

IDENTIFICATION

Product Code: MAINDEC-08-DO7B-D

Product Name: Random ISZ Test

Date Created: March 25, 1968

Maintainer: Diagnostic Group

Author: R. Green

1. ABSTRACT

This program is written to test the ISZ instruction of the PDP-8. An ISZ instruction is placed in a FROM location, and a TO location contains the OPERAND. Part 1 of the program selects FROM, TO, and OPERAND from a random number generator, with the option of holding any or all constant. Part 2 uses a fixed set of FROM, TO, and OPERAND numbers.

2. REQUIREMENTS

2.1 Equipment

One PDP-8 equipped with Teletype.

2.2 Storage

This program uses locations 0000 - 7600₈. The Binary Loader must be stored in the last memory page.

2.3 Preliminary Programs

MAINDEC-08-D01(n), MAINDEC-08-D02(n), and MAINDEC-08-D03(n)

3. LOADING PROCEDURE

The standard Binary Loader is used.

4. STARTING PROCEDURE

4.1 Switch Settings

SR0 = Halt on error *N*

SR1 = Eliminate error printouts *N*

SR3 = Fixed FROMS (1)
Random FROMS (0) *Y*

SR4 = Fixed TOS (1)
Random TOS (0) *Y*

SR5 = Fixed OPERAND (1)
Random OPERAND (0)

SR9 = Do one ISZ only

SR11 = Do part 2 (1) → SR3, 4, 5 must be 0s.
Do part 1 (0)

4.2 Starting Address

37

4.3 Operator Action

- a. Set SR (SWITCH REGISTER) to 0037 and press LOAD ADDRESS.
- b. Set SR to desired mode of operation; for most runs, SR9 = 1 allows the most testing in the least amount of time.

For fixed FROM, TO, or OPERAND usage, the fixed number may be selected and entered into the memory locations shown below:

FROM = 0002

TO = 0020

OPERAND = 0021

- c. Push START.

5. OPERATING PROCEDURE

Same as paragraph 4.

6. ERRORS

6.1 Error Halts and Description

<u>C (PC)</u>	<u>Cause</u>
0002	Peripheral interrupt
0254	Halt on error. SRO = 1

6.2 Error Printouts

F xxxx T yyyy
 0 ZZZZ F mmmm R nnnn NS

6.2.1 Printout Explanation

(FROM)	F xxxx	- The ISZ instruction in location xxxx failed.
(TO)	T yyyy	- The operand address of the ISZ instruction was yyyy.
(OPERAND)	0 ZZZZ	- The starting count in the ISZ loop was ZZZZ.
(FAILED)	F mmmm	- The failure occurred trying to ISZ the number mmmm.
(RESULT)	R nnnn	- The result of this ISZ was nnnn.
	NS	- No skip occurred.
	S,	- Indicates a skip.

6.2.2 Examples

a. The following is a typical error printout.

```
F 3003 T 5470
O 3705 F 4777 R 5000 S
```

Line 1 of the printout is a statement of the problem. It says that located at 3003 is an ISZ instruction incrementing an operand stored in location 5470.

Line 2 of the printout gives information for error analysis. 3705 was the initial operand, 4777 was the operand being incremented when the error occurred, and 5000 is the operand following the failing increment. The S indicates that the increment resulted in a skip. The error here is obviously that the skip should not have occurred.

b. The following is another typical error printout.

```
F 3003 T 5470
O 3705 F 4777 R 5020 NS
```

This is identical to example (a) except that a different type error has occurred. The result of incrementing 4777 should be 5000, not 5020.

6.3 Error Recovery

The program continues on, following an error printout unless SR0 = 1. After a halt on error, push CONTINUE to resume testing.

When errors exist, a failing condition chosen from those typed out must be used with the scope mode. For the scope mode, perform the following steps:

- a. Stop the program.
- b. Insert chosen FROM into location 0002.
- c. Insert chosen TO into location 0020
- d. Insert chosen failing OPERAND into location 0021
- e. Restart program with control switches 1, 3, 4, 5, and 9 set to 1.

NOTE: By setting SR0 the program halts following the error printout. The operator may at this time set switches 1, 3, 4, 5 and 9 and push CONTINUE. The program enters a scope mode using the failing conditions just printed.

