

## SG300A Radar Gun



The radar gun is designed to be easy to use.

Press green “Y” button labeled “ON” to turn on the power.

To operate the gun, aim the gun at the desired moving object and pull the trigger button to take a measurement.

## Accuracy.

The radar gun can measure speed to within plus or minus one kilometer per hour provided the gun is placed in a such a position that the moving object is coming directly toward or directly away from the gun. If the object is moving at an angle to the gun, the COSINE effect will cause the measured speed will be slower than the actual speed. See description later in this document for a detailed description of cosine effect.

## Quick Start

### Initial Set Up

The SG300A gun is easy to use. Simply aim the gun in line (parallel) with the target, pull the trigger, and you are ready to record a speed reading.



## Control Panel Functions

The control panel features an LCD display and six buttons.

- The “**Trigger**” button takes measurements.
- The “**Mode**” (Left arrow) button selects Peak, Peak/Last, Last or Continuous measurement modes.
- The “**History**” (Up/Down arrows) buttons are used to display historical speeds.

The LCD window displays the speed. When you turn the power on, a start-up message displays in the window for several seconds, the Peak/Last Mode appears, indicating that the gun is in Peak/Last Speed mode. This is the default mode that the gun is always in when you power it up.

## Clocking a Speed Reading

The SG300A radar gun detects targets moving either toward or away from it. The radar measures the true release speed with an accuracy of +/- 1 mph (+/- 1.6 kph).

For the most accurate reading stand to one side of the catcher and point the gun toward the pitch, so the radar beam is aligned straight across (parallel) from the ball, not at an angle. If you point the radar gun at an angle with the ball, you introduce an angular error known as the cosine correction error (see section on Angular Interference-Cosine Error Effect.) Also, you can stand behind the pitcher to position the radar.

The radar will detect speeds within a 300-foot range. However, when the gun is closer to the release pitch, the speed reading is more accurate.

## Operating Modes

The SG300A gun has several operating modes. To switch modes, tap the “**Mode**” button. The “**Mode**” button toggles between Peak, Peak/Last, Last and Continuous Speed mode.

### Peak/Last Speed Mode

In this mode, the radar beam remains active once you pull the trigger. When the SG300A gun sees and displays the pitch-release speed, the speed remains on the readout for a few seconds.

The radar beam is always ready for the next pitch. To stop taking measurements, pull the trigger again.

### Continuous Speed Mode

In this mode, the radar beam is always active. The SG300A gun continuously displays recorded speeds until you move the gun from the target's alignment to clear the last recorded speed. After a few seconds, the speed no longer appears in the display window. The SG300A gun is instantly ready for another pitch.

After a few seconds, the speed no longer displays, automatically clearing the display. After the speed clears, the SG300A gun is instantly ready for another pitch. This mode is useful when you operate the gun from a tripod mount.

## Radar Gun Power

The SG300A radar gun is extremely durable and has an easy-grip handle. The gun uses 6-AA NiMH rechargeable batteries in the battery pack that is part of the handle. Alternatively, the radar gun can be connected to a wall adapter or connected to a readout that provides power.

- Tap the “**N**” button twice to show the charger status.
- Tap the “**N**” button a third time to show the power status.
- Tap the “**N**” button again time to show the internal power supply voltages.

When connected to external power the display shows:



When **Low Battery** appears on the LCD display window, the batteries needs to be recharged.



When the batteries are good, the LCD display shows:



When the radar is transmitting, it consumes roughly twice as much power than when it is not transmitting.

## External Power Connector

The AC/DC power connector performs the following functions. The 5.5mm/2.1mm coaxial AC/DC power connector may be used to operate the unit.

If using the SG300A for extended periods of time from external power, it is best to use an 11-12VDC wall adapter rather than a 15VDC adapter especially on hot days. The same 15VDC wall adapter that can be used to power the readout can be used to operate the SG300A.

When the SG300A is connected to an Alzatex radar gun readout, the readout provides power to the radar gun.

## Controls

The SG300A Faceplate has six buttons, an LCD display and several LED status indicators.



## LCD Display Window

The SG300A gun has a two-line back lit LCD readout. The LCD window displays the speed, mode and status.

## Status LEDs

The SG300A gun has 4 front panel status LEDs. The status LEDs indicate the following:

- Green LED – Indicates that the radar gun is transmitting.
- Yellow LED – Indicates that a button was pressed on the IR remote. Yellow LED always on indicates the test / diagnostic mode is enabled.
- Red LED – Flashes any time a button is pressed. If a button is held, this LED stays on until another button is pressed.
- Blue LED – While transmitting, this LED flashes each time movement is detected. Indicates that the radar gun is detecting movement.

NOTE: While transmitting, if the Blue LED flashes at unexpected times, there may be a fan or other object causing interference possibly leading to false readings.

## Control Buttons

The unit has six buttons on the Faceplate of the unit. In user mode, the buttons have the following functions.

- Press the “**Y**” button to turn the unit on.
- Pull the “**Trigger**” button on the handle to take speed measurements.
- Press and hold the “**N**” button to turn the power OFF.
- The “**Up**” and “**Down**” arrows scroll through the History memory.
- The “**Mode**” button (“**Left**” Arrow) selects between Fast, Fast/Last, Last or Continuous Mode.

## Setup Mode

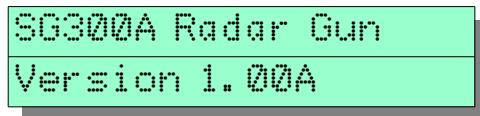
In setup mode, the buttons have the following functions.

- Press and hold the “**Mode**” button to enter the setup mode.
- The “**Left**” and “**Right**” arrow buttons toggle through the setup choices.
- Tap the “**Y**” button to enter the Edit mode.
- In Edit mode, the “**Up**” and “**Down**” arrows select the desired setup value.
- Press and hold the “**Y**” button to save the settings.
- Tap the “**N**” button once or twice to exit the setup mode.

## Turning ON/OFF the Power

Tap the “**Y**” button to turn the unit on.

Press and hold the “**N**” button to turn the unit off.



The unit will automatically turn itself off if the unit is operating off the Battery power, and the **Low Batt** display is showing and there is no activity for 30 seconds or more.

A start up message displays in the LCD window for several seconds, then the message **Peak** or **Peak/Last** appears indicating that the gun is in Peak/Last Speed mode (the default setting).



## Displaying Speed

Pulling the trigger button initiates a speed measurement.

The SG300A radar gun transmits and receives microwave energy and is ready to record a speed.

When the green LED on the front panel is lit the unit is in the **XMIT**, transmitting mode.

