

Proton Control User Guide

Introduction

This document will help you understand and use the smartphone app to get the most out of your Proton ball machine.

The apps for iPhone and Android can be found by searching for “Proton Control” in the App Store or Google Play stores. The Apple Watch app is included with the phone download, but depending on your preferences you may have to open the built in “Watch” app (from Apple) on your phone and select installation of Proton Control on your Apple Watch.

The Proton communicates with the iOS or Android device using Bluetooth, and requires a device that supports Bluetooth Low Energy. For an iPhone, this means an iPhone 6s or newer, and running iOS 12 or newer. Android phones from 2016 or newer should be OK. Apple Watch should be Series 3 or newer.

Pairing and Renaming

A connection must be made for each practice session. It is accessed through the “hamburger menu” in the top right, as shown in Figure 1.

If your Proton is powered on, you should then see the screen in Figure 2, which will list any Protons nearby by the last 4 digits of its serial number or custom name. It will also show the signal strength as an “RSSI” number. If the RSSI stays greater than -90 (for example -80) that should be sufficient to maintain connection, and the signal should be -60 to -70 when you are near the machine.

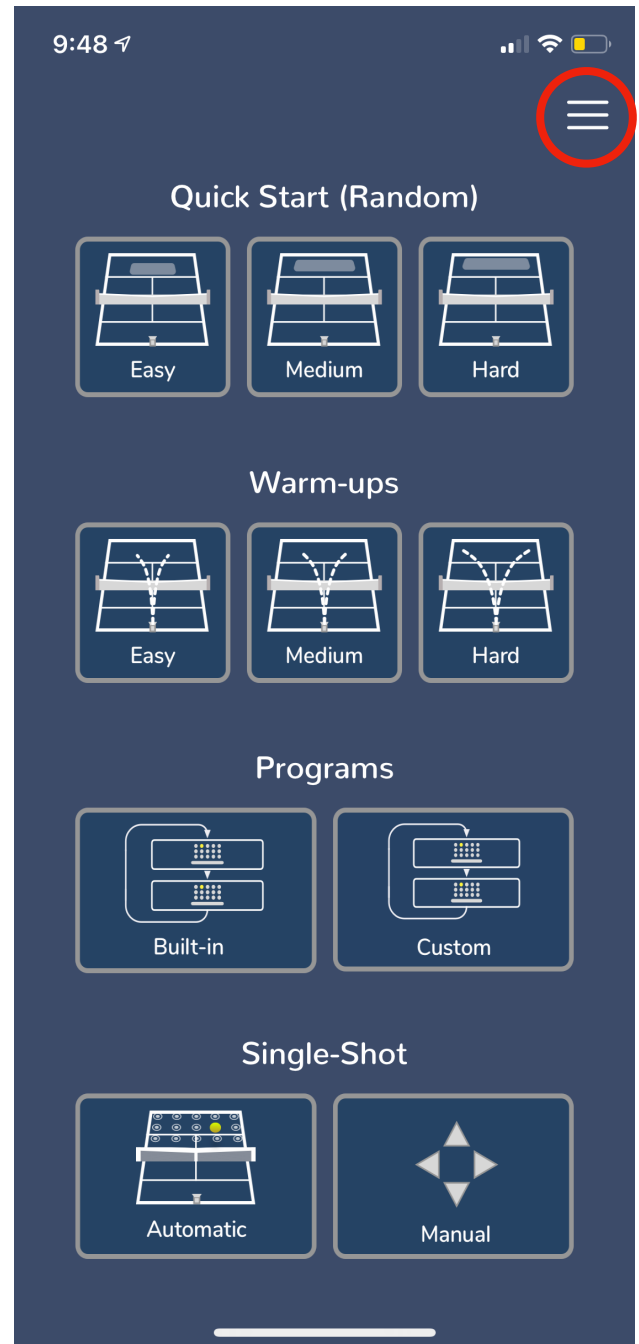


Figure 1. Start screen

Once you are connected with the Proton, the hamburger menu will turn green, and you may access “settings/rename Proton” in the hamburger menu again to give your machine a custom name.

Once the Proton is running the bottom menu bar will show **PAUSE** and **STOP**. The **PAUSE** button will keep the throwing wheels spinning and the machine aimed for the next shot. The **STOP** button will stop the throwing wheels and park the Proton back in the home position.

