
[Report from Subgroups]

Analog Electronics Subsystem

Advanced Materials Science, Univ. of Tokyo

Shigenori Moriwaki

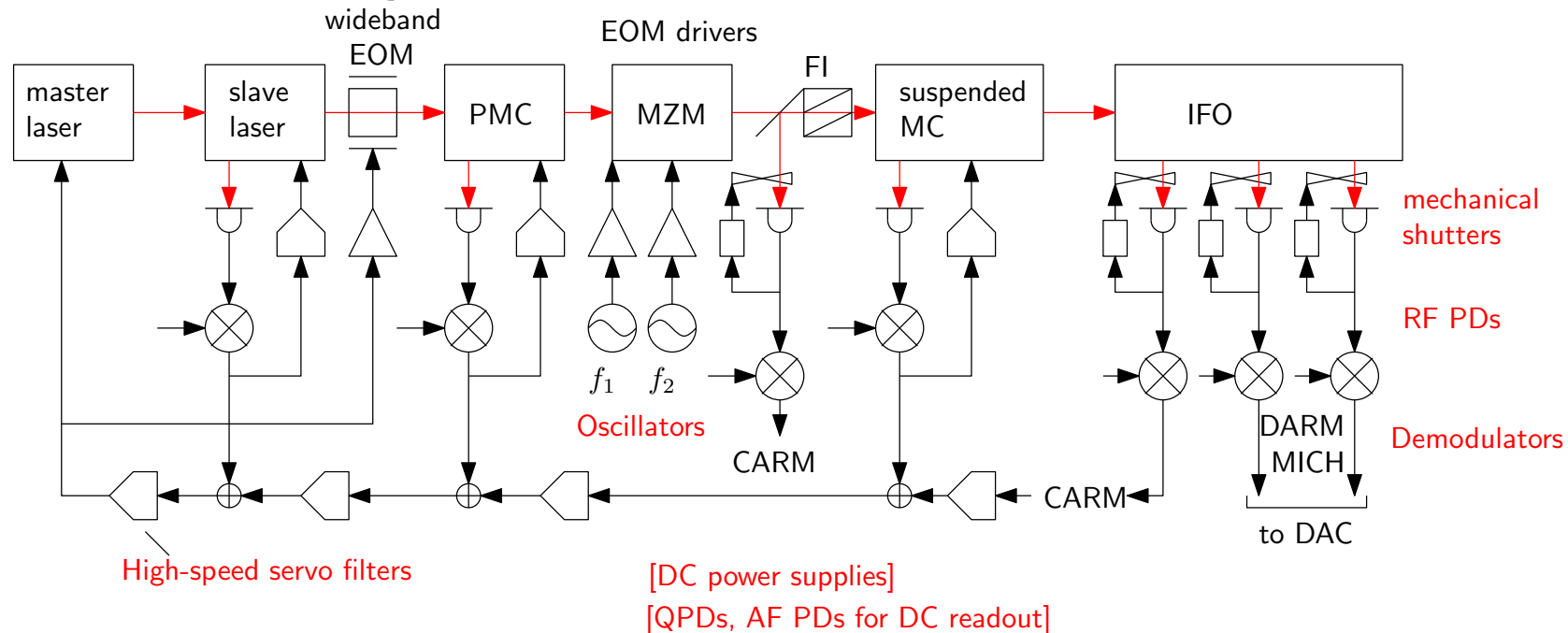
Current members:

- Yoichi Aso
- Souichi Telada
- Osamu Miyakawa
- Shinji Miyoki

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Tasks of Analog Electronics Subsystem



Design:

- Common electronic/mechanical interfaces

Components to be provided:

- DC power supplies
- Photo detectors
- Actuator drivers
- RF oscillators, drivers and demodulators
- conditioning filters for ADC/DAC
- High-speed servo control out of the digital control subsystem

