## MDIAG

The purpose of MDIAG is to test the dynamic or the static RAM, both the refresh capability and bit integrity. This test can be used with any RAM in a single-user system, up to 64K. MDIAG operates by filling each 8K block of memory with random numbers, and then tests for any changes. Next, it fills all of memory with a specific fill code, and tests that for changes. The program then waits a certain "delay time" after filling before it tests memory. This time increases with each pass through the board. Each time the delay is increased, the program repeats, beginning again with 0000.

> **WARNING:** MDIAG is a memory destructive test. Before running the program, make sure you have written any important data in memory to your disk.

To run MDIAG, first make sure that switch S1 has switch 0 in closed position.
(See Figure 1).

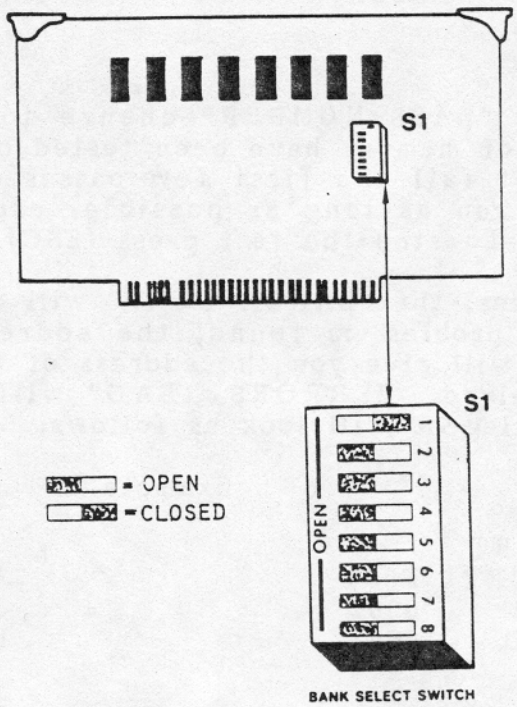


Figure 1

Insert your Vector test diskette and boot, using normal procedure. Enter **MDIAG**, and press {RETURN}. The test begins automatically.

When the MDIAG test begins, you will see the following legend on your screen:

Example 1

```
STATUS REPORT:
TOP OF MEMORY   E000          ACTIVE BLOCK 0000
PASS NUMBER     0000          FILL CODE    FF
ERRORS READ     0000          DELAY TIME   00
ERROR DUMP:
0000 00 00
```

Upon completion of the first pass of MDIAG, assuming no errors, the legend on your screen will look like this:

Example 2

```
STATUS REPORT:
TOP OF MEMORY   E000          ACTIVE BLOCK C000
PASS NUMBER     0001          FILL CODE    00
ERRORS READ     0000          DELAY TIME   02
ERROR DUMP:
0000 00 00
```

Once you see "PASS NUMBER" change to 0001, you will know that all 8K blocks of memory have been tested once. Frequently a memory board will not fail the first few passes of MDIAG. The test should be allowed to run as long as possible, especially if the failure is intermittent. To stop the test press {ESC}, which will take you back to MON>.
If MDIAG passes, the "ERROR DUMP" will continue to read all zeros. However, if a problem is found, the address and the error will be dumped. This will give you the address of failure, the bytes sent and the bytes received. "ERRORS READ" will give you the number of errors. Your legend will look as follows:

Example 3

```
STATUS REPORT
TOP OF MEMORY   E000          ACTIVE BLOCK C000
PASS NUMBER     0002          FILL CODE    FF
ERRORS READ     0003          DELAY TIME   02
ERROR DUMP
0000  00  00
3ABB  DF  DE
3133  C3  C2
3DEF  27  26
```

To isolate the IC causing this failure, the address and the bit must be determined. The first group of four numbers under "ERROR DUMP" in example 3 is the address. This tells you which horizontal row of memory chips contains the bad bit. The first number of each set of the two numbers following that represents the high order bit and the second number of each set represents the low order bit. Therefore, the address for the failure shown above is in the 3000 block, or first row, as shown in figure 2. Looking at the hex code for the failure, the high order bits in example 3 match (D,D;C,C;2,2), but the low order bits are all off by one (F,E;3,2;7,6), showing that what was sent did not match what was received.
Since these bits are all off by one, the bad chip must be the one which corresponds to the low order bit one, or the right-hand chip of the first row. (See Figure 2)

| HEX CODE | BINARY CODE |
|---|---|
| DF | 1 0 1 1 1 1 1 1 |
| DE | 1 0 1 1 1 1 1 0 |
| C3 | 1 0 0 1 0 0 1 1 |
| C2 | 1 0 0 1 0 0 1 0 |
| 27 | 0 0 1 0 0 1 1 1 |
| 26 | 0 0 1 0 0 1 1 0 |

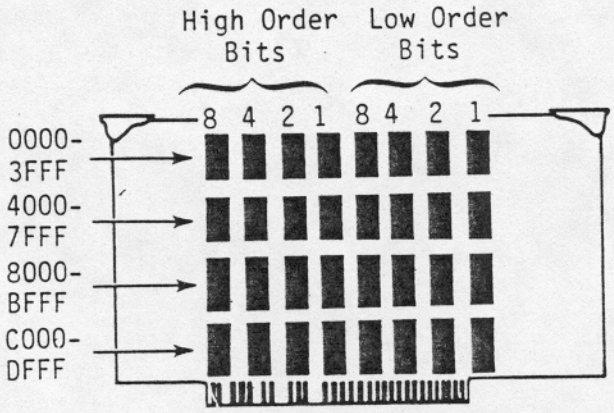


Figure 2

A failure such as this is a good indicator that the problem is with the memory board. All three errors are within the same address range, and all three consistently show a difference of one between the bytes sent and the bytes received. Before doing any work on the board, however, you should verify this by replacing the suspected board with a working board, and running the test again. If the

system still fails, the ZCB is the next most likely failure area. If the system works with the new memory board, the problem has been found, and the suspected PCBA should be replaced.

Sometimes the failure pattern is inconsistent. When this happens, it is likely that a component other than a memory chip is responsible, and the board should be replaced. If, after replacing the memory board with another, the problem remains, it is again probable that the ZCB is at fault.

Remember that MDIAG is a memory diagnostic test. A failure in this test points to a probable failure of the memory board, but may actually be caused by other components of the system, including the ZCB, motherboard, and power supply. Sound troubleshooting techniques should be used at all times to isolate the problem, and procedures such as reseating the boards and cleaning the edge connectors should be standard.