7. RESTRICTIONS

7.1 Starting Restrictions

None

7.2 Operating Restrictions

The interrupt is enabled during program operation. Any attached device, which might cause spurious interrupts, must be disabled.

8. MISCELLANEOUS

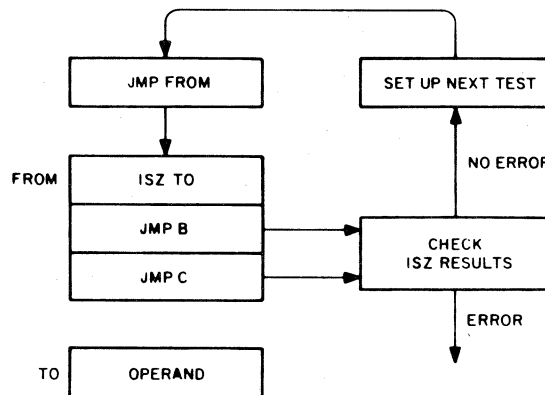
8.1 Execution Time

SR9 = 0. 11,000 ISZ operations/second.

SR9 = 1. 3,500 ISZ operations/second

9. PROGRAM DESCRIPTION

The test loop is shown below:



Part 1 of the program uses a random number generator to select the FROM, TO, and OPERAND numbers. Once selected, the OPERAND is incremented until it reaches zero. Each ISZ is checked by duplicating ISZ with TAD, IAC, DCA. Each iteration is also checked for the proper skip or no-skip condition.

Part 2 of the program is actually part 1, with the random number generator replaced by a fixed number generator. Sequencing of events is as follows, (note: $621_8 < \text{MEMORY TEST AREA} < 7600_8$):

- a. FROM = 621 TO = 624 Test a set of 24 selected OPERANDS.

To save time it is suggested that SR9 = 1, so that the ISZ is performed on each OPERAND only once instead of incrementing it until the ISZ instruction skips.

b. FROM = 621 TO = 625 Repeat the set of OPERANDS used in (a) above.

This sequence continues until TO reaches the upper limit of the memory test area. FROM is then incremented by 1 and the process is repeated. When FROM reaches the upper limit of the memory test area, the test is complete.

Ideally, it is desirable to ISZ every location from every other location in the test area and, in doing so, use all 24 of the selected worst case operands for each set of addresses. This is what Part 2 does, but it takes many days to complete the test. It is for this reason that the program uses the random number generator system of Part 1. Part 2 is an additional feature of the program with very limited use.

A 07 is printed after each group of 32,000 tests.

```

/PDP-0S ISZ TEST
/
/CONSTANTS AND VARIABLES
*0
0000 0000
0001 5001
0002 0002
0003 0003
0004 0200
0005 0547
0006 7771
0007 0007
0010 0000
0011 0000
0012 7401
0013 3607
0014 0003

0015 2420
0016 5115
0017 5140
0020 0000
0021 0000
0022 0000
0023 0000
0024 0004
0025 0400
0026 0200
0027 0100
0030 0000
0031 0260
0032 0200
0033 0205
0034 0413
0035 1013
0036 0000

0
JMP 1
FRMLOC, 2
LIMLO, 3
LIMHI, -7600
ASUC, SUC
M7, -7
MSK7, 0007
WORK, 0
WORK1, 0
M377, -377
NUM, 3607
THREE, 3

0
JMP 1
JMP 2
JMP 3
TO, UC, 0
PATRN, 0
BEFOR, 0
AFTER, 0
K4, 4
K0400, 0400
K0200, 0200
K0100, 0100
NOTE, 0
PRINT, INF1-1
AERR1, ERR1
AERR2, ERR2
APDR, PDR
ITADNM, TAD NUM
ATFCLF, TFCLF

/PERIPHERAL INTERRUPT
/ISZ TEST INSTRUCTION LOCATION
/LOW LIMIT TEST AREA
/HIGH LIMIT TEST AREA
/OCTAL CONVERSION MASK
/IR0
/IR1
/THE RANDOM NUMBER LOCATION
/MOVING ISZ
/TEST INSTRUCTION
/GROUP,
/LOCATION TO BE ISZ'0
/STARTING ISZ PATTERN
/FAILING PATTERN BEFORE FAILING ISZ
/PREDICTED RESULTS OF EACH ISZ
/SWITCH REGISTER MASKS

//S'ERROR WITH NO SKIP
/0'S'ERROR WITH SKIP
    
```



```

/SR0=MALT AFTER ERROR PRINTOUT
/SR1=NO PRINTOUTS
/SR3 = HOLD FROM CONSTANT
/SR4 = HOLD TO CONSTANT
/SR5 = HOLD PATTERN CONSTANT
/SR9 = DO ONE ISZ ONLY
/SR11 = DO PART 2
/
/

