



Keithley Benchtop Multimeter SOP

Standard Operating Procedure for the Keithley 2700 Multimeter/Data acquisition system.

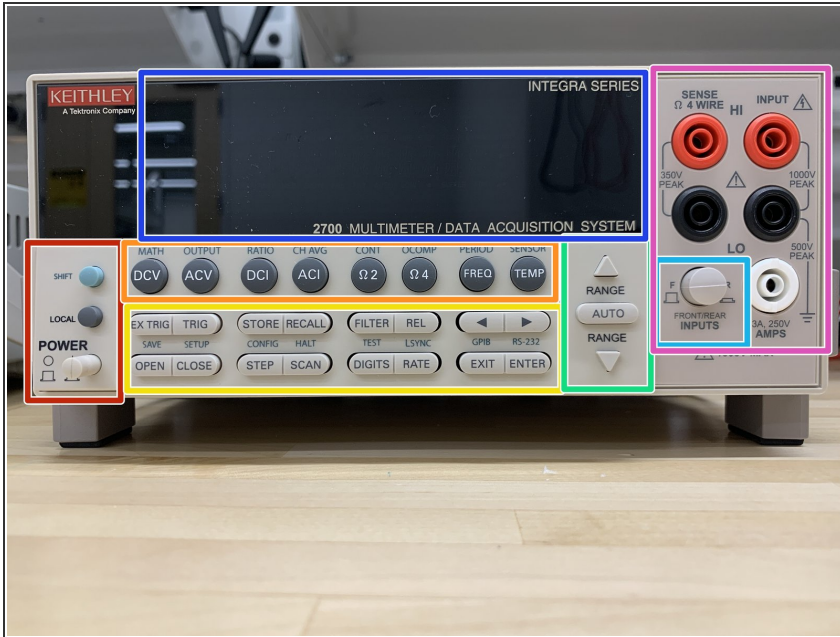
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Introduction

This guide will serve as an introduction to the Keithley 2700 Multimeter/Data Acquisition/Switch Systems. It will show the user how to use the all the basic functions of the machine.

Step 1 — Button layout

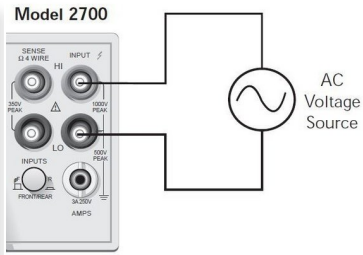


- Power switch and special keys
- Function and operation key (top row)
- Function and operation key (middle & bottom row)
- Range keys
- Display
- Input selector
- Probe inputs

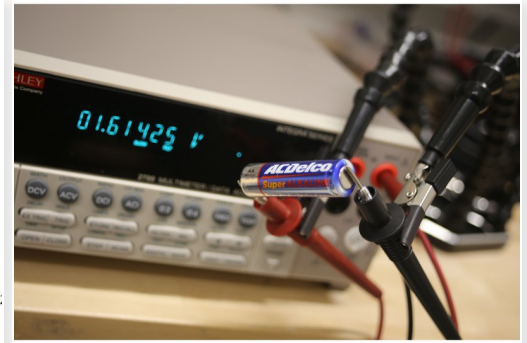
Step 2



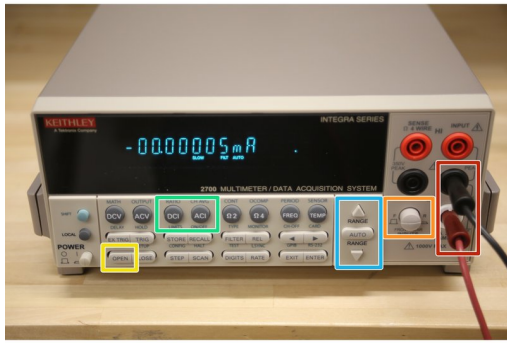
- Push the power switch to turn on the 2700.
- SHIFT - Use to select a shifted function or operation.
- LOCAL - Cancels GPIB remote mode.



