SDR-Kits Female Calibration Kit of Rosenberger parts
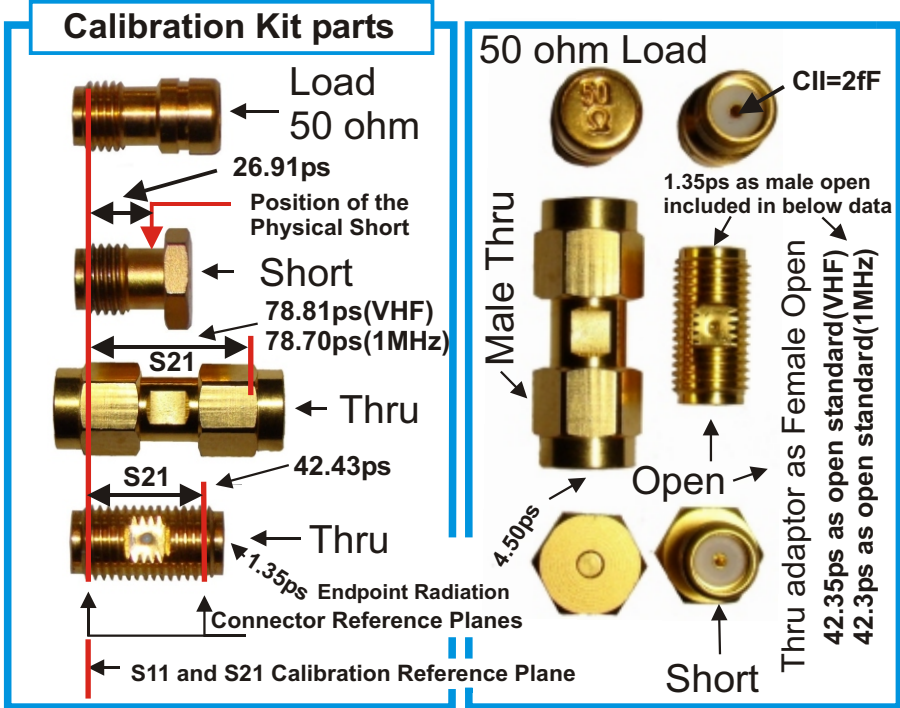## for the DG8SAQ VNWA   by Kurt Poulsen OZ7OU   Revision 4 Oct 2014

Calibration Kit parts

Load 50 ohm
26.91ps
Position of the Physical Short
Short
78.81ps(VHF)
78.70ps(1MHz)
S21
Thru
42.43ps
S21
Thru
1.35ps Endpoint Radiation
Connector Reference Planes
S11 and S21 Calibration Reference Plane

50 ohm Load

CII=2fF

1.35ps as male open included in below data

Male Thru
4.50ps
Open
Short

Thru adaptor as Female Open
42.35ps as open standard(VHF)
42.3ps as open standard(1MHz)

