

One Year Warranty

This product is warranted to be free of manufacturing defects for a 1-year period from the original consumer date of purchase. The warranty does not include damage to the product resulting from accident, misuse, improper installation, operation, or unauthorized repair or alteration. Opening the product case will void this warranty. If the product should become defective within the warranty period, Sports Radar Ltd., will repair or replace it at our option, free of charge. You must fill out and return the enclosed registration form to ensure warranty coverage. Failure to fill out registration form may void warranty. To obtain warranty service, first contact Sports Radar's warranty repair department, then, upon approval, send the unit at purchaser's cost to:

Sports Radar, Ltd., 9119 W. Veterans Dr., Homosassa, FL 34448

Return shipping to purchaser will be at Sports Radar Ltd.'s cost inside the 48 continental United States, international shipping is the sole responsibility of the purchaser.

The consumer's sole remedy shall be such repair or replacement as is expressly provided above, and we shall in no event be liable for any incidental or consequential damages arising out of the use or inability to use this product for any purpose whatsoever. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights. You may also have other rights, which vary, from state to state. Manufactured by Sports Radar, Ltd. in the U.S.A.

SPECIFICATIONS

Mechanical: length 6"; width 2-1/4"; height 7-1/2"; weight 1 lb.

Display Type: 2-1/2 digits LCD

Accuracy/ resolution: 3% / 1 MPH or 1 Km/H

Speed Units: Miles Per Hour (MPH) or Kilometers per Hour (Km/H)

Speed Range: 5 to 199 (MPH or Km/H)

Power: 6 standard AAA (alkaline type recommended)

Battery Life 25 hours (continuous), over 150 hours typical (trigger)

Operating Temperature 30-105 degrees F

Storage Temperature 20-125 degrees F (excluding batteries)

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Sports Radar Ltd.

Tracer™

INSTRUCTION MANUAL
Tracer Radar Gun



Features

- Speeds from 10 to 199 in MPH or Km/H
- Range up to 60 feet on balls, 1000 feet on cars
- Trigger or continuous modes.
- Tri-Pod mount for hands free operation
- Quick read mode for bat and club swing speeds
- Average speed statistic
- Beeper on or off select
- 150 hour use with 6 AAA alkaline batteries
- Auto shutdown to prolong battery life

USER BUTTONS in DETAIL

PWR/MODE button:

The PWR/MODE button has 2 basic functions, powering the Tracer on and off, and allowing selection of the user options:

- Pressing this key when power is off will power up the gun.
- Press and hold this key down for 3 seconds to power the unit down.
- Pressing this key when unit is powered up will display the user selectable options. Each press of the MODE key will display the next option that can be selected (by pressing the SEL key).

AVG/SEL button:

The AVG/SEL button also has 2 functions, displaying the average speed, and selecting a user option.

- **AVG (average speed):** The Tracer keeps a running average of the speeds recorded during a session. A session is from the time the Tracer is powered up to the time it is turned off. To view the average speed of the session, press the **AVG/SEL**, the AVERAGE SPEED marker appears and the display will show the average of all speeds registered during the session. The average speed is displayed as long as the **AVG/SEL** button is pressed; releasing the button restores the display to the previous content.
- **SEL (user option select):** Pressing **AVG/SEL** key after pressing the **PWR/MODE** key will **select** the user option that is displayed.

USER OPTIONS

Speed units, MPH or Km/h. To change the speed units press the **PWR/MODE** button *once*, the alternate speed unit is displayed, to select it, press the **AVG/SEL** button.

Reading mode, Trigger or Continuous To change the reading mode press the **PWR/MODE** button *two* times, the alternate reading mode is displayed, press the **AVG/SEL** button to select it.

The trigger mode will register a speed when the trigger is pulled. In the continuous mode speeds will be registered without the need to pull the trigger. This is the "hands free" mode, typically used with tripod mounting. This mode allows a single user to pitch or hit balls and get the speed of every pitch. In the continuous mode, the Tracer will have a delay of 3 seconds between readings.

*Note that upon power up, the default operating modes are MPH and Trigger.