```

```

0037 4440
0040 0614
0041 0014
0042 7640
0043 5425
0044 1035
0045 3164

0046 7604
0047 0027
0050 7440
0051 5054

/PROGRAM START
START, JMS I ,+1      /ION
        PATCH        /LAS
        AND THREE
        SZA CLA      /SKIP IF PART 1
        JMP I K0400  /GO TO PART 2
        TAD ITAUNM
        DCA RANUM+1
        /CHECK FOR FIXED PATTERN
CHEK1, LAS
        AND K0100
        SZA
        JMP CHEK2

```

```

0052 4163
0053 3021
SELPAT, /SELECT THE PATTERN
        JMS RANUM
        DCA PATRN

0054 7604
0055 0026
0056 7640
0057 5064
CHEK2, /CHECK FOR FIXED TO
        LAS
        AND K0200
        SZA CLA
        JMP CHEK3

0060 4163
0061 3020
0062 1020
0063 4150
SELTO, /SELECT THE TO LOCATION
        JMS RANUM
        DCA TOLOC
        TAD TOLOC
        JMS LIMITST

0064 7604
0065 0025
0066 7640
0067 5074
CHEK3, /CHECK FOR FIXED FROM
        LAS
        AND K0400
        SZA CLA
        JMP PLCINT

0070 4163
0071 3002
0072 1002
0073 4150
SELFRM, /SELECT THE FROM LOCATION
        JMS RANUM
        DCA FRMLOC
        TAD FRMLOC
        JMS LIMITST

/PLACE FROM INSTRUCTIONS

0074 7240
0075 1002
0076 3010
0077 1015
0100 3410
0101 1016
0102 3410
0103 1017
0104 3410
PLCINT, CLA CMA
        TAD FRMLOC
        DCA WORK
        TAD ISZ1
        DCA I WORK
        TAD JMP1
        DCA I WORK
        TAD JMP2
        DCA I WORK

```

```

0105 1021 /DEPOSIT PATTERN IN TO LOCATION
0106 3420 TAD PATRN
DCA I TOLOC

/STORE PREDICTED ISZ RESULT
0107 1021 TAD PATRN
0110 3022 DCA BEFOR
LUP1, TAD BEFOR
0111 1022 IAC
0112 7001 DCA AFTER
0113 3023 JMP I ASUC
0114 5405

/RETURN FOR NO SKIP CONDITION
BACK, LAS
0115 7604 RAL
0116 7004 SPA CLA
0117 7710 JMP LAS1
0120 5131 TAD I TOLOC
0121 1420 CIA
0122 7041 TAD AFTER
0123 1023 SEA CLA
0124 7640 JMP I AERR1 /ERROR IN ISZ OPERATION
0125 5432 TAD I TOLOC
0126 1420 SNA CLA
0127 7650 JMP I AERR1 /ERROR IN ISZ SKIP DETECTION
0130 5432 LAS
0131 7604 AND K4
0132 0024 /SKIP IF NOT ONE ISZ (SR9)
0133 7440 JMP CHEK1
0134 5046 IAC
0135 7001 TAD BEFOR
0136 1022 JMP LUP1=1
0137 5110

/RETURN FOR SKIP CONDITION
BAKRN, LAS
0140 7604 RAL
0141 7004 SPA CLA
0142 7710 JMP CHEK1
0143 5046 TAD I TOLOC
0144 1420 SEA CLA /SKIP IF TO LOCATION OK
0145 7640 JMP I AERR2 /ERROR IN ISZ LOCATION
0146 5433 JMP CHEK1
0147 5046

/TEST HIGH-LOW LIMITS
LIMITST, 0
0150 0000 SPA
0151 7510 JMP ,+5
0152 5157 TAD LIMLO
0153 1003 SMA CLA
0154 7700 JMP I LIMITST
0155 5550 JMP RANUM+1
0156 5164 TAD LIMHI
0157 1004 SMA CLA
0160 7700

