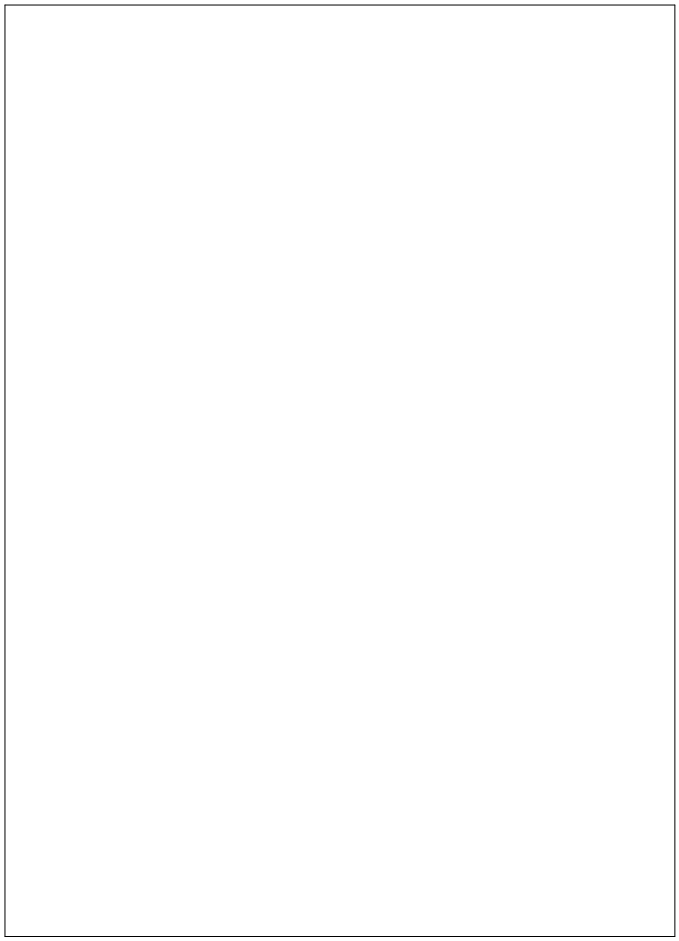
TACHOMETER / STROBOSCOPE



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1. FEATURES

* Intelligent, microprocessor circuit design, high accuracy, wide range, digital readout.
* One instrument include two functions of " Digital Photo Tachometer " & " Digital Stroboscope "
* Digital Stroboscope :
  Wide setting range from 100 RPM to 100,000 RPM, digital display with high accuracy. Modern solid state high visible orange light, long life, almost maintenance free. It is ideal for inspecting and measuring the speed of moving gears, fans, centrifuges, pumps, motors and other equipment used in general industrial maintenance, production, quality control, laboratories and as well as for schools and colleges for demonstrating strobe action.
* Digital Photo Tachometer :
  No contact RPM measurement, wide measuring range from 5 to 100,000 RPM. 0.1 RPM resolution for the measured value < 1000 RPM. The last value, max. value, min. value can be stored into the memory automatically & be obtained by pressing " Memory Call Button ". High visible LCD display gives RPM reading exactly with no guessing or errors.
* The use of durable, long lasting components, including a strong, light weight ABS plastic housing. Cabinet has been carefully shaped to fit comfortable in either hand.

2. SPECIFICATIONS

2-1 General Specification

Display	5 digits, 10 mm (0.4") LCD (Liquid Crystal display) with function annunciation.
Accuracy	(0.1 % + 2 digit).
Sampling Time	1 second (60 RPM).
Time base	Quartz crystal.
Circuit	Exclusive one-chip design microprocessor LSI circuit.
Battery	4 x 1.5V AA (UM-3) battery.
Operation Temperature	0 - 50 蚓 (32 - 122 蚌).
Operating Humidity	Less than 80% RH.
Size	215 x 65 x 38 mm. (8.5 x 2.6 x 1.5 inch).
Weight	300g(0.66 LB)/including battery.
Accessories Included	Carrying case .....1 PC. Operation manual .....1 PC. Reflecting tape marks (600 mm) ..... 1 PC.

2-2 Electrical Specifications (Photo Tachometer)

Measurement Range	5 to 99,999 RPM
Resolution	0.1 RPM (< 1,000 RPM) 1 RPM (1,000 RPM)
Photo Tach. detecting distance	50 to 150 mm/2 to 6 inch. * Typical max. 300 mm/12 inch depending upon ambient light.

2-3 Electrical Specifications (Stroboscope)

Stroboscopic Flash Rate	100 to 100,000 FPM/RPM *FPM : flash per minute* *RPM : round per minute*
Flash Adjust Range	*3 ranges :* Range A: 100-1,000 FPM Range B: 1,000-10,000 FPM Range C: 10,000-100,000 FPM
Resolution	0.1 FPM/RPM. *(Less than 1,000 FPM/RPM)* 1 FPM/RPM *(Over 1,000 FPM/RPM)*
Flash tube	High efficiency orange LED lamp.
Flash Duration	Approximately 60 to 1,000 microseconds.
Flash color	Orange
Flash Duration	Approx. 16% of period time.
Flash Adjust Knob	Coarse adjust knob and Fine adjust knob.
Calibration	Crystal time base and microprocessor circuit, don't necessary take any external calibration process.

Remark :

The above spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.