QUICK READ. The quick read mode allows the Tracer to acquire a targets maximum speed when the target is only moving a short distance. This mode is useful for measuring baseball bat, or golf club swing speeds. To select the Quick reading mode, press the **PWR/MODE** key *three* times, the **QUICK READ** icon is displayed, press the **AVG/SEL** button. Note that if the quick read mode was previously selected, this will exit the quick read mode. Quick read works with both trigger and continuous modes; however the trigger mode is suggested to reduce the effect of noise and undesired readings. The difference in quick read and normal modes is that the normal mode has better accuracy, but takes longer to acquire the target speed. Quick read mode will register a speed with a minimum target movement of less than 2 feet in the speed range of 50 to 150MPH, with +/- 4% accuracy. Normal mode requires about 6 feet of target travel in the same speed range with +/- 2% accuracy.

BEEPER ON or OFF: The Tracer has an audible beeper that sounds when a speed is registered, and is enabled as default on power up. To disable (or enable) the beeper, press the **PWR/MODE** button *four* times, the beeper will sound, press the **AVG/SEL** button. If the beeper was enabled (beeped when a speed is registered), it will now be disabled. Likewise, if the beeper was disabled, it will now be enabled.

REGISTERING A SPEED

To take a reading in the **trigger mode**, point the Tracer down the line of the target and squeeze the trigger. The display will blank and the **READING** indicator will come on. When a speed is displayed, release the trigger. The recorded speed will remain in the display. If a speed was not recorded, the display will show "00" (speeds of 00 are not included in the average). In the **continuous mode**, the **READING** indicator comes on when continuous mode is selected, and the Tracer will automatically take a reading and display the speed when a target is present. After a reading is taken the Tracer will not take another reading for 3 seconds. This delay is useful, for instance, when a pitched speed is registered, the throw back from the catcher will not be registered.

For the best accuracy the Tracer should be positioned in the direct line of travel as the target, or as close as safely possible. The angle off the direct line, called the **COSINE ANGLE**, will result in displayed speeds **LESS** than actual ball speed, see page 7 for details on the **COSINE FACTOR**.

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C o n g r a t u l a t i o n s

On your purchase of the Sports Radar *Tracer* radar gun, a precision training instrument designed to provide years of service. Made in the USA, the *Tracer* will track the speed of almost anything that moves. This manual will guide you to insure optimal performance and satisfaction using your *Tracer* radar gun.

INTRODUCTION:

The Sports Radar *Tracer* radar gun is a microprocessor based computing device that uses a low power doppler radar transceiver. The radar gun sends out a signal, which bounces off the object you are tracking and is reflected back to the radar gun. A mixer provides the difference in the frequencies of the original sent signal and the reflected signal that bounced off the object. From this difference signal, which is proportional to the speed of the object, a microprocessor calculates speed and displays it in miles per hour (MPH) or kilometers per hour (Km/H).

If you have any questions or experience any difficulty operating your Sports Radar product, contact Sports Radar Ltd directly.

All warranty information is located at our office; therefore it is important that you contact us, not your retailer. Sports Radar products are thoroughly tested and inspected prior to shipment and most issues can be resolved with a phone call. However mishaps do occur, so be sure to fill out and return the warranty card, as any product return is subject to verification of proper return authorization. Information and authorization number may be obtained by writing or calling our offices, or log on to www.sportsradargun.com and fill out an RMA request.



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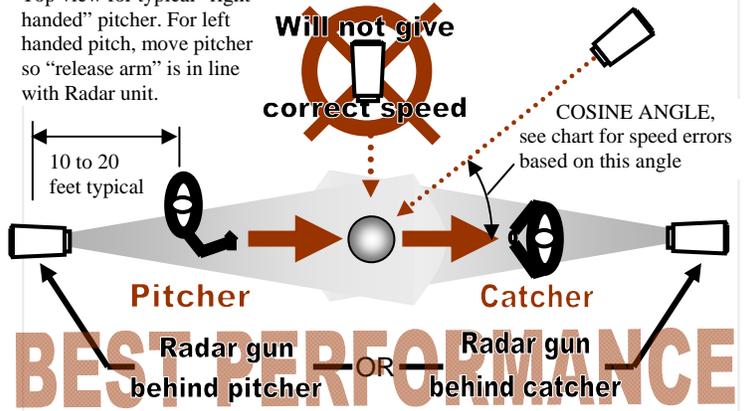


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<http://www.sportsradargun.com>
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Top view for typical "right handed" pitcher. For left handed pitch, move pitcher so "release arm" is in line with Radar unit.



