



OWNER'S MANUAL

Instructions for **JUGS Pro-Sports™** **Digital Radar**

Part No. R2000



SAVE THIS MANUAL

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by JUGS SPORTS could void the user's authority to operate the JUGS PRO-SPORTS RADAR.

———— Not intended for Law Enforcement use. ————

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Introduction

The JUGS PRO-SPORTS K-band radar was designed to measure the speed of a wide variety of ball sports such as baseball, softball, soccer, tennis, and cricket. It may also be used in a carnival or fundraising setting.

The JUGS PRO-SPORTS radar sends out very-high- frequency radio waves and measures the change in the frequency after it bounces off a moving object. This is commonly referred to as Doppler radar. This invisible radio wave is extremely low power (about 1/200th of a watt) and is completely safe for close and continuous operation.

The JUGS PRO-SPORTS radar is a true digital system. The JUGS PRO-SPORTS radar converts the reflected microwave signals into a digital stream of data. The gun's own computer then processes this data stream using sophisticated programming to interpret, filter, and measure the speeds. This technology is closely related to the compact digital disc and modern personal computers. This type of radar system has the potential to provide substantially superior performance and accuracy over conventional radar systems.

While the technology in the JUGS PRO-SPORTS radar is extremely advanced, its operation is quite simple. You need only to press the ON/OFF key and pull the trigger to begin measuring ball release speed.

If you want to try other features and settings, reading through this manual will help you to take full advantage of the other features and capabilities of the JUGS PRO-SPORTS radar.

Package Contents

The components included with your JUGS Pro-Sports radar are listed below. If you are missing any parts, or if you would like to upgrade your package, contact JUGS Sports at 1-800-547-6843.

JUGS Pro-Sports Radar

K-Band Radar Gun R2000
6-AA Nickel Metal Hydride
(NiMH) Batteries (rechargeable)
Wall Charger
Radar Manual
Carrying Case



Quick-Start Instructions

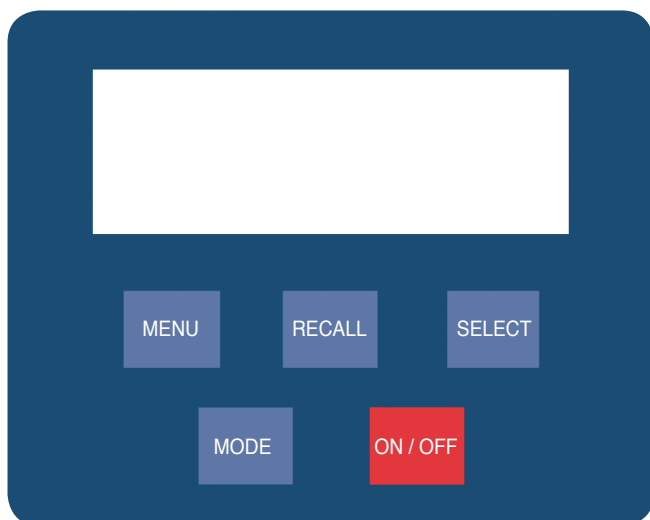
For first-time usage or to charge the batteries, remove the clip at the end of the handle and insert the six, NiMH batteries into the chamber. Connect the 9-pin port end of the wall charger to the gun and plug into AC power for 12 hours.

With a fully charged set of batteries inserted in the gun, simply do the following:

1. Turn the gun ON by pressing the red ON/OFF button.
2. Squeeze the trigger to begin transmitting.

Operator Menu

For the quick-start instructions above, we have preset the defaults to Ball Sports, MPH unit of measure, Trigger mode, and the Roll-down feature in the off position. There are [four buttons](#) that control the radar gun functions: The MENU and SELECT buttons work together to change settings. The MODE and RECALL buttons function independently.



Operator Menu

MENU BUTTON

The Menu button is used to change the Range setting, turn the Roll-down feature on or off, or to toggle the unit of measure from MPH to KPH.

The Range Setting

Press the menu button and you will enter the range setting. Changing the range has to do with increasing or decreasing the gun's sensitivity. For ball sports, you want the sensitivity set at 3 so that the gun will capture the speed of the object at its maximum distance.

Ball Sports Range



For carnival or fundraising settings, simply press the select button to change from 3 down to 1. The #1 setting is ideal for close quarter activity as this reduces the gun's sensitivity and helps eliminate competing background objects.