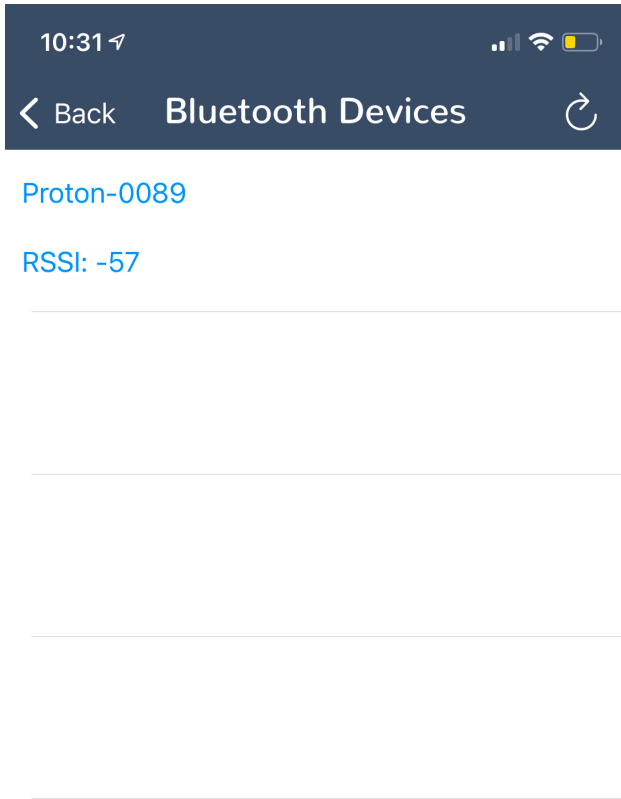


Figure 2. List of available devices.

After pairing, you will return to the previous screen, in this case the start screen. From there, you can start using your Proton.

Quick Start

The top row of icons on the start screen are for quick start, as shown in Figure 1. The quick start programs are a series of shots already stored on the Proton. Simply press the **START** button and the machine will randomly cycle through those shots, after an initial delay of about 10 seconds.