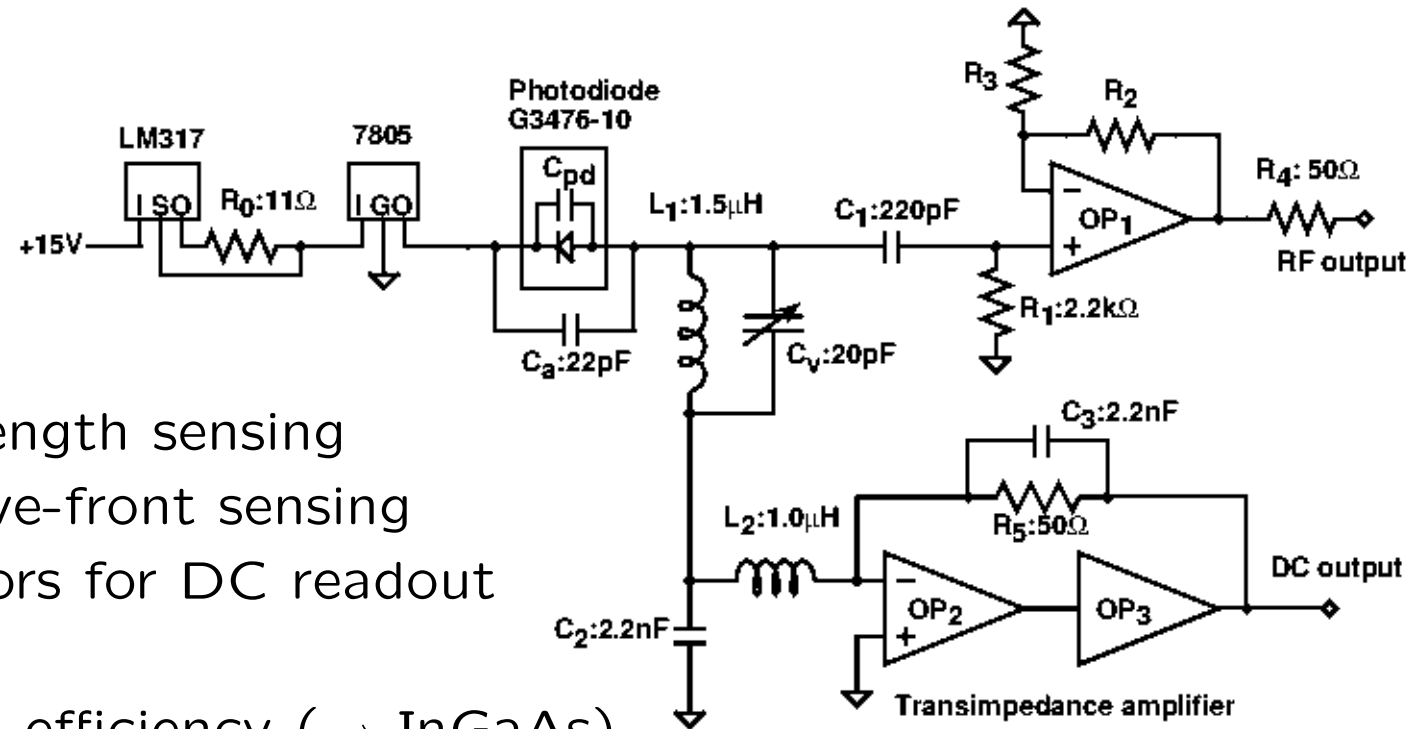
Components to be provided: detailed

- Power supplies
 - Bipolar 24 V power supply
 - 24-to-15 V series regulator
 - 150-180 V high-voltage supply for QPD bias, coil driver, piezo actuator
- Photo detectors
 - RF PDs for length sensing
 - QPDs for wave-front sensing
 - Photo detectors for DC readout
 - (CCD imaging monitors)
- Actuator drivers
 - Piezo actuator drivers
 - Coil drivers
 - TEC (Peltier) driver
- RF Oscillators, distributors, EOM drivers and demodulators
- Conditioning filters for ADC/DAC
- High-speed servo control filters

Photo detectors

Example: TAMA300 RF PD

N. Mio et al., Jpn. J. Appl. Phys. **40**, p.426 (2001)



types:

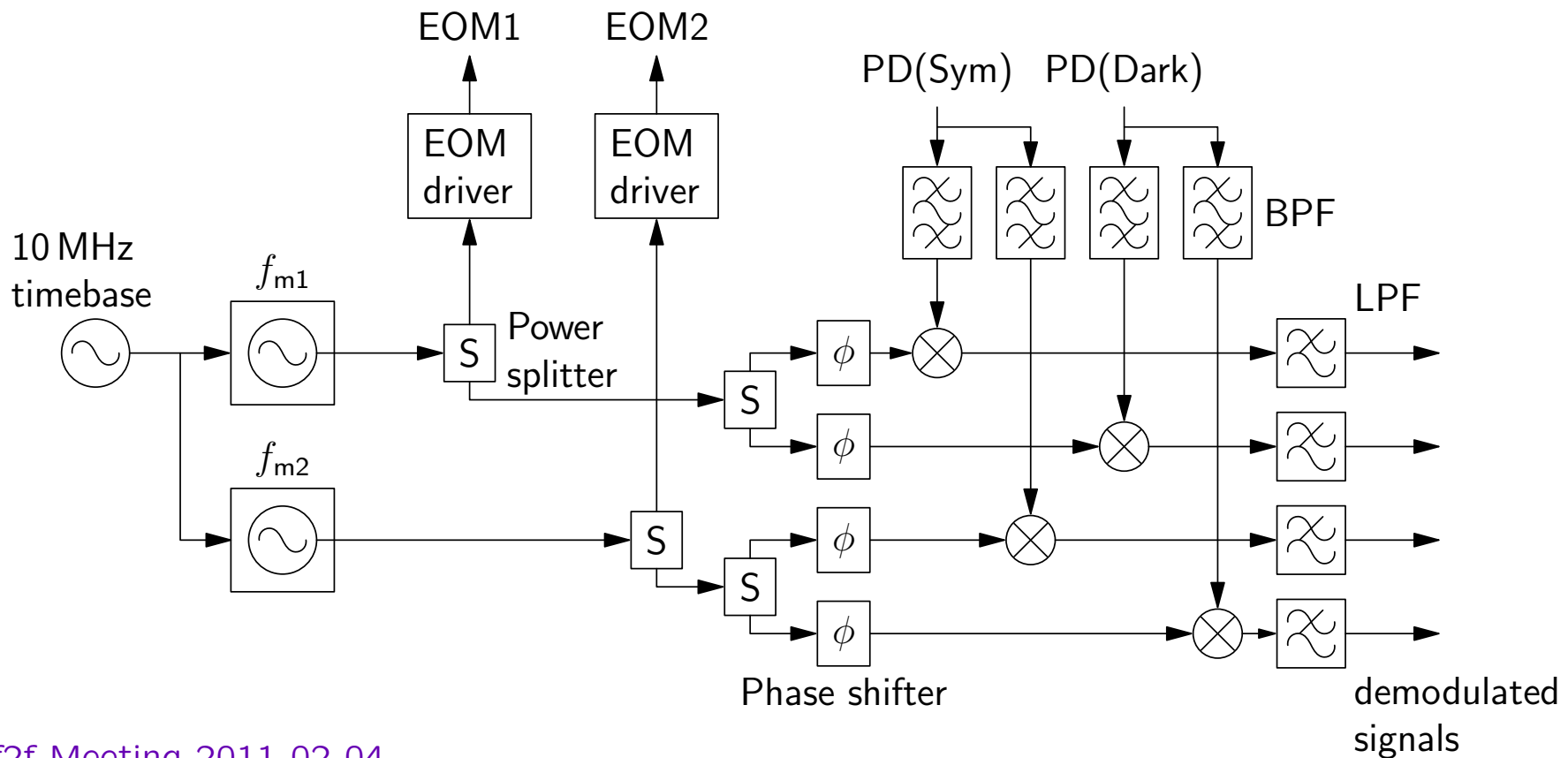
- RF PDs for length sensing
- QPDs for wave-front sensing
- Photo detectors for DC readout

Requirements:

- high quantum efficiency (\rightarrow InGaAs)
- Larger aperture than TAMA ϕ 1 mm diode: \rightarrow 2-3 mm? (TBD)
- Mechanical shutter for photodiode protection
- Vacuum compatibility

RF oscillators, EOM drivers and demodulators

- Low-noise oscillators
 - 11.25 MHz and 45 MHz PM (or AM, SSB...) for main IFO
 - 10-50MHz PM for MC
- Distributors with stable delay time
- Demodulators with remote phase tuning



Electronic/mechanical interfaces: modules

To avoid **Electromagnetic noise**...

DC Power supply:

- **Dropper type** power supply using series (linear) regulator:
Commercial product for **general circuits**
Low-ripple supply for **special circuits** (PD bias, ...)
- **Switching-mode** power supply
for **LD driver, ...**

Circuit modules:

- Standard EIA 19-inch open racks
- General 19 inch rack modules with D-sub power supply
- NIM crates, NIM modules

Hot plugging is possible!

