NEWTRAP, A PDP-8 MONITOR DEBUGGING PROGRAM

NEWTRAP is a utility program for the AGS PDP-8; it is of assistance in debugging other programs. It uses and is fully compatible with our MONITOR Program. NEWTRAP allows a user to halt the progress of a program at any point and display, on the teletype, the contents of the Accumulator, Link, up to six randomly selected core locations and a dump of core between any two addresses. The random list and sequential dump may be called together, separately, or not at all.

NEWTRAP is loaded with the MONITOR binary loading routine. NEWTRAP's present version uses core locations 7400-7574, but other versions could be made to be compatible with core usage of the future.

NEWTRAP is called by typing a "#" sign (3 + shift) on the keyboard. The next legal instructions are an octal number, a "C", or any other character. The octal number represents the new trapped core location; if any trap had been set previously, it will be restored and the random core list and sequential dump will be cleared. The "C" sets the trap address to zero without restoring any previous trap. In connection with this see "warnings.

1 J. Alderman, M. Barton, Monitor Program for the PDP-8, AADD Tech Note #18.
and caveats" below. Any other character will just restore a previous trap without setting a new one.

If the first command is not an octal number, control returns to MONITOR after it is completed. If it is an octal number, the teletype carriage will tab three spaces and wait for the next command which can be another octal number or a "D." If it is an octal number, it represents the first of the six possible random core locations to be listed; the carriage will tab three spaces and wait for yet another octal number which represents the second of the six core locations to be listed, or again a "D." This process continues until six octal numbers have been typed; upon the sixth the carriage will tab three spaces and wait for the next command which may only be a "D".

The "D" command, of course, represents the dump call; and on this command NEWTRAP will cause a carriage return-line feed and wait for two octal numbers separated by a three space tab. These numbers are the beginning and end of the desired core dump. After this control returns to monitor.

When the program under test comes to the trapped location, a carriage return-line feed will occur and a line will be typed of the following format:

```
TRAP: LINK: XXXX: XXXX: ....
```

The "XXXX's" will be the random core location that the user has requested; none will be typed if none has been asked for and only those requested will be typed. Under this line the trapped location, the contents of the link, the accumulator and the requested core locations will be typed each under its name.

If then a dump has been called too, another carriage return-line feed will occur and the dump will start. Each line of the dump will start off with an octal core address followed by up to eight octal numbers which are the contents of the address heading the line and those of the next seven
sequential core locations. When the dump is finished, control returns to
MONITOR.

Warnings and Caveats.

The term "octal number" refers to a four-place octal number and none
other.

The "C" command should be used only as the first command in a debugging
operation and never after a trap has been set. It is included so a user
need not run the risk of overwriting his program if a trap had been set, but
not restored by a previous user. After the first trap of a debugging opera-
tion, a user cannot overwrite his program because a previous trap is auto-
matically restored in calling for a new one; but he would be unable to restore
a trap by using the "C" command out of season. The last trap may be restored
without setting a new one by calling NEWTRAP and typing anything but an
octal number or a "C."

Appendix

To use NEWTRAP as a core dump only exclusive of the trapping feature, it
is only necessary to trap NEWTRAP itself. This may be done by trapping location
7447(8) and calling the dump in the normal manner. The dump will begin
immediately and the "self-trap" will be restored by setting the next trap.

Listing

The listing of the present version of NEWTRAP follows:

cc: J. Alderman
    M. Barton
    A. Carlucci
    R. Frankel
    B. Garfinkle
    A. Maschke
    A. Watts
/*NEWTRAP, AN ON-LINE DEBUGGING
PROGRAM, ASSEMBLED WITH M6K
*/

