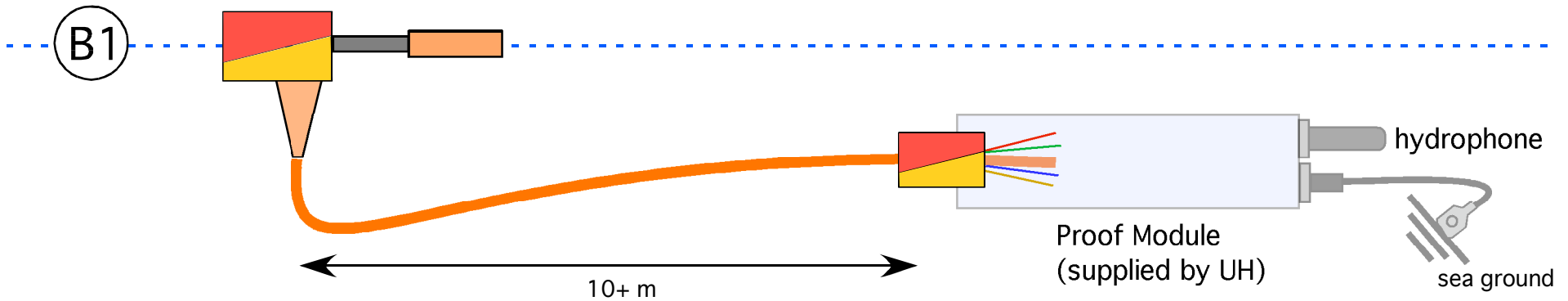


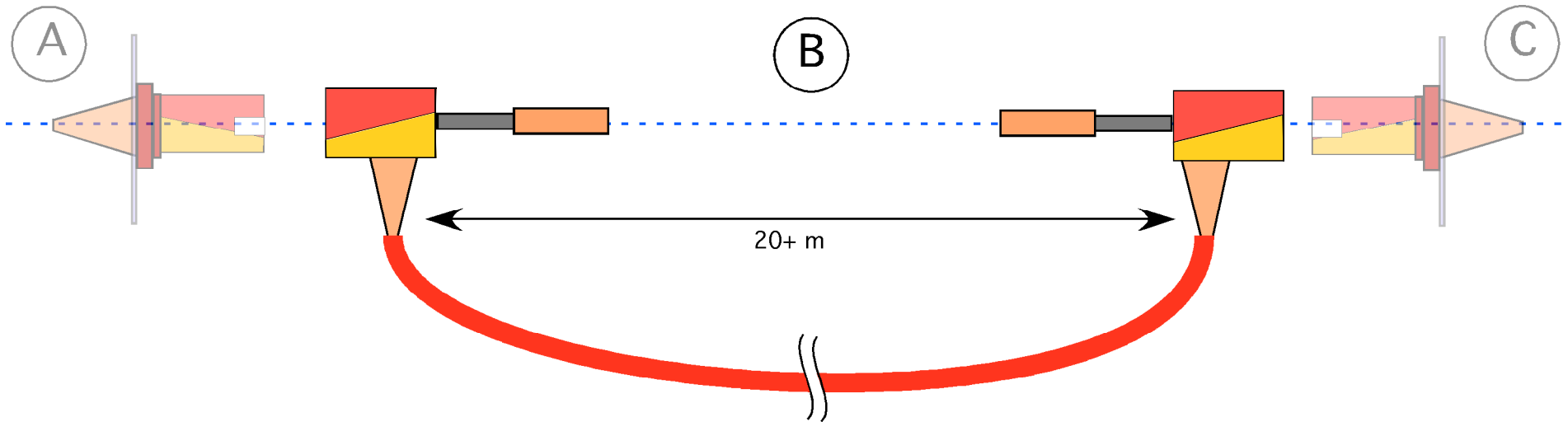
A) CABLE UMBILICAL: This umbilical consists of two parts to be spliced together prior to installation, and then spliced to the HAW-4 SL-280 cable at sea. The SL 6-fiber cable tail (blue), ~10 meters in length, mates to a universal joint terminating mechanical strength on left side. SL tail, universal joint splice kit, and hybrid whip (black) too be supplied by TYCO. The black whip must fit through a 0.515" dia. hole, and must be spliceable to the universal joint. Two fibers terminate in the splice box. The orange whip is 3+m of 4-fiber, 2-conductor oil-filled cable compatible with SL cable. Red connector is assumed to be an ODI NRH female bulkhead wet-mate 4-fiber 2 @ 2 kV conductor connector Ti shell (All connectors have Ti shells). This connector will be mounted on a frame for ROV connection to B or to B1. ODI requested to supply the wet-mate connector and orange oil-filled whip, and transition to the black whip. Black whip can likely be supplied by TYCO. TYCO will perform the hot splice of the ODI whip to the SL cable tail. This umbilical will be housed in a termination frame constructed from the front end of the HUGO junction box. The grey hardware item (supplied by Hawaii) must be attached to the whip prior to splicing. Water depth: 5200 m.

