
ADVANTEST[®]

ADVANTEST CORPORATION

**INSTRUCTION
MANUAL**

TR5820







FREQUENCY COUNTER

MANUAL NUMBER 5820 OED00 803

Before reselling to other corporations or re-exporting to other countries, you are required to obtain permission from both the Japanese Government under its Export Control Act and the U.S. Government under its Export Control Law.

SAFETY NOTES

1. Before applying power, make sure that it is set to the same voltage as that of the power supply.
2. For electric shock protection, connect the protective earth terminal (rear panel of equipment) to ground.
3. Safety symbols

	Refer to this manual for your safety.
	High voltage
	External conductor of input measurement terminal is internally connected with the protective earth terminal.
	Protective earth terminal
	Alternating current
	Direct current

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1.1 Outline

1. OUTLINE

1.1 Outline

TR5820 is a frequency counter primarily composed of a microprocessor and two custom LSIs. New technology has simplified and sped up measurement in the low frequency domain, and at the same time improved the cost/performance ratio.

TR5820 is a frequency counter, however, it can measure periods and time interval as well. In time interval measurement specifically, and negative measurements of a single pulse width signal can be performed by one touch (pulse mode) with a high time resolution of 100ns.

It is not necessary to worry about overflow because of the underflow display system.

In frequency measurement, the low frequency can be measured at a high speed because a reciprocal system has been adopted for frequency measurement. In frequency measurement (monitor of a power source frequency) at a high voltage, safe measurement can be made using the floating input.

In the input portion, the trigger indicator, auto filter, and pulse mode have been adopted for easy handling. Also, the trigger level, slope, coupling, and sensitivity functions have been built in which enables measurements to be performed under various conditions.

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2.1 Electrical Performance

2. SPECIFICATIONS

2.1 Electrical Performance

Model name		TR5820	
		INPUT A Reciprocal system	INPUT B (Floating input) Reciprocal system
Frequency measurement	Measuring range	1mHz to 1MHz/DC coupling 10Hz to 1MHz/AC coupling	30Hz to 30kHz
	Gate time	10ms (9ms to 0.1s), however, for less than 10Hz, 1 time period of the input frequency 0.1s (90ms to 1s), however, for less than 1Hz, 1 time period of the input frequency 1s (0.9s to 10s), however, for less than 0.1Hz, 1 time period of the input frequency 10s (9s to 100s), however, for less than 10mHz, 1 time period of the input frequency Note: At gate times of 10ms and 0.1s, the auto reset works at approx. 1.3s. Therefore, measure frequencies of 0.8Hz or less at a gate time of 1s or 10s.	
	Unit display	mHz, Hz, kHz, MHz	
	Measurement accuracy	(Trigger error/number of periods to be measured) ±1 count ± standard time accuracy	
	Measuring range	1μs to 999.99s/DC coupling 1μs to 100ms/AC coupling	-
Period measurement	Magnification (10 ⁿ)	10 ⁰ , 10 ¹ , 10 ² , 10 ³	-
	Time unit	100ns	-
	Unit display	μs, ms, s	-
	Measurement accuracy	(Trigger error/10 ⁿ) ±1 count ± time base accuracy	-
	Measuring range	1μs to 999.99s/only DC coupling	-
Time interval measurement	Magnification (10 ⁿ)	10 ⁰ , 10 ¹ , 10 ² , 10 ³	-
	Time unit	100ns	-
	Pulse mode	Positive and negative pulse width measurements	-
	Unit display	μs, ms, s	-
	Measurement accuracy	(Trigger error/ 10 ⁿ) ±1 count ± time base accuracy	-
	Dead time	500ns	-

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2.1 Electrical Performance

Model name		TR5820	
		INPUT A Reciprocal system	INPUT B (Floating input) Reciprocal system
Input voltage range	Input sensitivity	150mVp-p, 1.5Vp-p, 15Vp-p	80Vrms (only at the time of 150mVp-p)
	Input voltage range	150mVp-p to 240Vp-p, three stages change over	80Vrms to 230Vrms
	Damaging input voltage	230Vrms (DC to 100Hz) 20Vrms (100Hz to 1MHz)	500Vrms
	Input coupling mode	DC coupling (pulse measurement possible), AC coupling	AC coupling
	Input impedance	Approx. 1M Ω 30pF	Approx. 1M Ω
	Trigger level	Approx. -1V to +1V continuous variation	Only PRESET
	Trigger slope	Possible to change over to + and -	
	Imposed noises elimination	The filters of 20Hz, 200Hz, 2kHz are automatically changed over by the input signals.	

