Pocket Laser Tach 200

Tachometer / Rate Meter / Totalizer / Timer

Pocket Laser Tach 200

(PLT200)

As Manufacturer:
Monarch Instrument
Division of Monarch International Inc.
15 Columbia Drive, Amherst NH 03031  USA
declares under Monarch’s sole responsibility that the product:
Pocket Laser Tach 200

to which this declaration relates is in conformity with the following directives and
standards when installed and operated in accordance with the user manual:

Directives: EMC 89/336/EEC

           Electrical Safety: IEC61010-1:2001
           Laser Safety: IEC60825-1:2001

References: Retlif Testing Laboratories, (Report No. R-4283N)
            Technical Construction File PLT-0704 of July 2004

24th June 2004
Manufacturer (Amherst,NH) Alan Woolfson, VP Engineering (Authorized Signature)
SAFEGUARDS AND PRECAUTIONS

WARNING - This product emits a visible beam of laser light. Avoid exposure to the laser radiation. The use of optical viewing aids (binoculars, for example) may increase the ocular hazard.

CAUTION - The laser beam should not be intentionally aimed at people or animals.

CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Read and follow all instructions in this manual carefully, and retain this manual for future reference.

Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.

This instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product.

In order to comply with EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE): This product may contain material which could be hazardous to human health and the environment. DO NOT DISPOSE of this product as unsorted municipal waste. This product needs to be RECYCLED in accordance with local regulations, contact your local authorities for more information. This product may be returnable to your distributor for recycling - contact the distributor for details.

Monarch Instrument's Limited Warranty applies. See www.monarchinstrument.com for details.

Warranty Registration and Extended Warranty coverage available online at www.monarchinstrument.com.
12.0 BATTERIES
When displayed, replace batteries.

Remove battery cover

Install two 1.5V “AA” alkaline batteries

NOTE: Both batteries face the same direction.

13.0 CLEANING
To clean the instrument, wipe with a damp cloth using mild soapy solution.
1.0 OVERVIEW

The Pocket Laser Tach 200 is a precision hand-held multifunction Tachometer, Rate meter, Totalizer and Timer. It is programmable to display directly in Revs, Inches, Feet, Yards, Miles, Centimeters and Meters or function as a stopwatch or interval timer. Input / output sockets allow for remote sensing and pulse output to external indicating devices. For ease of use, the instrument can be “Locked-on” for continuous operation.

2.0 FEATURE LOCATIONS

![Feature Locations Diagram]

AVOID EXPOSURE - LASER RADIATION IS EMITTED FROM THIS APERTURE

11.0 INPUT / OUTPUT

**Input:** Accepts remote sensor or Remote Contact Assembly (RCA). 1/8” (3.5mm) stereo phone plug.

**Output:** 1 pulse per revolution TTL output on internal operation. Pulse repeater with external sensors. 1/8” (3.5mm) mono phone plug.

![Input Connector Detail (Stereo plug)]

![Output Connector Detail (Mono plug)]
10.0 MAKING MEASUREMENTS

10.1 Non-Contact Measurements

On Target Indicator. Blinks on whenever there is an input signal. Will appear to be solid on at higher frequencies.

Low Battery icon. Indicates that the batteries are low and need to be replaced.

Times Ten icon. Indicates that the value shown is ten times that which is displayed.

Laser Indicator. Red laser is on when this indicator is illuminated.

Lock icon. Indicates that the unit is “Locked” on and making continuous measurements (Lock mode).

10.2 Direct Contact Measurements

Rotational

Linear

ONLY USE MODERATE PRESSURE

WARNING: Making measurements in direct contact with rotating equipment can be dangerous. Keep all loose clothing and hair away from exposed moving machinery. Keep the hand holding the instrument well behind the back end of the Remote Contact Assembly. Properly replace all machinery guards after completing measurement. Do not use for rotation greater than 20,000 RPM.

