Professional Sports Radar
Owner's Manual

stalker sportsradar.com

Stalker Pro IIs Quick Guide for Baseball

Charging/powering up the unit

The Pro IIs is shipped with a protective cover over the
battery terminals. Be sure to remove it before use.
See photo on right.

The rechargeable Lithium-ion battery handle is not shipped fully charged.
Charge the battery fully before use (about 3 hours).

To power up the unit, push the red ON/OFF button.

Remove protective cover

Reading the display

Here is how the readings are displayed:

ROLL-DOWN Speed
The roll-down speed of a pitch is the speed
of the ball as it crosses home plate, and is shown
in the upper right window.

PEAK Speed
The Pro IIs measures the peak (release) speed
of a baseball pitch and shows it as the larger
number in the display window.

SPIN Rate
The Pro IIs measures the ball spin rate of a
baseball pitch in RPM and shows it in the upper left
display window.

SPIN RATE → 2045   78.3↓ ← ROLL-DOWN

87.2↓ ← PEAK

Default Settings

Low Speed.............................50 mph (80 km/h)
High Speed............................150 mph (241 km/h)
Range ....4 – For maximum sensitivity
Peak ON/OFF (button) ....ON - This shows ball release speeds.
Auto-Clear Delay....................2 seconds – After loss of target tracking, the radar holds
the speeds on the display before clearing them.

stalker sports radar.com

Stalker Pro IIs Quick Guide for Baseball

Connecting to LED Speed Signs

Wireless Configuration

The Pro IIs easily communicates with Stalker's LED Speed Signs via wireless interface. No more tangled cables or limited mobility.

Wireless Module
200-1328-00

2 1/2-digit model
200-0778-00

3 1/2-digit model (shown)
200-0779-00

Turning the transmitter On/Off

TRANSMIT

The silver **TRANSMIT** key is used to turn the transmitter ON/OFF.

ON (Constant transmit)
When ON, the gun is in Auto transmit mode and shows the peak speeds continuously without the need to press the trigger. **XMIT** shows in the lower left corner of the display. The peak speed remains for 2 seconds after the target is gone. This setting is often used when on a tripod.

OFF (Triggered transmit)
When OFF, the gun is activated by pulling the trigger. Peak speeds will be shown while the trigger is depressed. The peak speed remains for 2 seconds after the target is gone if the trigger is still depressed. Releasing the trigger while a speed is displayed holds the speed on the display until the trigger is pulled again.

Recalling speeds

RECALL

The silver **RECALL** key displays the last ten speed readings that were measured. The most recently saved speed shows first. Exit the recall mode by pressing the **RECALL** key or by pulling the trigger. The recall queue is cleared when the unit is powered down.

The Pro IIs also remembers the highest peak speed it has seen since it was turned on. Press and hold the **RECALL** key for longer than 1/2 second to display the Highest Peak Speed.

Saving changes to settings

After making any changes to the gun settings, **BE SURE TO PULL THE TRIGGER ONCE, TO SAVE.**

stalker sports radar.com

applied concepts, inc.
855 East Collins Boulevard ■ Richardson, Texas 75081
972.398.3780 ■ Fax 972.398.3781

888-STALKER

Table of Contents

Introduction

Congratulations! You have purchased the most advanced - and accurate - sports radar available.

You need only charge the battery, press the ON/OFF key, and pull the trigger to measure baseball speeds.

Real-Time Spin Rate reading - Only Stalker has it.

Your new Stalker Pro IIs has something that no other radar gun has. It measures a pitched baseball's spin rate as quickly as it measures release and over-the-plate speeds. Spin rate is a major influence in how a pitched ball behaves during its flight to the batter. That makes spin rate an important data point in evaluating a pitcher, and your Pro IIs is the only radar in the stands that can measure it. So you don't have to wait for a slow, video-analyzed approximation. You can consisitently know the spin rate just as fast and accurately as you know ball speed.

Directional - measure pitched speed and batted ball speed.

Another thing that makes the Stalker Pro IIs unique is that it is a *directional* radar. It can tell the difference between targets moving toward it and targets moving away from it. And now you have a choice. Your Stalker Pro IIs can capture pitch speeds and ball rotation at the same time *or* pitch speeds and hit speeds at the same time - menu selectable. So have fun. If it moves, you can clock it with the Pro IIs!

Wireless Networking Technology

We communicate with a variety of devices by creating a personal network. On your device you will be able to locate the Stalker Pro IIs listed under your device's menu of available devices. For more wireless pairing information, see "Wireless Configuration" on page 9.

Basic Operation

Power is supplied by a removable, rechargeable battery handle. The battery handle is not fully charged when shipped. **Remove the yellow cover from the battery handle contacts.** Charge for three hours before initial use. Attach the handle to the radar body by inserting the front tip of the handle into the mating lip on the radar body, then pivoting the handle up until it is firmly seated. Rotate the thumb latch to lock into the slot in the back of the handle. Turn the gun ON by pressing the ON/OFF key. Squeeze the trigger to begin operating (transmitting).

Changing Modes

To change settings, use the two blue keys on the keypad to configure the radar. The MENU key navigates through the menu structure to choose a menu item. The SELECT key changes the setting for the chosen item. Refer to the Options Menu section on page 8 for details.

The silver PEAK key enables or disables the peak speed display.

Turning the Transmitter ON and OFF

The silver TRANSMIT key is used to turn the transmitter ON/OFF.

ON (Constant transmit)

Figure 1

When ON, the gun is in Auto transmit mode and shows the peak speeds continuously without the need to press the trigger. XMIT shows in the lower left corner of the display (Figure 1). The peak speed remains for 2 seconds after the target is gone. This setting is often used when the radar is on a tripod.

OFF (Triggered transmit)

Figure 2

When OFF, the gun is activated by pulling the trigger and the XMIT icon is not displayed until the trigger is pulled. (Figure 2). Peak speeds will be shown while the trigger is depressed. The peak speed remains for 2 seconds after the target is gone if the trigger is still depressed. Releasing the trigger while a speed is displayed holds the speed on the display until the trigger is pulled again.

Controls and Indicators

LCD Display Windows

(UPPER LEFT) 2045	Spin Rate, expressed in Revolutions Per Minute, displays here. The alpha-numeric characters in the upper left corner make up the Message Window. When outbound hit speed is enabled, it will appear here in place of the Spin Rate.
(UPPER RIGHT) 78.3	The four smaller digits in the upper right corner show the rolldown (across the plate) speed.
(MAIN) 87.2	The four large digits display the peak speed.

