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# User's Guide



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# HHT21A Laser Tachometer



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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
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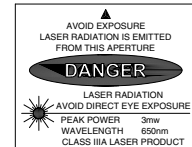
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## Safeguards and Precautions



1. Read and follow all instructions in this manual carefully, and retain this manual for future reference.
2. Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.
3. Making measurements in close proximity to rotating equipment can be dangerous. Keep all loose clothing and hair away from exposed moving machinery. Properly replace all machinery guards after completing measurement.
4. The socket on the front of the instrument is for use with a remote charger. Only use model R-5 (115 Vac) or R-6 (230 Vac) rechargers to charge the instrument.
5. The HHT21A has a laser beam light source. Do not view the laser beam directly as it could be hazardous to the eyes. Do not point the laser beam into another person's eyes. Do not view the laser beam with telescopic devices.
6. With exception of replacing the batteries, this instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product.



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of the way. It may also be convenient to keep a spare supply of reflective tape in the free area underneath this cover.

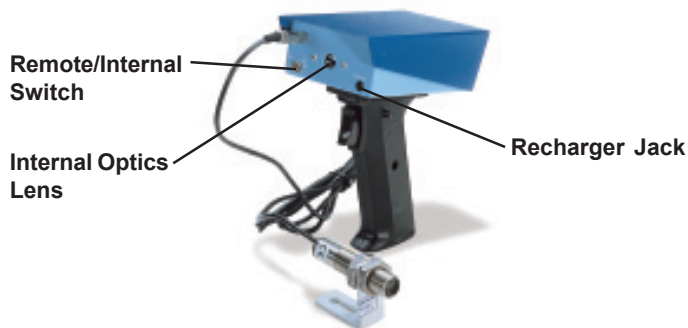
The instrument will provide six to eight hours of continuous operation on a single set of batteries, depending on the type used. The instrument is provided with a built-in charging network, which works in conjunction with the optional NiCad batteries. The optional recharger plugs into the single jack located next to the optical lens at the front end of the instrument. Fourteen to sixteen hours is required for a complete recharge. When the battery voltage in the HHT21A is getting low, the display will blink "LO BAT" to indicate that the batteries need to be replaced.

**NOTE:** Only use model R-5B (115 Vac) or R-6B (230 Vac) rechargers with NiCad batteries. Do not attempt to charge non-rechargeable batteries.

**ALWAYS DISPOSE OF BATTERIES IN A SAFE AND RESPONSIBLE MANNER.**

### **CLEANING**

To clean the instrument, wipe with a damp cloth using mild soapy solution.



**Figure 1 HHT21A-R  
with Optional Remote Sensor (HHT20-ROS)**

## CALIBRATION AND SELF-TEST

The HHT21A SERIES is a crystal controlled digital instrument that requires no calibration. However, the accuracy of the instrument can be checked at any time by aiming it at an old style fluorescent light and observing  $7200 \pm 2$  RPM. In countries with 50 Hz. power line frequency, the display will read  $6000 \pm 2$  RPM.

**NOTE:** The Tachometer will not correctly read on energy-efficient fluorescent lights.

## BATTERIES

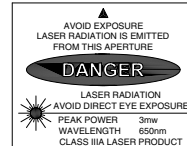
The HHT21A SERIES operates from four 'AA' size batteries which are located under the hinged top of the instrument. To access these batteries, grip the tapered cover at the optical lens end of the instrument and pull up. The cover is hinged at the display end of the instrument and pivots fully out

## SPECIFICATIONS

This product is designed for indoor or outdoor use under the following conditions (per IEC1010-1):

<b>Speed Range:</b>	5 RPM to 100,000 RPM
<b>Accuracy:</b>	$\pm 1$ RPM or .01% of reading
<b>Resolution:</b>	1 RPM
<b>Display:</b>	6-digit 0.45" high liquid crystal
<b>Display Update:</b>	Twice per second
<b>On-Target Indication:</b>	Target (Bullseye) on lower left of display
<b>Operating Distance:</b>	Range: Up to 10 feet [3.1 m] from leading edge of reflective tape Angle: Up to 45° from perpendicular to leading edge of reflective tape
<b>Power-On Switch:</b>	Pistol grip trigger - may be locked on with latching push-button for longer duration measurements Auto hold of last measurement for 90 seconds Visible laser light source

