MZOS on Vector Graphic

I obtained a dump of an MZOS ROM that supports version 1.4 of the MZOS disk from Santo Nucifora (snuci on the Vintage Computer forums). I've also obtained MZOS 1.5 and 1.52 disks from Howard Harte which I have archived into .vgi files.

Unfortunately, there are incompatibilities between the MZOS 1.4 ROM and the MZOS 1.5x disks. The following table documents the 1.4 ROM entry points and shows what some of the 1.5 ROM entry points appear to be:

Vector	1.4 ROM	1.5x ROM
C400	Boot	Boot
C402	Disk I/O	Disk I/O
C404	Display "% Syntax Error"	Display disk error
C407	Display "% File Error"	Check for and display disk error if present. Return otherwise.
C40A	Display "% Huh?"	Unknown
C40D	Display "% Write protected"	Unknown
C410	Display "% Disk overflow"	Unknown
C668	Display error message, exit through DF5C	(middle of other code)
C6C3	(middle of other code)	Display error message, exit through DF5C

The primary change from the 1.4 to 1.5 ROM appears to be in the error handling mechanism for the C402 Disk I/O call. The 1.4 ROM prints error messages as disk errors occur and then exits through a vector in RAM at DF5C. The 1.5 ROM gives the caller the option to handle the error by returning with an error code in A' (prime). MZOS does a call to C407 after every call to C402, which appears to check if a disk error is present in A'. If not, control immediately returns to the caller, otherwise, it displays an error message and exits through the DF5C vector.

Since the MZOS 1.5x code always calls C407 after C402, this is basically the same as calling just the C402 entry point in the 1.4 ROM.

MZOS also calls the ROM to display other error messages and then exit through a RAM vector at DF5C. This entry point is in different places in the 1.4 versus 1.5 ROM as shown in the table above.

A bug in the Disk I/O code in MZOS calls the C402 entry point with a "seek" command instead of a "verify" command when doing writes with verify. The command should be patched to 2 instead of 3 as present in the code. This assumes the verify command was

not changed to 3 in the 1.5 version of the ROM. The manual for version 1.5 still shows the verify command to be 2, so I'm thinking this is a bug.

MZOS 1.5 versus 1.52

The only difference between version 1.5 and 1.52 is the addition of a patch in 1.52 at address 22C3 that jumps to empty space at the end of MZOS (28F6) and fixes a bug in a disk overflow calculation that is present in version 1.5. The patch then jumps back to continue the original code at 22C6. There is really no reason to work on/modify version 1.5 as 1.52 is otherwise identical and includes the bug fix.

Patching MZOS 1.52 to work with ROM version 1.4

The following patches to MZOS 1.52 allow it to work with the version 1.4 ROM. The patched version of the disk image is "MZOS 1.52P.VGI"

1) Change 2126 from 3E 03 D9 to C3 0D C4. This is the code to jump to ROM to display the "% Write Protect" error.
2) Change 23FA from CD 07 C4 to 00 00 00. This NOPs out the call to C407 in the new ROM that processes disk errors.
3) Change 240D from CD to C3. This replaces the call to C402 with a jump and therefore bypasses the subsequent call to C407.
4) Change 2748 from C3 to 68. This changes the call to C6C3 to a call to C668, the address of the error message display routine in the ROM.

The final patch is a bug fix, not a ROM version fix. The verify step of a write command issues a "Seek" command (3) instead of a "Verify" command (2).

5) Change 240B from 03 to 02. The "Verify" command is 2, not 3.

MZOS on the Simh Emulator

Simh will work with MZOS disks if the mfdc.c file is updated to use the checksum read from the disk image instead of overwriting it with the computed checksum. This is because the checksum used on MZOS disks differs from the checksum used for all other Vector Graphic software. The MZOS checksum starts with the checksum set to zero, then for each data byte: 1) RLC the data byte, 2) XOR result of #1 into the checksum. Note this is backwards from the NorthStar checksum that it seems VG was trying to duplicate (XOR data into checksum, then RLC the checksum).

Some MZOS applications expect older versions of the VG monitor to be present (e.g., version 2 at C000). Calls are made into specific addresses in the monitor that aren't standardized entry points. This causes problems when running under Simh which has VG monitor version 4.x at E000 and a helper ROM at C000 that directs just two of the older ROM entry points (console in and out) to the proper locations in the version 4.x monitor.

In order to make the MAP program on the MZOS disk run, I added the "print address" entry point at C1B6 to the helper ROM to jump to the proper address in the version 4.x monitor.

Moving on to making the MDIAG program on the MZOS disk work, I found it called ten different entry points in the version 2 ROM. At this point I gave up. The proper solution will be to incorporate a version 2 ROM at C000 into Simh in the future.