BUTTERFLY

AMICUS PRIME

Table Tennis Robot
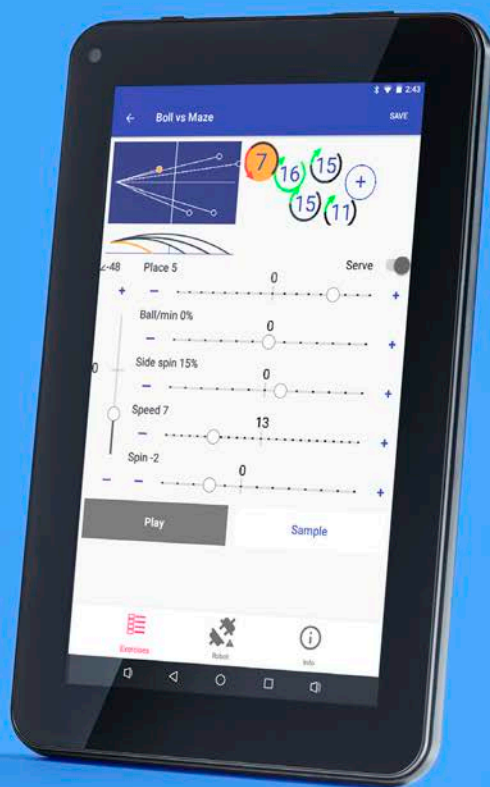
AMICUS PRIME TABLE TENNIS ROBOT

- State of the art 3-wheel ball delivery technology provides all types of spin.
- Rigid sponge wheels with a special coating for longer durability.
- Lightweight and easily transportable. Weighs approximately 6 kg (13 lbs.).
- Random features include natural scattering of shots, random placement, or both!
- Randomize placement of individual balls within an exercise.
- Programmed or random delivery of balls with different spin, speed, placement, and trajectory.
- Start exercise with serve, which inserts a natural pause before each repetition.
- Limitless memory places, including 21 pre-programmed exercises from Richard Prause.
- Videos showing top players demonstrating each pre-programmed exercise, or add your own.
- IFC (Individual Frequency Control) function for more natural timing of balls in an exercise.
- *Mirror* switch to quickly change exercise for either right or left handed player.
- Alternate play and break periods (interval training) with the Cycle function.
- 3rd Ball Attack Training with serve detection to know when to play the first return.
- This manual also available onscreen on the tablet.

Covered by a full 2-year Manufacturer's + 1-Year Distributor's Warranty (North & South America only) and 5-year guarantee of parts and service availability. See full warranty information on page 32.

CAUTIONS

- Please read this Owner's Manual carefully before using the machine.
- This machine may only be connected to 100–230 V current.
- The ball throw wheels rotate at high speed. Avoid touching the wheels during operation!
- Use this product only in enclosed and dry rooms.

Used properly, your Amicus Prime will always be a great training partner and friend (*Amicus* is Latin for *Friend*).

Edition 2, August, 2020

IMPORTANT: Please read instructions carefully prior to use!

CONTENTS

1. SETUP

a. Robot and Net Assembly
b. Power Supply (Input: 100 – 240 V, Output: 24V DC, 2.7A)
c. Tablet
d. Tablet Cable
e. Tablet Power Supply
f. Control Panel Bracket
g. Remote Switch Fob
h. Plug Adapter (if applicable)

Other parts: Hex wrenches (2 and 4mm) for wheels, Wheel Adjustment Gauge (black tube with fins), spare rubber bands for Side Nets, Velcro strips. Repair White Strips for repair of Deflector Plate.

1. Place the robot on top of your table tennis table. Fold apart both sides of the net at the same time until the first stop (Photo 1A). Rotate towards you the curved Support Legs into the position as seen in Photo 1B (about 15–20 cm, or 6–8 in. apart).

2. Rotate the entire robot 180° with the Support Legs facing away from you. From behind, grasp the robot with both hands on the bottom of the Base. Pick up the robot, angle the Support Legs downward, slip them under the end of your table, and push the robot onto the end of the table. Gently let go of the base and the robot will hang by its own weight as seen in Photo 2.

    Please note that Amicus robots can fit tables with tops 9mm to 25mm thick. To adjust, unscrew the rubber tip on each Support Leg by an amount equal to the difference between 25mm and the thickness of your tabletop. E.g., if your tabletop is 19mm thick, you will need to unscrew each rubber tip 6mm (25mm–19mm). When correctly adjusted, your robot should be level and plumb (vertical). Occasionally the screw underneath the rubber tip becomes stuck. To free, remove the rubber tip and turn the screw with a hex wrench or pair of pliers.

    CAUTION: Please use the included longest Velcro strip to help secure the robot to the end of the table. This is especially important if children play around the table. The Velcro strip helps stabilize the robot to prevent it being knocked off the table.

3. Loosen the large Black Knob found on the rear of the Ball Tube. Rotate the head 180° and then pull the head upwards until the 3rd coloured ring on the tube is just visible (Photo 3A), then tighten the Black Knob to hold it in place (but not too tightly). Lastly, fasten the Head Cable coming from the head to the serial connector found on top of the Base (Photo 3B).
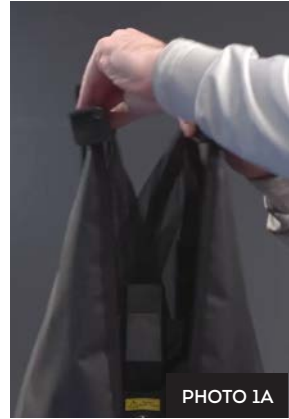

PHOTO 1A

Support Legs   PHOTO 1B

PHOTO 2

Black Knob

PHOTO 3A

Head Cable

PHOTO 3B
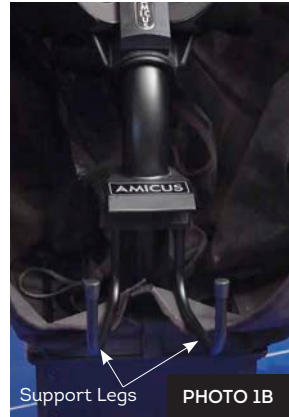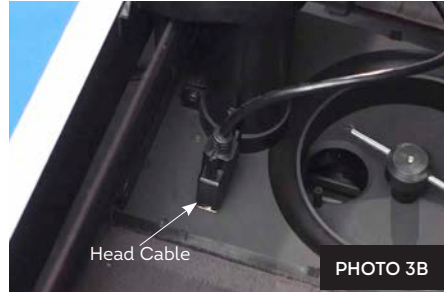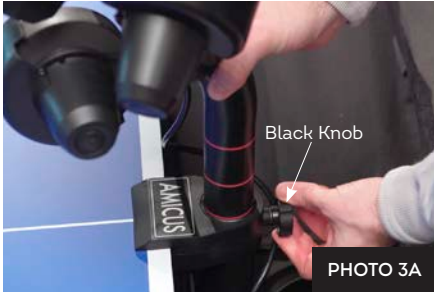
4. Standing behind the robot, grip the top of the net and fold the net down on both sides until the net fully opens (as seen in Photo 4A). Fit the Net Corner Brackets around the corners of your table as seen in Photo 4B.

PHOTO 4A

Net Corner Bracket

PHOTO 4B
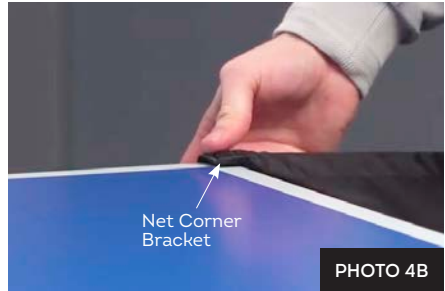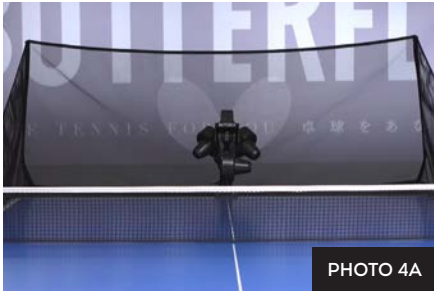
NOTE: We recommend attaching the two shortest Velcro strips to the corners of your table under-neath the Net **Corner Brackets** to help the brackets stay down and stabilize the entire net.

5. Pull a side net along the sideline of the table and pass its thick rubber band *over the top* of the table's net standard (see Photo 5A). Then wrap the rubber band around the Clamp Screw that holds the net onto the table. Attach the Side Net's Velcro tab to its matching piece located on the Net Corner Bracket as seen in Photo 5B.

Pass band over net standard

Wrap band around clamp screw

PHOTO 5A

Secure Velcro flap here

PHOTO 5B
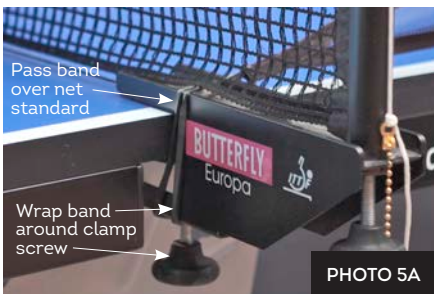
6. Plug your Power Supply into a power outlet and then into the power socket on the side of the Base (See Photo 6). Attach the Tablet to the Control Panel Bracket and slip it onto the side of the table closest to your free hand. Adhere a long Velcro strip to side of table to prevent bracket from slipping off. Lastly, connect the Tablet Cable from the 3.5 mm socket (next to the power socket) to the USB-micro port of your tablet.

Plug Tablet Cable here

Plug power cord here

PHOTO 6

2. TABLET

PHOTO 7
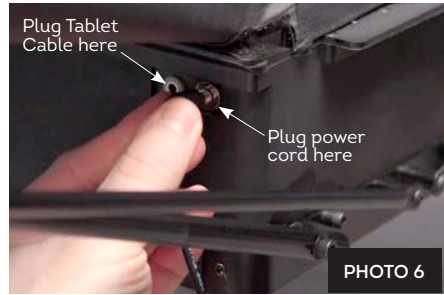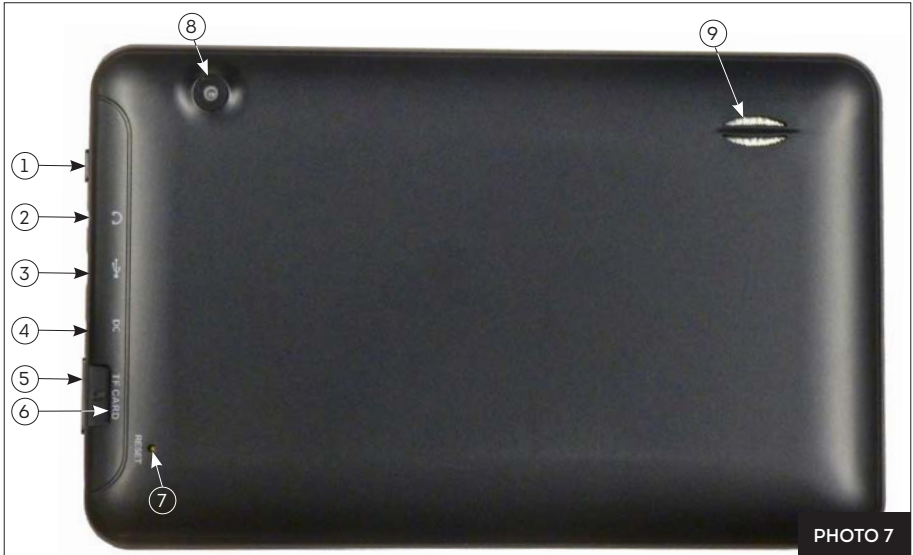
1. Power Button – Used to turn the tablet on and off. Hold down for a few seconds. Brief press to put tablet to sleep.

