

Tentative HAM SAS internal cabling list and connections scheme.

LIGO Document E060008-00-E

The cabling is assumed to be done with commonly shielded 12 twisted pair cables ending on both sides with Peek Isolated 25 pin sub-D UHV connectors http://www.accuglassproducts.com/Multi_Pin/D_Main.htm

Each LVDT coil (emitter or receiver) or actuator coil is connected via 2 wire wrap pins, connected to the wires by means of female sockets crimped on the pair wires.

Each accelerometers is connected via 9 pin sub-D UHV connector.

Each stepper motor is connected via 9 pin sub-D UHV connector.

The coil (or capacitor) driver current to the LVDT and accelerometers cannot go in the same cable of the sensing wires, but the accelerometer sensing wires can be mixed with the accelerometer force coil wires because the driving is at 100 KHz and the force coil is Dc to low frequency.

List of Cables:

Cable 1: 8 (+2 witness) pairs for LVDT coil driving (H+V, 12 kHz)

Cable 2: 8 (+2 witness) pairs for LVDT sensing (H+V, 12 kHz)

Cable 3: 8 (+2 witness) pairs for accelerometer capacitive bridge driving (H+V, 100 kHz)

Cable 4: 4 pairs for accelerometer capacitive bridge sensing (H, 100 kHz)
4 pairs for accelerometer actuator driving (H, DC to 1 kHz)

Cable 5: 8 pairs for the main Voice Coil actuator driving (DC to 100 Hz)

Cable 6: 4 (+2 witness) pairs for accelerometer capacitive bridge sensing (V+W, 100 kHz)

4 (+2 witness) pairs for accelerometer actuator driving (V+W, DC to 1 kHz)

Cable 7: 8 pairs for the horizontal tuning stepping motors (DC 1.5 A)

Cable 8: 8 pairs for the vertical tuning stepping motors (DC 1.5 A)

End point of cables

ground platform:

cable 1: LVDT drive, H1 H2 H3 H4 W1 W2

Cable 5: Voice Coil actuator driving H1 H2 H3 H4

Cable 7: stepping motors H1 H2 H3 H4

spring box:

cable 1: LVDT drive, V1 V2 V3 V4

Cable 2: LVDT sensing, H1 H2 H3 H4

Cable 3: accelerometer capacitive bridge driving H1 H2 H3 H4

Cable 4: accelerometer capacitive bridge sensing H1 H2 H3 H4

accelerometer actuator driving H1 H2 H3 H4

Cable 5: Voice Coil actuator driving V1 V2 V3 V4

Cable 8: stepping motors V1 V2 V3 V4

optical bench:

Cable 2: LVDT sensing V1 V2 V3 V4 W1 W2

Cable 3: accelerometer capacitive bridge driving V1 V2 V3 V4 W1 W2

Cable 6: accelerometer capacitive bridge sensing V1 V2 V3 V4

accelerometer actuator driving V1 V2 V3 V4

Cable terminations and fan-out pattern.

Cable 1 would end (connecting with the 25 pin sub D radiating connector) on the ground platform

Cable 2 would end (connecting with the 25 pin sub D radiating connector) on the spring box

Cable 1 and 2 terminate in a sub-D connector fanning out with 12 individual pairs, roughly 1.5 m long, ending with piggy tail wires each crimped to female sockets.

Cable 3 and 4 would end on the spring box, in an accelerometer break out box equipped with:

- Two input 25 pin sub-D connectors for cable 3 and 4
- Four 9 pin sub-D connector each carrying the triple individual pairs connecting to the four horizontal accelerometers H1 H2 H3 H4
- A 25 pin sub-D connectors for the lines of cable 3 ending on the optical bench (V1 V2 V3 V4 W1 W2), Cable 3-A

Cable 5 would end on the base platform, in a voice coil break out box equipped with:

- A 25 pin sub-D connectors for cable 5
- A 9 pin sub-D connector each carrying four individual pairs connecting to the four horizontal actuator coils H1 H2 H3 H4
- A 25 pin sub-D connectors for the lines of cable 5 ending on the spring box (V1 V2 V3 V4 W1 W2), Cable 5-A

Cable 5-A would end on the spring box connecting to a 25pin sub-D connector carrying the four individual pairs connecting to the four vertical actuator coils V1 V2 V3 V4

Cable 3-A and 6 would end on the optical bench, in an accelerometer break out box equipped with:

- Two 25 pin sub-D connectors for cable 3-A and 6
- Six 9 pin sub-D connector each carrying the triple individual pairs connecting to the four vertical accelerometers V1 V2 V3 V4 and two witnesses W1 and W2

