Amicus 3000 Plus

Users Manual

Amicus 3000 Plus Users Manual

G E N E R A L   I N F O R M A T I O N

The Amicus 3000 Plus table tennis robot should only be used in closed, dry rooms!

Do not touch rotating wheels while machine is running. This can cause injury.

If you have problems assembling or using your robot please contact:

Tamasu Butterfly Europa GmbH
Am Schürmannshütt 40a
47441 Moers
website: www.butterfly-world.com
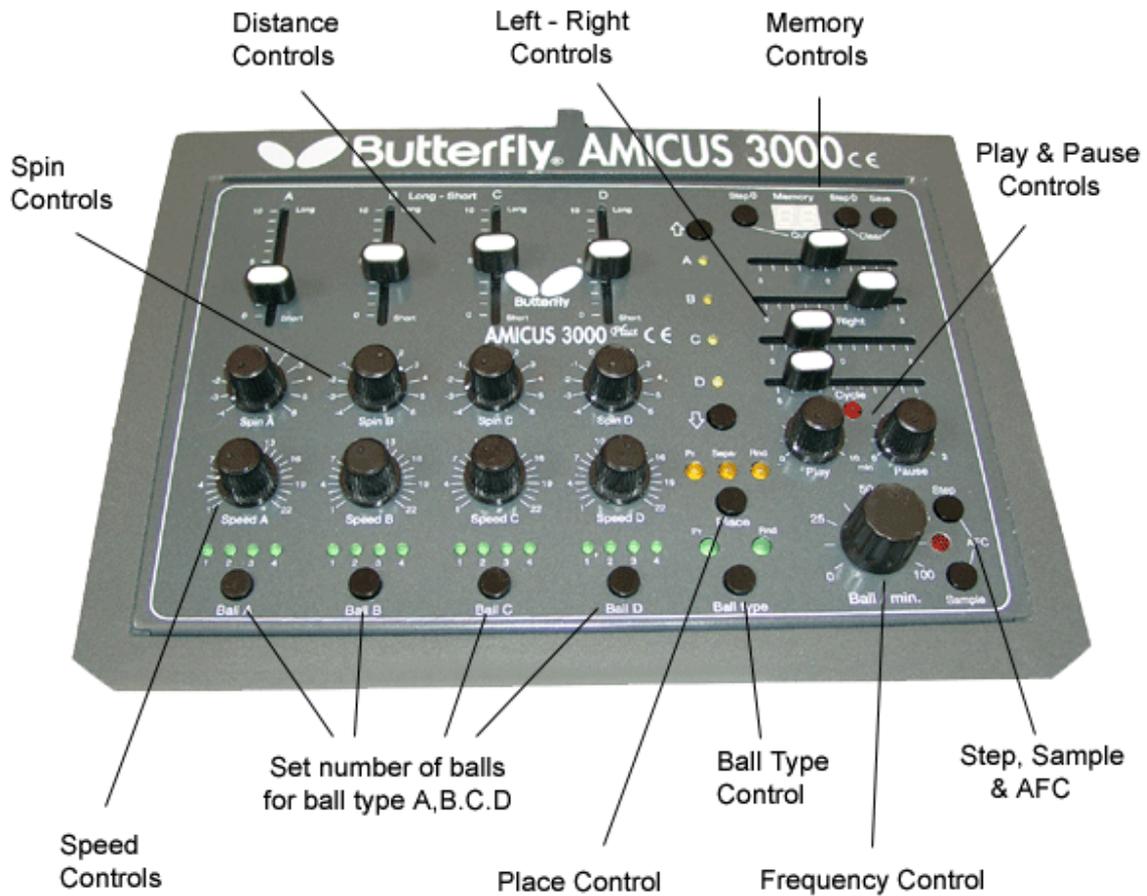phone: +49 2841 905320
fax: +49 2841 9053220

The manufacturer (Cs. Lukacs) provides a full 1 (one) year warranty.

The manufacturer (Cs. Lukacs) provides a service for parts and repairs for 2 years from date of purchase.