```

0161 5164
0162 5550

JMP RANUM+1
JMP I LIMITSI

```
0163 0000
0164 1013
0165 7104
0166 7430
0167 1014
0170 3013
0171 1013
0172 5563

0173 0333
0174 0334
0175 1000
0176 0000
0177 0000

/RANDOM NUMBER GENERATOR
RANUM, 0
TAD RANUM
RAL CLL
SZL
TAD THREE
DCA NUM
TAD NUM /AC=NEW RANDOM NUMBER
JMP I RANUM

A1, SKPDAT
A2, SKPDAT+1
K1000, 1000
KP, 0
CT, 0
```

	0200	*200	/ERROR ROUTINE 1
0200	1541	ERR1,	TAD SKPUAT+6
0201	3333		DCA SKPUAT
0202	7040		CMA
0203	3030		DCA NOTE
0204	5207		JMP KPGO
			/ERROR ROUTINE 2
0205	1332	ERR2,	TAD SKPUAT-1
0206	3333		DCA SKPUAT
0207	1342	KPGO,	TAD SKPUAT+7
0210	3334		DCA SKPUAT+1
0211	1002		TAD FRML0C
0212	3010		DCA WORK
0213	1371		TAD A3
0214	4343		JMS SETUP
			TAD TOL0C
0215	1020		DCA WORK
0216	3010		TAD A4
0217	1372		JMS SETUP
0220	4343		
			TAD PATRN
0221	1021		DCA WORK
0222	3010		TAD A5
0223	1373		JMS SETUP
0224	4343		TAD BEFOR
0225	1022		DCA WORK
0226	3010		TAD A6
0227	1374		JMS SETUP
0230	4343		
			TAD I TOL0C
0231	1420		DCA WORK
0232	3010		TAD A7
0233	1375		JMS SETUP
0234	4343		
			/TTY PRINT ROUTINE
0235	6002	TTY,	I0F
0236	1031		TAD PRINT
0237	3010		DCA WORK
0240	1410		TAD I WORK
0241	6046		TLS
0242	6041		T SF
0243	5242		JMP ,=1
0244	1012		TAD M377
0245	7640		SEA CLA
0246	5240		JMP TTY+3
0247	6042		TCF
0250	6001		I0N
0251	7004		LAS
0252	7710		SPA CLA
0253	7402		HLT

/HALT AFTER ERROR (SR0)

0254 1030
0255 7650
0256 5046
0257 3030
0260 5131

TAD NOTE
SNA CLA
JMP CHEK1
DCA NOTE
JMP LAS1

/RETURN TO NO SKIP ROUTINE

```

0261 0306
0262 0240
0263 0000
0264 0000
0265 0000
0266 0000
0267 0240
0270 0240
0271 0324
0272 0240
0273 0000
0274 0000
0275 0000
0276 0000
0277 0215
0300 0212
0301 0215
0302 0215

```

```

/ERROR PRINT OUT LINE 1
INF1, 306 /F FROM (INSTRUCTION LOCATION)
      240 /SPACE
INDATA, 0 /X LOCATION
       0 /X
       0 /X
       0 /X
      240 /SPACE
      240 /SPACE
      324 /T TO (OPERAND ADDRESS)
      240 /SPACE
ONDATA, 0 /X ADDRESS
       0 /X
       0 /X
       0 /X
      215 /CR
      212 /LF
      215 /CR
      215 /CR

```

```

0303 0317
0304 0240
0305 0000
0306 0000
0307 0000
0310 0000
0311 0240
0312 0240
0313 0306
0314 0240
0315 0000
0316 0000
0317 0000
0320 0000
0321 0240
0322 0240
0323 0322
0324 0240

