Starrett®

Instruction Manual

Pocket Laser Tachometer
S7793Z
Contact and Non-Contact Digital Tachometer

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.

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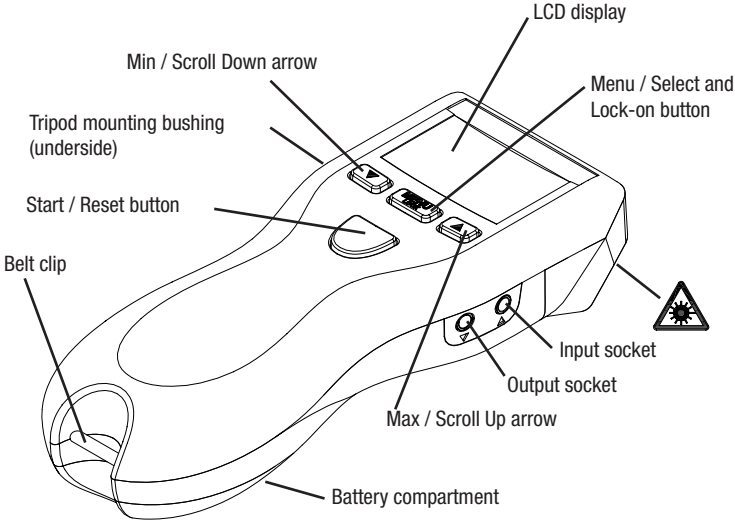
1.0 OVERVIEW

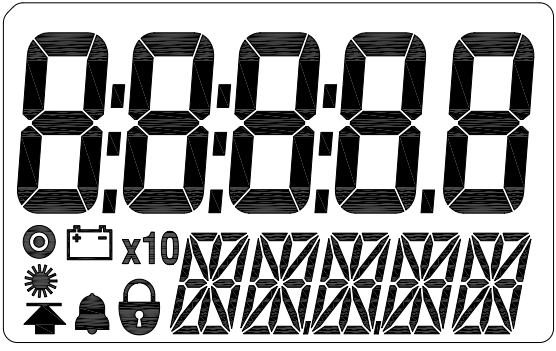
The Pocket Laser Tach 200 is a precision hand-held multifunction Tachometer, Ratemeter, Totalizer and Timer. It is programmable to display directly in Revs, Inches, Feet, Yards, Miles, Centimeters and Meters or function as a stopwatch or interval timer. Input / output sockets allow for remote sensing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

2.0 FEATURE LOCATIONS

3.0 LCD DISPLAY SYMBOLS



AVOID EXPOSURE - LASER RADIATION IS EMITTED FROM THIS APERTURE



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.

x10 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).

4.0 PLT200 SPECIFICATIONS

Laser Specifications:

Classification: Class 3R (per IEC 60825-1 Ed 1.2 2001-8)
Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.

Maximum Laser Output:	3mW
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)

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 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 Measurement Ranges (continued):

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

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

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)
Weight:	Approx. 7 oz. (210 g)

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

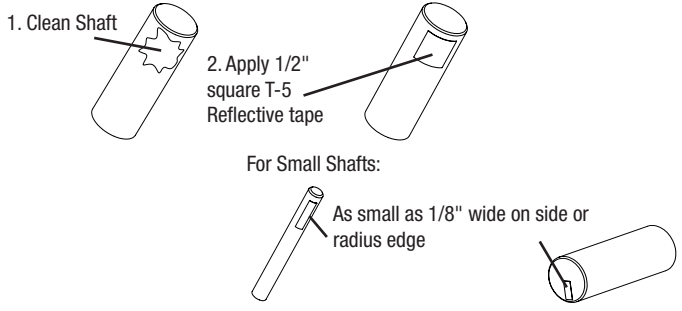
Installation Category II	per IEC 664
Pollution Degree Level II	per IEC 664
Temperature:	40°F to 105°F (5°C to 40°C)
Humidity:	Maximum relative humidity of 80% for temperatures up to 88 °F (31 °C) decreasing linearly to 50% relative humidity at 100 °F (40 °C). Humidity non-condensing.

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).

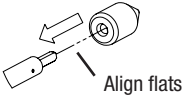


5.2 Direct Contact Preparation

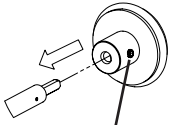
For External operation ONLY using optional Remote Contact Assembly (RCA).