Since the "peak" speed of these targets is most important, it shows in the Main Window. The "live" (roll-down) speed of the target slowing down shows in the Upper-Right Window. And, if enabled, the spin rate or the hit speed of the target moving in the opposite direction displays in the Upper-Left Message Window.

LCD Display Icons

PEAK	Indicates that Peak Mode is "ON" allowing peak speed display.
STORE	Is on when recalling the highest peak speed or speeds from the RECALL queue.
LO BAT	Indicates the battery is low and needs recharging or replacement. LO BAT blinks when the battery is approaching exhaustion.
XMIT	Indicates the gun is transmitting and is able to take readings.

Keypad Controls

The six keys on the rear panel control the radar gun functions and configuration.

TRANSMIT	Toggles the transmitter ON and OFF (instead of the normal trigger activation).
RECALL	In Radar Mode, displays the highest peak speed or the last 10 speeds recorded and stored. In Menu Mode, decreases the setting for a chosen menu item.
PEAK	Turns ON or OFF the display of the peak speed.
MENU	Navigates the MENU system to choose a menu item to be changed.
SELECT	Increases the setting for a chosen menu item.
ON/OFF	Turns the Pro IIs power ON or OFF.

LCD Backlight

The Pro IIs display has a backlight that may be used in low light conditions. It is turned on or off in the Operator Menu shown on page 5.

When directly behind home plate, it's best to be slightly elevated so your Pro IIs has an unobstructed view of the pitch. At ground level, you'll want to be slightly left or right so that the catcher and umpire don't block the gun's ability to read the spin of the pitch. To get the most accurate Spin Rate measurement, the majority of the ball's flight must be visible.

Just for Baseball

The Pro IIs is a dedicated baseball radar. In addition to being the only radar that measures Spin Rate, the Pro IIs also measures the peak (release) speed and the roll-down (across-the-plate) speed of a pitch. It analyzes not only the ball but also the pitcher's motion to report the most accurate release speed. It also measures the speed of a hit ball and can display all three speeds (release, roll-down, and hit) at the same time. The ideal location for monitoring baseball speeds is on the straight line beginning at the pitcher, going through the catcher, and continuing to the radar with a clear view of the pitched ball's path.

The on-board computer analyzes the pitcher's body movements 50 times per second to determine the exact point where the ball is released and provides this data as the correct release speed. Only Stalker Radar provides this precision in release speeds.

Settings for Baseball Scouts

It is important that the gun is set correctly when measuring baseballs. Check these settings:

Low Speed	*50 mph (80 km/h)*
High Speed	*150 mph (241 km/h)*
Range	*4 – For maximum sensitivity*
Peak ON/OFF	*ON – This shows ball release speeds.*
Auto-Clear Delay	*2 seconds – After loss of target tracking, the radar holds the speeds on the display before clearing them.*

Settings are changed through the Options Menu shown on page 8

Displaying Hit Speeds

With its direction sensing capabilities, the Pro IIs can tell the difference between approaching (pitch) and receding (hit) targets. When enabled in the Operator Menu, any acquired hit speed is displayed in the upper left message window.

When measuring hit balls, testing has shown that placing the radar approximately 30 feet behind the plate yields the best results. Remember that hit balls will fly away from the radar in a wide range of angles. The speed of a line drive to center field will display more accurately than a hit toward first or third base, which will have a large angle error.

Operator Menu

The Operator Menu is short and contains items that a user is most likely to change while operating the gun.

While in radar mode, briefly press the MENU key to enter the Operator Menu where the first item and its setting are displayed.

Then briefly press the MENU key to step through the menu items and display their settings. Change the setting for an item while it is displayed by pressing the SELECT or RECALL key.

Pull the trigger at any time while in Menu Mode to return to Radar Mode. Any changed menu settings are stored in non-volatile memory when the trigger is pulled so that they are remembered the next time the Pro IIs is turned on. If the Pro IIs is turned off while in Menu Mode, the settings will not be remembered.

NOTE: Always remember to "trigger out" of the menus to save the settings.

The factory default for each menu setting is indicated in the Operator Menu table below by the **bold** value.

Operator Menu Items

Menu Item (briefly press MENU key to step down)	Item Description	Item Legend	Item Settings (in main window) (**bold** indicates factory default)
1	Range	RANGE	1,2,3,**4**
2	Target Direction	DIR	Outb, **Inb**
3	Spin/Hit Speed Enable	SP-Hᴢ	**SPin**, Hit, OFF
4	Backlight On/Off	LIGHT	**OFF**, On
5	Battery Charge Monitor	BATT	nonE, Ch99, Ch9d, On

Range: The range setting affects the sensitivity (clocking distance and target size) of the radar.

• 4 - Setting the range to 4 increases the gun's sensitivity and lengthens the clocking distance. It "looks" as far away as possible for targets and gives the gun the highest level of performance. It is also able to "see" smaller targets. This is the default setting.

• 3, 2 - Setting the range to 2 or 3 sets the gun to a medium range in its clocking distance.

• 1 - Setting the range to 1 decreases the gun's sensitivity and shortens its clocking distance. The range 1 setting is handy for clocking objects close to the gun and when you want to restrict the gun from "seeing" smaller objects or objects farther out in the background.

Target Direction: The Pro IIs can be configured to monitor outbound targets (Outb) or inbound targets (Inb). The default setting is Inb.

Spin/Hit Speed Enable: The default setting is SPin.

Backlight On/Off: This menu item turns on or off the display's backlight. Independent of this setting, the backlight always turns off while the unit is in the power saving sleep mode. This is usually the only indication that the Pro IIs has gone to sleep. The default setting is OFF.

Battery Charge Monitor: The last Operator Menu item is a monitor only. It does not actually configure a feature setting; it shows the status of the battery handle.

- If the Pro IIs is operating on battery only (with no external voltage supplied to the side connector), ⷊⷁⷕⷕ displays in the Message Window and the main window shows ⷁⷌ.

- If external voltage is supplied and a battery handle is attached, the main window shows the charging status: ⷕⷘⷚⷚ (charging) or ⷕⷘⷚⷆ (charged).

- If external voltage is supplied but no battery handle is attached, the main window shows ⷌⷁⷌⷉ since there is no battery.

