

Title: **FABRICATION PLAN FOR HORIZONTAL ACCESS MODULES (HAM)**

**FABRICATION PLAN
FOR
HORIZONTAL ACCESS MODULES (HAM)
LIGO VACUUM EQUIPMENT**

**Hanford, Washington
and
Livingston, Louisiana**

PREPARED BY: Phillip F. Estlin

QUALITY ASSURANCE: Alan Brudhoe

MANUFACTURING ENGINEER: Phillip F. Estlin

TECHNICAL DIRECTOR: D. O. McWilliams

PROJECT MANAGER: Rickert Bayly

Information contained in this specification and its attachments is proprietary in nature and shall be kept confidential. It shall be used only as required to respond to the specification requirements, and shall not be disclosed to any other party.

Ø	PF	5/1/96	REB	5/2/96	ISSUED PER DFC 0161 FOR FDR
REV LTR.	BY-DATE	APPD. DATE	DESCRIPTION OF CHANGE		

PROCESS SYSTEMS INTERNATIONAL, INC.					SPECIFICATION	
INITIAL APPROVALS	PREPARED	DATE	APPROVED	DATE	NumberA	Rev.
	PF	5/1/96	REB	5/2/96	V049-2-081	Ø
					LIGO-E960163-00-V	

Title

FABRICATION PLAN FOR HORIZONTAL ACCESS MODULES (HAM)

TABLE OF CONTENTS

- 1.0 Purpose
- 2.0 General
- 3.0 Responsibility
- 4.0 Fabrication Plan

ATTACHMENTS:

- 1. HAM Fabrication Documents
- 2. Fabrication Flow Chart
- 3. Fabrication Priority List

Number

Rev.

SPECIFICATION

Number

A

V049-2-081

Rev.

0

1.0 PURPOSE

The purpose of this procedure is to define design guidelines, specifications, and procedures to enable PSI to specify, purchase, inspect, fabricate, test and ship the HAM per LIGO requirements.

2.0 GENERAL

All Horizontal Access Modules (HAM) shall be fabricated per this fabrication plan. Each fabrication process shall be controlled via a written procedure. A "first article" approach will be used to validate all fabrication processes prior to release of the full vessel lot.

All vessels will be fabricated in accordance with the Quality Plan. Key points in the fabrication process shall be verified to ensure consistent results.

All vacuum equipment shall be fabricated in accordance with LIGO Project Contract PC175730 dated September 12, 1995, and subsequent change orders.

3.0 RESPONSIBILITY

The Manufacturing Department is responsible for the execution of this procedure, with input and monitoring by the Project Engineer, the Quality Assurance Department, and the Project Manager.

4.0 FABRICATION PLAN

4.1 A first article approach will be used to start the HAM manufacturing cycle to validate the manufacturing procedures and technique prior to the full production release.

4.2 The HAM chambers will be fabricated using an outside manufacturing shop. PSI will perform vessel cleaning, leak checking, bakeout and preparation for shipment.

4.3 The HAM will be fabricated and tested per documents listed in Attachment I "Fabrication Documents".

4.4 The HAM will be fabricated and tested per Attachment 2 HAM Fabrication Flow Chart.

Number

Rev.

SPECIFICATION

Number

A

V049-2-081

Rev.

0

Title

FABRICATION PLAN FOR HORIZONTAL ACCESS MODULES (HAM)

4.5 The HAM vessels will be fabricated according to the Fabrication Priority List, Attachment 3.

4.6 Procurement

PSI will procure all S.S. plate and flange material and supply it with the selected fabrication vendor.

PSI will purchase vessel heads and supply them to the selected fabrication vendor.

4.7 Quality Assurance

The HAM Fabrication Process shall be monitored and control via the Quality Plan.

Outside fabrication vendors will perform the quality plan inspections for their portion of the work. PSI will witness critical process inspections as detailed in the Quality Plan.

PSI will audit each major fabrication vendor's Q.A. Program after P.O. awards.

PSI and fabrication vendors will inspect all incoming materials to purchase documents.

4.8 Shop Conditioning/Testing

The HAM Vessels will be shop conditioned (cleaned, bakeout, etc.) per PSI Procedure V049-2-047.

4.9 Preparation For Shipment

The HAM Vessels will be prepared and shipped per PSI Procedure V049-2-123.

Number
Rev.