Select and install contact option:

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



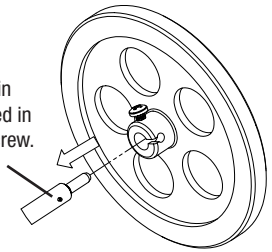
2. 10 cm Wheel



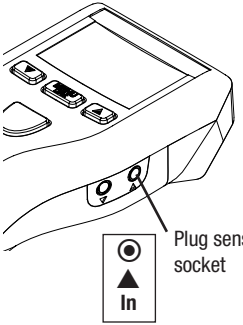
Tighten screw securely into flat on shaft.

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 Contact Assembly (RCA)
(shown with optional 12 inch wheel)

Remote Optical Sensor (ROS-P)

Infrared Sensor (IRS-P)

Magnetic Sensor with Amplifier (MT-190P)

6.0 TACHOMETER MODE

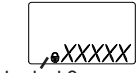
6.1 TACHometer Setup

1. Turn Power ON

Last Units selected are displayed

1a. To toggle Lock On/Off

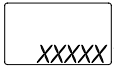
Press and Hold



Locked On

2. Enter Setup Mode

3. Enter selection of Mode



Last Mode selected is displayed

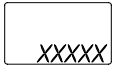
4. Select TACH Mode

OR

Repeat until TACH displayed

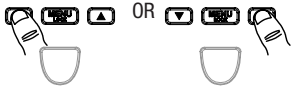
5. Save and advance

6. Enter selection of Units



RPS, RPM or RPH

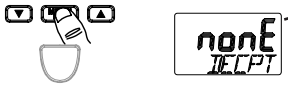
7. Select Units



Repeat until desired Units displayed

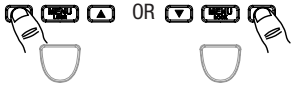
8. Save and advance

9. Enter selection of number of decimal places



NONE, 1, 2 or 3

10. Select decimal places



Repeat until desired decimal places displayed

11. Save and advance

2. 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.

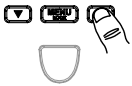
6.2 TACHometer Operation

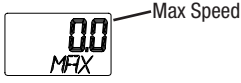
Measure

Press and hold

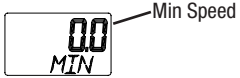
Lock on

Recall Max

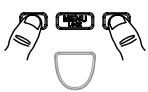




Recall Min



Resets Max/Min



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

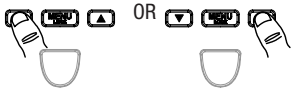
Locked On

2. Enter Setup Mode

3. Enter selection of Mode

Last Mode selected is displayed

4. Select RATE Mode

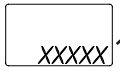


Toggles between RATE and TOTAL. Select RATE.

5. Save and advance

RATE Setup (continued):

6. Enter selection of Units

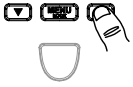


Rotational: C RPS, C RPM or C RPH

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

OR



Repeat until desired Units displayed

8. Save and advance

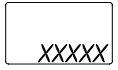
OR

Rotational Units

Linear Units

ONLY FOR LINEAR UNITS:

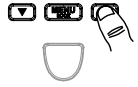
8a. Enter selection of Wheel



Last Wheel selected is displayed

8b. Select Wheel

OR



Toggles between 10CM and 12IN

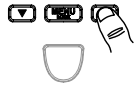
8c. Save and Advance

9. Enter selection of number of decimal places

NONE, 1, 2 or 3

10. Select decimal places

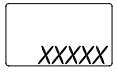
OR



Repeat until desired decimal places displayed

11. Save and advance

12. Exit Setup – Ready to measure



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.

7.2 RATE Operation

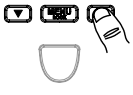
Measure

OR

Press and hold

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

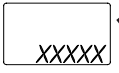
8.0 TOTALIZER MODE

8.1 TOTALizer Setup

1. Turn Power ON

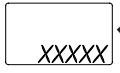
Different messages displayed for Internal or External operation.

INTERNAL OR EXTERNAL ROS:



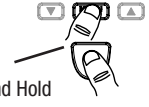
Last Units selected

EXTERNAL RCA:

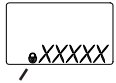


EXTRN, then scrolling message, then last Units selected

1a. To toggle Lock On/Off



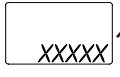
Press and Hold



Locked On

2. Enter Setup Mode

3. Enter selection of Mode



Last Mode selected is displayed

4. Select TOTAL Mode

OR

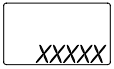
Repeat until TOTAL displayed.