Carnival Range



Range 2 is a medium sensitivity setting and not used as widely as the other two.

If your usage is exclusively for carnival or fundraising activities, you should change the target type in the option menu. See Option Menu for details.

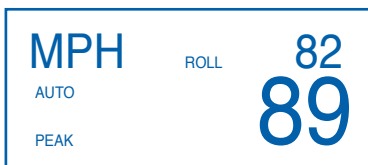
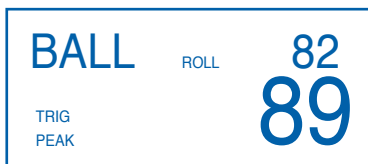
Operator Menu

Roll-Down Function

The JUGS Pro-Sports radar is capable of measuring the peak (release) and the live (roll-down) speeds of a moving ball. Peak speed always displays in the lower right window whether in trigger or auto mode. When enabled, the roll-down speed displays in the upper, right window.

To turn on the roll-down function, press the menu button two times. You will see the word Roll and then either Off or On.

Press the select button to toggle between On and Off.



Unit of Measure

The JUGS Sports Radar is equipped with both the English (MPH) and metric (KPH) units of measure. When you pull the trigger, the upper left area of the screen changes to the default unit of measure (MPH).



Change to KPH

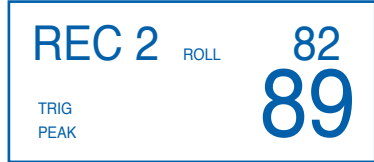
To change to KPH, press the menu button three times and then the select button to toggle between MPH/KPH.



RECALL BUTTON

The JUGS Pro-Sports radar allows you to recall the last five speed-readings that were measured, by pressing the RECALL button. Speeds are added to the recall queue when a new speed is acquired.

The stored peak and roll-down speeds in the recall queue (most recent first) display in a sequential mode as the RECALL key is pressed repeatedly. The Message window flashes the Recall Number and speed units (or target type if the gun is not armed).



Exit the recall mode by pulling the trigger at any time or by stepping through all stored recall speeds and pressing the RECALL key once more.

MODE BUTTON

Trigger Mode

Trigger mode is a manual operation. The trigger must be pulled prior to each pitch. The clocked speed will remain on the screen until the trigger is pulled again or the auto shut- down feature activates.



Auto Mode

To change to Auto mode, press the mode button to toggle from trig to auto. In Auto, the gun will arm, record, then clear automatically after 5 seconds.



Target Types

Ball Sports

When you press the ON/OFF button, your JUGS Pro-Sports radar default settings are for ball sports as indicated in the box to the right.

BALL

TRIG
PEAK

BALL = Ball Sports

TRIG = Trigger Mode

PEAK = Maximum speed

Most activities will be able to utilize this target type.

Carnival

Carnival and fundraising activities generally occur within close quarters. Changing the range for this target type decreases the gun's sensitivity and eliminates competing background speeds of greater distance.

Simply change the Range setting by pressing the menu button, then the select button to toggle down to Range 1.

Tennis

The JUGS Pro-Sports Radar includes a special setting for tennis. The parameters for this target type are unique to tennis and, therefore, should be utilized for optimum performance.

To set the target type for tennis, do the following:

- Press the menu button and then the menu and mode button simultaneously to enter the option menu. The first, upper left window will indicate “LOW.”



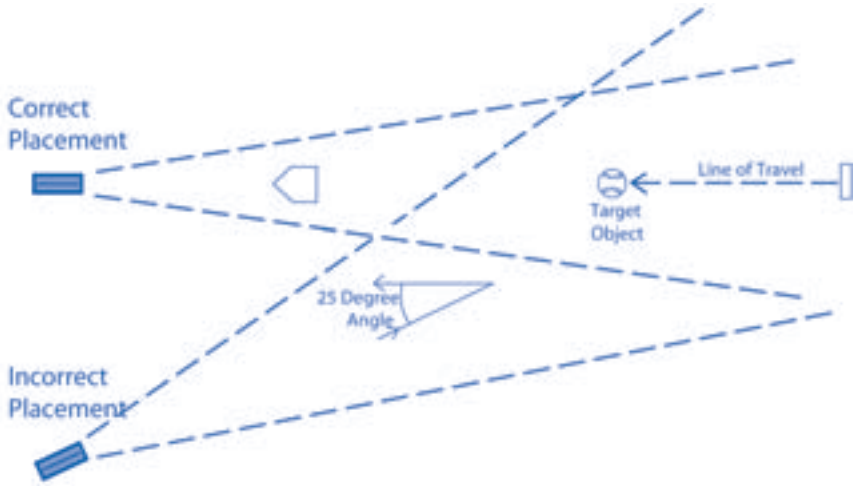
- Press the menu button two more times to enter the Target window.



