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GVT-427B User Manual

SAFETY TERMS AND SYMBOLS

These terms may appear in this manual or on the product:

WARNING. Warning statements identify condition or practices that could result in injury or loss of life.

CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

The following symbols may appear in this manual or on the product:

DANGER High Voltage

ATTENTION refer to Manual

Protective Conductor Terminal

(Ground) Earth Terminal

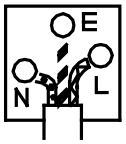
FOR UNITED KINGDOM ONLY

NOTE: This lead/appliance must only be wired by competent persons

WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow: Earth
Blue: Neutral
Brown: Live (Phase)



As the colours of the wires in main leads may not correspond with the colours marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with the letter E or by the earth symbol ⏚ or coloured Green or Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black.

The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or **coloured** Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.
This cable/appliance should be protected by a suitably rated and approved HBC mains fuse : refer to the rating information on the equipment and/or user instructions for details. As a guide, cable

of 0.75mm² should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any moulded mains connector that requires removal /replacement must be destroyed by removal of any fuse & fuse carrier and disposed of immediately, as a plug with bared wires is hazardous if a engaged in live socket. Any re-wiring must be carried out in accordance with the information detailed on this label.

Introduction

GVT-427B is versatile AC voltmeter which is able to measure AC voltage from ranges of 10 Hz to 1 MHz with full scale ranges from 300 μV to 100 V. The dB scale measures 1V as 0dB and ranges from -90 dB to +41 dB. The 600 Ω (1mW) dBm scale ranges from -90 dBm to +43 dBm.

The scales on the meter are graduated up to 1.1 (for +1dB) and these extended scales are especially useful when measuring the characteristics of audio amplifiers. In addition, both instruments can give AC voltage output of approximately 0.1V in full scale from the output terminals, and the measurements can therefore be monitored.

GVT-427B is a two channels voltmeter with isolated output for each channel which enables it to be used as a two channels preamplifier.

Preliminary Notes

1. *Chassis grounding terminal:*

   Make sure the chassis ground terminal is connected to the earth before inserting the power plug into the main supply.

2. *Maximum input voltage:*

   The voltmeter may be damaged if any input voltage exceeding the specified voltage is applied to it. The specified voltage is determined by adding the peak value of the input signal and the superimposed DC voltage: 300 V for the 300 μV ranges, and 500 V for the 3 V to 100 V ranges.

3. *Connection leads:*

   When the measured signal level is low (i.e. 300 μV) or the measured signal source impedance is high, the input line is susceptible to external noise. To resist the noise, shielded wires or a coaxial cable should be used depending on the noise frequency.

4. *Full scales:*

   GVT millivoltmeter adopts a special extended scale which has a reading range larger than the conventional full scale.

Conventional	Extended
0 to 1.0	0 to 1.12
0 to 3.1 (3.2)	0 to 3.5
-20 to 0 dB	-20 to +1 dB
-20 to +2 dBm	-20 to +3.2 dBm

   Note that the term “full scale” considers ‘1.0’ on the 0 - 1.12 scales as the rated value. The red ▼ mark is setting at ‘1.0’ on the outermost scale.

Panel Description

(1) Meter

Provide easy readings for both voltage and dB scales. For GVT-427B, the black pointer is CH 1 and the red one is CH 2.

(2), (3) ZERO adjustment

Mechanical ZERO adjustment for the pointer. For GVT-427B, the black-mark screw **(2)** is to adjust CH 1 pointer whereas the red-mark screw **(3)** is to adjust CH 2.

(4), (5) CH 1 and CH 2 Range selector switch

10 dB step attenuator to select a desired voltage range for an easy readout. When the mode switch (**10)** of GVT-427B is DISENGAGED, CH 1 and CH 2 range can be selected independently. However, when the mode switch is DISENGAGED, the CH 2 range will change according to the selected CH 1 irrespective of the CH 2 selector switch **(5)** position.

