

<i>Title</i>	<i>RF Triplexer Test Procedure</i>
<i>Author</i>	<i>R. Abbott, Caltech</i>
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<i>Hardware Version</i>	<i>PCB D1600001-v1 in Chassis D1600002</i>

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## 1 Overview

This procedure is used to verify proper operation of the D1600001-v1 WFS Centering RF Triplexer PCBs contained within the D1600002 chassis. Each PCB has a single 45.5MHz input containing signals at 18.2MHz and 91.0 MHz that are useful in the WFS centering process. The 18.2MHz and the 91.0MHz signals are separated from the 45.5 MHz signal. Three outputs are thus produced: 45.5MHz, 18.2MHz and 91.0MHz. Each RF Triplexer chassis contains four of the D1600001 circuit boards and can thus serve all four quadrants of a single RF WFS.

The four boards within a D1600002 chassis will be tested simultaneously and the results contained in a chassis level test report filed in the chassis file card associated with the chassis S-number.

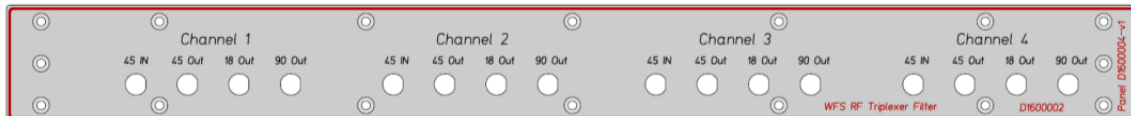
**Table 1**

<b>Chassis Serial Number</b>		
<b>Date</b>		
<b>Tested By</b>		
<b>Overall Test Result</b>	PASS <input type="checkbox"/>	FAIL <input type="checkbox"/>

## 2 Information

### 2.1 Chassis front panel

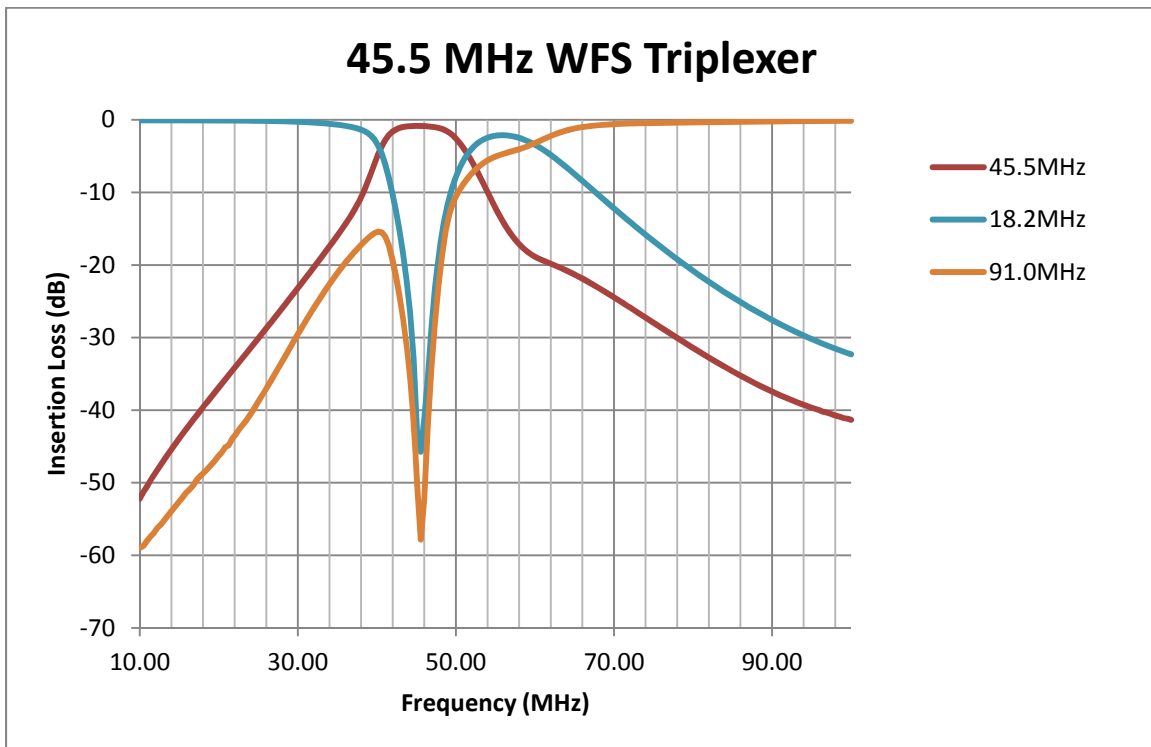
**Figure 1, RF Triplexer Front Panel showing four channels, each having a single input and three associated RF outputs**



