



LIGO Laboratory

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LIGO

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LLO PUMP STATION
MAINTENANCE MANUAL

K. Mailand

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HEPI/SEI Group

This is an internal working note
of the LIGO Project.

California Institute of Technology
LIGO Project – MS 18-34
1200 E. California Blvd.
Pasadena, CA 91125
Phone (626) 395-2129
Fax (626) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project – NW17-161
175 Albany St
Cambridge, MA 02139
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

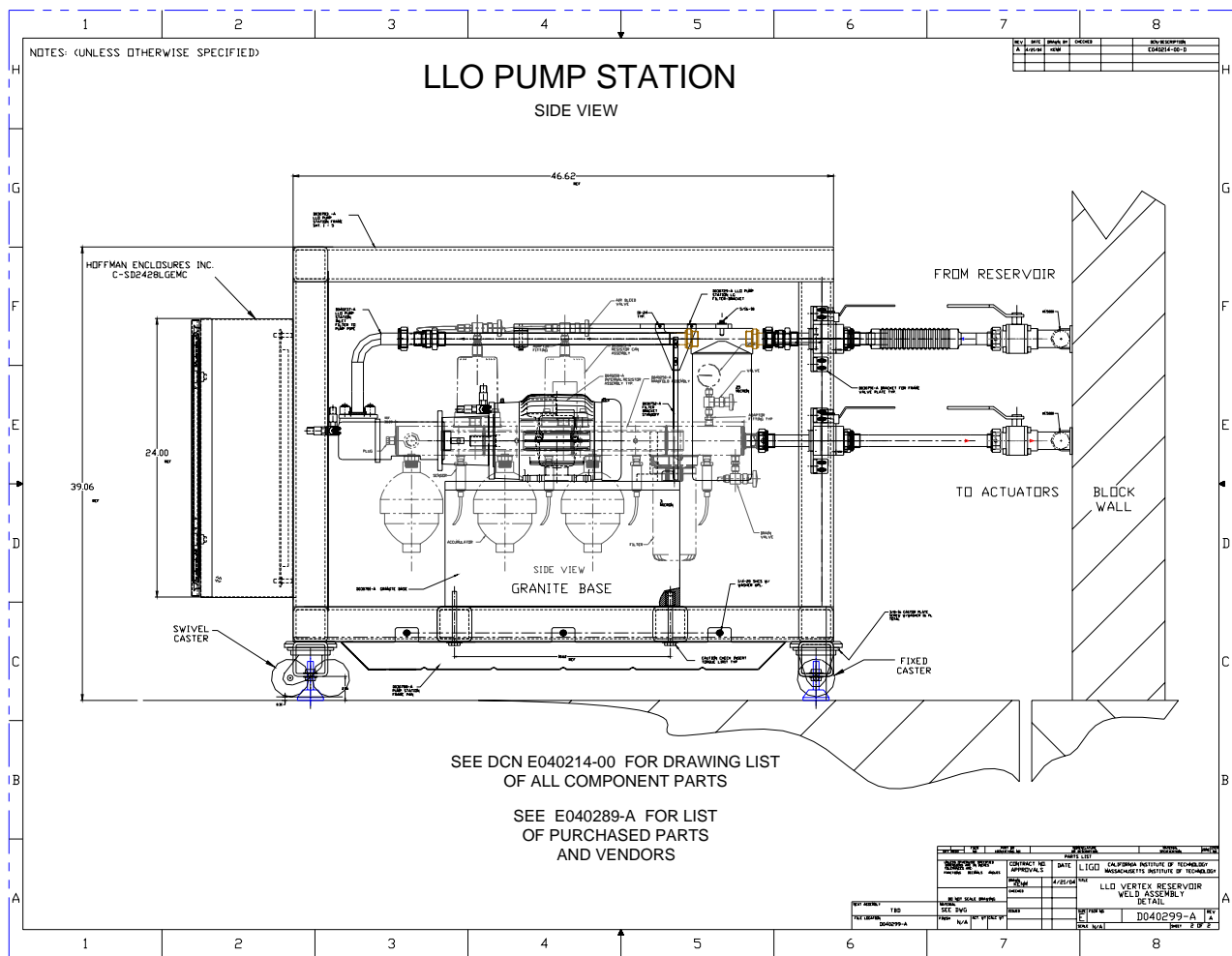
LIGO Hanford Observatory
P.O. Box 1970
Mail Stop S9-02
Richland WA 99352
Phone 509-372-8106
Fax 509-372-8137

LIGO Livingston Observatory
P.O. Box 940
Livingston, LA 70754
Phone 225-686-3100
Fax 225-686-7189

