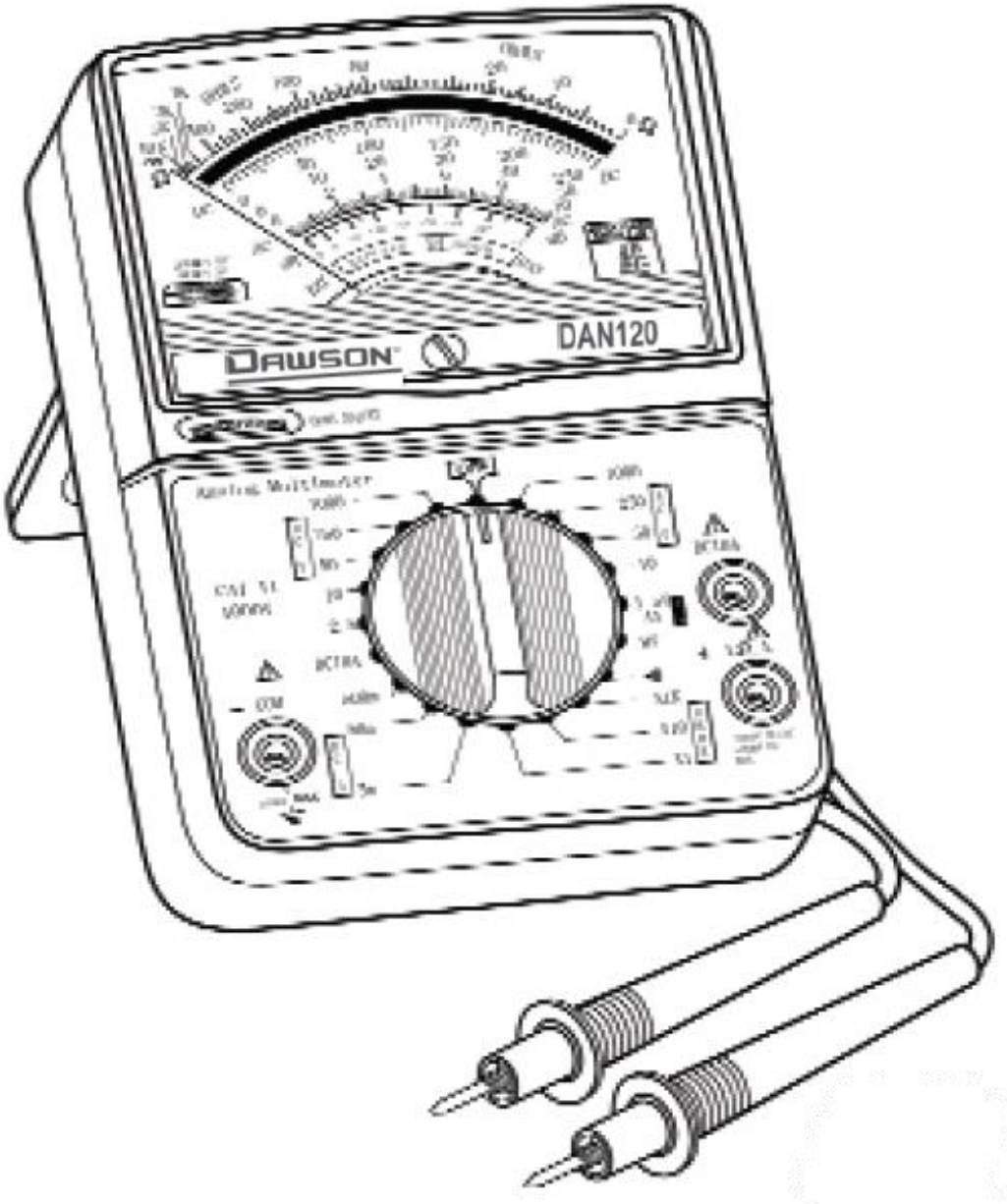
Dawson DAN120

Analog Multimeter

User's Manual



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LIMITED WARRANTY AND LIMITATION OF LIABILITY

This instrument from Dawson Tools Inc. will be free from defects in workmanship and material for three years from the date of original purchase. This warranty does not cover defects resulting from damage caused by the user such as drops, neglect, misuse, unauthorized alteration, usage outside of specified conditions, contamination, or improper repair/maintenance. To receive service on the instrument if it becomes necessary during the warranty period, contact your nearest Dawson authorized service center at (800) 898-6991 or visit www.DawsonTools.com to obtain a return authorization (within the US only). A return authorization is necessary before returning any instrument to Dawson; no service will be provided without a return authorization. The user is responsible for properly packing the unit and charges such as shipping, freight and insurance charges. The extent of Dawson's liability is limited solely to the repair/replacement of the instrument. The above warranty in its entirety is inclusive and no other warranties, written or oral, are expressed or implied.

