

Lab 1 - Equipment Familiarization

Introduction

In this lab you will:

- unpack, install and test a Rigol DG1032Z function / arbitrary waveform generator (AWG),
- prepare a receiving report,
- use the waveform generator to generate a signal and measure some of its parameters using the Rigol DS2072 digital oscilloscope (the “scope”), and
- familiarize yourself with the documentation for the waveform generator and ‘scope.

Unpack and Check Contents

Unpack the DG1032Z AWG and check the contents against the included packing (“Contents”) list. If there are any missing items, note this down and inform the instructor.

Installation

Remove Analog Oscilloscope

To make room on the bench you will have to remove the analog oscilloscope. Disconnect the power cord and the probes and put them in the storage pouch on top of the ‘scope. Move the ‘scope to the storage area.

Install AWG

Follow the setup instructions on page 11 of the English section of the Quick Guide included with the AWG. Attach the USB cable to the connector on the back and leave the other end of the cable visible on the front of the bench. Use the power outlet freed up when you removed the ‘scope. Rotate the handle under the AWG so that the display and controls are easy to see. Use the BNC cable to connect Channel 1 of the AWG to Channel 1 of the ‘scope.

Self-Check

Turn on the AWG and the scope and make sure the start-up self-tests complete without errors. Inform the instructor if there are any error messages.

Put the remaining accessories, CD, Certificate of Calibration and warranty cards back in the plastic bag. You will hand these in with your receiving report at the end of the lab.

Record Serial Number

Press Utility -> System Tools to display the AWG serial number. Compare the serial number to the serial number of the Certificate of Calibration. Double-check that you have recorded the serial number correctly. Inform the instructor of any discrepancies.

Ask the instructor to attach an asset (inventory) tag to the AWG. Record the tag number.

Receiving Report

At larger companies employees may be required to produce receiving reports when equipment is delivered. The employee compares received items to those listed in the corresponding purchase order and prepares a report. This report tells the accounting department that the items were received in good condition. The accounting department then pays the vendor.

Before leaving the lab, hand in the plastic envelope with the accessories (other than the USB and power cables), documents and a sheet of paper with:

- the title “Receiving Report”
- your name, BCIT ID number and date
- the AWG serial number (double-check this)
- the asset tag number (double-check this)

- a list of any missing items (or “packing list verified”)
- a list of any failed tests (or “self-tests passed”)

You can use the printer in the lab to print this report.

Equipment Familiarization

Configure the AWG for a 1 Vpp, zero-mean 1 kHz sine wave output on Channel 1. Adjust the 'scope to display approximately two cycles of the input on Channel 1. Use the measurement menu to display the frequency, peak-to-peak voltage and RMS voltage.

Capture the display (showing only the waveform and measurements, no other menus) and save it to a USB drive plugged into the 'scope.

Configure the AWG for a 3.525 kHz 1% duty cycle pulse waveform with a low voltage of -5V and a high voltage of 0V. Adjust the 'scope for a *rising* edge trigger at a level of -1V. Adjust the horizontal time scale and position controls to display the *falling* edge of the pulse so the fall time takes about half of the display width. You may have to use the “delayed sweep” feature. Add the fall time measurement to the display and take another screen capture.

Re-attach the 'scope probe to Channel 1 and put the BNC cable in the plastic bag with the other accessories. Leave the USB cable attached to the AWG.

Pre-Lab Report

Read the “Front Panel Overview” and “User Interface” sections of the DG1000Z (AWG) and DS2000 ('scope) Quick Guides. Read the Table of Contents of the two User Guides so you know where to find more detailed information. These guides and manuals are available on the course web site under Content / Documentation / Equipment Manuals.

Answer the following questions about the 'scope:

1. What button automatically adjusts the display to view the input waveform(s)?
2. What color is used for the Channel 2 controls and display elements?

3. How are the trigger position and zero voltage level indicated on the display?
4. How do you configure the 'scope for use of 10X probes? What happens if you don't do this?
5. How do you capture the display and save it to a flash drive?

Answer the following questions about the AWG:

1. Where is the LOCAL button?
2. What button returns you to the previous menu?
3. How do you enable/disable Channel 1 output?
4. Assume the signal generator is set to 2Vrms output level and the load impedance is set to 50 ohms using the menu Utility and System Settings / Channel Set / Output Set). What RMS voltage will you measure on a 'scope directly connected to the AWG output? *Hint: the 'scope input impedance is 1Mohm.*

Lab Report

Lab Report Format

Each lab report must include the following on a separate cover page: lab number and title, the course number, your name and BCIT ID, and the date the report was created. You will probably find it helpful to create a document template that you can re-use for your future reports.

Lab Report Content

Prepare a report containing the above title page and the two 'scope screen captures. Submit it to the course web site dropbox before the deadline (1 week after the lab).