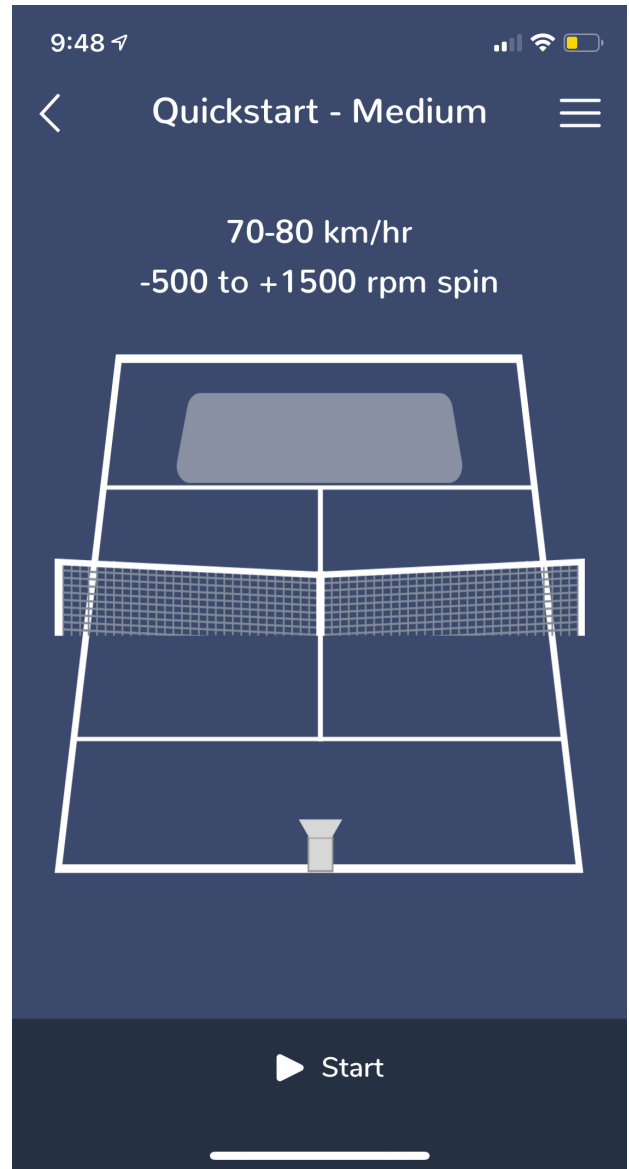


Figure 3. Quick start

Built-In Programs

“Programs” are sequences of shots that can be played repeatedly. Within the app, programs can be accessed through the **BUILT-IN** and **CUSTOM** selections on the start screen. The **WARMUP** buttons on the start screen also take you to 3 built-in programs that you may wish to access frequently.

Programs List

The App comes with a number of built-in programs as a starting point. Tap any program and you will be taken to the shot list for that program. These cannot be edited, but the built-in programs can be copied to serve as a starting point for your own custom programs.

The number in front of a program name tells the number of shots in that program.

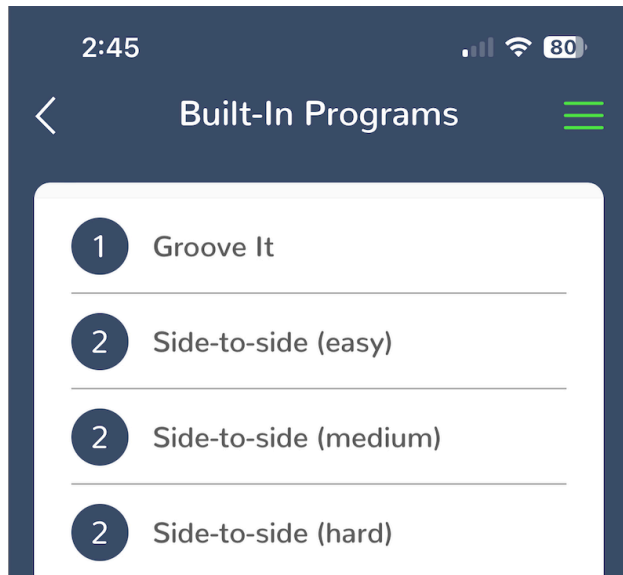


Figure 4. Program list

Copying Programs

Any program can be copied with a long press on the program name. Navigate to the custom program list and long-press on another program to paste in what you have copied.

Shot List

Selecting a program will take you to the shot list of which it is comprised.

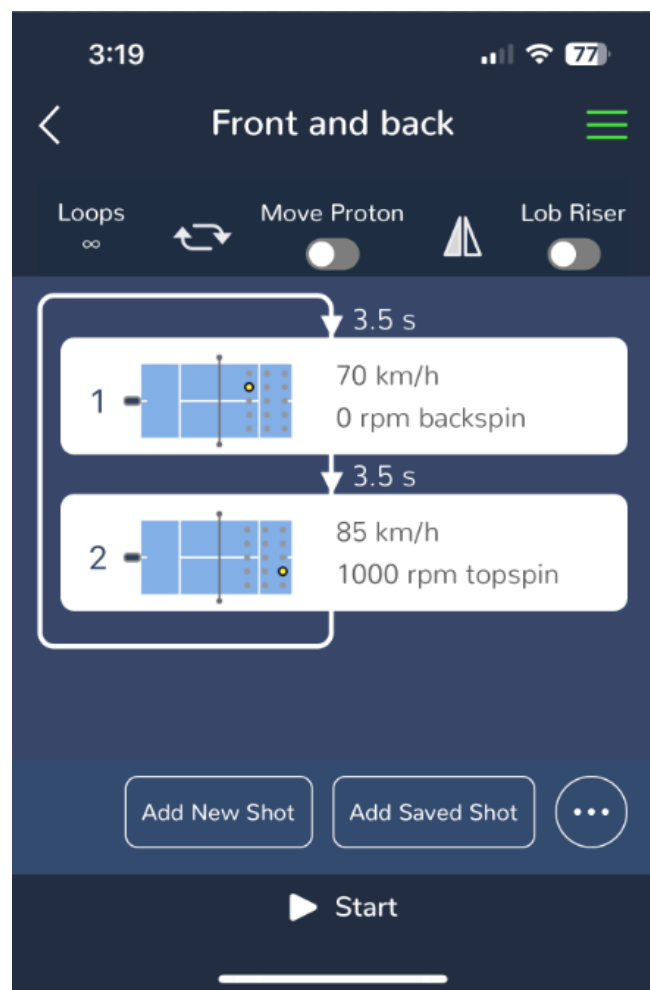


Figure 5. Shot list

Each shot is listed with an icon to show where it will land, the speed and spin for the shot, and

the delay before the shot. In the shot location icon of Figure 6 you can see the Proton (here at the baseline hash mark) and a yellow dot to indicate where the shot is targeting.