<table>
<thead>
<tr>
<th>Line</th>
<th>decimal</th>
<th>hexadecimal</th>
<th>Instruction</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>7400</td>
<td>0000</td>
<td>0000</td>
<td>TRAP, 0</td>
<td>TRAP STARTS; ALSO A COUNTER</td>
</tr>
<tr>
<td>7401</td>
<td>4524</td>
<td>0452</td>
<td>ROCT</td>
<td>READ THE KEYBOARD AND LOOK FOR:</td>
</tr>
<tr>
<td>7402</td>
<td>5205</td>
<td>0520</td>
<td>JMP’.+3</td>
<td>RESTORE THE PREVIOUS TRAP</td>
</tr>
<tr>
<td>7403</td>
<td>4250</td>
<td>0425</td>
<td>JMS RSTR</td>
<td>AND SET THE NEW ONE</td>
</tr>
<tr>
<td>7404</td>
<td>5212</td>
<td>0521</td>
<td>JMP STRT</td>
<td>RESTORE THE TRAP ONLY?</td>
</tr>
<tr>
<td>7405</td>
<td>1244</td>
<td>0124</td>
<td>TAD MC</td>
<td></td>
</tr>
<tr>
<td>7406</td>
<td>7640</td>
<td>0764</td>
<td>SZA CLA</td>
<td></td>
</tr>
<tr>
<td>7407</td>
<td>4250</td>
<td>0425</td>
<td>JMS RSTR</td>
<td>YES</td>
</tr>
<tr>
<td>7408</td>
<td>3261</td>
<td>0326</td>
<td>DCA LOC</td>
<td>/NO, JUST ZERO &quot;LOC&quot;</td>
</tr>
<tr>
<td>7409</td>
<td>5774</td>
<td>0577</td>
<td>BOMB</td>
<td>/AND BOMB OUT.</td>
</tr>
<tr>
<td>7410</td>
<td>3261</td>
<td>0326</td>
<td>STRT, DCA LOC</td>
<td>STORE THE TRAP LOCATION</td>
</tr>
<tr>
<td>7411</td>
<td>5774</td>
<td>0577</td>
<td>BOMB</td>
<td></td>
</tr>
<tr>
<td>7412</td>
<td>3261</td>
<td>0326</td>
<td>DCA LOC</td>
<td></td>
</tr>
<tr>
<td>7413</td>
<td>1661</td>
<td>0166</td>
<td>TAD I LOC</td>
<td>GET THE CONTENTS OF THAT</td>
</tr>
<tr>
<td>7414</td>
<td>3262</td>
<td>0326</td>
<td>DCA SAVE</td>
<td>LOCATION AND SAVE THEM</td>
</tr>
<tr>
<td>7415</td>
<td>1266</td>
<td>0126</td>
<td>TAD TINS</td>
<td>PUT THE TRAP CALL IN</td>
</tr>
<tr>
<td>7416</td>
<td>3661</td>
<td>0366</td>
<td>DCA I LOC</td>
<td>THE TRAPPED LOCATION</td>
</tr>
<tr>
<td>7417</td>
<td>4523</td>
<td>0452</td>
<td>LIST, TAB</td>
<td></td>
</tr>
<tr>
<td>7418</td>
<td>4524</td>
<td>0452</td>
<td>ROCT</td>
<td>/READ THE KEYBOARD AGAIN</td>
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<tr>
<td>7419</td>
<td>5232</td>
<td>0523</td>
<td>JMP HIC</td>
<td>/LOOK FOR A DUMP CALL.</td>
</tr>
<tr>
<td>7420</td>
<td>3670</td>
<td>0367</td>
<td>DCA I LST</td>
<td>/OR AN OCTAL NUMBER, WHICH</td>
</tr>
<tr>
<td>7421</td>
<td>2270</td>
<td>0227</td>
<td>ISZ LST</td>
<td>/IS THE FIRST LOCATION ON</td>
</tr>
<tr>
<td>7422</td>
<td>1277</td>
<td>0127</td>
<td>TAD FULL</td>
<td>/THE LIST. GO BACK FOR MORE</td>
</tr>
<tr>
<td>7423</td>
<td>1270</td>
<td>0127</td>
<td>TAD LST</td>
<td>IF THE LIST ISN'T FULL,</td>
</tr>
<tr>
<td>7424</td>
<td>5240</td>
<td>0524</td>
<td>SZA</td>
<td>OTHERWISE...</td>
</tr>
<tr>
<td>7425</td>
<td>5217</td>
<td>0521</td>
<td>JMP LIST</td>
<td></td>
</tr>
<tr>
<td>7426</td>
<td>4523</td>
<td>0452</td>
<td>TAB</td>
<td></td>
</tr>
<tr>
<td>7427</td>
<td>4517</td>
<td>0451</td>
<td>READ</td>
<td></td>
</tr>
<tr>
<td>7428</td>
<td>1265</td>
<td>0126</td>
<td>HIC, TAD MD</td>
<td>/LOOK FOR THE DUMP CALL.</td>
</tr>
<tr>
<td>7429</td>
<td>7440</td>
<td>0744</td>
<td>SZA</td>
<td>/NOT A DUMP CALL, BOMB OUT.</td>
</tr>
<tr>
<td>7430</td>
<td>5774</td>
<td>0577</td>
<td>BOMB</td>
<td>/TO MONITOR</td>
</tr>
<tr>
<td>7431</td>
<td>4531</td>
<td>0453</td>
<td>LINE</td>
<td></td>
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<tr>
<td>7432</td>
<td>5242</td>
<td>0524</td>
<td>ROCT</td>
<td></td>
</tr>
<tr>
<td>7433</td>
<td>5530</td>
<td>0553</td>
<td>BURP</td>
<td></td>
</tr>
<tr>
<td>7434</td>
<td>3341</td>
<td>0334</td>
<td>DCA DP1</td>
<td>/DUMP CALL, GET THE FIRST</td>
</tr>
<tr>
<td>7435</td>
<td>4523</td>
<td>0452</td>
<td>TAB</td>
<td>/ADDRESS</td>
</tr>
<tr>
<td>7436</td>
<td>4524</td>
<td>0452</td>
<td>ROCT</td>
<td>/AND THE SECOND.</td>
</tr>
<tr>
<td>7437</td>
<td>5530</td>
<td>0553</td>
<td>BURP</td>
<td></td>
</tr>
<tr>
<td>7438</td>
<td>3342</td>
<td>0334</td>
<td>DCA DP2</td>
<td></td>
</tr>
<tr>
<td>7439</td>
<td>7440</td>
<td>0744</td>
<td>CMA</td>
<td>/NOW SET THE</td>
</tr>
<tr>
<td>7440</td>
<td>3263</td>
<td>0326</td>
<td>DCA DPSW</td>
<td>/DUMP SWITCH.</td>
</tr>
<tr>
<td>7441</td>
<td>5774</td>
<td>0577</td>
<td>BOMB</td>
<td>/AND BOMB OUT.</td>
</tr>
<tr>
<td>7442</td>
<td>0000</td>
<td>0000</td>
<td>RSTR, 0</td>
<td>TEMPORARY TRAP STORAGE</td>
</tr>
<tr>
<td>7443</td>
<td>3371</td>
<td>0337</td>
<td>DCA PNTR</td>
<td>/RESTORE THE TRAPPED LOCATION</td>
</tr>
<tr>
<td>7444</td>
<td>1262</td>
<td>0126</td>
<td>TAD SAVE</td>
<td>/TO ITS FORMER SELF</td>
</tr>
<tr>
<td>7445</td>
<td>3661</td>
<td>0366</td>
<td>DCA I LOC</td>
<td>/RESET THE LIST POINTER</td>
</tr>
<tr>
<td>7446</td>
<td>1267</td>
<td>0126</td>
<td>TAD CLST</td>
<td></td>
</tr>
<tr>
<td>7447</td>
<td>3270</td>
<td>0327</td>
<td>DCA LST</td>
<td></td>
</tr>
</tbody>
</table>
DCA DPSW /ZERO THE DUMP SWITCH,
TAD PNTR
JMP I RST.
LOC, 0
SAVE, 0
DPSW, 0
MC, -303
MD, -304
TINS, JMP I 2
CLST, +2
LST, +1