Out of the Box

Check the Meter and accessories thoroughly before using the Meter. Contact your local distributor if the Meter or any components are damaged or malfunction.

Accessories

- Test Leads 1 pair
- 1.5V AA Battery 1pc

Safety Information

⚠ WARNING

TO REDUCE THE RISK OF FIRE, ELECTRICAL SHOCK, PRODUCT DAMAGE OR PERSONAL INJURY, PLEASE FOLLOW THE SAFETY INSTRUCTIONS DESCRIBED IN THE USER MANUAL. READ THE USER MANUALS BEFORE USING THE METER.

⚠ WARNING

TO ENSURE SAFE OPERATION AND LIFE OF THE METER, DO NOT PLACE THE METER IN ANY ENVIRONMENT WITH HIGH PRESSURE, HIGH TEMPERATURE, DUST, EXPLOSIVE GAS OR VAPOR.

- Avoid shaking, dropping or any kind of impacts when using or transporting the Meter.
- To avoid electric shock or personal injury, repairs or servicing not covered in this manual

should be performed only by qualified personnel.

- Avoid direct exposure to sunlight to ensure extended life of the Meter.
- Do not place Meter in a strong magnetic field; this may cause false readings.
- Use only the batteries indicated in the Technical Spec.
- Avoid exposing batteries to humidity. Replace batteries as soon as the low battery indicator appears.
- Please keep the original packing for future shipping purposes (ex. Calibration)
- After opening the box, check for any damage during delivery.

Safety Symbols on the Meter

	Important safety information, please refers to the user manual
	Earth ground
	Indicates compliance with requirements for double insulation

⚠ Important Safety Information

- Never use the Meter to measure voltages that might exceed 1000V DC/AC above earth ground.
- Always be careful when working with voltages above 60V DC or 30V AC RMS. Keep fingers behind the probe barriers while measuring.
- Never connect the Meter leads across a voltage source while the rotary switch is in the resistance, diode or continuity mode. Doing so can damage the Meter.
- Inspect test leads and probes for cracks, breaks or crazes on the insulation before using the Meter.
- Repair or maintenance should be implemented by trained personnel.

Certification

- **CAT II**: This meter has meet IEC1010-1 standard with an overvoltage category (10 00V CAT II) and pollution degree 2.
- CEThe Meter is compiled to EMC requirements.

Introduction

Overview

The DAN120 is a compact analog multimeter featuring large analog scale. Functions include AC/DC voltage, AC/DC current measurement, resistance measurement and battery test. This DAN120 meter is ideal for both professional and hobbyists.