[Diagram of measurement tools and icons]
4.0 PLT200 SPECIFICATIONS

Laser Specifications:

Classification: Class 2 (per IEC 60825-1 Ed 1.2 2001-8)

Maximum Laser Output: 1mW
Pulse Duration: Continuous
Laser Wavelength: 650 nm
Beam Divergence: < 1.5 mrad
Beam Diameter: 4 x 7 mm typical at 2 meters
Laser Diode Life: 8,000 operating hours MTBF (1 year warranty)

Non-Contact Specifications:

Ranges: RPM 5 – 200,000
RPS 0.084 – 3,333.3
RPH 300-999,990

Resolution: Fixed: 1 (10 above 99,999)
Auto-ranging: 0.001 to 1.0 (10 above 99,999)

Accuracy: ±0.01% of reading or resolution limit

Operating Range: up to 25 feet (7.62 m) or up to 70 degrees off perpendicular to T-5 tape target

Contact Specifications using optional Remote Contact Assembly:

Range: Contact Tips: 0.5 to 20,000 RPM
10 cm / 12-inch Wheel: 0.5 to 12,000 RPM

Resolution: Fixed: 1 (10 above 99,999)
Auto-ranging: 0.001 to 1.0 (10 above 99,999)

9. Exit Setup – Ready to measure
Unit will remember these settings (including lock on/off) even if turned off and back on.

9.2 TIMER Operation

Measure:

Manual Each press toggles Start and Stop

Auto OR Start and Stop triggered by Remote Optical Sensor (ROS)

Reset With Timer stopped - Resets time to 00:00.0

Lap With Timer running - Stops at elapsed time to date.
To continue, press again.

Power Off OR Automatic after 90 seconds if unit not Locked on
9.0 TIMER Mode

9.1 TIMER Setup

1. Turn Power ON
   - Last Units selected are displayed

   1a. To toggle Lock
       - Press and Hold
       - Locked On

2. Enter Setup Mode
   - Last Mode selected is displayed

3. Enter selection of Mode

4. Select TIMER Mode
   - Repeat until TIMER displayed

5. Save and advance

6. Enter selection of Timer function
   - MAN or AUTO

7. Select Timer function
   - Toggles between Manual and Auto

Contact Specifications (continued):

Accuracy:
- Revs: ±0.05% of reading (RPM) or resolution limit (with no slippage)
- Linear: ±0.5% of reading or resolution limit (with no slippage)

Contact Measurements Ranges:

TACHOMETER:
- Revolutions per Minute (RPM): 0.5 to 20,000 RPM
- Revolutions per Second (RPS): 0.0833 to 333.33 RPS
- Revolution per Hour (RPH): 30 to 999,990 RPH

RATES:
- Wheel Circumference:
  - Inches per Second: 10 cm: 0.033 to 1312.3 IPS
    - 12 in: 0.100 to 2,400.0 IPS
  - Inches per Minute: 10 cm: 1.969 to 78,740 IPM
    - 12 in: 6.000 to 144,000 IPM
  - Inches per Hour: 10 cm: 118.11 to 999,990 IPH
    - 12 in: 360.00 to 999,990 IPH
  - Feet per Second: 10 cm: 0.003 to 109.36 FT/S
    - 12 in: 0.009 to 200.00 FT/S
  - Feet per Minute: 10 cm: 0.164 to 6,561.7 FT/M
    - 12 in: 0.500 to 12,000 FT/M
  - Feet per Hour: 10 cm: 9.843 to 393,700 FT/H
    - 12 in: 30.000 to 720,000 FT/H
  - Yards per Second: 10 cm: 0.001 to 36.453 YPS
    - 12 in: 0.003 to 66.667 YPS
  - Yards per Minute: 10 cm: 0.055 to 2,187.2 YPM
    - 12 in: 0.167 to 4,000.0 YPM
Contact Measurements Ranges (continued):