AMICUS 3000 PLUS Control Panel

Distance
Controls

Left - Right
Controls

Memory
Controls

Spin
Controls

Play & Pause
Controls

Set number of balls
for ball type A,B.C.D

Ball Type
Control

Step, Sample
& AFC

Speed
Controls

Place Control

Frequency Control

CONTROL PANEL QUICK REFERENCE GUIDE

Speed controls (range: 1 to 22) Controls the speed of the ball. Set to "22" for very fast, "1" for very slow

Spin controls (range: -4 to +6) Controls the spin of the ball. Set to -4 for heavy underspin, 0 for no-spin, 6 for heavy topspin.

Distance controls (range: 0 to 10) Controls the long-short distance (and height of balls). Set to 10 for longer (higher) balls, 3-4 for shorter (lower) balls, and 0-2 for serves (delivers balls to robot side of table first).

Ball number buttons (Located above "Ball A, B, C, and D" labels.) Sets the ball number for this ball type to 1, 2, 3 or 4 balls. (For a total of 16 balls for A, B, C, and D)

Memory step & clear buttons The memory "step" button is used to select various memory positions. The "save" button allows saving of a pattern into memory. These buttons are used together to clear patterns from memory.

Left-Right position (5 to 5) controls for A, B, C, D. Horizontal levers used to set the left-right positions for positions A, B, C, D.

Play & Pause controls Enables setting of the play/pause timer: intervals of continuous play for 10sec to 10min, with 5sec to 2min pauses between each play interval.

Step & Sample buttons The "step" button is used to select the next ball within a ball type or within a pattern. The "sample" button is then used to test this ball.

Ball/min knob (range: 0 to 100) Allows setting of ball frequency from 0 to 100 balls/min. (Can also be used to start and stop continuous play)

"Place" button Allows selection of one of three BALL PLACEMENT modes: Program, Separate, or Random

"Ball type" button Allows selection of one of two BALL TYPE modes : Program or Random

(See chapters 4,5, and 6 for more information on using the control panel.)

"AFC" Automatic Frequency Control (see chapter 5**)**

"Memory Controls" Settings for saving programs. (See memory section)

Amicus 3000 Plus Table Tennis Robot Users Manual

Table of Contents

CHAPTER 1 – INTRODUCTION

Congratulations on your purchase of the Amicus 3000 Plus table tennis robot. Amicus, derived from the Latin language meaning "friend"; that is that the Amicus can become a real friend as your training partner - offering a whole new world of 'dynamic' robot-based table tennis training possibilities for beginners through professionals.

Table Tennis is a multi-dimensional sport requiring a unique set of hand-eye coordination skills and athletic abilities. Advancing players are required to learn fundamental strokes, footwork, timing, and a variety of stroke combinations. This is where the power of the Amicus table tennis robot comes in handy. Not only can you learn to master the fundamental strokes such as the counter-drive, push, loop, etc., but you can also practice the combinations that are used in actual games.

For example: step in and push ball 1 (against a short underspin ball), move back and loop ball 2 (against a medium speed no spin ball), then move to the side and smash ball 3 (against a lob). The Amicus is unique in its ability to deliver up to four different types of balls - each with its own speed, spin, distance and position settings. Additionally these balls can be delivered in almost any order you can imagine!

Here is a short preview of features offered by the Amicus:

Topspin, underspin, no-spin, and side-spin balls

Independent control of spin, speed, and distance

Delivery of balls to various positions on table including long and short balls

Delivery up to 100 balls/min

Patterns of any of the above ball types

99 pattern setups can be saved in memory

Play/Pause timer (up to 10 min for play, 2 min for pause)

The Amicus automatically 'recycles' balls that are captured in the net allowing for continuous play

Serve and play mode: Amicus delivers a serve then continues with a pattern

The Amicus can be used with 38 or 40mm balls

Robot has wheels on its base for easier mobility

Rugged institutional quality design

AFC(Automatic Frequency Control) Function which takes into consideration that the previously projected ball was fast or slow. Backspin or topspin and depending on that "simulating a real game" shoots the next ball faster or slower for the real time experience.