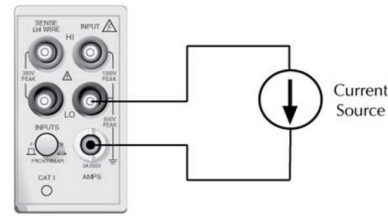
3. ACV Connections



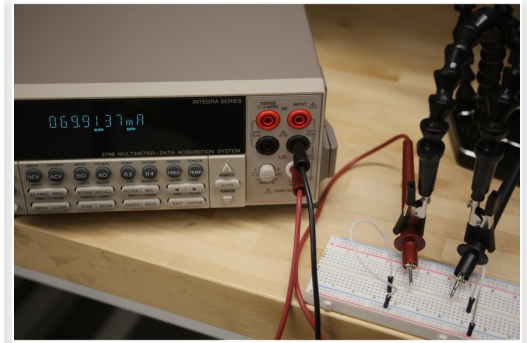
Step 4 — Measuring Current



DCI and ACI connections using front panel inputs

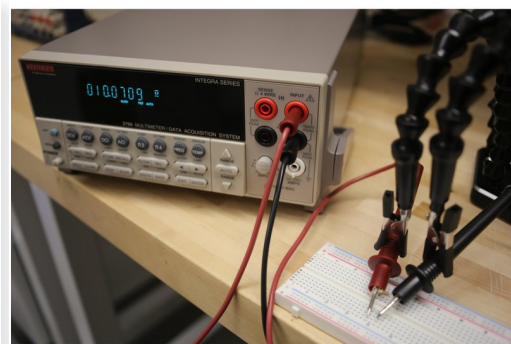
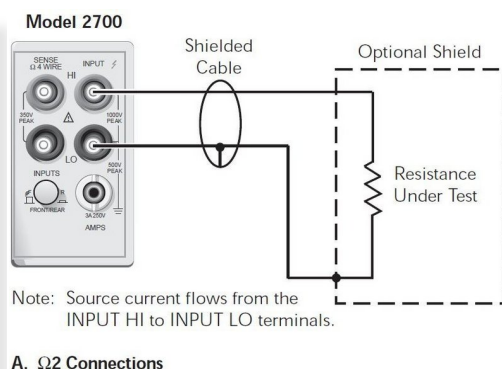
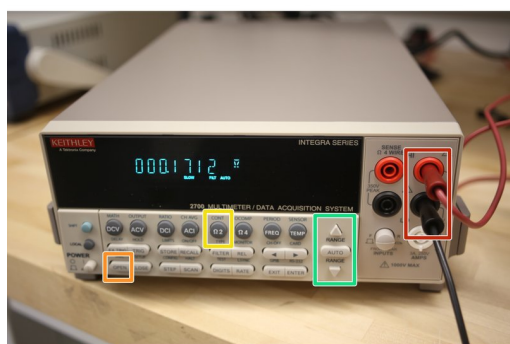


Caution: Maximum Input = 3A DC or RMS



- Connect the probes to the white and black inputs on the right.
- Make sure the INPUT switch is in the F position.
- If the display shows a switching channel is closed, press OPEN to open it.
- Select DCI for direct current or ACI for alternating current.
- Use the RANGE keys to select a measurement range consistent with the expected current or use AUTO.
- Insert the probes into the circuit such that current can flow through the machine and be measured.

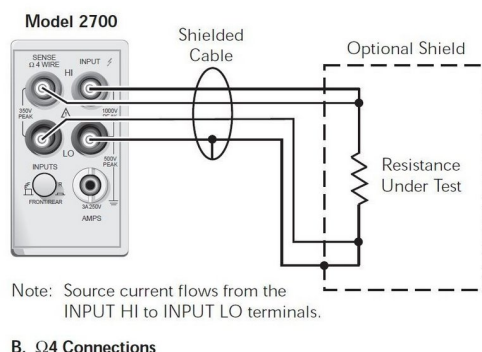
Step 5 — Measuring Resistance (2 wire mode)



i 2 wire mode is typically for $>1\text{k}\Omega$ measurements.

- Connect the probes to the red and black inputs on the right.
- If the display shows a switching channel is closed, press OPEN to open it.
- Select 2Ω for the 2 wire resistance function.
- Use the RANGE keys to select a measurement range consistent with the expected resistance, or press AUTO for auto-ranging.
- Resistance will be measured between the two probes.

Step 6 — Measuring Resistance (4 wire mode)



i 4 wire mode is typically for $\leq 1\text{k}\Omega$ measurements.

i Traditional ohm meters (2Ω mode) usually apply a small current and measure the resulting voltage to calculate resistance. 4 wire mode utilizes a voltmeter in parallel with an ammeter to calculate resistance. This reduces the severity of the probes' internal resistance on measurement and is called a Kelvin connection.