### Optical System:



### WARNING:

**Do not view the laser beam directly as it could be hazardous to the eyes. Do not point the laser beam into another person's eyes. Do not view the laser beam with telescopic devices.**

<b>Time Base:</b>	Crystal controlled
<b>Power Source:</b>	4 "AA" batteries; Recharger socket provided for optional rechargeable batteries
<b>Recharger Input:</b>	Max input 7.8 Vdc @ 50mA
<b>Temperature:</b>	41 °F [5 °C] to 104 °F [40 °C]
<b>Humidity:</b>	Maximum relative humidity 80% for temperature up to 88 °F [31 °C] decreasing linearly to 50% relative humidity at 104 °F [40 °C]

**Dimensions (LxWxH):** 6.13" x 3.25" x 1.75 " plus 4.75" handle  
[155.7 mm x 82.6 mm x 44.5 mm x 120.7 mm]  
**Weight:** 1.25 lbs [0.57 kg]

## OVERVIEW

The HHT21A SERIES combines the accuracy and safety of a non-contact optical tachometer with the convenience and ease of operation of a pistol grip instrument. The instrument provides non-contact measurement of rotational speed to an accuracy of .01% of reading. It reads RPM directly to the nearest RPM, and a 'on-target' indicator is provided to verify the instrument is properly aligned on a target and receiving valid information.

## OPERATION

The HHT21A measures rotational speed from a single pulse per revolution. This pulse is supplied by marking the rotating shaft with a visible reflective tape target. The HHT21A is equipped with a built-in laser light source providing a bright red beam which is aimed at the reflective tape located on the rotating shaft. The pulse from the reflective tape is received back through a single lens reflex optical system and detected by a photocell inside the instrument. The HHT21A then computes the rotational speed and displays it to a resolution of 1 RPM.

To operate the instrument, simply aim it at the reflective tape while holding it at a distance of 1 inch [25.4 mm] to 10 feet [3.1 m] making sure to observe laser safety precautions. Squeeze the pistol grip trigger, and read the indicated speed. The on-target indicator must be on. The display is updated up to twice per second.

For longer duration measurements, the trigger latch on the side of the pistol grip handle can be depressed after pulling the trigger, and the instrument may be mounted on the 1/4-20 threaded bushing at the base of the handle.

When the trigger is released, the HHT21A will hold the last measurement taken and display it for up 90 seconds.

On very small shafts, the HHT21A will work down to a reflective tape size of approximately 1/8 inch [3.2 mm] square. However, with this small tape size, it would be necessary to operate the instrument very close to the rotating shaft and insure it is held steady. For normal operation, a tape size of approximately 1/2 inch [12.7 mm] square or larger is recommended, and on very large diameter shafts or for very high-speed applications, a larger size piece of tape may be required. It is also recommended that the reflective tape be viewed just slightly off the perpendicular. The HHT21A will operate at angles from 0 to 45 degrees, but best results are obtained by aiming the instrument at the reflective tape at approximately a 10 to 20 degree angle. This insures that only pulses from the reflective tape are received by the instrument and minimizes the problem of interference from a highly polished surface or varying ambient lighting.

## USING THE HHT21A-R WITH A REMOTE OPTICAL SENSOR

The HHT21A-R version of the tachometer has a provision for using the optional HHT20-ROS Remote Optical Sensor. In addition to the standard built-in optics of the HHT21A SERIES, a 1/8 inch [3.5 mm] phone jack is provided on the front panel of the Tachometer to accept a remote optical sensor plug. A toggle switch on the optics panel selects internal or remote operation.

For applications requiring the remote optical sensor, move the Remote/Internal switch to the remote position to disable the internal optics of the Tachometer. When the trigger is pulled or latched, the remote optical sensor can be used for measurements. The HHT20-ROS Remote Optical Sensor operates 3 feet [0.9 m] and  $\pm 45^\circ$  from the reflective tape.