Adjustable neck that lets you shoot balls from different trajectories

CHAPTER 2 - ASSEMBLY OF THE AMICUS

PARTS & TOOLS NEEDED:

The Amicus 3000 Plus table tennis robot can be assembled in approximately 40 minutes. The tools needed are: a small flat head screw driver, a Philips-head screwdriver, and a hex wrench (included with the Amicus).
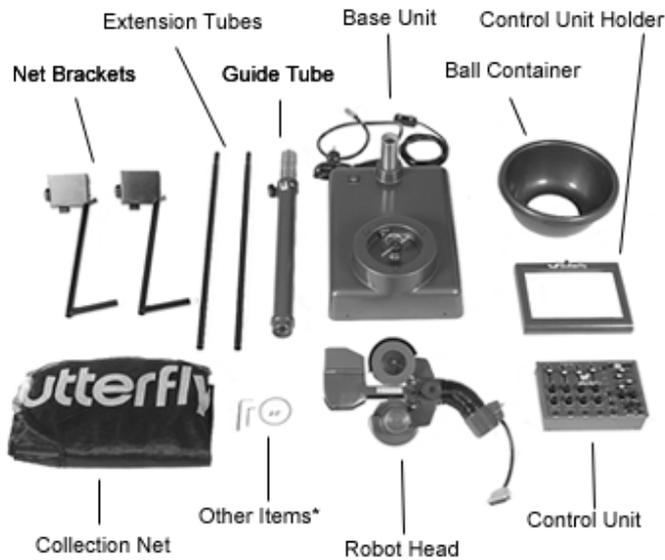
*Other items: 2 piece hex wrench, 2 spare fuses, spare rubber rings for collecting net.

ASSEMBLY PROCEDURE

2. Fasten the ball container to the robot base using a Philips-head screw driver and the recessed head screws supplied (Fig. 1a, 1b) Ensure that the screws cannot fall into the opening of the container (perhaps covering the opening with a cloth)

Fig 1a   Fig 1b

3. Slip the ball guide tube onto the tube section of the robot base (studs . must be at the bottom end) and tighten the studs.(Fig 2). Ensure that the ball guide tube is mounted on the tube section as far as it will go.

4.

5.   Fig 2

6.

7.

8.

9. Push the cord that connects to control unit snuggly into the slot on the ball guide tube. (Fig 4).

10.   Fig 4

11. Slip the robot head onto the Guide Tube as shown in figure 5a. Make sure the head slides down as far as it can go. Tighten the lower screw of the clip with the hex wrench (supplied) as shown in Figure 5b. Do not tighten or loosen the upper screw for any reason. It is factory set..

12.   Fig 5a   Fig 5b

13. Fasten the holder of the control unit with the two hexagon socket screws (with the washers) to the assembly point intended for it (Fig 6). Tighten the screws evenly. The Butterfly Amicus 3000 Plus labeling must be at the top. Tighten the screws with the hex wrench.

Fig   6

Assembly Procedure cont

14. Then lay the control unit in the frame and insert the cable plugs into the connections on the operating section (Figs 7 & 8). (The center connection remains free for possible special accessories {not yet available}).

Fig 7

Fig 8

15. Fasten the net holders at the corners of the TT Table (Fig 9) and slip the extension tubes onto the tube sections (Fig 10). Place the six plugs sewn onto the net into the end of the extension tubes (Fig 11) or into the tube section at the corner sections. Ensure that the net cutout for the robot head is about 8 inches above the TT table and that the Butterfly logo (printed on the net) can be read by a player using the robot. Then guide the ends of the collecting net over the TT net holder and fasten the rubber rings on the fastening screws of the table tennis net (Fig 12).
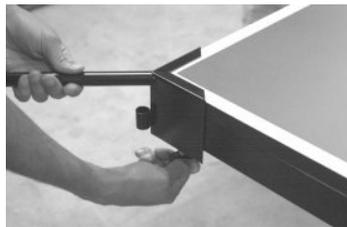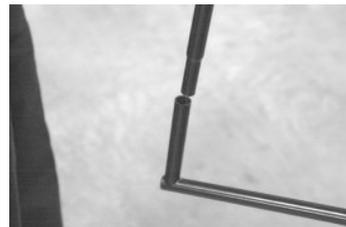

Fig 9

Fig 10

Fig 11

Fig 12

C H A P T E R   3   -   Q U I C K   S T A R T   G U I D E

Assuming that your Amicus is fully assembled, this chapter will help you to get your Amicus3000^{plus} up and running within a few minutes.

16. Position the Amicus such that the head of Amicus is centered just behind the center opening in the net, and that the ball bin is centered below the opening in the bottom of the net.