Providing Power to the Pro IIs

Battery Handle - The Pro IIs handle is a removable, rechargeable lithium ion battery. Attach the battery handle to the radar body by inserting the front tip of the handle into its mating lip on the radar body and rotating the back of the handle toward the body until seated. Next, rotate the thumb latch to engage the ramping slot in the back of the handle.

External - To power the Pro IIs from an external 12VDC (nominal) source, use the optional 12VDC CIG Cable attached to the 8-Pin Interface Connector on the side of the gun. The battery handle does not need to be attached to the gun body when running under external power. If it is attached, the 12VDC CIG Cable also charges the battery handle while it is supplying power to the radar, whether the unit is turned on or off. The unit does not enter sleep mode as long as external power is connected.

Operational Time Using the Battery Handle

The Pro IIs draws the most current when it is transmitting, so the run time depends upon how often the radar transmitter is on. The Pro IIs also has a sleep mode to conserve battery life when it is not being operated. When operating on battery power, the sleep mode is automatically initiated after 10 seconds of inactivity when the transmitter is off. Squeezing the trigger or pressing any key immediately "wakes" the gun and brings it back into operation.

Figure 3

Type of Operation	High Capacity 3700 mAh Battery
Continuous Transmitting	4.5 Hours
Typical Trigger Operation	11-13 Hours

Low Battery Warning

The LO BAT icon blinks when the battery runs low (Figure 3). The Pro IIs operates for a short time after this. Operation is disabled when the battery voltage falls to an extremely low level. LoV displays in the large main window in this case. Now is the time to recharge or change the battery handle.

Charging the Battery Handle

A battery charge monitor is available as the last item in the Operator Menu and indicates status: charging (Chgg), charged (Chgd) or no external voltage present (On). If external voltage is supplied but no battery handle is attached, the main window shows **nonE**.

The battery handle may be charged while attached to the gun body, or when detached using an optional charger stand.

While attached to the gun, it may be charged from 90-250VAC house current with a wall adapter or from 12VDC (nominal) power using a cigarette plug. The battery handle charges whether the gun is turned on or not.

Charge with the 200-0842-00 Battery Wall Charger Cable set:

Or charge from a 12VDC (nominal) source with the 155-2232-00 12VDC Cigarette Cable:

Desktop Charger

When the battery handle is removed from the Pro IIs body, use the optional Battery Handle Charger (200-0839-00) to charge it.
Power the charger from 90-250VAC house current with the wall adapter:

Or power it from a (nominal) 12 VDC electrical system using the 015-0182-00 12VDC Cigarette Cable:

Since the charger monitors the battery temperature to prevent damage to the battery, the battery must not be hot or cold while charging. Install a battery on the charger by inserting it into the mating battery connector in a manner similar to attaching it to the radar body. The charging cycle will automatically start when the battery is connected, and the green indicator should glow indicating that the battery is being quick charged. Quick charging should take about 3 hours to complete. After quick charging is complete, the green indicator will extinguish. For longest battery life and best service, batteries should only be charged in an environment where the temperature is between 32°F and 104°F (0°C and 40°C).

NOTES:

• The charger senses battery temperature to prevent damage to the battery. As a result, it may refuse to charge a battery that is too hot or cold. If this occurs, allowing the battery to stabilize in a room temperature environment for a few minutes should correct the problem.

• Battery performance and longevity will be greatly reduced if it is exposed to temperatures over 125°F (52°C).

• Batteries do NOT need to be fully discharged prior to charging. The battery will last longer if recharged frequently.

Auto-Shutdown Feature

The Pro IIs has a 30-minute timeout auto-shutdown feature. After 30 minutes in sleep mode, the Pro IIs automatically shuts off.

How to Save Battery Life

• Since the transmitter has the highest current draw, turn it off whenever you are not taking readings.

• If you use the trigger to start and stop transmitting, it's easy to save battery life.

• If you tripod mount the gun, (and use the silver TRANSMIT key to transmit) then turn the transmitter off between sessions.

Options Menu

The Options Menu contains items that are not likely to be changed during a user session.

Enter the Options Menu from the Operator Menu by pressing and holding the MENU key for longer than ½ second. Change an item's setting using the SELECT key to advance to the next setting or the RECALL key to revert to the previous setting. When setting multi-digit numbers, such as Low Speed or High Speed, the TRANSMIT and PEAK keys can be used to select a specific digit to increase or decrease. Briefly pressing the TRANSMIT key moves the cursor to the left of the current digit, and briefly pressing the PEAK key moves the cursor to the next digit on the right. A section describing each menu item follows the table below.

Pull the trigger at any time to save any changes and exit the menu.

Options Menu Items

Menu Item (briefly press MENU key to step down)	Item Description	Item Legend (in Message Window)	Item Settings (in main window) (**bold** indicates factory default)
1	Low Speed	LOW	0 - 150 (mph) 0 - 241 (km/h)
2	High Speed	HIGH	0 - 150 (mph) 0 - 241 (km/h)
3	Units	**MPH**, KM/H	Unit
4	Resolution	RES	**onES**, tnth
5	Auto Clear Delay	CLEAR	0SEC, 1SEC, **2SEC**, 3SEC, 4SEC, 5SEC, 6SEC, 7SEC, 8SEC, 9SEC, 10SE, 20SE, 30SE, OFF
6	Trigger Function	TRIG	**Con**, SS, Loc
7	Aux Trigger Function	AUX	**OFF**, StoP, trig
8	Stopwatch Mode	STOP	**Std**, LAP, SPLt
9	Cosine Angle	ANGLE	**0** - 45
10	Serial Port Speed	BAUD	12, 24, 48, **96**, 192, 384, 576, 1152
11	Serial Port Format	FOR	-.**A**, A1, bE. Co1

12	Format A Speed	A SPⰄ	LASt, **PEA**, SPin, Hit
13	Peak Message Type	PKMSG	**Cont**, Sin9
14	Leading Zero	LEAIⰄ	2Ero, **SPAC**, nonE
15	Message Termination	TERM	Cr, CrLF, u Cr, u CL
16	Wireless Configuration	WI EN	OFF, Si9n, **APP**
17	Wireless Sign ID	WISIN	0000-9999
18	Wireless Pairing PIN	WIPWⰄ	0000-9999
19	Reset	RESET	YES, **no**
20	Reset Confirmation	SURE?	YES, **no**

1 & 2. Low Speed and **High Speed**: The Low Speed setting is a speed value under which the radar will not report targets. Likewise, the radar will not report speeds higher than the High Speed setting. These settings can be used together to define a speed range to filter out undesired targets. Due to conversions and processing methods, speeds 1 or 2 units (2 or 3 km/h) from the setting values may be reported.

