



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

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LIGO

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ISC RF System: Acceptance Documentation

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This is an internal working note
of the LIGO Laboratory.

California Institute of Technology
LIGO Project

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1 Requirements documentation

The RF system components included in this package are:

- RF sources
- RF distribution amplifiers
- RF signal distribution (cabling)
- Delay line phase shifters
- Harmonics generators
- Frequency doublers and dividers
- RF preamplifiers
- Low Noise VCOs
- RF diplexers/diplexer-amplifiers

Documentation for all of the above is found in the DCC tree, under:

aLIGO Document Tree > aLIGO, ISC > aLIGO, ISC, Electronics > aLIGO, ISC, Electronics, RF System:

[LIGO-E1200109](#)

(Note that Demodulators and PFDs are included in this tree node, but they are reviewed separately for acceptance.)

The specifications for each component are found in the tree for that component. For example, for the RF Source ([E1200110](#)), the specification is the first related document: [LIGO-E1200124](#).

2 Design overview and detailed design documentation

a) *Final Design Document (FDD)*:

For each of the components, the specification DCC entry serves also as the final design document. For the RF distribution design, see [LIGO-E1100591](#).

b) *Review reports*:

- Review report for sources, distribution amps, and phase shifters: [LIGO-T0900259](#)
- The harmonic generator design was reviewed, but no report written. The other modules were not reviewed (other than within ISC).

c) *Supporting design documents*: Everything is in the DCC tree, under the node:

aLIGO Document Tree > aLIGO, ISC > aLIGO, ISC, Electronics > aLIGO, ISC, Electronics, RF System

d) *Drawings*: Schematics and assembly drawings are all linked in the DCC tree.

e) *Bill(s) of Materials (BOM)*: For each module, the parts list is found within the assembly drawing for that module; e.g., [LIGO-D1000124](#) for the distribution amplifier.

f) *Interface control*: none

g) *Software*: TwinCAT libraries exist for: RF Amplifiers, Dividers and Doublers; Low Noise VCO; Delay Line; PLL for Low Noise VCO. They are all linked in the root DCC entry for each module

h) *Design source data*: For each module, the assembly DCC file card includes a zip-file containing the design source data ([LIGO-D1000124](#) for the distribution amplifier).

3 Materials and fabrication specification

No special materials.

4 Parts and in-process spares inventoried

The root DCC entry for each module type includes a file that contains the inventory details: serial numbers, interferometer, location, etc. (look for a filename that contains the word ‘Count’). All modules are also entered in ICS.

5 Assembly procedures

There are no assembly procedures. The wiki pages for many of the modules include photographs of the chassis that show the interior assembly.

6 Installation procedures

None.

7 Test documents

Test procedures are linked in the root DCC entry for each module (e.g., test procedure for the RF sources is E1000059, which is linked under E1200110: **aLIGO, ISC, RF System, RF Source**).

Test reports are linked in the root DCC entry for each module (e.g., test reports for the RF sources are in E1100511 and E1300821, which are linked under E1200110: **aLIGO, ISC, RF System, RF Source**).

8 User interface software

Other than the TwinCAT libraries mentioned above, there is no user software.

9 Operation Manual

None.

10 Safety

All ISC electronics is in conformance with the LIGO [EEIP](#) (Electrical Equipment Inspection Program). This program was implemented to protect personnel from electrical hazards.