*MEMORANDUM*

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DATE: December 13, 2013

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| TO: | ISC team |
| FROM: | Daniel Sigg, Rich Abbott |
| SUBJECT: | RF Splitter/Filters for LSC-AS\_B and LSC\_POP\_B |
| Refer to: | LIGO-E1300899-v2 |

The ASAIR\_B and POPAIR\_B LSC chains look at the $2f$-signals of the main and secondary modulation frequency at $2f$ and $10f$. These are strong signals which don’t require rejection of close-in lines. However, the demodulation of the $2f$-signal will also demodulate the $10f$-signal with an efficiency which might be as high as 20%.

As a consequence we implement internal filters for the associated demodulators. The $2f$-signal demodulator will be equipped with a 20 MHz low pass filter, whereas the $10f$‑signal will be equipped with a high pass filter.

The demodulator patch panels, D1100956, in rack R2 for POPAIR\_B and REFLAIR\_B, and in rack R3 for ASAIR\_B are equipped with TNC bulkhead feedthroughs (Ch 1, Ch 3 and Ch 3, respectively). Two insulating bushings are used per bulkhead. Remove the unneeded TNC to SMA cables from the patch panel.

The sketch below indicates how the SMA adapters and cables are connected to the demodulators for POPAIR\_B and ASAIR\_B. It is important that the tee is mounted at the demodulator channel with the lower frequency. A custom TNC-SMA cable connects from the patch panel to the demodulator side.

BOM (for 3 ifo):

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| Qty | Item | Distributor | Description |
| 6 | PLP-21.4+ | Mini-Circuits | Low pass filter for $2f$-signal |
| 6 | PHP-100+ | Mini-Circuits | High pass filter for $10f$-signal |
| 6 | 501-1254-ND | Digi-Key | SMA tee adapter female-female-female |
| 6 | ACX1240-ND | Digi-Key | SMA barrel, male-male |
| 6 | J4106-ND | Digi-Key | SMA cable, 6”, straight-straight |
| 9 | ACX2020-ND | Digi-Key | TNC bulkhead feedthrough |
| 18 | A24479-ND | Digi-Key | Insulating bushing |

Mounting:

Cable

Cable from TNC bulkhead

$10f$**-signal demodulator**

$2f$**-signal demodulator**

Directly attached to Ch2/4 of demodulator

Directly attached to Ch1/3 of demodulator

SMA female

SMA male

Tee

Barrel