- Press the select button twice and the target type will indicate “tEnn.” Simply pull the trigger and you are ready to record.



Radar Gun Placement



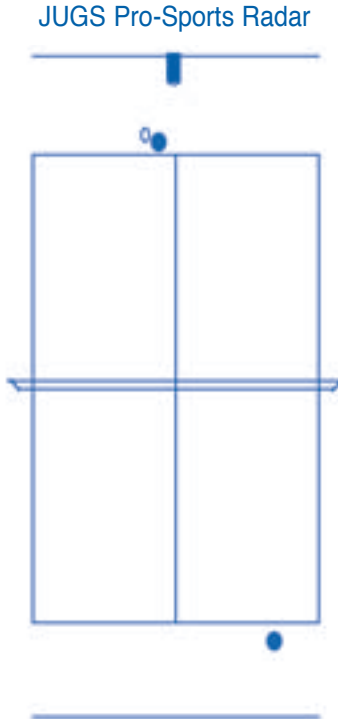
The most common mistake made with all radar guns is trying to clock targets at angles.

All radar guns work on the Doppler principle and need to clock objects moving directly at or away from the gun. Clocking at an angle with a stationary radar gun results in angle error, and the gun displays a speed that is LOWER than the actual speed.

For accurate readings, the radar gun must be placed in the line of travel of the target. At slight angles, the error is very small; however, at larger angles, the error becomes substantial.

Placement of Radar for Tennis

For the most accurate results, position the JUGS Pro-Sports radar gun down the centerline of a tennis court. In this manner, the gun will capture serve and court shot speeds from either end of the court.



WARNING

Do not attempt to catch a thrown or struck ball and clock with the JUGS Pro-Sports radar simultaneously. This may result in personal injury or damage to your radar gun.

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.

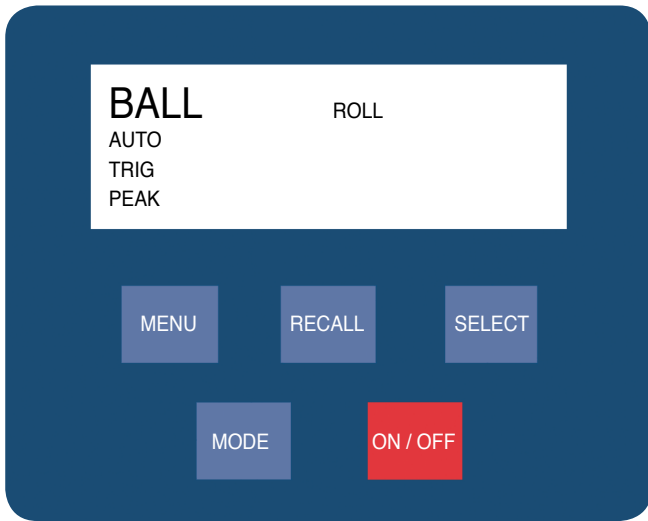
For example: if you are clocking at 30 degrees, and the gun displays 80 mph, take 80 and divide by the cosine of 30 degrees (0.866) to get a true speed of 92 mph.

NOTE: You can configure the JUGS Pro-Sports radar to automatically adjust for angle error by changing the Cosine Angle setting in the Option MENU. In the above example, if the Cosine Angle setting is 30, the gun will display 92 MPH, and no manual calculations are necessary.

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 mph	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

Controls and Indicators



LCD Display Icons

BALL – Upper left window displays target type (bALL/cARN), unit of measure (MPH/KPH) when operating, or Range (3, 2, 1) when in menu.

ROLL – Indicates the roll-down feature is on and is to be displayed in the upper, right window.

AUTO – Is on when gun is in AUTO mode.

TRIG – Is on when gun is in TRIG mode.

PEAK – Is always on and displays in the main or lower left window.