The range of both settings is 0 to 150 mph (or the equivalent speed 241 km/h). Selecting a value in such a large range would be tedious if forced to press the SELECT key (increment) or RECALL key (decrement) for each step. When setting multi-digit numbers, such as Low Speed or High Speed, the TRANSMIT and PEAK keys can be used to select a specific digit to increase or decrease. Briefly pressing the TRANSMIT key moves the cursor to the left of the current digit, and briefly pressing the PEAK key moves the cursor to the next digit on the right.

When monitoring in a high-speed range indoors, don't be surprised to see "speeds" generated by fluorescent lights, other electrical sources, moving/rotating objects, or vibrating objects. Because of the great sensitivity of the Pro IIs, indoor use will usually require a lower Range setting of 3 or 2.

3. Units: The available units of measure are:

- MPH – Miles per hour. This is the default setting.
- KM/H – Kilometers per hour

4. Resolution: Select onES to display speed in whole units, such as 25 mph. This is the default setting.

Select tnth to display speed in tenths, such as 25.4 mph.

5. Auto-Clear Delay: The time the speed reading is held after the target is lost and before the display screen clears. The default is 2 seconds. If set for OFF, the last speed displayed stays on the screen until the next speed is acquired. This delay also applies to speeds reported in messages sent out of the serial port.

6. Trigger Function:

- Con – Continuous trigger operation: Pull the trigger to turn on the transmitter and release it to turn off the transmitter. This is the default setting.

- SS – Start-Stop trigger operation: Pull and release the trigger to turn the transmitter on. Pull and release it again to turn off the transmitter.

- Loc – When the transmitter is turned on using the TRANSMIT key on the rear panel, the Trigger Function setting is automatically set to Loc. Likewise, if the Trigger Function menu setting is changed from Con or SS to Loc, the transmitter is automatically turned on as if the TRANSMIT key had been pressed.

7. Aux Trigger Function: The AUX Input pin on the 8-Pin Interface Connector can be used for stopwatch or radar trigger functions. The optional Stopwatch Cable (#155-2272-00) is available for these purposes.

- OFF – The AUX Input pin is ignored. This is the default setting.

- StoP – The AUX Input pin is used to start and stop a stopwatch which displays in the Message Window. Refer to the Stopwatch Mode setting description below for more details.

- tri9 – The AUX Input is used as an alternate trigger input and duplicates the functions of the trigger on the gun body.

8. Stopwatch Mode: This menu item is only displayed in the Options Menu if the Aux Trigger Function is set to StoP.

The optional Stopwatch Cable (#155-2272-00) is used to control the stopwatch in any of the three modes listed here. When running, the timer takes over the Message Window during standard radar operation. Press and hold the stopwatch trigger for a full second to stop the timer and clear it from the Message Window.

- Std – Standard Timer: Successive presses of the stopwatch trigger start the stopwatch at 0.00.00 or stop the stopwatch. This is the default setting.

- LAP – Lap Timer: The first press of the stopwatch trigger starts the stopwatch at 0.00.00. Each subsequent press displays the time since the last trigger press and resets the timer, which is running in the background, to zero.

- SPLt – Split Timer: The first press of the stopwatch trigger starts the stopwatch at 0.00.00. Each subsequent press of the stopwatch trigger displays the current cumulative time while the timer continues to run in the background.

Figure 4

When the timer display is under 10 minutes, resolution is in hundredths of seconds (Figure 4).

When the timer display is over 10 minutes, resolution is in tenths of seconds (Figure 5).

9. Cosine Angle: This setting is used to automatically correct speed readings for angle errors. It can be set in one- degree increments in the range from 0 through 45 degrees. The default setting is 0 degrees. Refer to the Angle Errors section (page 21) for more details.

Figure 5

10. Serial Port Speed: This setting configures the baud rate for data transmitted from the serial port. The available settings are 1200 (12), 2400 (24), 4800 (48), 9600 (96), 19200 (192), 38400 (384), 57600 (576), and 115200 (1152). The default is 9600. Refer to "Exporting Speed Data From the Pro IIs" on page 15 for more details.

11. Serial Port Format: The Pro IIs can transmit speed and status information out the serial port in different formats for different applications. Refer to the Transmitting Speed Data from the Serial Port section (page 15) for more details on the message contents.

- "-" – The "dash" setting turns the serial port off. No data is transmitted.

- A – The "A" format is a simple ASCII format which reports a single speed in each message packet. A Pro IIs configured to stream data in this format can connect directly to any serial printer, PC, or display sign, such as the Stalker LED Speed Sign, that receives ASCII data. This is the default setting.

- A1 – The "A1" format is exactly like the "A" format except that a character for the thousands digit is added. Use this format to stream spin rates; they are usually four digits long.

- bE – The "bE" format can report multiple speeds in each message (last, peak, spin, hit) as well as configuration and status information. A Pro IIs configured to stream data in this format can connect directly to a Stalker LED Speed Sign which is configurable and intelligent enough to choose one of the speeds (last, peak, spin, or hit) to display. It is also possible to daisy-chain the serial output of the radar gun to three Stalker LED Speed Signs which can each be configured to display a different type of speed.

- Col – The "Col" (or colon) format is an alternate ASCII format that reports a single speed. It matches the format of messages from legacy Stalker sport guns. The peak speed is reported if peak speeds are enabled. Otherwise, the roll-down speed is reported.

12. Format A Speed: This menu item is only displayed in the Options Menu if the Serial Port Format is set for the A or A1 Format.

It is used to select the speed to be transmitted in the data message: the last live speed (LASt), the SPin rate, the peak speed (PEA) or the hit speed (Hit). PEA is the default setting. Since spin rate is usually four digits, select Format A1. Spin rate is not sent out in Format A.

13. Peak Message Type: This menu item is only displayed in the Options Menu if the Serial Port Format is set for A or A1 Format and the Format A Speed is set for PEA.

- Cont – Continuous: the radar continually streams out A Format messages containing the peak speed at the rate of over 46 messages per second. This is the default setting.

