

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

HAYSTACK OBSERVATORY

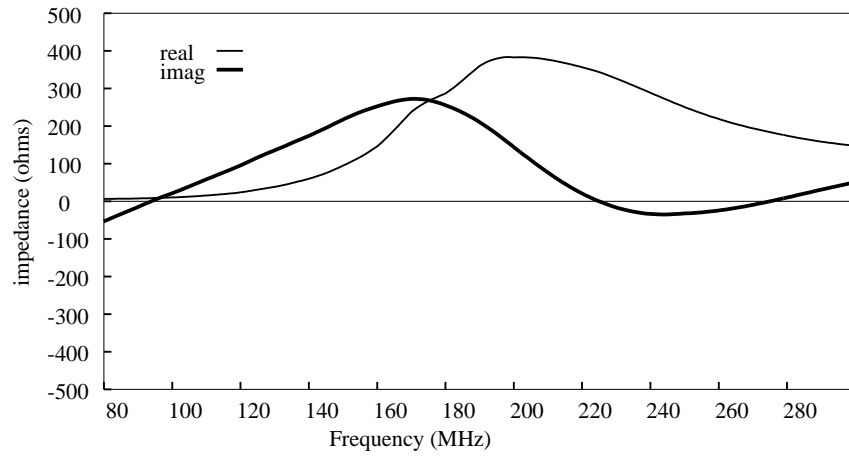
WESTFORD, MASSACHUSETTS 01886

June 1, 2007

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To: MWA Group
From: Alan E.E. Rogers
Subject: Measurements of MWA antenna impedance

Measurements were made of MWA antennas at Haystack Using a network analyzer. The analyzer was calibrated and the end of the 50' of LMR-400 plus a short length of RG-316. A ferrite snap-on filter (28A0592-0R2 - Digikey 240-2245-ND) was used as a balun. The use of this type of balun means that the measured impedance is the full value across the balanced inputs rather than the impedance from each side to center which will have half the values plotted. The antenna was placed on a 4'x3'. Aluminum ground plane located about 30' from the facilities building. The impedance at several combinations of connection to the antenna were measured. The connection combinations were as follows:



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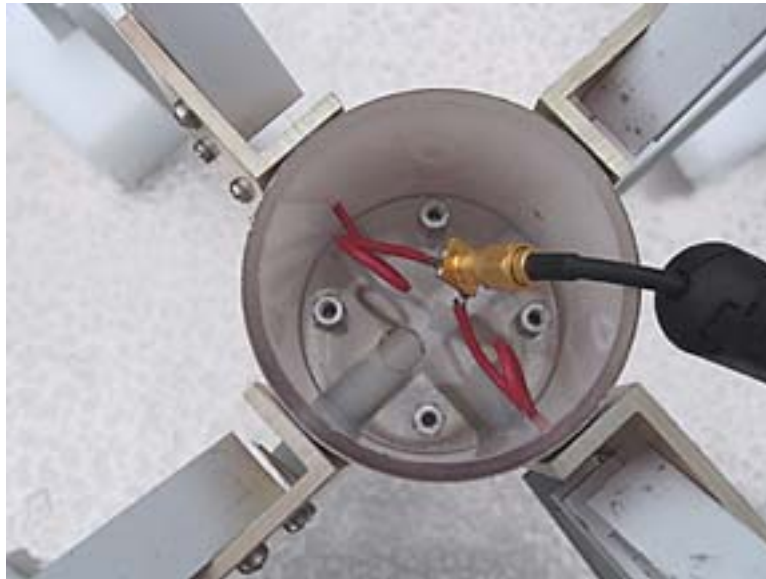
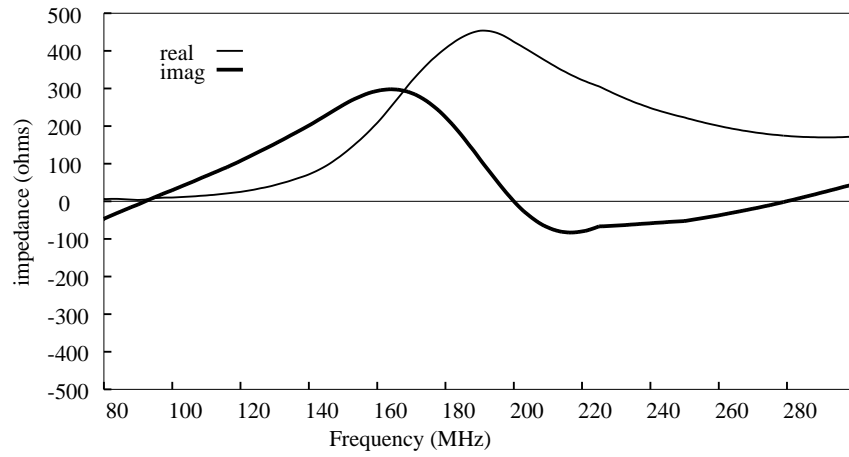


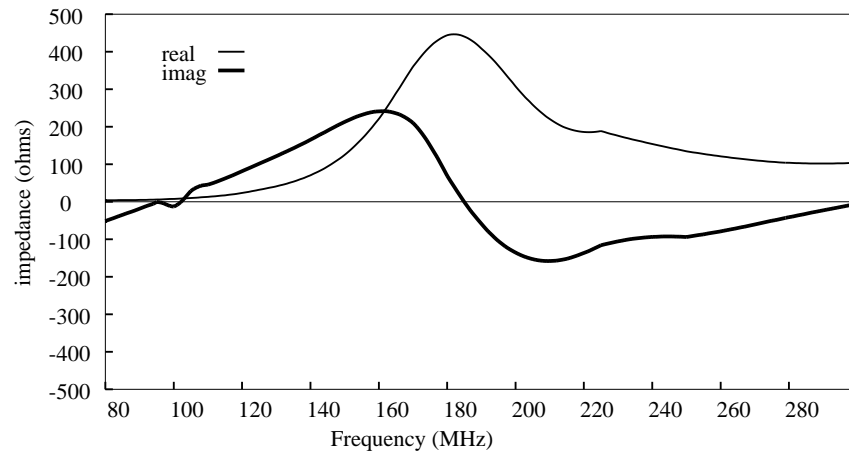
Figure 1. Original MWA antenna with single turn coil of wire.