2. Headphone Jack – Connect headphones or earphones here. Not used for Amicus operations currently.

3. Micro USB Port – Can be used to charge tablet from robot with provided Tablet Cable, or alternatively, charge the tablet by connecting it to a user-supplied USB Charger..

4. DC Power Port – Plug the provided Tablet Power Supply into a power outlet and then into this port. This keeps the tablet's battery charged. If unplugged, tablet has approximately 4 hours of battery time when new. We recommend leaving the tablet plugged into power to prevent the Power Saver function from turning off the screen during play.

5. **Volume Button** – Press left side of button to turn volume up and right side to turn volume down.

6. **TF Card Slot** – Insert a TF or micro SD Card here to increase storage capacity of tablet, backup custom exercises, or transfer exercises when there is no internet connection.

7. **Reset Hole** – Insert paper clip here to reset the tablet.

8. **Rear-Facing Camera** – Currently unused by Amicus, but can be used for Android operations.

9. **Speaker Outlet** – For best sound, do not cover this outlet.

10. **Front-Facing Camera** – Currently unused by Amicus, but can be used for Android operations.

3. OPERATION

NOMENCLATURE

To assist in clearly communicating the various features of your robot, it is necessary to define how we refer to certain elements. Here are various terms used throughout this manual:

Ball Type – 4 controls affect Ball Type: Spin, Speed, Sidespin, and Trajectory.

Ball Placement – the left/right location where a ball lands, determined by the Place control.

Basic Ball – the ball thrown when the original *Default game* exercise is selected.

Current Ball – the ball that is currently selected as indicated by an orange circle.

Ball 1-10 – refers to the Ball Indicators (white circles) located along the right side of the table diagram. The ball furthest left is Ball 1, and each successive ball to the right would be named Ball 2, Ball 3, etc..

Exercise – a series of between 1 and 10 balls. Also called drill, program, or rally.

Sequence – 2 or more exercises linked together, usually as a training routine, previously called Cluster.

1-4 Rings – how the head height adjustment is described. E.g., *3 rings* would mean the head height is adjusted so 3 rings (painted on the Ball Tube) are visible (see Photo 8).

ADJUSTMENT OF HEAD HEIGHT

On most table tennis robots, head height cannot be adjusted. In contrast, Amicus robots offer 4 different heights to better simulate realistic play. It is quite easy to adjust the head height. From behind the net, push the top of the net down to reach over it. Grab the curved ball tube with one hand and loosen the large Black Knob with the other hand (see Photo 8). Pull the tube up or push it down to adjust head height. Lock it in place by tightening the Black Knob just enough to hold the head in place.

IMPORTANT: Before tightening the Black Knob, be sure one of the painted rings is right at the top of the lower tube (see Photo 8). Be careful not to tighten the Black Knob too tightly — you can dent the tube if tightened too much. Failure to adjust correctly can result in ball jams, double throws, missed throws, and other ball feed issues.

Black Knob

Adjust height so lowest ring is barely showing

PHOTO 8
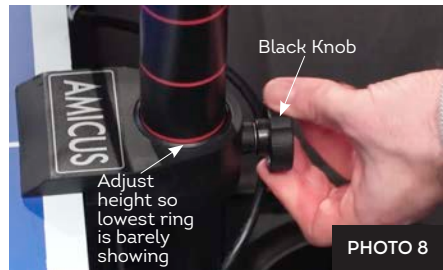
SETTING UP YOUR TABLET

Before beginning play on your robot, it is best to connect your tablet to the internet and set your local time. Hold down the Power button on the tablet until the screen turns on and then let go of the button. Soon you should see the Amicus logo appear and then the Exercise List.

Touch ◉ at bottom to go to the Home screen. Next, touch 🔢, and then the Settings icon. The first setting is Wi-Fi, press it. Then tap on your preferred Wi-Fi network. Type in your password (if required), and tap **Connect**. You should see *Connected* in the Wi-Fi list underneath your selected network.

Go back to the Settings list by pressing ← at the top left of the screen. Select **Date & Time**. Then select your time zone. Next, verify *Automatic date & time* is set to *On* (if you don't have internet access, you can set time manually). Touch ■ at bottom right and then tap the Amicus window to return to that app.

Next, verify you have the latest version of the Amicus app by touching *Info* (ⓘ) at bottom right. At top of resulting screen, touch **Check For Updates** (requires internet access). If an update is available, a pop-up widow appears. Tap **Update**. After the update is downloaded, a new popup appears. Tap **Install**. If no update is available, the message, *Is currently the latest version* briefly displays at the bottom.

Lastly, connect your robot to your tablet using its Bluetooth connection. At the bottom of the Amicus app, verify that the **Robot** icon shows a connection (📡). If it shows unconnected (📡), click on that icon, and look for *Amicus BTLE* in the Connection Manager. Then touch **Connect** to establish a connection between robot and tablet. If you have trouble making a connection, please verify that your robot is powered on and that *Location* and *Bluetooth* tabs in Settings are both turned *On*. Then return to the Exercise List by pressing **Exercises** (📃) at the bottom. To troubleshoot the connection, see page 19.

ALIGNING THE ROBOT TO THE CENTERLINE

After completing Setup on pages 4–6, place about 50 or more 40 or 40+ balls (use one or the other, but do not mix them together) into the Ball Collection Tray. Grab your racket and prepare to return balls from your robot. In the Exercise List, tap *Default game*, and then **Play Exercise**. Basic Balls are delivered along the centerline. Observe where balls land in relation to the centerline. Press **Stop Exercise**. If balls are not delivered on or very close to the centerline, loosen the Black Knob on the rear of the Ball Tube (see Photo 8) and rotate the head in the direction necessary for balls to land closer to the centerline. Repeat until all balls are landing very close to or on the centerline, and then stop ball delivery.

BALL SCREEN

Staying in the *Default game* exercise, press ⑬ (see Photo 9). It turns orange and opens the Ball screen where you can adjust the settings for that ball (see Photo 10):

Place determines the left to right placement of the ball. Hold down the slider handle and move it back and forth. Notice that the ball's position on the diagram at the top moves left and right across the table diagram in response to this setting. "0" corresponds with a centerline placement, -8 with an extreme angle off the left side of the table, and 8 with an extreme angle off the right side.

Ball/min % (aka, Individual Frequency Control, or IFC) delays or quickens the timing between balls. After setting Ball/min to your liking, use this control when the timing between any two balls is too little or too much. For example, an exercise with a slow, short back-spin serve followed by several fast topspin shots. Or, an exercise with several fast topspins followed by a slow, high popup. A "0" set-ting means that the timing between balls is as set for Ball/min. Add more time after a ball by using negative settings (this reduces the Ball/min setting for that one Ball) or reduce the time after a ball by using a positive setting (which increases Ball/min for that one ball).

PHOTO 9

Sidespin changes the orientation of the spin on the ball. The "0" setting means no sidespin. Every step from "0" represents a 15° change in orientation. Settings to the right of "0" are degrees of right sidespin and to the left are degrees of left sidespin.

Speed determines how hard the ball is thrown. A setting of 1 means the speed is very slow and 25 means it's very fast, with 13 being the default speed in the middle. Please note that the number in the middle of the circle (that represents this ball) changes in response to this setting. So a 13 in the circle means a speed of 13 and a 25 means a speed of 25. The effect of this setting is shown on both the top view and side view diagrams of the table.

Spin determines if the ball has topspin, backspin, or no spin. "0" indicates no spin (dead ball) and the circle is coloured gray. Positive settings mean degrees of topspin with 1 being very light topspin, and 7 being extremely heavy topspin. As topspin is increased, the

PHOTO 10

circle shows a longer and longer green arrow in a clockwise direction. Negative settings mean degrees of backspin with -1 meaning light backspin and -5 meaning very heavy backspin. A longer and longer red arrow around the circle in a counterclockwise direction indicates increasing amounts of backspin.

Trajectory is the vertical slider along the left side of the screen. This sets the throw angle of the ball. A "0" setting indicates a ball thrown straight out with only a slight upward angle. When this slider is moved upward, the robot will throw the ball increasingly higher. And when this slider is moved down-ward, it means a lower throw angle. The lowest settings are used to make the ball bounce first on the robot's end of the table (a serve). Its effect is shown on both the side view and top view diagrams.

The **Sector** switch lets you set a range of Placements (see Place) for a ball. For example, instead of specifying a ball thrown to Placement 4, you specify a range of ±4, which would tell the robot to throw a ball randomly anywhere in the right court.

To activate Sector, please see Photo 11. The Sector Switch is turned on and there are now 2 slider but-tons in the Place control instead of one. Move these two buttons to select the range for the placement.
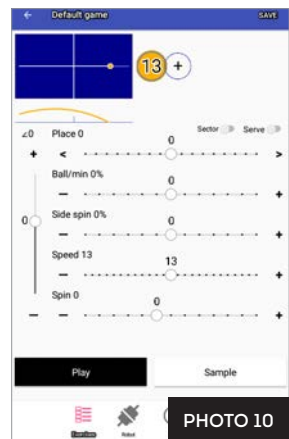
In Photo 11, the range has been set to 4 ±4, which results in that ball being thrown randomly anywhere between Placements 0 and 8. As the buttons are moved back and forth, the Place setting (given directly underneath the side view diagram) changes accordingly.

When Sector is turned on, the ball icon ⑬ has a gray line running through it (Photo 12). Its length provides an approximate width of the range. You also see the gray line in the Exercise List (Photo 13):

IMPORTANT: Sector overrides Random Scatter and Random Place functions (explained in *Exercise Screens,* page 11). If any ball in an exercise uses Sector, the Random Scatter and Random Place functions won't work until Sector is turned off.

The Sector range must be set in increments of 2 units because it is given as equal plus and minus values from a midpoint. For example, you cannot select a range from 0-7. You would need to select 0-8 (4 ±4), 0-6 (3 ±3), or 1-7 (4 ±3).

The **Serve** switch can be used on the first 3 balls of an exercise. When switched on, it introduces a 1.5 second delay before that ball. This simulates the normal pause that occurs before the serve in an actual game. If more than one Ball is designated as a Serve, then the robot automatically picks one of those Balls and starts the Exercise with that Ball. Balls designated as Serves are coloured pink.