COSINE ERROR CHART: The speed registered by the radar gun will be less than the actual speed by the cosine of the angle depicted above. Best performance, and optimal accuracy is achieved when the radar gun is in a direct line with the line of the target travel. The chart below gives some angles, and the resultant cosine factor. NOTE that the displayed speed will be the actual target speed times the cosine factor.

Cosine angle	Cosine factor	Cosine angle	Cosine factor
5 degrees	0.996	30 degrees	0.866
10 degrees	0.985	35 degrees	0.819
15 degrees	0.966	40 degrees*	0.766
20 degrees	0.940	45 degrees	0.707
25 degrees	0.906	50 degrees	0.642

* This is the approximate cosine angle depicted, an actual target speed of 100MPH would be displayed as 77MPH.

As shown, angles of 5 degrees or less will provide accurate results. The pictorial only shows a horizontal angle, keep in mind that there is also a vertical angle that also causes a cosine error. Hold or mount the radar gun so it is in a direct line with the line of the target travel both horizontally and vertically.

TIPS on USING THE TRACER

The *Tracer* will register the speed of almost anything that is moving. The target can be either moving towards, or away from the *Tracer*. The accuracy of the reading, and the range, or distance away from the moving object are affected by many factors, see pictorial, next page.

Accuracy is mainly a function of the angle between the position of the radar gun, and the line of the target travel. This is called the COSINE EFFECT. The pictorial on the following page provides information on the COSINE ERROR, due to this effect. For detailed information log onto Sports Radar's web site and click on APPLICATION NOTES.

Range is dependant on the size, shape and material of the target, and also the speed of the target. In general, large solid objects like an automobile will have a range over 600 feet, and small objects like a baseball or tennis ball have a typical range of 30 to 40 feet. The *Tracer* is optimized for target speeds from 40 to 100MPH, and the range will be greatest in this target speed range.

Undesired readings There may be occasions when the *Tracer* displays an erroneous speed. There are many causes of undesired readings (called NOISE), and a better understanding of what the radar interprets as a speed will help you reduce or eliminate undesired readings. As stated above, anything that moves can be interpreted as a target. If the motion is relatively constant, for a minimal period of time, the *Tracer* will display an associated speed. It may be an automobile passing in the background a few hundred feet away, or a runner between bases. It could be a fan blade spinning, or a power pole transformer vibrating or most troublesome, a fluorescent light! Out-doors is typically a low-noise environment, and undesired readings are rare. If you are experiencing noise, and undesired readings, you should be able to locate the source, reposition the noise source or the radar gun and eliminate the problem. Typically in-doors will have more noise sources, fluorescent lights, fans of all kinds, even the fan in a PC can be interpreted as a target. In general, if you can hear it (like a fan motor) the radar gun can see it, and may register it as an undesired speed. Move as far away as possible, and point the *Tracer* away from a noise source when taking a reading. In the continuous mode the radar unit is always looking for a target, and is more susceptible to noise. Using the trigger mode, and timing the trigger pull just before the desired target is in motion will eliminate most undesired speed-readings.

GETTING STARTED



Battery Installation:

The *Tracer* uses six standard AAA size batteries. To install batteries, hold the *Tracer* up-side-down and release the battery door. Install 3 batteries in each side making sure the polarity of the batteries is as shown on the battery door.

Follow polarity indicators on battery door

- Terminal
+ Terminal

QUICK START

With batteries installed, press the PWR/MODE button, the display will flash an initialization routine, and the beeper will sound, then display 00. The power up default modes are speeds displayed in Miles per Hour (the MPH indicator on) and Trigger mode (the Trigger indicator is on). You are ready to take a speed reading, just point at the target and pull the trigger! To turn the *Tracer* off, press and hold the PWR/MODE button for about 3 seconds, the display will flash, and the radar gun will turn off when you release the button. The *Tracer* has an auto shut down feature that will automatically shut the radar gun off in about 13 minutes if not used.

FCC ID JPFSRA3000

This device complies with FCC part 15 rules. Operation of this device is subject to the following 2 conditions:

- 1 This device may not cause harmful interference.
- 2 This device must accept any interference that may cause undesired operation.