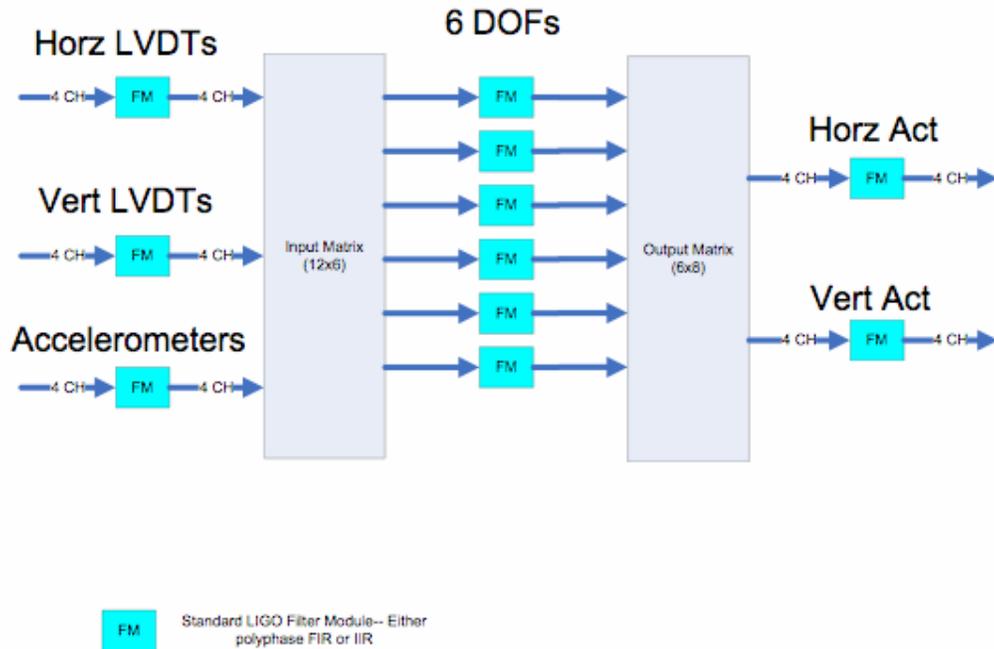
Cable 7 would end on the ground platform in a stepper motor break out box equipped with:

- a 25 pin sub-D connectors for cable 7
- Four 9 pin sub-D connector each carrying the double pairs connecting to the four horizontal stepper motors H1 H2 H3 H4

Cable 8 would end on the spring box in a stepper motor break out box equipped with:

- a 25 pin sub-D connectors for cable 8
- Four 9 pin sub-D connector each carrying the double pairs connecting to the four horizontal stepper motors V1 V2 V3 V4

LASTI HAM SAS Digital
Controls Block Diagram



List of analog driver units

Readout Module	chan. /mod.	NIM width	Current req.	@	# of modules	# slots
LVDT	4	single	120 mA	± 24 V	3(+s)	3
(Accelerometer)	3	double	230 mA	± 24 V	3(+s)	6)
Coil	2	double	2A/ch	± 24 V	4(+s)	8
Stepper driver	4	single	2A/ch in use	± 24 V	2(+s)	2

NIM crates two.

Characteristics of Standard LIGO cables

PN 600334. Kapton cable assembly 13 feet long:

A. Individual Wire:

28 AWG 40 strands of .050mm bare copper wire)

Insulation (2 layers Kapton tape 0.0012 inch, at 50% minimum overlap and 1 layer Kapton resin coating, thickness 0.001).

Bare copper OD 0.015 inch (nominal), 2 layers Kapton tape 0.024/0.027 OD and resin coating 0.026/0.029 ID.

600 Volt, 8.0 KV per or 5.7 KVAC high frequency

B Cable

12 twisted pair 4-5 turns per inch.

40 AWG silver plated copper braided shield, 90% minimum coverage.

Braid angle 24 deg. from cable center line, 9.7 picks/inch, 24 bobbins with 10wires per bobbin.

C Outer Braid

.011 Natural PEEK monofilament

Braided over cable shield with 50% coverage.

At each end Braided Monofilament will be knotted to prevent fraying.



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Subject: Quote Nr.8/2005

Pisa, 11/07/2005

We are pleased to submit the following quote:

Item no.	Description	Quantity	Unit price	Extension
1	Monolithic accelerometer with electronic assembly included	4	€ 4.350,00	€ 17.400,00
2	Accelerometer driver NIM Module (3 channels)	2	€ 3.200,00	€ 6.400,00

Prices are TAX escluded.

Best regards


Giorgio Carelli





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Subject: Quote Nr.7/2005

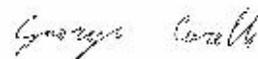
Pisa, 11/02/2005

We are pleased to submit the following quote:

Item no.	Description	Quantity	Unit price	Extension
1	Coil Driver NIM Module 2 channels	5	€ 1.300,00	€ 6.500,00
2	Accelerometer driver NIM Module	2	€ 3.200,00	€ 6.400,00
3	LVDT driver NIM Module 4 channels	3	€ 1.250,00	€ 3.750,00

Prices are TAX excluded.

Best regards


Giorgio Carelli

