

**MASSACHUSETTS INSTITUTE OF TECHNOLOGY
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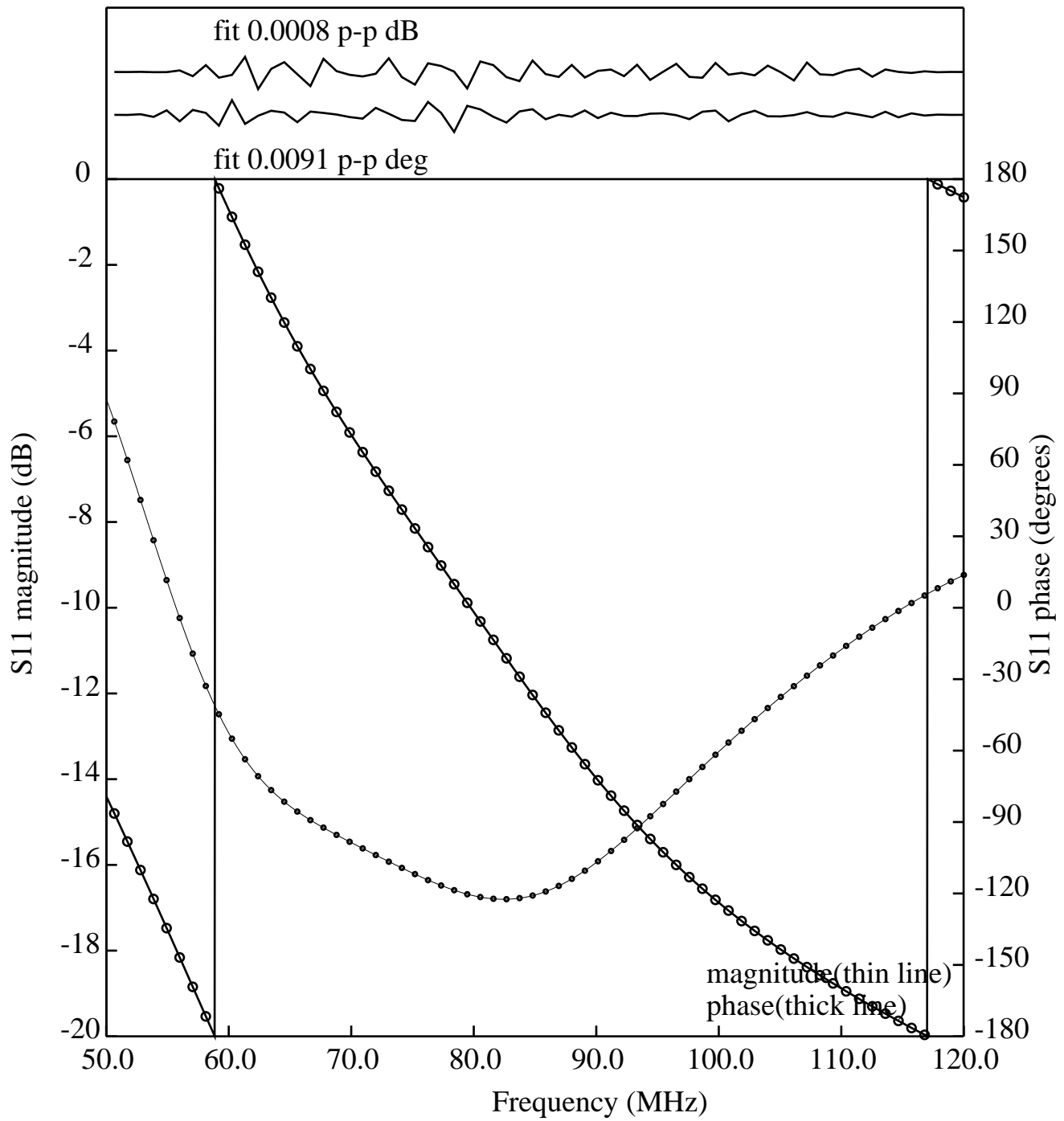
Telephone: 617-715-5533

To: EDGES Group
From: Alan E.E. Rogers
Subject: Contact corrosion as a probable cause of intermittent S11 observed at Devon Island

The large intermittent change in the EDGES-3 S11 which started at about 20 UT on day 233 reported in memo 397 was studied upon return of the antenna to Haystack. Initial tests of the resistance reported in memo 397 found a high resistance of 8 ohms between the chase nipple conduit and the box panel even though it was tightly screwed into the bottom plate. This detection of high resistance was an indication the corrosion is occurring in critical places. A look at the SMA input showed that corrosion may also have taken place on the SMA connection to the middle front panel but this could not be determined with a resistance check with a 2-terminal ohmmeter because a connection to ground is present at the 8-position switch in the front end box.