Note: Elimination of superimposed noises: When the FILTER is ON, the upper frequency is approx. 2kHz. A measurement of approx. 2kHz or more can not be made with the FILTER ON.

So, turn OFF the FILTER for the A input pulse measurement.

Time base

Internal reference frequency: 10MHz
 Frequency stability : Aging rate $\pm 5 \times 10^{-7}$ /month
 Temperature characteristics $\pm 5 \times 10^{-6}$
 (0°C to +40°C)
 Power source variation $\pm 2.5 \times 10^{-7}$ (100V $\pm 10\%$)
 Internal reference output : Frequency 10MHz, output voltage 1Vp-p to 2Vp-p
 Output impedance Approx. 500 Ω
 External reference input : Frequency 10MHz, input voltage 1Vp-p to 10Vp-p
 Input impedance Approx. 500 Ω

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2.2 General Specifications

2.2 General Specifications

Count capacity	:	Five decimal digits
Display system	:	Green, 7 segment LED, storage display system
Sample rate	:	50ms or hold
Self-check	:	Count operation check by the internal reference signals
Operating environment range	:	Temperature 0°C to +40°C, humidity 85% or less
Storage temperature	:	-20°C to +70°C
Power source	:	100VAC±10% (120V, 200V, 220V±10%, 240 ^{+4%} _{-10%} depending on the specification) 50Hz to 400Hz
Power consumption	:	20VA or less
Dimensions	:	Approx. 240 (Width) x 88 (Height) x 280 (Length) mm
Weight	:	3.5kg or less

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2.3 Attachments

2.3 Attachments

(1) Input cable (MI-03)	1
(2) Input cable (MI-71)	1
(3) Normal fuse (1A) (100VAC, 120VAC)	2
(4) Instruction manual	1
(5) Carrying case (TR16202A) (Sold separately)	1

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3.1 Preparation Before Use and General Cautions

3. HANDLING METHOD

3.1 Preparation Before Use and General Cautions

3.1.1 Check List

When you receive this equipment, check if there has been any damage to it during transportation. Especially check the switches and terminals on the panel.

If they are damaged or do not work in accordance with the specifications, contact our front office at CE Headquarters or the nearest business office or branch office.

3.1.2 Storage

When this equipment is not used for a long period of time, cover it with a vinyl sheet or put it into a carton box and store it in a place with low humidity and free from direct rays of the sun.

3.1.3 Cautions Regarding Transportation

When transporting this equipment, use the packing materials in which the equipment came. If you lose the packing materials, follow the following list.

- (1) Pack this equipment in a vinyl sheet, etc.
- (2) Use a carton box with a thickness of 5mm or more and put cushioning material, 40mm or more thick, inside the carton box in which this equipment is placed.
- (3) After wrapping this equipment with the cushioning material, put the attaching parts and the cushioning material into the carton box again. Close the box and secure the outside of the box with string.

3.1.4 General Cautions Before Use

(1) Power Source

The power source voltage was set at the time of shipping this equipment and it is indicated in the place where the power source cable comes out on the back panel. Use this equipment within 100VAC \pm 10% (or 120V, 200V, 220V \pm 10%, 240V $^{+4\%}_{-10\%}$ depending on the specifications) and a power source frequency of 50Hz to 400Hz. Before connecting the power source cable be sure to check that the POWER switch has been set to STBY.

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3.1 Preparation Before Use and General Cautions

(2) Replacement of Fuse

The power source fuse is housed in the fuse holder of the back panel of the main body. When replacing the fuse, turn the fuse holder cap in the direction of the arrow to remove it and replace the fuse with a new one.

CAUTION

Before replacing the fuse, disconnect the power source cable from the power socket.

(3) Operating Environment

Do not use this equipment in a dusty place, in a place exposed to direct rays of the sun or where corrosive gas is present. Use this equipment in a place where the ambient temperature is between 0°C and +40°C with a humidity of 85% or less.

(4) Shock

Since a crystal vibrator is used in this equipment, be careful that it does not sustain mechanical shocks when handling it.

