Lab-01

Introduction to Electronic Instruments

Chia-Chun Tsai

Objectives

- Understand all related electronic hand tools
- Understand how to operate basic electronic instruments, such as DMM, Power Supply, Function Generator, and Oscilloscope.

Hand Tools

Single core cable or Wires

Needle-nose pliers

Diagonal pliers

Screwdriver set

IC chip extractor

Soldering iron

Alligator Clips

Test Clips

60/40 Lead Solder, rosin core .062" 1lb

VOM or DMM

- **A VOM or DMM can measure resistance, DC voltage/current, AC voltage, and other Components.**

Analog multimeter (**VOM**)

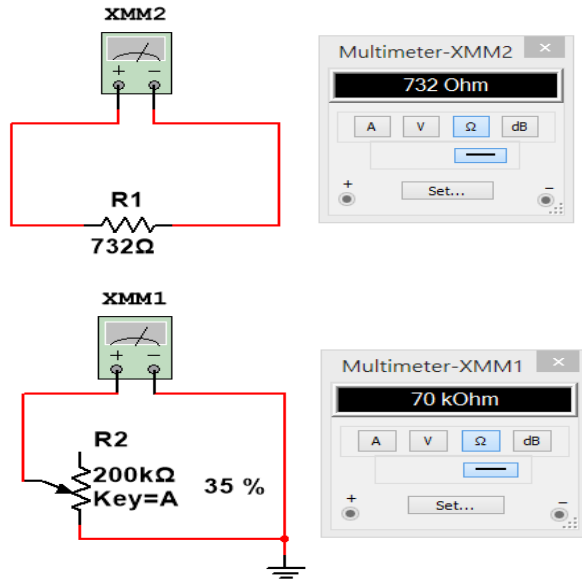
(b) Analog multimeter (VOM)

Digital multimeter (**DMM**)

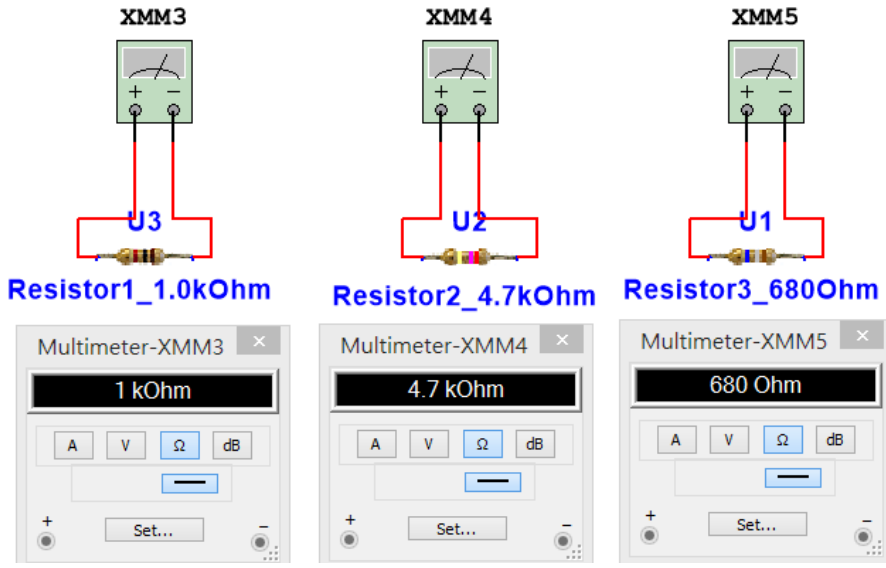
(a) Hand-held digital multimeter (DMM) *(Reproduced with permission from the Fluke Corporation)*

