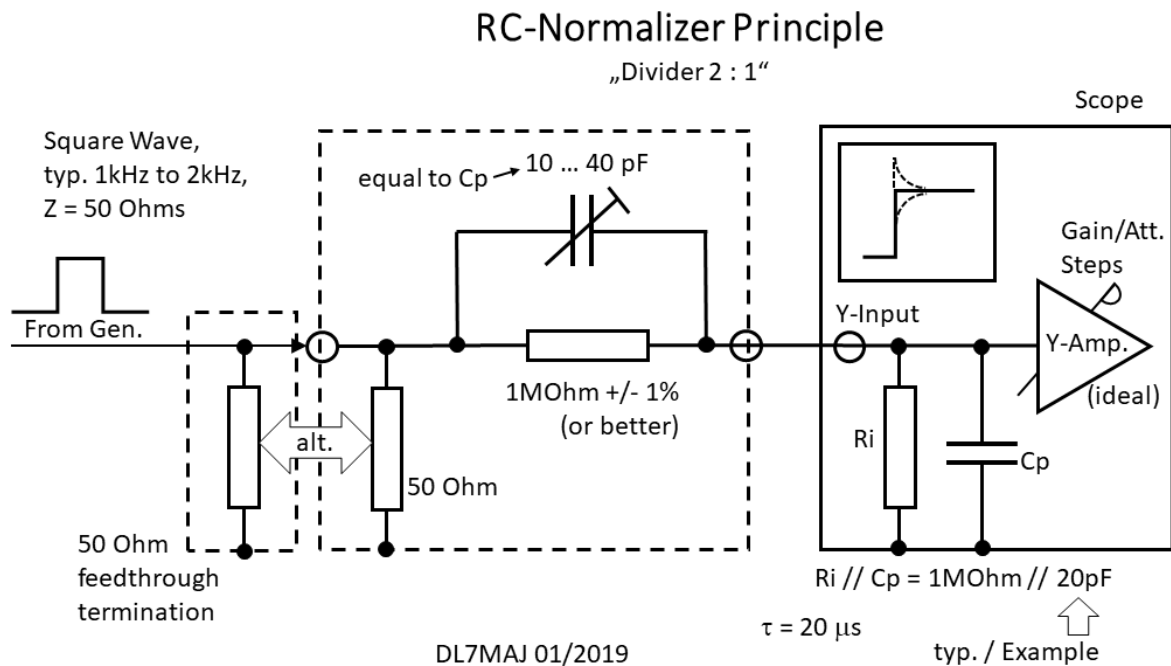# RC-Normalizer for Scopes

Introduction

For the alignment of the input attenuator of an oscilloscope, a RC-Normalizer is necessary. This Normalizer provides a standard input impedance, consisting of a resistor and a capacity. This normalizer is a 2:1 divider.