Figure 6. Shot details

Above the shot list is a toolbar with 5 options for modifying your program.

Looping a Program

By default, a program will loop continuously until the hopper is empty, but the leftmost icon in the shot list toolbar of Figure 5 can be used to modify this behavior. Tap on the “Loops” button to select another value. If you select 10, for example, the Proton will execute the program 10 times (20 balls for a 2-shot program) and then stop.

Sequential or Random

The second icon in the toolbar toggles between sequentially playing the shots in your program (the normal mode) and having the Proton play them in a random order. Please note that the Proton needs time to move between shots. If the required time to move or change wheel speeds is greater than the shot delay, the shot list will highlight an error. The required delays are verified in advance for a sequential program, but if in a randomized version there is not time to move directly from shot 1 to shot 4, for example, you will never see shot 4 following shot 1.

Moving the Proton Location

The center icon in the shot list toolbar toggles the “Move Proton” option. This is unavailable for the built-in programs, but is enabled for custom programs. When selected, the Proton can be placed at one of 5 positions. 3 along the baseline, one at the service T and one about 3 yards behind the baseline center. As long as you let the app know where the Proton is located, it will adjust the aiming angles to correctly target the shots. Note that if you change the location of the Proton, shots which were previously valid (i.e. in the court) may no longer be feasible and will require editing before the program can be run. An invalid shot is outlined in orange.

The service T option is a great one for beginner players, as the ball will come across the net much more softly. Behind the baseline is a useful option for higher shots such as lobs.

Mirror

Toolbar icon 4 is the mirror toggle. It is only available for programs where the Proton is on the center axis of the court, and will flip shots from the forehand side to the backhand side, so a program created for mostly forehand practice can easily be used for backhand practice. The location of the shots will be reflected in the shot icon. For the warmup sequence, this doesn't change anything except the first shot, as the program simply alternates from forehand to backhand.

Lob Riser

The final shot list option is for the lob riser. The lob riser is a physical piece of plastic that is installed under the front foot to raise the Proton

for lobs. When the lob riser toggle is turned on, the Proton will adjust all the altitude angles to account for the extra height.

The lob riser adds 7 degrees to the minimum and maximum altitude that machine can achieve, so programs that shoot hard balls at a low angle may be unable to execute. In general there is no need to install the lob riser, except to practice lobs. You can still do non-lob shots with the riser if they are not too low, but note that it takes time to transition from maximum height to minimum height, so you cannot necessarily shoot a lob followed immediately by a passing shot.

Custom Programs

One of the great powers of the Proton is the ability to quickly make complex custom programs to suit your personal taste. To do so, press the **CUSTOM** button on the start screen. From the custom program list, press enter your program name. This will create an empty program, which you can tap to begin creating. Press the **ADD SHOT** button to add a shot, and you will see the add shot screen shown in Figure 7. This is where much of the magic happens.