Controls and Indicators

Rear Panel Buttons

MENU – This button enters the MENU mode to select a feature to be changed.

SELECT – Once the MENU button has selected a feature, use the select button to change the setting for that feature.

MODE – Toggles the mode between TRIG and AUTO operation.

RECALL - Displays the last five speeds recorded and stored.

9-Pin Port Connector

The 9-Pin D Connector has the following pinout:
Pin 1 is on the top right, and Pin 9 is on the bottom left.

1 AUX INPUT	Stopwatch trigger input or remote transmit input
2 RS-232 TX	Transmit data-stream
3 RS-232 RX	Receive (not used at this time)
4 6.6 V OUT	Output (limited to 50 mA)
5 Ground	Ground
6 Charger Input	120V AC Wall Charger
7 RS-485-A	Transmit data-stream
8 RS-485-B	Transmit data-stream
9 Voltage Input	External voltage input, 6VDC to 16 VDC

Option Menu

The Option Menu is where you may make internal changes to features not offered in the operating instructions.

MENU Step	DESCRIPTION	FEATURE Step down by pressing MENU key	SETTINGS Change by pressing SELECT key
MENU Step ORDER	DESCRIPTION	MESSAGE WINDOW	Main Window (Bold indicates factory default)
1	Low Speed	LOW	OFF, 5, 10, 15, 20, 30 , 50
2	Resolution	RES	onES , tnth
3	Target Type	TARGT	bALL , cArn, tEnn
4	Aux TriggerFunction	AUX	OFF, StoP , trig
5	Stopwatch Mode	STOP	Std , LAP, SPLt
6	Cosine Angle	ANGLE	0 - 45
7	Serial Port Speed	BAUD	12 , 24, 48, 96, 192, 384
8	Serial Port Format	FOR	JUGS , A, bE, -
9	Format A Speed	A SPD	rOLL, PEA
10	Leading Zero	LEAD0	2Ero, SPAC , nonE
11	MessageTermination	TERM	Cr , CrLF, u Cr, u CL
12	Peak Message Type	PKMSG	Cont, Sing
13	Reset	RESET	yES, no
14	Reset Confirmation	SURE?	yES, no

Option Menu

Enter Option Menu

Press the MENU button to enter the OPERATOR MENU.

Press the MENU and MODE buttons simultaneously to enter the OPTION MENU.

All 8's will briefly flash in the message and main windows to indicate the change of menu.

Press the MENU key to step through each of the features.

The SELECT key changes the setting once a feature is selected.

Press the trigger at any time to exit the OPTION MENU, save all settings, and return to normal operation.

Option Menu

Options Defined

Low Speed: This option allows you to set your low-end speed range. Speeds will not record below the number you choose. See the table below for the settings available for each target type and unit of measure. The factory default for each setting is indicated in bold. Recommended settings are located on page 20.

<u>Target Type</u>	<u>Units</u>	<u>Low Speed</u>
Ball/Carn	MPH	OFF, 5, 10, 15, 20, 30 , 50
	KM/ H	OFF, 10, 15, 25, 35, 50 , 75
Tennis	MPH	OFF, 5, 10, 15, 20, 30, 50
	KM/ H	OFF, 10, 15, 25, 35, 50, 75

Resolution: Select **onES** to display speed in whole units, as 25 MPH, or tnth to display speed with tenths, as 25.4 MPH.

Target Type: The target types available on the JUGS Pro-Sports radar are **BALL** for ball sports, **CARN** for Carnival, and **TENN** for Tennis.

Aux Trigger Function: The Aux Trigger function allows you to utilize the JUGS Pro-Sports radar as a stopwatch. OFF disables this function, **StoP** = stopwatch, trig = radar trigger. The Optional Stopwatch Cable is needed with this feature.

Stopwatch Mode: This feature is only displayed if the Aux Trigger is set to StoP. The stopwatch may be set to standard, lap, or split timer. The timer displays in the upper, left window. To use this feature, see Stopwatch Feature.

Cosine Angle: You may adjust the cosine angle by ones from **0** to 45°. See Calculating Angle Errors.

Serial Port Speed: **1200**, 2400, 4800, 9600, 19200, or 38400.

Serial Port Format: **Jugs** is the default. The “-“ (dash) is for no serial output, the **A** format is for Selected Target Speed, and the **bE** format is for multiple speeds.