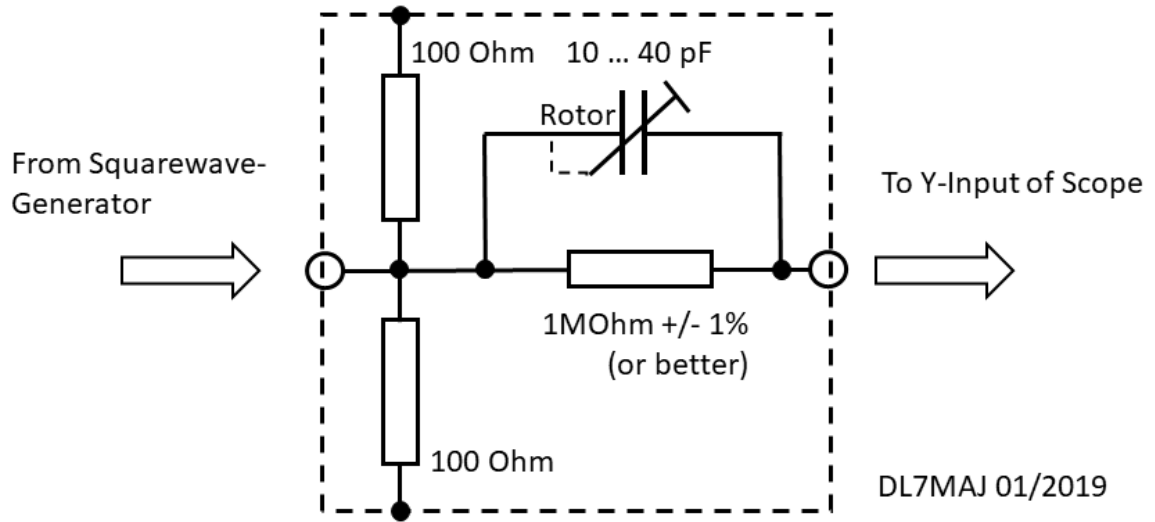## Principle

Picture 1: Principle of a RC-Normalizer

The equivalent input circuit of a scope consists of typically 1MOhm and 20pf in parallel (picture 1). The square wave generator has to be terminated with 50 Ohms.
If the time constants of the normalizer and the scopes input are equal, the transient behavior for a square wave is optimal.
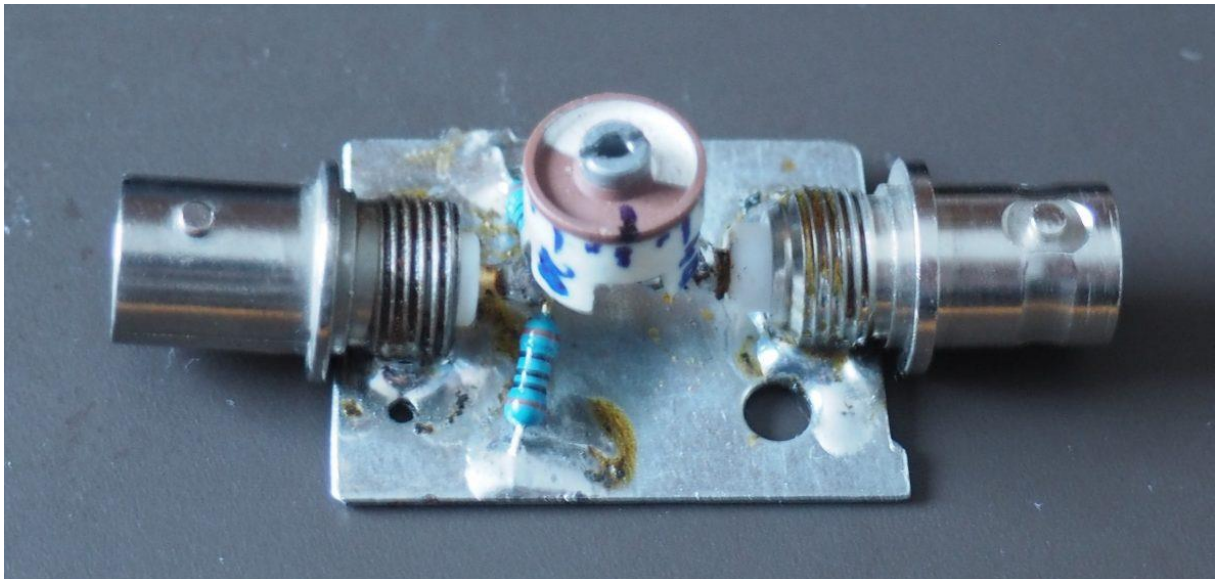
Construction