- Sing – Single: the radar sends only one A Format message containing the peak speed for each acquired target. This setting could be used if the radar is connected to a printer so that each pitch's release speed is printed once.

14. Leading Zero: This menu item is only displayed in the Options Menu if the Serial Port Format is set for A, A1 or bE Format.

It defines the character used for leading zeros when speed values are transmitted out the serial port. Examples below show how one-digit, two-digit, and three-digit speeds would appear on a speed sign or printout.

- ZEro – ASCII zeros are used for leading zero characters.

     "500"

     "050"

     "005"

- SPAC – ASCII spaces are used for leading zero characters. This is the default setting.

     "500"

     " 50"

     " 5"

- nonE – For the A or A1 Format, leading zero characters are not transmitted, and the message length is reduced by the number of skipped zeros.

     "500"

     "50"

     "5"

For the bE format, ASCII spaces are used for leading zeros (as above for the SPAC setting) because the bE format uses fixed length fields.

15. Message Termination: This menu item is only displayed in the Options Menu if the Serial Port Format is set for the Ḁ or Ḁ¹ Format.

It defines the way each Ḁ/Ḁ¹ Format message is terminated. Examples below show the ASCII string that would be sent with each setting for a 100-mile-per-hour speed message. The 0x0D and 0x0A nomenclature used below represents the hexadecimal values used in serial data transmission to control a printer or display cursor position. The 0x0D character represents a "carriage return" which moves the cursor back to the first character in the current line. The 0x0A character represents a "line feed" which moves the cursor down to the next line.

- Cr – Each message is terminated with only a carriage return. This is the default setting.

    "100(0x0D)"

- CrLF – Each message is terminated with a carriage return followed by a line feed.

    "100(0x0D,0x0A)"

- ᴜ Cr – Each message is terminated with the speed's unit of measure followed by a carriage return.

    "100MPH(0x0D)"

- ᴜ CL – Each message is terminated with the speed's unit of measure followed by a carriage return and then a line feed.

    "100MPH(0x0D,0x0A)"

16. Wireless Configuration: This setting disables wireless operation (OFF), or enables sending speed messages to an ACI Speed Sign equipped with an ACI wireless dongle (Sign), or enables wireless communication with an application on a smart device (APP). The default is APP.

17. Wireless Sign ID: This menu item is only displayed in the Options Menu if the Wireless Configuration is set for Sign. Set this value in the range of 0000-9999 to match the last four digits of the serial number of the dongle on the Speed Sign.

18. Wireless Pairing PIN: This menu item is only displayed in the Options Menu if the Wireless Configuration is set for APP. It is used in the wireless pairing process and can be set in the range of 0000-9999. The default is the last 4 digits of the gun's serial number. Sometimes when paring, this value is entered on the other device as a six-digit value - with two leading zeros, 001324.

19 & 20. Reset and Reset Confirmation: Use the following steps to reset the radar to factory default settings.

- Set RESET to YES. Now, the only two Options Menu items are RESET and SURE?.

- Set SURE? To YES also, and pull the trigger to exit all menus and change all settings to factory defaults.

- To exit without forcing factory defaults, set RESET and SURE? to no and pull the trigger.

Detailed Operating Instructions

Turning the Transmitter ON and OFF

The radar transmitter must be turned ON to measure speed. There are two ways to transmit: 1) Press the trigger, or 2) press the TRANSMIT key.

The silver TRANSMIT key is used to turn the transmitter ON/OFF.

ON (Constant transmit)

When ON, the gun is in Auto transmit mode and shows the peak speeds continuously without the need to press the trigger. XMIT shows in the lower left corner of the display. The peak speed remains for 2 seconds after the target is gone. This setting is often used when on a tripod.

OFF (Triggered transmit)

When OFF, the gun is activated by pulling the trigger. Peak speeds will be shown while the trigger is depressed. The peak speed remains for 2 seconds after the target is gone if the trigger is still depressed. Releasing the trigger while a speed is displayed holds the speed on the display until the trigger is pulled again.

NOTE:

* When the gun *IS NOT* transmitting, the XMIT icon is off (Figure 6). If speeds are present when the trigger is released, they will remain on the screen showing the last speeds registered. Pull the trigger again to clear the speed windows and acquire a new target.

* When the gun *IS* transmitting, the XMIT icon is on and the unit of measure displays in the message window (Figure 7).

Figure 6

Figure 7

Displaying Spin Rate

Your Pro IIs measures Spin Rate by default so there are no adjustments needed on the gun. As with other readings taken by the gun, the best location is behind the catcher, within 150 feet of the pitcher for Spin Rate readings, parallel to the ball's line of travel. Activate the gun either by pressing the trigger or pressing the TRANSMIT button. The Spin Rate in RPM is displayed in the upper-left corner.

Displaying Peak Speeds

Use the PEAK key to turn on and off the display of the peak speed of targets. For example, when **tracking a baseball pitch**, the peak speed is the same as the release speed since a ball only slows down after it is thrown.

When Peak mode is OFF, the PEAK icon is off. The live, changing ball speed shows in the upper right window, and the main window is blank (Figure 8).

Figure 8

When Peak mode is on, the PEAK icon appears. The highest speed for each ball displays in the main window. The ball's roll-down speed displays in the upper right window (Figure 9).

Displaying Highest Peak Speed

Not only can you monitor the peak speed for each target, the Pro IIs also remembers the highest peak speed it has seen since it was turned on. Press and hold the RECALL key for longer than ½ second to display the Highest Peak Speed. The STORE icon turns on, and MAX flashes in the message window during this time. To clear the highest peak speed from the display, press and hold the RECALL key again or simply pull and release the trigger.

Figure 9

Recalling Stored Speeds (10 maximum)

The silver RECALL key redisplays the last ten speed readings that were measured. Speeds are added to the recall queue:

> • when the trigger is released (the last speeds displayed will also be saved on the display until the next trigger pull).

> • when they are cleared from the display after the Auto-Clear Delay has expired.

> • or two seconds after the target is lost if the Auto-Clear Delay is set to OFF.

The last ten groups of stored peak, live, hit and/or spin speeds display in a sequential manner with successive brief presses of the RECALL key. The message window display cycles through the Recall Number, speed units, and hit or spin speed (Figure 10). The STORE icon is on while recalled speeds are displayed.

Figure 10

The most recently saved speed group shows first. Pressing the RECALL key briefly once more while the last speed group in the queue is displayed exits Recall Mode. Exit the recall queue at any time by pulling the trigger.

