

Alignment of the 12 Meg and 5 Meg Hard Drives have become very important for proper operation. The following are the procedures you should follow in doing these alignments.

MINIMUM EQUIPMENT REQUIRED:

60 MHZ Oscilloscope (Tektronics 2213 or B&K 1570)
Plastic tuning tool
x10 scope probes
HDDIAG Diagnostics diskette

- NOTE:
1. A MINIMUM 60 MHZ scope must be used.
 2. DO NOT use a metal screwdriver for the adjustments as it can affect the circuit under test.
 3. DO NOT use x1 scope probes as they can load down the circuit under test.

HARD DISK CONTROLLER BOARD ADJUSTMENTS

There are three adjustments on the controller board. R1 adjusts the one shot used to start the reading of the track. R18 adjusts the bias on the error amplifier. C33 adjusts the free running frequency of the VCO.

Run the program HDDIAG56 and proceed to step 1 of the alignment procedures. Before starting this procedure, the drive should be running for about 4 minutes.

1. Voltage controlled oscillator (VCO) adjustment.

First check for between +2.4-3.0 Vdc at pin 14 of U32. If it is not within this range, check R22, R24, and U32. R22 and R24 form a voltage divider to supply a reference voltage to U32. If the voltage is not within this range, either one of the resistors has an incorrect value or U32 is pulling down or in some other way affecting the voltage.

Then attach Channel A of your scope to TP9 and set channel A to 2 volts/div. TP9 is between U33 and U34.

DC couple Channel B, set it to 1 volt/div. and attach it to TP8. TP8 is between the voltage regulator and U32.

The time base should be set for 50 nanoseconds/div., trigger should be normal and on channel A.

Adjust C33 and R18 to obtain exactly a 100 ns waveform on channel A and a +2.5 Vdc level on channel B. You should have your scope set up to display both of these signals at the same time. Adjusting one will affect the other. See Figure 1.

When this has been done press enter to proceed on to the next step.

2. "DRUN" adjustment

DC couple channel A and connect the probe to TP1. TP1 is located between U1 and U2. The timebase should be set to 50 nanoseconds/div. and trigger should be set to negative and normal.

R1 should be adjusted so that channel A's waveform is clean and low for 250 +/- 5 nanoseconds. After the 250 ns, the signal will look like garbage, that is both high and low at the same time, this is normal. See Figure 2. Once you have adjusted for the proper DRUN signal you need to make sure the signal is truly "locked" in. This can be accomplished by turning the Hard Disk off, wait 30 seconds, then turn the Hard Disk back on again and verifying the signal has not changed. This step is very important as it is possible to have the proper signal displayed on the scope but as soon as you turn off the Hard Drive the signal will change.

IMPORTANT NOTE: It is possible to get a harmonic of the proper DRUN display that looks correct but is not. Figure 3 shows what the INCORRECT DRUN signal may look like.

3. Error Amplifier adjustment.

This adjustment must be done during a continuous read, since the DRUN adjustment does that, this adjustment should be done while the DRUN counter is running on the screen.

DC couple channel A, set it to 1/2 volt/div. and connect it to TP8 again. TP8 is between the voltage regulator and U32. Set the time base to 20 microseconds/div. Set the trigger to normal and adjust the level control for a steady display.

Use R18 to minimize the pulses going up and down on the scope. They should be as small as possible and the positive and negative pulses should be about equal in size.

Once the above steps have been completed track 1 should be reformatted and the above procedure should be repeated until R18 and C33 do not require any further adjustment.

HARD DISK MOTOR SPEED ADJUSTMENTS

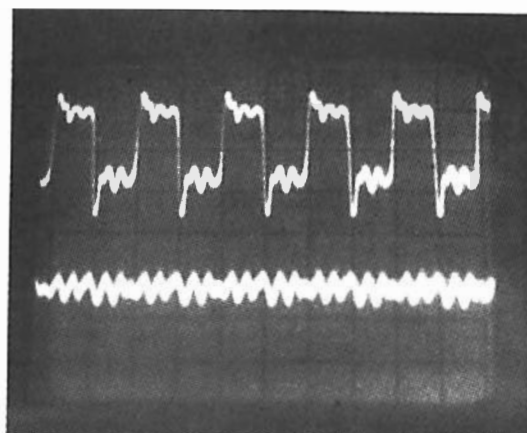
Motor speed alignment is very important for proper operation of the Hard Drive. Each Hard Drive in the system should be checked for correct motor speed. This can be accomplished with the diagnostics and a frequency counter. Select the first Hard Drive with the diagnostics and place the frequency counter probe to test point 12 on the controller board. The counter should display a count of 16.58ms to 16.74ms. If the count is not within this range motor speed alignment is required and you should proceed to step one. If the count is in this range DO NOT attempt to adjust it.

NOTE: If more than one Hard Drive is in the system, you will need to select each Hard Drive individually and check motor speed as above.

1. With power off, remove the four screws that hold the metal frame the controller board and power supply are mounted on. Disconnect the cables, from the bubble assembly to the controller board, and tilt the controller board and frame to the right up on its end. This way the power supply can still be connected to the bubble assembly.
2. Remove the four screws that hold the bubble assembly brackets to the base of the hard disk and turn the bubble assembly on its left side so the drive logic board is facing the power supply.
3. Remove the right bubble mounting bracket, (which should now be on the top of the bubble), to expose the holes which allow access to the motor speed adjustment pots.
4. Be sure the drive logic or any other boards are not shorting to the frame and turn on the power. The bubble can be operated on its side but it should **NEVER** be operated upside down.
5. Attach the Frequency Counter probe to Test Point 3 of the drive logic board. Adjust R5 for a 16.58ms to 16.74ms count.
6. Power down and reassemble.

Channel A

Channel B



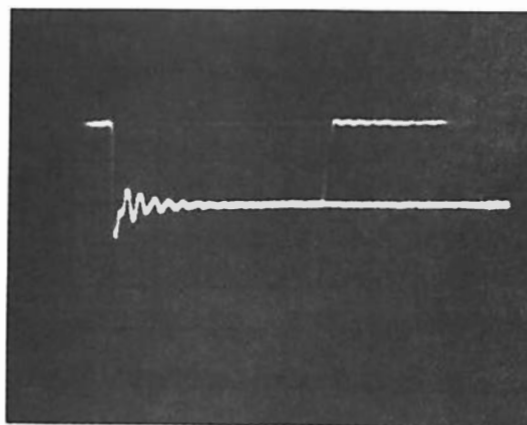
VCO

Channel A - TP9 2 volts/div.

Channel B - TP8 1 volt/div.

Time base 50 nanoseconds/div.

Figure 1

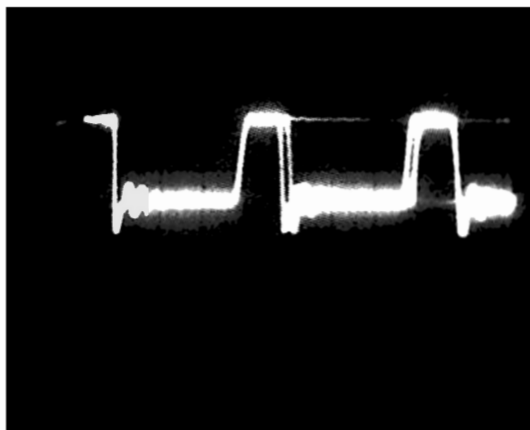


DRUN

Channel A - TP1 2 volts/div.

Time Base - 50 nanoseconds/div.

Figure 2



INCORRECT DRUM

Figure 3