SPECIFICATION

Number	A	V049-2-081	Rev.	<i>Ø</i>
--------	----------	------------	------	----------

ATTACHMENT 1

HAM FABRICATION DOCUMENTS

1.	Spec. For HAM Fabrication	V049-2-078
2.	HAM Quality Plan	V049-2-087
3.	Bill of Material	V049-4-002
4.	Flanges	V049-2-040 & V049-2-042
5.	Heads	V049-2-039
6.	Raw Material Handling Procedure	V049-2-120
7.	Weld Data Sheet Spec.	V049-2-084
8.	Weld Procedures	V049-2-070, V049-2-071, V049-2-072, V049-2-073
9.	Weld Repair Procedure	V049-2-074
10.	Cleaning Procedures	V049-2-015
11.	Painting Procedures	V049-2-077
12.	Stress Relief Procedures	V049-2-046
13.	Bakeout Procedure	V049-2-019
14.	Leak Test Procedure	V049-2-014
15.	Components Shop Conditioning/Testing Plan	V049-2-047
16.	Dimensional Verification Procedure	V049-2-121
17.	Component Packaging, Handling, and Shipping Procedure	V049-2-123
18.	PSI Drawings	
	HAM Assembly	V049-4-002
	Vessel Supports	V049-4-052
	60" Expansion Joint	V049-4-053
	Bellows Tie Rod Assembly	V049-4-040
	84 1/4" ID Flange (Grooved)	V049-4-021
	60 1/2" ID Flange (FF)	V049-4-032
	60 1/2" ID Flange (Grooved)	V049-4-031

Number

Rev.

SPECIFICATION

Number

A

V049-2-081

Rev.

Ø

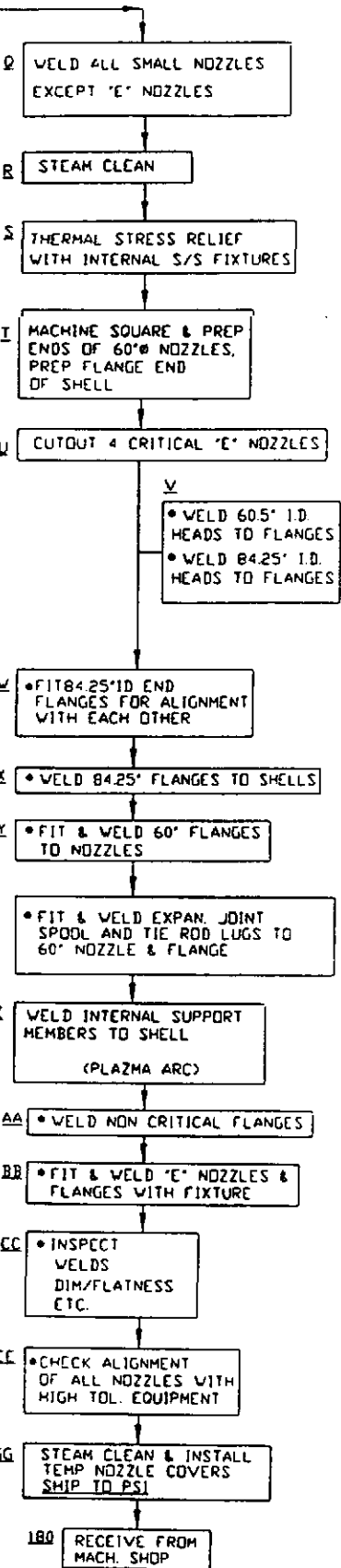
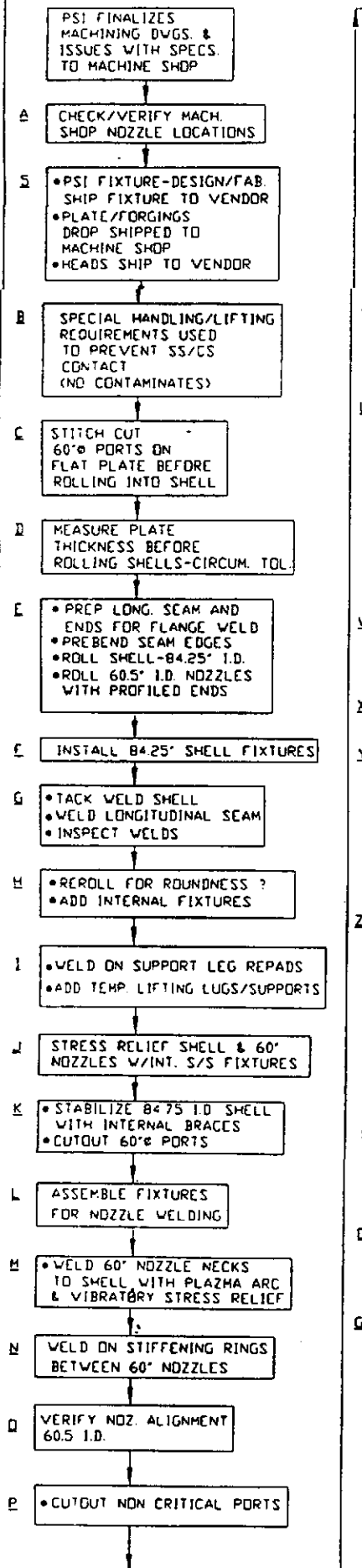
LEGEND
 NUMBERS=PSI MANUFACTURING ACTIVITY
 LETTERS=MACHINE SHOP ACTIVITY (VENDOR)