3. FRONT PANEL DESCRIPTION

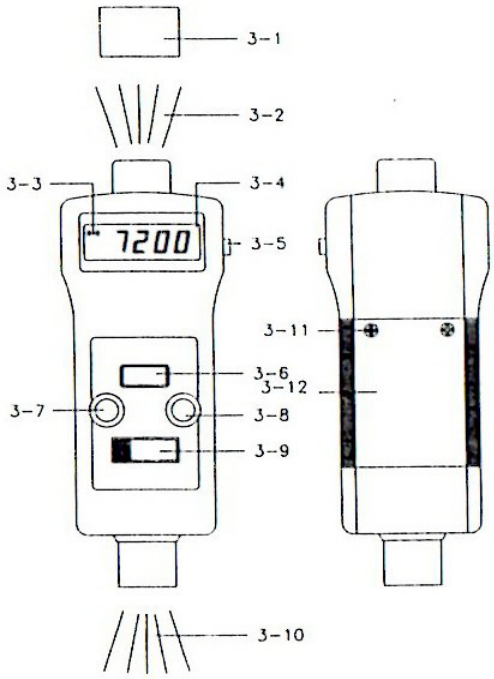

Fig. 1

3-1 Reflecting Mark
3-2 Tachometer light Beam
3-3 Monitor indicator
3-4 Display
3-5 Measuring Button
3-6 Memory Call Button
3-7 Fine Adjust Knob
3-8 Coarse Adjust Knob
3-9 Function/Range Switch
3-10 Stroboscope Flash Light Beam
3-11 Battery Cover Screws
3-12 Battery Compartment

4. STROBOSCOPE MEASURING PROCEDURE

4-1 Preparation

Determine the " Function/Range Switch (3-9, Fig. 1) to
1,000 RPM (100 to 1,000 RPM)
or 10,000 RPM (1,000 to 10,000 RPM)
or 100,000 RPM (10,000 to 100,000 RPM)

4-2 Checking Speed (RPM/FPM)

a. Power off the measured installation, make a " mark " for the rotation area that will intend to measure the RPM. Then power on the measured installation.
b. Depress the " Measuring Button " (3-5, Fig. 1) & align the " Stroboscope Flash light beam " (3-10, Fig. 1) with the applied target.
c. When checking speed, care must be taken to insure that the strobe is flashing in unison (one to one) with the object being monitored. Turn the " Fine Adjust Knob " (3-7, Fig. 1) or " Coarse Adjust Knob " (3-8, Fig. 1) until the mark look like " Stop " (synchronize).
d. The Stroboscope will also stop motion at 2:1, 3:1, 4:1 et., this is normally referred to as harmonies. To be sure of unison, turn the dial until two images appear - this will double the actual speed. Then lower the flashing rate until a single and stationary image appears - this is the actual true speed.

4-3 Checking Motion

For motion analysis, simply locate the actual speed as mentioned above and then turn the dial slowly up or down. This will give a slow motion effect allowing complete inspection.

5. PHOTO TACHOMETER MEASURING PROCEDURES

a) Select the " Function/Range Switch " (3-9, Fig. 1) to the " Photo RPM " position.
b) Apply a reflecting mark to the object being measured. Depress the " Measuring Button " (3-5, Fig. 1) & align the " Tachometer Light Beam " (3-2, Fig. 1) with the applied target. Verify that the " Monitor Indicator " (3-3, Fig. 1) lights when the target pass through the light beam. Release the "Measuring Button" when the reading stabilizes (about 2 seconds).

Measuring consideration :
If the measured RPM values is very low (for example less than 50 RPM), recommend to attach more "Reflecting Marks" average to the object. It will get the real RPM with high resolution, precisely & fast sampling time when divided the reading values by the no. of the " Marks ".

6. OPERATION PROCEDURE FOR MEMORY RECALL (TACHOMETER only)

a) The readout of " last value ", " max. value " & " min. value " can be obtained immediately & memorized into the circuit automatically after turning off the "Measuring Button".

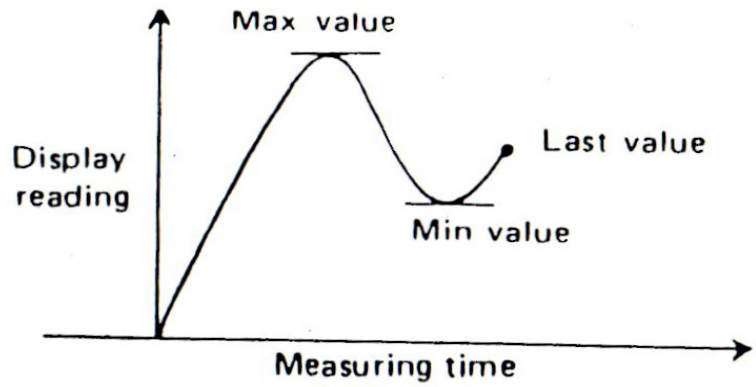

Fig. 2

b) When finish the measuring procedures (after release the measuring button), the memorized values can be displayed on the LCD display whenever :

* *First push the " Memory Call Button " (3-6, Fig. 1) : To display the last value (" LA " and the last value will be displayed alternately).*
* *Second, push the " Memory Call Button " again : To display the maximum value (" UP " and the max. value will be displayed alternately).*
* *Third, push the " Memory Call Button " again : To display the minimum value (" dn " and the min. value will be displayed alternately).*

7. BATTERY REPLACEMENT

a) When the LCD display appear " LO ", it indicate a normal battery output of less than approx. 4.7 V. It is necessary to replace the batteries. However in-spec measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
b) Open the Battery Cover (3-11. Fig 1) by use the screwdriver to loss the screws and remove the batteries.
c) Replace with new batteries correctly into the battery compartment and reinstate the cover.

8. PATENT & PATENT PENDING

This Tachometer/Stroboscope had the patent pending in following countries :

USA, GERMANY, TAIWAN