1. IDENTIFICATION

1.1 Maindec 839

1.2 PDP-8 Memory Parity Option

1.3 February 22, 1966
2. ABSTRACT
   This program is designed to exercise and detect memory parity control and data errors on the PDP-8.

3. REQUIREMENTS
3.1 Storage
   \text{0000}_8$ - \text{7700}_8$

3.2 Subprograms and/or Subroutines
   RIM Loader, Binary Loader.

3.3 Equipment
   PDP-8, memory parity option, keyboard reader and teleprinter, 2 jumper wires.

4. USAGE
4.1 Loading
   Normal binary tape loading procedures.

4.2 Calling Sequence

4.3 Switch Settings

4.4 Start Up and/or Entry
   The starting address of this test is \text{0200}_8.

4.5 Errors in Usage
   Errors detected by the program will cause the program to halt and display a \text{7402}_8 in the MB register.
   The error halt information is as follows:

<table>
<thead>
<tr>
<th>Mnemonic</th>
<th>Halt Address</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>0205</td>
<td>Parity error forced; 6101 skipped in error.</td>
</tr>
<tr>
<td>E2</td>
<td>0213</td>
<td>Parity error forced; interrupt did not occur.</td>
</tr>
<tr>
<td>E3</td>
<td>0222</td>
<td>PWR CLR did not clear the parity error flop; or 6101 did not skip.</td>
</tr>
<tr>
<td>E4</td>
<td>0227</td>
<td>No parity error; interrupt occurred.</td>
</tr>
<tr>
<td>Mnemonic</td>
<td>Halt Address</td>
<td>Cause</td>
</tr>
<tr>
<td>----------</td>
<td>--------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>E5</td>
<td>0240</td>
<td>6104 did not clear parity error flop.</td>
</tr>
<tr>
<td>E6, E7</td>
<td>0002</td>
<td>Parity error detected by parity option.</td>
</tr>
</tbody>
</table>

Memory address 0000 contains the address +1 of the program when the parity error interrupt occurred.

4.6 Recovery from Such Errors

4.6.1 E1, 2, 3, 4, 5 should be restarted from 0200 after the program has halted. E6, E7 should be restarted from T6 (0252).

5. RESTRICTIONS
Parity errors are not forced into memory.

6. DESCRIPTION

6.1 Discussion
This program requires operator intervention in its operation. The program has four printout messages for the operator to follow:

(1) GROUND PIN U R202 MF11 SET PARITY ERROR PRESS CONTINUE
(2) UNGROUND PIN U R202 MF11 GROUND PIN K B104 MF9 PRESS START
(3) GROUND PIN U R202 MF11 SET PARITY ERROR PRESS CONTINUE
(4) UNGROUND PIN K B104 MF9 UNGROUND PIN U R202 MF11 PRESS CONTINUE

Message (1) relates to E1, E2 error halts.
Message (2) relates to E3, E4 error halts.
Message (3) relates to E5, error halt.
Message (4) removes all hardware restrictions.

Test T6 uses a sequential number generator to test parity at one memory address only (PATR).
Test T7 uses a random number generator to test memory parity from 1000 to 7700 registers.

The program will then loop in test T7 until an error occurs.
7. METHODS (Not Applicable)

8. FORMAT (Not Applicable)

9. EXECUTION TIME
   3 msec

10. PROGRAM

10.1 Core Map (None)

10.2 Dimension List (None)

10.3 Macro List (None)

10.4 Program Listing

<table>
<thead>
<tr>
<th>Address</th>
<th>Instruction</th>
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<tbody>
<tr>
<td>0001</td>
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<td>0002</td>
<td>SUB</td>
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<tr>
<td>0003</td>
<td>MUL</td>
</tr>
<tr>
<td>0004</td>
<td>DIV</td>
</tr>
<tr>
<td>0005</td>
<td>JUMP</td>
</tr>
<tr>
<td>0006</td>
<td>CALL</td>
</tr>
<tr>
<td>0007</td>
<td>RETURN</td>
</tr>
<tr>
<td>0008</td>
<td>BRANCH</td>
</tr>
<tr>
<td>0009</td>
<td>LOOP</td>
</tr>
<tr>
<td>000A</td>
<td>END</td>
</tr>
</tbody>
</table>

(Sample program listing continues with addresses 0010 to 015F)
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MPP-B MEMORY PARITY OPTION

0000 0000
0011 1101 CMP
0022 7402 R6, HLT

/MA 0000 = ERROR ADDRESS
/ERROR DATA OR INSTRUCTION
/RESTART AT TEST 16

0026 0010 PHX
0021 6A46 TLS
0022 6241 TSP
0023 5422 JMP *-1
0024 7232 CLA
0025 5426 JMP 1 PHX

0026 1012 CHX, M
0027 7246 CLA
0028 1151 TAD CR
0029 422A JMS PHY
002A 1152 TAD LF
002B 422A JMS PHY
002C 5426 JMP 1 CHX

0035 0202 MESG4,
0036 7246 CLA
0037 1141 TAD SPY
0038 4220 JMS PHY
0039 1142 TAD CX
003A 4220 JMS PHY
003B 1143 TAD MX
003C 4220 JMS PHY
003D 1144 TAD TX
003E 4220 JMS PHY
003F 4220 JMS CRLF
0040 5435 JMP 1 MESG4

