

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
- LIGO -
CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Technical Note LIGO-E980026-A - W 2/27/98

**SPECIFICATION FOR
DC POWER SUPPLY ASSEMBLY 'B2'**

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ASSEMBLY 'B2'

DESCRIPTION

Containerized DC power supply complete including primary conduit, transformer frame, primary transformer, 480 Volt service disconnect, DC power supply metering, grounding and miscellaneous equipment according to this specification and reference documents.

REFERENCE DOCUMENTS

This section includes reference documents

B2	Portable DC Power Supply with 277/480 Volt, 3 Phase, Metered Service	D980079
	Panel 'B2' Riser Diagram	D980087
	Panel 'B2' Metering Cabinet	D980088
	Bill of Materials	D980089
B2-1	277/480 Volt, 1000 Amp Panel 'B2'	E980008
F3	500 KVA Transformer Mounting Frame	D980076
G	DC Shunt Cabinet	D980080
	Copper Splice Plate Detail	D980081
	Copper Splice Plate Detail	D980082
	Bill of Materials	D980054

COORDINATION

- A. Provide labor and equipment to assemble the DC power supply container as shown on drawings, described in equipment lists and as specified herein. Provide all material, not specifically listed as provided by LIGO on material lists for a complete assembly. Completed assembly installation shall where required, be inspected and approved by a Washington State Department of Labor and Industries representative and ready for operation.
- B. Provide labor, equipment and necessary miscellaneous materials to disconnect portable service assembly. Disconnected assemblies shall be relocated and connected at a new location at the LIGO facility as specified on plan drawings and as directed by LIGO. The Contractor shall provide the necessary means to provide for safe and efficient transport of assemblies to the new location.

PRODUCTS

- A. All equipment shall be new, UL approved with necessary modifications required for complete installation.
- B. See material lists for type and manufacturer of required equipment.

STEEL FABRICATION AND GALVANIZING

GENERAL

- A. The supplier shall furnish all materials and shall provide all labor tools and equipment necessary to fabricate, galvanize and deliver the transformer mounting frame.

MATERIALS

- A. All materials furnished by the supplier shall be new. Supplier shall furnish evidence as to the kind of quality of materials supplied.
- B. Structural steel shall be of the type specified on the drawings and shall meet the requirements of ASTM Specification A36 for grade and strength. The raw steel prior to fabrication and galvanizing shall be relatively free of surface contamination.
- C. The zinc galvanizing coating shall conform to specification ASTM B6 for zinc requirements.

FABRICATION

The steel shall be cut, welded and drilled according to the schedule and details on the drawings. Welds shall be continuous, free from voids, smooth and free of splatter. The finished pieces shall be dimensionally correct to within the stated drawing tolerance. Welds shall be made in such a manner as to minimize thermal distortion (bowing) of steel members.

GALVANIZING

The fabricated steel shall be zinc hot dip galvanized according to ASTM A-123-89a "Standard Specification for Zinc Coatings on Iron and Steel". The galvanized steel shall be tested for coating thickness and inspected per the requirements of A123 Section 7 and Section 8.1, "Test and Inspection by Galvanizer".

DESIGN COORDINATION

If, during the course of fabrication, the supplier notes inconsistent or incorrect design information on the drawings, the supplier shall immediately notify LIGO. LIGO shall direct what corrective course of action shall follow.

INSTALLATION

- A. Contractor shall fasten LIGO furnished 500 kVA transformer to contractor supplied transformer mounting frame. Mounting frame shall be, manufactured from ASST. A37 steel, welded construction, hot-dipped galvanized after fabrication. Contractor shall supply and install cooling fan to fins of 500 KVA transformer. Cooling fans shall be connected to adjacent 120 volt power supply by means of cord and plug attachment.
- B. Contractor shall mount LIGO furnished sub-assembly Panel 'B2-1' in container as shown on drawings. Panel shall be securely mounted to container interior wall.

- C. The Contractor shall install secondary service entrance conduit and conductor between panel and 500 KVA transformer. Conduit system shall be UL approved flexible watertight conduit and fittings sized as indicated on riser diagram. Service entrance conductor shall be of a type recognized by the N.E.C. as approved as service entrance, 600 V minimum, type XHHW copper. Conduit and conductors shall be sized as indicated on riser diagram.
- D. Conductors at panels shall be terminated using properly sized solderless lugs or connectors. The Contractor shall leave sufficient conductor length at secondary compartment of transformer for termination by the serving utility.
- E. The Contractor shall provide UL approved flexible watertight conduit and fittings sized as indicated on riser diagram between 54 kV transformer frame and 500 kV transformer mounting frame. The 15 kV conductor shall be supplied and installed by serving utility. Coordinate installation with serving utility.
- F. The Contractor shall properly ground main disconnect switches, conduit systems, supports, cabinets, equipment, fixtures, etc., and ground circuit conductor in accordance with latest issue of National Electrical Code. Provide all bonding jumpers and wire, grounding bushings, clamps, etc. required for complete grounding. Route conductors to provide shortest and most direct path to grounding electrode system. Install all ground conductors in conduit except where specified or noted otherwise.