The recall queue is cleared whenever the unit is powered off.

Exporting Speed Data From the Pro IIs

The radar measures speed data at a rate of just over 46 readings per second, and it sends speed data messages out its serial port at that same rate. The messages are streamed out when the radar transmitter is on; no data is sent when the radar is in hold. Refer to the following Options Menu settings which are available to configure the data streaming features: Serial Port Speed, Serial Port Format, Format A Speed, Leading Zero, Message Termination and Peak Message Type. The messages are sent out both the RS-232 and the RS-485 data streams.

The optional RS-232 Serial Cable (#155-2284-00) or Y Cable (#155-2278-00) is required for data communications between the 8-Pin Interface Connector on the side of the gun body and speed signs, computers, printers, and other electronic devices. If a 9-pin D serial extender cable is required, use a standard (straight-through) computer cable, NOT a null-modem cable which crosses the transmit and receive signals.

The serial port configuration on the radar is fixed at 8 data bits, no parity and 1 stop bit; so the user must ensure that his receiving device is also configured for those values. The serial port baud rate on the radar is configurable in the range from 1200 through 115200 with a default setting of 9600 baud.

The message contents of the available Serial Port Formats are defined below. An A or A1 Format message is very simple and contains only a single speed value: either last speed, peak speed, spin rate, or hit speed. To ensure that each message in this format is sent out before time to start the next one, the Serial Port Speed should be set for 9600 or higher.

A bE Format message can contain from one to three speed values as well as configuration and status information. If the bE Format message is reporting one speed, the Serial Port Speed should be set for 19200 or higher. For a bE Format message reporting two or three speeds, the Serial Port Speed should be increased to 38400.

A Col Format message also contains only a single speed value: the peak speed if peak speeds are enabled or the last/live speed if not. New messages are sent whenever the speed changes (up to 25 messages per second) and/or every 1/3 second if the speed remains the same.

A Format

When Resolution = **ones**:

Byte #	Content
1	Speed hundreds digit (ASCII)
2	Speed tens digit (ASCII)
3	Speed ones digit (ASCII)
4(+) setting	Carriage Return (0x0D) or alternate termination string determined by the Message Termination

When Resolution = **tenths**:

Byte #	Content
1	Speed hundreds digit (ASCII)
2	Speed tens digit (ASCII)
3	Speed ones digit (ASCII)
4	Decimal Point (0x2E)
5	Speed tenths digit (ASCII)
6(+) setting	Carriage Return (0x0D) or alternate termination string determined by the Message Termination

A1 Format

When Resolution = **ones**:

Byte #	Content
1	Speed thousands digit (ASCII)

2	Speed hundreds digit (ASCII)
3	Speed tens digit (ASCII)
4	Speed ones digit (ASCII)
5(+)	Carriage Return (0x0D) or alternate termination string determined by the Message Termination setting

When Resolution = **tenths**:

Byte #	Content
1	Speed thousands digit (ASCII)
2	Speed hundreds digit (ASCII)
3	Speed tens digit (ASCII)
4	Speed ones digit (ASCII)
5	Decimal Point (0x2E)
6	Speed tenths digit (ASCII)
7(+)	Carriage Return (0x0D) or alternate termination string determined by the Message Termination setting

bE Format

Byte #	Content	
1	Message type = 0x88	
2	Unit Config:	Bit 7 = 0 (to force ASCII character)
		Bit 6 = 1 (to force ASCII character)
		Bit 5 = unused
		Bit 4 = Resolution: ones = 0, tenths = 1
		Bit 3 = always 0 for directional radar
		Bit 2 = always 0 for stationary radar
		Bit 1 = Peak Speed not enabled = 0; Peak Speed enabled = 1
		Bit 0 = always 0
3	Unit Status:	Bit 7 = 0 (to force ASCII character)
		Bit 6 = 1 (to force ASCII character)
		Bit 5 = unused
		Bit 4 = unused
		Bit 3 = always 0
		Bit 2 = always 1
		Bit 1 = always 0
		Bit 0 = always 0
4	ASCII 0 or space - disregard	
5	ASCII 0 or space - disregard	
6	ASCII 0 or space - disregard	
7	Number of Speeds Reported (ASCII 1, 2 or 3) = One for Last Speed + One for Peak Speed if enabled + One for Spin or Hit Speed if enabled	

For each Speed ID reported (when speeds are <= 999.9) – 15 ASCII bytes:

1	Speed ID:	ASCII 4: Primary – Last/Live Target Speed
		Secondary – none
		ASCII 5: Primary – Peak Speed

Secondary – Highest Peak Speed

ASCII 6: Primary – Spin or Hit Speed - The speed streamed out here will be the one chosen in the spin/hit speed enable menu step in the Operator Menu.

Secondary - none

2 Zone Status: Bit 7 = 0 (to force ASCII character)

        Bit 6 = 1 (to force ASCII character)

        Bit 5 = always 0

        Bit 4 = always 0

        Bit 3 = always 0

        Bit 2 = Secondary Speed Direction (1 = inbound, 0 = outbound)

        Bit 1 = Primary Speed Direction (1 = inbound, 0 = outbound)

        Bit 0 = Transmit = 1, Hold = 0

3 Primary speed hundreds digit (ASCII)

4 Primary speed tens digit (ASCII)

5 Primary speed ones digit (ASCII)

6 Primary speed tenths digit (ASCII)

7 Secondary speed hundreds digit (ASCII space)

8 Secondary speed tens digit (ASCII space)

9 Secondary speed ones digit (ASCII space)

10 Secondary speed tenths digit (ASCII space)

11 Reserved (ASCII space)

12 Reserved (ASCII space)

13 Reserved (ASCII space)

14 Reserved (ASCII space)

15 Reserved (ASCII space)

For each Speed ID reported (when speeds are > 999.9) – 15 ASCII bytes:

1 Speed ID: ASCII 7: Primary – Last/Live Target Speed

        Secondary – none

      ASCII 8: Primary – Peak Speed

        Secondary – Highest Peak Speed

      ASCII 9: Primary – Spin or Hit Speed

        Secondary - none

2 Zone Status: Bit 7 = 0 (to force ASCII character)

        Bit 6 = 1 (to force ASCII character)