Turn off when no use

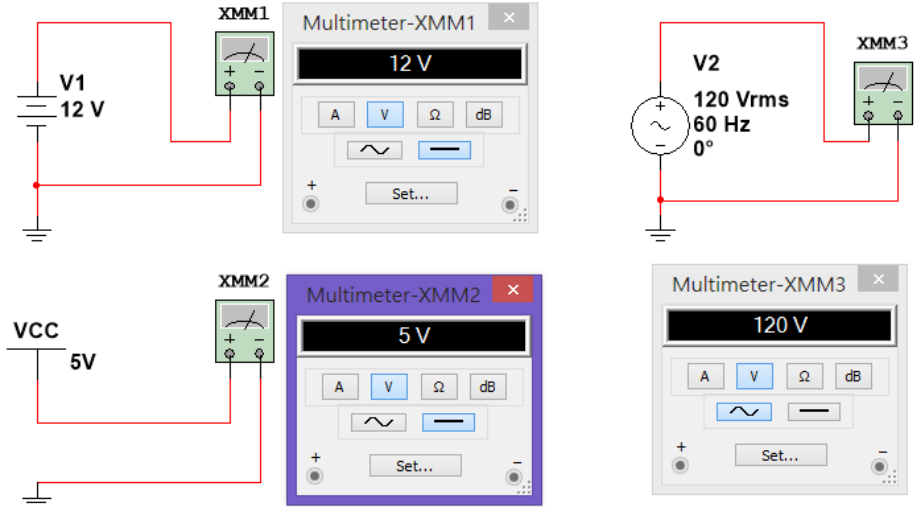
Measure Resistance



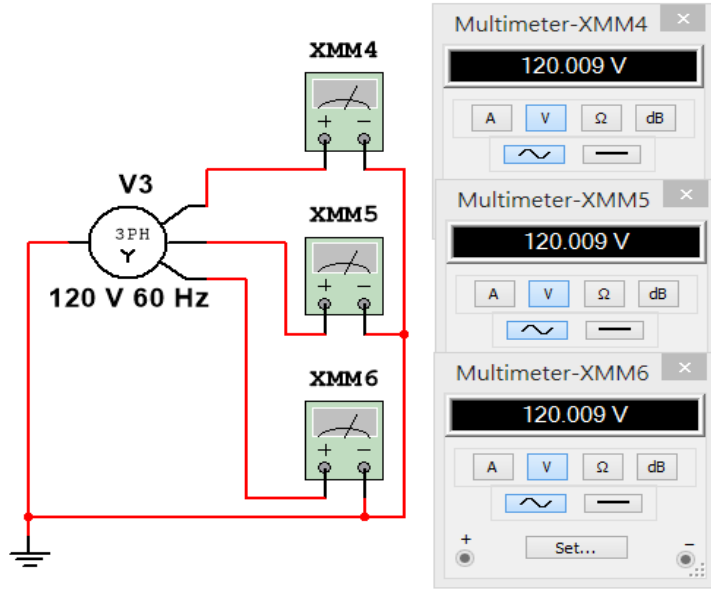
Measure Resistance



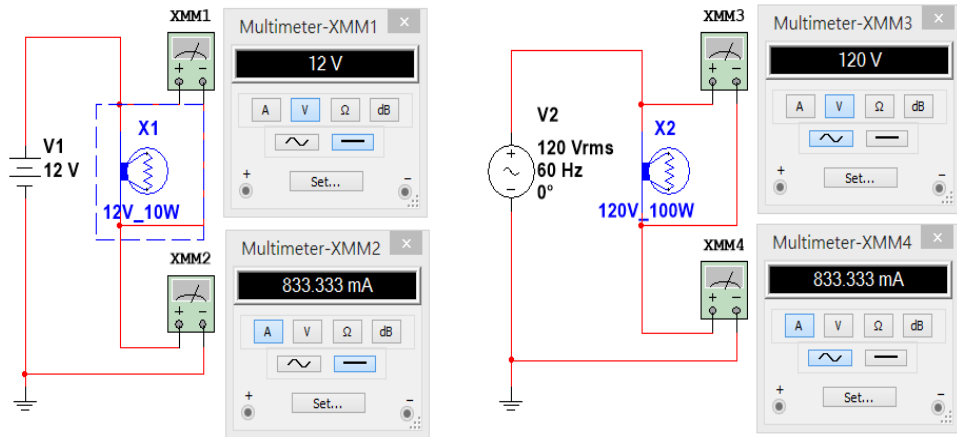
Measure DC & AC Voltages



Measure 3-Phase AC Voltages



Measure DC &AC Currents



Power Supply-1

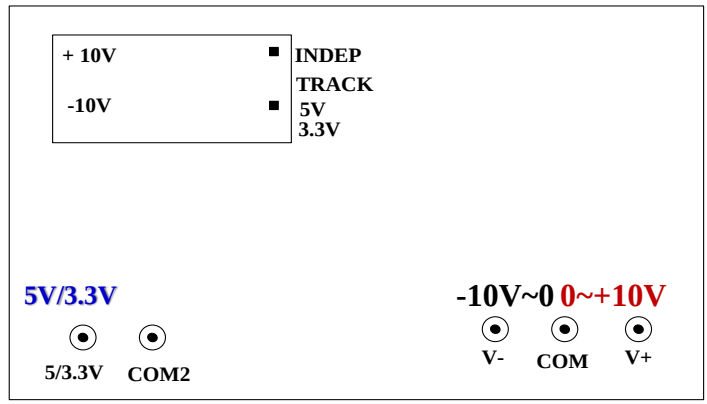
- A power supply can support at least two DC voltages / currents.

0~ +30V, 3A
0~ -30V, 3A
Fixed 5/3.3V

Source: Motech LPS-305 **2-group voltages**

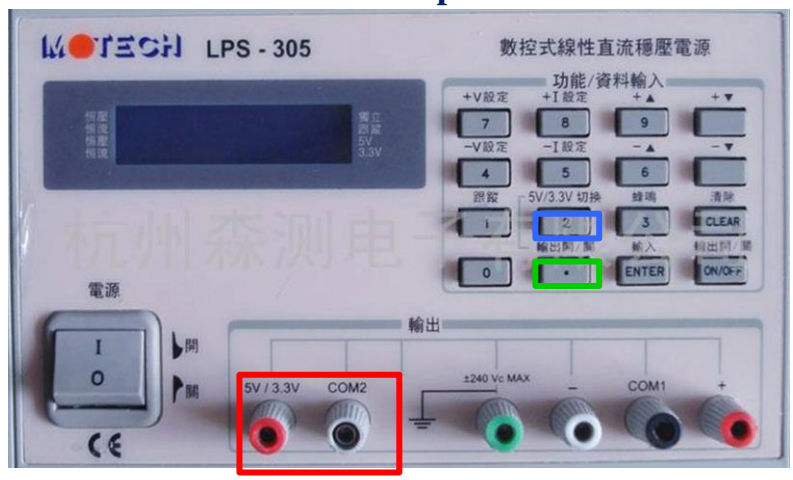
Basic Operations for Motech LPS-305

