Programming Host Software for the FD3812 Disk Cabinet/Controller

Seek Operation

A seek is initiated by the host as follows:

1) The host provides the controller the track number to seek via the *Set Track* command.
2) The host initiates the seek by issuing the *Seek* command.

The controller executes this seek as follows:

1) The controller sets its current track register by reading the track number from an address mark on the current track.
2) Step-in or step-out commands are issued to the drive and the track register updated until it matches the seek-to track number set by the host.
3) The controller verifies the proper track was reached by reading the track number from an address mark on the new track.

The controller attempts to read an address mark for up to 16 revolutions before timing out (about 2.7s). If the controller fails to read an address mark from either the starting track or the destination track, a CRC error is returned. At this point, the host software should issue a restore to track zero and re-seek to the destination track. If after the restore the seek still returns an error, then all sectors on that track should be treated as bad. Attempting to read the data anyway will fail on each sector and take 2.7s per read attempt since the address marks are all unreadable. If code is attempting the typical three or more read tries per sector, this process could easily take ten or more seconds per sector, or several minutes per track. This is, of course, unacceptable.

In order to read the address marks at the start and end of the seek operation, the proper density must be selected in the controller. However, since track zero is single density and all other tracks are double density, the controller will fail to read the address mark either at the start or the end of a seek operation when seeking to or from track zero (the controller cannot change the density on its own). To get around this, any seek to track zero should be done with a restore command instead of a seek operation. The restore command does not read the starting track ID or the ending track ID since it establishes track location by the Track 0 signal. When seeking from track 0 to a higher track, the host should select double density (i.e., the density of the destination track). When the Track 0 signal is asserted, the controller does not attempt to read a starting track ID since the Track 0 signal establishes the starting track number.

Other Notes

Controller commands are initiated by bit 0 of the command word transition from zero to one. Bit 0 must be returned to zero before another command can be recognized. This is typically done by writing the *Examine Status* command (all zeros) to the controller after each command. When transferring from the read buffer, the *Examine Read Buffer* command puts bit 0 back to zero and leaves the read buffer output enabled instead of the status register output.

To improve the speed of the loops used to read and write the sector buffers as required for the double density operation of the 3812, the interface board in the host computer was updated to automatically drop bit 0 back to zero with a one-shot. This saves four instructions per byte as the host computer loops through the sector bytes. The one shot also means most commands do not have to be followed with an *Examine Status* command since bit 0 is cleared by the one shot. However, the *Examine Status* command

must still be issued following the *Load Unit/Sector* command because bit 5 of this command errantly enables the logic that causes bit 0 to toggle when writing to the data port. If this command is not cleared, then writing to the data port to, for example, set the track number to seek, writes the track number byte into the unit/sector register immediately upon writing the track byte.