For example, let's say Ball 1 is thrown to the backhand, Ball 2 is thrown to the center, and Ball 3 is thrown to the forehand. All 3 balls are designated as Serves. For the 1st repetition of that exercise, there is a 1.5 second delay, Ball 1 is served to start the exercise, and then that Serve is followed by all other programmed balls not designated as Serves. The 2nd repetition will also have a 1.5 second delay, then start with Ball 2, and followed by all other balls not designated as Serves. The 3rd repetition will follow a similar pattern except its serve will be Ball 3. The 4th repetition uses Ball 1 as the serve. However, if Type RND is turned on, the serve is selected at random to start each repetition of the exercise instead of following the exact order as just described.

Underneath all the sliders are 2 buttons, **Play** and **Sample**. To test your settings for a ball, tap **Sample**. It changes to Stop Sample and samples of the Current Ball are repeatedly thrown at the rate determined by the Ball/min setting. When you finish sampling the Current Ball, touch Stop Sample. Repeat until the Current Ball is to your liking. Use Sample to throw *only* the Current Ball.

When you touch **Play**, you are switched to the Stop Exercise screen. Balls are thrown out in order from Ball 1 to however many Balls are in that exercise (unless Place Random is selected.) Use Play to throw *all* balls in an exercise.
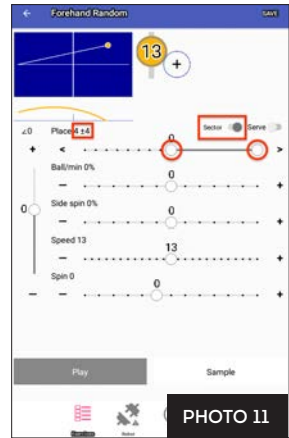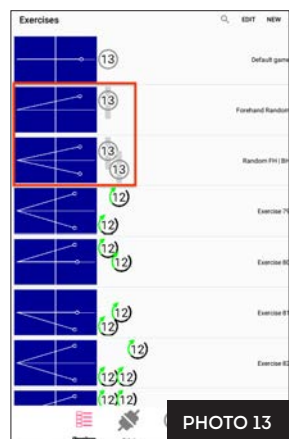

PHOTO 11

PHOTO 12

PHOTO 13

Best Practices: We recommend **not** saving any changes to the *Default game* exercise. This exercise is handy for checking calibration. When exiting the Play Exercise screen, if you get a Save Exercise alert, choose **Close Without Save** (see more info on Pg. 16).

Furthermore, if you edit the settings for a pre-programmed exercise, be certain you want to permanently change its settings. To keep the pre-programmed exercise as programmed by the factory, select **Close Without Save**. Alternatively, save it under a different name by tapping **Save** at the top right, then **Save As**, and give it a new name. This keeps the original exercise unchanged.

When changing settings, large adjustments are most easily accomplished by moving the slider control with your finger. For fine adjustments, touch the + or – symbol at either end of the slider. Doing so will increase/decrease the settings by 1 unit for every touch.

EXERCISE SCREENS

After learning the controls in the Ball screen, return to the Exercise List by tapping Exercises ( ). All saved exercises appear in this list. By looking at the diagram for each exercise, you can quickly determine the number of balls, order of balls, and the placement, speed, and spin of each ball (see Photo 13).

Scroll this screen by lightly touching it and moving your finger up or down. Notice that this list includes exercises named *Default game* and then 21 exercises named *Exercise 79* to *Exercise 99*. These are the pre-programmed exercises of your Amicus Prime. Created by well-known Butterfly Coach Richard Prause, he recommends these drills as a base upon which to develop more advanced skills.

As noted previously, we recommend to not overwrite these pre-programmed exercises by using the Save command (use Save As instead). However, modifying these exercises is permitted. If you choose to do so, the original exercises can easily be restored by selecting **Restore factory exercises** on the Info screen (page 22).

To learn about the settings in the Exercise screens, touch *Exercise 79*. The Play Exercise screen appears (see Photo 14). At the top of this screen are a top view and side view diagram of the exercise. From these 2 diagrams, you can quickly see that this exercise throws the 1st ball to the left corner and the 2nd ball to the right corner. Both balls have light topspin, a medium speed of 12, and a mid-table landing spot (about halfway between the table net and your endline). There is also a brief written description of the exercise (which can be edited by touching it).

Touch the **Play Exercise** button to begin playing this exercise. The screen flashes and shows a red Stop Exercise button (see Photo 15). After a short delay, the robot begins throwing balls in the order shown in the top view diagram. The first ball is closest to the table and each successive ball further away. As each ball is thrown, the ball icon and trajectory lines turn orange to indicate the Current Ball. After playing this exercise for a short while, tap **Stop Exercise**.

PHOTO 14

PHOTO 15
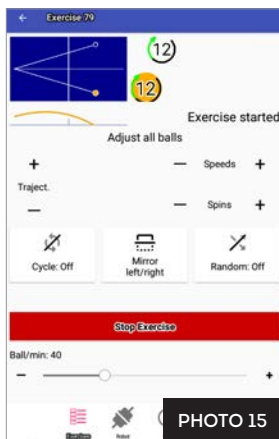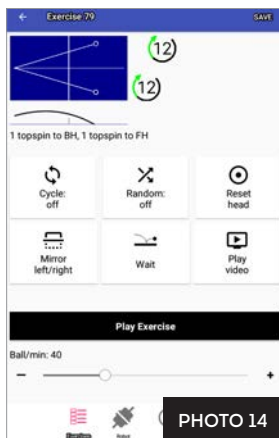
Next, let's explore the **Random** options. Touch the **Random** button. A popup window appears with *Scatter*, *Place RND*, and *Type RND* checkboxes. Touching the checkbox in front of each option results in a checkmark, indicating that option is selected (see Photo 16). Here's an explanation of each option:

1. **Scatter** – Is similar to the less precise shots a human might deliver. Without Scatter, the robot delivers shots within an area approximately 13 cm (5 in.) in diameter. But with Scatter, balls are delivered in an enlarged area of approximately 40 cm (16 in.).

2. **Place RND** – This option requires at least 2 balls; it has no effect on 1-Ball exercises. When selected, the robot randomly selects one of the Placements programmed for the exercise and throws the ball there in an unpredictable order. Using Exercise 79 as an example, the normal order for ball throws would be left-right-left-right. With Place RND selected, placements are random, so something like right-right-left-right-left-left-left.

3. **Type RND** – This option randomizes Ball Type. If, for example, Ball 1 is medium speed light backspin and Ball 2 is fast heavy topspin, and Type RND is on, the robot throws balls such as medium speed light topspin, fast heavy backspin, or medium speed heavy topspin, in addition to the programmed Ball Types. Use caution when using this option, as it is impossible to read the robot as you would a human. If you can't read the ball type being delivered, don't continue using this option as it is teaching you to guess what type of ball is coming, not something you want to do in your training.

You may also select 2 or all 3 options. For instance, selecting both Scatter and Place RND will enlarge the landing spot and randomize the placement of each ball. Tap outside of the popup window to make the popup go away and the selected options will be shown on the Random button (see Photo 17).

Cycle is useful as it emulates interval training on your robot, widely regarded as one of the best ways to maximize the effectiveness of your robot training. Interval training alternates intense, all-out periods of exercising (the *Play* period) with shorter periods of rest (the *Pause* period). This is the same type of rhythm that occurs naturally in a table tennis game – you serve, followed by several quick shots in the rally, the rally ends, and then you wait a few seconds until the next serve begins a new rally.

Tap the **Cycle** button. A popup window appears. At the top are some quickset options – 20, 40, 60, and 80. Touching one of these options sets Play at the number selected (in seconds) and Pause at one half that time. This will be reflected in the 2 sliders below (see Photo 18).
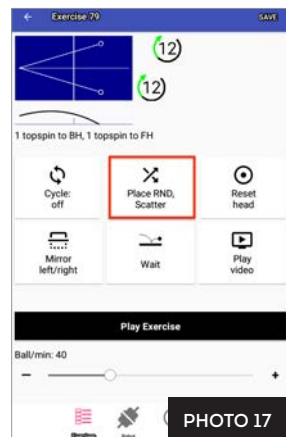

PHOTO 16

PHOTO 17

PHOTO 18

To set customized Play and/or Pause periods, move one or both slider handles until you see the desired number of seconds. Play period ranges from 10 to 120 seconds, and the Pause period ranges from 5 to 60 seconds. Instead of controlling the Play period by amount of time, you may also control it by number of balls thrown. Simply select Balls as the Mode, then enter the number of balls.

Tapping outside the popup window reveals that the Play and Pause periods are shown on the Cycle button. For example, if Play is set to 40 and Pause at 20, 40/20 is shown below Cycle (see Photo 19).

The **Mirror** button is a handy feature. It is used to match the sequence of shots in an exercise with the playing hand of the user. To illustrate, Exercise 79 is programmed for a right-handed player so Ball 1 is thrown to the left corner (a right-hander's backhand) and Ball 2 to the right corner (a right-hander's forehand). This is reflected in the top view diagram of that exercise (see Photo 19).

However, if you're left handed, the default order throws Ball 1 to your FH and Ball 2 to your BH. To correct the placement of shots, tap **Mirror** and the placement of shots in the top view diagram will be flipped (see Photo 20), with Ball 1 directed to the right corner (a left-hander's BH) and Ball 2 to the left corner (a left-hander's FH).

An alternative use of this button is to create a new sequence of placements without having to create a new exercise. In the above example, if a right-handed player wanted to start Exercise 79 with a FH instead of a BH, tapping the Mirror button would be the quickest way to create an exercise with the desired placements.

Tap **Reset Head** to start a Head Reset, which checks that each motor of the head responds to commands and sets the Deflector Plate to a known location. Use this as your first troubleshooting step for an irregularity in the way balls are thrown out. For instance, the side view diagram indicates a ball is to be delivered low over the net, but instead, it is thrown high off the end of the table.

Press **Play Video** (see Photo 21) to start a video of the exercise being demonstrated by a live player. This button shows only when a video file is linked to the exercise.

The video opens in landscape orientation. It begins playing and loops over and over so you can study the player's movements and strokes. After watching the video, exit by touching the **Return** icon (◁). This returns you back to the Play Exercise screen.

To add your own video to an exercise, tap directly below the side view diagram. A popup window appears with a **Select Video** button. Tap that button and navigate to where you stored the video file on the tablet's file directory or select it from the Gallery.