- Push button "**7**" +**VSET** to set **positive V+** to COM
- Push button "**8**" +**ISET** to set **limited current** of V+
- Push button "**1**" to select the **toggle INDEP/TRACK**
- Push button "**2**" to select the **toggle 5V/3.3V**



Basic Operations for Motech LPS-305

- Push button "**2**" to select the **toggle 5V/3.3V**
- Push button "**.**" to **on/off output 5V/3.3V**

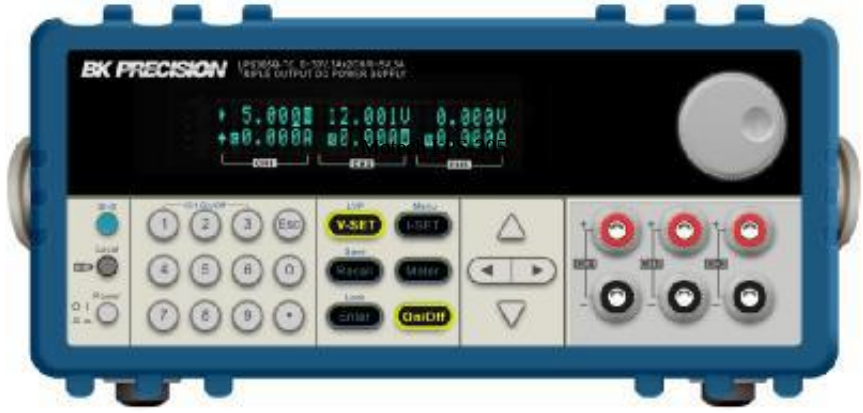


Basic Operations for Motech LPS-305

- Push button "**7**" +**VSET** to set **positive V+** to COM
- Push button "**5**" to set V+ = **5V**
- Push button "**on/off**" to output **5V**