## Trigger Modes

Peak, Peak/Last, Last Speed, continuous trigger modes.

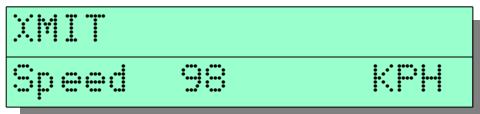
- The **Peak** mode displays the fastest speed detected on a single measurement.
- The **Peak/Last** mode displays the fastest speed and the Last speed detected on a single measurement.
- The **Last** mode displays the last speed detected on a single measurement.
- The **Continuous** mode takes continuous measurements and displays the current speed.
- Tap the “**Y**” button to re-display the most recently captured speed.

To select Peak, Peak/Last, Last or Continuous Speed mode, tap the “**Mode**” (“**Left**” arrow) button. The “**Mode**” button toggles between these modes. In each of the modes, the radar detects the speed of the pitch and displays it.

## Peak Trigger Mode

Pull and release the trigger to change to **XMIT**.

While transmitting, the display shows the speed.



When using the Peak mode, the radar detects the speed of the pitch and displays it.



The readout will show the peak speed.



The readout will show the peak speed.



When using the Peak-Last mode, the radar detects the pitch speed and the catch speed of the pitch and displays the peak speed.

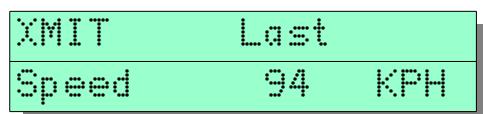
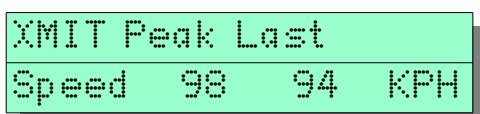
The next speed reading detected will be recorded. The recorded speed will show in the window for the length of hold time that has been set. Once a reading is detected, the reading goes back to 0 the after several seconds of no further activity.

If no readings are detected, pull and release the trigger to turn off the **XMIT**.

## Peak/Last Trigger Mode

Pull and release the trigger to change to **XMIT**.

While transmitting, the display shows the peak and last speeds.



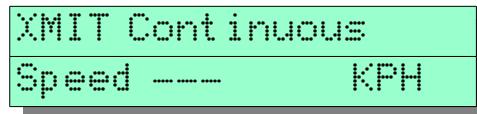
The readout will show the last speed.



When using the Last mode, the radar detects the catch speed of the pitch and displays it.

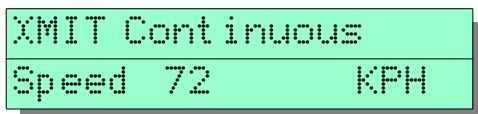


In this mode, the unit continuously takes speed readings.



## Continuous Mode

Tap the “**Mode**” button to select the **CONTINUOUS** mode.



While transmitting, the display shows the current speed.

The current speed is shown on the LCD display.

NOTE: If you have Audio enabled, the speed cannot be played while transmitting.

If the **Power up ON** mode is set, the radar gun powers up and starts taking measurements without pressing the trigger button. The radar gun keeps taking measurements as long as the gun is ON or if the trigger button is pulled.

If the display is in any other mode, ie: setup, history, etc, it goes to the power up default mode when switching from **HOLD** to **XMIT**.

If the display is in one of the speed display modes, ie: **Peak**, **Last**, **Peak Last** or **Continuous**, the display mode does not change when switching from **HOLD** to **XMIT**.

## IR Remote



- The “**CLK**” button permits the time and date to be set.
- The “**EXIT**” button exits the setup mode.
- The “**0-9**” and “**A-F**” buttons permit numbers to be entered for storing history notes or setting date and time.

An optional infrared remote can be used to operate some of the basic functions of the radar gun.

- The “**UP**” button starts taking speed measurements.
- The “**DN**” button stops taking speed measurements.
- The “**BACK**” button displays the last speed recorded.
- The “**LEFT**” and “**RIGHT**” buttons scroll through the History memory.
- The “**MODE**” button selects between Fast, Fast/Last, Last or Continuous Mode.
- Tap the “**OK**” button for to save the number to the selected history entry or to save time and date.

## History Button

Press the History “**Up**” and “**Down**” buttons to display the most recently recorded speed. Press the History “**Up**” arrow button again to display the next most recently recorded speed. Each successive press of the history “**Up**” Arrow button will display the next older recorded speed. Each successive press of the history “**Down**” Arrow button will display the next newer recorded speed. When the end of the history memory is reached, it starts over at the beginning of the history memory again.



## Setting the Time and Date

The when saving history memory to the USB drive it is helpful to have the correct time and date on the saved file.

- Tap the “**CLK**” button on the IR remote to display the time and date. The arrow will be pointing towards the date.
- Use the “**0-9**” buttons to enter the desired date: **YYMMDD**.
- Example: “**250519**” for May 19, 2025.
- Tap the “**OK**” button for to save the to save the date.
- Tap the “**CLK**” button again on the IR remote to display the time and date. The arrow will be pointing towards the time.

- Use the “**0-9**” buttons to enter the desired time: HHMM.
- Example: “**1409**” for 14:09 (2:09 PM).
- Tap the “**OK**” button for to save the to save the time.

## Adding notes to History Memory

A short note can be added to a history memory. All subsequent measurements will have the same note. If the note is set to zero, then no note will be recorded.

- Tap the History “**Up**” or “**Down**” arrows to select the desired history memory.
- Use the IR remote to enter a note.
- Tap the “**0-9**” and/or “**A-F**” buttons on the IR remote to enter a value. Up to 8 characters may be entered.
- Tap the “**OK**” button for to save the value to the selected history memory.
- Tap the “**EXIT**” button to exit the setup mode.

## Saving History Readings

The history memory is automatically cleared each time the power is turned off.

The history memory can be saved to the USB drive. The radar gun must be in the idle mode (Not taking measurements).

- Tap the History “**Up**” arrow to display the history.

- Press and hold the “**Up**” Arrow for two to three seconds to save the history memory to the USB drive.
- The file will be saved in the “**history**” folder as “**history/hist1245.txt**”. Each time you save, the number will be the hour and minute of the day in the form **histhhmm.txt**
- **hist1306.txt** is saved at time **13:06**
- **hist1308.txt** is saved at time **13:08**, etc.
- Since the files are saved in Append mode, if you save to the same file more than once, the new data will be appended to the previous data.
- If you want to clear the local history memory, press and hold the “**Up**” arrow again for two to three seconds to clear the history memory.