5. Save and advance

6. Enter selection of Units

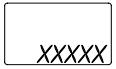
Different options displayed for Internal or External operation.

INTERNAL OR EXTERNAL ROS:



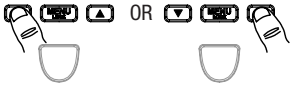
COUNT Only

EXTERNAL RCA:



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

7. Select Units



Repeat until desired Units displayed

8. Save and advance

COUNT or REV

OR

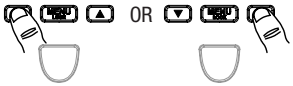
Linear Units

ONLY FOR LINEAR UNITS:

8a. Enter selection of Wheel

Last Wheel selected is displayed

8b. Select Wheel



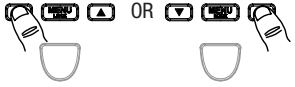
Toggles between 10CM and 12IN

TOTALizer Setup (continued):

9. Enter selection of number of decimal places

NONE, 1, 2 or 3

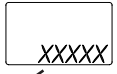
10. Select decimal places



Repeat until desired decimal places displayed

11. Save and advance

12. Exit Setup – Ready to measure



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

Units = COUNT:
DONE, then Units selected

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

8.2 TOTALizer Operation

Measure

Press and hold Lock on

Recall Max

Max Speed

Recall Min

Min Speed

If unit Locked on:

Resets Max/Min

Power Off

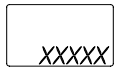
OR

Automatic after 90 seconds if unit not Locked on

9.0 TIMER MODE

9.1 TIMER Setup

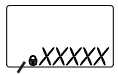
1. Turn Power ON



Last Units selected are displayed

1a. To toggle Lock On/Off

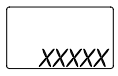
Press and Hold



Locked On

2. Enter Setup Mode

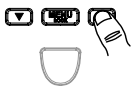
3. Enter selection of Mode



Last Mode selected is displayed

4. Select TIMER Mode

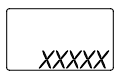
OR



Repeat until TIMER displayed

5. Save and advance

6. Enter selection of Timer functio



MAN or AUTO

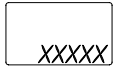
7. Select Timer function

OR

Toggles between Manual and Auto

8. Save and advance

9. 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.

9.2 TIMER Operation

Measure:

Manual

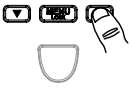
Each press toggles Start and Stop

Auto

OR

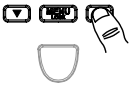
Start and Stop triggered by Remote Optical Sensor (ROS)

Reset



With Timer stopped -
Resets time to 00:00.0

Lap



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

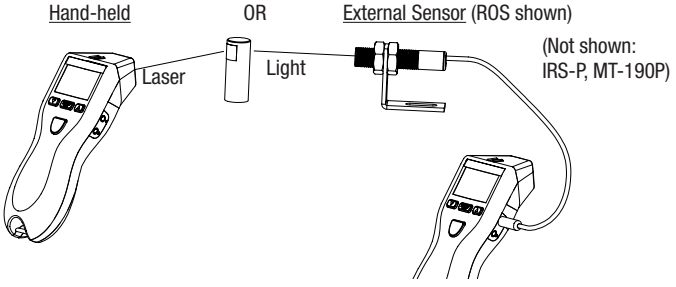
Power Off

OR

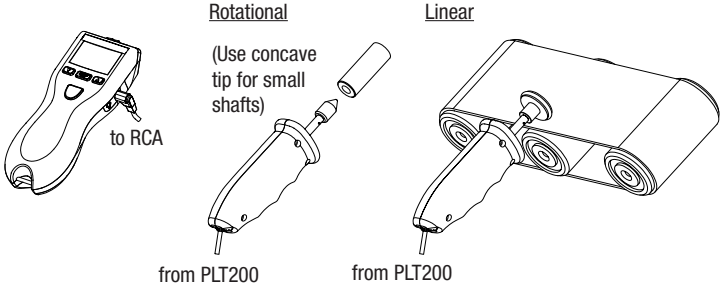
Automatic after 90 seconds if unit not Locked on