Power Supply-2

- **A power supply can support at least two DC voltages / currents.**



Source: BK Precision LPS305B-TC **3-group voltages**

Basic Operations for BK LPS305B-TC

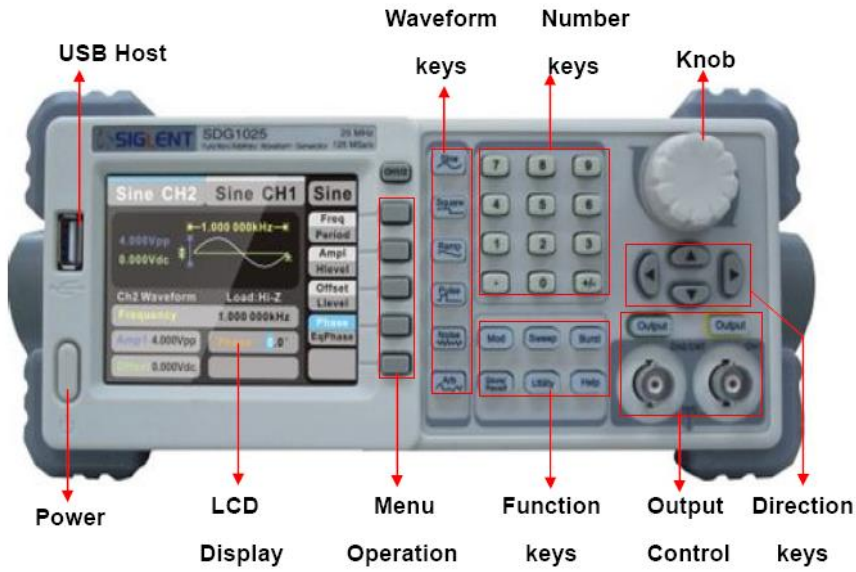
- Push button **V-set** **(LED on for setting)** + Number + **Enter** to set the **output voltage**
- Push button **I-set** **(LED on for setting)** + Number + **Enter** to set the **output current**
- Push button **Local** to select other **CH**annel for setting
- Push button **shift**+"**1**" , +"**2**", or +"**3**" to output the respective **CH**annel
- **Meter: LED on for measuring; LED off for setting**
- **On/Off: LED on/off for VFD panel on/off**
- **Recall: LED on to recall the stored setting powers**
- **CV: Constant voltage mode**
- **CC: Constant current mode**
- **LVP: Limited Voltage Peak**

Function Generator

- **A Function Generator can output at least four kinds of waveforms: Sinusoidal, Square, Ramp/Triangle, and Arbitrary waves.**

Source: SIGLENT SDG100

SIGLENT SDG100



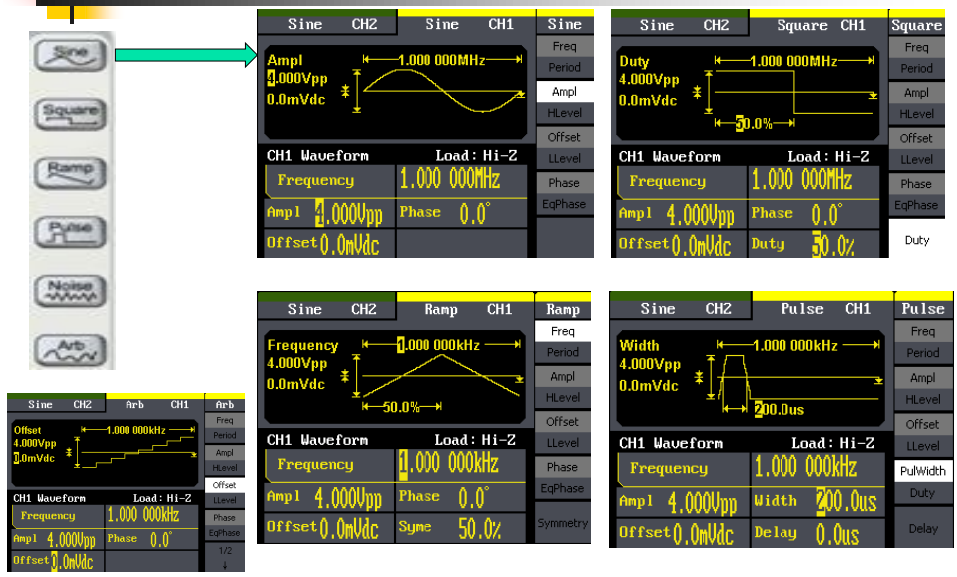
 Source: SIGLENT SDG100

SIGLENT SDG100

- **Sine** or **Square** waveform: **1μHz to 50MHz**
- **Ramp/Triangle** waveform: **1μHz to 300kHz**
- **Pulse**: **500μHz to 5MHz**
- **Arbitrary** waveform: **1μHz to 5MHz**