PHOTO 19

PHOTO 20

PHOTO 21

13
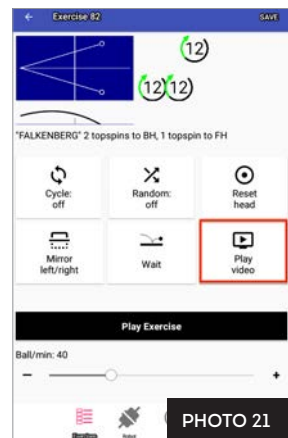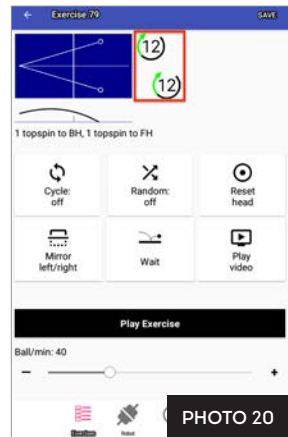
Wait is an ingenious use of the tablet's capabilities to train in a whole new way. The tablet's microphone senses the sound of a serve's second bounce and then releases the first ball of the exercise. This allows the player to serve the ball in a natural rhythm and then practice 3rd ball attacks against shots from the robot.

The first time Wait is used, the tablet asks *Allow Amicus to record audio*? Click **Allow** (see Photo 22). Turn off by going to *Settings>Apps>Amicus>Permissions*, and turn off *Microphone*.

PHOTO 22

To use Wait, press the button. The wheels start spinning in standby mode. *Waiting for serve* is displayed onscreen (see Photo 23). Then do a serve. The robot senses the sound of your serve's second bounce, and begins throwing balls. When the last ball is thrown, it enters standby mode and listens for your next serve. Exit Wait by tapping Wait again. The robot automatically turns Wait off if no serve is delivered after 30 seconds.

IMPORTANT: Wait relies upon sensing the sound of a ball bounce. So do not bounce the ball on the floor, dribble it on the tabletop, stomp your foot, or make other sounds that could falsely trigger the robot to begin throwing balls**.**

If you're training in a gym or other location with lots of background noise, the tablet's microphone can be made less sensitive by using the *Calibrate Sound* function on the Info screen (see page 22).

If you're using your own device, this function may or may not work. It definitely won't work if you place the device in your pocket while playing an exercise. If you can attach your device to the Control Panel Bracket supplied with your robot, it should work. You could also place your device on your table close to the table net where it will be out of the way of most shots but can pickup the sound of your serves bouncing on the table.

PHOTO 23

The **Ball/min** slider is used to control the frequency, or rate, of delivery. Default is 40 Balls Per Minute (BPM), which is a good starting rate. This control ranges from 5–120 BPM. 60 is the average topspin counter rate. 30–45 is often used for beginner/novice training. Lower settings can be used for serve return, 3rd ball attack, and other specialized drills. This control can be changed either with ball delivery stopped or while balls are being thrown. The Ball/min setting is saved with the other settings. If you change it, save that change when exiting the exercise. It is considered a good practice for most exercises to set Ball/min to a rate at which the next ball is thrown when your return hits the robot's net. This will better simulate the timing that occurs in an actual game. Of course, this advice does not apply when practicing against shots where the opponent would contact the ball above the table (short serves, some pushes, etc.) or against deep shots like lobs or chops.

Touch **Start Exercise** to play the exercise at the rate shown on the Ball/min slider. The app changes screens and a red Stop Exercise button appears (see Photo 15). After a momentary delay, balls are thrown in the order shown in the top view diagram (unless Place RND is turned on). When the last Ball of an exercise is thrown, the exercise repeats automatically. To stop ball delivery, touch **Stop Exercise.** Once touched, the screen changes back and the black Start Exercise button reappears.

CHANGING SETTINGS DURING PLAY

With Amicus, it's possible to change some settings for all balls in an exercise at one time. To do so, the robot must be delivering balls and the red Stop Exercise button must be visible (see Photo 15). Without stopping play, tap the + or – symbols to adjust the Trajectory, Spin, or Speed for all balls in a drill.

To better understand this function, let's say Ball 1 has a 20 Trajectory and 20 Speed and Ball 2 has a -10 Trajectory and a 10 Speed. If you tap the Trajectory + symbol twice, Ball 1's Trajectory changes to 22 and Ball 2's trajectory to -8. Tapping the Speed – symbol once results in the Speed for Ball 1 changing to 19 and for Ball 2 to 9.

If all balls in an exercise are the same spin, the Spin adjustment appears and allows you to change the amount of spin on all balls. If Spin is set to 1 for Ball 1 and 2 for Ball 2, tapping the Spins + symbol once would change the Spin for Ball 1 to 2 and for Ball 2 to 3.

In addition, you may change the Ball/min setting either by moving the slider handle or tapping the + or – symbols. Cycle, Random, and Mirror can also be turned on/off or adjusted during play.

CREATING A NEW EXERCISE & MODIFYING AN EXERCISE

Touch Exercises (▤) at the bottom of the screen to go to the Exercise List. Touch **New** at the top right. A new Play Exercise screen appears with only Ball 1. Tap on the ball symbol and then change the parameters of Ball 1 according to the instructions in the *Ball Screen* section. Sample the ball if you like.

Then tap the + symbol to the right of Ball 1. This creates Ball 2. It is a copy of Ball 1. Tap its symbol, change its parameters to your liking, and then sample it if desired. Repeat this process, adding as many balls as you wish. If you run out of room on the right side of the screen to show all balls, simply touch the area to the right of the table diagram and slide your finger left to show more balls. There is a maximum of 10 balls per exercise.

When you're done adding balls, touch **Play** to test the exercise to see if it plays as expected. If not, tap each ball that needs correction, change its settings accordingly, and then **Sample** the ball. After all balls have been changed, touch **Play** to play the entire exercise. Repeat this process until the exercise is as desired.

If, during this editing process, you need to delete a ball, or change the order of balls, touch and hold down on the symbol for the appropriate ball. In a brief second, the *Ball Operations* popup menu appears (see Photo 24). You can now Delete, Duplicate, Move Left, or Move Right the Current Ball.

Delete is self-explanatory. **Duplicate** copies all settings of the Current Ball and places that new ball at the end (furthest to the right). **Move Left** and **Move Right** commands are used to change the order of balls. In the Photo 24 example, Ball 2 (🟠15) is selected. If you choose Move Left, Ball 2 becomes Ball 1, and Ball 1 becomes Ball 2, and the order of Balls becomes 🟠15 - 🟢13 - ⑪. If Move Right is chosen, then Ball 2 becomes Ball 3 and Ball 3 becomes Ball 2 and the order changes to 🟢13 - ⑪ - 🟠15.

PHOTO 24
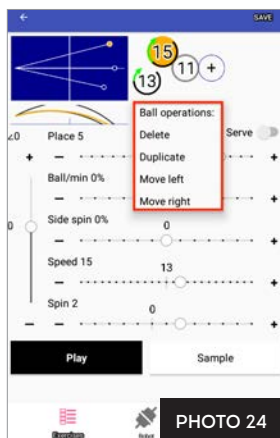
SAVING AND DELETING AN EXERCISE

After verifying the exercise runs the way you want it to, please save that exercise to store it in memory and add it to the Exercise List (📋). From either the Ball screen or the Play Exercise screen, tap **Save** at the top right. A popup menu appears with 4 options: **Save**, **Save As**, **Save To Sequence**, and **Revert Changes** (see Photo 25).

If **Save** is chosen for a new exercise, the Set Exercise Properties popup window appears. Enter a name for the exercise and a description. Then tap **Save** at the bottom right of that window. If Save is chosen for an exercise that was previously saved, the older saved version is immediately overwritten with any changes you have made since the last time it was saved.

Save As is the safer method to save a file because it does not overwrite the existing exercise (the original exercise is kept unchanged, and a new exercise is created with the new modifications). However, please be sure to provide a unique name for the modified exercise so the name will not conflict with the name of another exercise.

Save To Sequence saves an exercise to either a new or existing sequence. Sequences are described in the next section.

Revert Changes throws out any new modifications and keeps the exercise as it was last saved.

If you do not use one of the above save options from the Save popup menu, and then exit the Play Exercise screen or Ball screen, you are presented with an *Exercise is not saved* dialog box (see Photo 26). Choose to either **Save and Close** (the same as Save, above) or **Close Without Save** (same as Revert Changes, above).

To **Delete** an exercise, tap Exercises (📋). Tap **Edit** at top right. Find the exercise to delete by scrolling the list. Then touch the listing and slide your finger to the left. A red stripe will appear with a trash can icon along with a Delete dialog box (see Photo 27). Tap **Delete** at bottom right of that dialog box to permanently delete the exercise. Or tap **Cancel** if you decide not to delete the exercise.

SEQUENCES

With Amicus Prime, you can string together 2 to 10 exercises into a sequence. For each sequence, one repetition of each exercise is played in a loop. For example, if Exercises 1, 2, and 3 are saved into a sequence, one repetition of Exercise 1 is played, followed by one repetition of Exercise 2, and followed by one repetition of Exercise 3. The sequence continues looping through Exercises 1, 2, & 3 in that order until play is stopped.

PHOTO 25
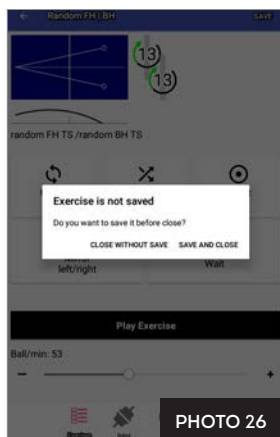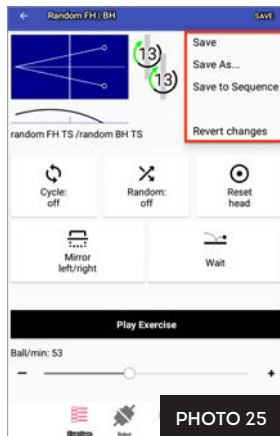
PHOTO 26

PHOTO 27

There will always be 10 mini table diagrams shown for each sequence listed, even if a sequence doesn't include 10 exercises. Open spots are coloured light blue while filled spots are dark blue. Photo 28 shows a sequence with 3 filled and 7 empty spots.

CREATING AND SAVING SEQUENCES

There are 2 ways to create a sequence:

1. From the Exercise List, select the first exercise to be included in the sequence and open its Play Exercise screen. Tap **Save** at top right, then **Save To Sequence**. In the resulting dialog box, select **New Sequence**,

2. If you already have one or more sequences saved, they will show up in the Save To Sequence dialog box. Tap one of the already saved sequences and the exercise will be added to that sequence in the next available open spot.

Continue adding more exercises, in the order you want them to play, until you have no more to add. Or, you can click on the next open spot in the sequence diagram and proceed to build a new exercise from scratch (follow directions in the Ball Screen section). Such exercises are saved directly into the sequence by tapping **Save** at top right, then **Save** in the resulting popup window.
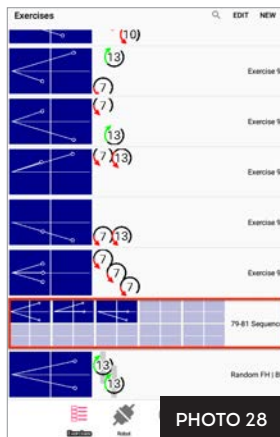
PLAYING A SEQUENCE

To better understand sequences, create one following the above instructions. If not already open, tap a sequence in the Exercise List to open the Play Sequence screen (see Photo 29), Study the table diagrams to understand what exercises are included and their order. Once you have a mental image of the exercises, touch the **Play Sequence** button. It takes a few seconds for the sequence to load and begin playing.