On this sheet you will find the settings required in "Calibration Settings" and "Simple SOLT" for the Reflection (S11/S22) and Transmission (S21/S12) calibrations.
- *Please note that if you want to calibrate to the Reference plane of the VNWA Female TX SMA connector on the cabinet, then you must use a male Calibration Kit. Else look at the "How to..." below.*
- When using testcables and measuring both S11 and S21, then the Thru adaptor is used, during S21 calibration, but removed during real measurements. To compensate for the changed transmission delay between the TX and RX port, you have to enter the delay for the Thru adaptor in the calibration settings. When doing so the reference planes for both reflection and transmission remain "in sync" at the chosen testcable's calibration plane.
- When the test cables have male SMA at the testing end, the Female Calibration Kit data is used, and likewise for female SMA the Male Calibration kit data is used.
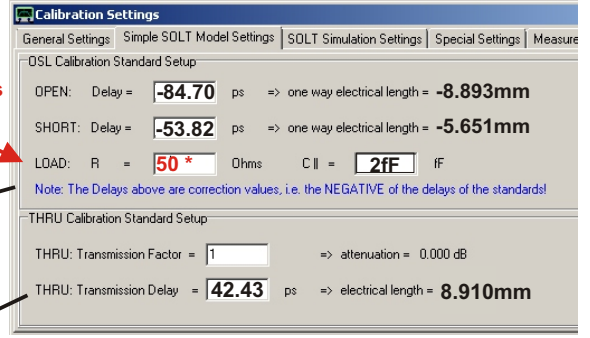- Do not use the Crosstalk Calibration for general use.
- Always set Delay Thru to 0 ps else transmission and reflection is not "in sync" any longer.
The Rosenberger Female-Female adaptor has a delay of 42.35ps.
The Rosenberger Male-Male adaptor has a delay of 78.81ps at VHF decreasing to 76.7ps at 1MHz
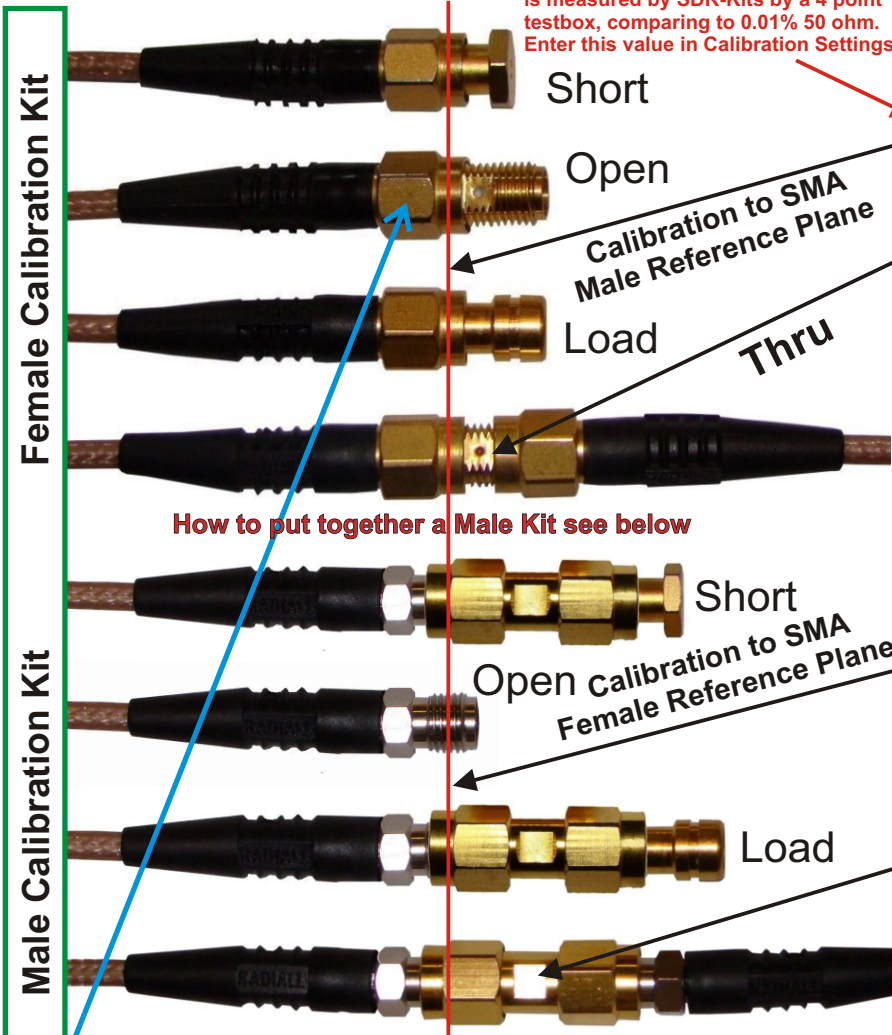
* The DC Resistance value of the Load is measured by SDR-Kits by a 4 point testbox, comparing to 0.01% 50 ohm. Enter this value in Calibration Settings
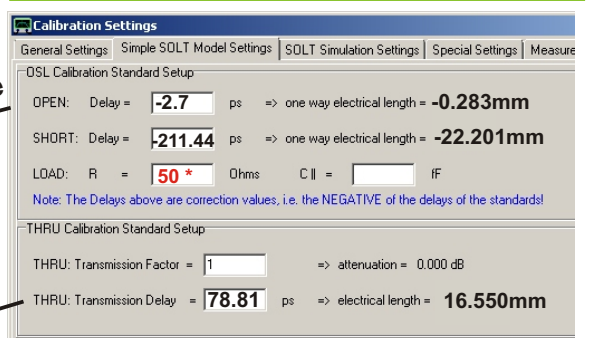
Female Calibration Kit