17. Load the ball bin with about 100 balls (use 40mm balls).

18. Power on the Amicus using the red switch on the base of the robot.

> The robot needs about 6-8 seconds in to adjust itself (meanwhile the display is flashing) and the integrated computer is booted up.
> After that, the robot starts calibration function and "CA" appears in the display.
> (-> see *"CA" calibration function*)
>
> Push Ball "A" button in order to leave the calibration and start defining your first ball!

TIP: *If the Amicus begins to automatically fire balls you may stop the delivery of balls with the remote control (on/off switch).*

> Set the left-right (horizontal) slide lever for "A" between 0 and 5.

19. On the far left of control panel set the speed for "A" to 8, the spin to +1, and the distance slide lever to 4.

20. On the far right of the control panel set the "Ball/min" knob to 50.

21. Next, test the delivery of a few balls by momentarily holding the sample button.

22. If the balls go into the net or off the table, adjust the distance (long/short lever) for ball A accordingly.

23. Once you have set the distance control to deliver the balls properly, use the remote control on/off switch to deliver balls continuously.

> You may also use the "Ball/min" knob to start/stop the continuous delivery of balls (simply set this knob to "0")

Ball Type Controls

On the left half of the control panel there are 4 "channels" of controls - One channel for each of the four ball types: A, B, C, D. For each ball type there is a control for you to set the speed, spin, and distance. Additionally there is a button at the bottom of each channel to select the number of balls delivered within a given "sequence" or "pattern". By pattern we mean different ball types linked together - for example, ball "A" could be set for fast balls; followed by ball "B", slow balls; "C", topspin balls; and "D", underspin balls. The Amicus can create almost any pattern you can think of! (Up to four balls of each type can be delivered before delivering a ball of another type.)

Try this: For ball A, press the ball number button several times.(This button is located just above "ball A" label.) For each green light that is on, a ball of this type is delivered. Up to four balls of each type can be delivered before delivering balls of another type. Once the end of a pattern is reached the Amicus automatically repeats the pattern.

Now try this: Using the ball number buttons, select two balls of type A, and three balls of type B (Note: there should now be two green lights on above "ball A" and three green lights on above "ball B")

If ball "A" was set (for example) for topspin and ball "B" for underspin, then two topspin balls would be delivered followed by three underspin balls, then the pattern would automatically repeat with the topspin balls, etc.

The following table may be used as a rough guide in creating balls type to train with:

	SPEED	SPIN	Long-Short
Slow no spin	8	1	4
Medium Speed topspin	11	3	4
Slow, shoulder high topspin	2	2	7
Short, mild underspin	4	-2	4
Long, medium underspin	5	-2	3
Long, heavy underspin	16	-3	2.5
Heavy topspin	16	6	4

In general when setting ball types you may want to set the desired spin and speed first; then set the distance (which also controls ball height). [**For examples of *training patterns* see Appendix II**]

Note: The Amicus is fairly consistent when delivering the above ball types; however it may not be as consistent with either very slow or very fast balls that are close to the net or near the edge of the table. For more consistent balls, allow the ball to clear the net by more than 2", and landing within 4" from the end of the table.

Testing Balls Types with the Step & Sample buttons

Ok, so how do you test all of these different ball types before playing a whole pattern? On the bottom right hand corner of the control panel you will find a step button and a sample button.

The "STEP" button is used to "move" to the next ball you want to test, and the "SAMPLE" button is used to "test" this ball.

Try this: Using the above example (two balls for "A", and three balls for "B"), use the step button to move to each of the balls in this pattern. Note that after moving from the 3rd "B" ball the pattern returns to the 1st "A" ball.

Now set the speed, spin, and distance controls for ball "B" similar to "A", and set the left-right position control for "B" to -3 (3 dashes to the left of "0"). Use the step and sample button to test ball "B". Now use the remote control (on/off switch) to play the whole pattern. You should see the Amicus deliver two balls to the center of the table, followed by three balls to the forehand corner of the table (then repeating to the center, etc.) Congratulations you have just created your first training pattern.

Understanding ball positioning modes

Now we move on to one of the more challenging aspects of using the Amicus. When you first power on the Amicus you will notice that above the "Place" button the yellow "Pr." light is on, and above the "Ball type" button, the green "Pr." button is on - these are the default modes and you will probably do much of your training using these settings.