*NOTE: The history memory can be cleared before any other buttons are pressed after saving the history memory. The history memory is cleared each time the power is turned on.*

### Example History File:

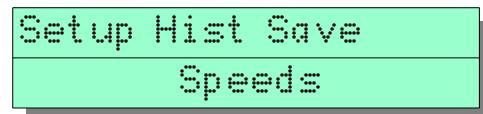
- Open history File: **history/hist1245.txt**
- **MinSpeed=8 Peak**
- **00:12:46 Peak 69 KPH Last 69KPH**
- **00:12:54 Peak 69 KPH Last 69KPH**

### Saving Speeds

Speeds and/or detail can be saved to the USB drive. In addition to saving to the history

memory, the speeds are saved directly to the USB drive as speeds are recorded.

- Press and hold the Setup (“**Left**” arrow) button to enter the setup mode.
- Tap the Setup (“**Left**” arrow) button several times until **Hist Save** is displayed.
- Tap the “**Y**” button to enter the Edit mode.
- Tap the “**UP**” and “**Down**” arrow buttons to select Save “**Speeds**” or do not save “**OFF**”.
- Press and hold the “**Y**” button to save the new setting.



- The file will be saved in the “**history**” folder as “**history/sped1245.txt**”. Each time you save, the number will be the hour and minute of the day in the form **spedhhmm.txt**
- **sped1306.txt** is saved at time **13:06**
- **sped1308.txt** is saved at time **13:08**, etc.



In addition to saving speeds, interference levels and other details are saved into the history memory. This feature is useful when trying to identify interfering objects and/or disturbances.

- The file will be saved in the “**history**” folder as “**history/dtal1245.txt**”. Each time you save, the number will be the hour and minute of the day in the form **dtalhhmm.txt**
- **dtal1306.txt** is saved at time **13:06**
- **dtal1308.txt** is saved at time **13:08**, etc.

Set to **OFF** if you do not need to save data.

## Charging The Battery

Connect a 15VDC wall adapter to the power connector on the side of the unit. The SG300A defaults to **slow** charge mode when external power is applied. This is the preferred mode because it extends the life of the batteries.

If you need to charge the batteries in a hurry, put the charger into **fast** charge mode.

Use the following procedure.

- Tap the “**N**” button twice to display the charge status menu.
- Tap the “**Y**” button to change the charger to the **fast charge** mode. The fast charge will run for up to one hour.
- Tap the “**Y**” button again to change the charger to the **slow charge** mode. The slow charge will run for up to twelve hours.

The upper LED is the charger status.

- Red-Green alternate – Radar gun is OFF, charging the battery.
- Red ON steady – Radar gun is ON, fast charging the battery for up to one hour.

- Red blinking – Radar gun is ON, charging the battery for up to 12 hours.
- Red-Green alternate – Radar gun is ON, last 10 minutes charging the battery. Then turns green.
- Green steady – The battery is full charge.

The lower LED is the power/data/transmit status.

- Red Flash – Serial data received on the RS232 port.
- Green Flash – Serial data sent on the RS232 port.
- Red rapid Flashing – Power supply voltage error.
- Green steady – The transmitting.

Power/Charger status display in battery mode.

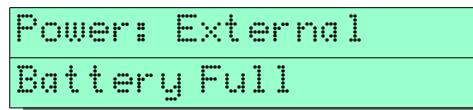


Power/Charger status display when external power is applied.



Power/Charger status display when external power is applied and the battery is fully charged.

When a **Battery Full** condition is detected while in fast charge, the charger will revert to the slow charge mode for up to 12 hours, then turn off. When a **Battery Full** condition is detected while in slow charge, the charger will turn off.



## Power status

- **Power: External** Operating from external power.
- **Power: Battery** Operating from battery.

## Power/Charger status

Charger/Battery status messages

- **Charge OFF**. Typical charge current 0.00A.
- **Charge Fast**. Typical charge current up to 1.05A.
- **Charge Slow**. Typical charge current 0.05A to 0.16A.
- **Battery Full**. The battery is fully charged.
- **Battery Error**. When attempting to charge the batteries, the battery is either missing or one or more cells is defective.
- **Battery Normal**. Normal.
- **Low Battery**. The battery needs to be recharged. The radar gun will shut off after one minute.
- **External Power Low**. The external power is too low to charge the batteries. The radar gun operates properly, but cannot charge the batteries.
- **V3. 3v Low**. The voltage is too low to operate the radar gun.

## Power and charge voltages

The charge voltage and charge current can be monitored from the charge menu. These values are automatically updated every 4 seconds.

Extern=S 14. 24V
C= 8. 27 I=0. 124

- External power voltage **Extern=S 14. 24V** when operating from external power.
- Charge voltage **C= 8. 27** while charging.
- Charge current **I=0. 124** while charging.

## Battery voltage

The Battery voltage can be monitored from the charge menu when operating from battery.

Battery 7. 87V
C= 0. 01 I=0. 000

- Battery voltage **7. 87V** when operating from internal batteries.
- Charge voltage **C= 0. 01** while charging.
- Charge current **I=0. 000** while charging.

Battery 81%V
C= 0. 01 I=0. 000

- Battery percent of battery charge is monitored **81%V** when operating from internal batteries.

## Play Welcome Message

A PA amplifier can be connected to the Audio output of the SG300A. A welcome message can be played to a PA.

Example audio message:

“Welcome to the Carnival”.

You can choose whether the Welcome Message is ON or OFF. You can replace the default message with your own welcome message on the USB drive. The file names are “welcome1.mp3” through “welcome4.mp3”.



- Press and hold the “Down” Arrow button to go to the welcome message screen.
- Tap the “Up” Arrow button to select the desired welcome message “1” through “4” or “OFF” to turn this feature off.
- While the welcome message is enabled, tap the “Down” Arrow button to play the welcome message.
- Each time the unit is first powered up, the welcome message is “OFF”.



## User Settings

The SG300A has several user settings.

The unit has six buttons on the Faceplate of the unit. In setup mode, the buttons have the following functions.

In this mode, various settings can be changed.

- Press and hold the “Left” arrow button to enter the setup mode and view the settings.
- Tap the “Left” and “Right” arrow buttons to toggle through various settings.
- To change a setting, tap the “Y” button to enter the edit mode.
- While in Edit mode, the “Up” and “Down” arrows change the setting value.
- Press and hold the “Y” button to save the new setting.
- Tap the “N” button to exit the setup mode.
- To exit the Edit mode without saving, tap the “N” button twice.