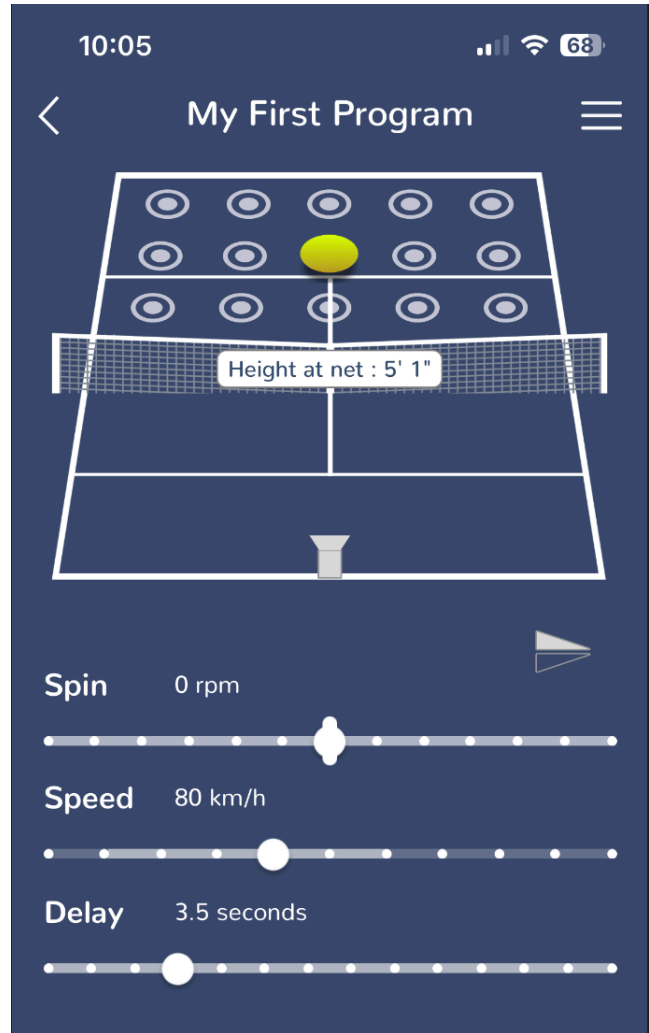


Figure 7. Add shot screen.

An alternate way to start a custom program is to “long press” on a built-in or another custom program and select copy. Then long press somewhere on the custom program list and you can paste it in as a starting point.

Speed, Spin and Location

To start, tap one of the 15 shot locations on the screen. Next, select the spin you would like. Most recreational players will hit with 1000 rpm or less, but if you want to try a heavy pro shot,

the Proton can go to 3000 rpm topspin or backspin. Then select the speed. You may notice that the sliders are not always enabled across the full range. This is because not all shots can be realized at every spin and speed. In the example screen of Figure 7, with no spin, the ball needs to be at least 65 kph to reach the center of the court.

Delay

Finally, after the shot parameters are set, choose the delay. This will set the delay *before* the shot you are editing, so if it is the first shot of the program it will be the delay after the programs final shot, when it loops back to play the first one again.

You may notice that not all delay options are available. The Proton naturally has limitations on how fast it can move up and down and left to right, as well as how fast the wheels can change speed. Once you have multiple shots in your program, some delay may be required to move between shots, including from the last shot back to the first. Experiment and you can find good combinations that stay within the physical constraints of the machine.

Save Shot

Be sure to save each shot if you like it. The back arrow will not keep your changes.

Manipulating the Shot List

Once your return to the shot list of Figure 5, there are some further editing possibilities. Tapping the circle with 3 dots in the bottom right will allow you to drag and drop shots for re-ordering or delete them.

Swiping left on a shot in the shot list (swiping right in Android) will delete the shot.



Figure 8. Custom program list

Fully Custom Shots

Most programs can be created using the built-in locations and speed/spin options. If you want something else, however, you can use **Manual Mode** (see below) to create any combination of angles spins and speeds that the Proton allows.

These custom shots can now be mixed into standard programs.

The list of custom shots can be accessed from the hamburger menu. Shots can be fired from the custom shot page either for testing, or to manually feed for training. If, for example, you wanted a very soft feed, you could place the proton on the same side of the net with you, turn the speed down to 30 kph and adjust angles to get the ball you wanted.

Single-Shot Automatic Mode

The single shot automatic mode is intended as an on-demand feed for coaches. They can quickly select shot parameters, and then press the **FIRE** button each time they want a ball fed. The Proton will pre-load balls into the firing chamber, so the shot is nearly instantaneous when you press **FIRE**. In this way the coach can work next to the pupil without having to hand feed from across the net.