Ball "Place" button

The ball place button can select three different ball positioning modes:

Pr. (Program), Separ. (Separate), and Rnd (Random), indicated by the 3 yellows lights on the control panel.

24. In Program mode - "Pr." light is on - Ball A is sent to left-right position A, Ball B is sent to L-R position B, Ball C is sent to L-R position C, and Ball D is sent to L-R position D. [These four Left-Right positions are determined by the four horizontal levers on the right side of the control panel]

25. In Separate mode - "Separ." light is on - the 1st ball of a given pattern is sent to the L-R position A, the 2nd ball to the L-R position B, 3rd to C, and 4th to D, repeating with the 5th ball to L-R position A, etc.

26. In Random mode - "Rnd." light is on - the Amicus will randomly deliver balls, selecting from the L-R positions you have chosen.

Ball "Place" mode examples

An example of the 'Program Mode' was used at the beginning of this chapter ... if you remember - Ball A (two balls) was sent to position A, and Ball B (three balls) was sent to position B. Lets now move on to examples of the 'Separate Mode' and 'Random Mode'.

Separate Mode example: Using the same setup as before ...ball A (two balls) and ball B (three balls), try this ... select the 'Separate Mode' by pressing the 'Place button', (the yellow light below "Separ" should now be on). Then press the remote on/off button to play the pattern. You should notice that the:

27. 1st ball (A) is sent to position A

28. the 2nd ball (A) is sent to position B

29. the 3rd ball (B) is sent to position A

30. the 4th ball (B) is sent to position B

31. and the 5th ball (B) is sent to position A

In the above example, balls are delivered to two separate L-R positions. To select additional positions - use the up and down arrow keys, as you do this a yellow light will turn on next to the position(s) you have selected. Balls would then be sent in this order:

32. 1st Ball - Position A

33. 2nd Ball - Position B

34. 3rd Ball - Position C

35. 4th Ball - Position D

36. 5th Ball - Position A

"Ball Type" Button

37. In Program mode - "Pr." light is on - Balls are delivered in the order you have set by the ball type controls.

38. In Random mode - "Rnd." light is on - the Amicus will randomly select balls from one of the ball types you have made settings for (at least one of the ball number lights of a given ball type must be on in order to be a candidate).

"Ball Type" mode examples

All examples thus far have used the "Ball Type - Program Mode". An example of "Ball Type - Random Mode" follows: Set Ball 'A' for slow balls, Ball 'B' for medium speeds balls, and ball 'C' for fast. Then select "Ball Type" for 'random' the 'Rnd' light should now be on. Now play the pattern. You will notice that the Amicus is delivering the different ball types in no particular order ... perhaps 1 fast ball, 1 slow, 2 medium, etc.

In summary of understanding the "PLACE" and "BALL TYPE" modes: the "BALL TYPE" mode determines WHAT type of ball will be sent, either according to the order you have set or according to a random order. The "PLACE" mode determines WHERE balls will be sent:

39. Program Mode: Sending Ball A to position A, Ball B to position B, etc.

40. Separate Mode: Sending the 1st Ball to position A, 2nd to B, 3rd to C, etc.

41. Random Mode: Sending balls to random positions, pre-selected by using the arrow keys.

Note: when using Random ball type and/or random placement modes there are no 'visual cues' (other than watching the ball itself) as to **WHERE** the next ball will be placed or **WHAT** type of ball will be delivered. Therefore when using these random features, you may want to limit the ranges of ball types or positions you are using.)

Using the memory feature

By now you should have a good understanding of the left two-thirds of the control panel. Next we will move to the upper right hand corner of the control panel to learn how to use the memory feature.

For starters, remember that you can only change the speed, spin, distance, and left-right position control, etc. when ALL memory lights are OFF. [If any of the memory lights are ON, you **CANNOT** make such changes.]

There are 99 memory positions to which you can save and recall patterns you create. To select any of these positions you must use the "memory step button" (located just to left and right of the memory lights). Use the step button to move to any of the 99 positions. A blinking red light means that this memory position is free. A solid red light means that this position has a pattern saved to it. If any of the memory numbers are blinking then that memory slot position is free. If the memory numbers are solid then that position is full.