NOTE: If, for some reason, the display did not change from **Save** to **Saved**, then to **Set up** after several seconds, repeat the save process.

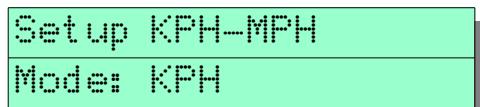
- Tap the “Y” button to enter the edit mode.
- Press and hold the “Y” button to save the new setting.

## KPH-MPH mode

Display KPH or MPH.

- Press and hold the Setup (“**Left**” arrow) button to enter the setup mode.

The KPH-MPH mode is displayed.



- Tap the “**Y**” button to enter the Edit mode.
- Tap the “**UP**” and “**Down**” arrow buttons to select either “**KPH**”, (kilometers per hour) or “**MPH**”, (miles per hour) display.



- Press and hold the “**Y**” button to save the new setting.



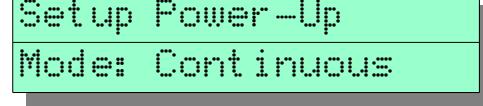
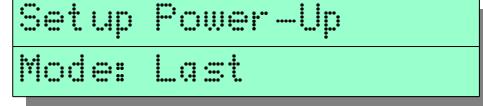
- When setup is completed, tap the “**N**” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “**N**” button twice.

NOTE: If you cannot find this setting, it may be intentionally hidden to prevent it from accidentally being changed.

## Default Display mode

Default display mode.

- Tap the “**Left**” Arrow button go to the next setup mode.
- Tap the “**Y**” button to enter the Edit mode.
- Tap the “**UP**” and “**Down**” arrow buttons to select the default mode:



- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “**N**” button twice.

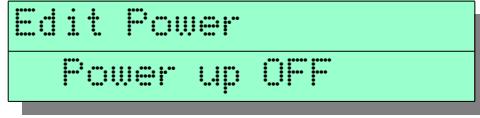
## Default Power ON

Option 1) **Power up OFF** When power is applied to the radar gun, the radar gun remains in the off state until the **ON** button is pressed.

Option 2) **Power up ON** When power is applied to the radar gun, the radar gun turns **ON** and starts transmitting without pressing any buttons. This feature is useful only when batteries are not installed and using external power to power the radar gun. If you leave the batteries installed without the external power connected, the batteries will go completely dead.

NOTE: The transmit can still be manually turned on or off using the trigger button or by using the IR remote.

- Tap the “**Left**” Arrow button go to the next setup mode.
- Tap the “**Y**” button to enter the Edit mode.
- Tap the “**UP**” and “**Down**” arrow buttons to select the default mode:



- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.

- To exit the Edit mode without saving, tap the “**N**” button twice.

## External Power Operation

When using the SG300A without a battery, a 12VDC power supply should be used. The SG300A operates much cooler in the hot sun with the lower voltage power supply.

When operating from external power without batteries, the external power voltage can be as low as 9VDC.

The SG300A has an internal safety circuit that will protect itself and shut down the power supply if an overheat condition is detected.

## Battery Operation

Either the 12VDC or 15VDC power supply should be used when charging the batteries. The minimum voltage required by the battery charging circuit is 12VDC. In fast charge mode, the battery charges much faster when using a 15VDC power supply.

## LCD Backlight Setup

The LCD back light can be set to one of several settings.



- Tap the “Right” Arrow button go to the next setup mode.
- Tap the “Y” button to enter the Edit mode.



You are now in the LCD Backlight setup mode.

- Press the “UP” and “Down” arrow buttons select the desired LCD backlight mode.

Modes are “OFF”, “Auto”, “ON”.

- Press and hold the “Y” button to save the new setting.
- When setup is completed, tap the “N” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “N” button twice.

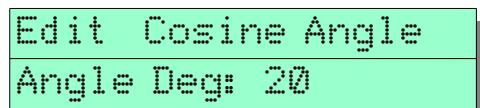
NOTE: The most commonly used setting is “ON” to make the display easier to read in most lighting conditions.

## Cosine Angle

Select the desired cosine angle: 0 to 45 degrees.

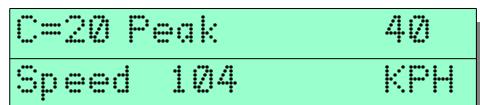


- Tap the “Right” Arrow button go to the next setup mode.
- Tap the “Y” button to enter the Edit mode.
- Tap the “UP” and “Down” arrow buttons to select the cosine angle: 0 to 45 degrees in 5 degree increments.



- Press and hold the “Y” button to save the new setting.
- When setup is completed, tap the “N” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “N” button twice.

If the cosine angle is greater than zero, the LCD display will show the cosine angle C=20. The speed will be adjusted for the cosine angle.



The cosine effect cause the radar device to display a speed, which is lower than the actual pitch-release speed. This condition exists whenever the target's path is not parallel to the gun's antenna. As the angle between the beam of the antenna and the

target increases, the displayed speed decreases. An angle of zero degrees is best.

The following table shows the effect that an increasing angle has on a displayed speed.

Small angles (less than 10°) have little effect on accuracy. As the angle increases, the error increases. At 90°, the target speed is 0 grossly incorrect.

The radar gun will measure speed to within +/- one kilometer per hour provided the gun is placed in such a position that the moving object is coming directly toward or directly away from the gun. If the object is moving at an angle to the gun, the COSINE effect will cause the measured speed will be slower than the actual speed.

As the angle of incidence increases, the accuracy will decrease. The angle of incidence is the cosine of a right triangle, hence the cosine effect. If you knew the exact angle of incidence, you could take the measured speed multiplied by one divided by the cosine of the angle and compensate for the cosine effect to figure the actual speed.

The cosine setting on this unit is adjustable from 0 to 45 degrees in 5 degree increments.

- Distance off center at a 10-degree angle gives 1.5% error.
- Distance off center at a 20 degree angle gives 6% error.
- Distance off center at a 30 degree angle gives 13% error.

## Speed Range

Select the desired speed range. The radar gun will ignore speeds outside of the speed range.

Speed range options:

- **HI-1** : 48-225 kph 30-140 mph
- **LO-1** : 8-225 kph 5-140 mph
- **HI-2** : 75-225 kph 47-140 mph
- **LO-2** : 16-225 kph 10-140 mph



- Tap the “**Right**” Arrow button go to the next setup mode.
- Tap the “**Y**” button to enter the Edit mode.
- Tap the “**UP**” and “**Down**” arrow buttons to set the speed range.



- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “**N**” button twice.

## Display Hold Time

The display hold time can be set to anything between 2 and 15 seconds.