Vertical PCB arrangement helps cooling.

We will make custom crates with ± 24 V enhancement and separated transformers.

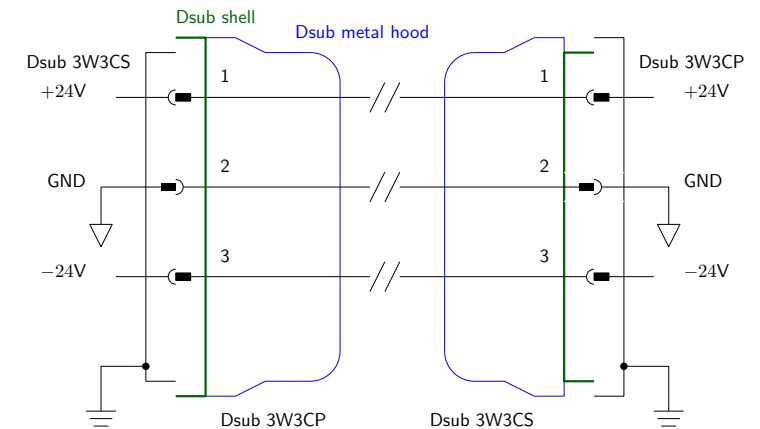
Electronic/mechanical interfaces: connectors and cables

DC supply cable:

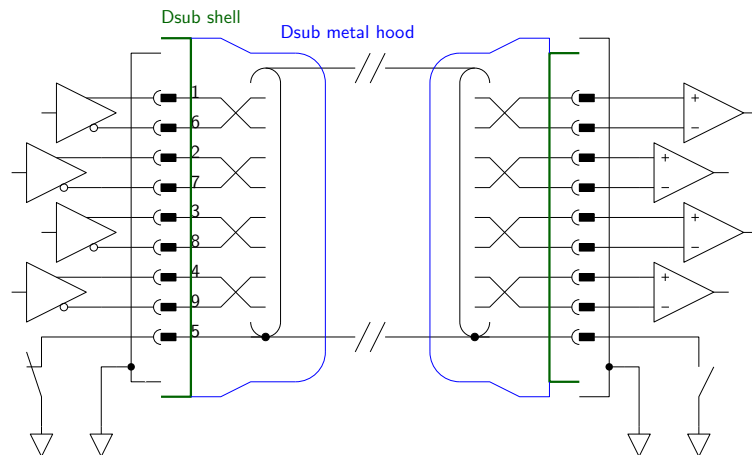
- D-sub 3W3 connectors and cables without shield

Signal cable:

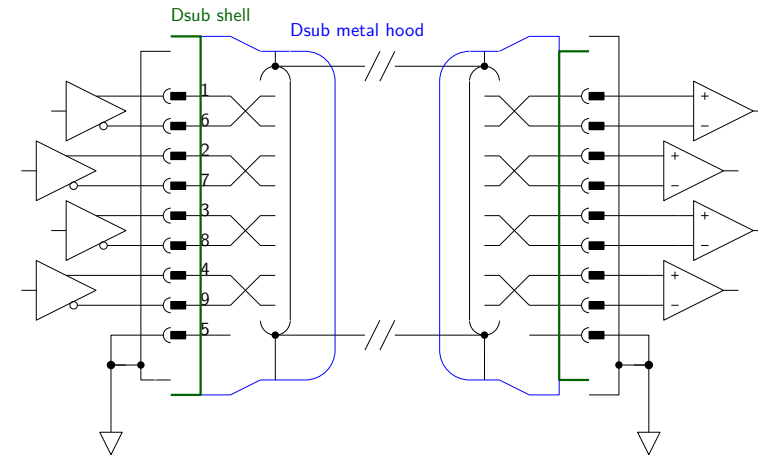
- SMA connectors for RF signals
- D-sub connectors and shielded twist pair cables for AF signals



±24V DC supply cable



Shield grounding through jumper switches



double-sided shield grounding (optional shield isolation adapter)

Summary

- Components to be provided:
 - DC power supplies
 - Photo detectors
 - Actuator drivers
 - RF oscillators, drivers and demodulators
 - Conditioning filters for ADC/DAC
 - High-speed servo control filters
- Making LCGT standard for Electronic/mechanical interfaces:
Selecting connectors and cables for ...
 - various levels of signals
 - DC power supplies(TBD)