

From: DJ Osborne djo@mbari.org
Subject: RE: Update on MEMS oscillator in Elmo controllers
Date: February 28, 2020 at 3:54 PM
To: Paul McGill mcgill@mbari.org, Dale Graves grda@mbari.org, Alana Sherman alana@mbari.org, Ken Smith ksmith@mbari.org, Tom Marion tmarion@mbari.org, Jose Rosal jrosal@mbari.org, John Ferreira fejo@mbari.org, Thom Maughan tm@mbari.org

Hi Paul,
Not sure where you are with this effort as I need to sit down and catch up with your efforts. I did want to pass this on... after a huge effort I did finally get input from Elmo on the crystal they used to fix my controller that failed under pressure. This is the controller we sent that they identified as failed and subsequently installed an oscillator THEY chose. I got this part from them AFTER I had reverse engineered and installed the one I chose.

Here is what they sent...

Hello DJ,

Hope you're having a great weekend and this message finds you well. Here's the part number on that high pressure tolerant oscillator. No additional specs were provided. Let me know if you have any questions.

The manufacture PN is SiT1602BI-31-33E-4.000000 (4MHZ) E

Best Regards,

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-----Original Message-----

From: Paul McGill <mcgill@mbari.org>
Sent: Wednesday, January 22, 2020 12:11 PM
To: DJ Osborne <djo@mbari.org>; Dale Graves <grda@mbari.org>; Alana Sherman <alana@mbari.org>; Ken Smith <ksmith@mbari.org>; Tom Marion <tmarion@mbari.org>; Jose Rosal <jrosal@mbari.org>; John Ferreira <fejo@mbari.org>; Thom Maughan <tm@mbari.org>
Subject: Update on MEMS oscillator in Elmo controllers

As you know, our Elmo motor controller failed during its deployment to 4000 m at Station M last October. We had installed a MEMS oscillator to replace the original manufacturer's oscillator because the original, in a metal can, was crushing under pressure. John and I tested the new MEMS part for ten cycles to 4000 m and it passed with flying colors, so we thought we were good to go.

After the failure, at Dale's suggestion, we replaced the MEMS oscillator a second time and it fixed the Elmo controller. Hoping that we'd just had a bad solder connection, I had Tom mount the failed oscillator to a little test board (the same one I used for the pressure test). Unfortunately, it is indeed bad as it draws too little current and produces no output.

Now we're in the difficult position of finding that our fix for the Elmo controllers to make them pressure-tolerant doesn't really work. One thing to note is that the MEMS oscillator that John and I pressure tested isn't the one that got installed in the Elmo for deployment (i.e. same part number, different part). It's possible that the part we installed first just died due to infant mortality, or it's also possible that some of them are pressure-tolerant and some aren't.

My suggestion moving forward is that we test more of the MEMS oscillators, and possibly other types, to better understand the failures. Thom Maughan is interested in pursuing this and may get a test PCB laid out so we can test more parts at the same time. The parts aren't too expensive but engineer and tech time is. We're also looking at ways to physically examine the failed part to try to see what went wrong.

Cheers,
Paul