- Tap the “**Left**” Arrow button go to the next setup mode.
- Tap the “**Y**” button to enter the Edit mode.
- Tap the “**UP**” and “**Down**” arrow buttons to set the display hold time in seconds.



- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “**N**” button twice.

## Audio Play Setup

A PA amplifier or PC speakers can be connected to the Audio output of the SG300A. The speed will be played as an audio message.

Example audio message:

“Your Speed Is 112 Kilometers per hour”.

“あなたの速度は時速 112 キロメートルです”.

You can choose whether the Audio is ON or OFF and what language you would like to play. To use the audio, a USB drive must be plugged into the USB connector on the radar gun. You can use the standard set of files or create your own audio files.



- Tap the “**Left**” Arrow button go to the next setup mode.
- Tap the “**Y**” button to enter the Edit mode.



You are now in the Audio setup mode.

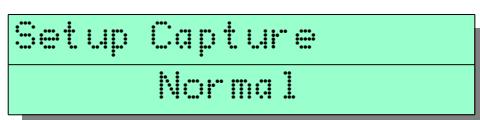
- Press the “**UP**” and “**Down**” arrow buttons select the desired audio mode.

Modes are:

- “**OFF**”
- “**English**”
- “**Spanish**”
- “**Japanese**”
- or any other language files that you install.
- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “**N**” button twice.

## Capture Options

The capture options are set here. The default is normal captures.



- Tap the “**Left**” Arrow button go to the next setup mode.
- Tap the “**Y**” button to enter the Edit mode.

- Tap the “**UP**” and “**Down**” arrow buttons to select the desired capture option.
- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.

The **Peaks** capture causes a single capture of the peak speed to be captured. This is useful in picking out valid peak speeds for small objects.

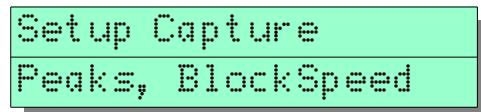
This feature affects the peak speed in the **Peak** and **Peak/Last** modes only.



If there is a specific speed that is causing interference, it can be blocked. Be sure to select the speed to be blocked in the **BlockSpeed** menu.



Both the **Peaks** and the **BlockSpeed** options can be enabled at the same time.



## Block Speed

If there is a specific speed that is causing interference, it can be blocked. The speed to be blocked is entered here.

When the blocked speed is detected, the Red LED flashes instead of the Blue LED. The measurement is ignored.

Block speed must be enabled to use this feature.



- Tap the “**Left**” Arrow button go to the next setup mode.
- Tap the “**Y**” button to enter the Edit mode.
- Tap the “**UP**” and “**Down**” arrow buttons to select the speed to be blocked.
- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “**N**” button twice.

NOTE: The Speed can also be entered directly from the IR remote. Press “**OK**” to save.

NOTE: The speed just above and just below the blocked speed are also blocked. For example, if **139K** is blocked, then **138K** and **140K** are also blocked.

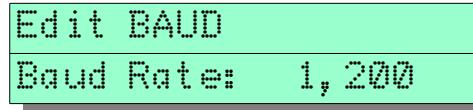
## Baud Rate Setup

To change the baud rate for the readout, perform the following procedure.



Tap the “**Left**” Arrow button go to the next setup mode.

Tap the “**Y**” button to enter the Edit mode.



You are now in the baud rate selection mode.

- Press the “**UP**” and “**Down**” arrow buttons to select the desired baud rate.
- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.

The default is 1,200 baud rate. This baud rate is required for most readouts. The 115,200 baud rate is useful for debugging. If this baud is selected, the output from the **Error Level** setting will be sent out on the serial port.

Baud rate choices are:

- 1,200 (Default for most readouts)
- 2,400
- 4,800
- 9,600
- 19,200
- 38,400
- 57,600
- 115,200 (Special for debugging)



## Serial Details

The **Details** option sends serial data with extra details for testing the radar gun.



The unit address can be set to any address **A00** to **A09**.

"L0s 61 C 26 A2345 N103	<b>A00</b>
"L4s 61 C 16 A2155 N153	<b>A04</b>
"L5s 61 C 16 A1895 N153	<b>A05</b>
"L0l 61 C 8 A2667 N138	<b>A00</b>
"L0p 61 C 8 A2891 N138	<b>A00</b>
"L0r 61	<b>A00</b>

Description of fields.

<b>"L0s</b>	Unit address <b>A00</b> . <ul style="list-style-type: none"> <li><b>s</b> speed</li> <li><b>p</b> peak speed</li> <li><b>l</b> last speed</li> <li><b>z</b> means no speed detected</li> <li><b>r</b> speed measurement from a remotely connected radar gun.</li> </ul>
<b>61</b>	Measured speed
<b>C 26</b>	The number of measurements at this speed.
<b>A2356</b>	The amplitude of the most recent measurement.
<b>N103</b>	Background noise level.

## Peak/Last Display Wired



Two radar guns can be connected together. The speed of the remote radar gun can be shown on the top right corner of the display of this radar gun.

Set the serial mode to the **sss000** option on both radar guns.

While transmitting, tap the “**N**” button to display the remote radar gun speed.

The remote radar gun measured 98KPH. The local radar gun also measured 98KPH.



NOTE: This feature works with either a wired cable or a wireless radar gun.

## Peak/Last Display Wireless

Two radar guns can be connected together using a wireless connection. The speed of the remote radar gun can be shown on the top right corner of the display of this radar gun.

If the remote radar gun is setup to send **Details**, then the remote gun will appear as follows.



R	Remote radar gun sending details.
098	Speeds
w	The remote gun is connected using a wireless connection.

NOTE: This feature only works with a wireless radar gun.

ASCII character string examples:

82 KPH	<b>082000</b> <CR>
143 KPH	<b>143000</b> <CR>
59 MPH	<b>059000</b> <CR>
105 MPH	<b>105000</b> <CR>

Serial port LED Status.

- The serial LED flashes GREEN each time serial data is sent from the RS232 port to the readout.
- The serial LED flashes RED each time serial data is received on the RS232 port.

## Wireless

Optional feature that will be available in the future.

- Wireless models. The wireless models transmit data to a compatible readout with built in wireless receiver.
- The wireless transmitter is activated and a speed reading is sent to a wireless readout each time a measurement is taken.

## Serial Port Protocol

The serial output RS232 communications port is standard on all models. The communications port lets you connect and transmit data to a SG300A remote digital display or computer.

Baud rate: 1200 default. Baud rate is user settable to other baud rates for special applications. Data format: 8 data bits, no parity, 1 stop bit.