```

```

/ERROR PRINTOUT LINE 2
      317 /O OPERAND (STARTING COUNT)
      240 /SPACE
STDATA, 0 /X PATTERN
       0 /X
       0 /X
       0 /X
      240 /SPACE
      240 /SPACE
      306 /F FAILING COUNT
      240 /SPACE
FLDATA, 0 /X PATTERN BEFORE FAILING ISZ
       0 /X
       0 /X
       0 /X
      240 /SPACE
      240 /SPACE
      322 /R RESULT AFTER FAILURE
      240 /SPACE

```



```

0325 0220 RSDATA, 0 /X PATTERN AFTER FAILING ISZ
0326 0000 0 /X
0327 0000 0 /X
0330 0000 0 /X
0331 0240 240 /SPACE
0332 0240 240 /SPACE
0333 0310 SK_PUAT, 316 /N NO
0334 0323 323 /S SKIP
0335 0215 215 /CR
0336 0212 212 /LF
0337 0212 212 /LF
0340 0377 377 /RUBOUT
0341 0316 316 /N
0342 0323 323 /S

0343 0000 SETUP, 0
0344 3011 DCA WORK1
0345 1010 TAD WORK
0346 7006 RTL
0347 7006 RTL
0350 4363 JMS MORSU
0351 7012 RTR
0352 7012 RTR
0353 7012 RTR
0354 4363 JMS MORSU
0355 7012 RTR
0356 7010 RAR
0357 4363 JMS MORSU
0360 4363 JMS MORSU
0361 7200 CLA
0362 5743 JMP I SETUP
0363 0000 MORSU, 0
0364 0007 AND MSK/
0365 1376 TAD TW6
0366 3411 DCA I WORK1
0367 1010 TAD WORK
0370 5763 JMP I MORSU

/PAGE 1 CONSTANTS
0371 0262 A3, INDATA-1
0372 0272 A4, ONDATA-1
0373 0304 A5, STDATA-1
0374 0314 A6, FLDATA-1
0375 0324 A7, RSDATA-1
0376 0260 TW6, 0260

```

```

/PART 2 INITIALIZATION ROUTINE
*400
0400 0400
0401 1003
0402 7041
0403 3310
0404 3310
0405 1003
0406 7040
0407 3311
0408 1546
0409 3313
0410 1314
0411 3164
0412 5046

TAD LIMLO
CIA
DCA FROM /LOW LIMIT TO FROM
TAD LIMLO
CMA
DCA TO
TAD A0
DCA PATCYC
TAD INST1
DCA RANUM*1

JMP CHEK1 /GO TO PAGE 0 START

/PATH DECISION ROUTINE
PUR,
TAD RANUM
CIA
TAD GFRUM
SNA CLA /SKIP IF NOT REQUESTING FROM
JMP FRUT /GO TO FROM ADDRESS ROUTINE

TAD RANUM
CIA
TAD GTO
SNA CLA /SKIP IF NOT REQUESTING TO
JMP TURUT /GO TO TO ADDRESS ROUTINE
JMP PRUT /GO TO PATTERN ROUTINE

```

0426	1713		/SELECT PATTERN AND OTHER THINGS
0427	3312	PRJT,	TAD I PATCYC
0430	1312		DCA PATT
0431	7450		TAD PATT
0432	5240		SNA
0433	7201		JMP ,*6
0434	1313		CLA IAC
0435	3313		TAD PATCYC
0436	1312		DCA PATCYC
0437	5563		TAD PATT
			JMP I RANUM
			/
0440	1345		TAD AK7776
0441	3313		DCA PATCYC
0442	7001		IAC
0443	1311		TAD TO
0444	3311		DCA TO
0445	1311		TAD TO
0446	7041		CIA
0447	1310		TAD FROM
0450	7640		SZA CLA
0451	5255		JMP ,*4
0452	1311		TAD TO
0453	1014		TAD THREE
0454	3311		DCA TO
0455	1311		TAD TO
0456	7500		SMA
0457	5276		JMP GOUT
0460	1004		TAD LIMHI
0461	7710		SPA CLA
0462	5276		JMP GOUT
0463	7201		CLA IAC
0464	1310		TAD FROM
0465	3310		DCA FROM
0466	1003		TAD LIMLO
0467	7041		CIA
0470	3311		DCA TO
0471	1310		TAD FROM
0472	1004		TAD LIMHI
0473	7640		SZA CLA
0474	5276		JMP GOUT
0475	5200		JMP 400
0476	7200	GOUT,	CLA
0477	1312		TAD PATT
0500	5563		JMP I RANUM