- 1 INTRODUCTION 3**
- 2 FLUID 4**
- 3 MOTOR..... 4**
 - 3.1 DESCRIPTION 4
 - 3.2 LUBRICATON..... 4
 - 3.3 LUBRICATION PROCEDURE: 5
- 4 PUMP..... 5**
 - 4.1 DESCRIPTION 5
- 5 PUMP COUPLING 5**
 - 5.1 COUPLING SPIDER CHANGE PROCEDURE 6
- 6 STATION FLUID FILTERS..... 6**
 - 6.1 FLUID FILTER CHANGE PROCEDURE..... 7
- 7 ACCUMULATOR..... 7**
 - 7.1 DESCRIPTION 7
 - 7.2 ACCUMULATOR CHARGING PROCEDURE..... 7
- 8 RESERVOIR FILTER & TAPER FLANGE MOUNTING ADAPTOR..... 8**
- 9 RESISTOR [2]..... 8**
 - 9.1 DESCRIPTION 8
- 10 MANIFOLD SIDE VIEW..... 9**
- 11 MANIFOLD DRAIN 9**
- 12 RELIEF VALVE..... 9**
- 13 ANALOG DIAL PRESSURE GAUGE 10**
- 14 LLO VERTEX PUMP STATIONS..... 10**

1 INTRODUCTION

This document describes basic maintenance, and periodic service or replacement items contained in the 6 LLO Site Pump Station assemblies, this also includes the identical unit sent to LASTI. The system is designed to run continuously.



2 FLUID

The fluid used in the system is HOUGHTO-SAFE 419TY a water/glycol mixture, rated food safe. Chemical analysis should be done every 3 months, send one pint of fluid to address below attn: Mary Reese.

Label Fluid Sample:

1. LIGO HEPI 419TY
2. Date removed
3. Name the System: e.g. X-end, Y-end, LASTI etc.

Address To:

HOUGHTO-SAFE CO.
BOX 860, CARROLLTON, GA. 30112
770-832-3507
FAX 770 830 0114
Ref. see LIGO Doc. T030036

3 MOTOR

3.1 DESCRIPTION

PART #CEM3587T, REF. Baldor Motor, TEFC 2 hp. 3phase - 230/460 volt / 1750 rpm

Note: this motor is precision balanced, after purchase. The 6800 gram rotors are balanced to within .05 gram-inches, with machine calibrations in accordance with ISO 10012-1 [ref. the unbalanced rotors have registered 1.75g/in]

The vendor used for this operation:

Industrial Balancing Inc.
1515 N. Kraemer BL.
Anaheim, CA 92806-1404
1-714-632-6888 or 1-805-794-7352 Mark or Vick

3.2 LUBRICATON

The motor is a ball bearing type with two zerk fittings on the housing at the front and rear

Recommended grease for standard service conditions is Polyrex EM [Exxon Mobile] others equivalent and compatible greases include Texaco Polystar, Rykon Premium #2, Pennzoil Pen 2 Lube and Chevron SRI

The lube recommended interval at a 1725 rpm operation is 12,500 hours. Or about 16 months, at lower rpm adjust the hours between lube intervals by dividing the rpm into 1725 and multiplying the 12,500 hour interval.

The amount of grease to add is: .30 oz., or 8.4 grams by weight or .6 cu in, or 2 teaspoons by volume.

3.3 LUBRICATION PROCEDURE:

The grease can be added while the motor is running or stopped.

Clean the grease fitting by wiping with a clean cloth then attach the grease gun tool and add the required amount of compatible grease slowly. Do not install more grease than the recommended amount, if grease is added sooner than the recommended time interval, reduce the amount accordingly.

4 PUMP

4.1 DESCRIPTION

The pump is an IMO # AA3GNVPMCE095SC SCREW PUMP. The pump has a housing mounted over pressure valve and is factory pre-set at 210 psi. The pump does not require periodic maintenance; it is lubricated by the fluid and is smooth running. If any internal metallic sound or vibration is observed the pump should be replaced ASAP.

IMO PUMP [COLFAX CORP.]

1710 AIRPORT ROAD

MONROE, NC. 28111-5020

JIM DAVIS X 2390

704 289 6511

FAX 704 289 9273

5 PUMP COUPLING

The pump coupling consists of three parts the Motor hub the Pump hub and the Drive spider. The spider is Buna-N elastomer and over time will wear due to compression flexing of the spider arms due to the pump pressure pulse resistance. If Buna-N material is seen building up around the base of the coupling or rumbling sound or vibration is noticed in the coupling area the spider should be replaced.

