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TRA Test Report No.: TRA TR 2015 12 19 01

Test Date: 19-Dec-2015

Test Requested by: Wes Greenman

Device(s) Under Test (DUT)

1 East-West TFD feed cabling from hybrid to array power combiner (incl Polyphaser), identified as "Red feed"
2 North-South TFD feed cabling from hybrid to array power combiner (incl. Polyphaser), identified as "Blue feed"

Test Procedure

A) Use a calibrated 2-port VNA to measure and compare Red feed and Blue feed electrical lengths.
B) Use a calibrated 2-port VNA to measure summed insertion loss of Red feed + Blue feed from 10 to 40 MHz in 10 kHz steps.

Test Equipment

Array Solutions VNA-2180 vector network analyzer, S/N 5249, warmup time 0.5 hours minimum.
VNA software version 542.
Note: tests performed in situ at LGM Observatory.

Test Results Data File Directory

Test No.	Date	Calibration File	Data File	Calibration Plane	Notes
	19-Dec-2015	Cal 2015 12 19.acal	n/a	end of test cable	Port A Calibration
1	"	"	01 Red Feed.csv †	"	Red feed S11
2	"	"	02 Blue Feed.csv †	"	Blue feed S11
	"	Cal 2015 12 19 S21.acal	n/a	"	Port B Calibration
3	"	"	05 S21 Red + Blue_B.csv †	"	Red + Blue S21

† Indicates data plotted on following page(s)

Test Results

1 Red feed electrical length

Measured 6.0λ at 20.106 MHz

2 Blue feed electrical length

Measured 6.0λ at 20.082 MHz

Δf = 24 kHz
6.0 λ = 2160 degs

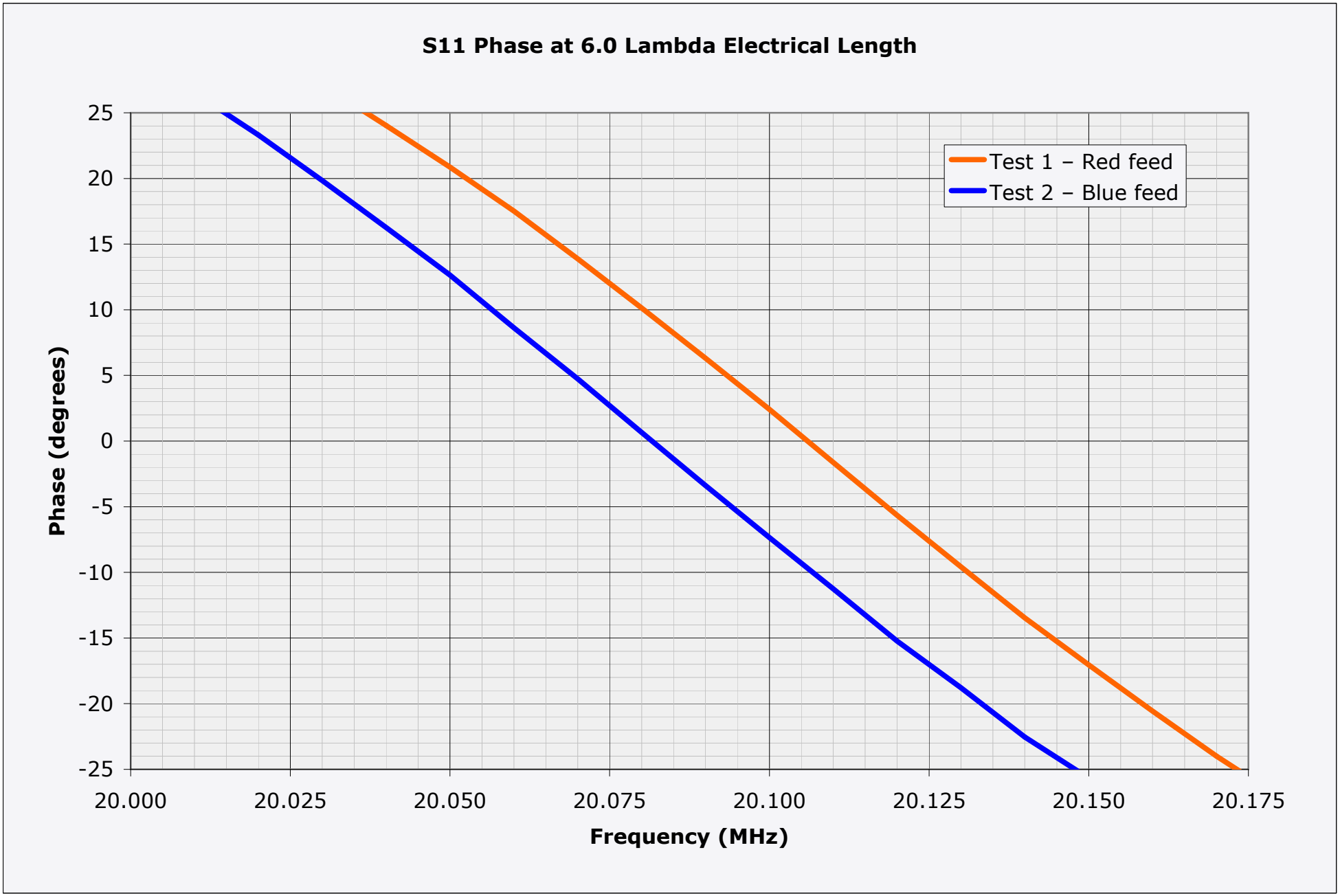
2160 * (0.024 / 20.106) = **Δϕ = 2.58° at 20.106 MHz**
Blue feed is longer by about 2.75" assuming RG-58 with 66% VoP.