(6), (7) CH 1 and CH 2 input connector respectively

The terminal where the measured signal is applied.

The maximum voltage of DC isolation is ±30 V (peak value)

(8), (9) CH 1 and CH 2 Output connector respectively

Provide output signals when the meter is used as a preamplifier. When the range selector switch is setting at 100 mV, the output voltage will be approximately equal to the input voltage. However, when the range selector switch is setting to the next higher or lower voltage range, the amplification factor is decreased or increased by 10 dB respectively.

The maximum voltage of DC isolation is ±12 V (peak value)

(10) Mode switch

If this button is setting as DISENGAGED, the CH 1 and CH 2 range selector switches could select their related own ranges. If the mode switch has been pressed, the CH 1 range selector switch could select both CH 1 and CH 2 voltage ranges simultaneously, and the CH 2 range selector switch would be ineffective.

(11) Grounding selector switch

If this switch is setting to the upper position, the CH 1 and CH 2 Input Command Lines are isolated from each other, and they are floated relative to chassis ground through a resistance of 100 kΩ. If the switch is setting the down position, both lines could be connected directly to the chassis.

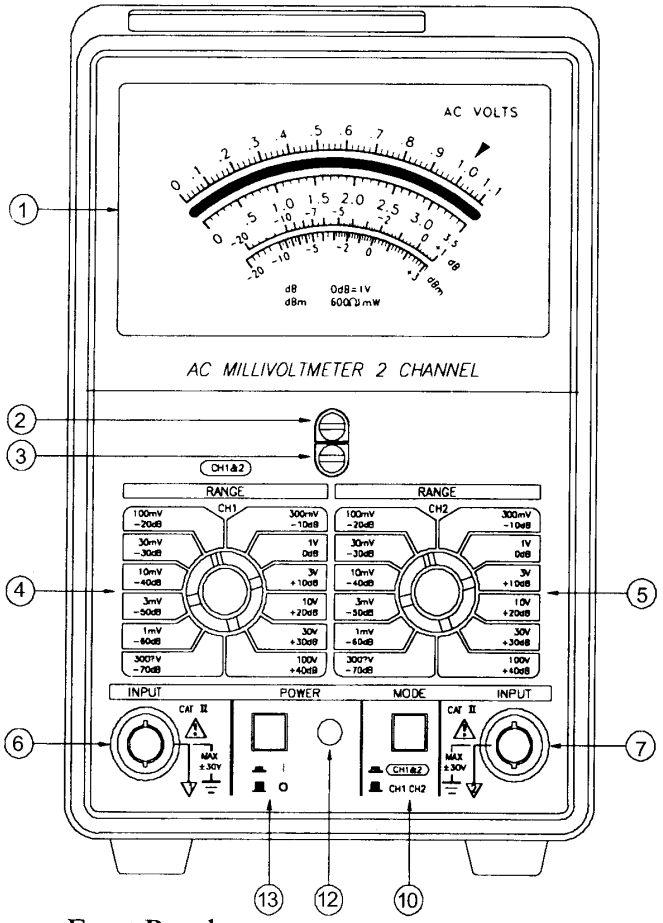
The maximum voltage of DC isolation is ±30 V (peak value)