0501	1311	TORUT,	/SELECT TO ROUTINE	
0502	5563		TAD TO	
			JMP I RANUM	
0503	1310	FRUM,	/SELECT FROM ROUTINE	
0504	5563		TAD FROM	
			JMP I RANUM	
0505	0471	GFRUM,	/PAGE 3 CONSTANTS	
			SELFRM+1	/STORED RETURN ADDRESS WHEN
0506	0061	GTO,	SELTO+1	/RANDOM FROM IS REQUESTED
				/STORED RETURN ADDRESS WHEN
0507	0053	GPAT,	SELPAT+1	/RANDOM TO IS REQUESTED
				/STORED RETURN ADDRESS WHEN
0510	0000	FROM,	Ø	/RANDOM PATTERN IS REQUESTED
0511	0000	TO,	Ø	/CURRENT FROM ADDRESS
0512	0000	PATT,	Ø	/CURRENT TO ADDRESS
0513	0000	PATCYC,	Ø	/CURRENT PATTERN
0514	5434	INST1,	JMP I APDR	/CURRENT PATTERN ADDRESS
0515	7776	K7776,	7776	
0516	7775		7775	
0517	7773		7773	
0520	7767		7767	
0521	7757		7757	
0522	7737		7737	
0523	7677		7677	
0524	7577		7577	
0525	7377		7377	
0526	6777		6777	
0527	5777		5777	
0530	3777		3777	
0531	0001		0001	
0532	0003		0003	
0533	0007		0007	
0534	0017		0017	
0535	0037		0037	
0536	0077		0077	
0537	0177		0177	
0540	0377		0377	
0541	0777		0777	
0542	1777		1777	
0543	3777	K3777,	3777	
0544	0000		Ø	
0545	0515	AK7776,	K7776	
0546	0544	AØ,	K3777+1	

0547	1177	SUB,	TAD CI
0550	7001		IAC
0551	3177		DCA CI
0552	1177		TAD CI
0553	7640		SZA CLA
0554	5436		JMP I ATFCLE
0555	1176		TAD KP
0556	1175		TAD K1000
0557	3176		DCA KP
0560	1176		TAD KP
0561	7640		SZA CLA
0562	5436		JMP I ATFCLE
0563	6002		IOF
0564	1375		TAD ZERO
0565	3573		DCA I A1
0566	1376		TAD SVN
0567	3574		DCA I A2
0570	1374		TAD INF2
0571	3010		DCA WORK
0572	5773		JMP I ,+1
0573	7602		7602
0574	0332	INF2,	SKPUA I-1
0575	0260	ZERO,	200
0576	0267	SVN,	207

```

0600      *600
          /CHECK FOR TO=FROM CONFLICT

0600 1020      TFCLF, TAD TULOC
0601 7041      CIA
0602 1002      TAD FRMLOC
0603 7450      SNA
0604 5054      JMP CHEK2
0605 7001      IAC
0606 7450      SNA
0607 5054      JMP CHEK2
0610 7001      IAC
0611 7050      SNA CLA
0612 5054      JMP CHEK2
0613 5402      JMP I FRMLOC

0614 0000      PATCH, 0          /RESTORE THEN GO AWAY
0615 3000      DCA 0
0616 1232      TAD X
0617 3001      DCA 1
0620 1233      TAD X1
0621 3002      DCA 2
0622 1234      TAD X2
0623 3003      DCA 3
0624 1235      TAD X3
0625 3037      DCA START
0626 1236      TAD X4
0627 3040      DCA START+1
0630 6001      ION
0631 5014      JMP I PATCH

0632 7402      X, 7402
0633 0000      X1, 0
0634 7157      X2, 7157
0635 6001      X3, ION
0636 7604      X4, LAS

          *7602
7602 1410      TAD I WORK
7603 6046      TLS
7604 6041      TSF
7605 5204      JMP ,=1
7606 1012      TAD M377
7607 7640      SZA CLA
7610 5202      JMP ,=6
7611 5217      JMP OVR

          *7617
7617 6042      OVR, TCF
7620 6001      ION
7621 5436      JMP I ATFCLF