Ok, let's try to save the previous pattern (two balls for A, three balls for B) to memory position "1". Using the step button, move to memory position 1 (which should be blinking if it is free). Next press and hold the save button until the red blinking light turns solid. You have just saved you first pattern! This pattern can be used again simply by using the memory step button to select the memory position you want, and then playing the pattern with the remote on/off switch.

[You may also test the different ball types within your pattern using the sample and test buttons as before.]

Note: The frequency (balls/min), and play/pause settings CANNOT be saved in pattern memory.

To clear a pattern from memory

1. Use the memory step button to select the appropriate position.

2. Hold the save button, and press the step button (clearing) at the same time until the number starts to blink a few times to indicate that it has been cleared.

The play/pause feature

When training on the Amicus you have the choice of playing a pattern continuously, or using the play/pause feature! The play/pause feature allows you to play a pattern from 10 sec to 10 min, pause from 5 sec to 2 min, and then continue to play your pattern. Adjust the play knob to the desired number of minutes. Now simply select the desired time you wish to pause between play intervals, then play the pattern. The red light (just above theses knobs) indicates that you have enabled the play/pause feature.

The serve and continue feature

The serve and continue feature allows you to serve one ball (ball A), and then continue with a pattern set by ball B, ball C, and ball D. To use this feature first set ball A to the type of 'serve' you want to receive ... perhaps a short underpin ball for example. Then set ball B, C, and D to the desired ball types you want to be delivered after the serve. Next press the ball number button for ball A until all four green lights are blinking ... this indicates that you are in serve and return mode. Next, simply play the pattern ... the Amicus should deliver one ball of type, continuing with ball B, C, D, and then continuing with ball "B".

Changing ball distance of a memory pattern

In general ball type settings cannot be changed once in memory. There is however one exception to this rule. The 'ball distance' of pattern in memory can be increased or decreased by using the up and down arrows on the control panel.

Note: When you adjust the ball distance in this way, the distance (height) of ALL balls within a given memory pattern will be adjusted

AFC (Automatic Frequency Control) mode

Function which takes into consideration that the previously projected ball was fast or slow, backspin or topspin. Depending on that "simulating a real game" shoots the next ball faster or slower for the real time experience.

To access this function press and hold down the "STEP" and "SAMPLE" on the bottom right hand side of control unit. When you see the red LED light come on then the function is running.

Example: A slow backspin ball needs more time to get from the robot to the player than a quick topspin ball needs. That's why the balls coming one after the other with different speed and spin do not follow each other in the same tempo.

"CA" calibration function

The machine sets (programs) a given type of ball in this function, which is shot only in case of pushing continuously the 'Sample' button. The robot is adjusted correctly in case this sample ball reaches the table onto the middle line about 10-20 cm from the end of the table. In case the robot does not shoot the ball onto the middle line, it is necessary to turn the whole machine in the right direction.
In case the robot shoots the balls too long or too short regarding the adjusted distance from the basic line, then the " ⇑ " and " ⇓ " buttons have to be pushed enough times in order to reach the right length. (The robot remembers on this correctly set distance also after switching off the machine, so it is not necessary to make this calibration.)

Attention! Only "Sample" and " ⇑ ", " ⇓ " buttons work during the calibration function, no other buttons can be used.

It is possible **to get out from "CA" function** with pushing any of "Ball type A,B,C,D" buttons, which in the same time means to start defining the ball that will be used or programmed.

Usually in practice the "CA" function will be jumped through with activating "Ball type A,B,C,D," regarding that it is necessary to make new calibration only quite seldom, for example in case the shooting wheels are getting worn or it is need of change the height of the machine.

CHAPTER 6 - MISC. FEATURES, MAINTENANCE, AND OPERATING INFORMATION

Delivering sidespin balls

The Amicus robot is capable of delivering left (or right) sidespin balls. To use this feature simply loosen the large knob on the side of the robot head, and rotate the head to the left or the right. Use arrow and 'angle indicator' (located just above this knob) for exact angle settings (-45 degrees to + 45 degrees).

Moving the robot using its wheels

To move the robot with its wheels, simply tilt the robot backwards (in the direction of the control panel), and gently roll the robot forwards.