        Bit 5 = always 0

        Bit 4 = always 0

        Bit 3 = always 0

        Bit 2 = always 0

        Bit 1 = Target Speed Direction (1 = inbound, 0 = outbound)

        Bit 0 = Transmit = 1, Hold = 0

3 Primary speed thousands digit (ASCII)

4	Primary speed hundreds digit (ASCII)
5	Primary speed tens digit (ASCII)
6	Primary speed ones digit (ASCII)
7	Primary speed tenths digit (ASCII)
8	Secondary speed thousands digit (ASCII space)
9	Secondary speed hundreds digit (ASCII space)
10	Secondary speed tens digit (ASCII space)
11	Secondary speed ones digit (ASCII space)
12	Secondary speed tenths digit (ASCII space)
13	Reserved (ASCII space)
14	Reserved (ASCII space)
15	Reserved (ASCII space)
Last Byte	ASCII Carriage Return = 0x0D

Col Format

When Resolution = **ones**:

Byte #	Content
1	Speed hundreds digit (ASCII)
2	Speed tens digit (ASCII)
3	Speed ones digit (ASCII)
4	ASCII Colon = 0x3A
5	Carriage Return (0x0D)

When Resolution = **tenths**:

Byte #	Content
1	Speed hundreds digit (ASCII)
2	Speed tens digit (ASCII)
3	Speed ones digit (ASCII)
4	Speed tenths digit (ASCII)
5	Carriage Return (0x0D)

8-Pin Data Interface Connector

Outputting speed data from your Pro IIs through a wired connection is accomplished using the 8-pin interface on the right side of the gun. Use the chart below to properly configure the 8-Pin Interface Connector.

The 8-Pin Interface Connector has the following pin-out:

1	Ground	Ground
2	Voltage Input	External voltage input, 6.5 VDC to 16 VDC
3	7V Out	Output (limited to 50 mA)
4	RS-485-A	Transmit data stream
5	RS-485-B	Transmit data stream
6	Aux Input	Stopwatch trigger input or remote radar trigger input
7	RS-232RX	Receive (for factory use only)
8	RS-232TX	Transmit data stream

Diagnostic Mode

The Pro IIs has a diagnostic mode in which the user can determine internal unit status and test basic target acquisition capabilities.

After the unit powers up and enters radar mode, press the MENU key for longer than ½ second (press & hold) to enter the **Diagnostic Mode** where the unit displays its version of software. This version screen will timeout after two seconds and the unit will automatically return to radar mode. Briefly press the MENU key before the two-second timeout to step through the other diagnostic screens described in detail below. Pull the trigger at any time while in Diagnostic Mode to return to Radar Mode.

Entering Diagnostic Mode

Enter the Diagnostic Mode while in Radar Mode as described above by pressing and holding the MENU key. An alternate method of entry into the Diagnostic Mode is to briefly press the MENU key immediately after powering up the unit while all of the display segments are on.

The first display screen in Diagnostic Mode is the **Version Screen** where the version of the operating code is displayed. In the figure at right, the unit is loaded with Pro IIs Version 1.0.0. (Figure 11)

Briefly press the MENU key while the version is displayed to enter the **Fork Diagnostic**. The transmitter is turned on automatically and all directionality, filtering, and special target processing is turned off so that any target moving in the range of 25-100 mph will be displayed. A ringing tuning fork held in front of the radar should produce a steady speed display. (Figure 12)

Briefly press the MENU key while in the Fork Diagnostic to enter the **Voltage Monitor Diagnostic**. The radar gun can be powered from the battery handle voltage or from external voltage, and the Voltage Monitor Diagnostic displays whichever of these two voltages is higher as in the following examples: (Figure 13 and Figure 14). Voltages are displayed in hundredths of volts. 720 on the screen means 7.20 volts.

Briefly pressing the MENU key cycles the unit through the diagnostics. Pull the trigger at any time to exit Diagnostic Mode and return to Radar Mode.


Figure 11

Figure 12

Figure 13

Figure 14

Angle Errors

The most common mistake made with radar guns is trying to clock targets at angles.

All radar guns work on the Doppler principle and return the most accurate readings when clocking objects moving directly toward or away from the gun. Clocking at an angle results in angle error, and the gun displays a speed that is LOWER than the actual speed.

Radar Gun Placement
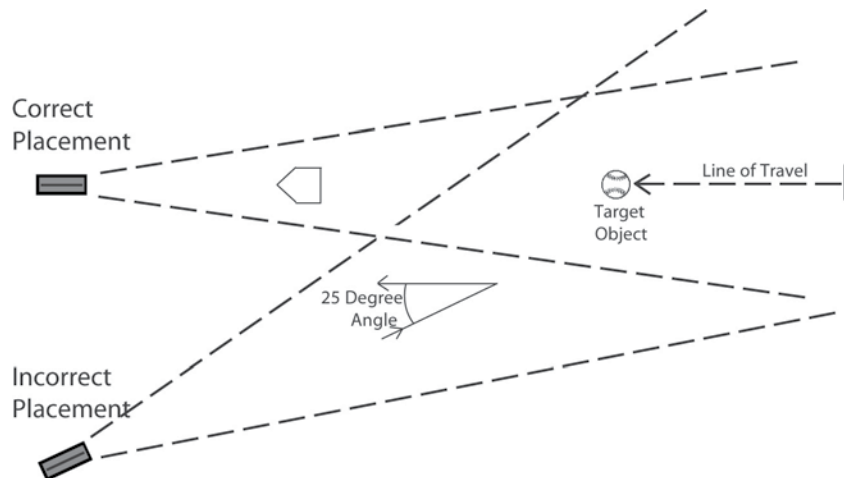
At slight angles the error is very small; however at larger angles, the error becomes substantial as the table below shows.