- Connect probes in all four red and black inputs.
- If switching channel is presently closed (displayed), press OPEN to open it.
- Select 2Ω.
- Use the RANGE keys to select a measurement range consistent with the expected resistance, or press AUTO for auto-ranging.
- Measure the device with both red leads on one side and both black leads on the other.

Step 7 — Functions: Top Row (Unshifted)



- DCV - DC voltage measurement function.
- ACV - AC voltage measurement function.
- DCI - Direct current measurement function.
- ACI - Alternating current measurement function.
- $\Omega 2/\Omega 4$ - 2/4-wire resistance measurement function.
- FREQ - Frequency measurement function.
- TEMP - Temperature measurement function.

Step 8 — Functions: Top Row (Shifted)



- MATH - Configures and controls $mX+b$, percent, or reciprocal ($1/X$) calculation.
- OUTPUT - Configures and controls digital and audio (beeper) output for limits.
- RATIO - Enables/disables channel ratio.
- CH-AVG - Enables/disables channel average.
- CONT - Configures and controls continuity test.
- OCOMP - Enables/disables offset compensated ohms with $\Omega 4$ function selected.
- PERIOD - Selects period measurement function.
- SENSOR - Configures temperature measurements.

Step 9 — Functions: Middle Row (Unshifted)



- EX TRIG - Selects external triggering (front panel, bus, trigger link) as the trigger source.
- TRIG - Triggers a measurement when in external triggering (EX TRIG).
- STORE - Sets the number of readings to store and enables the buffer.
- RECALL - Displays stored readings and buffer statistics. Use the arrow keys to navigate through buffer.
- FILTER - Enables/disables filter for selected function.
- REL - Enables/disables relative for selected function.
- < and > - Dual function—Manually scans switching channels. When in a menu, these keys control cursor position for making selections or change values.

Step 10 — Functions: Middle Row (Shifted)



- DELAY - Sets user delay between trigger and measurement.
- HOLD - Holds reading when the selected number of samples is within the selected tolerance.
- LIMITS - Sets upper and lower limits for readings.
- ON/OFF - Enables/disables limits.
- TYPE - Configures and enables filter for selected function.
- MONITOR - Selects and enable/disables monitor channel.
- CH-OFF - Disables channel for a scan (must be in scan channel setup mode).
- CARD - Identifies switching modules installed in mainframe. Set up switching modules that require configuration. View closed channels and channel settings for switching modules that require configuration.

Step 11 — Functions: Bottom Row (Unshifted)



- OPEN - Opens closed channel.
- CLOSE - Closes specified channel.
- STEP - Steps through channels; sends a trigger after each channel.
- SCAN - Scans through channels; sends a trigger after last channel.
- DIGITS - Sets display resolution for all functions.
- RATE - Sets measurement speed (fast, medium, or slow) for all functions.
- EXIT - Cancels selection, moves back to measurement display.
- ENTER - Accepts selection, moves to next choice or back to measurement display.

Step 12 — Functions: Bottom Row (Shifted)



- **SAVE** - Saves up to four instrument setups for future recall, and selects power-on setup.
- **SETUP** - Restores a default setup (factory or *RST) or a saved setup. Enables/disables buffer auto clear, auto scan, and auto channel configuration. Sets timestamp, date, and time. Displays serial number of Model 2700.
- **CONFIG** - Selects and configures a simple scan or an advanced scan.
- **HALT** - Disables step/scan.
- **TEST** - Selects the calibration menu, display test or the key-press test.
- **LSYNC** - Enables/disables line cycle synchronization. When enabled, noise induced by the power line is reduced at the expense of speed.
- **GPIB** - Enables/disables GPIB and selects address.
- **RS-232** - Enables/disables RS-232 interface; selects baud rate, flow control, and terminator.

Step 13 — Range Keys



- Δ and ∇ - Dual function. Selects the next higher/lower measurement range for the selected function. When in a menu, these keys make selections or change values.
- AUTO - Enables/disables autorange for the selected function.

Step 14 — INPUT Switch



- Front panel inputs (out position)
- Switching module inputs (in position)

Step 15 — Front Panel Inputs



- INPUT HI and LO - Used for DCV, ACV, $\Omega 2$, CONT, FREQ, PERIOD, and TEMP measurements.
- SENSE HI and LO - Use with INPUT HI and LO for $\Omega 4$ and RTD TEMP measurements.
- AMPS - Use with INPUT LO for DCI and ACI measurements.