## Mounting Configurations

The SG300A is designed for hand-held, stationary-only operation.

In addition you can mount the gun to a standard camera tripod. The gun has two locations that can be used as a tripod mount.

- The 1/4-20 receptacle near the trigger handle.



- The 1/4-20 receptacle at the bottom of the handle under the battery holder.



## USB connector

NOTE: The SG300A has a USB connector. The A type connector is for use with a USB drive only. The USB drive is typically used for data storage.

A history of all measurements for the day or event can be recorded. These measurements can be saved on the USB drive.

The USB drive is also used for storing audio messages.

## Performance Tips

Understanding potential radar interference and what you can do when it occurs can greatly increase the radar's performance.

## How Radar Works

Determining a target's speed begins with the radar gun transmitting and directing a beam of microwave energy (radio waves) at an approaching (or receding) target. When energy from this beam strikes the target, a small amount of energy is reflected back to the antenna in the radar device. The reflected signal frequency shifts by an amount proportional to the speed of the target. This is known as the Doppler effect. The radar device then determines the target speed from the difference in frequency between the reflected and transmitted signal.

## Interference Sources and Remedies

When properly installed and operated, Doppler radar technology is extremely accurate and reliable. However, variations in the environment can cause situations and circumstances that cause spurious (erratic and unusually high or low) speeds to display.

- A reading appears when no target is in the operational range of the antenna.
- A target entering the operational range overrides the interfering signal, causing the display to change suddenly.
- Interference is irregular and does not provide a valid tracking history.

## Electromagnetic Interference (EMI)

EMI can be produced while operating. To correct the interference, simply turn off its source.

### Feedback Interference

When the radar beam is directed at laptop computer screens, streetlights, electric motors and other devices, it can display spurious speeds. To correct the interference, relocate the radar gun's antenna. If the problem disappears, the interfering event was in the beam before you moved the antenna.

### Multi-Path Beam Cancellation

If multi-path beam cancellation occurs, the target speed sporadically blinks and reappears at

semi-random intervals. This type of interference occurs when the radar loses track of the target, because the target is reflecting two or more signals that are interfering with each other. Radar guns today such as SG300A gun are virtually immune to multi-path cancellation.

## Radio Frequency Interference (RFI)

The system can inadvertently process radio energy as Doppler speeds, including that from cell phones, WiFi, Bluetooth, police radios, airport radar, microwave transmission towers, CB radio transmitters, and AM/FM transmission towers. For this type of interference to occur, the radar gun must be operating very close to the transmitter.

## Noise/Interference Levels

The background noise / interference levels of the radar measurements can be observed.

- Tap the “N” button six times until the **Interference** menu appears.
- Pull the trigger to start transmitting.

While data is being captured, several parameters can be monitored.

Interference	114
98K 2352R	1 102

The **Interference** menu displays the average noise level and various other measurement parameters.

- The **98K** is the most recent speed detected. After a few seconds of no measurements, this value returns to zero.
- The **2352R** is the signal to noise ratio of the speed recently detected. After a few seconds of no measurements, this value returns to zero.
- The **2** is the number of measurements recently detected.
- The **114** and **102** the baseline noise level. The upper number is the baseline noise level at 98KPH (61MPH). The lower number is the baseline noise level at 180KPH (112MPH).

Baseline noise levels. The baseline noise levels only update while transmitting.

- When **0** to **40** the radar gun was recently powered on. It may take up to 20 seconds for the noise level to stabilize the first time the trigger is pulled.
- The **40** to **180** is the normal range. Nominal **80** to **120** depending on the environment.
- The **180** or more, There is background noise that may affect the speed measurement.

## Scanning

The SG300A radar gun is designed to use while attached to a solid mount or hand held in a steady position. Moving or scanning the antenna past stationary objects can cause the system to detect motion and is considered deliberate

misuse of the system. Obtaining a speed reading from scanning will not happen when you properly use the radar.

## Tuning Fork Test

You can verify the signal processing accuracy of your radar gun with a tuning fork, which comes with it. Set the gun to Peak Speed mode. Pull and release the trigger. Tap the tines of the fork on a firm, non-metallic surface. The tuning fork will ring audibly. Then place the tuning fork with the narrow side facing about 3 inches directly in front of the antenna. Pull and release the trigger again. Compare the speed in the display to the speed stamped on the fork. If the difference is within  $\pm 1\text{mph}$  ( $\pm 2\text{kph}$ ), the radar gun is working properly.

The SG300A gun is extremely sensitive to movement. If the displayed speed is incorrect, repeat the test. Make sure you hold the gun and fork perfectly still. If the radar gun does not display the expected speed, contact Alzatex, Inc at [www.alzatex.com](http://www.alzatex.com) to arrange for service.

Only tap the tuning fork against hard plastic, wood and materials that are softer than metal.

Repeatedly tapping the tines on hard surfaces, such as metal and concrete, can damage the tines and invalidate the fork for future tests.

## Environmental Conditions

Fog, rain, snow, and blowing dust can reduce the detection range.

## Care, Cleaning / Storage

Avoid spilling food, beverages, and other liquids and substances on the radar device.

When you are not using or transporting the device, store it in its original packaging.

To clean the radar device, dust it with a soft clean cloth, which is free of cleaning solutions.

Remove the batteries when the radar gun is put into long term storage to prevent damage to the gun from corroding or leaking batteries

## Warranty / Repair

Two year limited warranty.

Alzatex, Inc guarantees the SG300A radar gun to be free from defects in workmanship and materials and to operate within specifications for a period of two years. During this period, Alzatex, Inc. will repair or replace, at its option, any component (excluding batteries) found to be defective, without cost to the owner, providing you return the SG300A radar gun to the warranty service center, Alzatex, Inc.

The full warranty on parts and workmanship does not include normal wear and tear.

Crushing, dropping, fire, impact. Immersion, or damage from attempted repair or modifications by unauthorized service agents.

For repairs, simply return the unit (transportation prepaid) directly to Alzatex, Inc. (the repair facility) by following the instructions in section Service Return Procedure.

## Service Return Procedure

If your SG300A gun has a problem, first see the Frequently asked questions (FAQ). If the problem persists, contact Alzatex, Inc. Our customer service staff will try to solve the

problem over the phone. If we can not, you will need to return your radar package in the original box, if possible. Please include a short note describing the problem. Be sure to include your name, phone number, and the address you want it returned to.

The customer is responsible for the shipping charges to send the system to Alzatex, Inc., the authorized service center. The Alzatex authorized service center does not accept COD shipments and will return ALL COD shipments to the sender, unpaid.