Ref part numbers

LOVEJOY SPIDER STYLE

PART MATERIAL: Aluminum

ALO90 WITH .50" BORE [pump side]

ALO90 WITH .875 BORE [motor side]

SOX SOLID [BUNA-N] SPIDER

PUMP STATION MOTOR/PUMP COUPLING



INSTALLATION:

1. Center the spider over the gap between the motor and pump shaft.
2. Bring the two halves together touching the center buna-N spider.
3. Lock the set screws over the shaft keys, Typ

5.1 COUPLING SPIDER CHANGE PROCEDURE

The motor must be turned off, the clear plastic adaptor port cover removed for access to the coupling.

The hub set screws loosened to allow the hubs to slide apart on the shafts; it may be possible to change out the spider without removing the motor base hold down screws.

If enough clearance to remove the spider is not available by sliding the hubs, the motor base and adaptor spacer screws must be removed and the motor moved to provide clearance to install a new spider.

After installing a new spider reattach the adaptor and reinstall the motor and base screws. Move the coupling hubs together until they touch the spider, the hubs should be centered over the gap between the pump and motor shafts, tighten the set screws in both hubs.

The motor and pump are aligned automatically when assembled due to the location bores on the mounting adaptor.

REF. The coupling halves are balanced by the same vendor as the motor [see 3.1] above; this balance is done on a best efforts basis.

6 STATION FLUID FILTERS

The pump station has two filters both the screw on type. The pre-pump filter is a 25 micron filter part # ZLE-25 this filter is large and will not need replacing until the differential pressure across the filter is 6 psi or greater. This 6 psi drop can be established with the gauges installed at the LASTI installation, and a time interval for site filter changes established. This pressure drop may take several years to reach due to the clean environment and the large size of the filter. A more conservative change interval may be set at approx. 2 years.

The line filter down stream of the pump is a 3 micron filter part # ZHE-03L this filter is large and will not need replacing until the differential pressure across the filter is 14 psi or greater, at 3.5 gpm. This drop should also take years and a conservative 2 year interval for change may be established.

6.1 FLUID FILTER CHANGE PROCEDURE

In the changing of either filter the seal gasket must be lubricated with fluid prior to screwing on and seating the filter seal. Installing the large [25 micron] filter can, tighten with a strap wrench attaching it near the bottom of the filter to prevent crushing the can. Tighten approx. 1 turn after the first contact of the filter seal and head seal boss.

Install the 3 micron filter by hand tightening approx. ½ turn after first contact of the rubber seal with the head seal boss.

Vendor ref.

Zinga Filters
2400 ZINGA DRIVE,
REEDSBURG, WI 53959,
1-608-524-4200

7 ACCUMULATOR [TYP 3]

7.1 DESCRIPTION

The pump station assembly has 3 accumulators these should be charged with nitrogen initially to a pressure of about 93% of the lowest operating line pressure adjacent to the accumulator. This setting will vary in each accumulator depending on its location in the system.

The minimum pressure in the accumulator should not be less than 60% of the line pressure adjacent to the accumulator.

The accumulators have a hybrid valve consisting of a tire type Schrader valve and a military metal to metal positive shut off.

7.2 ACCUMULATOR CHARGING PROCEDURE

To charge the accumulator the line pressure must be known and the system shut off for accumulator nitrogen charging to take place with zero pressure in the line.

Use a socket to turn open the military valve closure hex, and this will allow the tire type Schrader valve to function, and using a tire type filler nozzle to mate, fill the bladder to the designed pressure for that location approx .93 of the line pressure. [see above]

When the pressure in the accumulator bladder is set, the military closure hex is rotated with a socket tool to 45-65 in-lbs of torque

REF. Vendor & Part

Part: S421AM453

[45 CU IN 'AccuMIGHT' ACCUMULATOR]
SPECIAL VALVE AI-S3-309
BUNA-N BLADDER
ACCUMULATORS Inc. HOUSTON, TX [accumulators.com]
Phone: 713-465-0202 Fax 713-468-1618

8 RESERVOIR FILTER & TAPER FLANGE MOUNTING ADAPTOR

The reservoir filter needs to be inspected and replaced if the flow is restricted. This filter should last 2 years+ in normal operation. The filter is set in a taper flange and can be twisted and pulled and easily removed. For a visual filter 'restricted flow' indicator a yellow pop out stem is located at the base of the filter housing. The vendor says it is likely with our conditions the filter will last for extended periods of time, but recommended a 12 month change period. This filter is always above the fluid level.

Part number:

DC-OC-8

3 MICRON FILTER

GRIMSTAD INC.