PHOTO 28

PHOTO 29
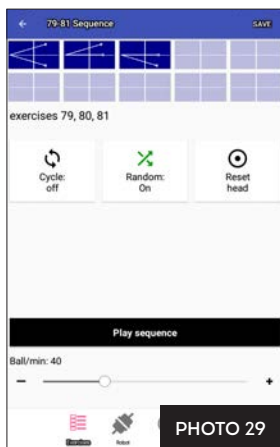
Play Sequence plays a series of exercises in a row similar to how Play Exercise plays a series of balls in a row. Play Sequence begins with one repetition of the 1st exercise shown and continues with one repetition of every other exercise in the order shown. When it reaches the last exercise, it loops back to playing the 1st exercise and continues this order until the **Stop Sequence** button is touched.

Use the **Random** button to play the exercises out of their normal order. As an example, let's say Exercises 1, 2, and 3 are saved into a sequence. When played, the order could be something like 2-3-3-1-1-2-3 with Random on; whereas, with Random off, the order would always be 1-2-3-1-2-3.

Cycle can also be used with sequences in a fashion almost exactly the same as used in Play Exercise (see page 11). And the **Reset Head** button functions the same (see page 13).

EDITING AND DELETING SEQUENCES

Once a sequence is created, you can edit it to change the order of the exercises, delete an exercise, and delete the entire sequence.. To change the order of exercises, open the Play Sequence screen. Then hold down on the exercise you want to move. After a second or two, a popup menu appears. Select **Move Left** or **Move Right** to change the order of exercises. Continue this same process for each exercise you want to move until all exercises are in the order you wish.

To delete a particular exercise from a sequence, follow the above procedure, but select **Delete** from the popup window, and then confirm you want to delete. To copy an exercise, so it appears more than once in the sequence, select **Duplicate**, and a copy is inserted immediately after the selected exercise.

To delete an entire sequence, go to the Exercise List, tap **Edit** at top right and locate the desired sequence. Then touch the sequence and slide your finger to the left. A red stripe appears and a delete dialog box appears. Tap **Delete** to permanently remove the sequence.

EDITING AND SAVING EXERCISES WITHIN A SEQUENCE

If an exercise appears within a sequence, but is not saved as an individual exercise, you can do so with a few commands. Open the Play Sequence screen. Tap on the exercise you want. Then tap **Save** at top right. In the resulting popup window, select **Save As**. Give the exercise a unique name and then tap **Save**. The exercise is saved as a standalone exercise and placed at the bottom of the Exercise List.

To change settings for individual balls, tap on an exercise in the Play Sequence screen and proceed to make changes as described in the *Ball Screen* section (see page 8). After making any changes to a sequence, be sure to save your changes by using the standard **Save** command at top right.

MODIFYING THE EXERCISE LIST

There are several functions within the Exercise List that need to be pointed out. The quickest way to access the Exercise List is to tap on Exercises (▤) at the bottom right. All exercises and sequences are saved to and stored in this list (this list is essentially the robot's memory). Besides storing these items for easy access, you can perform several functions from this screen.

1. To create a new exercise, tap **New** at top right and follow directions under Ball Screen (see page 8).

2. To change the order of the exercises and sequences, tap **Edit** at top right, hold down on the item you want to move, move it up or down to the desired position, then let go. Tap **Done** at top right.

3. To rename the exercise, edit the item's description, or add a video demonstrating the exercise, tap **Edit** at top right, Then tap on the equal symbol (=) to the far right of the item. This opens a popup to enter or modify an item's name, change its description, or add a video. To add a video you must first add the video to the device's file directory. For ease of use, most videos can be accessed through the Gallery app. Don't forget to tap **Save** in that window to save your changes.

4. If you know the name of the exercise you want to locate, tap the magnifying glass icon at top right, then type a word or words that appear in the exercise's name. A list of all exercises matching that word, or those words, appears. When finished, tap the X at top right to exit the search function.

5. To delete an exercise or sequence, tap **Edit** at top right, locate the desired exercise or sequence, then drag left on it. In the resulting dialog box, tap **Delete**.

6. If you set up an email, Facebook, and/or other social media account on your tablet, share items by tapping **Edit** at top right. Next tap the checkbox at far right for each exercise you want to share. Then tap **Share** at top right. A list of your email and social media programs appears. Select the one you want to use and a new message window appears. Type in your message and recipient, then send. When your friend receives the message on their own Amicus tablet, they can tap on the attached file, the Amicus app opens, and the exercises are automatically added to their Exercise List.

7. Save your exercises to a Micro SD (TF) card by inserting a card with available space into the TF Card port of the tablet. Tap **Edit** on the Exercise List, select the exercises you want to save, and then tap **Share** at top right. In the resulting Sharing Options window, tap **Save to file**. Enter a file name and tap OK. The screen flashes and the selected exercises are saved to the *SD Card/Android/data/tt.butterfly.Amicus/files* folder with the extension *.amicusgame*. You are then returned to the Exercise List Edit screen. This function is handy if you wish to create a backup of your custom exercises or if you want to share exercises when there is no internet connection.

CONNECTION MANAGER

The Robot icon (🤖 or 🤖) at bottom reveals whether or not your tablet is connected to your robot. Many times, the tablet automatically establishes a Bluetooth connection with the robot when the Amicus app is first launched, when the power to the Base is cycled on/off, and at other times. When a connection is established, (🤖) is shown, but when it is broken, (🤖) is shown.

When a broken connection is indicated, try these things:

1. Tap the Robot icon and in the resulting screen (the Connection Manager), touch Rescan at top right. If the tablet finds an Amicus robot, it shows it in a list of all Amicus Prime robots within Bluetooth range. Select yours and tap the associated Connect button.

2. If no robots appear after rescanning, close the Amicus app on the tablet and then reopen it. Close the app by tapping the Windows icon (▣) at the bottom, then the X on the Amicus app window. Reopen by tapping the Home icon (◉) at bottom center, then the Apps icon (▦), and then the Amicus app icon in the Apps screen.

3. If restarting the app doesn't work, unplug and re-plug the robot into power.

4. Verify that both *Settings>Bluetooth* and *Settings>Location* are *On*. Go to Settings by tapping the Home icon (◉) at bottom, then the Apps icon (▦), then **Settings** in the resulting screen.

5. Reboot the tablet by holding down the power button until a popup dialog box appears, select *Reboot*, then *OK*. Rebooting the tablet takes about 2 minutes.

6. Use a straightened paper clip or similar object to press the recessed *Reset* button on the bottom of the tablet. Wait a few seconds, then hold down the power button until the screen comes back on.

7. As a last resort, go to *Settings>Backup & reset>Factory data reset*. This restores all settings to factory settings. You will then need to reset Time, Network, and any other settings you modified. Before using, save all custom exercises to a micro SD card as all are deleted during a factory data reset.

8. Check that only a single Amicus app is installed by going to *Settings>Apps*. You should see only a single Amicus app. If there is more than one, delete or disable the oldest version.

9. If you have the Amicus app installed on two or more devices, be sure only one app is trying to connect to the robot. The other app should be closed or show the robot being disconnected.

10. Go to the **Robot** screen and verify that *Amicus BTLE* shows up in your Connection Manager. And once you connect to Amicus BTLE, that *Hardware version*, *Firmware version*, *Serial number*, and *Bootloader version* are given on that screen. If you do not see this information (especially if you see *Waiting for informations* displayed instead), there is likely a problem with the Power Circuit Board. It will need to be replaced. Contact a Butterfly Service Center for replacement instructions.

Once the Robot icon indicates a connection (🌋), there are several other functions available from that screen. They are discussed in detail below.

CALIBRATION

All robots differ to some degree as motors can vary from the manufacturer, but even more so as they age. In addition, the wheels wear differently depending upon use. Calibration harmonizes the mechanics (the Head and Base) with the electronics (the Power Circuit Board). This is especially important if the Power Circuit Board or Head are replaced.

Before starting a Calibration, verify that your robot is vertical (plumb) or very slightly leaning back (see Step 2 under *Setup*).To check Calibration, tap the **Robot** icon at bottom, then the **Calibrate** button (provided there is a connection with the robot – see above). And then follow the onscreen directions. An easy way to create a Calibration target is to place a small piece of masking tape 40cm (16 in.) from the endline and along the centerline on the player's end of the table. This target makes it easier to judge whether or not balls are landing at the proper location on the table.

IMPORTANT: Do not perform other operations with the tablet during calibration. It can cause the app to crash and the robot to shut down.

REMOTE SWITCH

The wireless remote (see Photo 30) has a range of 4–5 m (13–16 feet) and the following functions:

1. If Ball/min on the Tablet is set to "0", pushing START on the remote throws 1 ball of the Current Ball (similar to sampling a ball). For multi-ball exercises, this means you can sample each ball by repeatedly pressing the Start button to cycle through each ball of an exercise.

2. If Ball/min on the Tablet is not set to "0", pushing START on the remote will cause the exercise shown on the tablet to start playing at whatever frequency the Ball/min is set (same as pressing Play Exercise on the tablet).

3. The 2 middle buttons increase (+) or decrease (–) Ball/min by 1 increment for each press. Or hold one down for rapid acceleration of Ball/min.

PHOTO 30

4. Press the bottom red STOP button to halt ball delivery (same as Stop Exercise on the tablet).

LINKING THE REMOTE SWITCH TO THE TABLET

Each remote is linked to an individual robot. This linkage is done at the factory and each tablet and remote pair is kept together throughout the manufacturing process. In case you buy additional remotes or a replacement, you need to link each remote to your tablet. To start the linking process, tap the **Robot** icon (must show connected), then the **Learn Remote** button. The button starts counting down from 10 seconds. During this countdown, press any one of the 4 buttons on the remote. An acknowledgment of the linkage is shown briefly at the bottom on the screen. After the countdown ends, and the acknowledgment shown, the remote is linked to the tablet.

Up to 4 remotes can be linked to the same tablet. For every additional remote, a different button on the remote must be pressed during the Learn Remote countdown.

CHANGING THE BATTERIES IN THE REMOTE SWITCH

The remote is powered by two 3V CR2016 button cell batteries. After long use, the batteries will discharge and need to be replaced. After purchasing new batteries, open your remote by inserting a coin or flathead screwdriver in the slot on the wide end of the remote and twisting to pop it open.

Remove the circuit board containing the battery. With your thumbnail, pull the battery holder away from the circuit board. Pop the two depleted batteries out of the battery holder and replace with fresh batteries. When inserting into the battery holder, be sure the positive side (+) of both batteries face up. Re-insert the battery holder into the circuit board.