<table>
<thead>
<tr>
<th>RATES:</th>
<th>Wheel Circumference:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yards per Hour</td>
<td></td>
</tr>
<tr>
<td>10cm:</td>
<td>3.281 to 131,233 YPH</td>
</tr>
<tr>
<td>12 in:</td>
<td>10.000 to 240,000 YPH</td>
</tr>
<tr>
<td>Miles per Hour</td>
<td></td>
</tr>
<tr>
<td>10 cm:</td>
<td>0.002 to 74.564 MPH</td>
</tr>
<tr>
<td>12 in:</td>
<td>0.006 to 136.36 MPH</td>
</tr>
<tr>
<td>Centimeters per Second</td>
<td></td>
</tr>
<tr>
<td>10 cm:</td>
<td>0.084 to 3,333.3 CM/S</td>
</tr>
<tr>
<td>12 in:</td>
<td>0.21 to 3,048.0 CM/S</td>
</tr>
<tr>
<td>Centimeters per Minute</td>
<td></td>
</tr>
<tr>
<td>10 cm:</td>
<td>5.000 to 200,000 CM/M</td>
</tr>
<tr>
<td>12 in:</td>
<td>15.240 to 365,760 CM/M</td>
</tr>
<tr>
<td>Centimeters per Hour</td>
<td></td>
</tr>
<tr>
<td>10 cm:</td>
<td>300.00 to 999,990 CM/H</td>
</tr>
<tr>
<td>12 in:</td>
<td>914.40 to 999,990 CM/H</td>
</tr>
<tr>
<td>Meters per Second</td>
<td></td>
</tr>
<tr>
<td>10 cm:</td>
<td>0.001 to 33.333 M/SEC</td>
</tr>
<tr>
<td>12 in:</td>
<td>0.003 to 60.960 M/SEC</td>
</tr>
<tr>
<td>Meters per Minute</td>
<td></td>
</tr>
<tr>
<td>10 cm:</td>
<td>0.050 to 2,000.0 M/MIN</td>
</tr>
<tr>
<td>12 in:</td>
<td>0.153 to 3,657.6 M/MIN</td>
</tr>
<tr>
<td>Meters per Hour</td>
<td></td>
</tr>
<tr>
<td>10 cm:</td>
<td>3.000 to 120,000 M/H</td>
</tr>
<tr>
<td>12 in:</td>
<td>9.144 to 219,460 M/H</td>
</tr>
</tbody>
</table>

TOTALIZER:
Counts: 0 to 999,999
Scale Totals in Inches, Feet, Yards, Centimeters or Meters
Input: Internal or External optics or linear contact wheel

Timer Specifications:
Minutes:Seconds.Tenths to 99:59.9
Accuracy: ±0.2 second
Resolution: 0.1 second

8.2 TOTALizer Operation
Measure [ ] [ ] [ ] OR [ ] [ ] [ ]
Press and hold Lock on
Recall Max or Min [ ] [ ] [ ]
Recall Time in seconds [ ] [ ] [ ]
Max or Min Speed (in last selected Tach or Rate mode units)
Show time in seconds from when the Start / Reset button is pressed until the last input signal measured.
If unit is Locked on:
[ ] [ ] [ ] Resets Max/Min, Total and Measurement Time
Power Off [ ] [ ] [ ] OR Automatic after 90 seconds if unit not Locked on
NOTE: Pressing [ ] [ ] [ ] once before 90 seconds will keep measurements in memory and the display turned on longer.
TOTALizer Setup (continued):

9. Enter selection of number of decimal places

10. Select decimal places

11. Save and advance

12. Exit Setup – Ready to measure

Units = COUNT:
DONE, then Units selected

Rotational/Linear Units:
DONE, USE CONTACT TIP or
[wheel selected], then Units selected

Unit will remember these settings (including lock on/off) even if turned off and back on.

Display: 5 x 0.5” (12.7mm) numeric digits plus 5 Alpha-numeric LCD

Batteries: 2 “AA” 1.5 V (DC) alkaline included
(Note: Batteries are NOT rechargeable.)

Battery Life: 30 hours continuous typical with batteries provided

External Input:

Absolute max: -0.3 V to 5 V (DC)

Minimum: low below 1.2 V and high above 2 V (TTL compatible)

Edge: Triggers on Positive edge

Power Out: 3.0 V nominal, approx. 2.8 V @ 20 mA max

Pulse Output: 0 V to 3.3 V (DC) pulse
Same shape as External Input signal or high when internal optics sees a reflection

Dimensions: 6.92” (17.58 cm) H x 2.4” (6.10 cm) W x 1.6” (4.06 cm) D

Weight: Approx. 7 oz. (210 g)

This product is designed to be safe for indoor use under the following conditions (per IEC61010-1).

Installation Category II per IEC 664

Pollution Degree Level II per IEC 664

Temperature: 40 °F to 105 °F (5 °C to 40 °C)

Humidity: Maximum relative humidity of 80% for temperatures up to 88 °F (31 °C) decreasing linearly to 50% relative humidity at 100 °F (40 °C). Humidity non-condensing.