The normalizer´s schematic is shown in picture 2. It is recommended to install the 50 Ohm termination inside the normalizer. Pictures 3 to 5 show the normalizer; the trim cap has been calibrated outside the normalizer with a pF-meter with high resolution (it was easier). An adapter (double male is used to connect the normalizer to the scope. This adds together with the BNC-jack some pF (typically 3 to 5pF) – these some pF have to be subtracted. Therefore the calibration of the trim cap isn´t the true value of the scopes input capacity, it shows a little bit too much, but it´s good for comparing attenuator steps.
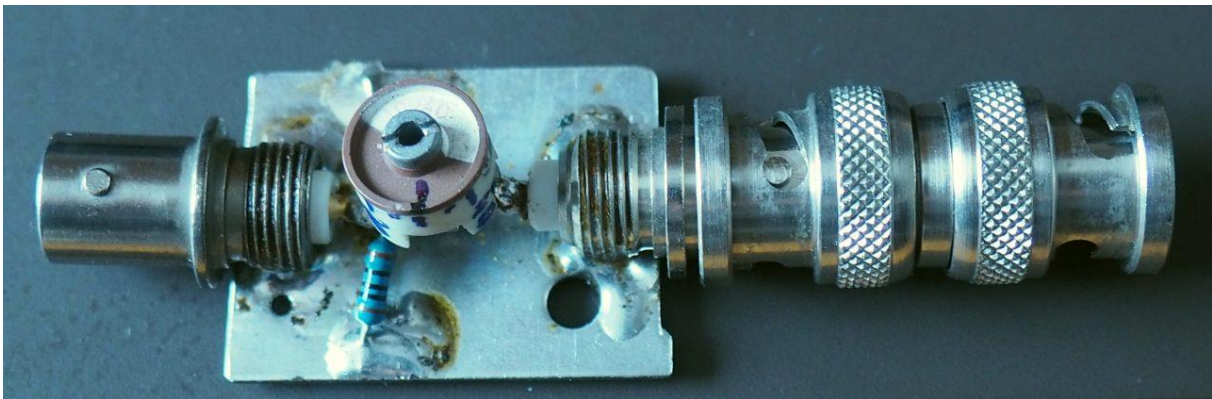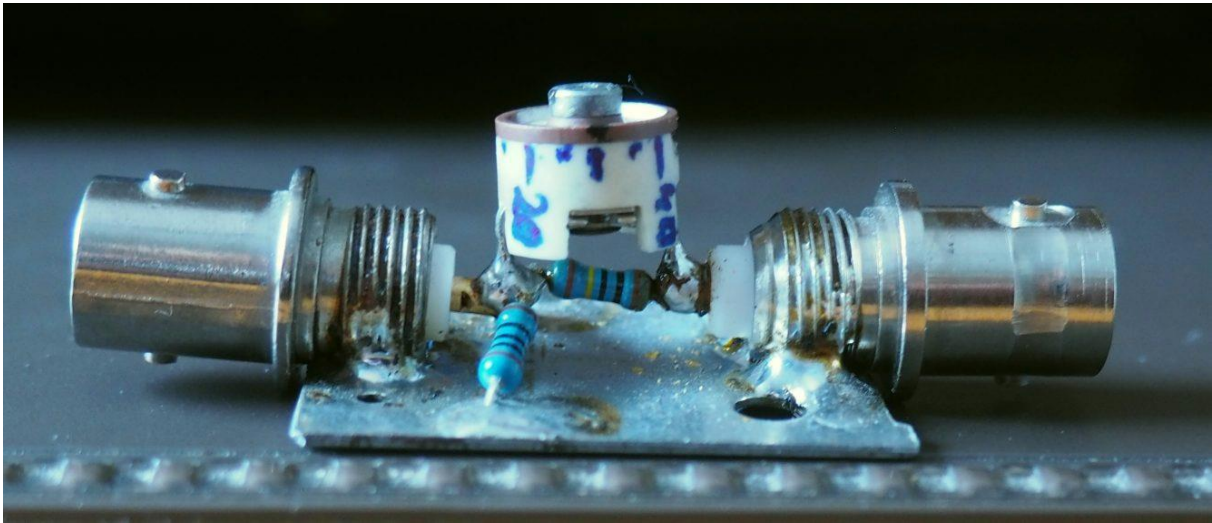Important: The rotor of the trim cap should be connected to the 50 Ohm termination and not to the sensitive side of the scopes input to avoid detuning when touching it with a screwdriver.

RC-Normalizer Schematic

Picture 2: Schematic of the RC-Normalizer

Pictures 3 to 5: Close View to the normalizer

Usage

The normalizer can be used to check whether for all steps of the input attenuator of the scope the input impedance – especially the capacity - is constant and equal for both channels. Additionally the normalizer can be used as a reference for the alignment of the input attenuator of a scope.

Further details can be found here:
My Video at YouTubeDE
You can find a video about this RC-Normalizer here in my YouTubeDE channel DL7MAJ:

https://www.youtube.com/watch?v=cTCixSjhqIM

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