Teledyne RESON A/S
A Teledyne Marine Company
Tel: +45 4738 0022
www.teledynemarine.com/reson

TECHNICAL NOTE

Frequency Roll-Off for TC4014, TC4032, and TC4042

TC4014, TC4032, and TC4042 all use the same TL8140, TL8142, and TL8144 accessory cable range.

Electrical characteristics of the raw cable used are:

- Cable capacitance: 42 pF/ft. or 138 pF/m
- Electrical resistance: 33 Ω/km
- Cable impedance approx.: 130 Ω

The cable will load the preamplifier built into the hydrophone and thereby affect performance and response of the hydrophone. This will become more significant with very long cables and high-frequency operation. *Figure 1* shows the effect of the cable load on the preamplifier used in TC4014 and TC4032.

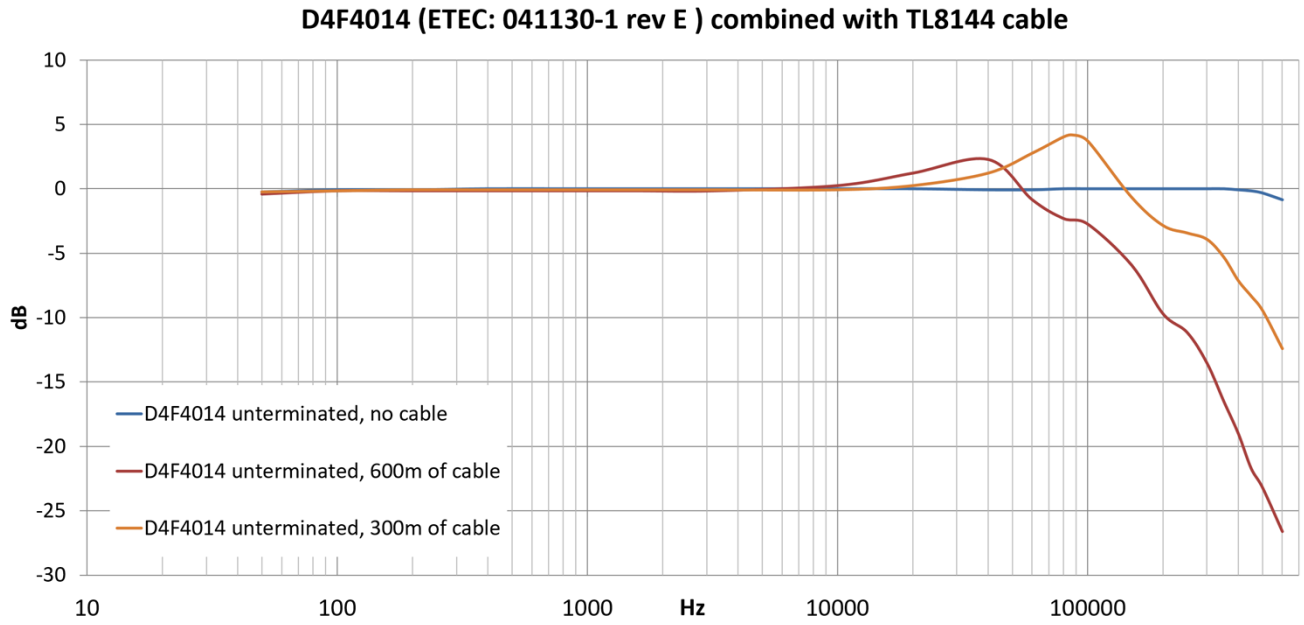


Figure 1: Cable load effect on TC4014/TC4032 preamplifier. 0m, 300m, and 600m.

Below 10 kHz, the cable needs to be very long to have an effect – based on *Figure 1*, around 1000m is estimated.

Low Ohm termination:

Figure 2 illustrates the effect of terminating the cable output to 2 x 65 Ω. Terminating the cable with a low resistance will lead to a sensitivity loss as shown, but it will not eliminate the frequency-dependent sensitivity roll-off. Consequently, low Ohm termination has limited potential and is not recommended.