Figures and Components

Front Panel

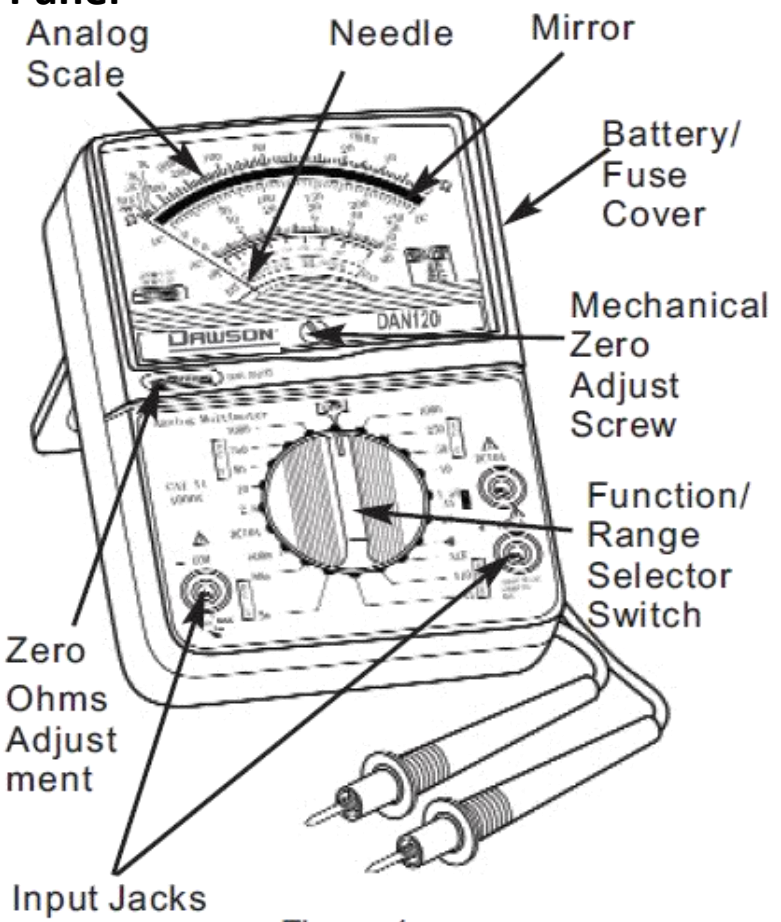


Figure 1

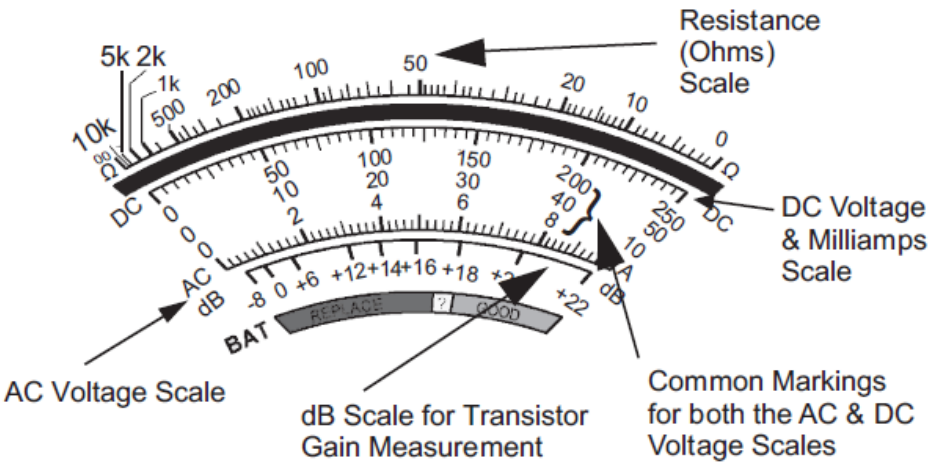
Using the Meter

Preparation

Fully plug the test leads into the input jacks. Red lead to "**VΩA+"** input and black lead to "**COM-"** input.
Calibration of the scale is needed before making measurement. Use a small size flat tip screwdriver to adjust the black knob located in the center of the Meter, next to the Dawson logo. The needle on the scale should align with "0" on the left side of the scale.

- The "⚠" symbol next to the input lead shows that the input voltage or current should not exceed the specified value in order to protect the internal circuit from damage.
- Turn the rotary switch to the required function and range to be measured.
- Choose the highest range when the value to be measured is unknown.
- When making connection, connect the common test lead first and then the powered test lead.
- Remove the charged test lead first when disconnecting.

Reading the Scale



General

Make sure to align the needle with the scale.

Resistance (Ohms - Ω)

Use the top scale (Green) to read resistance.

If the meter is set to X10, multiply the resistance value by 10, and in x1K multiply the resistance value by 1000.

DC Voltage (V DC)

Use the middle scale (Black). To read of the measurement, first match the dial range setting to the highest number on the scale to find out the according scale.

NOTE:

- For 2.5V range measurement, use the scale of 250V and divide by 100.
- For 1000V range measurement, use the scale of 10V and multiply by 100.

AC Voltage (V AC)

Use the same numbers and procedures used for DC voltage measurement.

DC Current (mA)

Use the same scale (Black) and procedures as used for the DC voltage setting.

Decibel Gain (dB)

Use the scale marked dB to read decibels for transistor gain. Use the chart at the right of the scale for proper conversion.

DC/AC Voltage Measurement

- Plug the test leads in to input jacks.
- Use rotary switch to select DCV or ACV and the proper range (0~2.5 DC only, 0~10V, 0~50V, 0~250V or 0~1000V). Choose the highest range when the value to be measured is unknown.

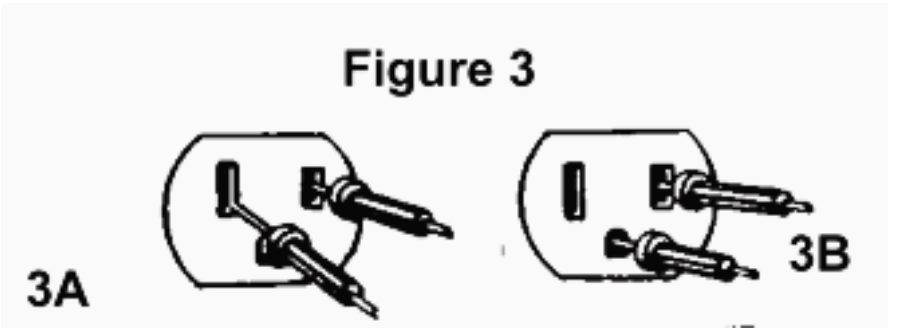
- Connect the test leads to the circuit in series, that is, to let the current of the circuit to pass the Meter through test leads. If the needle deflects to the left, reverse the leads connection.
- Read of the scale as described in **Reading the Scale.**