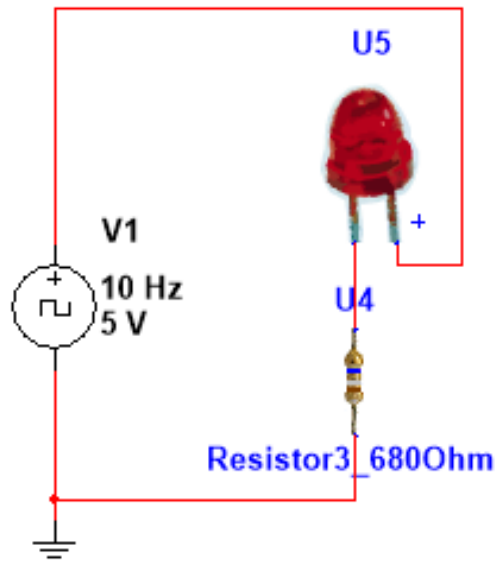
 Source: SIGLENT SDG100

SIGLENT SDG100



Source: SIGLENT SDG100

A Square Waveform to LED

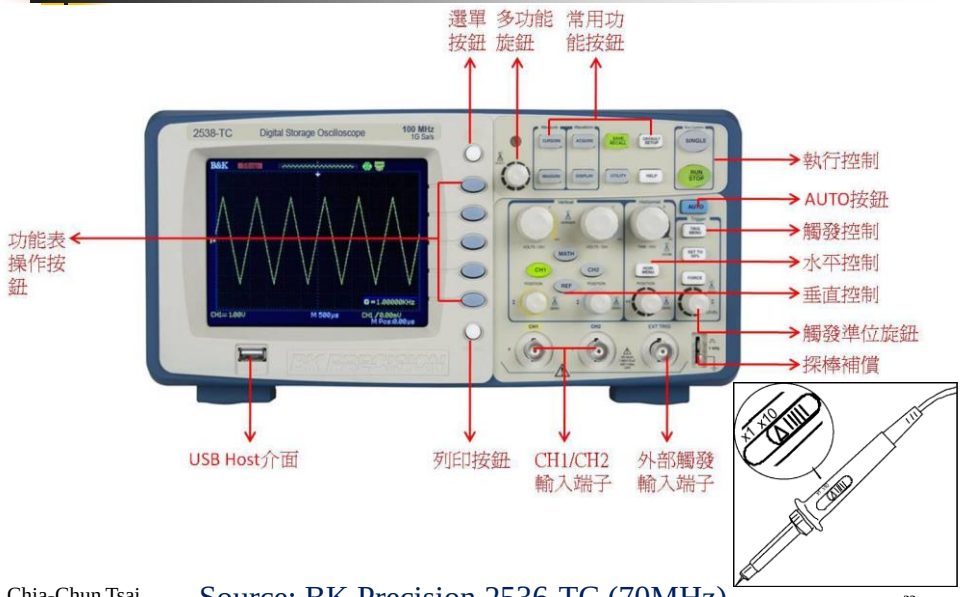


Oscilloscope

- An Oscilloscope (or Scope) can measure any waveforms such as Sinusoidal, Square, Pulse, or Triangle waveforms.