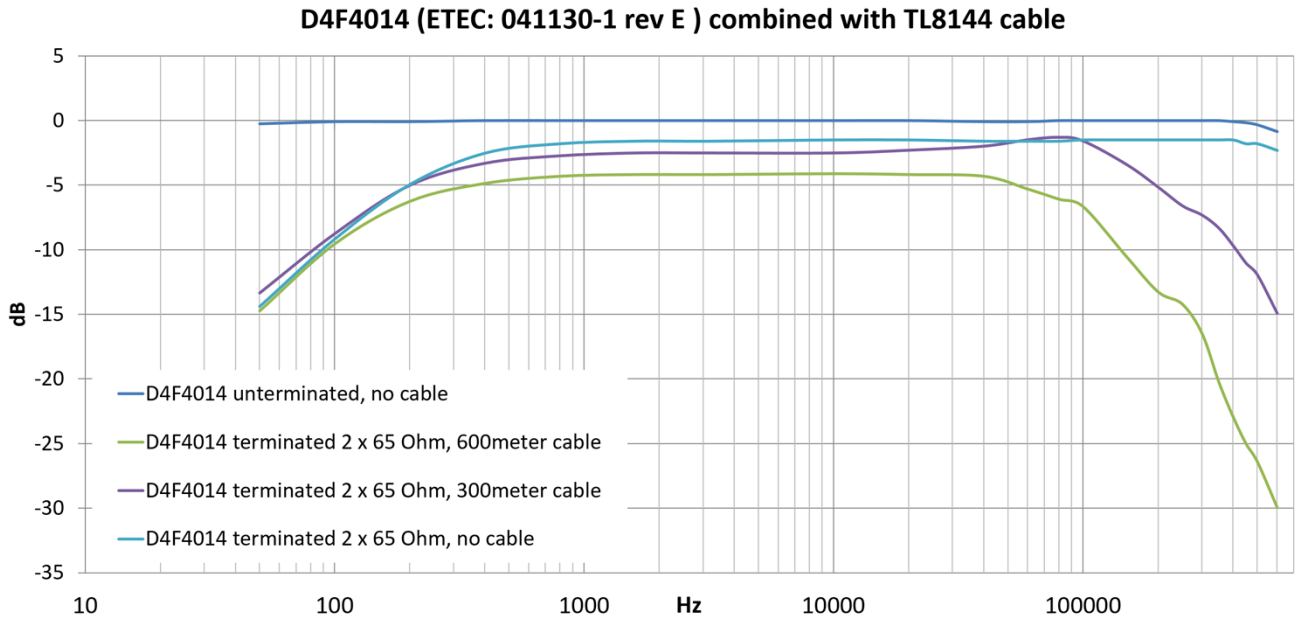


Figure 2: End of cable terminated to 2 x 65 Ω to match cable impedance. D4F4014 unterminated, "no cable" for reference.

The optimum approach:

For long-cable operation with TC4014, TC4032, and TC4042, Teledyne RESON recommends having the cable and hydrophone defined as one unit at our acoustic calibration facility prior to use. Long cables mean more than 200 meters of cable for TC4032 and TC4042 (typically used up to 100 kHz) and more than 100 meters of cable for TC4014 (up to 480 kHz). With this approach, the sensitivity is known at any given frequency within the operational frequency range of the particular hydrophone combined with the long cable. *Figure 3* and *Figure 4* show case data for TC4032-1.

TC4032 case data:

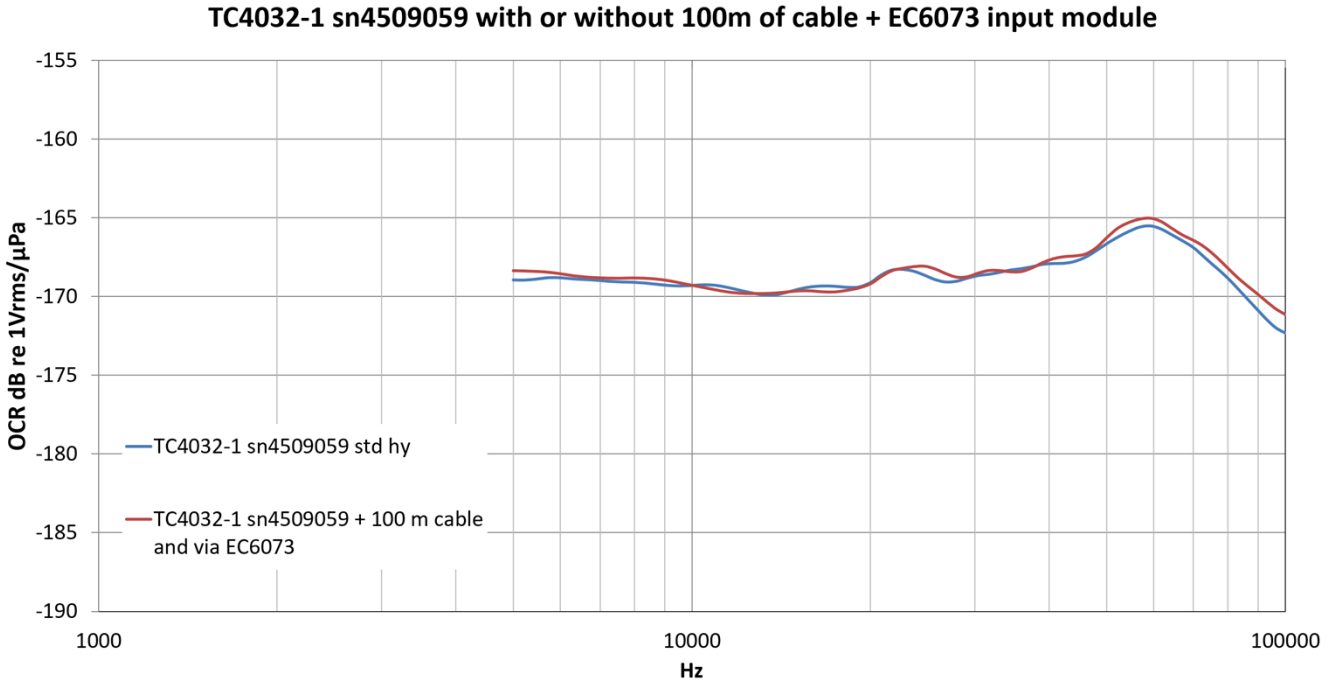


Figure 3: TC4032-1 and EC6073 – effect of 100 meters of TL8144 cable.

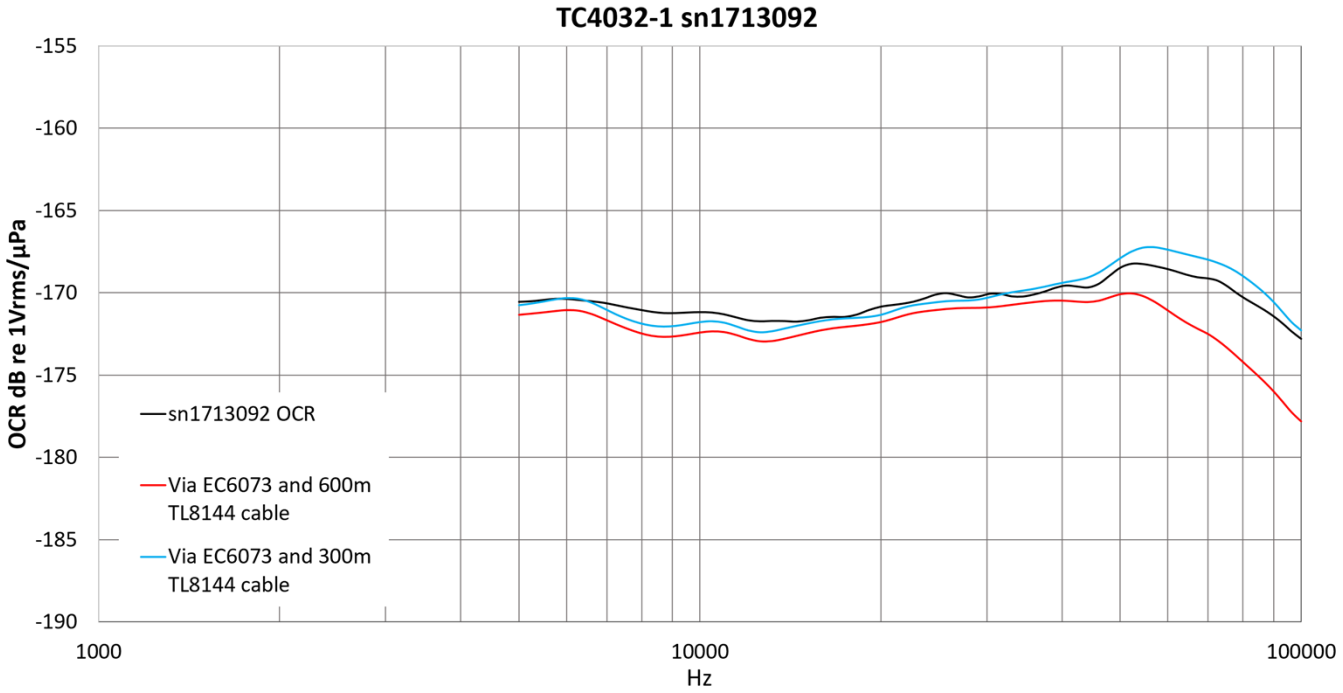


Figure 4: TC4032-1 and EC6073 input module – effects of 300 and 600 meters of TL8144 cable.

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