## 2.2 Nominal RF Transfer Functions

In the transfer function shown below, the nature of each RF path can be seen. The 45.5MHz path has a band-pass characteristic with a pronounced wide flat top. The 18.2MHz and 91.0MHz paths are low-pass and high-pass respectively. A transmission zero (notch) is visible in the 18.2MHz and 91.0MHz paths. This transmission zero should be tuned to 45.5MHz as part of the tuning process. Further iteration of the various tuning parameters will simultaneously yield a minimum insertion loss along with the desired phase response. Each circuit board is fully tested prior to insertion into the chassis to avoid the uncertainty of phase length differences associated with the RF cabling internal to the chassis.

**Table 2, Typical measured transfer functions for the three RF paths associated with an individual channel**



## 2.3 Measured Transfer Functions

Using an RF network analyzer, sweep the board under test over a frequency range sufficient to give visibility for the frequencies shown in the table below. Be sure to calibrate the test cables used such that their loss and phase is removed from the measurement. Remember, these data reflect the response of individual boards contained within the chassis BEFORE they are mounted inside the chassis. Mounting the boards into the chassis will cause additional phase error due to the internal RF cable that has to be hand cut for each channel. The utility in measuring the boards prior to insertion into the chassis is that there is only one correct phase to tune each board. Randomizing this phase by inclusion of the interconnect cable would only serve to hamper an already tricky tuning process.

**Table 3, Measured Transfer Functions (individual boards)**

<b>Function</b>	<b>Channel 1</b>	<b>Channel 2</b>	<b>Channel 3</b>	<b>Channel 4</b>	<b>Pass</b>	<b>Fail</b>
45.5MHz input to 18.2MHz output magnitude (dB)	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 18.2MHz output phase (deg)	-75 +/- 0.5deg	-75 +/- 0.5deg	-75 +/- 0.5deg	-75 +/- 0.5deg	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 45.5MHz output magnitude (dB)	Loss < 0.9dB	Loss < 0.9dB	Loss < 0.9dB	Loss < 0.9dB	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 45.5MHz output phase (deg)	-0 +/-5deg	-0 +/-5deg	-0 +/-5deg	-0 +/-5deg	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 91.0MHz output magnitude (dB)	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 91.0MHz output phase (deg)	85 +/- 0.5deg	85 +/- 0.5deg	85 +/- 0.5deg	85 +/- 0.5deg	<input type="checkbox"/>	<input type="checkbox"/>

## 2.4 Transfer Functions after Chassis Integration

After taking the individual board data, the individual boards should be assembled into the chassis in their respective channels per Table 3, Measured Transfer Functions (individual boards), and final data taken on the actual transfer function including interconnect cable and feedthroughs. Fill out the data in the table below.

**Table 4, Measured Transfer Functions (after chassis integration)**

Function	Channel 1	Channel 2	Channel 3	Channel 4	Pass	Fail
45.5MHz input to 18.2MHz output magnitude (dB)	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 18.2MHz output phase (deg)	-75 +/- 0.5deg	-75 +/- 0.5deg	-75 +/- 0.5deg	-75 +/- 0.5deg	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 45.5MHz output magnitude (dB)	Loss < 0.9dB	Loss < 0.9dB	Loss < 0.9dB	Loss < 0.9dB	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 45.5MHz output phase (deg)	-0 +/-5deg	-0 +/-5deg	-0 +/-5deg	-0 +/-5deg	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 91.0MHz output magnitude (dB)	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	Loss < 0.2dB	<input type="checkbox"/>	<input type="checkbox"/>
45.5MHz input to 91.0MHz output phase (deg)	85 +/- 0.5deg	85 +/- 0.5deg	85 +/- 0.5deg	85 +/- 0.5deg	<input type="checkbox"/>	<input type="checkbox"/>