## **DG291: Creative Electronics**

# Workshop introducing equipment and measurement techniques

Learning how to use the oscilloscope and function generator by observing and measuring waveforms.

### Assignment 1:

Connect the 'main' output of the function generator to the 'A' input of the scope, the generator's 'sync' output to the 'B' input of the scope. Use two so-called 'BNC' cables.

For a start let the generator's main output produce a symmetrical (referred to zero Volt) sine wave of 2V top-top / 1 kHz.

Now carefully study the operation of the control functions (of the scope and generator) indicated hereafter **one by one**. If necessary re-read appendix E of the reader. Be aware that some controls may have slightly different names or appear not to be present on the scope or generator you're working with. Don't hesitate to ask for help if anything is unclear to you.

oscilloscope	function generator
Beam intensity (INTENS)	Amplitude mains output (AMPLITUDE)
Beam focus (FOCUS)	Adding a DC level (DC OFFSET)
Vertical sensitivity (AMPL/DIV)	Ranges frequency control (RANGE)
Vertical position (POSITION)	Fine control frequency (FREQUENCY)
Input coupling (AC/DC/ON/OFF/o)	Waveform type control (FUNCTION)
Display of 2 waveforms (CHOP/ALT)	Range control mains output voltage (VOLTS OUT)
Adding 2 waveforms (ADD)	Waveform invert (INVERT)
Inverting a waveform (INVERT)	Frequency modulation (SWEEP int/ext)
Timebase control (TIME/DIV)	Speed of modulation (SWEEP RATE)
Timebase fine contr. (VARIABLE/CAL)	Modulation depth (SWEEP WIDTH)
Horizontal position (X POSITION)	Duty cycle waveform (DUTY)
Triggering: which input chan. (A/B)	TTL level defined output (SYNC)
Triggering on the mains freq. (LINE)	
External triggering (EXT)	
Triggering on the pos. or neg. edge (+/-)	
Triggering: level adjustment (LEVEL)	
Auto triggering (AUTO)	

#### Assignment 2:

Connect the 'main' output of the function generator to one of the inputs of the scope and to the input of your multi-meter as well. If available use a BNC T-piece, BNC cable and BNC-to-Banana cable and/or a BNC-to-Banana adapter.









Let the generator's main output produce a symmetrical (referred to zero Volt) sine wave of 2V top-top / 1 kHz measured by using the oscilloscope.

- 1. Now write down what the multi-meter (AC volt position) is reading. Compare oscilloscope and multi-meter's readings. Explain !!!
- 2. Increase and decrease the frequency (roughly between 100Hz and 10000Hz) of the waveform and keep comparing oscilloscope's reading with the multi-meter one. Explain !!!
- 3. Again adjust the output to 2V top-top / 1 kHz. Next connect a 47 Ohm resistor in parallel to the generator's output. Notice how this resistor affects the level of reading. Explain !!!

# Assignment 3:

Start working on the CE reader's practical assignment (ref. Chapter 3 and 4): analyzing resistive networks and calculating, building and testing filters. Ask if you need any help.