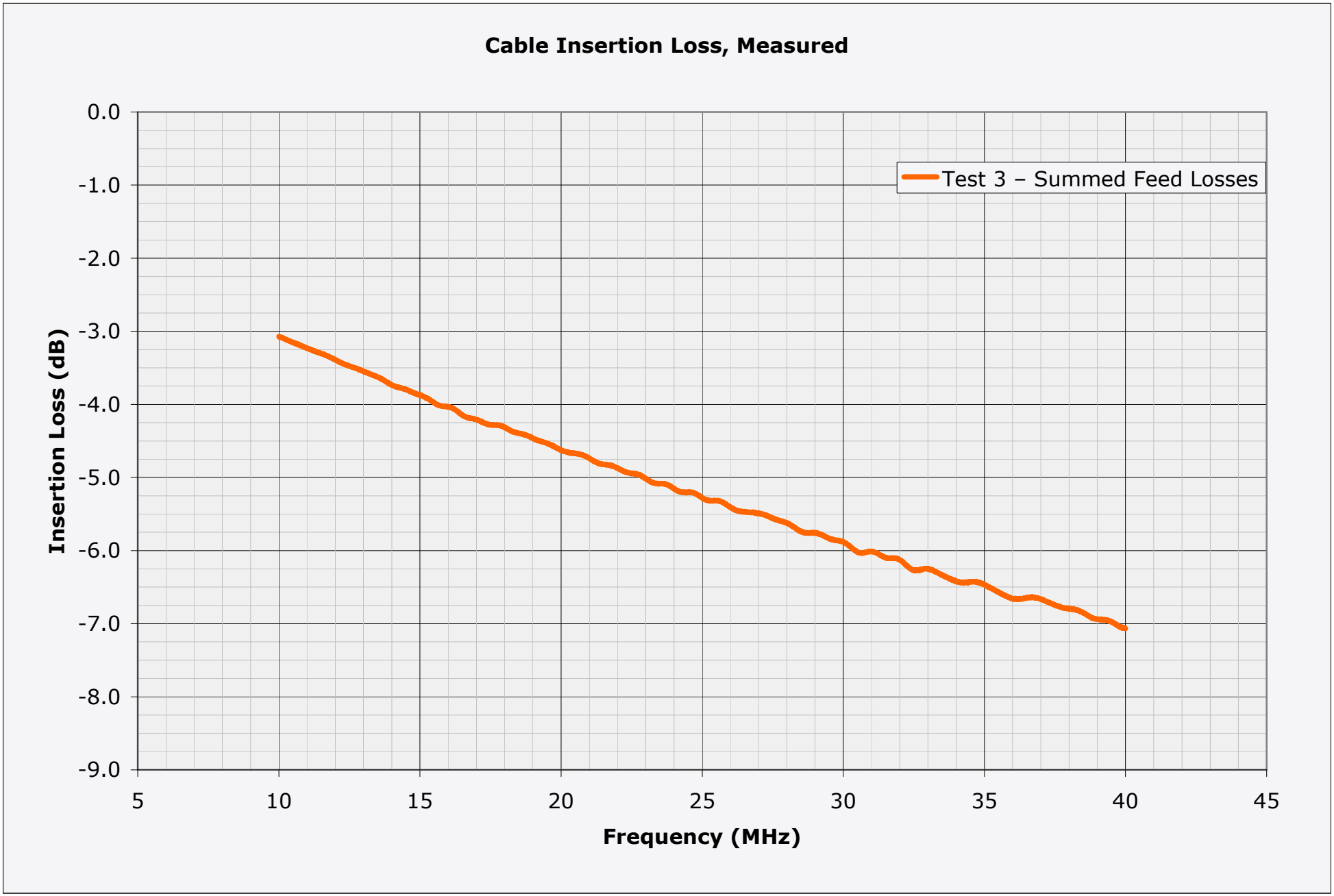
3 Insertion loss of summed Red and Blue feeds

Red feed + Blue feed + Polyphasers + short connector cables from box to Polyphaser and Polyphaser to hybrid connected in a loop using a BNC bullet in the array junction box.

Freq. (MHz)	Summed S21 (dB)	Calculated One-Way S21 (dB)
14	–3.73	–1.87
16	–4.03	–2.02
18	–4.32	–2.16
20	**–4.63**	**–2.32**
22	–4.87	–2.44
24	–5.16	–2.58
26	–5.41	–2.71
28	–5.63	–2.82
30	–5.88	–2.94
32	–6.13	–3.07

Dave Typinski Date


S11 Phase at 6.0 Lambda Electrical Length
Test 1 – Red feed
Test 2 – Blue feed
Phase (degrees)
25
20
15
10
5
0
-5
-10
-15
-20
-25
20.000
20.025
20.050
20.075
20.100
20.125
20.150
20.175
Frequency (MHz)


Cable Insertion Loss, Measured
Test 3 – Summed Feed Losses
Insertion Loss (dB)
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
-9.0
5
10
15
20
25
30
35
40
45
Frequency (MHz)