Dummy plugs: One marine growth dummy plug needed for connector A.



B1) PROOF MODULE: Male wet-mate hybrid with 10 m whip. Plugs into A. Oil-filled to hybrid feed-thru (4-fiber, 2-conductor). Female side in pressure vessel should have whips ~ 2m in length. B1 to be installed with termination frame. The proof module will contain a regenerator, communications card, and an A/D converter to digitize data from an attached hydrophone. A sea water return will be attached; polarity is negative to cable. Two fibers will be looped back in the Proof Module. This module will be housed in or above the termination frame and removable by ROV.

These two items (A and B1) are the highest priority for delivery (before November 1. 2005).



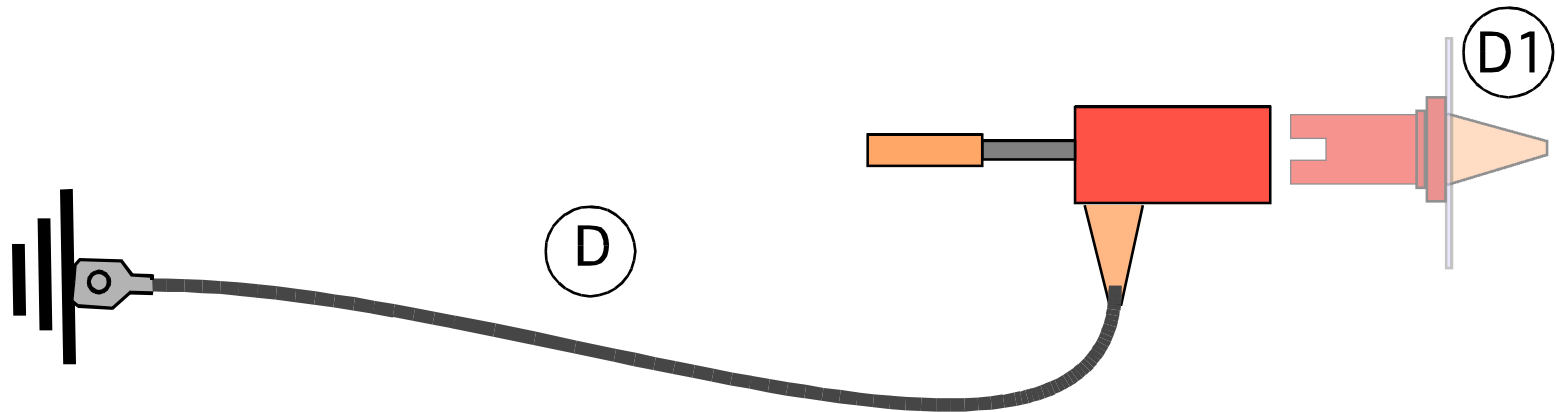
B) **Main Umbilical.** Identical male ODI NRH hybrid ROV connectors on both ends connecting A to C. Oil filled 20+ m cable. 4 fiber 2@ 2 kV-rated conductors.

One each pin-protecting dummy plug (to be mounted on termination frame) needed to take the place of (C) when the observatory is removed.