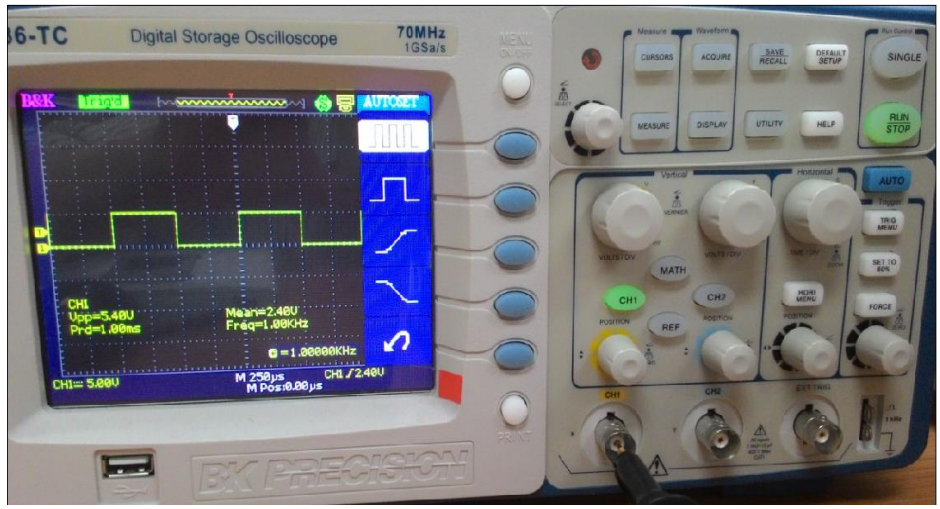
Source: BK Precision 2536-TC (70MHz)

Scope- BK 2536-TC



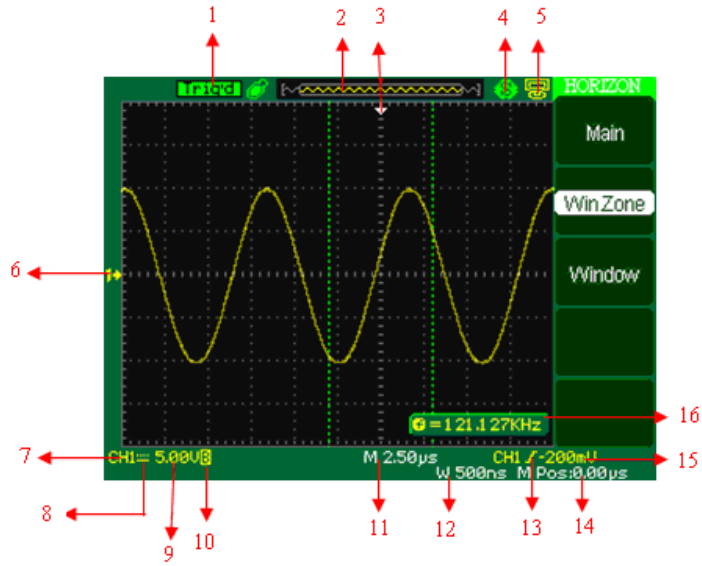
Source: BK Precision 2536-TC (70MHz)

Basic Operations- BK 2536-TC



Chia-Chun Tsai Source: BK Precision 2536-TC (70MHz) 23

Basic Operations- BK 2536-TC



Chia-Chun Tsai Source: BK Precision 2536-TC (70MHz) 24

Basic Operations- BK 2536-TC

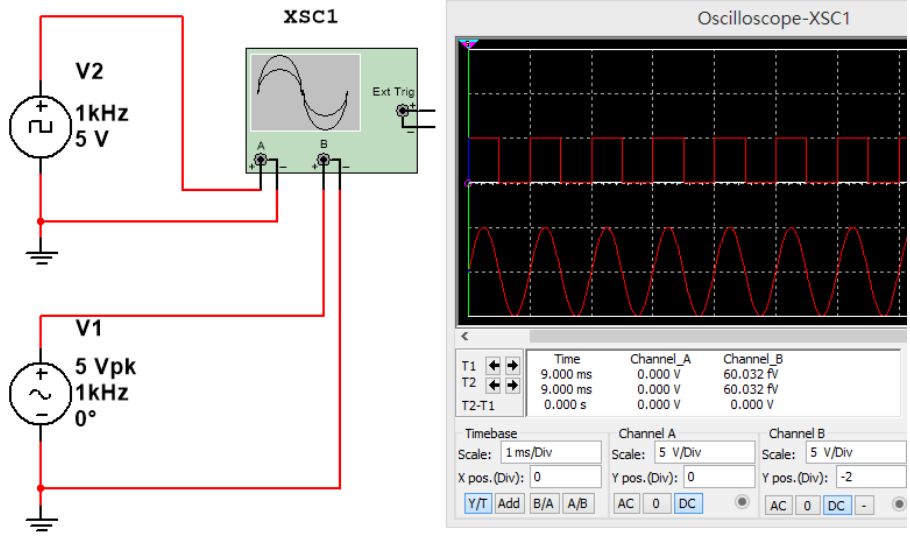
1. Trigger state: Trig"d- Triggered; Ready; Scan; Auto; Stop
2. Current wave in the memory
3. Mark the triggering position
4. ***P*** / ***S*** for printing / storing picture
5. /to set the rear USB to computer or printer。
6. Channel marker
7. CH1
8. CH1 coupling marker。
9. CH1 Vertical parameter
10. B: CH1 limited bandwidth
11. Main timebase
12. Horizontal position of main timebase
13. Triggered type
14. Real time
15. Triggered level
16. Frequency