Specifications subject to change without notice.
5.0 PREPARATION FOR MEASUREMENT

5.1 Non-Contact Preparation

For Internal operation (Red laser) or External operation using optional Remote Optical Sensor (ROS-Red LED).

1. Clean Shaft
2. Apply 1/2” square T-5 Reflective tape

For Small Shafts:

As small as 1/8” wide on side or radius edge

5.2 Direct Contact Preparation

For External operation ONLY using optional Remote Contact Assembly (RCA).

Select and install contact option:

1. Contact Tip (Convex tip shown. Use Concave tip for small shafts.)

Align flats

6. Enter selection of Units

7. Select Units

8. Save and advance

6a. Enter selection of Units

7a. Select Units

8a. Save and advance

Different options displayed for Internal or External operation.

Internal or External ROS:

External RCA:

Rotational: REV
Linear: INCH, FEET, YARDS, CM, METER

Repeat until desired Units displayed

Only for Linear Units:

Last Wheel selected is displayed

Toggles between 10CM and 12IN
8.0 TOTALizer Mode

8.1 TOTALizer Setup

1. Turn Power ON

Different messages displayed for Internal or External operation.

Internal or External ROS:

Last Units selected

External RCA:

EXTRN, then scrolling message, then last Units selected

1a. To toggle Lock On/ Off

Press and Hold

Locked On

2. Enter Setup Mode

3. Enter selection of Mode

Last Mode selected is displayed

4. Select TOTAL Mode

Repeat until TOTAL displayed.

5. Save and advance

2. 10 cm Wheel

OR

3. 12 inch Wheel

Install with pin in shaft fully seated in slot. Tighten screw.

5.3 Connecting External Sensors

Plug sensor into Input socket

Remote Optical Sensor (ROS-P)

Infrared Sensor (IRS-P)

Magnetic Sensor with Amplifier (MT-190P)
6.0 TACHometer Mode

6.1 TACHometer Setup

1. Turn Power ON

2. Enter Setup Mode

3. Enter selection of Mode

4. Select TACH Mode

5. Save and advance

6. Enter selection of Units

7.2 RATE Operation

Measure

Recall Max

Recall Min

If unit Locked on:

Power Off

11. Save and advance

12. Exit Setup – Ready to measure

Unit will remember these settings (including lock on/off) even if turned off and back on.
RATE Setup (continued):

6. Enter selection  of Units

Rotational: CRPS, CRPM or CRPH

Linear: IPS, IPM, IPH, FT/S, FT/M, FT/H, YPS, YPM, YPH, MPH, CM/S, CM/M, CM/H, M/SEC, M/MIN, M/H

7. Select Units

Repeat until desired Units displayed

8. Save and advance

8a. Enter selection of Wheel

Last Wheel selected is displayed

8b. Select Wheel

Toggles between 10CM and 12IN

8c. Save and Advance

Only for Linear Units:

9. Enter selection of number of decimal places

10. Select decimal places

Repeat until desired decimal places displayed

11. Save and advance

12. Exit Setup – Ready to measure

DONE, then Units selected

Unit will remember these settings (including lock on/off) even if turned off and back on.
6.2 TACHometer Operation

Measure

Press and hold  OR  Lock on

Recall Max

Max Speed

Recall Min

Min Speed

If unit Locked on:

Resets Max/Min

Power OFF

OR Automatic after 90 seconds if unit not Locked on

7.0 RATE Mode

NOTE: External Remote Contact Assembly (RCA) must be inserted into input socket.

7.1 RATE Setup

1. Turn Power ON  EXTRN, then scrolling message, then last Units selected

1a. To toggle Lock On/Off Press and Hold

Locked On

2. Enter Setup Mode

3. Enter selection of Mode Last Mode selected is displayed

4. Select RATE Mode Toggles between RATE and TOTAL. Select RATE.

5. Save and advance

NOTE:

1a. To toggle Lock On/Off Press and Hold

Locked On

2. Enter Setup Mode

3. Enter selection of Mode Last Mode selected is displayed

4. Select RATE Mode Toggles between RATE and TOTAL. Select RATE.

5. Save and advance