Common AC Voltage Measurements

Wall Receptacles

If the receptacle is controlled by a switch, make sure the switch is ON. Set the rotary switch to 250 ACV. Touch the red test lead to the “hot” and black to the “neutral” slots of the receptacle (see fig. 3A). The needle indicator should read 120V AC on the 0-250 scale. To test for proper grounding of the receptacle, touch the red test lead to the “hot” (narrow) side of the receptacle, and the black test lead to the ground slot. The meter should read 120V AC as before.

Figure 3



DC Current Measurement (mA)

⚠ **WARNING**

DO NOT APPLY VOLTAGE TEST WHEN ROTARY SWITCH IS IN CURRENT MODE

- Plug the test leads in to input jacks.
- Connect the test lead to the target, red to positive and black to negative terminals.
- Read of the scale as described in **Reading the Scale.**

NOTE:

- For 5mA Range, use the 0-10 scale and then multiply by 0.5mA
- For 500mA Range, use the 0-250 scale and multiply by 2mA

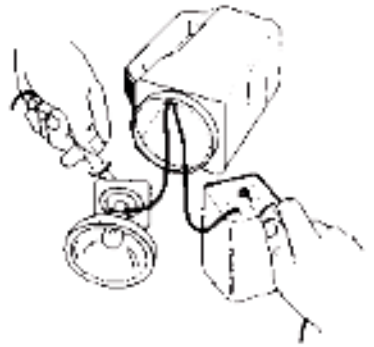
Common DC mA Current Measurements

⚠ **WARNING**

DO NOT APPLY VOLTAGE TEST TO THE TEST LEADS WHEN ROTARY SWITCH IS IN CURRENT MODE

It is important to point out that milliamps can also be expressed as thousandths of an Ampere; therefore 500 milliamps is 500 thousandths of one Amp. The 500mA function of your multimeter is commonly used by electronics repair technicians and hobbyists to troubleshoot various low voltage circuits. Although not normally used for electrical troubleshooting around house, this function can be used to measure the milli-amperage draw of household items such as flashlights and other battery operated devices that do not draw more than 500 mA. In fig. 2 the red (+) test lead is hooked up to the (+) terminal of the lantern battery while the black (-) test lead is hooked up to the bulb. The meter will indicate the milli-amperage draw when the flashlight switch is thrown in the ON position.

Figure 2



DC 10A Measurement

⚠ **WARNING**

DO NOT APPLY VOLTAGE TEST WHEN ROTARY SWITCH IS IN CURRENT MODE

A separate input jack is provided for measurement of DC current up to 10A. Maximum measuring time is 15 seconds with a 30 second interval between tests. Rotate the switch to “10A” position and use the “DC 10A” input. Use the 0~10 scale for reading.

Resistance/Continuity Measurement

⚠ **WARNING**

DO NOT APPLY VOLTAGE OR CURRENT TEST WHEN ROTARY SWITCH IS IN RESISTANCE MODE

⚠ **WARNING**

POWER OFF THE CIRCUIT

- Plug the test leads into input jacks.
- Rotate the switch to "**Ohm**" mode.
- Choose the highest range (**x1K)** when the value to be measured is unknown.
- Connect the test lead to the target, polarity can be ignored.
- For Resistance read of the scale (Green) as described in **Reading the Scale.**
- For Continuity test, turn the rotary switch to "•))".
- Connect the leads to the circuit. If the circuit is well connected, the Meter will buzz to indicate good continuity.

NOTE:

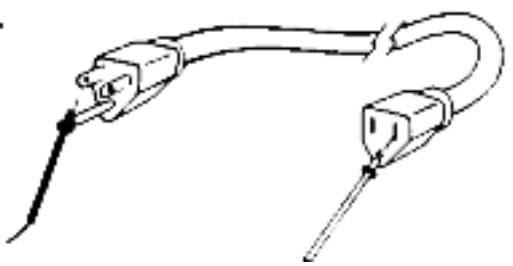
When switching between resistance mode and other modes, always calibrate the needle to zero before making measurement.

