

# 32T Test Plan -- Tiles and Beamformers (10)

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## 1 Introduction

The MWA tile consists on 16 dipoles, each containing a Low-Noise Amplifiers (LNA). All the dipoles are connected via coax cable to a beamformer. The beamformer combines the signals for each polarization from all the dipoles, after a settable time delay has been added. The two combined analog signals are sent to the receiver. There are 32 tiles in the 32T system. This plan is responsive to requirement #10 contained in the memo “MWA 32-T Objectives and Quality Assurance Evaluation Criteria”, dated 4 September 2009 (46-03001.99).

## 2 References

MWA Tile requirements doc?  
MWA Beamformer design doc?  
MWA Dipole design?  
Node – Beamformer ICD (TBW?)

## 3 Measurement Description

These test will measure the basic functionality of a tile and a baseline measurement of the LNA characteristics.

### 3.1 *Beamformer*

The beamformer has accept a command from the receiver that consists of 32 6-bit numbers, one for each of the 2 polarizations of the 16 dipoles. The lowest 5 bits are a delay setting in multiples of 4?? picoseconds. If the highest bit is set, then that signal is excluded. The delay is accomplished by using electronic switch to add in different length traces on the board.

The two most likely failure modes are:

- 1) A failure of one of the switches
- 2) A failure of the communication from the receiver.

The field test for the beamformer consists of switching in each delay path individually and then verifying that the signal is still coming through. The receivers will be running in burst-mode and the data should be captured automatically on the DAS computers. All four receivers simultaneously.

The receiver status messages should be examined to verify that the beamformer responded with the appropriate status messages and reasonable temperatures. The burst mode data should be plotted to verify that there is no signal when the traces are disabled and that the shape of the spectrum is the same (except for sky/ satellite variability) for all 5 different traces. Typical spectra are shown in appendix B.

The lab test for the beamformer uses a network analyzer to measure the phase delay from each trace. The lab tests have been completed for all fielded receivers.

### **3.2 Dipole/LNA**

The Dipoles and LNAs are tested 2 ways in the field. The first is to collect a burst mode spectrum from each dipole individually. The second is to collect a burst mode spectrum for all the dipoles except for one. The spectra should be plotted and evaluated.

## **4 Resources Required**

### **4.1 Staffing**

The command script can be executed by anyone on the M&C computer. Plotting the spectra should also be quick and easy (once we have the script written). Evaluation of the spectra may require someone familiar with the tile and beamformer system.

### **4.2 Hardware**

To run these tests we require functioning receivers, M&C system and DAS computers.

### **4.3 Software**

The M&C system must be functioning. Software for analyzing plotting burst mode data is also required..

### **4.4 Execution Time and Constraints**

The field tests can be performed on all 32 Tiles by running a script that will take about 30 minutes to run.

## **5 Success Criteria**

Success is defined by the evaluation of the burst mode spectra.

## Revision History

<b>Rev Ltr</b>	<b>Date</b>	<b>Author</b>	<b>Description</b>
01	2009-09-16	EHM	Initial rough draft
02	2010-01-05	RFG	Formatting