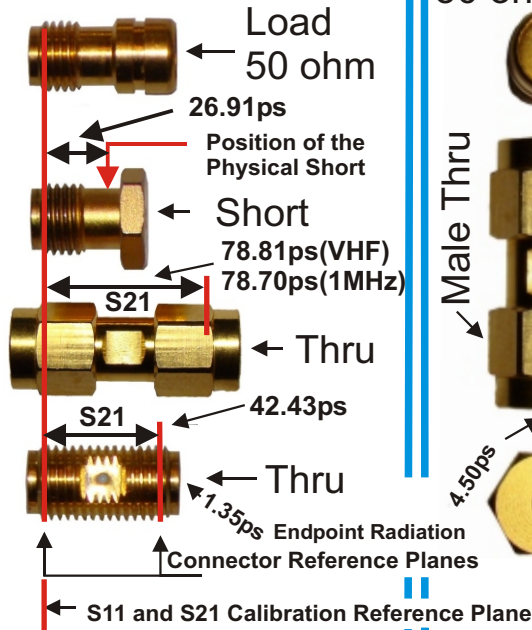


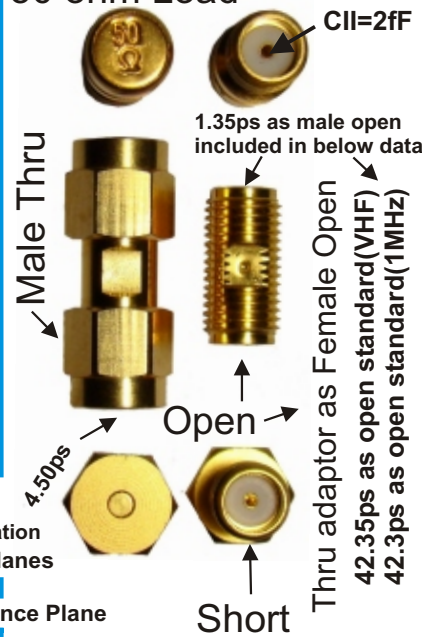
# SDR-Kits Female Calibration Kit of Rosenberger parts

for the DG8SAQ VNWA by Kurt Poulsen OZ7OU Revision 5 May 29 2017 Page1

## Calibration Kit parts



## 50 ohm Load



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.

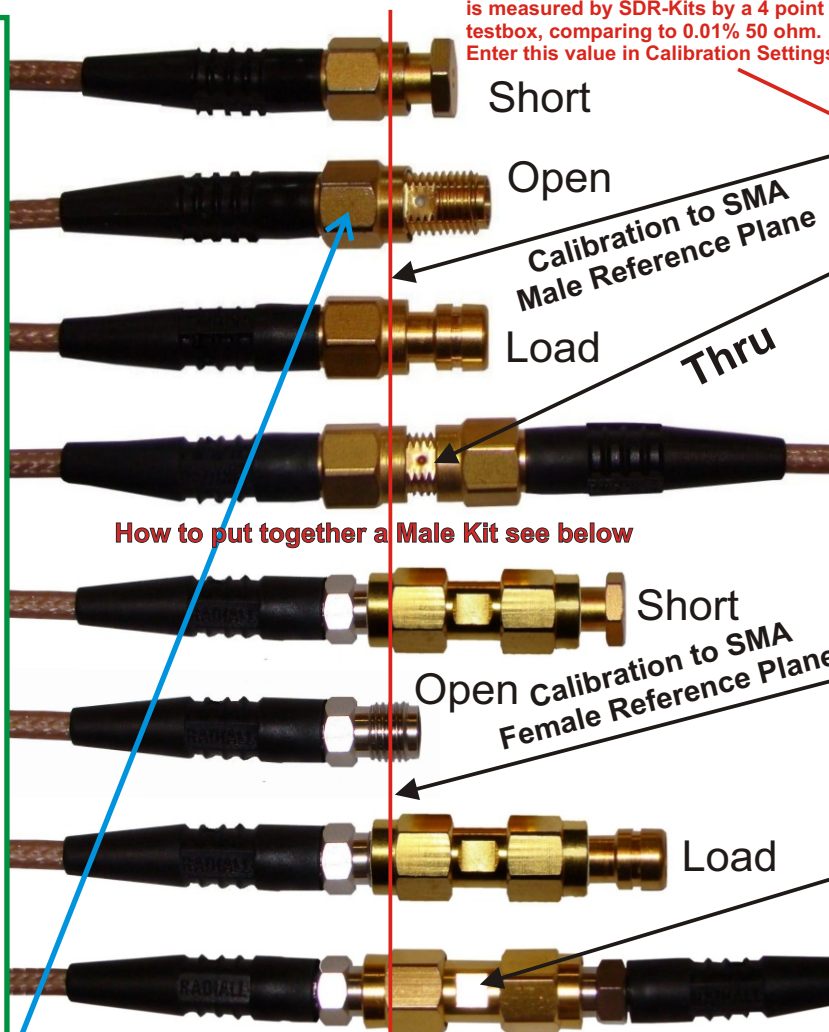
The Rosenberger Female-Female adaptor has a delay of 42.35ps.