(5) STBY

When connecting the plug of this equipment to the power socket, the reference oscillation circuit works to place it in the standby state. As long as you do not pull the plug out of the power socket, after POWER ON from the STBY state, measurements can be made. Temperature compensation is not made to the reference oscillator.

(6) Selection of Time-base Signal

For time-base signals, either the internal or external signals can be used by the EXT. STD IN./INT. STD OUT changeover switch. The internal time-base signals are selected in the INT. STD OUT. position and at the same time the internal time-base signals are output. The input (1Vp-p to 10Vp-p, approx. 500Ω, 10MHz) of the external time-base signals can be made in the EXT. STD IN. position.

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3.2 Panel Explanation

3.2 Panel Explanation

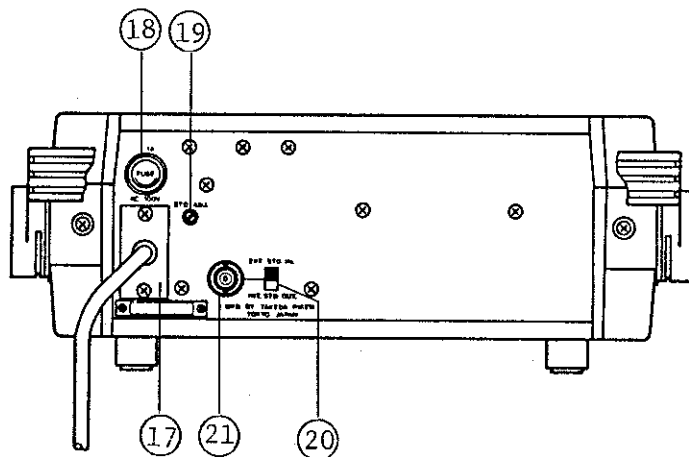
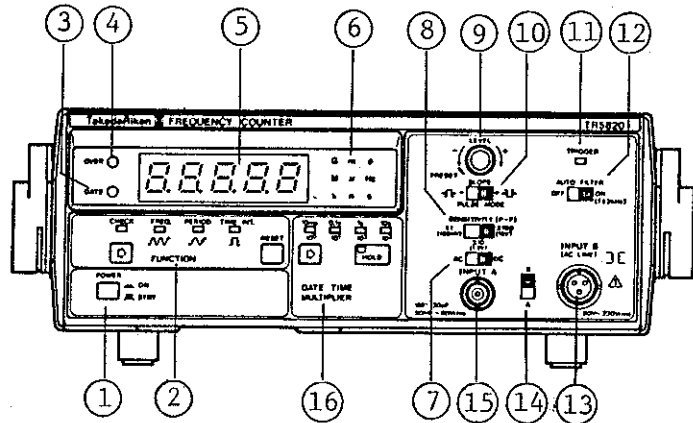


Figure 3 - 1 Panel Explanation

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3.2 Panel Explanation

① POWER

In **■** STBY, the power source of the main body is turned OFF. When the plug is connected to a power socket the reference oscillator works. When **■** ON, the power source of the main body is turned ON.

② FUNCTION

Whenever pressing the function selection key **□**, the lamp moves in the sequence of CHECK → FREQ. → PERIOD → TIME INT. → CHECK → The function of this equipment is selected by lighting the function's light. See **⑬** for RESET.

③ GATE

The GATE is the monitor lamp for the count operation. This lamp lights during counting (measurement).

④ OVER

⑤ Digit Display Portion

Green LED, 7 segment display with 5 digits

⑥ Unit Display Portion

The units of the measured results are displayed in the unit display portion.

⑦ AC/DC

The AC/DC is the selection switch for input coupling. By setting it to AC, the connection of the DC components to the input circuit are cut. By setting it to DC, the DC components are also lead to the input circuit.

⑧ SENSITIVITY

SENSITIVITY is the sensitivity changeover switch used to select the proper level of the signals to be measured.

⑨ LEVEL

LEVEL is the knob to trigger the signals to be measured at the proper level. It can vary the trigger voltage within the range of approx. -1V to +1V. When setting it to the PRESET (Turn it to the left end.), the trigger voltage is fixed at 0V.