The Alzatex authorized service center will pay the freight (up to \$10.00 US) for shipping the radar gun from the repair facility to the customer, provided the radar gun is still under warranty. The customer is charged for any shipping charges above the initial \$10.00. If you want to ship your package express mail or next day air, you will be invoiced for the freight charges, even though the gun is still under warranty.

If your radar gun is out of warranty and you would like to know the repair cost prior to the actual work being performed, Alzatex, Inc will be happy to give you an estimate. In most cases, we will charge a flat rate of \$200.00 to repair your gun. In a few rare cases where serious damage has been done to the gun, the repair could be more expensive.

## Regulatory Requirements

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

This device may not cause harmful interference, and This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.  
Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

## Status Menus

This unit has several status menus.

- Tap the “**N**” button one or more times to display the various status menus.

### Power/Charger status

Charger/Battery status messages

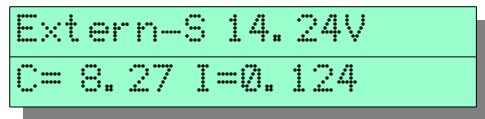
See details in the Charger section of the manual.



Power: External  
Charge Slow

### Power and charge voltages

- External power voltage **Voltage= 14.24V** if operating from external power.
- Battery voltage **Voltage= 8.65V** if operating from battery.
- Charge voltage **C= 8.27** while charging.
- Charge current **I=0.124** while charging.



External= 14.24V  
C= 8.27 I=0.124

### Internal power supply voltages

- The 5 volt power supply should be **4.95V-5.12V** nominal.

- The 3.3 volt power supply should be about **3.3V** nominal.

P5V = 5.02V
P3.3V= 3.31V

## SG300A version numbers

There are two software version numbers.

- The top number is the firmware version for the main PCB.
- The lower number is the firmware version for the power supply PCB.

Version V0.08A
0.15

## USB status

- Unmounted
- Mounted
- Unknown
- Number of audio files queued.
- Audio: Idle
- Audio: Paused
- Audio: Playing

USB: Mounted
Queued= 0 IDLE

## Error Level

The serial port baud rate must be set to 115,200 for the Error Level output to be sent on the serial port.

NOTE: When the power is turned off, the setting reverts back to the error level set in the **sg311.ini** file on the USB drive. To change this setting permanently, modify the **sg311.ini** file.

In this file the choices are:

- error level = error** (Normal)
- error level = debug** (Debug)

Changing the setting from the front panel.

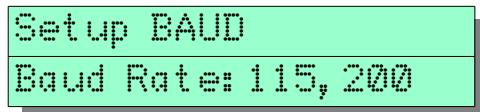
- Tap the “**Y**” button to toggle between the **Normal** and **Debug** settings.
- Error Level: Normal** This is the default. Only error/failure messages are recorded.

Error Level:
Normal

- **Error Level: Debug** Error and Debug messages are recorded. This is useful for troubleshooting various problems.



To see the Error and/or Debug information on the serial port, change the baud rate to 115,200. This is the only baud rate that sends this information.

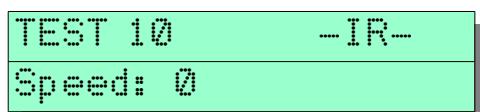


Send speed to the readout “111”, “222”, 333” - - - “999”, “000”. This sequence advances to the next number once per second, then repeats.



## Test and diagnostics

- Tap the “N” button eight or more times to display the **TEST** menu.



Send all segments lit to the readout “8.8.8”



## Readout Test

Once the Test menu appears, tap the “N” to send test messages to the readout. The Yellow LED indicates that the test mode is enabled.

The following messages can be displayed.

Send speed to the readout “123”

Send all blanks to the readout to make the readout go dark.

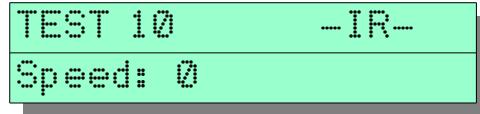


## Play Hello Message

A PA amplifier can be connected to the Audio output of the SG300A. A hello message can be played to a PA.

You can replace the default hello messages with your own custom messages.

- Tap the “**N**” button eight or more times to display the **TEST** menu.



- Press the “**UP**” button on the front panel to play various Hello messages. The file names are “**hello.mp3**”, “**hello1.mp3**” through “**hello4.mp3**”.
- Press the “**Down**” arrow button to exit the **TEST** mode.

## IR Remote Readout Test

IR Remote features while in the **TEST** mode.

- Press the “**UP**” and “**Down**” arrow buttons on the IR remote to increment or decrement and display the test speed.
- Press the “**0**” to “**9**” buttons on the IR remote to direct enter a test speed. Press the “**OK**” button to display the speed on the readout.

NOTE: If audio is enabled, the speed will also be played on the audio output.



## Exception Test

If the SG300A appears to freeze, an exception was detected, the error code will appear on the 4 LEDs. All functions will pause.

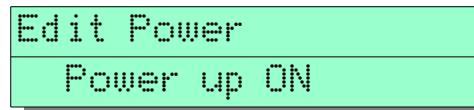
- Take note of which LEDs were lit.
- Tap the “Y” button to resume operation.

Test to verify that the exception processing is working properly.

- Tap the “Right” arrow button to generate an exception. All four LED should light.
- Tap the “Y” button to exit the exception test mode.
- Tap the “Left” arrow button to generate an exception. The GRN, YEL and RED LEDs should light.
- Tap the “Y” button to exit the exception test mode.

## Always ON Feature

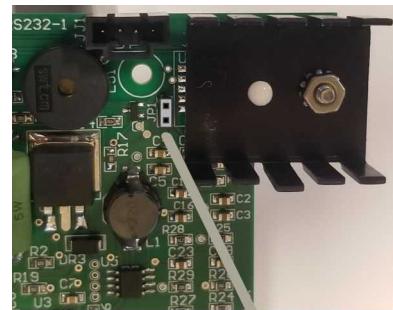
There are two ways to keep the power ON at all times. This feature is useful only when batteries are not installed and using external power to power the radar gun. To use this feature, enable the Default Power ON setting.



- Each time external power is applied, the radar gun turns ON.
- The power can still be turned off manually by holding the “N” button and can be turned ON using the “Y” button.

## Hardware Power ON

- In hardware, a jumper can be installed on the power supply PCB inside the radar gun. With this jumper installed, the power can never be turned OFF unless the power cord is disconnected. When using this feature, do NOT install batteries, otherwise the batteries will go completely dead unless external power is applied.