(12) Power Indicator

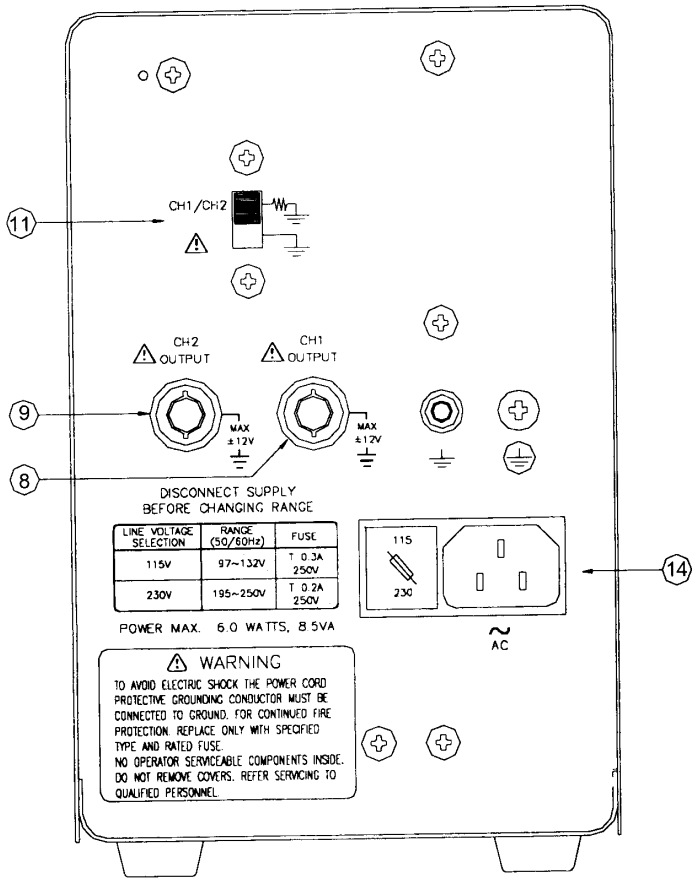
(13) Power Switch

(14) Appliance AC Inlet

PANEL DESCRIPTION (GVT-427B)



Front Panel



Rear Panel

Operation Method

A. Voltage measurement

1. Turn off the power.
2. Check the ZERO setting of the pointers. If there is offset, you could use a screwdriver to adjust the zero adjustment screw at the center of the meter front cover.
3. Plug the AC plug into the AC line.
4. Set the RANGE to 100 V and turn on the power.
5. Connect leads to the INPUT terminal and the load is under testing.
6. Alter the RANGE selector switch until the pointer is at a position which located at $\geqq 1/3$ of the scale, therefore, the reading can be taken easily.

B. Use of decibel ranges

There are two dB scales provided on the dial which have been calibrated as

0 dB = 1 V

0 dBm = 0.775 V (1 mW into 600Ω)

1. dB:

"Bel" is a logarithmic unit which expresses the ratio of two powers. One "decibel" (abbreviated dB) is one-tenth of a Bel. The dB is defined as follows:

$$dB = 10 \log P_2 / P_1$$

If the impedance is at the place where P_1 and P_2 are equal to each other, the ratio of power could be expressed as follows:

$$dB = 20 \log E_2 / E_1 = 20 \log I_2 / I_1$$

Decibel is originally the ratio of power as explained above. However, the logarithm of the ratio of other values (ratio of voltage or current) can also been called "decibel".

For example, If the input voltage of an amplifier is 10 mV and its output voltage is 10 V, the degree of amplification could be 10 V / 10 mV = 1000 times. This is also expressed in dB as follows:

Degree of amplification = 20 log 10 V / 10 mV = 60 dB

2. dBm

"dBm" is the abbreviation of dB (mW). This decibel value expressed the power ratio with respect to 1 mW. Normally, "dBm" implies the condition where the power exists in an impedance of 600 Ω.

Therefore, "0 dBm" can be signified as the following:

0 dBm = 1 mW or 0.775 V or 1.291 mA

3. The power or voltage levels are determined by adding up the scale readings and the selected RANGE settings.

Example:

Scale		RANGE		Level
(-1 dB)	+	(+20 dB)	=	+19 dB
(+2 dBm)	+	(+10 dBm)	=	+12 dBm

4. The dB and dBm scales of the indicating meter are as stated the following:

Range setting	dB	dBm
+40	+20 to + 41	+20 to +43
+30	+10 to +31	+10 to +33
+20	0 to +21	0 to +23
+10	-10 to +11	-10 to +13
0	-20 to + 1	-20 to + 3
-10	-30 to - 9	-30 to - 7
-20	-40 to -19	-40 to -17
-30	-50 to -29	-50 to -27
-40	-60 to -39	-60 to -37
-50	-70 to -49	-70 to -47
-60	-80 to -59	-80 to -57
-70	-90 to -69	-90 to -67

Specifications

This section contains a table of GVT-427B characteristics.