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

## Male Calibration Kit



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  $2 \times -5.0\text{ps} = -10.0\text{ps}$ .

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

**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 = **-8.87mm**

SHORT: Delay = **-53.82** ps => one way electrical length = **-5.647mm**

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 = **8.904mm**

## 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 5fF.



If you have already an Amphenol Connex Male Short, then it will provide a better Short calibration by using  $2 \times -17.24\text{ps} = -34.48\text{ps}$  in (the calibration settings decreasing to  $-34.2\text{ps}$  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 = **-0.2833mm**

SHORT: Delay = **-211.44** ps => one way electrical length = **-22.19mm**

LOAD: R = **50 \*** Ohms C || = **5fF** 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 = **16.540mm**

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 | Measure

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.

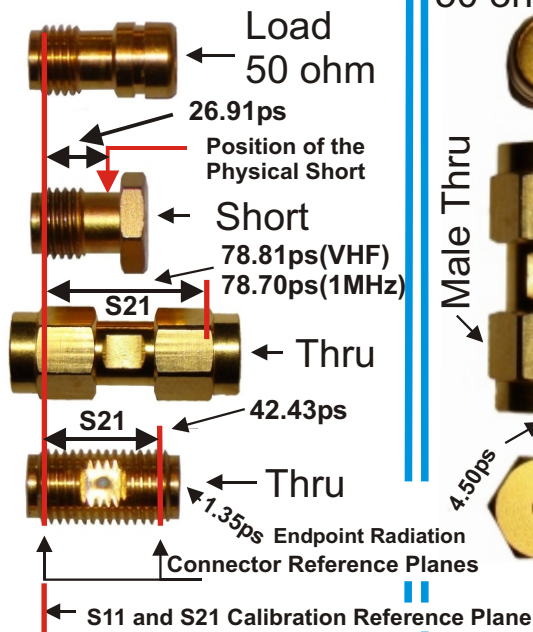
Delay Thru (formerly in Port Extensions) = **0** ps

Delay S21 = **0.00ps**

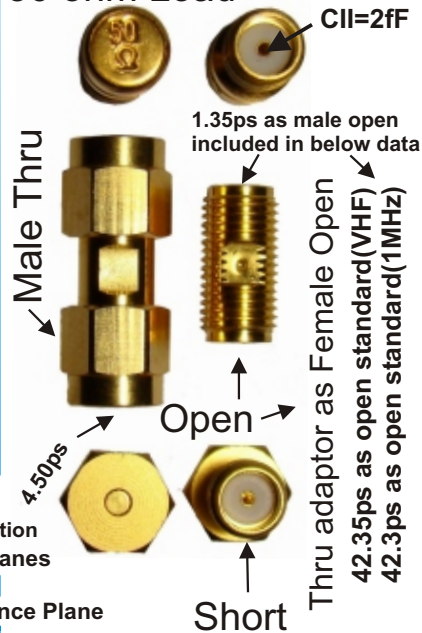
# SDR-Kits Female Calibration Kit of Rosenberger parts