10.0 MAKING MEASUREMENTS

10.1 Non-Contact Measurements



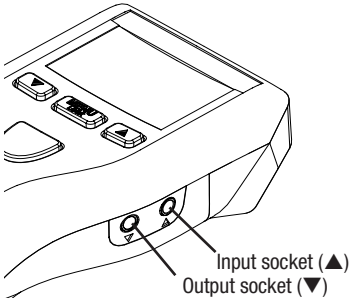
10.2 Direct Contact Measurements



ONLY USE MODERATE PRESSURE

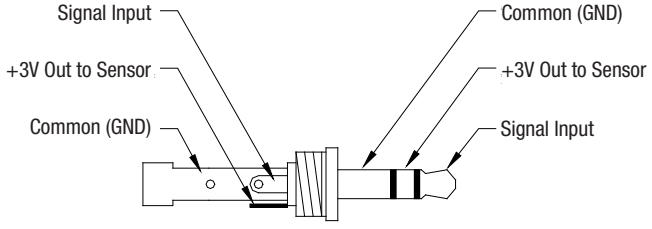
WARNING: Making measurements in direct contact with rotating equipment can be dangerous. Keep all loose clothing and hair away from exposed moving machinery. Keep the hand holding the instrument well behind the back end of the Remote Contact Assembly. Properly replace all machinery guards after completing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

11.0 INPUT / OUTPUT

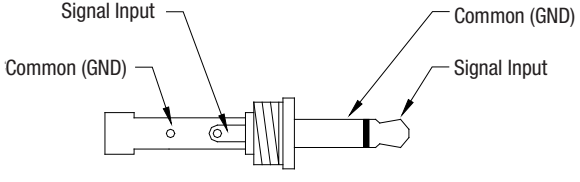


Input: Accepts remote sensor or Remote Contact Assembly (RCA). 1/8"(3.5mm) stereo phone plug.

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

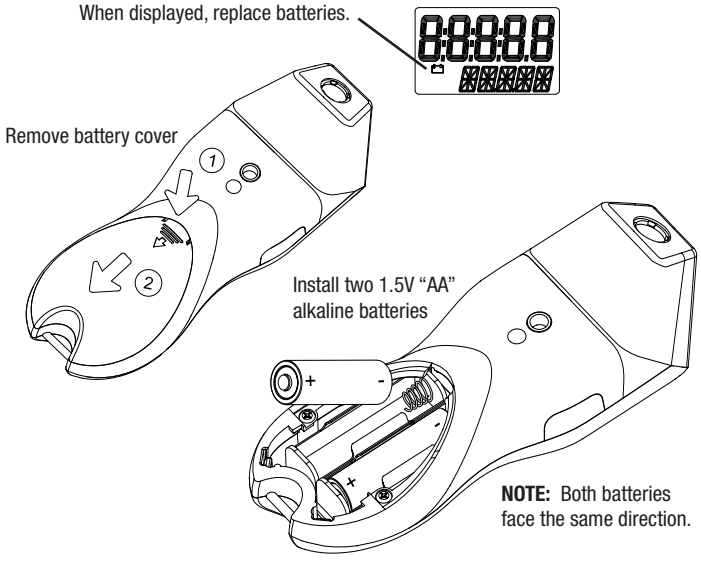


Input Connector Detail (Stereo plug)



Output Connector Detail (Mono plug)

12.0 BATTERIES



13.0 CLEANING

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

14.0 OPTIONS /ACCESSORIES

T-5	Reflective Tape, 5 foot [1.5 m] roll, ½ inch [13 mm] wide
RCA	Remote Contact Assembly with 10 cm wheel, concave and convex tips
CTE	Concave/convex contact tips and 10 cm linear contact wheel
12 inch Wheel	12 inch circumference wheel for use with RCA
CA-4044-6	6 foot Input/Output cable, 1/8" mono phone plug to BNC connector
ROS-P	Remote Optical Sensor
ROS-P-25	Remote Optical Sensor with 25 foot cable
EC-25P	25 foot extension cable for all sensors
MT-190-P	Amplified Magnetic Senso
IRS-P	Infrared Sensor
CC-10	Padded Nylon Carrying Case
CC-11	Latching Carrying Case for Pocket Tach and accessories
CAL-N.I.S.T.	N.I.S.T. Traceable Certificate of Calibration

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