Format A Speed: (only for Format A) Roll or Peak speed.

Leading Zero:	Zero = 090	090.1
(only if format = A or bE)	Space = 90	90.1
None = 90	90.1	

Message Termination: Cr = Carriage Return only (0x0D)

(Only if format = A) CrLF = Carriage Return & Line Feed (0x0D 0x0A)

u Cr = units followed by Carriage Return
– e.g., “MPH”0x0D

u CL = units followed by Carriage Return
& Line Feed – e.g., “km/h” 0x0D 0x0A

Peak Message Type: Cont = continually streams peak speed

(Only if format = A) **Sing** = sends one peak speed message per acquired target

Reset and Reset Confirmation:

The following steps reset the unit to the factory default settings:

- **RESET no** – YES. Press the select button to toggle between no and YES.
- **SURE? no** – YES. Press YES if you wish to reset the factory defaults. Pull the trigger to exit and restore factory defaults.

Stopwatch Feature

The JUGS Pro-Sports radar may be used as a stopwatch. You will need to purchase the Optional Stopwatch Cable if you do not already own one.

Operation

Plug in the cable's 9 pin port connector to the radar gun.

Press the red button on the stopwatch cable, and the timer begins.

To stop the timer, press the red button a second time.

To return to radar mode, press and hold the red button.

Stopwatch Timer Modes

The default setting for the stopwatch is the standard timer.

Standard Timer This timer is useful as a running time clock or for successive, one-time events such as sprints.

Lap Timer The Lap Timer is useful for determining times between events such as a relay or between laps. Each press of the stopwatch trigger displays the time since the last trigger press.

Split Timer The Split Timer operates similarly to the Lap Timer but each press of the trigger displays the cumulative time.

Recommended Settings

Settings for Ball Sports

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

		<u>Menu</u>
Target Type	Ball	Option
Low Speed	30 MPH (50 KPH)	Option
Range	3 – maximum sensitivity	Operator
*Roll-down	For first and last speeds.	Operator

Settings for Carnival Use

You can experiment with the Range setting depending on what motion and what rides are around the gun.

		<u>Menu</u>
Target Type	Carnival	Option
Low Speed	30 MPH (50 KPH)	Option
Range	1 – To mask other nearby moving objects.	Operator
Auto		Operator

Settings for Tennis

Using a Low Speed cutoff of 50 MPH (75 KPH) helps to ignore speeds of motion less than 50 MPH (75 KPH).

		<u>Menu</u>
Target Type	Tennis	Option
Low Speed	50 MPH (75 KPH)	Option
Range	3 – Change to 1 or 2 if you track outside motion	Operator

Power Information

Providing Power to the JUGS Pro-Sports radar

Batteries - The JUGS Pro-Sports radar handle contains a battery compartment, which holds 6 NiMH rechargeable batteries. Squeeze and remove the end cap on the handle to access the battery compartment. When fully charged, one set of six batteries will power the gun for about 5 hours of continuous transmitting. The NiMH batteries can be recharged (in 12 hours) in the gun using the included Wall Charger. Optionally, the batteries can be removed and charged with a NiMH battery charger or rapid battery charger purchased at retail.

NOTE: Alkaline batteries must not be used in the JUGS Pro-Sports radar. Using alkaline batteries may damage the JUGS Pro-Sports radar and will void the warranty.

External - To power the JUGS Pro-Sports radar continuously, you will need the optional 12V DC Cigar Cable and either the optional 1 amp AC/DC adapter or some other external 12VDC power source. The 12V DC cigar cable does not charge the batteries while it is supplying power to the Radar.

Auto-Shutdown Feature

The JUGS Pro-Sports radar offers a 30 minute time-out auto-shutdown feature. After 30 minutes in sleep mode, the JUGS Pro-Sports radar automatically shuts off.

How To Save Battery Life

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

Utilizing the trigger mode will save the most battery life. The Auto mode will utilize more power, so be sure to turn off the gun between sessions.

Operational Time using AA NiMH Batteries

The JUGS Pro-Sports radar draws the most current when it is transmitting, so the run time depends upon how often the gun is transmitting. The JUGS Pro-Sports radar also has a sleep mode to conserve battery life when it is not being operated. The sleep mode is automatically initiated after about 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.