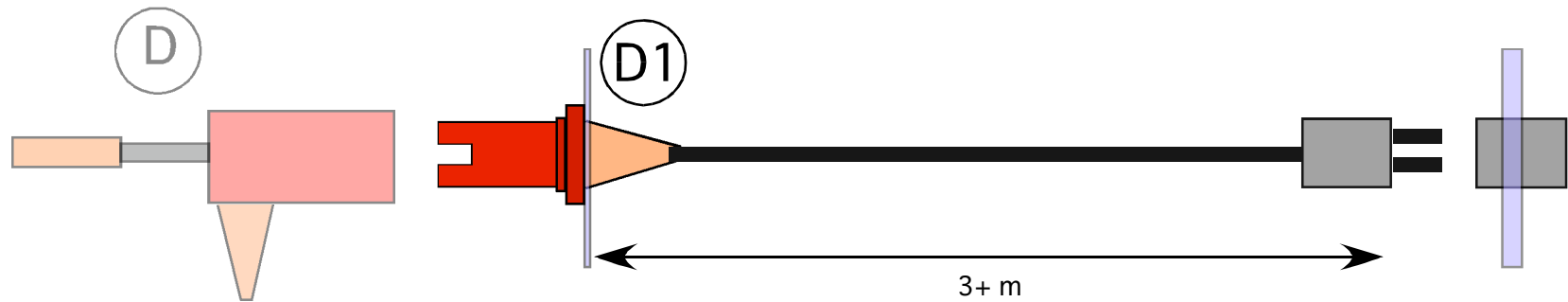
C) **Main Whip.** Female wet-mate ODI NRH connector identical to that on A. 3 m length. Oil fill not necessary, connects to penetrator on other end. Connects to B and plugs into comms module pressure vessel. Pressure vessel should have whips ~ 2m in length.

One marine growth dummy plug for wet-mate connector.



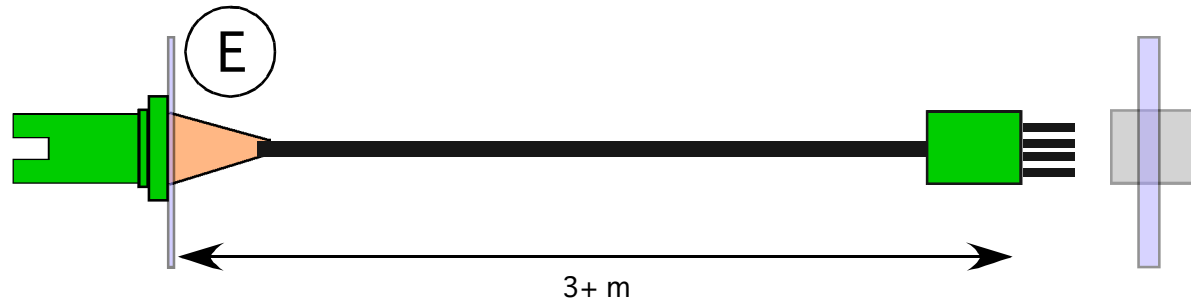
D) Sea Ground. 2-conductor male wet mate ROV connector on one end, 10 m long PU jacketed (not oil filled) ending in two spade lugs. UH will connect to sea ground. Connects to D1. Will carry 1.6 A at <2 kV.

No dummy plug needed.



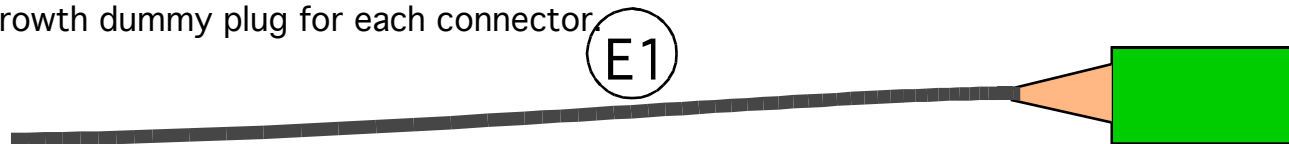
D1) Sea ground whip. 2-conductor female wet mate bulkhead compensated connected to 3rd party 2-pin bulkhead connector. 3m long. PU jacketed (not oil filled).

Marine growth dummy plug for female connector.