```

5

SYMBOL TABLE

AERR1	0032
AERR2	0033
AFTER	0023
AK776	0545
APDR	0034
ASUC	0005
ATFCLF	0036
A0	0546
A1	0173
A2	0174
A3	0371
A4	0372
A5	0373
A6	0374
A/	0375
BACK	0115
BAKBRN	0140
BLFOR	0022
CHEK1	0046
CHEK2	0054
CHEK3	0064
CI	0177
ERR1	0200
ERR2	0205
FLDATA	0315
FRMLOC	0002
FROM	0510
FRUT	0503
GFROM	0505
GUUT	0476
GPAT	0507
GTO	0506
INDATA	0263
INF1	0261
INF2	0574
INST1	0514
ISZ1	0015
ITAUNM	0035
JMP1	0016
JMP2	0017
KP	0176
KPGU	0207
K0100	0027
K0200	0026
K0400	0025
K1000	0175
K3777	0543
K4	0024
K7776	0515
LAS1	0131
LIMHI	0004
LIMLO	0003
LIMTST	0150

SYMBOL TABLE

LUP1	0111
MURSU	0363
MSK7	0007
MS77	0012
M7	0006
NOTE	0030
NUM	0013
ONDATA	0273
OVR	7617
PATCH	0614
PATCYC	0513
PATRN	0021
PATT	0512
PUR	0413
PLCINT	0074
PRINT	0031
PHUT	0426
RANUM	0163
RSDATA	0325
SELFRM	0070
SELPAT	0052
SELTO	0060
SETUP	0343
SKPDAT	0333
START	0037
STDATA	0305
SUC	0547
SVN	0576
TFCLF	0600
THREE	0014
TU	0511
TULOC	0020
TURUT	0501
TIY	0235
TW6	0376
WORK	0010
WURK1	0011
X	0632
X1	0633
X2	0634
X3	0635
X4	0636
ZERU	0575

SYMBOL TABLE

FHML0C	0002
LIMLO	0003
LIMHI	0004
ASUC	0005
M/	0006
MSK7	0007
WORK	0010
WORK1	0011
MS77	0012
NUM	0013
THREE	0014
ISZ1	0015
JMP1	0016
JMP2	0017
TULOC	0020
PATRN	0021
BEFOR	0022
AFTER	0023
K4	0024
K0400	0025
K0200	0026
K0100	0027
NOTE	0030
PRINT	0031
AERR1	0032
AERR2	0033
APDR	0034
ITADNM	0035
ATFCLF	0036
STAHT	0037
CHEK1	0046
SELPAT	0052
CHEK2	0054
SELTO	0060
CHEK3	0064
SELFRM	0070
PLCINT	0074
LUP1	0111
BACK	0115
LAS1	0131
BAKBRN	0140
LIMTST	0150
RANUM	0163
A1	0173
A2	0174
K1000	0175
KP	0176
CT	0177
EHR1	0200
ERR2	0205
KpG0	0207
TTY	0235
INF1	0261

SYMBOL TABLE

INDATA	0263
ONDATA	0273
STDATA	0305
FLDATA	0315
RSDATA	0325
SKPDAT	0333
SETUP	0343
MURSU	0363
A3	0371
A4	0372
A5	0373
A6	0374
A7	0375
TW6	0376
PUR	0413
PRUT	0426
GOUT	0476
TURUT	0501
FRUT	0503
GFROM	0505
GTO	0506
GPAT	0507
FROM	0510
TU	0511
PATT	0512
PATCYC	0513
INST1	0514
K776	0515
K377	0543
AK776	0545
A0	0546
SUC	0547
INF2	0574
ZERU	0575
SVN	0576
TFCLF	0600
PATCH	0614
X	0632
X1	0633
X2	0634
X3	0635
X4	0636
OVR	7617

THERE ARE NO ERRORS