Short
Open
Load
Thru

Calibration to SMA Male Reference Plane

How to put together a Male Kit see below

Male Calibration Kit

Short
Open calibration to SMA Female Reference Plane
Load

Calibration Settings
General Settings | Simple SOLT Model Settings | SOLT Simulation Settings | Special Settings | Measure

OSL Calibration Standard Setup
OPEN: Delay = -84.70 ps => one way electrical length = -8.893mm
SHORT: Delay = -53.82 ps => one way electrical length = -5.651mm
LOAD: R = 50 * Ohms C|| = 2fF fF
Note: The Delays above are correction values, i.e. the NEGATIVE of the delays of the standards!

THRU Calibration Standard Setup
THRU: Transmission Factor = 1 => attenuation = 0.000 dB
THRU: Transmission Delay = 42.43 ps => electrical length = 8.910mm

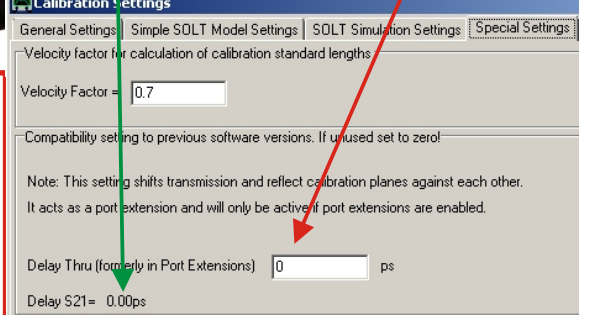**Remarks to the Male Calibration Kit.**
Better result can be obtained by using a Rosenberger Male Calibration Load type no. 32S15R-0,5E3. Use a CII of 35fF.

If you have already an Amphenol Connex Male Short, then it will provide a better Short calibration by using 2x -17.24ps= -34.48ps in (the calibration settings decreasing to -34.2ps at 1 MHz)
The reason for this is that any added adaptor will degrade the frequency response/reflection coefficient

Calibration Settings
General Settings | Simple SOLT Model Settings | SOLT Simulation Settings | Special Settings | Measure

OSL Calibration Standard Setup
OPEN: Delay = -2.7 ps => one way electrical length = -0.283mm
SHORT: Delay = -211.44 ps => one way electrical length = -22.201mm
LOAD: R = 50 * Ohms C|| = fF
Note: The Delays above are correction values, i.e. the NEGATIVE of the delays of the standards!

THRU Calibration Standard Setup
THRU: Transmission Factor = 1 => attenuation = 0.000 dB
THRU: Transmission Delay = 78.81 ps => electrical length = 16.550mm

Please check Delay Thru is set to 0 ps
Delay S21 is only active when Port Extension has been enabled (Port Ext.ON).

Calibration Settings
General Settings | Simple SOLT Model Settings | SOLT Simulation Settings | Special Settings

Velocity factor for calculation of calibration standard lengths
Velocity Factor = 0.7

Compatibility setting to previous software versions. If unused set to zero!
Note: This setting shifts transmission and reflect calibration planes against each other.
It acts as a port extension and will only be active if port extensions are enabled.

Delay Thru (formerly in Port Extensions) 0 ps
Delay S21= 0.00ps

If using an empty Female Thru adaptor (no center conductor no PTFE insert) then the SMA male center conductor is used as the Open standard. Thus the delay used is very small being 2x -5.0ps= -10.0ps.

A few Hints:
The calibration Plane can be moved forward and backward by using Measure/Port Extensions.
Port 1 used for the forward direction (S11 and S21), and Port 2 used for the reverse direction (S22/S12).
During reverse direction the DUT is reversed.
For a positive delay the Calibration Plane is moved away from the TX port and Vice Versa.
If the TX level is changed the calibration is also changed slightly. *READ ALSO THE HELP FILE*

Revision 4 Updated: 26/12/2014