0053 4226 MESG1,
0054 4226 JMS CRLF
0055 4570 JMS I GNYX
0056 4570 JMS I LUX
0057 4570 JMS I SETXY
0058 4570 JMS I PARY
0059 4570 JMS CRLF
005A 4570 JMS I PHESY
005B 4225 JMS MESG4
005C 5425 JMP 1 MESG1

/CRXL
/CRLF
/GROUND PIN
/PROD 1 M11
/SET
/PARITY ERROR
/CRLF
/RESS
/CONT
<table>
<thead>
<tr>
<th>Line</th>
<th>Code</th>
<th>Instruction</th>
<th>Notes</th>
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</thead>
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<td>MSEG2,</td>
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<td>/UN</td>
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<tr>
<td>068</td>
<td>4530</td>
<td>JMS I GRNX</td>
<td>/GROUN PIN</td>
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<td>330</td>
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</tbody>
</table>
/GROUND PIN U R202 MF11
/TO SET PARITY ERROR FLOP
/PRINT ABOVE MESSAGE

/ATTACH GROUND LEAD NOW AND
/PRESS (CONTINUE)

/PARITY ERROR FORCED
/STEP SKIPPED IN

/ERROR, (SNPE=SKP ON NO)
/PARITY ERROR

/TURN ON INTERRUPT

/ERROR, INTERRUPT FAILED
/INTERRUPT RETURN
/REMOVE GROUND LEAD

/FROM PIN U R202 MF11

/AND GROUND PIN K B104 MF9

/AD AD T3 ADDRESS AND PRESS (STA)
/ERROR, PWN CLR DID NOT CLEAR

/THE PARITY ERROR FLOP,

/FOR SNPE FAILED TO SKIP
/PARITY ERROR INHIBITED

/BY GROUND LEAD
/ERROR, INTERRUPT SHOULD
/NOT HAVE OCCURRED

/PRINT MESSAGE 1
/PRESS (CONTINUE)
/CLEAR PARITY ERROR FLOP

/ERROR, CMP FAILED TO CLEAR
/PARITY ERROR FLOP
; Page 7

; CR LF
; UM
; GROUND
; SK 8104 MF9
; UNGROUND PIN U R202 MF11
; PRESS CONTINUE

/6 TEST ALL PATTERNS 1 CURE
/LOCATION PATR
/TST FETCH OF ION
/TST FETCH OF NOP
/TST FETCH OF IOF
/TST TAD PATR
/TST DCA PATR
/COUNT PATTERN REG
/LOOP

/RANDOM TEST
/STARTING ADDRESS=1
/AD m INDEX
/LAST ADDRESS COMPARE
/LOOP RANDOM
/RANDOM NUMBER GENERATOR
/CONTINUE

/RANDOM NUMBER GENERATOR
<table>
<thead>
<tr>
<th>Address</th>
<th>Opcode</th>
<th>Host Command</th>
<th>Notes</th>
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645 1158 TAD SX /S
646 4278 JMS PRX
647 1158 TAD SX /S
650 4278 JMS PRX
651 1141 TAN SPX /Sd
652 4278 JMS PRX
653 5636 JMP 1 PRES

AUDRX 0115
AX 0163
AX 0166
CH 0151
CMFL 0026
CX 0142
DX 0154
EX 0147
E1 0295
E2 0213
E3 0222
E4 0227
E5 0240
E6 0162
FX 0161
GRN 0473
GRNX 0130
OX 0153
MALT 0134
INRET 0214
TX 0195
XX 0165
KWR77 0136
KWR77 0116
LF 0152
LUC 0233
Lucx 0127
Luc1 0427
Luc1x 0126
LX 0172
Mesg1 0253
Mesg2 0265
Mesg3 0277
Mesg4 0235
MX 0160
NAX 0140
NAX 0143
PAR 0600
PARx 0133
PATR 0125

PRES 0636
PRESx 0131
PRX 0220
PX 0145
RAN 0311
RET 0274
RJMP1 0117
RJMP2 0112
RNUMR 0135
RNJMP1 0120
RNJMP2 0122
RX 0146
SETX 0555
SETXX 0132
SPX 0141
START 0457
START 0200
STAW 0123
SX 0150
TX 0144
T1 0203
T2 0211
T3 0221
T3ADR 0480
T3ADRX 0124
T4 0223
T5 0234
T6 0252
T7 0267
UN 0126
UX 0137
UAX 0173
UX 0157
X1 0162
X2 0196
X3 0171
X4 0167
X9 0176
YX 0164
D