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3.2 Panel Explanation

⑩ SLOPE

SLOPE is used to select the trigger point to the positive or negative slope of the signals to be measured. By selecting +, it triggers by the positive slope, and by selecting -, it triggers by the negative slope. When TIME INT is used pulse mode is obtained. The negative pulse time is measured by +, and the positive pulse time is measured by -.

⑪ TRIGGER

When the signals to be measured cross the trigger point, the lamp lights.

⑫ FILTER

FILTER is the ON/OFF switch of the low-pass filter. When turning it ON, the filter works to automatically select the filters of 20Hz, 200Hz, or 2kHz according to the frequency of the signals to be measured. When turning the FILTER ON the upper frequency of this equipment is approx. 2kHz and the measurement can not be made at approx. 2kHz or more. Turn OFF the FILTER for A input pulse measurements.

⑬ INPUT B

The high voltage signals of 80V to 230Vrms are safely measured by the high voltage floating input.

⑭ A/B

A/B is the switch to change between INPUT A and INPUT B.

⑮ INPUT A

INPUT A is the input for the low voltage signals (BNC connector), and the voltage range is 50mV to 80Vrms.

⑯ GATE TIME, MULTIPLIER

The GATE TIME and MULTIPLIER are used to set the count time (CHECK, FREQ.) and the magnification (PERIOD, TIME INT.). Whenever is pressed, the lamp moves in the sequence of $10\text{ms}/10^0 \rightarrow 0.1\text{s}/10^1 \rightarrow 1\text{s}/10^2 \rightarrow 10\text{s}/10^3 \rightarrow 10\text{ms}/10^0 \rightarrow \dots$. The count time or magnification is set at the place where the lamp is lit.

When pressing , and when the orange lamp lights, the equipment counts only once, and it then stops. Under this state, whenever RESET is pressed, the equipment counts once and then stops. When pressing , it changes to and the hold function is released.

3.3 Basic Operating Method

3.3.1 Self-diagnostic Function (CHECK)

Before turning ON the power source, check "3.1.4 General Cautions Before Use".

- ① When turning ON the POWER, the self-diagnostic function works to check the microprocessor, the two LSIs, and if there are any reference signals. If no errors are detected all the lamps (excluding the decimal point) are lit (for approx. 2 seconds) to check the lamps.

After that, the initialization of this equipment is performed as follows.

FUNCTION : CHECK
GATE TIME : 10ms
Other functions: OFF

- ② At this time, 10.000MHz is displayed, and the GATE lamp flickers.
- ③ Press the GATE TIME in the sequence of 0.1s, 1s, and 10s, and check that the flicker of the GATE lamp is delayed.

By pressing again, set GATE TIME to 10ms.

- ④ By pressing , make it change to . At this time, the GATE lamp goes out.
- ⑤ When pressing RESET, the GATE lamp flickers only once.
- ⑥ By pressing to release the hold state, the GATE lamp starts flickering again.

3.3.2 Error Messages

If any error occurs during the self-diagnosis, during operation, or while setting the data, an error message will be displayed. The error message at the time of the self-diagnosis is displayed for approx. 2 seconds and then the CHECK operation starts (there are some cases when this does not happen because of the specific error). When an error message is displayed at the time of operation or data setting, the equipment will stop. [Table 3-1] shows the error messages. The cause of each error may apply to any effected part other than those shown here.

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3.3 Basic Operating Method

Table 3 - 1 Classification of Error Messages

E 01	Microprocessor (ROM, RAM)
E 02	Display data bus
E 03	Data bus port
E 04	LSI180-GC
E 05	LSI180-GC
E 06	LSI180-GC/SS data
E 07	When setting the crystal oscillator or changeover switch to EXT. STD IN., there are no external reference input signals. Turn ON the POWER switch, and when connecting and disconnecting the power source cable plug to the power socket at intervals of less than 1 second, error message "E07" may appear. However, this does not mean a defect has occurred. This occurs because the crystal oscillator requires some time until it oscillates.
E 08	LSI180-SS
E 09	LSI180-SS
E 10	Panel key

3.3.3 Panel Key Check

When turning ON the power source switch while pressing the RESET key, the following is displayed for panel key check mode.

P. 5 . . .
↑
A

When pressing each key, a digit is displayed in the A portion, which corresponds to the key. In case any digit does not light when pressing the key, or if any digit other than the corresponding digit is displayed, the key may be a defective.