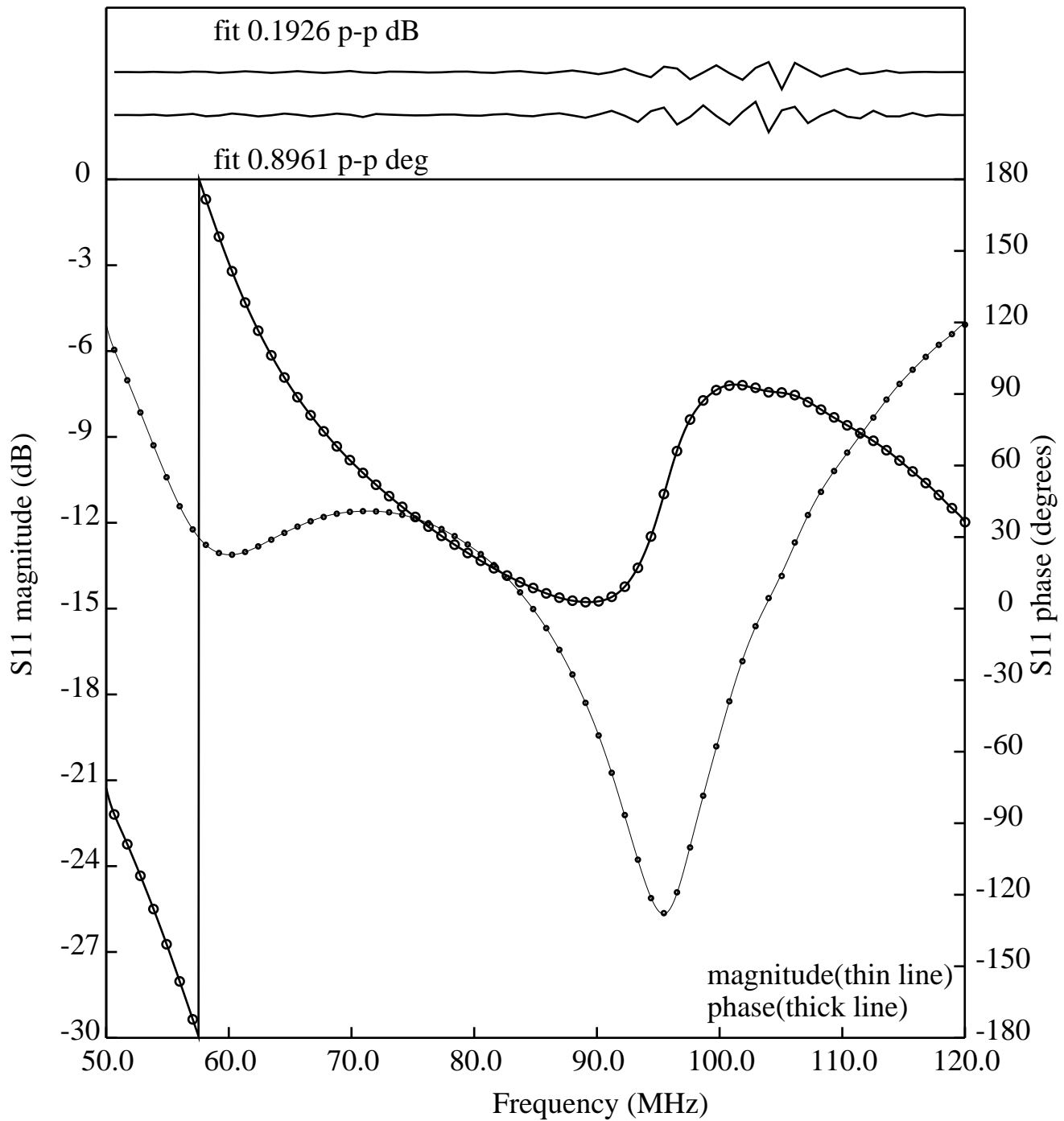
Figure 1 shows the antenna S11 taken on day 235 at 14 hrs UT and Figure 2 shows the antenna S11 taken at 8 hours which is close to the S11 from a FEKO simulation shown in Figure 3. The simulation was made for an added 0.05 microH inductance to the antenna port to account for the inductance of approximately 2.5 inches of 0.9 mm inner conductor of the 0.141 semi-rigid coax cable to the 3-position switch ground which would result from the missing ground at the front panel. The spectrum for day 233 in Figure 11 of memo 397 shows the “resonances” at about 72 and 104 MHz which occurred in addition to the large change in S11. These resonances are most likely the result of the increased coupling to the inside of the electronics box which would also have resulted from the missing ground connection at the front panel.

