To Do List for timing system R+D.

Items Added 9/7/99

1. Measure detector noise without light
   a. Measure the gain of the Mini Circuits low noise amplifier at nominal voltage at 350MHz. Use a -20dBm level test signal. Result: _______dB. Expect 20+/-0.5dB.
   b. Measure input noise of Mini Circuits low noise amplifier - compare with spec at 350MHz. Result: _______dB/Hz. Expect -165dB/Hz
   c. Measure input noise of detector using Mini Circuits amplifier, no input signal. Result: _______dB/Hz input noise. Expect -156db/Hz
   d. If noise exceeds spec. disconnect detector bias supply, and ground bias pin. re-check.
   e. if (d) fixes noise, check for noise on the bias supply - try to fix with caps.
   f. If noise is still out of spec, contact vendor for more information.

2 Check drive to the laser diode.
   a. At a point where the RF and dc bias are combined, add a “T”. Terminate one end of the “T”. Put a DC block on the other end, and attach to the spectrum analyzer.
   b. Check noise at 350MHz. Result: _______dB/Hz. Required: <-136dBm/Hz.

3. Simplify Bias connection to the diode laser.
   a. Remove all bias circuitry from the laser diode box except the 50 Ohm series terminating resistor.
   b. Connect the combined bias to the diode using only coax connections.
   c. Set the diode to the standard operating temperature ~25C.
   d. Set the diode bias for 1/2 full output power at the operating temperature. Set the RF level (measured at the diode housing). for 75% of the range from threshold to full power. Threshold current _____mA. Maximum current _____mA, Bias current ________mA, RF drive _______dBm.
   e. Measure the monitor photodiode current with the bias on, and the RF off. Monitor current ________mA.
   f. Measure the monitor photodiode current with the bias and RF on. Monitor current ________mA.
   g. Measure the output output optical power with bias on, and RF off with a power meter ______dBmO.
h. Measure the output optical power with bias on and RF on, with a power meter _______ dBmO.

4. Measure detector noise with the laser on:
   a. Connect 10db splitter, followed by 6dB splitter to output of laser. This should provide 50uW of output. Check output with power meter. Result _______ dBmO, Expected -13dBmO.
   b. Connect optical power to detector. Check output detector noise (see item 1 above). Result: _______ dB/Hz. Expect -146dBm/Hz.
   c. Use a 1330nm non-modulated laser. Attenuate signal to get 50uw (-13dBmO) on the detector. Check noise.

5. Test detector noise correlation (if the noise is above predicted noise). This should indicate if the noise is on the optical signal.
   a. Send equal 50uW optical signals into two detectors using an optical splitter.
   b. Measure the power on each arm of the splitter power arm A: _______ dBmO, power arm B: _______ dBmO.
   c. With the light on, measure the noise at 350MHz from each of the detectors: Noise detector A: _______ dBm/Hz, Noise detector B: _______ dBm/Hz.
   d. With the light on, combine the outputs of the detectors using a 0 degree combiner (Frisch has one). Measure the noise at 350MHz. Noise: _______ dBm/Hz.
   d. With the light on, combine the outputs of the detectors using a 180 degree combiner (Frisch has one). Measure the noise at 350MHz. Noise: _______ dBm/Hz.

6. Items we need, and should order if not available at SLAC
   a. Multi-line spectrometer. (Order written 7/16/99) - still in system.
   b. Optical power meter, +3dBmO range, and 10dB optical attenuator. Detector available from newport model FM-200 $830, attenuator is newport F-ADAT-OPT-15-10-55 (order 2). $150 each. Ordered _________.
   c. Synthesizer or other source for 357-.025MHz. Ordered_______