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Figure 2. Original MWA Antenna with single turn coil plus connection pads on original pc board.



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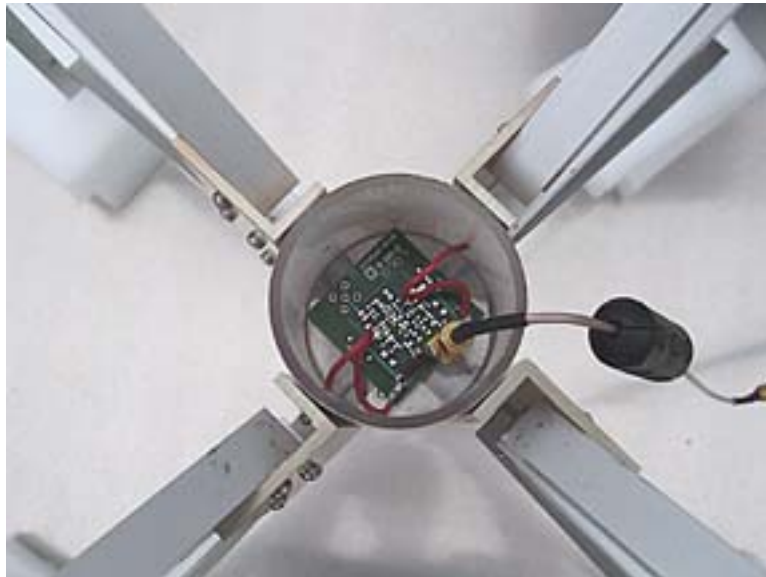
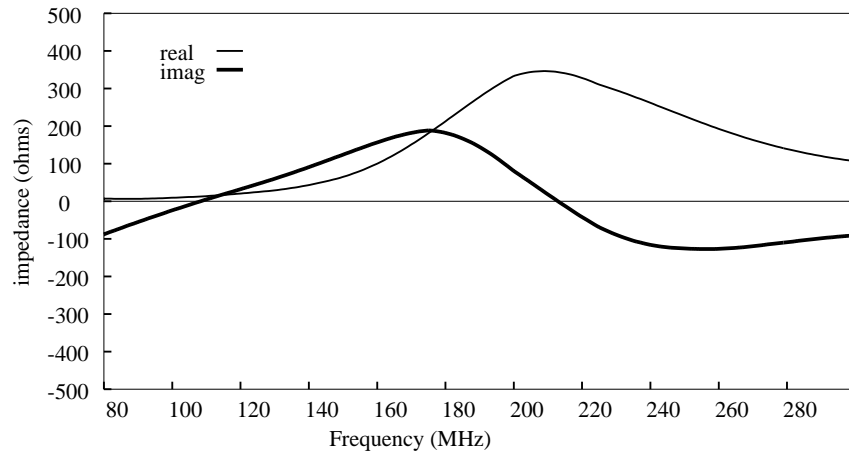


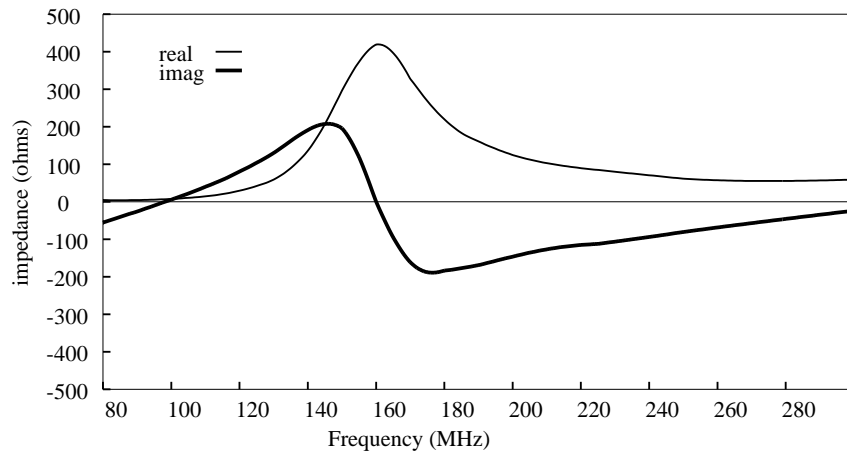
Figure 3. Same as in figure 2 but with new pc board. Impedance is measured at the ends of the traces to the transistors.



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Figure 4. New antenna with short 1/8" diameter leads to measurement point.



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Figure 5. New antenna including the new pc board. The impedance was measured at pads at the ends of the traces to the transistor inputs.

Comments on the measurements.

The peaking of the real parts of the impedance is most pronounced with the new antenna and the new pc board. Static measurements show the new antenna is about 12 pf compared with 10 pf for the original “early deployment” antenna. The new pc board add about 3 pf per input to ground or 1.5 pf differentially, due to the input traces, compared to the original pc board. Both these factors may be responsible for the more pronounced peaking at about 170 MHz.