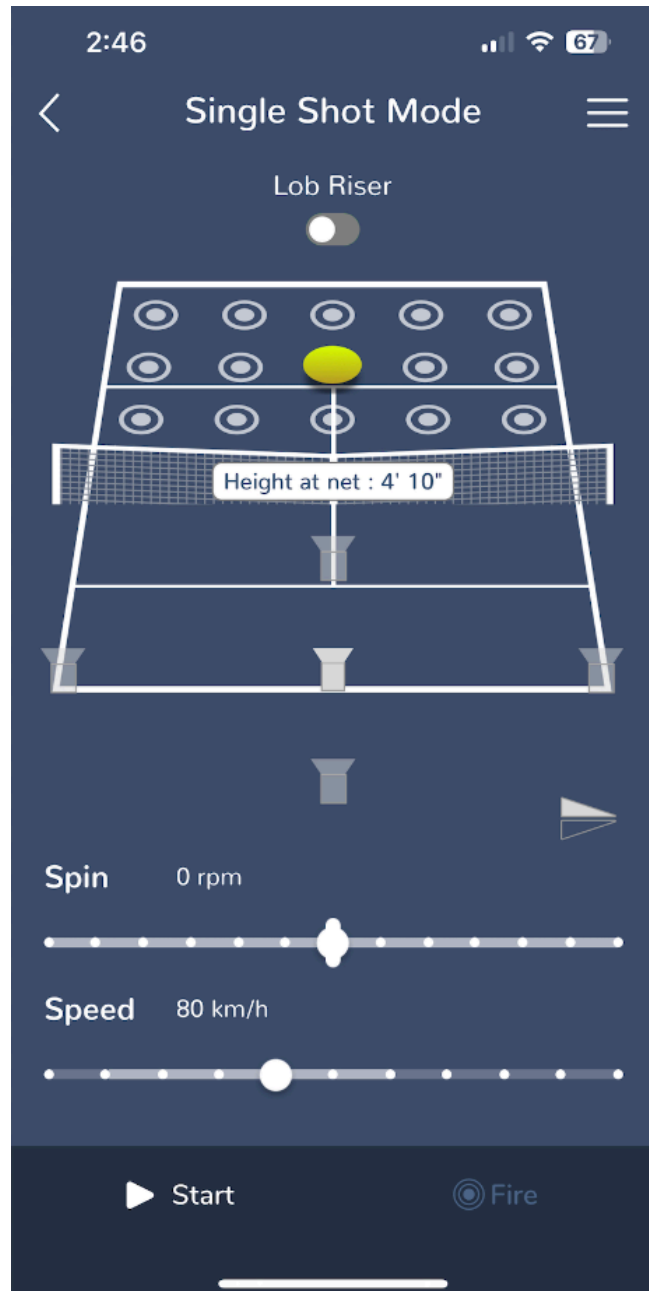


Figure 8. Single Shot Mode.

Each of the 5 Proton locations is also available within single shot automatic mode, as shown by the 5 Proton icons in Figure 8.

Single Shot Manual Mode

Manual Mode can be handy to debug your machine, but also gives you complete control over the machine for custom shots. You can use the full range of the Proton without concern of where the shot goes.

Perhaps you want to throw tennis balls for a little-leaguer, or launch balls for your dog. Shots created via Manual Mode can now be saved for use in your own programs. Note that **ALTITUDE** (up/down) and **AZIMUTH** (left/right) will move the machine immediately, but you have to press the **START** button to get the wheels turning.

Manual mode will also provide an estimate for how far your shot will travel, and the height at which it crosses the net (assuming it starts at the baseline).