Reassemble the circuit board into the top housing (battery side up). Position the U-shaped metal piece around the top housing. Then place the bottom housing on top and press the top and bottom housings together, starting at the narrow end and working your way to the wide end until they snap in place.

OTHER FUNCTIONS OF THE ROBOT SCREEN

There are 3 other functions of the Robot Screen that we have not covered yet:

1. The **Disconnect** button is used to break the Bluetooth connection between Control Tablet and Robot. You can also disconnect by quitting the Amicus app or powering down the tablet, or robot.

2. At the top left of this screen is reported some important information about the Bluetooth signal strength (handy for troubleshooting connection problems), hardware and firmware versions (helpful to know if you have the latest firmware), the Serial Number of your device, and the Bootloader version (a critical piece of software that loads the operating system). When you see this information displayed, you know that the tablet is communicating with the firmware located on the Power Circuit Board in the Base.

3. The **Firmware Update** button – when firmware is current, this button shows, *You have the latest firmware!* If you don't see that message, tap this button, and if you have an internet connection, the tablet retrieves the latest firmware. The update process can take 8–10 minutes, and it is very important that you never power off the tablet during that process (please plug the tablet into power or have plenty of battery life before starting). Please do not use the tablet for anything else during updating and let the update process end completely.

FUNCTIONS OF THE INFORMATION SCREEN

Access the Information screen by tapping on the **Info** icon (ⓘ) at bottom. This screen (see Photo 31) has the following functions:

1. Tap the **Support website** button to open the Butterfly Amicus webpage for the latest news on the Amicus line of robots.

2. If you have set up an email account, use the **Report an issue** button to send an email message directly to Amicus support. This automatically creates a new email with an error report. Type your message above the error report, and then send.

3. The **Check for updates** button is used to check for and install the latest Amicus app. Tap to see if a new version is available. Keep your app updated to get the latest features and bug fixes. After updating the app, also check to see if the firmware needs to be updated on the **Robot** screen.

4. The **Restore factory exercises** button is exactly that – tap it and all pre-programmed exercises are restored to their original settings. Any changes to the exercises named *Exercise 79* to *Exercise 99* will be lost. For this reason, if settings are changed in any of those exercises, please use the *Save As* command and type in a different name for each changed exercise before you use Restore Factory Exercises.

5. The **Calibrate Sound** button adjusts the sensitivity of the tablet's microphone when using the Wait function (see page 14). After tapping on this button, you will see a popup window (see Photo 32) that gives a reading of the current sound level and a slider control for adjusting the microphone's threshold. Adjust this slider to above the background noise level, but below the bouncing ball level.

PHOTO 31

PHOTO 32
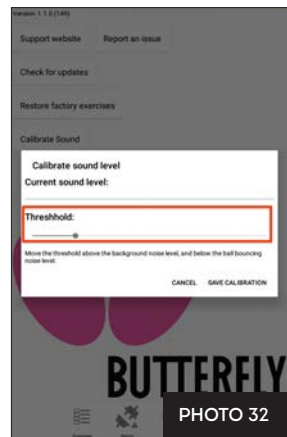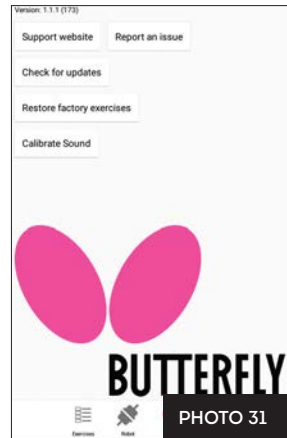
4. TAKE DOWN, STORAGE, & TRANSPORT

Upon finishing your training session, power off your robot by unplugging from power; or alternatively, plug your robot into a power strip and use the switch on the power strip to turn power off.

If you're ready to remove your robot from the table temporarily, please follow these steps:

1. Unplug the Power Supply from the outlet and base. Roll up and place it temporarily on your table. Then disconnect the Tablet Cable, roll it up, and place it on your table with your Power Supply.

2. Disconnect the rubber bands that hold up the Side Nets. Place Side Nets in the Ball Collection Tray.

3. Fold up the Net until the 2 trays are straight up (vertical). Unhook your robot from your table and set it on your tabletop with the open side facing you.

4. Place your rolled-up cables, Tablet, and Control Panel Bracket in the center area of the net on top of the balls (you do not need to remove the balls).

5. Finish folding the net all the way together until the Velcro tabs on the Net Corner Brackets adhere to one another. You may need to help the Net Uprights fold down as they tend to catch on other parts of the net as they are folded. One upright folds to the inside and the other folds to the outside. Stand your robot upright on the floor off to the side of your table or in a nearby closet. When you're ready to train again, it's quick and easy to set your robot back up on your table.

If you're removing the robot for transport or long-term storage, we recommend placing your robot into the included Carry Bag (see Photo 33) with these additional steps:

6. Partially unfold the net to remove the cables, tablet, bracket, and balls and place them in the storage pockets of the Carry Bag. Placing the balls in a plastic bag makes it easier to manage them. The Carry Bag is also handy for storing this manual, spare parts, tools, and other items that came with your robot.

PHOTO 33

7. Loosen the Black Knob on the rear of the Ball Tube, turn the head around 180° so it faces into the net, and lower the head to 1 ring. Then re-tighten the knob. Also rotate the 2 Support Legs backward so they point back into the net.

8. Finish folding up the net until the Velcro pieces on the Net Corner Brackets touch and adhere to one another. You may need to help the Net Uprights fold down as they tend to catch on other parts of the net as they are folded. One upright folds to the inside and the other folds to the outside. You can also stuff parts of the net that are sticking out into the central part of the net.

9. Lay the robot, net side down, into the Carry Bag and secure in place with its 2 straps.

5. MAINTENANCE & REPAIR

CAUTIONS

1. Before performing any maintenance or repairs, unplug your robot from power.

2. Be sure no objects like dented balls, hair, string, etc. fall into the net and then work their way into the machine where they can cause ball jams or interfere with correct operation.

3. Table tennis robots work best with clean, worn balls. When adding new balls, please wash the gritty manufacturing powder off them first with warm, soapy water, then rinse and dry before using. (Butterfly brand balls are pre-washed at the factory so this step is unnecessary with new Butterfly balls.) Keep your playing area clean to prevent balls that have rolled on the floor from picking up dirt and introducing that dirt into the machine.

4. The wheels have a special coating to prolong their lifetime. Do not clean the wheels with any chemical or cleaner, as those substances are detrimental to the coating.

5. Amicus robots are designed for use in clean, dry, indoor rooms. Do not use outdoors or in any wet or damp environment. Avoid leaving your robot in a hot car or trunk.

6. Use only 40 or 40+ balls in your robot. The better ball you use (ITTF-approved 3-star are best), the more consistent your robot can throw that ball.

CHECKING & ADJUSTING WHEEL CLEARANCE

Amicus wheels are very durable (at least 1000 hours). Eventually these wheels will wear down after long or intense use. As they wear down, the space among the 3 wheels enlarges, causing the wheels to lose their grip on the ball. Dropping the robot or other similar trauma during transport or use may also cause this. One sign that adjustment is needed is that the machine throws the balls at irregular lengths at high speed.

Slide gauge in and out among all 3 wheels

PHOTO 34A

To check wheel clearance, place the Wheel Adjustment Gauge (black tube with 3 fins) among the 3 wheels, fins first, and so no fin touches any wheel (see Photo 34A). Move it in and out. If clearance is correct, the gauge can be moved in and out easily with the wheels barely touching the outer surface of the gauge (wheels may turn slightly as gauge is moved). If the wheels don't grip the gauge at all, or conversely, they tightly grip the gauge, then proceed to the next step.

Stick gauge into end of Ball Tube

Fins should not touch any wheel

PHOTO 34B

To adjust the wheels, push the gauge into the end of the Ball Tube so it is held rigidly in place (see Photo 34B). Then use the 4 mm hex wrench found in the Accessory Packet to loosen the hex screw near the motor cover (see Photo 34C). Move the motor (gripping its cover) either towards or away from the gauge until the wheel barely touches it. Lastly, tighten the 4 mm hex screw to hold the wheel in place. Do this with all 3 motors.

Please note: The diameter of the Wheel Adjustment Gauge is 35 mm, which is the ideal amount of space among the 3 wheels. The robot functions correctly up to a diameter of 37–38 mm.

Use 4mm hex wrench to loosen this screw

PHOTO 34C
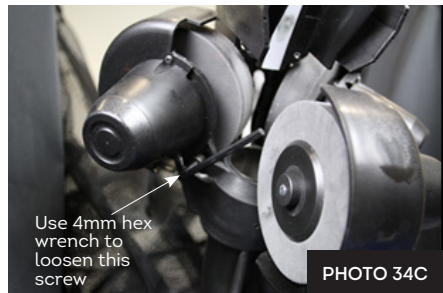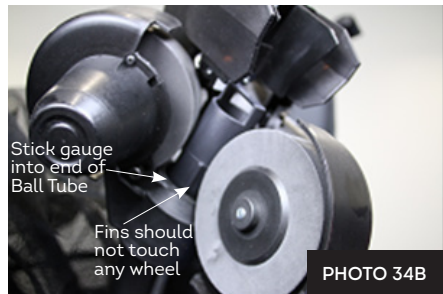
REPLACING THE WHEELS

When the wheels can't be adjusted anymore, or the special coating on the wheels has worn off, the wheels should be replaced. To do so, start with the lower wheel. Using the smaller 2 mm hex wrench, loosen the small setscrew that holds the wheel onto the shaft of the motor (see Photo 35A). Before

taking it off, check and remember how much of the shaft is protruding past the wheel. Pull the wheel off the motor shaft. Replace with a new wheel. Slip the wheel onto the motor shaft until the position of the original wheel is reached. Tighten the setscrew.

For the upper motors, the procedure is a little bit different. Begin by removing the two #1 Phillips screws on the Motor Covers and pull the covers off. Next, remove the 4 mm hex adjustment screws (see Photo 34C). Grab ahold of each wheel, and pivot it away from the Ball Tube (see Photos 35C & 35D). Loosen the 2 mm setscrew, remove the old wheel, and push the new wheel on the motor shaft. Tighten the 2 mm setscrew. Pivot the wheels back down into their original positions. Fasten the Motor Covers back in place. Replace and tighten the 4 mm hex screw.

Even if only one of the upper wheels has been damaged or worn out, we recommend replacing both upper wheels at the same time for best ball throw accuracy. After replacing wheels, adjust the wheel clearance as described in the previous section. Then manually spin each wheel to be sure it is not rubbing on any surface. While spinning the wheel, move the Deflector Plate back and forth to make sure the wheel is not rubbing on it. If any rubbing is observed, loosen the 2 mm setscrew and slightly move the wheel's position on the shaft until the wheel no longer rubs. If moving the wheel's position on the motor shaft does not prevent the rubbing, then you will have to loosen the 4 mm hex screw and move the wheel away from the Ball Tube. Lastly, tighten the setscrew securely. Before using the robot, do a Head Reset.