FULL.

DO,
DCA ACC /STORE
RAL /THE ACCUMULATOR AND THE
DCA LNK /LINK.

LST, LOCAL

ITRAP, LINK, ACCR

TAD INS1 /FIRST INSTRUCTION FOR THE
JMS DO1 /"DO1" SUBROUTINE.
LINE
TAD LOC /GET THE TRAPPED LOCATION
TOCT /PRINT IT
CLA
TAD LNK /GET THE CONTENTS OF THE LINK
TOCT /PRINT IT
CLA
TAD ACC /AND THAT OF THE ACCUMULATOR
TOCT /AND PRINT THAT.
CLA
TAD INS2 /TIME FOR THE SECOND PASS
JMS DO1 /THROUGH "DO1".
ISZ DPSW /CALL FOR A DUMP?
BOMB /NO, BOMB OUT.
DUMP /YES, CALL IT UP
DP1, 0 /FIRST ADDRESS
DP2, 0 /SECOND ADDRESS
CLA CMA /RESET DUMP SWITCH
DCA DPSW
BOMB /DONE, BOMB OUT.
DCA INST /"DO1" SUBROUTINE PRINTS
TAD LST /OUT THE LIST ADDRESSES OR
CMA IAC /THEIR CONTENTS, ACCORDING
TAD CLST /AS THE "INST" INSTRUCTION
CONTAINS A "CLA" OR
SMAS

JMP I DO1

/ A "DCA PNTR"

HANDLE A "NO LIST CALL"

7553 7500
7554 5746
7555 3203
7556 1270
7557 1200
7558 3371
7559 1771
7560 0000
7561 1771
7562 4526
7563 7200
7564 2200
7565 5356
7566 5746
7567 0000
7568 0000
7569 0000
7570 0303
7571 7500
7572 7400

DCA TRAP
TAD LST
TAD TRAP
DCA PNTR
TAD I PNTR
TAD I PNTR
TOCT
CLA
ISZ TRAP
JMP LP1
JMP I DO1

PNTR
ACC
LNK
BM

BOMB = JMP I BM

DO

TRAP