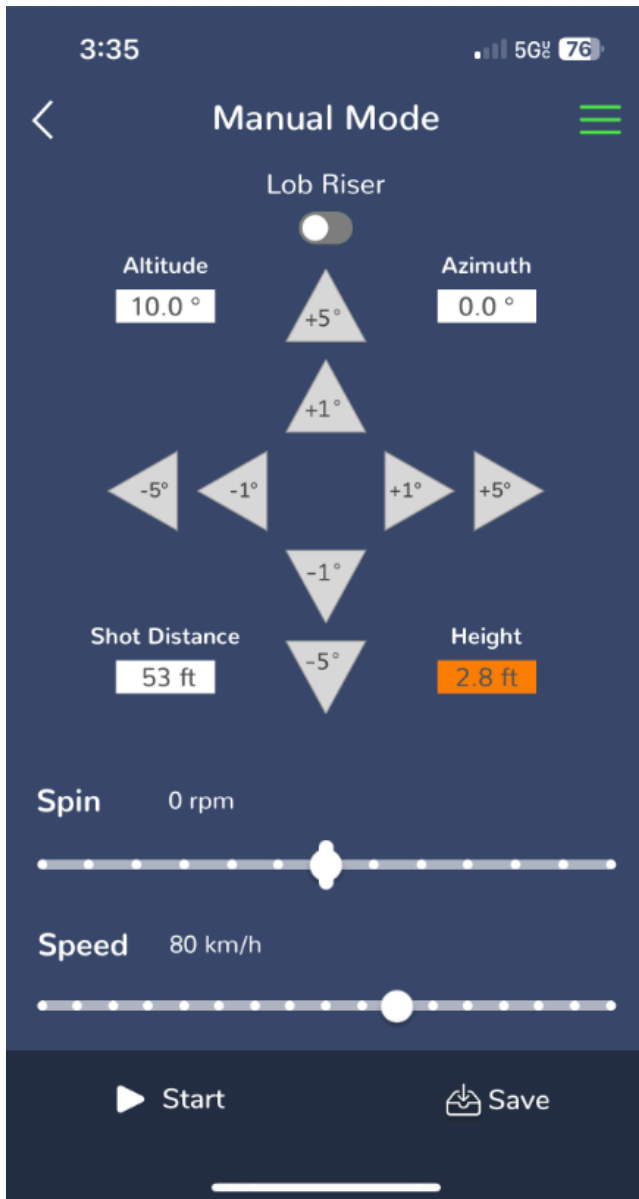


Figure 9. Manual mode

Calibration

If you find the Proton is shooting consistently too deep or shallow, or perhaps shifted to one side, the calibration menu (from the “Hamburger Menu”) can be used to fix it. If the Proton is paired, select **CALIBRATE PROTON**.

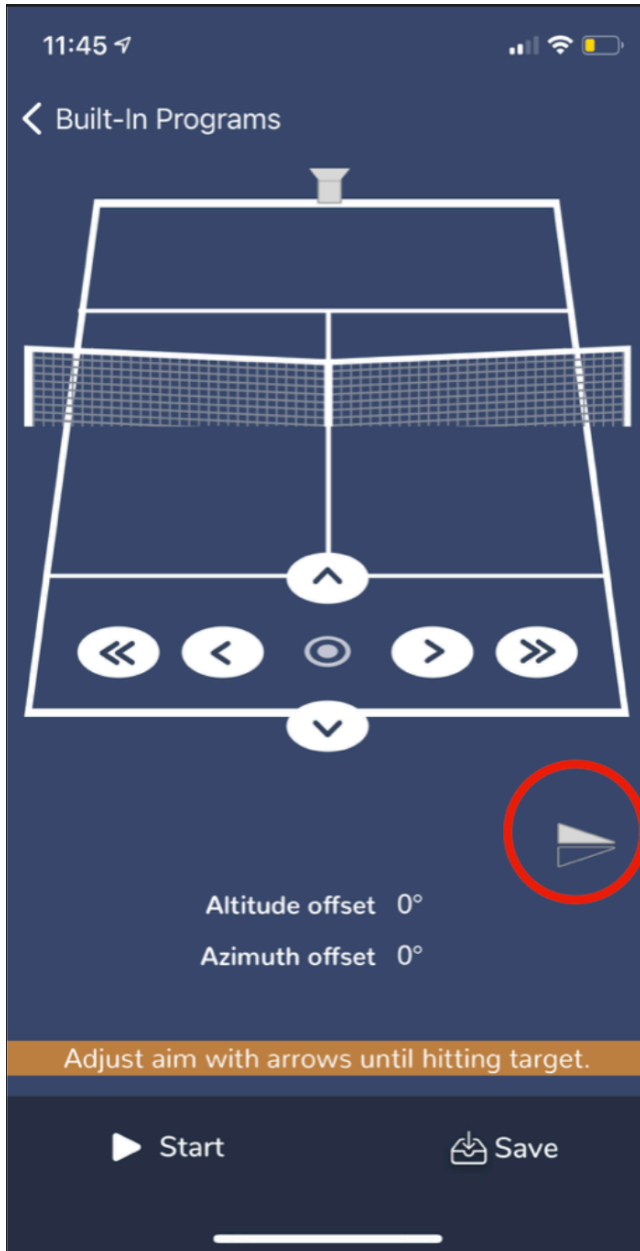


Figure 10. Calibration

You have to press **START** to activate the Proton, but at that point the up/down left/right arrows will move the machine to adjust the aim. Press **FIRE** to shoot a test ball and get it to land approximately on the target. The “Flip court” icon can be used to adjust the image to match where you are standing relative to the machine.