**HAM FABRICATION
 PROCESS DIAGRAM**
 SHT 1 OF 2

REF. DWG. V049-4-002 (S S-TS)
 REF. DWG. V049-4-021, 052, 053

OTHER MACHINE ITEMS

- I • MACHINE 84.25" I.D. FLANGES
2-GROOVED
2-FLAT FACED
- III • MACHINE HOLES IN (2) 84.25" HEADS
- II • MACHINE 60.5" I.D. FLANGES ON HEADS
1-GROOVED
1-FLAT FACED
• MACHINE HOLES IN (2) 60" HEADS
• MACHINE/DEVELOP 12"X14" OF NOZZLE NECKS
• MACHINE/PROFILE 8"X10" OF NOZZLES
- IV • ROLL STIFFENING RINGS & SUPT REPADS
- VI • BASE PLATES-MACHINE HOLES
- VII • PREFAB LEG ASSEMBLY
• BLAST & PAINT



SEE SHT. 2 OF 2

REV
 Ø

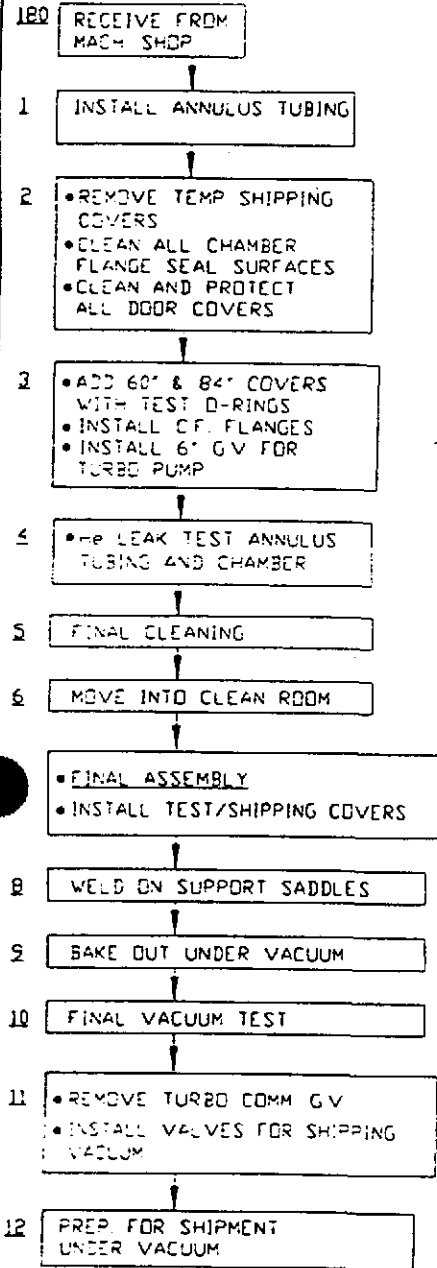
LEGEND

NUMBERS=PSI MANUFACTURING ACTIVITY
LETTERS=MACHINE SHOP ACTIVITY (VENDOR)

HAM FABRICATION
PROCESS DIAGRAM

SHT 2 OF 2

REF. DWG. V049-4-002 (5 SHTS)
REF. DWG. V049-4-021, 052, 053



REV.
Ø

ATTACHMENT 3

HAM FABRICATION PRIORITY LIST

WHAM1	(CS)
WHAM22	(CS)
WHAM11	(CS)
WHAM10	(CS)
WHAM7	(CS)
WHAM8	(CS)
WHAM9	(CS)
WHAM2	(CS)
WHAM3	
WHAM6	(CS)
WHAM5	(CS)
WHAM4	(CS)
WHAM13	(Spare)
LHAM1	(CS)
LHAM2	(CS)
LHAM3	(CS)
LHAM6	(CS)
LHAM5	(CS)
LHAM4	(CS)

Number

Rev.

SPECIFICATION

Number

A

V049-2-081

Rev.

0