PHOTO 35A

PHOTO 35B

PHOTO 35C

PHOTO 35D
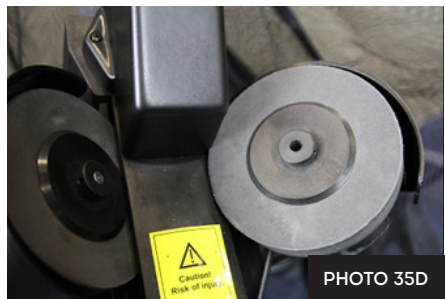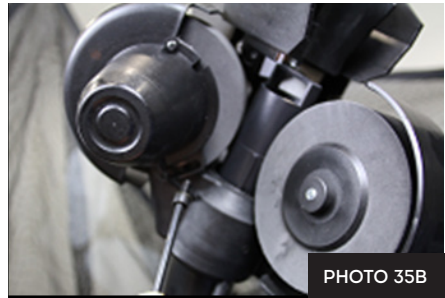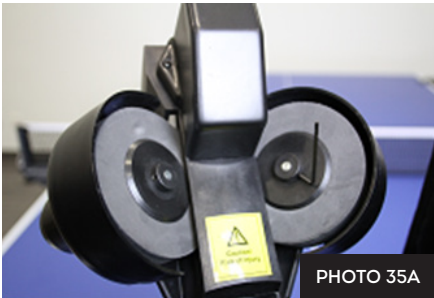
BALL JAMS

Your robot is equipped with a special system to detect and react to problems in the ball channel. When the system detects a problem, it will attempt to automatically clear the ball jam by turning the Ball Feed Motor and the wheels forward and backward several times.

If this procedure doesn't clear the ball jam, all motors stop and one of the following error messages will be displayed on the tablet:

1. *Robot Error. The feeding motors has been stuck. Ball jam! Defective or oversized ball or foreign object jamming the lower channel. Clear channel and test ball feed.*

2. *Robot Error. Ball gets stuck between the throw discs. Turn off power and then remove the ball.*

The first error message indicates a problem with the ball feed system, It is sensing that resistance in the Ball Feed Motor has risen above a set amount. This can be caused by a variety of issues including a broken or oversized ball, foreign object, sticky substance, incorrect head height adjustment, hair wrapped around the Ball Feed Gear shaft, new balls with a gritty powder on them, very dirty balls, a restriction in the ball channel, and other similar issues. But it can also be caused by a bad Ball Feed Motor or a loose connection between the Power Circuit Board and that motor. See Troubleshooting, p. 27,for more detailed instructions.

The second error message indicates a problem with one of the head motors, usually one of the Ball Throw Motors. This is commonly caused by lowering the head height, which then pushes the topmost ball out of the Ball Tube and it gets caught among the 3 wheels. Other potential causes could be a wheel rubbing on another part, wheel clearance adjusted too tightly, the Head Cable is loose or disconnected, or a bad Ball Throw Motor. Again, see *Troubleshooting*, p. 27, for more detailed instructions.

To check the ball channel, remove the head by disconnecting the Head Cable, loosening the large Black Knob on the rear of the Ball Tube, and pulling up on the head. Then tilt the entire net system forward onto the table until the balls in the lower channel roll out the top of the lower Ball Tube (see Photo 36). Then inspect through the access slot on the Base Bottom to verify that no more balls are in the channel. If necessary, take a long rod-like tool (screwdriver, dowel, etc.), insert it through the access slot, and push balls out of the channel.

Access Slot

PHOTO 36
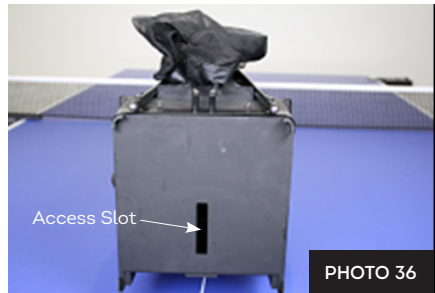
Once clear of balls, with the help of a flashlight, inspect inside the ball channel and clear out any foreign objects, sticky substances, or dirt. Also, insert a ball into the upper Ball Tube and see if it can roll all the way to the wheels and back without stopping. With the ball channel empty, test ball feed to see if the Ball Mixer Springs rotate when ball feed is started.

Without any balls in the machine, *and with Head Cable connected*, the Ball Mixer Springs should keep rotating until you stop ball feed. This would indicate the ball feed mechanism is operating normally and the issue is with the balls or something within the ball channel. But if the Ball Mixer Springs do not rotate at all, rotate backwards and forwards, or stop after only a few balls, that would indicate something is wrong with the ball feed mechanism, motor, connections, or the head. If the problem is with the head, the second error message is shown on the tablet. Otherwise, the first error message is shown.

If you cannot determine the cause of the issue with the above suggestions and the Troubleshooting Chart, please contact your Amicus Service Center for further assistance.

OTHER MAINTENANCE

The White Strip and the sidewalls of the Deflector Plate can accumulate ball residue from balls striking those surfaces. Keep these surfaces clean and smooth to increase consistency of ball throws. To clean, without removing the Deflector Plate, scrape the residue off with your fingernail or sharp-edged plastic tool. Then rub the remaining residue off with a Scotchbrite pad wetted in isopropyl alcohol.

After long use, the White Strip can develop a concave-shaped depression where the balls repeatedly strike it. Once this depression appears, please apply one of the Repair White Strips that came in your Accessory Packet *on top of* the existing White Strip after cleaning it with isopropyl alcohol.

IMPORTANT: The White Strip and Repair White Strip are not the same. The White Strip has a foam layer and is the original one installed on the Deflector Plate. There are 2 Repair White Strips included in the Accessory Packet. These do not have a foam layer. You may adhere one of these *on top of* the original White Strip. After the Repair White Strip wears out, you must remove both the White Strip and Repair White Strip and start over by attaching a new White Strip. **Never adhere a Repair White Strip directly to the Deflector Plate**.

The rest of the machine needs no maintenance. However, you can remove dirt and dust from the surface of the robot with a moist cloth and a mild, water-based cleaner as necessary. However, do not clean the wheels as cleaning may remove the coating on those wheels.

6. TROUBLESHOOTING

| PROBLEMS	SOLUTIONS
1. Head or Support Legs point towards net.	**A.** Loosen the large Black Knob on the rear of the Ball Tube, then rotate head 180° so head points away from net. Grasp Support Legs and rotate them away from the net.
2. The robot does not function. No lights, no sound, no movement.	**A.** Plug Power Supply into power outlet and connect other end to power jack on the Base (see Photo 6, page 6). Also make sure Head Cable is connected. **B.** Is the green LED on Power Supply lit? If not, check outlet for power. If power is present, replace Power Supply. Note – some power supplies do not have a green LED, so you would listen for any sound or watch for any movement to verify that power is reaching the robot. Alternatively, check with a voltmeter. **C.** Bad Power Circuit Board, or serial connection on that board is loose. Contact Amicus service center for assistance.
3. Control Tablet powers up, but no balls are thrown.	**A.** Check that tablet is connected to robot. To troubleshoot connection issues, see *Connection Manager*, pg. 19. **B.** Set Ball/min higher than zero. **C.** Tap on an exercise or sequence in the Exercise List, then tap **Start Exercise** or **Start Sequence** to start ball delivery.
4. Place Random won't turn on..	**A.** Place Random requires exercise to have at least 2 Balls. Add a second Ball. See page 12.

5.	Balls thrown to wrong places or inconsistent throws.	**A.**	Are there rubber bands around the Deflector Plate and/or is there a blue foam pad above it? If yes, remove those parts so Deflector Plate can move freely. Those parts are used only during transport.
		B.	Is Random on? If so, turn off.
		C.	Clean White Strip. Scrape ball residue off with fingernail and then scrub with Scotchbrite pad wetted with isopropyl alcohol. If White Strip has a concave-shaped depression, adhere a Repair White Strip on top of existing White Strip. See page 27.
		D.	Clean sidewalls of Deflector Plate. Scrape residue off with fingernail and scrub with Scotchbrite pad wetted with isopropyl alcohol. If sidewall has a groove worn into it, replace.
		E.	Unplug Head Cable and check that no pins are bent or missing. There should be 15 pins. Re-plug cable securely.
		F.	Check serial connection on the Power Circuit Board. Press firmly all around the serial connection to ensure the male half is firmly inserted into the female half.
		G.	Check wheel clearance. Adjust if necessary. See page 24.
		H.	Push Deflector Plate all the way up. Pull down about 1cm (0.5 inch). Let go. If good, the Deflector Plate should snap upwards and stop immediately, but if it wobbles around, it needs to be replaced. Contact Amicus Service Center. After doing this test, always do a Head Reset.
		I.	If balls are thrown further to one side than the other, Deflector Plate needs to be adjusted. Contact Amicus Service Center.
6.	Balls thrown at irregular depths.	**A.**	See Solution 5G.
		B.	Wheels worn. Replace all 3 wheels. See page 25.
		C.	See Solution 5C.
7.	Balls thrown high and off the table.	**A.**	Check that robot is level and plumb (vertical). Adjust Support Legs to fit your tabletop. See step 2 of *Setup*, page 4. Robot should not be leaning backward.
		B.	Tap the Head Reset button on any exercise (see page 13).
		C.	Verify that Deflector Plate is moving in accordance with the Trajectory Control on the Tablet. If so, change the Trajectory setting for the balls being thrown too high. If not, check head connections (see Solutions 5E & 5F). If head connections are good, then a bad Power Circuit Board. Replace.
		D.	Check Calibration. See page 20.
8.	Double throws or missed throws.	**A.**	Head height improperly adjusted (see Photo 8, page 8).
		B.	Are one or both springs missing from the Ball Mixer Springs? If so, replace that part.

