LIGO

CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DCN No. E980081-00-D
SHEET 1 OF 1

DOCUMENT CHANGE NOTICE (DCN)

DOCUMENT No. (DOC-REV-GP. ID)	TITLE	NEW REV.
E980082-n/a-D	LOS Alignment Fixture Fabrication Specification	A

CHANGE DESCRIPTION (FROM/TO): Initial Release

REASON FOR CHANGE: n/a

ACTION: ☒ Incorporate change ☐ Attach DCN to drawing(s) ☐ Other action (specify):

DISPOSITION OF HARDWARE (IDENTIFY SERIAL NUMBERS)

- ☒ No hardware affected (record change only)
- ☐ *List S/Ns which comply already:*
- ☐ List S/Ns to be reworked or scrapped:
- ☐ List S/Ns to be built with this change:
- ☐ *List S/Ns to be retested per this change:*
- ☐
- ☐
- ☐
- ☐

DCN DISTRIBUTION (X=incl. docs)

Althouse	Barish	Coles
Coyne	Lazzarini	Lindquist
Raab	Sanders	Shoemaker
Stapfer	Tyler	Weiss
Whitcomb	Zydowicz	

X Fine
X Hazel
X Mason
Jones

SAFETY, COST, SCHEDULE, REQUIREMENTS IMPACT? ☐ No ☐ Yes (If yes, enter Change Request number)

APPROVALS:		DATE	OTHER APPROVALS (specify)	DATE
ORIGINATOR:	J. Hazel	4-15-98		
TASK LEADER:	Mike Zucker	4/17/98		
GROUP LEADER:	D. Coyne	4/17/98		
DCC RELEASE:	[illegible]	4/17/98		

COMPONENT SPECIFICATION

TITLE

LOS ALIGNMENT FIXTURE FABRICATION SPECIFICATION

APPROVALS:	DATE	REV	DCN NO	BY	CHK	DCC	DATE
DRAWN: J. Hazel	4/14/98	A	E980081-00-D	n/a	n/a	n/a	n/a
CHECKED:							
APPROVED:							
DCC RELEASE:	4/17/98						

1 INTRODUCTION

1.1. Objectives and Scope

The scope of this document is limited to the specifications for the fabrication of the LOS (Large Optics Suspension) Alignment Fixtures.

1.2. Applicable Documents

LIGO-D980001: Alignment Fixture
LIGO-D960132: Large Optic Suspension Assembly, LOS1;Reference only - not required for fabrication
LIGO-L970196: Part Numbers and Serialization of Detector Hardware

2 SPECIFICATION FOR FABRICATION

2.1. Physical Configuration

Build in accordance with:

LIGO-D980001: Alignment Fixture

2.2. Fabrication

2.2.1. Cost Cutting

LIGO solicites the contractor to provide construction techniques and approaches for approval which would reduce the fabrication costs of the Alignment Fixture. Please contact the cognizant engineer concerning these issues. For example, some parts, shown as machined from one piece of material blank, may be welded or bolted together from more than one piece of material.

2.2.2. Protection from Contamination

A number of components of the Alignment Fixture are made of stainless steel (see drawing). No carbon steel hooks, fork lift forks, grapples or chains shall be allowed to contact the stainless steel.

Stored materials (raw materials or work-in-process) shall be protected from the shop atmosphere when not being handled (or worked on) by plastic sheets or similar protective covers. Polyethylene plastic sheet is

acceptable. Raw materials shall be protected from contamination throughout the fabrication process. Smoking is not allowed in any LOS Alginment Fixture storage or manufacturing area.

2.2.3. Part Machining

- **Liquid contaminants/Machining Lubricants**

Liquids containing hydrocarbons or other contaminants, other than the machining fluids specified herein, shall not be allowed to come into contact with alignment fixture material at any time. All machining fluids shall be water soluble and free of sulfur, chlorine and silicone; such as Cincinnati Milacron's Cimtech 410 (stainless steel) or Hangsterfer's S-500CF (all metals).

- **Grinding & Abrasive Cloth/Paper**

Grinding (with abrasive wheels, cloth, or stones), or use of abrasive cloth or paper, is permitted on alignment components, except where noted, if the ground or impacted surface is subsequently skimmed with a carbide tool to remove any residual contaminants. The use of oil free Arkansas stones are also approved to remove slight imperfections in the machined surfaces.

2.2.4. Welding

Welders must be certified to American Welding Society (AWS) or American Society of Mechanical Engineering (ASME) standards. Grinding shall comply with the requirements outlined under Grinding & Abrasive Cloth/Paper. An inert shield gas (e.g. Argon) must be used in all alignment fixture welding. All welding and fitting shall be done in clean manufacturing space.

2.2.5. Assembly

Clean all piece parts with isopropyl alcohol and acetone before assembly. In particular, clean all through, blind and threaded holes, especially ones that shall have dowel pins and Helicoil inserts installed. Assemble without lubrication. Verify proper fit. LIGO will verify proper performance and design.

2.3. Quality Assurance/Control

2.3.1. Identification

Separate (non-welded) parts and assemblies shall be marked with laser marking or acid etch techniques. A vibratory tool with a minimum tip radius of 0.0005" is acceptable for marking on surfaces which are not hidden from view. Engraving is also permitted.

Separate (non-welded) parts and assemblies to be serialized according to the document titled Part Numbers and Serialization of Detector Hardware, LIGO-L970196. This document allows for "bag-and-tag" type of identification for small parts.

2.3.2. Serial Number

The Serial number shall be of the format:
Dxxxxxx-y S/N *nnn* Where

Dxxxxxx-y is the LIGO piece part or assembly drawing number, Dxxxxxx, including the revision letter, -y, to which the hardware item was built, and

nnn is the sequential serial number, 001 through 999, in the order produced.

2.3.3. Quality Assurance Provisions

The assembly shall be produced and inspected for form, fit, dimensions and workmanship.

2.3.4. Purchaser Access

Non-escort privileges for the buyer, owner, government and owner representatives to all areas of the facilities where work is being performed shall be arranged. This will include access to all areas where material is being processed and stored. The purchaser shall have the right to witness all manufacturing processes.

2.3.5. QA Approval

LIGO QA reserves the right to inspect and approve vendor/fabricator QA plan and processes.

2.3.6. Travelers

QA travelers shall accompany all material from delivered raw stock to final components and assemblies.

2.3.7. Welding QC

A QC procedure for 100% inspection of all welded joints shall be developed and submitted for approval. This QC procedure shall be used to verify that all welds called out on the drawings have been accomplished and that the weld penetration is complete and that the weld quality is acceptable.