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3.3 Basic Operating Method

Digit to be displayed	Classification of key check
1	FUNCTION <input type="checkbox"/>
4	GATE TIME <input type="checkbox"/>
5	HOLD
6	RESET

3.3.4 Frequency Measurements (FREQ.)

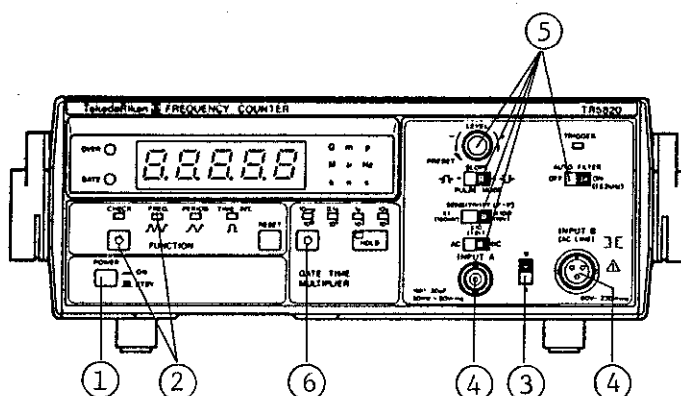


Figure 3 - 3 Operation Parts of Frequency Measurement

- ① Turn ON the POWER to check the CHECK operation.
- ② Press to set the FUNCTION to FREQ.
- ③ Select A or B of the input terminal changeover switch.
- ④ Connect the signals to be measured to the INPUT A or INPUT B connector according to ③. For B, set it to LEVEL-PRESET, SENSITIVITY-150mV.
- ⑤ Set each switch of the AC/DC coupling changeover, SENSITIVITY, SLOPE, LEVEL, and FILTER according to the signals to be measured.
- ⑥ Select the GATE TIME according to the necessary accuracy.

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3.3 Basic Operating Method

3.3.5 Period Measurements (PERIOD)

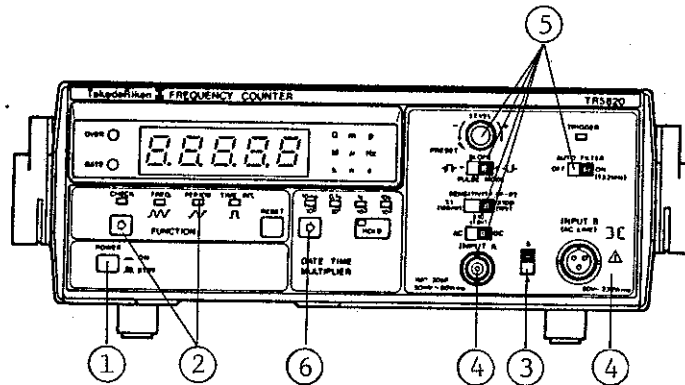


Figure 3 - 4 Operating Parts for Frequency Measurement

- ① Turn ON the POWER to check the CHECK operation.
- ② Press to set the FUNCTION to PERIOD.
- ③ Select A or B of the input terminal changeover switch.
- ④ Connect the signals to be measured to the INPUT A or INPUT B connector according to ③.
- ⑤ Set each switch of AC/DC, SENSITIVITY, LEVEL, SLOPE, and FILTER according to the signals to be measured.
- ⑥ Select the MULTIPLIER by pressing according to the necessary accuracy.

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3.3 Basic Operating Method

3.3.6 Time Interval Measurements (TIME INT.)

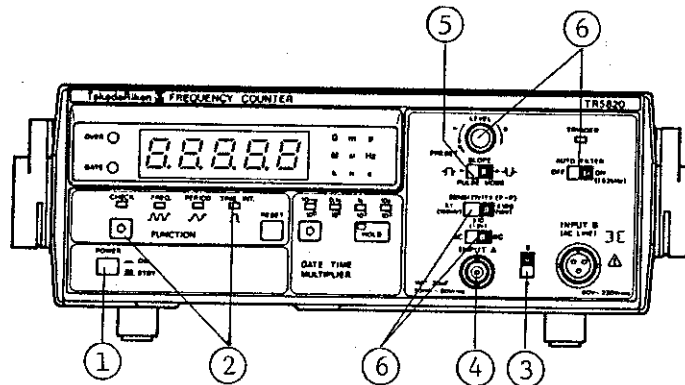


Figure 3 - 5 Operating Parts for Time Interval Measurements

- ① Turn ON the POWER to check the CHECK operation.
- ② Press to set the FUNCTION to TIME INT.
- ③ Set the input terminal changeover switch to A.
- ④ Connect the signals to be measured to INPUT A.
- ⑤ Set the SLOPE according to the polarity of the pulses to be measured.
- ⑥ Set the AC/DC changeover switch, SENSITIVITY, LEVEL, and FILTER according to the signals to be measured.

Caution: In PERIOD and TIME INT., when the measured result exceeds 999.99 (or in FREQ., in the case of 1mHz or less), this indicates that a malfunction has occurred. In addition, in this case, note that the OVER lamp does not light.

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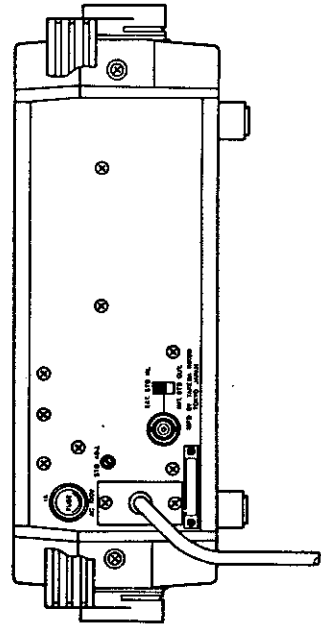
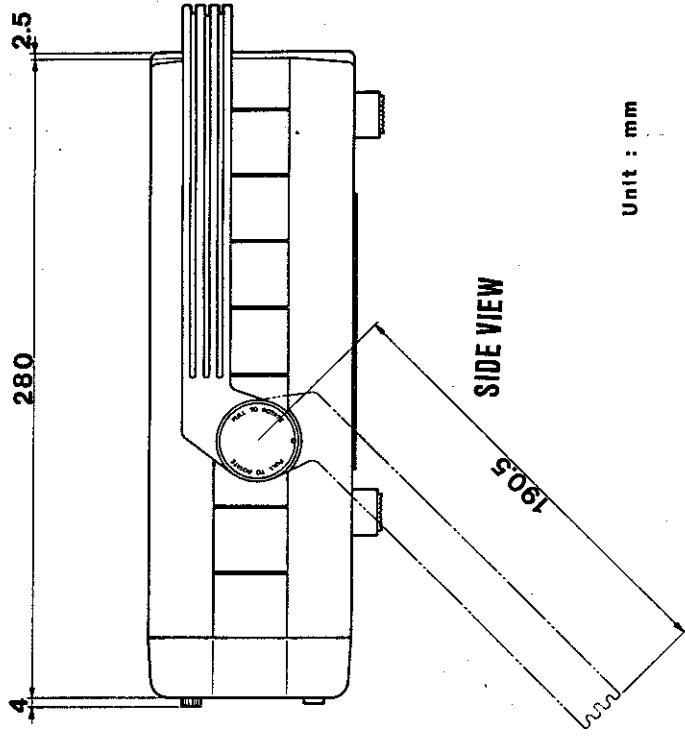
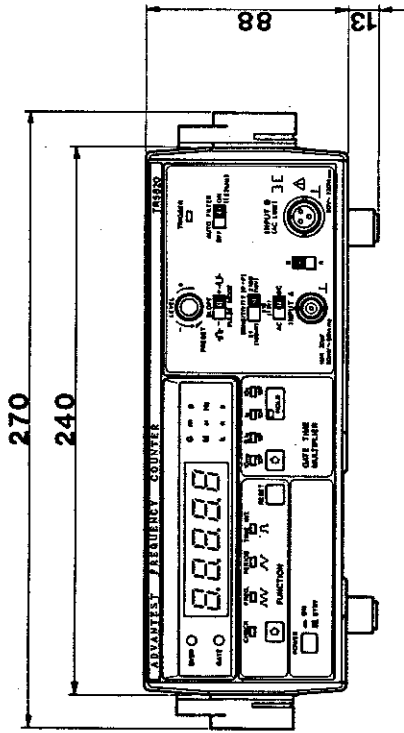
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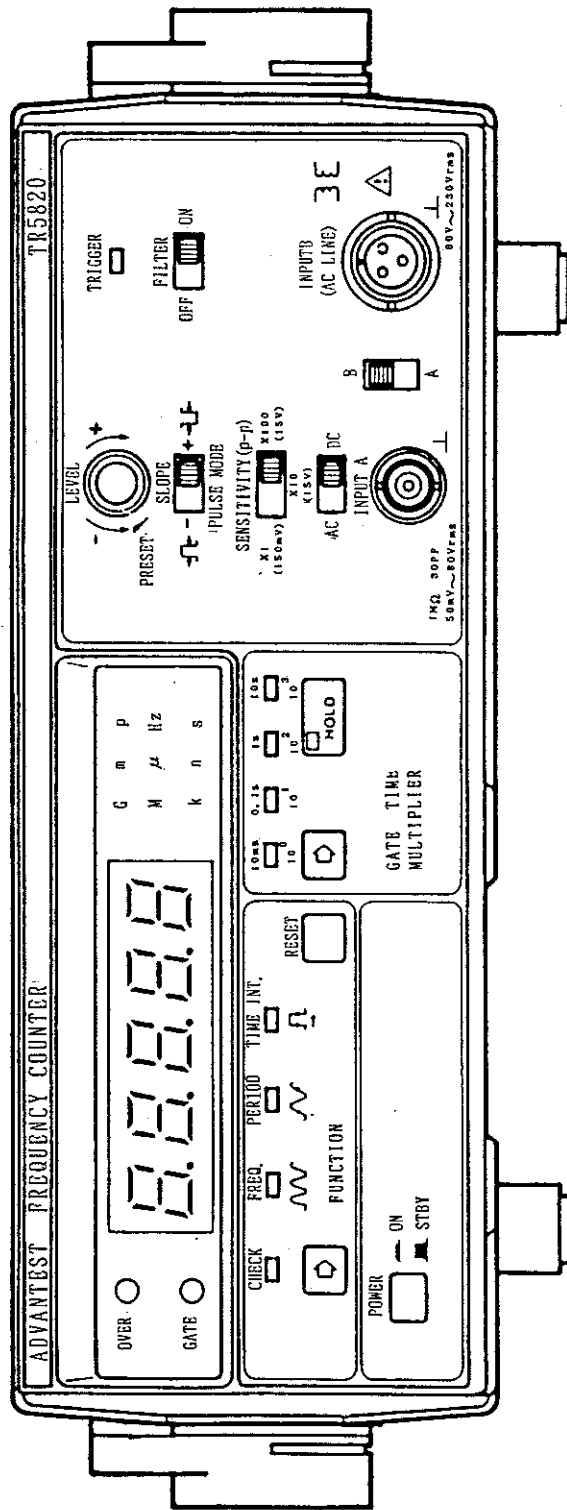
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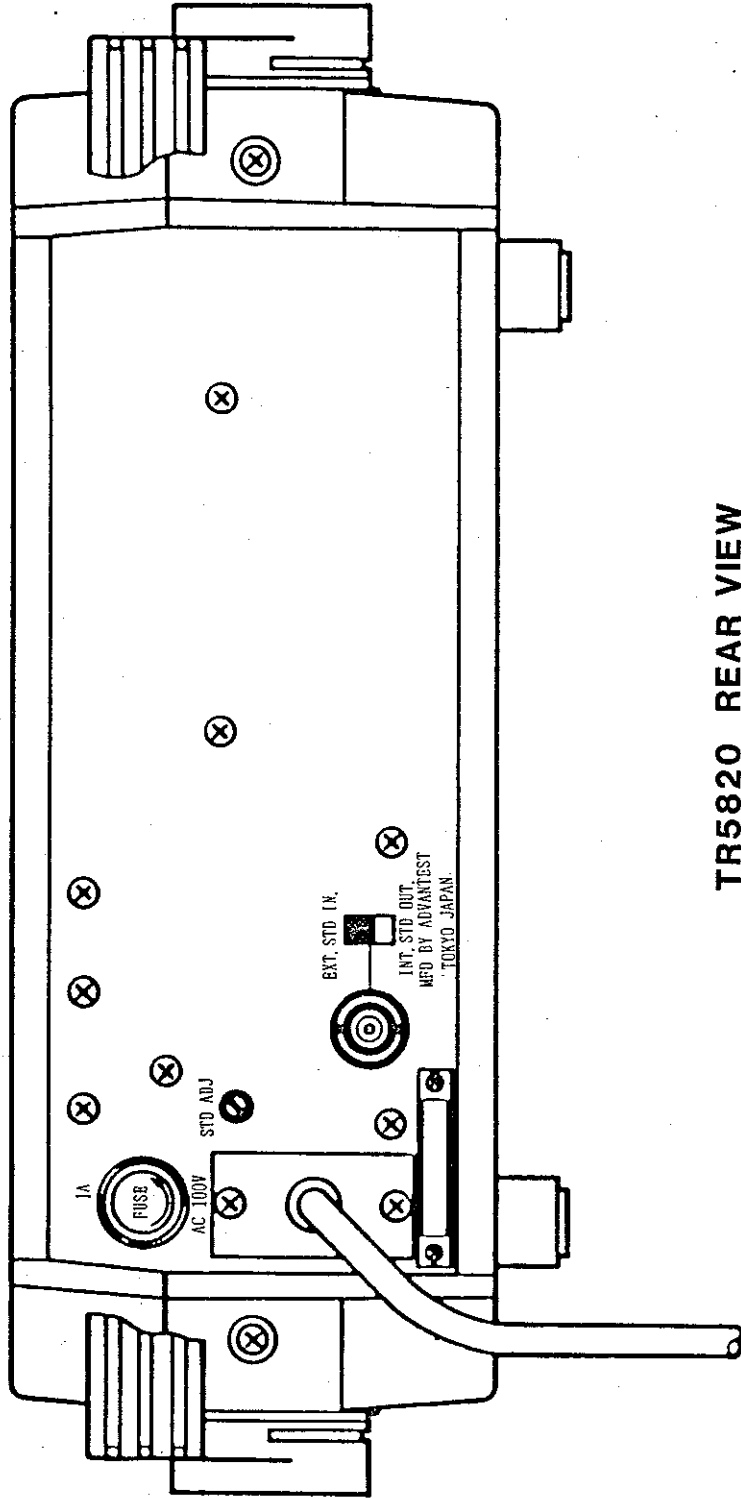


**TR5820
EXTERNAL VIEW**

5820 EXT1-803-A



TR5820 FRONT VIEW



TR5820 REAR VIEW

5820 EXT3-803-A

IMPORTANT INFORMATION FOR ADVANTEST SOFTWARE

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LIMITED WARRANTY

1. Unless otherwise specifically agreed by Seller and Purchaser in writing, Advantest will warrant to the Purchaser that during the Warranty Period this Product (other than consumables included in the Product) will be free from defects in material and workmanship and shall conform to the specifications set forth in this Operation Manual.
2. The warranty period for the Product (the "Warranty Period") will be a period of one year commencing on the delivery date of the Product.
3. If the Product is found to be defective during the Warranty Period, Advantest will, at its option and in its sole and absolute discretion, either (a) repair the defective Product or part or component thereof or (b) replace the defective Product or part or component thereof, in either case at Advantest's sole cost and expense.
4. This limited warranty will not apply to defects or damage to the Product or any part or component thereof resulting from any of the following:
 - (a) any modifications, maintenance or repairs other than modifications, maintenance or repairs (i) performed by Advantest or (ii) specifically recommended or authorized by Advantest and performed in accordance with Advantest's instructions;
 - (b) any improper or inadequate handling, carriage or storage of the Product by the Purchaser or any third party (other than Advantest or its agents);
 - (c) use of the Product under operating conditions or environments different than those specified in the Operation Manual or recommended by Advantest, including, without limitation, (i) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (ii) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;
 - (d) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended by Advantest;
 - (e) incorporation in the Product of any parts or components (i) provided by Purchaser or (ii) provided by a third party at the request or direction of Purchaser or due to specifications or designs supplied by Purchaser (including, without limitation, any degradation in performance of such parts or components);
 - (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;
 - (g) the occurrence of an event of force majeure, including, without limitation, fire, explosion, geological change, storm, flood, earthquake, tidal wave, lightning or act of war; or
 - (h) any negligent act or omission of the Purchaser or any third party other than Advantest.
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In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

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