2416	KBINT	0060	RUN4	1624
CHEXC1	0274	ERRLOC	0073	KDOWN	0070	RUNTST	0056
CHEXD	0302	ERRM	2434	KHIGH	2760	SAME	1631
CHEXD1	0310	ERROR0	2233	LAST	3625	SETSW	2621
CHEXE	0317	ERROR1	2234	LEGAL	0410	SINT	6254
CHEXE2	0400	ESL	0062	LEGAL0	0055	SIXTY	2000
CHEXM	0476	EXTAD	0200	LEGALA	0463	SIXTY0	2037
CHEXM1	0503	EXTAD0	0205	LEGALA	2251	SIXTY1	2040
CHEXM2	0510	FIRST	3624	LIMIT	3400	SIXTY2	2041
CHEXM3	0515	FIVE	0152	LOOP1	3600	SSL	0061
CHEXN	0527	GDATA	0066	LOOP2A	3605	STACK0	0030
CHEXN0	0530	GTF	6004	LOOP2B	3607	STACK1	0031
CHEXN1	0600	HEAD1	0053	M1	0074	STACK2	0032
CHEXN2	0622	HEAD12	2477	M2	0075	STACK3	0033
CHEXN3	0640	HIGHST	2737	M3	0076	STACK4	0034
CHEXN4	0656	INSAME	0054	M34	0100	STACK5	0035
CHEXN5	0674	K10	0102	M4	0077	STACK6	0036
CHEXN6	0712	K20	0103	MESSAGE	2050	STACK7	0037
CHEXN7	0730	K207	0112	MIN5	0153	STK0	0040
CHEXN8	0746	K212	0113	MIN50	0154	STK1	0041

STK2	0042	0042
STK3	0043	2471
STK4	0044	2326
STK5	0045	2327
STK6	0046	2332
STK7	0047	2335
STKPIN	0063	2340
STKTST	0064	2666
STOP	2242	
SUF	6274	
SW0	0020	
SW1	0021	
SW2	0022	
SW3	0023	
SW4	0024	
SW5	0025	
SW68	0026	
SW911	0027	
SWAD	3406	
SWAD0	3626	
TDF1	1252	
TDF2	1402	
TDF3	1445	
TDF4	1516	
TEMP	0071	
TEST	1200	
TEST1	1250	
TEST1A	1253	
TEST1B	1257	
TEST2	1400	
TEST2A	1403	
TEST2B	1410	
TEST3	1443	
TEST3A	1446	
TEST3B	1456	
TEST4	1514	
TEST4A	1517	
TEST4B	1530	
TESTAD	0057	
TITLE	2600	
TOSEL	3074	
TSTSYS	3017	
TYPE	2042	
TYPECH	2067	
TYPESP	3044	
XADDER	0151	
XCODER	0146	
XMESAG	0144	
XRETUR	0147	
XSIXTY	0145	
XSTOP	0150	
XTYPE	0143	

Z10	
Z11	
Z20	
Z21	
Z22	
Z23	
Z24	
Z8	

ERRORS DETECTED: 0

LINKS GENERATED: 133

RUN-TIME: 13 SECONDS

3K CORE USED