Continuous Transmitting	5	Hours
Typical Trigger Operation	10-11	Hours

Low-Battery Warning

The LOBAT icon blinks when the battery runs low. The JUGS Pro-Sports radar operates for a short time after this.

Operation is disabled when the battery voltage falls to an extremely low level. LoU displays in the large main window in this case. Recharge or change the batteries.



NOTE: DO NOT CHARGE THE BATTERIES UNTIL THE GUN DISPLAYS *LOBAT*.

Charging the Batteries

When the LOBAT indicator blinks, plug the connector of the wall charger into the 9-Pin connector on the right side of the JUGS Pro-Sports radar. Then plug the wall charger into a 110-120 volt outlet. The batteries should take about 12 hours to recharge.

NiMH batteries perform best when they are fully discharged and then fully recharged.

Interference Problems

The JUGS Pro-Sports radar transmits at a frequency of 24.125 GHz (24,125,000,000 Hz), using a K-Band Transmitter. The receiver is designed to read the Doppler frequency (the change in frequency) between 360 Hz and just over 43 kHz. 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 read 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. For example, a common situation occurs when a large number of 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 pitcher's 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 it actually is.

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.

How to Eliminate Interference

If you are experiencing erroneous readings, try these solutions:

Change your position to change where the gun is aimed.

Lower the sensitivity by changing the Range on the Operator MENU to 1 (low setting).

Change the Option MENU Low Speed setting to a setting with a higher low-speed cutoff if the readings are at low speeds (often interference from nearby motors).

Radar Accessories

Optional accessories are available for the JUGS Pro-Sports radar to assist you with all your radar needs.

- **PS Radar Wall Charger** R2001
(replacement)
- **PS Radar 12V Cigar Cable** R2002
Allows continuous power to the radar gun via a cigar-type adapter.
- **PS Radar Power/Data Cable** R2003
Allows continuous power to the gun and data flow from the radar gun.
- **PS Radar Stopwatch Cable** R2004
Transforms gun into a stopwatch.
- **PS Radar AC/DC Converter** R2005
Power supply for use with the Cigar or the power/data cables.
- **PS Radar Blue Data Cable** R2006
For use with JUGS Display.
- **PS Radar Wireless Adaptor** R2007
For use with wireless battery pack.
- **PS Radar 220V Adaptor** R2008
For use with 220 volt applications.
- **PS Radar Batteries** R2009
(replacement)

- **JUGS Display - 7" Numbers**R2020
2.5 digit display with 7" numbers.
- **JUGS Wireless Display - 7" Numbers**R2021
2.5 digit display with 7" numbers, wireless receiver, and 5-hour battery.
- **JUGS Wireless Display – 24" Numbers**R2022
3 digit display with 24" numbers, wireless receiver, and 5-hour battery.
- **Wireless Battery Pack**R2035
12 volt battery with wireless transmitter.
- **PS Radar Carrying Bag**R4000
(replacement)
- **Tripod for Radar Gun**R6000

Service Information

Before Servicing the JUGS Pro-Sports Radar:

Check the Batteries: If your JUGS Pro-Sports radar does not turn on, first check that the batteries are inserted correctly into the chamber. Next, charge the batteries for a full 12 hours. If the problem continues, try a volt meter to determine if the batteries are producing at least 7.5 volts. If not, you may need to order new batteries.

Check the Settings: Make sure that the settings are correct for your application. Read the operating instructions and the option menu for correct settings.

Call Customer Service: If you are unable to resolve the issue, please call JUGS Sports at 1-800-547-6843 for assistance. Our service department will determine if the gun needs to be returned for service.

You may contact JUGS Sports also by mail (11885 SW Herman Road, Tualatin, OR 97062), by fax (1-503-691-1100), or on the internet (info@jugssports.com or www.jugssports.com).

Diagnostics

Version Check

Enter the Diagnostic mode by pressing the MENU and RECALL keys simultaneously. The first diagnostic screen shows the version of code loaded into the gun. If no action is taken within two seconds, the version screen clears, and the gun reverts to radar mode.



Fork Mode

Press the MENU key while the version is displayed to advance to the Fork Diagnostic. The radar is automatically armed with no holdover, so the speed display shows just what the radar sees.

A tuning fork with known frequency can be used during this diagnostic to verify basic radar speed acquisition and accuracy. If no action is taken within one minute, the fork screen clears, and the gun reverts to radar mode.