The target is just a guideline. If you find the balls you like to practice with are going too deep, then adjust calibration to make them shorter and vice versa.

The left/right calibration will not be saved between sessions, but the altitude calibration will persist after the machine is powered down.

Other Settings Options

The settings page is accessible from the hamburger menu and provides access to additional options.

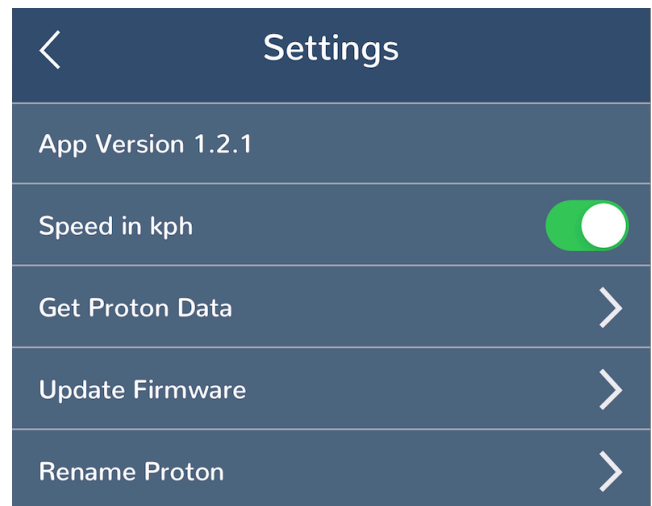


Figure 11. Settings

Get Proton Data

The **GET PROTON DATA** menu will let you see some important information about your Proton, including the serial number, firmware version, battery percentage, app version, and your total number of shots fired in the life of the machine.

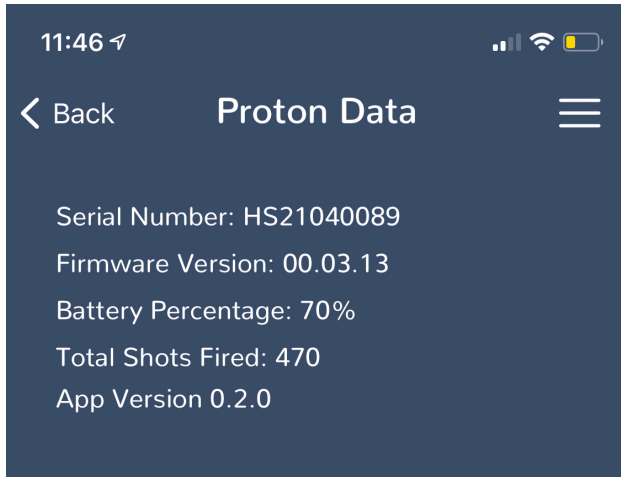


Figure 12. Get proton data.

Update Firmware

As new features are added to the Proton, they are often enabled through firmware updates. Firmware is the code which runs on the machine itself (not the app) and so needs to be uploaded from the app to the Proton. This is an opportunity to scramble the brains of your Proton, so please follow the on-screen instructions carefully and don't power cycle in the middle.

In general, you will want to use the highest revision number firmware. Older versions may be provided in case there is an unknown issue and you need to revert to an older build.



Figure 13. Firmware Update

Controlling Shot Height

Once you set the location, spin and speed for a ball, the trajectory is fully defined. If you would like the same shot location but lower, for example, you have to increase the speed or reduce topspin. Speed has the most dramatic effect on height, but spin plays an important part. If you add a lot of topspin to a shot, but keep the same target location and speed, the Proton will automatically increase the altitude (rise up) to compensate. To the same location, a shot with backspin will fly lower than a shot with topspin, just like when you play with a partner!