As a result of this observed corrosion the front panel of the box will be counter sunk by an amount TBD (as suggested in figure 14 of memo 300) to allow the addition of the lockwasher of the SMA female Amphenol 132106 connector, which had been omitted to expose enough threads to connect to the other antenna box. In addition we should consider using an anti-oxident like Noalox on critical connections like the SMA input and pipe attachment pipes during the assembly of EDGES-3.



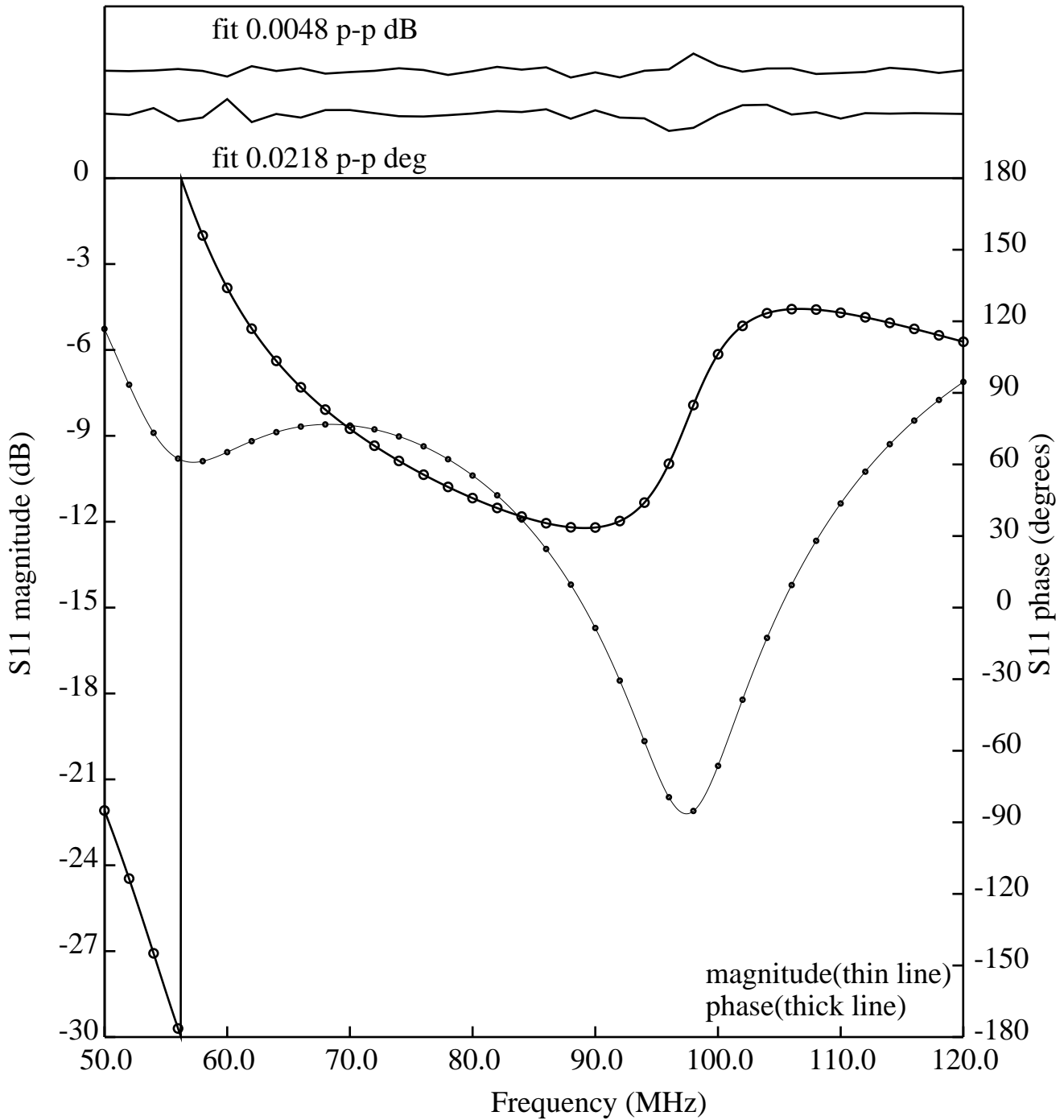
37 term Fit to antenna S11 rms diff 0.000 dB 0.001 deg 5.6e-06
 file: s11ant235.csv

Figure 1. Antenna S11 from EDGE-3 on Devon Island day 235 at 14 hours UT.



37 term Fit to antenna S11 rms diff 0.020 dB 0.109 deg 5.4e-04
file: s11ant235a.csv

Figure 2. Antenna S11 on day 235 at 08 hours showing large change from the expected S11



14 term Fit to antenna S11 rms diff 0.001 dB 0.004 deg
file: azelq.csv

Figure 3. FEKO simulation of antenna S11 with ground connection at 3-position switch



Figure 4. Photo of corrosion following the unscrewing of the nut on the SMA connector