Cosine Angle Error Chart

	0 Degrees	5 Degrees	10 Degrees	15 Degrees	30 Degrees	45 Degrees	90 Degrees
True Speed	0% Error	0.4% Error	1.5% Error	3.4% Error	13.4% Error	29.3% Error	100% Error
25.0 mph	25.0 mph	24.9 mph	24.6 mph	24.1 mph	21.7 mph	17.7 mph	0 mph
50.0 mph	50.0 mph	49.8 mph	49.2 mph	48.3 mph	43.3 mph	35.4 mph	0 mph
75.0 mph	75.0 mph	74.7 m[h	73.9 mph	72.4 mph	65.0 mph	53.0 mph	0 mph
100.0 mph	100.0 mph	99.6 mph	98.5 mph	96.6 mph	86.6 mph	70.7 mph	0 mph
125.0 mph	125.0 mph	124.5 mph	123.1 mph	120.7 mph	108.3 mph	88.4 mph	0 mph
150.0 mph	150.0 mph	149.4 mph	147.7 mph	144.9 mph	129.9 mph	106.1 mph	0 mph
200.0 mph	200.0 mph	199.2 mph	197.0 mph	193.2 mph	173.2 mph	141.4 mph	0 mph
250.0 mph	250.0 mph	249.0 mph	246.2 mph	241.4 mph	216.5 mph	176.8 mph	0 mph

Calculating Angle Errors

If you know the angle at which you are clocking, you can manually calculate the actual speed by taking the radar reading and dividing by the cosine of the angle.

For example: if you are clocking at 30 degrees and the gun displays 129.9 mph, divide 129.9 by the cosine of 30 degrees (0.866) to get a true speed of 150.0 mph.

Compensating for Angle Errors

You can configure the Pro IIs to compensate for angle error by changing the Cosine Angle setting in the Options Menu. In the above example, if the Cosine Angle setting is 30, the gun will display 150.0 mph, and no manual calculations are necessary. The accuracy of the corrected speed is directly dependent on the accuracy of the estimated angle error that you have set using the Options Menu.

Interference Problems

Interference Frequencies

The STALKER Pro IIs radar transmits at a frequency of 34.7 GHz (34,700,000,000 Hz) using a Ka-Band Transmitter. The receiver is designed to read the Doppler frequency (the change in frequency) which is much lower and lies between 100 Hz and 83,000 Hz. There are very few devices other than another radar gun that could cause interference in a radar gun's transmission frequency range. However, there are a number of devices that could interfere with a radar gun in the receiver's frequency range.

What Does Interference Do?

Interference can cause a radar gun to provide random readings, or make it harder for the radar gun to "see" the intended target.

Random readings are an obvious sign that there is interference. However, a loss of sensitivity can be subtle. A common situation occurs when a large number of professional baseball scouts operate many radar guns in close proximity.

A loss of sensitivity can cause the radar gun to be unable to "see" far enough away to get the ball speed right when it leaves the pitchers hand. Then, as the ball gets closer to the plate, the radar is able to get a reading, but only after the ball has slowed down. The result: the peak speed registers lower than the actual release speed.

Sources of Interference

There are two main sources that can cause ghost (random) readings in radar guns: electrical devices and objects that move or vibrate.

Electrical sources include television monitors, fluorescent lights, cellular phones, computers, some radio transmitters, and power transformers.

Moving or vibrating objects include ventilation fans, motors, and blowing debris that can produce a nearly constant speed reading.

Ways to Eliminate Interference

If you are experiencing erroneous readings, try these solutions:

Change your position to affect where the gun is aimed.

Lower the sensitivity by changing the Range in the Operator Menu to a lower setting.

If the erroneous readings are at low speeds (often interference from nearby motors) change the Low Speed setting in the Options Menu to a setting with a higher cutoff to completely eliminate all readings below the set speed. Likewise, if the erroneous readings are at high speeds, change the High Speed setting to a lower cutoff.

FCC Requirements

The Federal Communications Commission requires that all transmitting equipment carry a Grant of Type Acceptance. The STALKER Pro IIs is Type Accepted by the FCC under Type Acceptance number IBQACMI002. The FCC also requires that an operating license be obtained by the user of the equipment.

Service Information

A Check List Before Servicing the Pro IIs Radar

Check the Settings - If you are having a problem with your Pro IIs, first make sure that the settings are correct for your application. Call Customer Service at 1-877-STALKER if you need help with this.

Check the Battery - If the Pro IIs does not turn on, the problem is usually with the battery handle. Try charging the battery handle.

Call Customer Service - If the problem is not rectified with these steps, call Customer Service at 1-877-STALKER for help. A service representative will determine if the gun needs to be sent to the factory.

Factory Service Center Address

Applied Concepts, Inc.

Attn. Repair Department

855 East Collins Blvd.

Richardson, TX 75081

1-877-STALKER Toll Free

Phone: (972) 398-3780

Fax: (972) 398-3781

Warranty Information

The Pro IIs radar is covered for Two (2) Full Years, Parts and Labor, against defects in workmanship, parts, or materials, and is guaranteed to operate within specifications for that period.

Stalker Radar will repair or replace, at their option, any component or system found to be defective. The customer is responsible for shipping the defective product to the factory (freight prepaid), and Stalker Radar will pay for the return shipping via UPS Ground service back to the customer. Any expedited air shipping charges are to be paid by the customer.

This full warranty does not cover damage due to dropping, water, salt, improper voltage, fire, attempted repairs or modifications by an unauthorized service agent, or any other unusual treatment.

Stalker Pro IIs Specifications

Performance specifications

Speed Range	1 – 150 mph
Accuracy	± 3% of reading
	In onES resolution, round to the nearest integer;
	In tnth resolution, round to nearest tenth.
Max. Clocking Distances	300-500 feet for balls with unobstructed view
Max. Spin Measuring Distance	200 feet

Microwave specifications

Operating Frequency	34.7 GHz (Ka-Band) ± 50 MHz
Polarization	Circular Polarization
3 dB Beam width	12 Degrees Nominal (± 1°)
Microwave Source	Gunn-Effect Diode
Receive Type	Schottky Barrier Mixer Diode
Power Output	10 Milliwatts Minimum
	15 Milliwatts Nominal
	25 Milliwatts Maximum

General specifications

Product Type	Stationary Doppler Radar
Computer Processor	ARM Processor
Display Type	Liquid Crystal
Operating Temperatures	-30°C to +70°C (-22°F to +158°F)
Storage Temperatures	-40°C to +85°C (-40°F to +185°F)

Electrical specifications

Battery Capacity	7.4 VDC, 3.7 Ah, Li-Ion
Current Requirements	Transmitting - 0.54 Amps
(At 7.4 Volts DC)	Standby - 0.22 Amps
	Sleep Mode - 0.09 Amps

Physical specifications

Weight (with battery handle)	2.15 Pounds
Dimensions	7.35" H x 2.83" W x 7.9" L
Housing Material	Aluminum and Magnesium

The STALKER Pro IIs Complies with Part 90 of the FCC rules. FCC ID #IBQACMI002.