

## Restoration and Repair of a Pertec 3202 Dual Drive Cabinet

I obtained a rack-mount version of the Pertec 3202 dual drive cabinet without drives and without a top cover. This unit has the tan/brown ICOM color scheme instead of Altair blue/black.



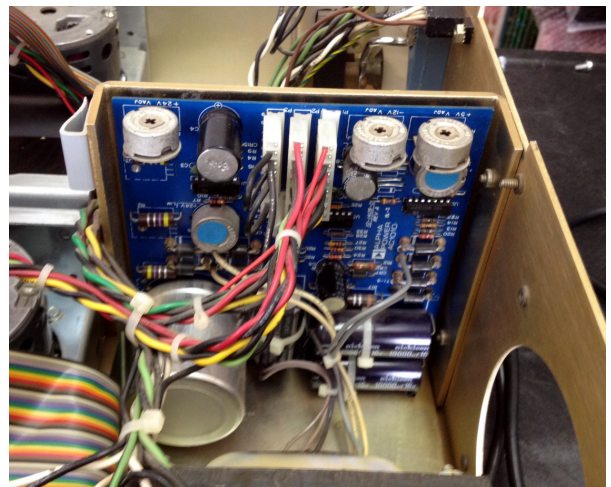
### Power supply repairs

With the 3202, MITS/Pertec went with an off-the-shelf power supply for the first time instead of designing their own. The power supply is in the back right hand side when the cabinet is viewed from the front.

With no load, the power supply outputs looked reasonable, however, after a few tests under load, it was clear that the voltage adjustment pots and connectors needed some contact cleaner and cycling to remove oxidation. I cycled the pots back and forth numerous times after spraying in a bit of contact cleaner. Voltage adjustment was then smooth instead of “jumpy.” Cycling of the three DC output connectors on the power supply numerous times fixed intermittent voltage “jumps” at the load.

Unlike the Altair single drive cabinets which supply -5v to the drive, the 3202 provides -12v to the drive.

Both the FD-400 and the FD-510 drives can work with either -5v or -12v, but the W1 or W2 jumper must be installed on the drive to properly select -5v or -12v operation. ***Connecting a drive configured for -5v to the -12v supply in the 3202 will damage the drive!***



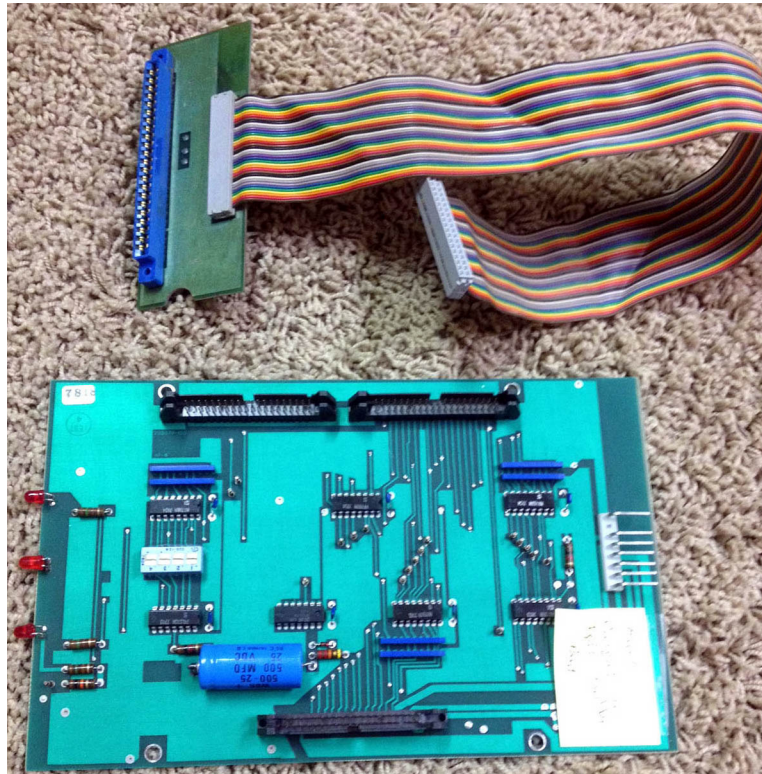
## Buffer board repairs

Three buffer boards came with the drive cabinet, though only two are required to support the two drives.

### “Ready” one-shot capacitor failures

C1 is a large, 500uf capacitor, that along with one-shot U3, provides a 4-5 second delay when the drive is powered up or a disk is inserted. During this period, the “ready” line back to the controller is inhibited. This is primarily for the FD-400 DC motors to give them time to spin up and stabilize, but this one-shot is present in the 3202 buffer board as well, even though the FD-510 drive used in the 3202 uses an AC motor which spins the hub all the time.

Two of the buffer boards had a failed C1. One capacitor was a dead short which caused the drive to never become ready, the second had the capacitor installed backwards which damaged the polarized capacitor. The third board had one lead of the capacitor clipped off. This results in no ready delay at all and was a fairly common field modification. I replaced all three capacitors with 330uf capacitors (because that’s what I had handy), and now the ready line on all three buffer boards operate as designed with a delay of about 4 seconds.



### Drive adapter cable problems

The drive adapter cable runs from an IDC-40 connector on the buffer board to a card edge connector on the rear of the Pertec drive. This card edge connector is not the Shugart 50 pin, 0.1” standard connector, but instead, a Pertec custom 44 pin, 0.156” connector.

Both adapter cables were damaged at the IDC-40 socket due to previous cycles of pulling on the cable to remove the connector from the board. I cut about ½ inch off each cable and installed a new IDC-40 socket. At this point, one cable worked well, however, the second one still had problems.

With the problem cable, the write protect light was not on when no diskette was inserted (the WP LED is normally on in this case). This indicates the write protect status signal was not making it from the drive to the buffer board. Second, the ready light would not turn off for the one-shot period when a disk was inserted. This indicates the “door shut” signal was not making it to the buffer board. Finally, the disk would attempt to read, but would not boot, indicating read data wasn’t making it to the buffer board either.

Since everything about the cable connections looked good, I decided to clean the contacts on the board edge socket. I flushed the contacts with contact cleaner and cycled the connector on and off a drive numerous times. This fixed the problem and both drive adapter cables now work fine.

### **Drive select issues with buffer board #1**

With buffer board #1 as the first buffer board, and buffer board #2 as the second buffer board, the second drive could not be accessed properly. When the second drive was accessed, the first drive continued to respond as if it were selected.

The problem ended up being with LS bit (A) of the drive address DIP switch. These DIP switches actually switch *two* internal switches to opposite states when a single actuator is moved between on and off. However, both internal switches were staying on causing the output to remain high enough at all times to look like a “true” to U2, the 8-input NAND gate for drive selection.

Cycling the switches numerous times did not fix the problem. However, after flooding the switch with contact cleaner and cycling more times, the internal switches freed up and buffer board #1 now works properly.

### **Drive cabinet cover**

A friend bent a cover for the cabinet for me and I had it painted using the Altair blue paint I have at the paint shop for the Altair 8800 Clone. This is the result:

