

Section G.3

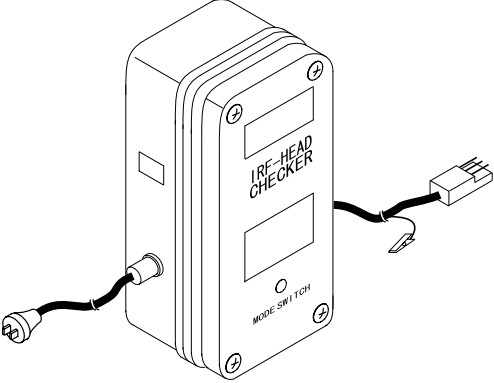
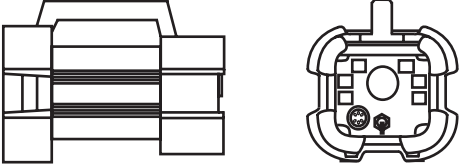
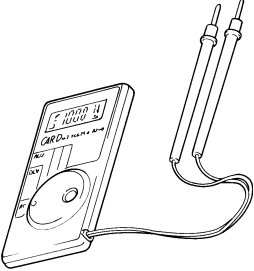
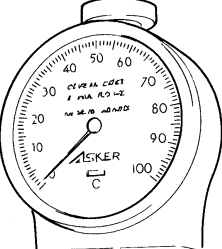
Measuring Instruments

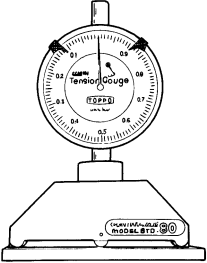
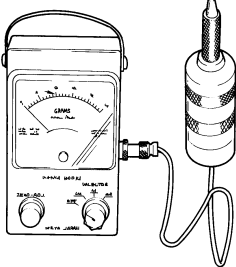
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G. GAUGES, TOOLS, AND MEASURING INSTRUMENTS

G.3 Measuring Instruments

Air jet weaving machines run at a speed several times higher than in the conventional ones. Therefore, adjusting them requires instruments suitable for measurement of fast revolution motions, such as pressure gauges, stroboscopes, tension meters, and others as listed below.

No.	Instruments	Appearance
G.3.1	IR checker (76201-00017)	
G.3.2	Stroboscope (76201-00016-0B)	
G.3.3	Circuit tester (Volt-ohm-milliammeter) (76201-00008)	
G.3.4	Hardness gauge for warp beams or weft cheeses (76201-00007)	

No.	Instruments	Appearance
G.3.5	Tension gauge for fabrics (76201-00004)	
G.3.6	Tension meter for yarns (76201-00006)	

REFERENCE: The IR checker (G3.1) and stroboscope (G.3.2) In the table above are included in specified tool kit. Since other instruments are not included, order them separately as needed.

G.3.1 Feeler Head Checker

The IR feeler head may become insensitive due to fouling of the sensor portion after use for a long period. If sensing errors occur frequently, use this checker to judge the feeler head quality without removing the feeler head from the loom. If defective, clean the sensor portion to regain the normal characteristic before restarting loom operation.

■ **Specifications**

- (1) Object to be measured: IR feeler
- (2) Input power supply: 85 to 265 VAC, 50/60 Hz
- (3) Operating temperature: 0 to 50°C

- 1: IR feeler head checker
- 2: Power cable
- 3: Test cable
- 4: Mode switch
- 5: Display panel

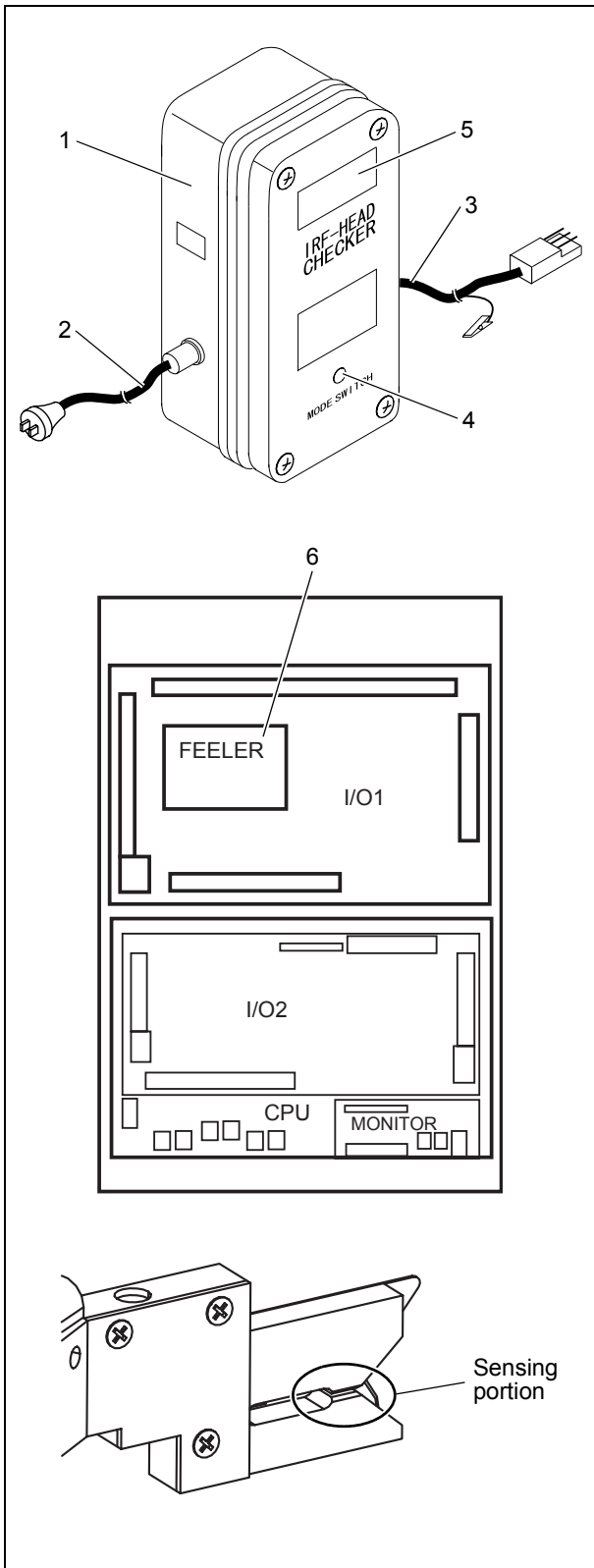
■ **Operation**

- (1) Plug in the IR feeler checker power cable **2** to the 100 VAC outlet installed on the front side of the control box at the rear right of the loom.
- (2) Disconnect the IR feeler cable from I/O1 board **6** in the control box, and connect it with the IR feeler checker test cable **3**.
- (3) Set the IR feeler checker **1** power.
- (4) Press mode switch **4** for selecting voltage (V), current (A), and resistance (Ω).
- (5) With the IR feeler detecting portion as shown below, see that the reading is as shown in the table below.

OPEN: Nothing at the sensing portion
 CLOSE: Paper, etc. pinched in the sensing portion

Mode	OPEN	CLOSE
V	1.5 to 6.3 mV	9 ± 0.5 mV
A	5 to 20 mA	28 ± 1 mA
Ω	1 Ω	0 Ω

- (6) If the table above is not satisfied, replace the IR feeler.
- (7) Return power cable **2** and signal cable **3** to their original positions.

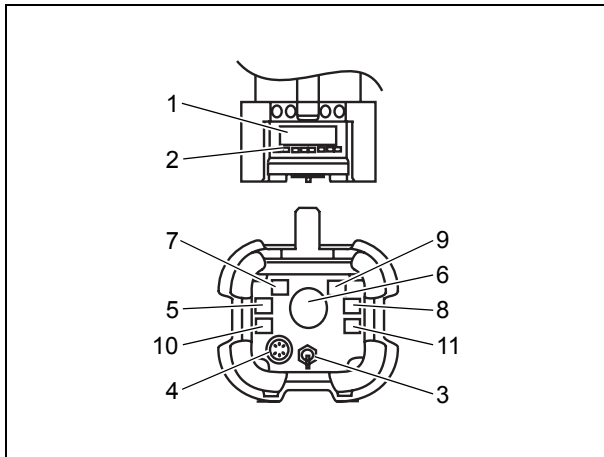


G.3.2 Stroboscope

The stroboscope allows you to measure a state of motions at a certain timing in fast revolution operation of the weaving machine.

⚠ CAUTION

- 1) Never use the stroboscope in a place full of inflammable gas, or in an atmosphere where there is the danger of explosion.
- 2) Do not use the stroboscope anywhere where its inside may be subjected to waterdrops or the like.
- 3) While the stroboscope is in operation, do not look straight at the flash lamp.
- 4) Prior to checking the inside of the stroboscope, be sure to unplug the power connector.

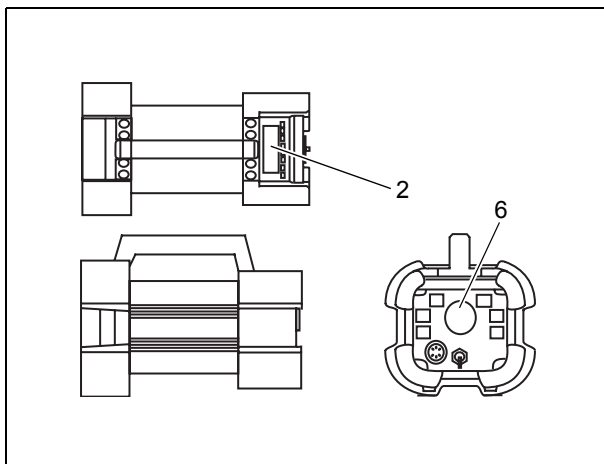


- 1 Delay angle (or RPM) indicator
- 2 Signal, unit, mode display
- 3 Power switch
- 4 Connector
- 5 Trigger signal select switch (internal oscillation/external trigger) *1
- 6 Delay angle (or RPM) setter
- 7 Unit select switch
- 8 Zero setting switch
- 9 Light emission mode select switch
- 10 Lamp ON/OFF switch
- 11 Light emission phase select switch

*1: Setting to "EXT" LED display for an external trigger for use in adjustment

■ Specifications

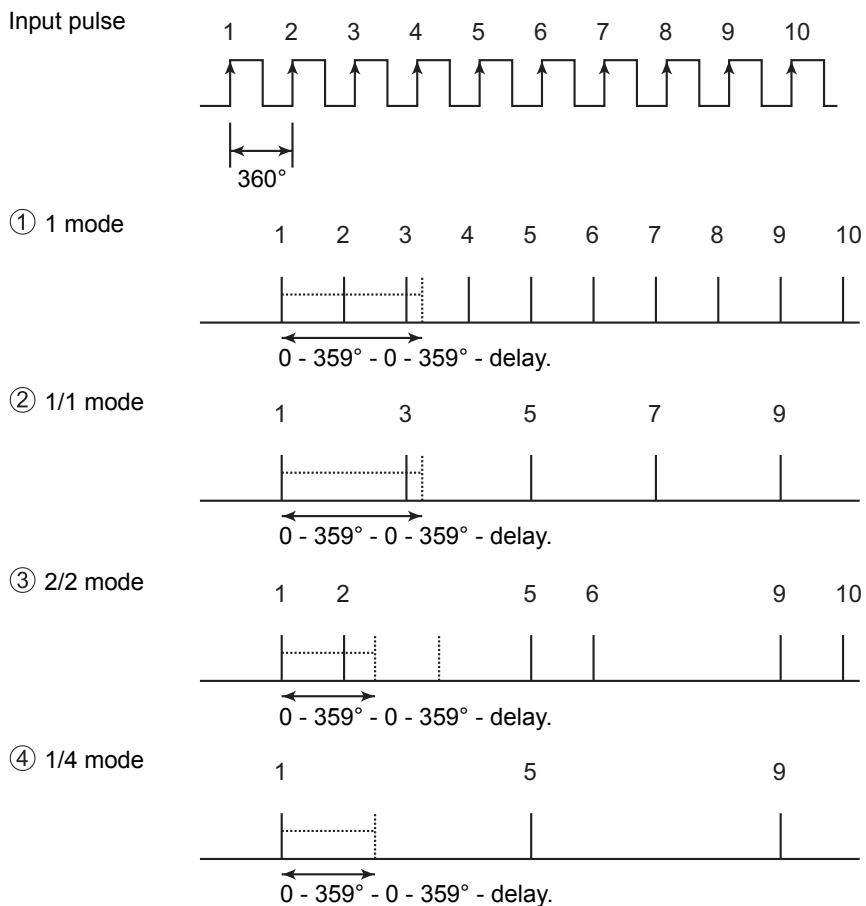
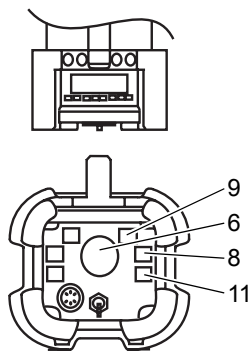
- (1) Synchronous revolution range:
200 to 1500 rpm
- (2) Accuracy : ± 1 rpm
- (3) Pin-delay angle setting range:
Turning setting knob **6** can set an arbitrary pin-delay angle (crank angle) of the weaving machine within a continuous range from 0° to 359° . The set angle will appear on indicator **2**.



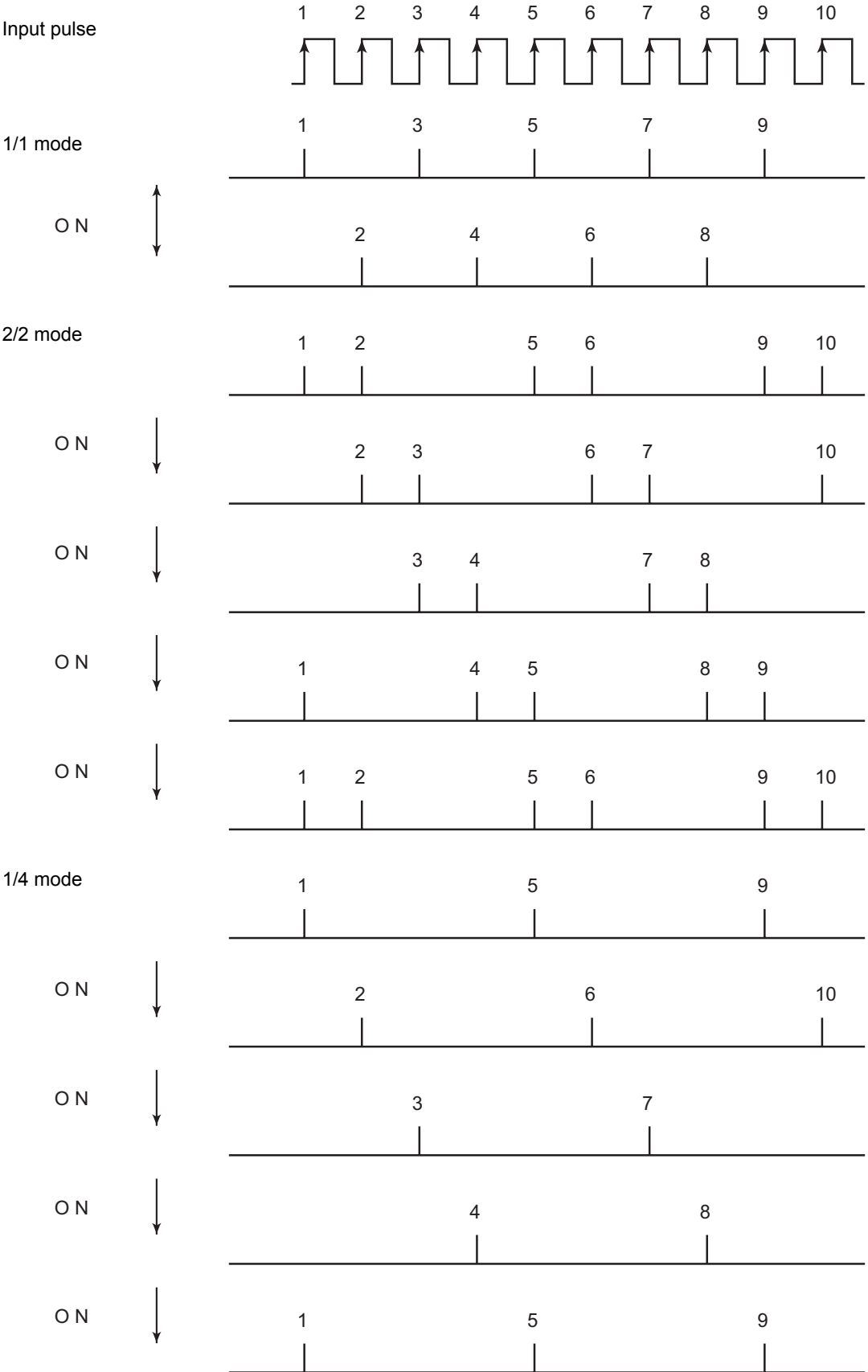
G. GAUGES, TOOLS, AND MEASURING INSTRUMENTS

(4) Light emission mode

The light emission mode switch (MODE) 9 changes in the order of $\boxed{1 \rightarrow 1/1 \rightarrow 2/2 \rightarrow 1/4}$.
 (Lamps 1 and 1/1 are on in the 1/4 mode.)



(5) Light emission phase
 The lamp ON timing changes as shown below each time the phase switch (SHIFT) 11 is pressed.



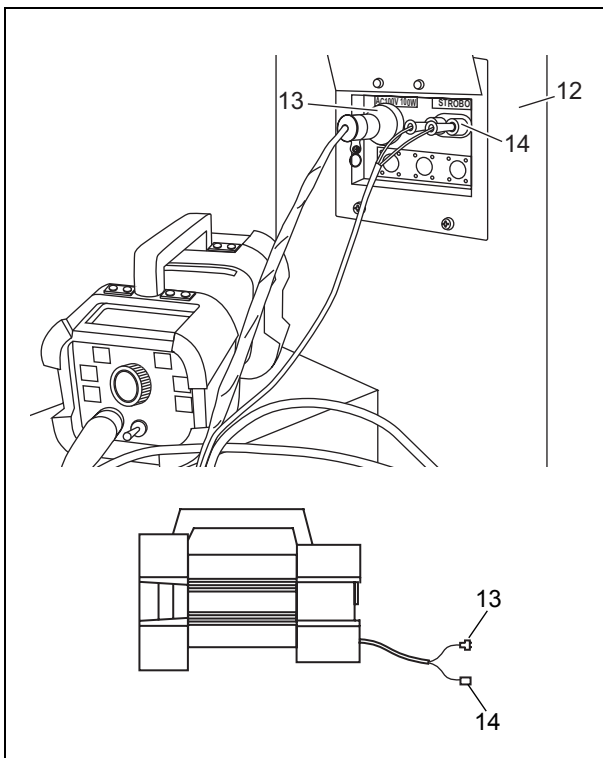
(6) Zero setting

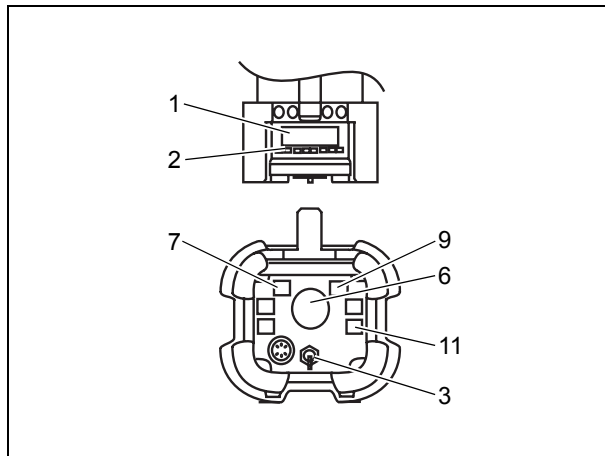
Immediately after power on, the delay angle is from zero adjustment at previous setting.

Turn the knob to set to the desired position and press the Zero setting switch at a display angle other than 0° . The position becomes the new 0° position. Then operate the knob again to set to another position. The angle from the first position upon zero setting switch operation appears. (Relative zero setting). Pressing the zero setting switch after setting the angle display to "0" will cause light emission in synchronism with the rising edges of the external reference signal. (Absolute zero adjustment: Light emission in synchronism with the loom angle.)

■ Operation

- (1) Plug power cord **13** of the stroboscope into the 100 VAC receptacle provided on the front side of control box **12** at the right rear of the weaving machine.
- (2) Connect stroboscope signal cord **14** to stroboscope terminal block (STROBO) on the control box.





- (3) Run the weaving machine and turn POWER switch **4** of the stroboscope to the ON position. Indicator **2** displays the actual machine speed (rpm) while showing the cursor on the rpm field.
- (4) Press mode switch (MODE) **9** to select necessary stroboscope lighting frequency from ① and ④.
- (5) Press DIVIDE/MODE switch **3** to the MODE position. Indicator **2** displays zero degree while showing the cursor on the deg. field.
- (6) Point the flash lamp towards the object, then turn setting knob **6** while monitoring the crank angle on indicator **2** until you can observe the posture of weft.
- (7) After completion of observation, turn off power switch **3**.
- (8) Disconnect power cord **13** and signal cord **14** from the control box.

■ **Example: Mix weaving**

- 1) Press the mode switch (MODE) **9** to set the light emission mode to 1/1.
- 2) Press unit select switch (UNIT) **7** to set the light emission mode to 1/1.
- 3) Press light emission phase select switch (SHIFT) **11** to enable weft yarns 1 and 2 to be observed separately.

G.3.3 Circuit Tester

The circuit tester measures DC and AC voltages, and resistance applied in the weaving machine and the related devices in order to facilitate maintenance of those electrical parts and troubleshooting of defective parts.

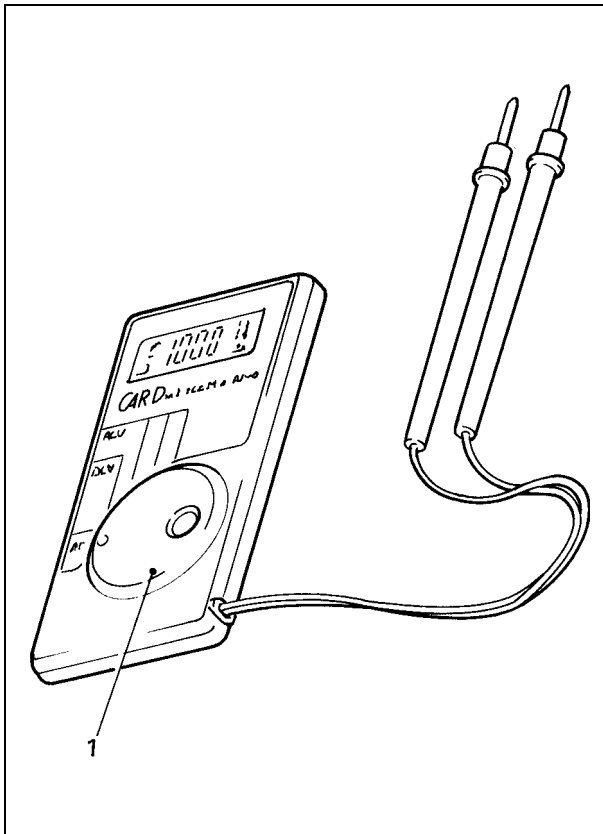
■ Specifications

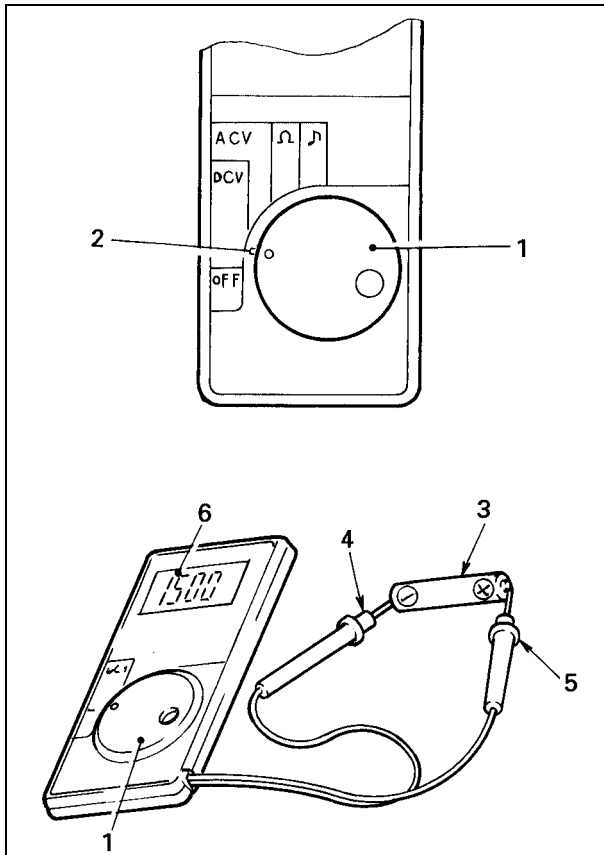
- (1) Measuring range (at $23 \pm 5^{\circ}\text{C}$, 80% RH):
 - DC voltage 200 mV to 500 V
 - AC voltage 2 V to 500 V
 - Resistance 200 Ω to 20 M Ω
 - Conductivity 1.5 k Ω to 15 k Ω
- (2) Buzzer function:

The buzzer built in the circuit tester sounds at any of the following:

 - 1) when function switch 1 is switched,
 - 2) when the circuit is conducting, or
 - 3) when the measuring range is switched up.
- (3) Measuring range switching:

Full automatic ranging
- (4) Indication frequency: 2 times/sec.
- (5) Batteries:
 - Two LR-44 lithium batteries
 - Service life: Approx. 80 hours in continuous operation



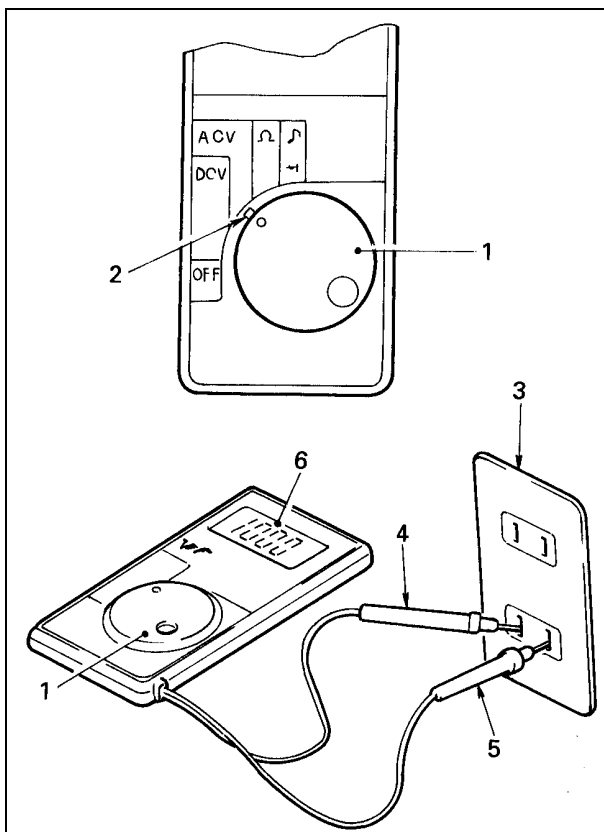


[1] Measuring the DC Voltage (VDC)

- (1) Set alignment mark 2 on function switch 1 to the DCV position.
- (2) Contact probes 4 (–) and 5 (+) to the measuring object 3.
- (3) Read the measured voltage on the indicator 6.

NOTE: The maximum applicable voltage is 500 V.

REFERENCE: Reversing the connection of the probes (+) and (–) reverses the polarity of the voltage indication.

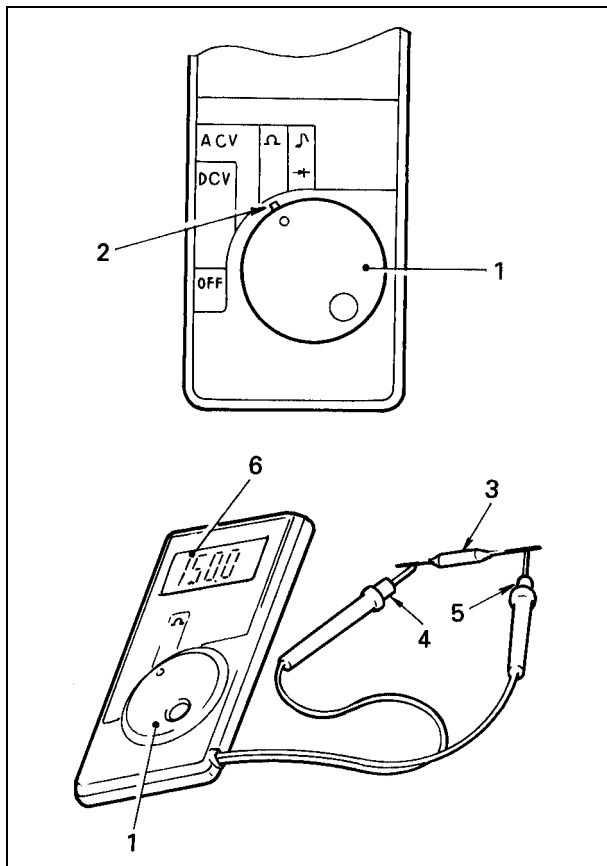


[2] Measuring the AC Voltage (ACV)

- (1) Set alignment mark 2 on function switch 1 to the ACV position.
- (2) Contact probes 4 (–) and 5 (+) to the measuring object 3.
- (3) Read the measured voltage on the indicator 6.

NOTE: The maximum applicable voltage is 500 V.

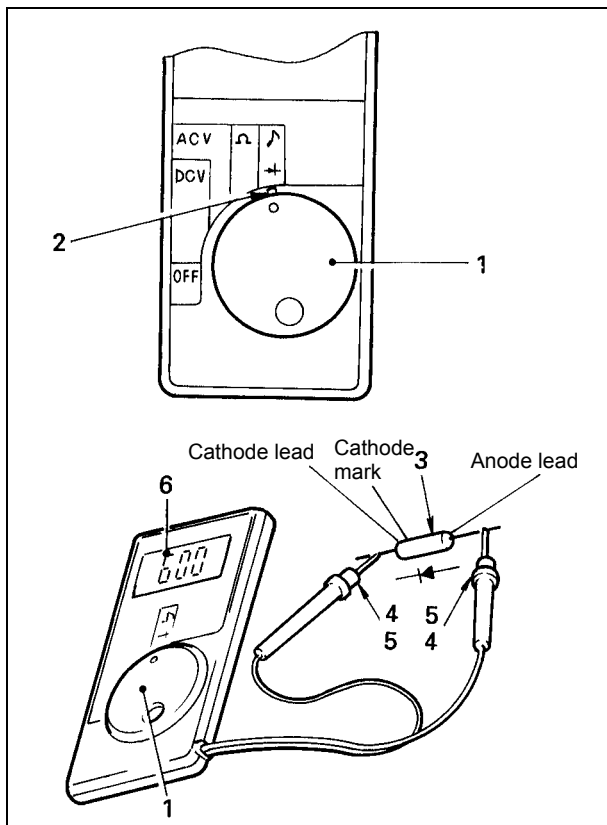
REFERENCE: When measuring AC voltage, the probes have no polarity.



[3] Measuring the Resistance (Ω)

- (1) Power off the circuit to be measured.
- (2) Set alignment mark 2 on function switch 1 to the Ω position.
- (3) Contact probes 4 (-) and 5 (+) to the measuring object 3.
- (4) Read the measured resistance on the indicator 6.

NOTE: The maximum overload input is 250 VAC/VDC.



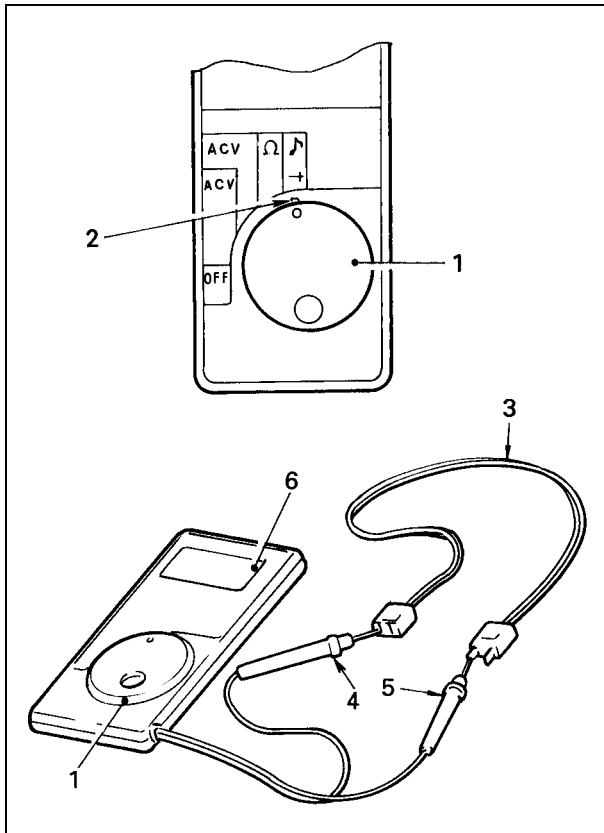
[4] Testing the Diode (\rightarrow)

- (1) Set alignment mark 2 on function switch 1 to \rightarrow position.
- (2) Contact probes 5 (+) and 4 (-) to the anode lead and cathode lead of diode 3 to be measured, respectively. Indicator 6 displays the forward voltage (energy gap voltage) of the diode and \rightarrow sign as the buzzer sounds.
- (3) Reverse the contact polarity of the probes 5 and 4.
If indicator 6 shows value of 1200 to 1800, the diode is normal.

[5] Testing the Conductivity (♪ →+)

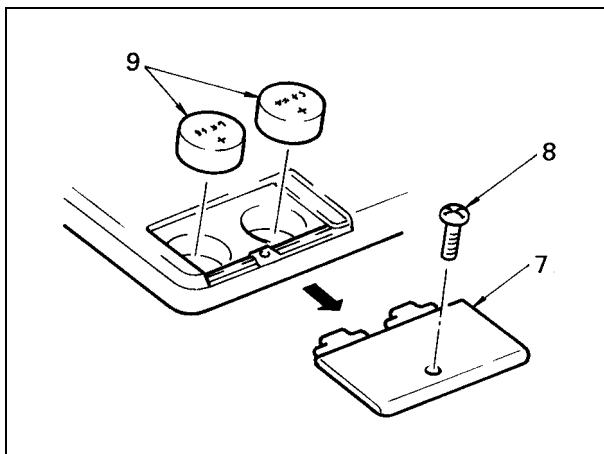
- (1) Set alignment mark **2** on function switch **1** to ♪ →+ position.
- (2) Contact probes **5** (+) and **4** (-) to the object to be measured **3**.

Indicator **6** displays ⇄ sign as the buzzer sounds, if the object is normal.

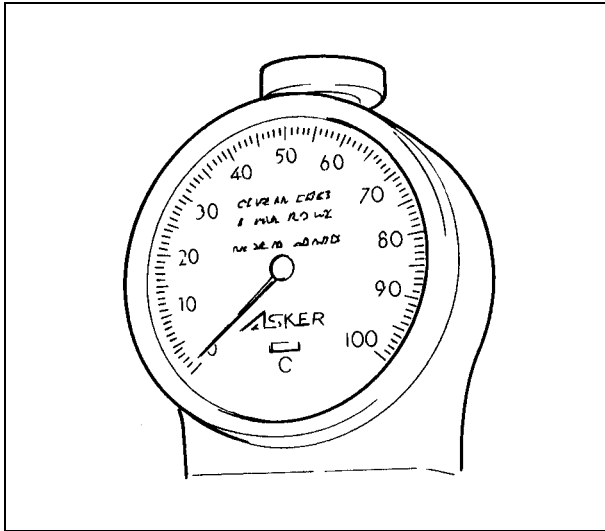


[6] Replacing the Batteries

- (1) Detach probes **4** and **5** from a circuit under measuring, then set alignment mark **2** on function switch **1** to the OFF position.
- (2) Take out the circuit tester from the case.
- (3) Remove screw **8** from battery cover **7** on the left of the bottom, then pull off cover **7**.
- (4) Replace both of two batteries **9** (LR44) with new ones in correct polarity.



G.3.4 Hardness Gauge (For Warp Beams or Weft Cheeses)



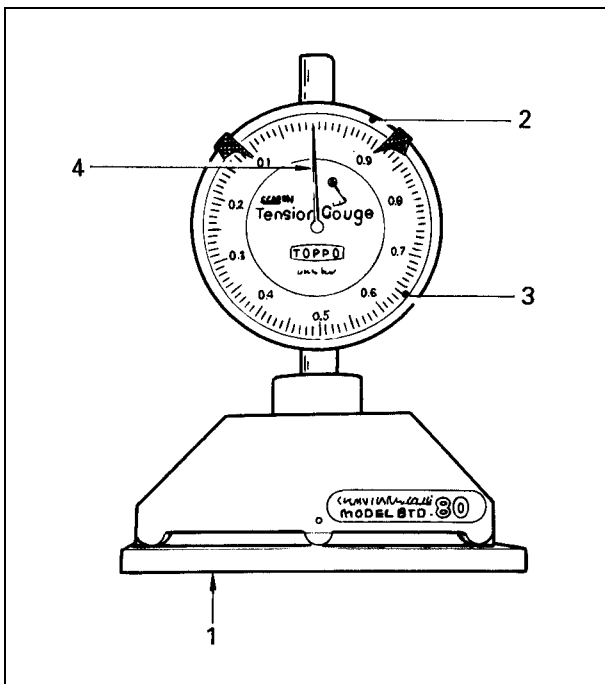
The hardness gauge measures the hardness of warp beams or weft cheeses.

Apply the measuring section of the hardness gauge at right angles to the object to be measured, then read the pointed scale.

The hardness is expressed in degrees.

REFERENCE: Hardness shall be measured at several points (3 to 4 points) on the object and expressed as a mean value of those measured values.

G.3.5 Tension Gauge (For Fabrics)



The tension gauge measures the tension of fabrics being produced on the weaving machine.

- (1) Put the tension gauge on glass surface plate 1.
- (2) Turn outer ring 2 of dial 3 to align scale 0 with pointer 4.
- (3) Put the tension gauge on the surface of fabric to be measured, and tap the fabric surface 2 or 3 times.

The long pointer of the dial will rotate and the short pointer will also shift slightly.

- (4) After the long pointer stabilizes and stops, read the scale on the pointed dial.

G.3.6 Tension Meter (For Wefts or Warps)

The tension meter measures the tension of weft or warp for numerical tension control.

■ Specifications

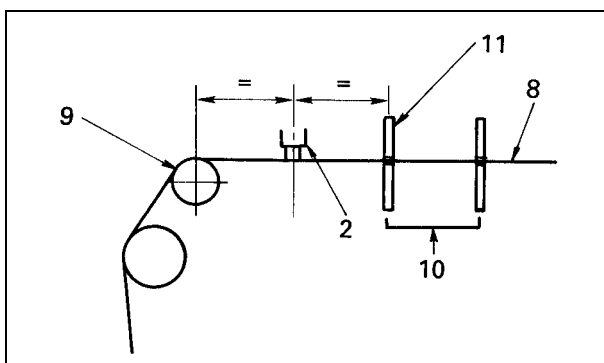
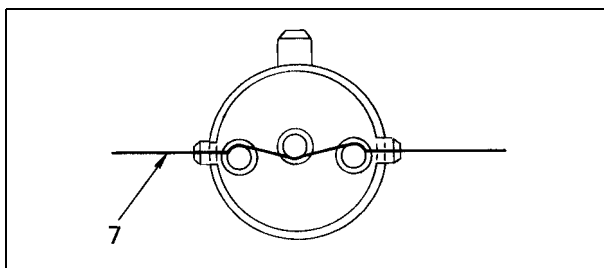
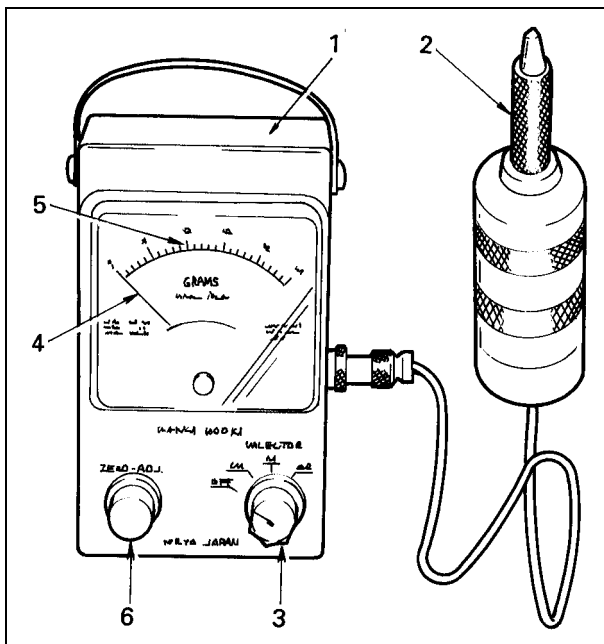
Measurable tension range:

0 to 100 gr for low-tension range

0 to 200 gr for high-tension range

■ Adjustment

- (1) Connect pick-up head 2 to meter 1.
- (2) Set SELECTOR knob 3 to the CH position and check that pointer 4 indicates mid-scale, which is CH position 5. If not, adjust it with ZERO-ADJ knob 6.
- (3) Set SELECTOR knob 3 to the R1 (low tension) or R2 (high tension) position.
- (4) Check that pointer 4 points 0 on the scale. If not, adjust it with ZERO-ADJ knob 6.



■ Operation

- (1) Apply weft 7 to be measured to pick-up head 2 as shown in the left figure, then read the tension in grams while keeping the weft as straight as possible.

NOTE: If the weft is routed in the reverse path (wrong path), it is impossible to measure it.

- (2) To measure the tension of warp 8, set pick-up head 2 at the center of the warp span between easing roller 9 and dropper 11 placed at the tail of dropper box 10.