949 757 1444

9 RESISTOR [TYP 2]

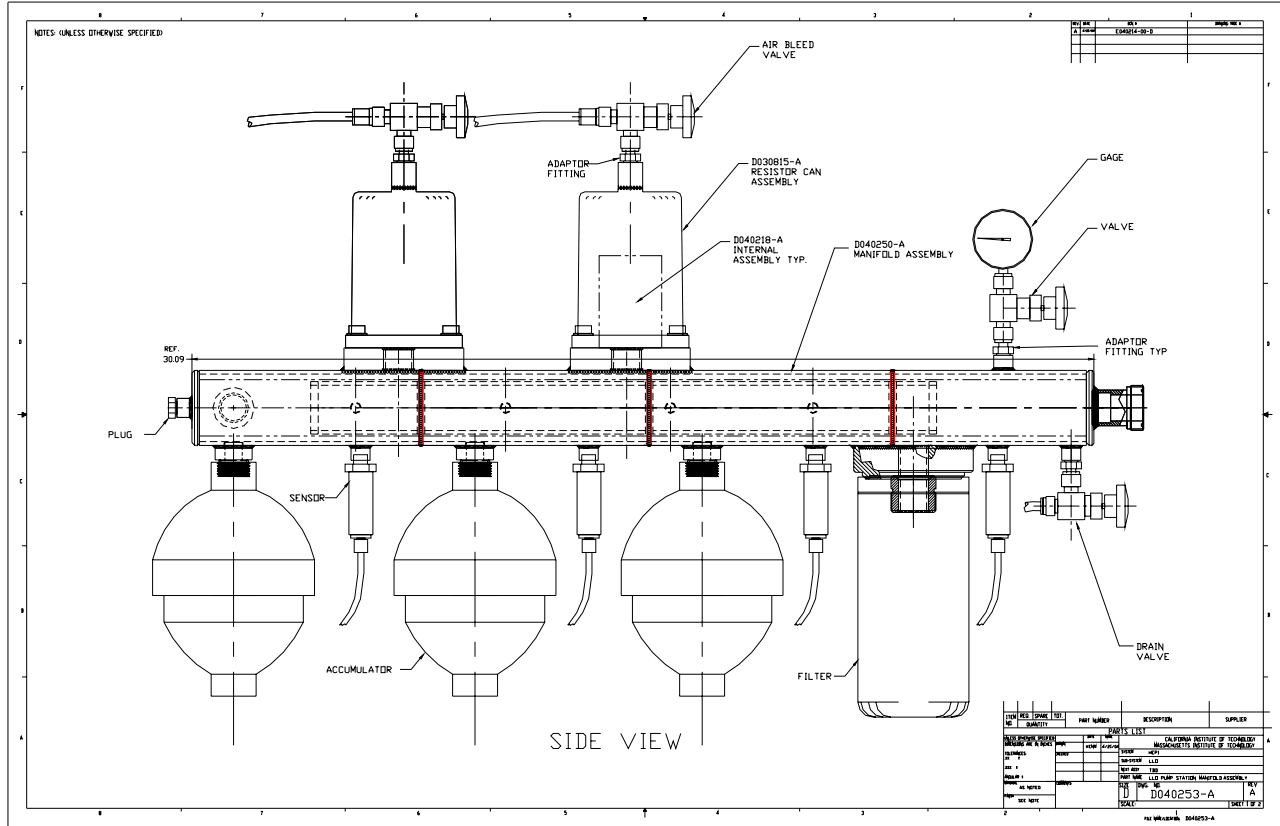
9.1 DESCRIPTION

There are two black cylindrical resistor stacks located on the main pressure manifold on the top side.

These two resistors have valves located on the top their purpose is to allow trapped air to be removed from the system by migrating to this 'high point'. The air can escape when the valve is opened slightly and flow thru a translucent tube into a holding container. This purge operation should be done frequently every two days at start up and then every week for the first two months after startup. When no air is seen entering the translucent tube when the resistor valve is opened, it can be assumed there is no entrained air in the fluid.

This procedure should be followed when the system is opened and serviced or filters are changed or any operation that allows air to enter the system at any point.

10 MANIFOLD SIDE VIEW



11 MANIFOLD DRAIN

There is a manifold drain valve located near the end of the manifold, opposite the manifold pressure analog dial gauge, on the bottom side. This valve allows fluid in the resistor cover cans and the manifold to be drained, also most of the fluid in the pump supply circuit can be drained by opening this valve, and manually rotating the pump.

12 RELIEF VALVE

At the vertex station are two pressure relief valves in the local line plumbing, and one at each end station. This relief valve has a pressure adjustment thimble with a numbered index around the thimble base for setting a pop off pressure setting. Vendor: Mc Master Carr

13 ANALOG DIAL PRESSURE GAUGE

For convenience there is an analog 0-160 psi dial gauge located at the exit end of the manifold. This gauge is in an assembly with a shut off valve, if the gauge needs to be changed the fluid flow can be shutoff by this valve, and the gauge replaced.

14 LLO VERTEX PUMP STATIONS

Three in continuous operation one as backup.