Install jumper on JP1  
Power always on feature

## Hide Settings

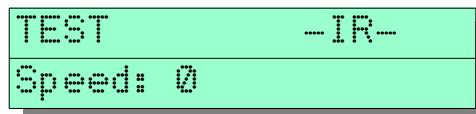
Certain settings can be hidden so that the user does not inadvertently change them to incorrect values. These settings can cause the display to not show the correct information.

When enabled, the following settings are hidden.

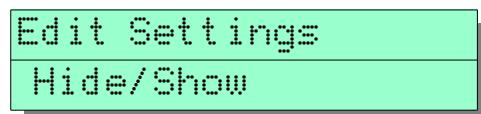
- Auto Power ON setting
- KPH/MPH
- Baud rate
- Serial mode
- Audio Modes
- Date and time settings

Changing the baud rate to the incorrect setting or changing KPH/MPH setting can cause the display to not show the desired information.

- Tap the “**N**” button eight or more times to display the **TEST** menu.



- Press and hold the “**Left**” arrow button to show the **Settings** **Show/Hide** menu.
- Tap the “**Y**” button to enter the **Edit** mode.
- Tap the “**UP**” and “**Down**” arrow buttons to enable or disable the Show/Hide mode.



- Press and hold the “**Y**” button to save the new setting.
- When setup is completed, tap the “**N**” button to exit the edit mode.
- To exit the Edit mode without saving, tap the “**N**” button twice.

## SG300A Specifications

- Nominal transmission frequency: 24.200GHz
- Range of frequency: +/- 50 MHz
- Effective range is 60 meters.
- Display accuracy +/- 1KPh
- Minimum distance of reading: 1 Meter
- Rated output: 8mW
- Maximum aperture power density: 1 mW / cm<sup>2</sup>
- Input voltage at oscillator: 5VDC
- Polarization: Circular Polarization
- Horn antenna: 7.5CM diameter.
- Input amplifier bandwidth: 15KHz
- Gain 23dBic
- Nominal horizontal beam width: 12 degrees
- Microwave source: Gunn-Effect diode
- Receive type: Schottky barrier mixer diode
- Product type: Stationary Doppler radar

- Computer processor: 80MHz
- Display type: Back lighted liquid crystal.
- Range 8-225KPH, 5MPH-140MPH
- Display Accuracy +/- 1 KPH
- Internal Accuracy +/- 1 KPH
- Sample rate: 45 updates per second

## Power Source

The SG300A can be powered from any one of several power sources.

- Built in battery holder inside the handle holds 6-NiMH AA rechargeable batteries.
- Powered from wall adapter. Corded power input: 11-15VDC nominal.
- Powered from readout over RS232 serial cable. One 15VDC power supply connected to the readout powers both the display and radar gun.
- Current requirements transmitting 0.36 amps, standby 0.20 amps, sleep mode 0.001 amps or less.

## Physical specifications

- Housing material: Metal enclosure.
- Weight: 1.9lbs (approx)
- Dimensions: 7.6" x3.25"x3.25" body. Handle 4.5" long. Handle plus battery holder is 6" long. Overall height with battery and handle 9" high.

*NOTE: Specifications subject to change.*

## Revision History

The version number appears for a couple of seconds each time the radar gun is powered up. The version numbers can also be displayed by tapping the “N” button 5 times.

The upper version number is the version of the JS311B PCB.

The lower version number is the version of the SG312C PCB.

### Version V0.01A.

Original as of 9/16/2023.

- First three prototype radar guns.

### Version V0.04B.

Revision as of 2/5/2024.

- Many features fixed and/or improved.

### Version V0.05A.

Revision as of 5/25/2024.

- Many features fixed and/or improved.

### Version V0.05C.

Revision as of 7/2/2024.

- Measurements are displayed right away. All of the delays have been eliminated.
- Added a feature that emulates the readout output to the from the HP2 radar gun.

### Version V0.05D.

Revision as of 7/15/2024.

- The SW version number can be displayed at any time, when desired.

### Version V0.06C.

Revision as of 9/10/2024.

- The method for finding the peak speed is greatly improved. This is particularly important to baseball since the speed slows after the ball is thrown.

#### Version V0.06D – 0.09.

Revision as of 10/6/2024.

- The power ON/OFF works correctly now.

#### Version V0.07E – 0.14.

Revision as of 12/20/2024.

- The always ON feature was added so that the radar gun turns on as soon as power is applied. This feature can be enabled or disabled with a setting.
- Improved the hide settings feature to hide additional seldom used settings.
- In the continuous mode, the actual speed is displayed, not the peak speed.
- Send only the first peak speed to the readout. Wait until the display times out before sending a new speed.
- Fixed the low battery function so that it properly displays Low Battery whenever the battery is low. The unit will shut off after one minute.
- The readout always shows the peak speed in the default mode. Added feature so that Peak and last can be shown on separate displays with user settable UNIT addresses.
- The Blue lamp function while transmitting was improved to flash when

- a signal is detected.
- If the SG300A appears to freeze, an exception was detected, the error code will appear on the 4 LEDs. Take note of which LEDs were lit. Tap the “Y” button to resume operation.
- Added a test to verify that the exception processing is working properly.
- Added a saved verification feature. Save initiated **Save**. Save completed **Saved**.
- Added a **Battery Full** Full status indicator.
- Improved the trigger button so that it does not wobble. Added springs to provide a more stable button.
- Unstable data has been eliminated during power on and off.

#### Version V0.07E – 0.15.

Revision as of 1/10/2025.

- The fast charge mode exits automatically if the battery pack has defective cells or is missing.
- The charger status menu updates every 4 seconds with the external power voltage, charge voltage and current when operating from external power.
- Battery percent of charge was added to the charge status menu.
- When the charger is in fast charge mode, the charger changes to slow charge mode

when a battery full condition is detected. Previously, the charger was staying in the fast charge mode even if the battery was fully charged. This was causing the battery to over heat.

- The Red LED fast flashing should only occur when the battery voltage is extremely low.

#### ***Version V0.08C – 0.15.***

Revision as of 1/23/2025.

- Added signal to noise ratio to the measurement that appears on the Interference menu and on the Serial details output.
- Improved the signal to noise ratio to detect weaker signals more easily.
- Added a feature to block a single speed. This is useful if there is interference at a specific speed. When enabled, the Red LED flashes whenever the interfering speed is detected.

#### ***Version V0.08D – 0.16.***

Revision as of 1/30/2025.

- When two radar guns are connected, the speed is recorded into the history file for every remote measurement in addition to the local measurements.
- Improvements to the battery charger.
- The product serial number is stored in software in addition to the external label.