Table 1: Specifications

Model / Specification	GVT-427B
Channels	Two
*Indicating Meter (105mm in scale length)	2-Pointers (Black and Red)
Scale Values	V_{rms} value of sinusoidal wave, dB value with 1 V as 0 dBm dBm value with 1 mW
Range Select Mode	Independent / tracking control mode for each channel range
Voltage Measurement	12 ranges: 300 μV, 1, 3, 10, 30, 100, 300 mV, 1, 3, 10, 30 and 100 V of full scale
Decibel Range	12 range: -70 to +40 dB in increments of 10 dB
Decibel Scale	-20 to +1 dB (0 dB = 1 V), -20 to +3 dBm (0 dBm = 1 mW [600 Ω])
Voltage Accuracy	Within ±3% of full scale at 1 kHz

Table 1: Specifications (Cont.)

Frequency Response (Reference : 1 kHz)	300uV range: From 20 Hz to 200 kHz, ≦ ±3% From 10 Hz to 500kHz, ≦ ±10% Other ranges: From 20 Hz to 200 kHz, ≦ ±3% From 10 Hz to 1 MHz, ≦ ±10%
Distortion Factor	≦2 % of full scale at 1 kHz
Input Impedance	Approximately 1 MΩ
Input Capacitance	≦50 pF
Input Maximum Voltage (DC + AC peak)	300 V (at 300 μV~ 1 V ranges) 500 V (at 3 V ~ 100 V ranges)
**DC isolation Resistance	0.1 Ω /100 kΩ ±10% (selectable)
Maximum Voltage of **DC isolation	±30 V (peak value) (at 100 kΩ isolation)
AC Output Voltage	0.1 V_{rms} ±10% for each range of 1 kHz (at full scale without load)
AC Frequency Response	10 Hz to 1 MHz, ≦ ±3% (reference: 1 kHz, without load)
Stability against Line Voltage Fluctuation	Indication change with respect to line voltage fluctuation of ±10% : is within ±0.5% of full scale.

AC Power Requirement	115/230 Vac, 50/60 Hz

Table 1: Specifications (Cont.)

AC Power Consumption	8.5VA or 5.0 Watts, Maximum
Fuse Replacement for 115 Vac selected	T type, 0.3 A, 250Vac
Fuse Replacement for 230 Vac selected	T type, 0.2 A, 250Vac
Operation Environment	Indoor user, Altitude up to 2000M Installation Category II Pollution Degree 2 Operating Temperature : $+0^0$ C to $+40^0$C, < 80% relative humidity
Dimensions	130 (W) x 210 (H) x 295 (D) mm
Weight	Approximately 2.84kg

*: Dual scales in different colors.
**: Between the input common and chassis.

Maintenance

This section includes the basic maintenance information for GVT-427B.

Cleaning

To clear GVT-427B, use soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage.

Do not use chemicals containing benzine, benzene, xylene, acetone, toluene, or similar solvents.

Do not use abrasive cleaners on any portion of this equipment.

Troubleshooting

Troubleshooting the GVT-427B is limited to checking the input power fuse. If you have other operational difficulties with your GVT-427B, contact your Good-Will representative for assistance.

WARNING. To avoid electrical shock, the power cord protective grounding conductor must be connected to ground.

WARNING. To continued fire protection. Replace fuse with the specified type and rating, and disconnect the power cord before replacing fuse.

Interchangeable Parts

Interchangeable parts can be ordered from your authorized Goodwill dealer directly.

Accessories

The items are shipped with the GVT-427B as following:

Table 2: Accessories

Accessory	Good Will Part Number
Test Leads GTL-101 x 2 (for GVT-427B)	1100-TL101U0
User Manual	82VT-427B0MC