9. Ball dribbles out of head or is thrown with little speed	**A.** One or more wheels are not spinning or spinning at the wrong speed. Tap the Head Reset button and watch the wheels to see if all 3 are spinning at about the same speed.
	B. See Solutions 5E, 5F, & 5G.
	C. Wheel is rubbing on another part, causing it to slow down. Rotate each wheel manually to feel for wheel that is not rotating freely. Adjust the wheel's position on motor shaft and/or move the wheel further away from the Ball Tube. Read pages 24–25.
	D. Broken wire where it is soldered to the motor. Remove motor cover and inspect wires. If broken off, re-solder.
	E. Shaft of motor has loosened from its drive pin. Contact Amicus Service Center for test procedure.
	F. Bad Ball Throw Motor or Power Circuit Board. Replace.
10. No ball frequency control. Balls are thrown out at constant frequency.	**A.** Dust around the Optical Sensor. Use canned air or a hard puff of breath to remove dust. Contact Amicus Service Center.
	B. The Optical Sensor's pickup tag mounted on bottom of Ball Feed Gear is missing or has fallen off. Remove gear and replace tag. Contact Amicus Service Center.
	C. Optical Sensor is bad. Replace. Contact Amicus Service Center
11. Robot Error message is displayed on Tablet.	**A.** Read *Ball Jams*, pages 25–26.
	B. Defective or oversized ball or foreign object jamming the lower ball channel. Clear channel and test ball feed.
	C. Dirty or unwashed new balls are being used. Clear ball channel of balls, then wash the balls to remove grit, rinse, and dry before placing back into robot.
	D. Is a foreign object or ball preventing the Ball Mixer Springs from moving? If so, remove that foreign object or ball.
	E. Was Black Knob tightened too much, denting the upper Ball Tube? Disconnect the head, and roll a ball up and down the Ball Tube to check if it is obstructed. If so, contact Amicus Service Center.
	F. Hair entwined around shaft of Ball Feed Gear. Remove Ball Mixer Springs by grabbing ahold of its hub and turning counterclockwise. If hair or fibers are found underneath, remove the E-Clip and Wave Washer from the shaft and pull off all entwined hairs and fibers.
	G. See Solutions 5E, 5F, & 8A.
	H. Is ball stuck among the 3 wheels? If so, turn off power, and remove that ball.
	I. Bad Ball Feed or Ball Throw Motor, or other part. Call your Amicus Service Center.

Attention: If you are not able to solve your robot's issues with the help of this manual, please consult with your Amicus Service Center. If you see any exposed wires on the Power Supply, disconnect from power immediately and replace it. Failure to do so could result in serious harm.

7. LIST OF REPLACEMENT PARTS

ID #	Part #	Part Name
1-10	mobil-100	Net & Base Assembly
1		Base Bottom
2		Base Top
3		Ball Feed Gear Assembly
3a		Ball Mixer Springs
3b		Ball Feed Gear
3c		Ball Feed Curved Wire
4	mobil-107	Ball Feed Motor
5		Front Support Assembly
5a		Front Support Plate
5b		Front Support Leg
5c		Lower Ball Tube
5d		Black Knob
6		Left Net Frame
7		Right Net Frame
8		Tensioning Arm
9		Ball Collection Tray
10		Ball Catching Net
10a		Side Net Rubber Band
11-21	mobil-101	Robot Head Assembly
11		Upper Ball Tube
12		Robot Head Central Support
13	mobil-106	Ball Throw Motor
14	mobil-110	Ball Throw Wheel
15	mobil-113	Ball Throw Motor Cover

ID #	Part #	Part Name
16		Directional Mounting Plate
17	mobil-108	Trajectory Motor
17a		Trajectory Gear
17b		Trajectory Pin
17c		Trajectory Pin Spring
18	mobil-109	Placement Motor
19	mobil-112	Deflector Plate
19a		White Strip
19b		Trajectory Pin Pad
20		Directional Motors Cover
21a		Trajectory Motor Spacer
21b		Placement Motor Screw
21c		Trajectory Motor Screw
22		Power Circuit Board
23		Power Circuit Board Cover
24	mobil-105	Tablet Cable
25		Control Panel Bracket
26		Prime Tablet
26a		Tablet Holder
27	mobil-104	Power Supply (24V, 2.7A)
28		Power Supply AC Cord
29		UK Plug Adapter
29		US Plug Adapter
30		Tablet Power Supply
Additional replacement parts on demand!		
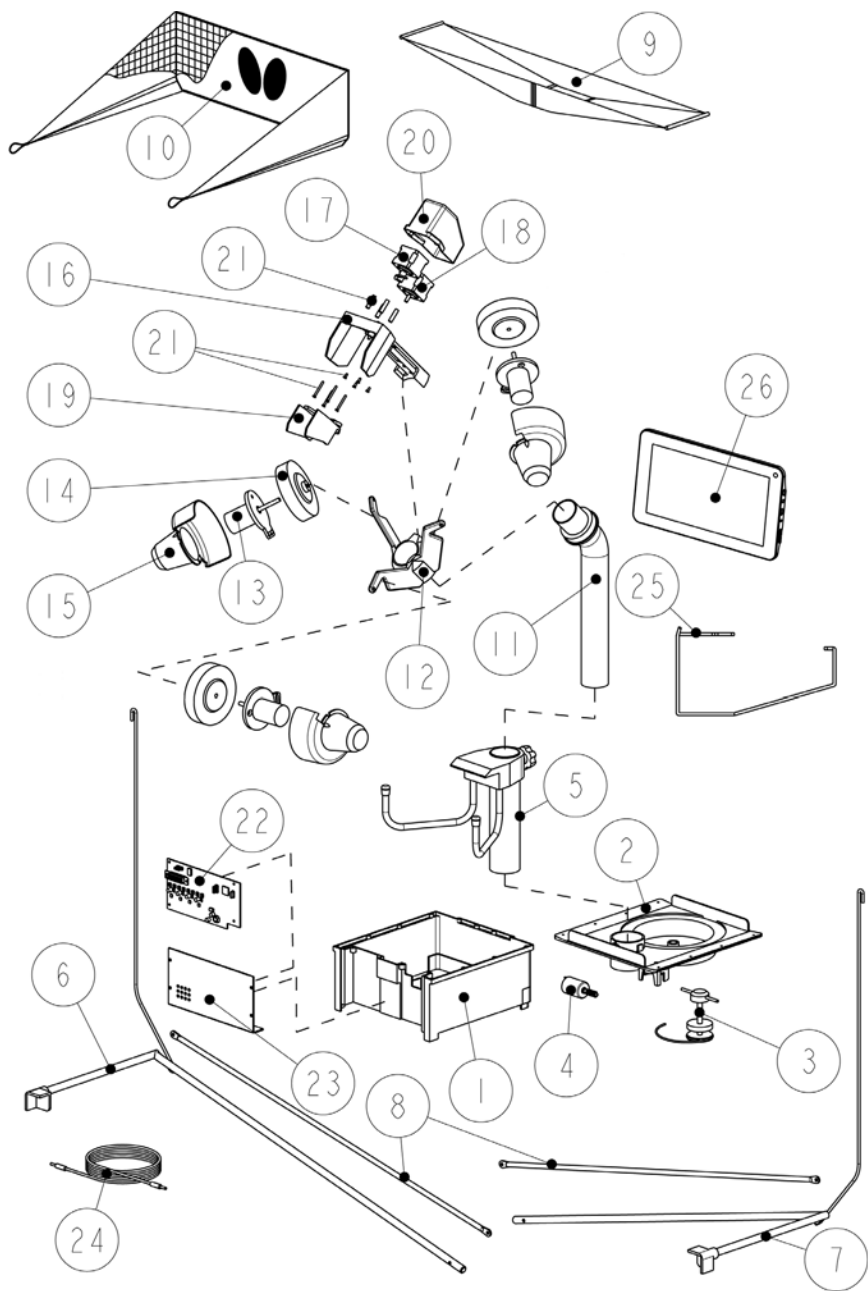
8. TECHNICAL DATA

Electrical Specifications: 100–230 V, 50–60 Hz AC, approximately 60 W
Can be operated in a temperature range of 0–40°C (32–104°F).
Weight: 6 kg with net (13.2 lbs.). Overall dimensions (folded, with net): Height 0.75 m, Width 0.28 m, Depth 0.25 m (2.5 x 0.9 x 0.8 feet).

An examination was done for the Power Supply:
Conformity with Low Voltage Directive 73/23/EEC, as last amended by EEC Directive 93/68/EEC–Registration #: AN 50091861 0001, Report #: 17004848 001.
Also Test Reports # NTEK-2010NT1115351E and NTEK-2010NT1115353SS.
The Amicus Prime table tennis robot is permitted to bear the CE trademark.
Manufacturer: Tamasu Butterfly GmbH, Kommunikationsstr. 8, 47807 Krefeld, Germany

9. WARRANTY INFORMATION

FULL 2-YEAR MANUFACTURER'S + 1-YEAR DISTRIBUTOR'S WARRANTY

Manufacturer warrants to the original retail purchaser this product to be free from defects in material and workmanship for a period of 2 years from date of purchase. Bowmar Sports, distributor of Butterfly products in North and South America, adds another 1 year to the warranty period for a total of 3 years.

Should this product become defective due to material or workmanship during the warranty period, contact an Amicus Service Center describing the problem. Always provide your serial number. We will provide you with return authorization and shipping instructions, or provide a replacement part and instructions for replacement. If you are asked to return the product, pack it securely.

If defective as provided by the terms of this warranty, we will, at our option, repair or replace the product and return it prepaid (areas outside a service center's territory will carry a shipping charge).

This warranty is not transferable and does not cover normal wear and tear, or damage caused by improper handling, installation, or use. This warranty is void if the product is in any way abused, damaged, or modified from its original state.

This warranty gives you specific legal rights, and you may have other rights that may vary from state to state, or country to country.

10. LIST OF FACTORY EXERCISES

Exercise 79	1 TS to BH, 1 TS to FH
Exercise 80	1 TS to FH, 1 TS to Center
Exercise 81	1 TS to BH, 1 TS to Center
Exercise 82	*Falkenberg*: 2 TSs to BH, 1 TS to FH
Exercise 83	2 TSs to FH, 2 TSs to BH
Exercise 84	1 TS to FH, 1 TS to Center, 1 TS to FH, 1 TS to BH
Exercise 85	1 TS to BH, 1 TS to Center, 1 TS to BH, 1 TS to FH
Exercise 86	3 TSs to FH, 1 TS to BH
Exercise 87	1 TS to FH, 1 TS to Center, 1 TS to BH, 1 TS to Center
Exercise 88	1 long BS to FH, 1 long BS to Center, 1 long BS to BH, 1 long BS to Center
Exercise 89	1 long BS to FH, 1 TS to BH, 1 TS to Center
Exercise 90	1 long BS to BH, 1 TS to Center, 1 TS to FH
Exercise 91	1 short BS to Center, 1 TS to Center
Exercise 92	1 short BS to BH, 1 TS to FH
Exercise 93	1 short BS to FH, 1 TS to BH
Exercise 94	1 short BS to FH, 1 short BS to Center, 1 short BS to BH
Exercise 95	1 short BS serve to BH, 1 TS to FH
Exercise 96	1 short BS serve to FH, 1 TS to BH
Exercise 97	1 short BS serve to FH, 1 BS to FH
Exercise 98	1 short BS serve to BH, 1 BS to BH
Exercise 99	1 short BS serve to FH, 1 short BS serve to Center, 1 short BS serve to BH

Abbreviations: TS=topspin, BS=backspin, FH=forehand, BH=backhand

Note: All factory exercises are programmed for right-handers. Use the Mirror function (see page 13) to mirror above placements for left-handers. We recommend not saving changes to the above drills. Use Save As to store in memory under another name. If factory exercises are changed, they can be restored by using the *Restore factory exercises* button on the Info screen (see page 22).

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