DC POWER SUPPLY

- A. The Contractor shall bolt LIGO furnished DC power supply in shipping container as shown. The Contractor shall supply labor, equipment and materials to route feeder conduit and conductors between service disconnect and DC power supply. The conduit system shall be UL approved electrical metallic tubing (EMT) and compression type fittings sized as indicated on riser diagram. Conduit shall be securely fastened to container interior wall or ceiling using approved conduit straps. The Contractor shall provide such labor and materials required to field modify top of DC power supply by fabricating and installing an adapter plate for attachment of feeder conduits. (Top of power supply has existing penetrations that may hinder conduit attachment) Feeder conductor shall be of a type recognized and approved by the N.E.C., 600 V minimum, type THWN copper. Conduit and conductors shall be sized as indicated on riser diagram.
- B. The Contractor shall provide and install exhaust duct from fans on back of DC Power Supply to exterior of container. Exhaust duct shall incorporate damper and exterior metallic diffuser. The Contractor shall cut penetrations in exterior of container as required for installation of duct system.

- C. The Contractor shall provide and install Type 'W' DC cabling from DC Power Supply to DC shunt Cabinet as shown on drawings. DC cables shall penetrate container wall through contractor supplied cord connectors as shown on drawings. Cables shall be supported by attachment to container within 18" of cable container wall entry and DC Power Supply termination location. DC Power supply terminations shall be bolted connections as shown. Connection bolts used for current carrying part shall be tightened to a nominal torque value of 40 ft/lb. After DC Power Supply termination are made and torqued, uninsulated parts shall be insulated to 600 Volts with shrink-wrap type or other approved insulative material.
- D. The Contractor shall install LIGO provided in use indicator light on top of container as shown on drawings. The Contractor shall install 1/2" E.M.T. conduit system and #12 conductor between indicator and DC Power Supply as required. The indicator light conductors shall be connected to terminals located on DC Power Supply as directed by LIGO.
- E. The Contractor shall provide ratchet type shipping straps and container attachment points for use as restraints when container is moved between bakeout location or packaged for shipment to other offsite location. The Contractor shall install shipping straps and blocking for preparation for transport as directed by LIGO.

DC SHUNT CABINET

- A. The Contractor shall supply labor, equipment and materials not specifically called out as LIGO furnished to install DC shunts, stand off insulators, splice plates, terminations, and related equipment in Shunt cabinet as shown on drawings. The Contractor shall firmly attach DC Shunt Cabinet to exterior of container as shown on drawings. Bolted connections for type 'W' cable terminations, splice plates and stand off insulators shall be tightened to a nominal torque value of 40 ft/lb. The Contractor shall fabricate or have fabricated the required splice plated as shown

METERING

- A. Where required for panel type B2 the Contractor shall supply labor, equipment and materials not specifically called out as LIGO furnished to install wire, conduit, terminals, test switches etc. for installation of metering cabinet as shown on drawings. The Contractor shall surface route 1" EMT with 12 #12 THHN conductors from Panel B2 to metering cabinet. The Contractor shall terminate conductors as shown on drawings. "CAUTION" Because of the current transformers the test switches in cabinet and in Panel B2 must remain in the shorted position unless LIGO has installed its portable metering equipment in Metering cabinet.

LIGHTING, OUTLETS, DEVICES

- A. Where required the Contractor shall supply labor, materials and equipment to install lighting fixtures, outlets, devices etc. to interior of container as shown on drawings. All conduit shall be E.M.T. surface mounted with appropriate straps and mounting devices. Outlets shall be mounted 18" above floor of container. Lighting and shut down switches shall be mounted 48" above container floor. Install lighting fixtures equal to those specified on appropriate material lists. 120 Volt power for container shall be obtained through the use of contractor installed cord and plug attachment to adjacent 120/208 Volt A1 or A3 type panel.

WIRING

- A. All conductor shall be installed in strict accordance with latest requirements of NEC.
- B. Label each service and feeder conductor with colored tape at each end to indicate phase, Black - A phase, Red - B phase, Blue - C phase, the neutral shall be color coded white.
- C. All wiring inside panels shall be neatly cabled and tied to Engineer's satisfaction.

TESTING AND CLEANUP

- A. Upon completion of this portion of the work the Contractor shall thoroughly clean all equipment and premises of any tools, crates, boxes, wire, etc., related to the electrical work. The Contractor shall perform all tests required to assure a complete safe operating system, including but not limited to all tests required by other sections of this specification.

END OF SECTION