for the DG8SAQ VNAW by Kurt Poulsen OZ7OU Revision 5 May 29 2017 Page2

## Calibration Kit parts



## 50 ohm Load



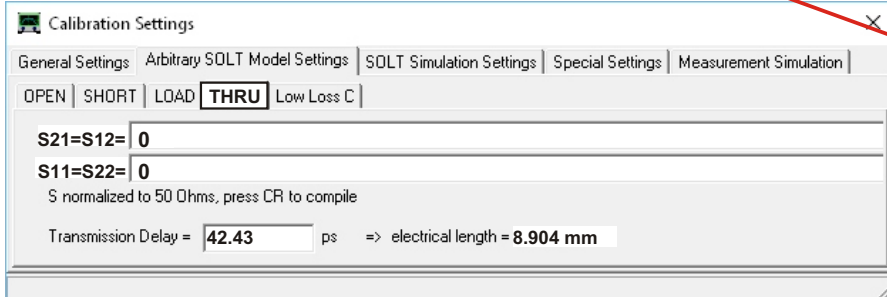
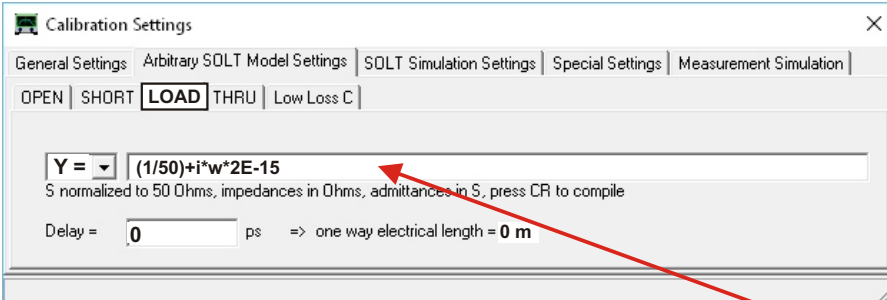
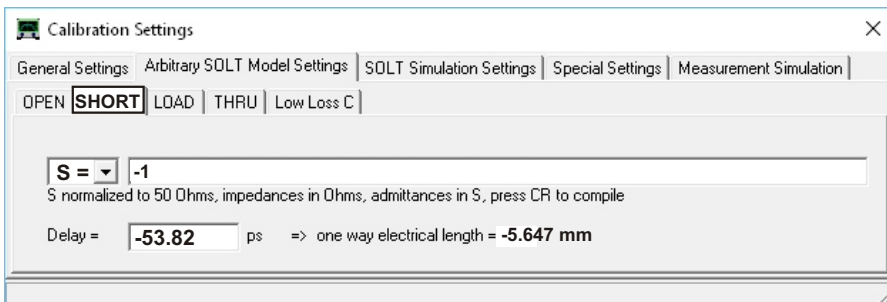
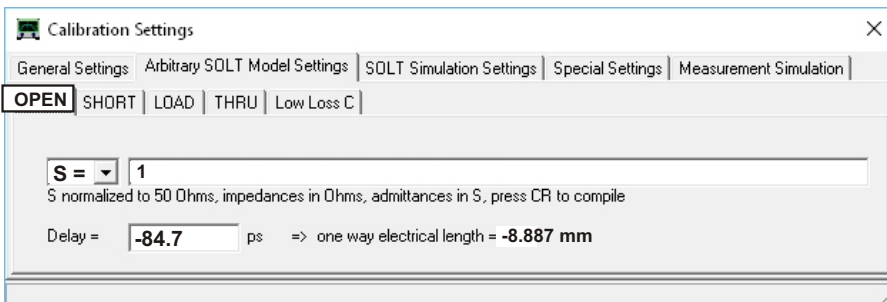
On this sheet you will find the settings required in "Calibration Settings" and "Arbitrary calibration" for the Reflection (S11/S22) and Transmission (S21/S12) calibrations.

- Please note the general guidelines described in Page 1 are also valid for arbitrary calibration.

- The speciality for arbitrary calibration is that more complex information can be entered for the open, short, load and thru calibration standards, such as e.g. a delay can be entered for the load, and for all calibration standard a formula can be entered which describes the frequency dependant parameters for a calibration standard.

- As an example the expression for the female load is the following:  $Y = (1/50) + i * w * 2e-15$ . As the load has a parasitic capacitance of 2fF in parallel with the 50 ohm resistance, it is convenient to express it as Y parameters. The load admittance is  $i * w * 2e-15$ .  $i$  is the same as  $j$ , expressing we are dealing with an imaginary component.  $w$  equals to  $2 * \pi * \text{freq}$  and  $2e-15$  is the capacitance of 2 fF. Please note you must enter your loads with measured resistance (4 point measurement). If not known use (1/50) or 0.0200 and it will be within 3%. Use the value provided by SDR-Kits as measured against a 0.01% 50 ohm resistor

## Arbitrary calibration settings (VHF)



## SMA Male-Female Adaptor



For protection of the VNAW TX and RX Port  
Delay=56,75ps



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