

Advanced LIGO Engineering Change Request (ECR)

ECR Title: Building EOM/AOM Driver

DCC No: E1500135-v1

Date: 2/18/2015

Requester: Daniel Sigg

Impacted Subsystem(s): ISC

Description of Proposed Change(s): Implement the EOM/AOM driver units described in [E1400445](#) on the EOMs driving the two main RF modulation sidebands. This is [integration tracker issue 937](#).

Reason for Change(s):

There isn't currently a dedicated EOM driver for the main modulations; we just use fixed outputs of the RF distribution. We removed this item from ISC scope fairly early on in the project, because it wasn't clear that it would be important, at least for early operation, so we dropped it to get everything else done.

Now we find that we need a dedicated EOM driver for two reasons:

- 1) Recent LLO measurements showed that the RF oscillator AM noise was only a factor of a few below the noise floor. The new driver has an AM stabilization servo to deal with this issue.
- 2) For lock acquisition we need the modulation index to be (2-3x) higher than the design value for final operation; however, with the current setup there is no way to reduce the modulation index after acquisition -- the new driver will allow this.

Estimated Cost: \$40k for 9 EOM/AOM drivers, 3 RF AM Measurements units, associated EtherCAT interface and some cabling.

Schedule Impact Estimate: none. The change needs to be implemented by the start of O1.

Nature of Change (check all that apply):

- Safety
- Correct Hardware
- Correct Documentation

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

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: O1
- Immediately (ASAP)

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Impacted Hardware (select all that apply):

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

Impacted Documentation (list all dwgs, design reports, test reports, specifications, etc.):

E1400445 and related
[D1200666](#), [E1200408](#), [T1100472](#), [E1300079](#),
[D1100683](#), [E1300688](#), [E1100591](#)

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