Extension Cords Continuity Test

Unplug the cord from two sides. Set the rotary switch to the ohm x1K position. Touch one of the test leads to one of the metal prong ends of the cord, insert the other test lead in either one of the receptacle slots on the other end of the cord. Make sure the test lead is making contact with the slot. Test both slots with the test lead, making sure in both cases that the leads are well

connected to the slot. If none of the tests appear to have 0 ohm resistance, the continuity test fails. Fig.4

Figure 4

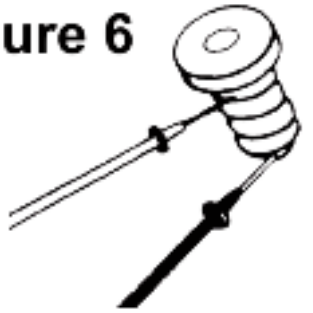


Fuses Test

Remove the fuse from the appliance. Touch each end of fuse (fig.5) with the test leads and perform the continuity test. For plug type fuses, touch the test leads at the bottom and the threaded metal contact (fig.6).

Figure 5

Figure 6



Switches

Remove the switch from any power source. Turn the switch to ON position and touch the test leads to the switch terminals (fig. 7). If the switch is good, the needle

indictor will move to ~0 ohm. On other switches such as three-way light switches or double pole double throw (ON-OFF-ON) switches, each ON position will need to be tested. Alternate the test leads between the switch terminals to determine which two terminals control the ON position.

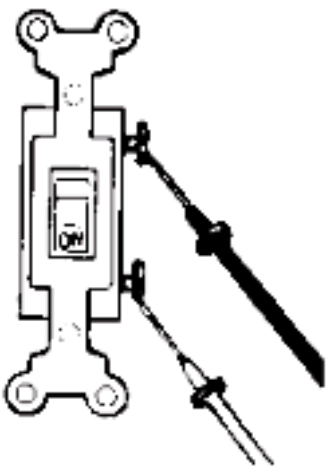


Figure 7

Transistor Gain Measurement (dB)

To measure the gain of a transistor:

- Plug the test leads into the input jacks.
- Set the rotary switch to any one of the AC voltage ranges and read the decibel measurement on the bottom (red) scale.
- Compute the actual decibel conversion based on the chart located at the bottom right of the faceplate.

NOTE:

Circuit impedance must be at least 600 ohms.

0 decibels = 1 milliwatt.

1.5V and 9V Battery Test

- To check if the battery is in good or bad condition, switch the rotary switch to "**1.5V AA**" or "**9V**" on the right side according to the battery type.
- Connect the red lead (+) to the (+) side of battery and black lead (-) to the (-) side.
- Read the result, **REPLACE** or **GOOD**, from the bottom of the scale.

Specifications

General Specification

- Ranges: 19 measuring modes
- DC Voltage: 2.5,10,50,250,1000 Volts
- AC Voltage: 10,50,250,1000 Volts
- DC Current: 5,50,500mA and 10A
- Resistance : Rx1, Rx10, Rx1K (resistance indicated multiplied by 1, 10 and 1000) ohms
- AC voltage range:-8dB to +62dB
- Accuracy:
  DC voltage, mA = ±4% full scale of range

AC voltage = ±5 % full scale of range
Resistance = ±4% arc of scale length

- Operating altitude: max. 2000 meters (7000 ft.)
- Display: Analog display
- Fuse: F500mA/250V Φ 5.2x20mm
  F10A/250V Φ 5.2x20mm
- Power Supply : 1.5V×1 AA batteries
- Test Lead: CE CATII 1000V 10A
- Operating Temperature: 18°C to 25°C (64°F to 77°F)
- Dimension: 149×97×43mm (5.8x3.8x1.7 in.)
- Weight: approximate 250g (9.8oz) including batteries

Maintenance and Repair

Repair

Please follow the steps closely if the Meter is not functioning properly:

- Check batteries; replace if necessary
- Follow User's Manual to confirm all procedures.
- Before sending Meter back for repair, include a description of the problems encountered. Remove batteries and pack Meter well to avoid damage in delivery, Dawson does not cover damage due to delivery.

- Repair or service not covered in this manual should be performed only by the authorized service center or qualified personnel.

Replacing Batteries

Follow these steps to replace batteries:

- Turn off the Meter.
- Loosen the back cover and remove from case.
- Remove batteries and replace with new batteries.
- Re-attach back cover and tighten screw.

Replacing Fuses

Fuses rarely need replacement. Almost all blows are the result of operation error.

- Loosen the back cover like in the **Replacing Batteries.**
- Replace the blown fuse with one at the specified rating described in **Technical Specification**.
- Re-attach back cover and tighten screw.

Contact Dawson

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Do not recycle