LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

-LIGO-

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ELECTRO-OPTICAL LINK DESIGN REQUIREMENT		
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ELECTRO-OPTICAL LINK DESIGN REQUIREMENTS

1.0 INTRODUCTION

The new Electro-Optical (EO) Link for LIGO shall compose of two independent links operating in unison as a single link. The two indepedent links shall be configured as shown in Figure 1 below:

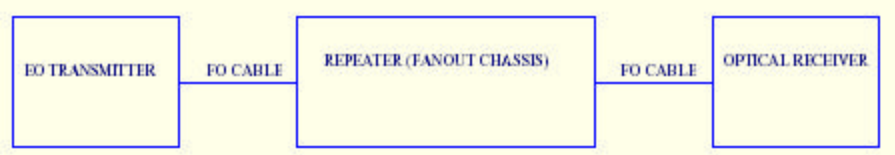

Figure 1. Block Diagram 0f LIGO's ELECTRO-OPTICAL LINK

The first link joints the EO Transmitter to the Fanout Chassis. The second link joints the Fanout Chassis to the EO Receiver.

2.0 ELECTRO-OPTICAL TRANSMITTER

The EO Transmitter shall have the form and fit factor of a 1U VME (Versa Modular Eurocard) based board. Power to the board shall be derived from the VME crate. BNC connector shall be used for its input. Upon receiving the TTL (Transistor-to-Transistor Logic) one pulse per second (1pps) and the 4 MHz clock pulses from the GPS (Global Position System) board, corresponding light pulses shall be launched into the connecting FO (Fiber-Optic) cables. Indicator lights shall be provided for both power supplies used on board and the 1pulse-per-second (1pps) and the 4 MHz clock pulse input signals. In addition, differential ECL (Emitter- Coupled-Logic) signals for the 1pps and 4 MHz clock pulses shall be available the a 4 pin LEMO connector on the front panel.

3.0 THE FANOUT CHASSIS

The Fanout Chassis shall process the light pulses (1pps and 4 MHz clock) launched by the EO Transmitter and branches them into 16 independent optical outputs each. All electronics shall be housed in a 2U high 19" rack mount shielded chassis. An AC linear + 5Vdc power supply shall be used for the unit. Indicator lights shall be provided for the AC input, + 5Vdc, 1pps and 4 MHz clock pulses in the front panel.

4.0 THE ELECTRO-OPTICAL RCEIVER

The EO Receiver shall have the form and fit factor of a 1U VMEbus based board. Power to the board shall be derived from the VME crate. Upon receiving the optical 1pps and 4 MHz pulses from the Fanout Chassis, the unit shall provide three (3) differential ECL outputs for each of the received pulses. Indicator lights shall be provided for both +/- 5 Vdc power supplies, 1pps and 4 MHz clock pulses.

5.0 FIBER OPTIC CABLES

Multimode 62.5/125 Fiber Optic cables shall be used for the EO Link system.

6.0 DEFINITIONS

6.1 TTL Logic Levels (operating on + 5 Vdc power supply):

"HIGH"	> 2.4 volt
"LOW"	< 0.8 volt

6.2 ECL Logic Levels (operating on - 5 Vdc power supply):

"HIGH"	-0.98 volt
"LOW"	-1.95 volt

7.0 JITTER LIMIT

To be determined (perferably less than 200 pico seconds).

8.0 ELECTROMAGNETIC INTERFERENCE COMPLIANCE

Good electromagnetic shielding technique to attenuate EMI/RFI between sources and susceptible equipment must be applied in all design.

REFERENCES:

E020350-08-R EMC, Shielding anf Grounding Retrofit Plan

MIL-STD-461E Requirements for the Control of Electromagnetic Interference Characteristic of Subsystems and Equipment.

MIL-HDBK-253 Guidance for the Design and Test of Systems Protected Against the Effects of Electromagnetic Energy

MIL-HDBK-454 General Guidelines for Electronic Equipment