

LIGO Engineering Change Request (ECR)

ECR Title: PUM Driver DAC Filter Frequency Shift **DCC No: E2100204-v3**

Date: 18 June 2021

Requester: Richard Abbott **Impacted Subsystem(s): SUS** **IJET Entry Ticket 18986**

Description of Proposed Change(s): A frequency scaling to increase the input filter corner frequencies is proposed. A factor of 5 reduction in resistor values associated with D070483-v7, R5 & R6 from 7.5k to 1.5k, and R8 from 1.5k to 300 ohms. An analysis of the frequency response and associated fitted poles and zeros has been performed and is available in LIGO-E2100205.

Reason for Change(s) / Motivation: (FRS entry seems unneeded in this case, IJET has been entered) The proposed changes will allow greater control authority at intermediate frequencies around 10Hz. This provides additional margin for actuation allowing both observatories to use the same circuit topology and explore optimal hardware filter states for low noise operation. LLO Log Entry location for additional information:
<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=54792>

Motivation / Projected benefit (check all that apply):

- Increased Sensitivity
- Decreased Glitch Rates
- Re-engineering to cope with obsolescence

- Re-engineering to cope with sourcing issues
- Re-engineering for technology insertion
- Re-engineering for life extension of aging components/subsystems

Rough Estimated Cost (Materials, Supplies, Equipment): The cost associated with changing the hardware is insignificant as only three surface mounted resistors in each chassis implementation will be changed.

Rough Estimated Labor (Hours only): The bulk of the labor is in harvesting the associated chassis, making the changes, and measuring the transfer functions. It will probably take a half day per instance unless assembly line work is enabled.

Rough Estimated Schedule: This work should be completed and tested well in advance of the next observing run (O4) to allow scheduling and evaluation flexibility

Schedule Impact Estimate: None

Nature of Change (check all that apply):

- Safety
- Correct Hardware
- Correct Documentation

- Improve Hardware
- Improve Software
- Improve/Clarify Documentation
- Change Interface
- Change Requirement

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Importance:

- Desirable for ease of use, maintenance, safety
- Desirable for improved performance, reliability
- Essential for performance, reliability
- Essential for function
- Essential for safety

Urgency:

- No urgency
- Desirable by date/event:
- Essential by date/event: O4 Preparations Spring 2021
- Immediately (ASAP)

Impacted Hardware (select all that apply):

- Repair/Modify. List part & SNs: All PUM Driver Chassis at LHO and LLO consisting of at least:

Referenced by:

- LIGO-S1101562-v5: [PUM Coil Driver Chassis](#)
- LIGO-S1200471-v1: [PUM Coil Driver Chassis](#)
- LIGO-E1100337-v3: [Suspension Electronics Drawing Tree](#)
- LIGO-S1101561-v7: [PUM Coil Driver Chassis](#)
- LIGO-S1200470-v7: [PUM Coil Driver Chassis](#)
- LIGO-S1101564-v8: [PUM Coil Driver Chassis](#)
- LIGO-S1200472-v6: [PUM Coil Driver Chassis](#)
- LIGO-S1000346-v9: [PUM Coil Driver Chassis](#)
- LIGO-S1101563-v13: [PUM Coil Driver Chassis](#)

Impacted Documentation (list all drawings, design reports, test reports, specifications, etc.): PUM Driver Schematic (D070483-v7), associated test procedure

Impacted Software (list all that apply):

- Scrap & Replace. List part & SNs:
- Installed units? List IFO, part & SNs: _____
- Future units to be built

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Disposition of the proposed change(s):

The disposition of this proposed engineering change request is to be completed by Systems Engineering and indicated in the “Notes and Changes” metadata field in the DCC entry for this ECR. The typical dispositions are as follows:

- **Additional Information Required:** in which case the additional information requested is defined. The ECR requester then re-submits the ECR with the new information using the same DCC number for the ECR but with the next version number.
- **Rejected:** in which case the reason(s) for the rejection are to be given
- **Approved**
- **Approved with Caveat(s):** in which case the caveat(s) are listed
- **TRB:** the ECR is referred to an ad-hoc Technical Review Board for further evaluation and recommendation. It is the System Engineer’s (or designee’s) responsibility to organize the TRB. The System Engineer (or designee) then makes a technical decision based on the TRB’s recommendation. Links to the TRB’s documentation (charge, memos, final report, etc.) are to be added to the “Related Documents” field for this ECR.
- **CCB:** a change request for approval of additional funds or schedule impact is to be submitted to the Configuration Control Board. Links to the CCB’s documentation (CR, etc.) are to be added to the “Related Documents” field for this ECR.

Concurrence by Project Management:

Acknowledgement/acceptance/approval of the disposition is to be indicated by the electronic “signature” feature in the DCC entry for this ECR, by one the following personnel:

- Systems Scientist
- Systems Engineer
- Deputy Systems Engineer