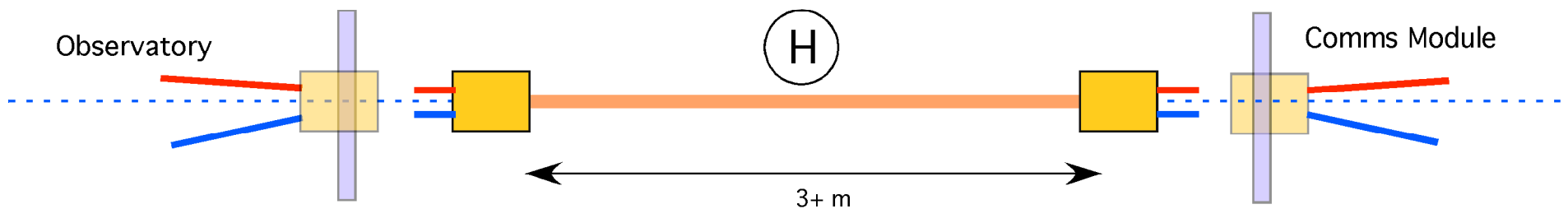


E) Experiment whips: 4 @ female ODI bulkhead wet-mate ROV compatible with MARS experiment connector. 12-pin. Other end is 3rd party (Impulse XSK-12-BCL) dry-mate male 12-pin. 4 sets of twisted pairs. See MARS science harness spec for pins.

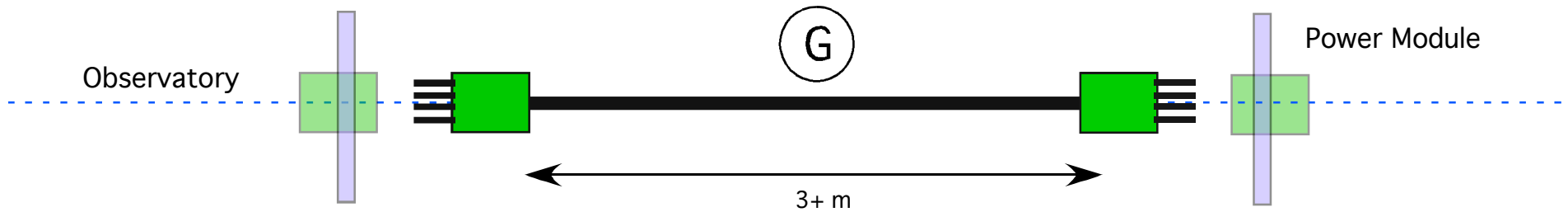
Marine growth dummy plug for each connector



E1) **Experiment Test Connector:** 1@ Wet mate male ODI 12-pin MARS spec to mate to one of the MARS connectors (E) with 2 m whip for testing. Diver-style (will only be connected by hand)

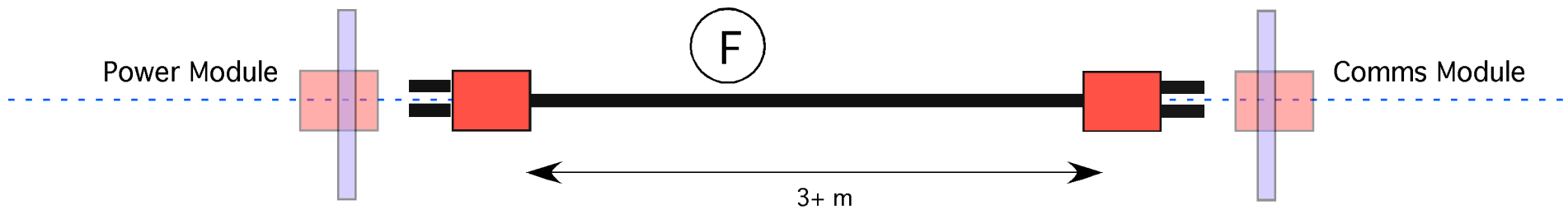


H) Comms/Observatory Optical whip: Passes comms fibers to/from the observatory. 2-fiber male dry-mate connectors both ends. Whips on back side should be ~ 3 m long.



G) Power/Observatory whip: Passes power to the observatory and comms from the power module to the observatory. 12-pin dry mate (Impulse XSK-12-BCL format) both ends. 12-gage wires.. 3 m long. Neoprene jacketed. 4 pins 10Base-Tx Ethernet, 2 pins A-Bus, 4 pins B-bus, 1 “green” ground.

Non-ODI Connectors



F) Power connector: 1 KV 2-conductor 3+ meters 2-pin male dry-mate both ends. Passes power from comms module to power module.

2@ Dummy plug for female bulkhead side.

Other connectors:

- 1) Male mates to all dry-mate female connectors (C,D1,E,F,G) with 1 m whip for testing.
- 2) 4@ Female dry-mate (Impulse XSK-12-BCL format) MARS bulkhead experiment connectors for spare ports. 8 dummy plugs.
- 3) 4@ male-male dry mate (Impulse XSK-12-BCL format) MARS on 3m cable whips for SOEST experiments and testing.