

HDC/DMA Adjustments

During the useful product life of the HDC/DMA disk controller it may be necessary to adjust the phase-locked loop circuit. There are two potentiometers on the PC board which set the center frequency of the PLL and the charge pump current of the loop. The pots are used to allow for variations in the discrete components as well as variations in the performance of the varicap (MV1404) and have been adjusted and sealed at the factory for correct operation. This procedure should be followed if the PLL is being either checked or re-adjusted and assumes the technician has both experience with and access to an oscilloscope with a 100 Mhz bandwidth (Tektronix 465 or equiv.).

Since the data transfer rate of the 5 inch winchesters (ST-506 type) is different from the transfer rates of 8 inch drives (SA-1000 type), there are two different center frequencies for the phase-locked loop. Wherever there is a difference in the frequency adjustment procedures, the SA-1000 adjustments will be given in parenthesis. The transfer rate for the ST-506 is 5.0 Mbit/s. The transfer rate for the SA-1000 is 4.34 Mbit/s.

SCOPE SETUP

Channel 1: 1.0 Volt / Division

Channel 2: 0.2 Volt / Division

Sweep Mode: Alternate

Coupling: DC (Both channels)

Trigger: Auto / Channel 1 / Negative edge

Timebase: 20 ns / Division (or smallest division possible for your scope)

Sweep Dly: Normal

- 1. Install HDC/DMA into system and apply power. A disk drive need not be connected to controller yet.*
- 2. Using an insulated clip lead (as short as possible), ground TP2 located at 1D (near the top right corner of the bottom voltage regulator heat sink).*
- 3. Place scope probe for channel 1 on pin 11 of IC at location 4C. Place scope probe for channel 2 on test point 1 (TP 1) located just under IC 1B (74LS00).*
- 4. Set the frequency adjust pot (board location 1D) to its maximum clockwise rotation.*
- 5. Adjust the charge pump balance pot (located at 1C) so that the base line of the voltage appearing on scope channel 2 is centered about the 0 volt line (i.e. no DC offset present).*
- 6. Adjust the frequency control pot at location 1D for a 10 Mhz waveform (8.68 Mhz for SA-1000) on scope channel 1. With the scope setting above, the period should be 5 divisions (6.3 divisions for the SA-1000). Keep adjusting pot to obtain the minimum amount of ripple on the channel 2 waveform. The two waveforms should now appear to be in "lock" with each other.*

7. Remove the jumper to ground from TP 2. The signals should remain synchronized to each other.

8. Attach a formatted disk drive to the controller using the 34 pin control (50 pin for SA-1000) and 20 pin data cables.

9. Using the CP/M disk utility DU.COM or a similar program, log onto or access the hard disk drive. The waveforms on the scope should remain in lock shifting slightly everytime the controller is issued a read command so as to synchronize with the disk data. When not reading the disk data, the PLL will again become synchronized to the onboard 10 Mhz (8.68 for SA-1000) crystal.

10. It is now necessary to power the computer off and then on again to be sure the loop will synchronize correctly each time power is applied. When the board is first powered up, it is likely the loop has synchronized to a harmonic of the onboard crystal. However, after the first time the disk has been accessed (read command has been issued), the controller should lock to the 10 Mhz (8.68 for SA-1000) crystal and the disk data. Repeat the power off/on and read sequence several times to be sure this is consistent. If the loop does not lock each time, adjust pot at location 1C (adjusted in step 5) so the waveform for channel 2 has a slightly more positive DC level than before (rotate clockwise). Repeat this step until loop behavior is consistent.

11. Using glyptol or similar sealant, seal pots to prevent accidental mis-adjustments of these pots.

From:- <http://www.vcfed.org/forum/showthread.php?42594-Morrow-HDC-DMA-Winchester-controller>

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