Voltage Monitor

Press the MENU key while the fork diagnostic is active to advance to the Voltage Monitor Diagnostic. If the battery voltage is higher than the external voltage, the BATTV screen displays the battery voltage.



If the external voltage applied to the connector on the side of the gun is higher than the battery voltage, the EXTV screen displays the external voltage.



Press the MENU key while the voltage monitor diagnostic is active to cycle back around to the version diagnostic screen.

Pull the trigger while in any diagnostic mode to exit all diagnostics and return to radar operation.

Warranty Information

The JUGS Pro-Sports 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.

JUGS Sports 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 JUGS Sports 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, charging alkaline batteries in the unit, attempted repairs or modifications by an unauthorized service agent, or any other unusual treatment.

Product Specifications

PERFORMANCE SPECIFICATIONS

Speed Range	.5 - 150 MPH
Accuracy	± 0.1 MPH
In onES resolution, round to the nearest integer; In tnth resolution, round to nearest tenth.	
Max. Clocking Distances	.300 Feet

MICROWAVE SPECIFICATIONS

Operating Frequency	24.125 GHz (K-Band) ± 50 MHz
Polarization	Circular Polarization
3 db Beam width	14 Degrees Nominal (15 Degrees Max.)
Microwave Source	Gunn-Effect Diode
Receive Type	Schottky Barrier Mixer Diode
Power Output	5 Milliwatts Nominal

The JUGS Pro-Sports radar complies with Part 15 of the FCC rules.
FCC ID #IBQACMI005.

GENERAL SPECIFICATIONS

Product Type	Stationary Doppler Radar
Computer Processor	Digital Signal Processor
Display Type	Liquid Crystal
Operating Temperatures	-20F to +120F
Storage Temperatures	-40F to +140F

ELECTRICAL SPECIFICATIONS

Battery Capacity	7.5 VDC, 1.6 Ah, NiMH
Current Requirements	Transmitting - 0.35 Amps
(At 7.5 Volts DC)	Standby - 0.14 Amps
	Sleep Mode - 0.11 Amps

PHYSICAL SPECIFICATIONS

Weight (with batteries)	1.75 Pounds
Dimensions	8" H x 3" W x 6.5" L
Housing Material	ABS

Serial Communications Protocol

An RS-232 or RS-485 Serial Cable is required for data communications to speed display boards, computers, and other electronic devices. The data connector is on the side of the unit.

Serial Port Connector9-PIN D-CONN
Mating ConnectorRS-232 or RS-485

Connector Signals:

1. Aux Input
2. RS-232 TX
3. RS-232 RX
4. 6.6 Volts (OUT)
5. GND
6. Charger Input
7. RS-485-A
8. RS-485-B
9. Voltage Input

BAUD Rate1200 to 38400 BAUD – default =1200

BAUD Data Format8 Data Bits
No Parity
1 Stop Bit

Serial Port Message Format

Serial Port Format: The A format reports a single speed (peak or roll-down), and the bE format reports both.

A Format (Roll or Peak) – Resolution = **ones**

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

A Format (Roll or Peak) – Resolution = **tenths**

Byte#	Description
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(+)	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

The **Leading Zero** setting affects format A :

- When set to SPAC (default setting), ASCII spaces are used for leading zeros:

"500"	or	"500.0"
" 50"	or	" 50.0"
" 5"	or	" 5.0"

- When set to 2Ero, ASCII zeros are used for leading zeros:

"500"	or	"500.0"
"050"	or	"050.0"
"005"	or	"005.0"

- For Format A, when set to nonE, leading zero characters are not transmitted:

"500"	or	"500.0"
"50"	or	"50.0"
"5"	or	"5.0"

For Format bE, when set to nonE, ASCII spaces are used for leading zeros (as above for the SPAC setting) because Format bE uses fixed length fields.

The **Message Termination** setting affects format A:

- When set to **Cr** (default setting), each message is terminated with only a carriage return: (0x0D).
- When set to **CrLF**, each message is terminated with a carriage return and a line feed: (0x0D 0x0A).
- When set to **u Cr**, each message is terminated with the speed's units and a carriage return: ("500MPH" 0x0D).
- When set to **u CL**, each message is terminated with the speed's units, a carriage return and a line feed: ("500MPH" 0x0D 0x0A).

Operator Notes

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more information about
this product
or any other
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