Basic Operations- BK 2536-TC

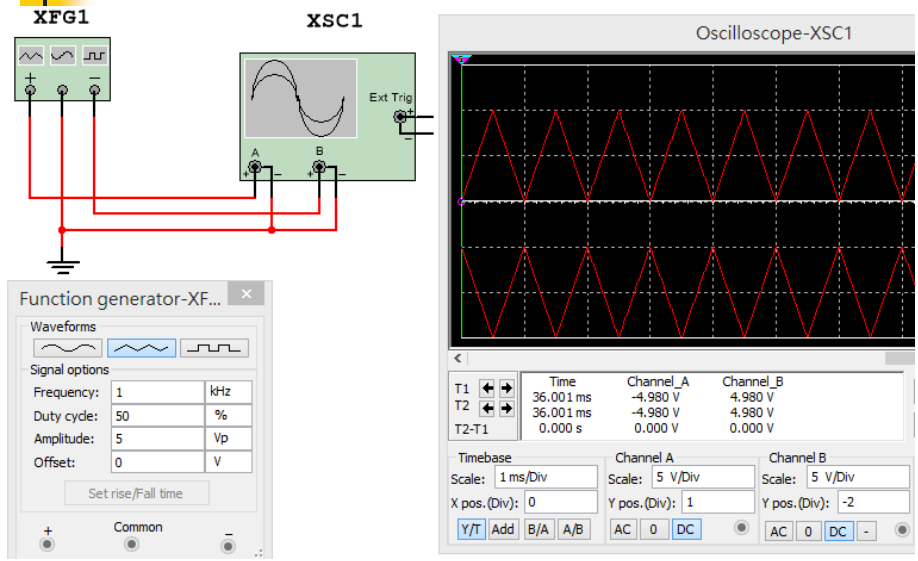
Basic Operations- BK 2536-TC

CH1、CH2：
MATH： Display “math functional table” e.g. CH1+CH2
REF： Display “refer-wave functional table”
HORI MENU： Display “horizontal functional table”
TRIG MENU： Display “trigger functional table”
SET TO 50%：Set trigger level at 50%
FORCE：Normal Trigger or just one-shot
SAVE/RECALL：Display “storing/recalling functional table”
ACQUIRE：Display “sampling functional table”
MEASURE：Display “auto measuring functional table”
CURSORS：display “cursor functional table”
DISPLAY：Display “display functional table”
UTILITY：Display “help-tool functional table”
DEFAULT SETUP：
HELP:
AUTO：
RUN/STOP：Continue/Stop to sample a series waves
SINGLE：Sampling a single wave then stop

Measure Square/Sine Waves



FG Output Waveforms for Scope



Experiments 1~4

1. Can get a voltage source, e.g., 12V, 5V or 3.3V from Power Supply. Please give an example.
2. Can use DMM to measure the resistance, short or open of a wire, DC voltage/current , and AC voltage/current. Please give some examples.
3. Can get a waveform source, e.g., sinusoidal, square, pulse, or ramp/triangle waveform with a voltage (12Vp-p) and a frequency (12kHz) from Function Generator. Please give some examples.
4. Can use oscilloscope to measure a DC voltage and any waveform with their period and frequency. Please give some examples.