Delivering balls from the corners of the table

In normal usage, the robot delivers balls from the center of the table. You may however make the Amicus deliver balls from the right hand corner (or left hand corner) of the table. There are Velcro enabled openings on each end of the net where the robot can be placed in order the use this feature. You will need to place a box, or a bucket to catch the balls that fall through the center hole in the bottom of the net.

Note: When delivering balls from these corners, the recycling feature will not work as there isn't a hole in the net for the balls to return into the robot's ball bin.

Serve Practice

The Amicus' net is a great tool for practicing serves. Simply move the robot and place a box or a bucket below the net to catch the balls as you practice your serves!

Shoot wheels care

The robot's 'shoot wheels' (there are two of them) will last for at least 500hrs. As these wheels begin to wear, the balls 'distance' will tend to vary for balls delivered at high speed. If this happens, the distance between these wheels will need to be adjusted. To do this, you will need to:

• Remove each of the two wheel covers using a Phillips head screwdriver

• Loosen the adjusting screws and set the correct spacing (a few millimeters narrower than the size of the ball you are using).

[If the wheels have worn such that this distance can no longer be adjusted, then you will need to have the wheels replaced. To do this, loosen and remove the set screw (and plastic spacer) and wheel from the motor shaft. Position new wheels on shaft and assemble in reverse order.]

Ball Jams

Be sure that no small objects (other than the balls) enter the small opening at the bottom of the ball bin. This can cause ball jams - the robot will not be able to feed balls to the shoot wheels.

If a ball jam does occur, the Amicus automatically tries to correct the situation by turning the drive, and shoot wheels backward and forward for 3-4 seconds. If this does not correct the problem, you will need to disassemble the robot in reverse order (see assembly notes in chapter 2), and then remove the foreign object that caused the ball to jam. Turn the robot gently on the side and use a sturdy thin object and push the jammed balls along, going through the opening underneath the machine (see picture below).
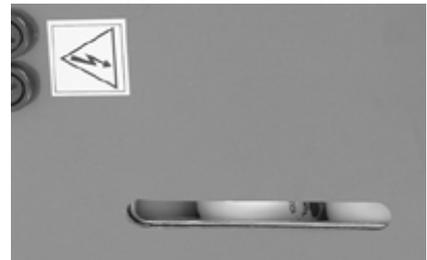
Stop Pin Maintenance

The stop pin, necessary for ball delivery, requires 1-2 drops of oil every 4-6 months. The stop pin is located just above the pivot head (mechanism that directs balls to the various left right positions).

Fuses

If your robot cannot be turned on, it is possible that a fuse may be blown. [Be sure, of course, to first check if your robot was plugged in!]

There are two fuses on the base of the robot. First unplug the robot, and carefully lay the robot on its side. Use a flat head screwdriver to unscrew the fuse sockets, and then replace the defective fuse. (Two spare fuses, T400ma, were included with your robot.)

Adjusting Wheels

If you need to adjust the wheels for any reason, first remove plastic covers from the two motors. Unscrew the big screw slightly and then slowly slide the wheel to the optimal position, and then tighten the screw (see picture below). The distance between the wheels should be 32mm.

When it is time to replace the wheel follow these instructions. Unscrew the caterpillar screw that is located on the wheel supporter, remove the wheel from the shaft of the motor, then unscrew the three screws that keep the plastic tight.. Replace with the new wheel and you are ready to go.

APPENDIX I

Amicus 3000 Plus Table Tennis Robot
Ball Type & Pattern Setup Sheet

Modes   **Ball Type Settings**   **Modes**

Balls/minute		A			B			C			D			Place	Ball Type		
		Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.				
Play	Pause														A	B	C	D
		1 2 3 4			1 2 3 4			1 2 3 4			1 2 3 4						

Balls/minute		A			B			C			D			Place	Ball Type		
		Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.				
Play	Pause														A	B	C	D
		1 2 3 4			1 2 3 4			1 2 3 4			1 2 3 4						

Balls/minute		A			B			C			D			Place	Ball Type		
		Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.				
Play	Pause														A	B	C	D
		1 2 3 4			1 2 3 4			1 2 3 4			1 2 3 4						

Balls/minute		A			B			C			D			Place	Ball Type		
		Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.				
Play	Pause														A	B	C	D
		1 2 3 4			1 2 3 4			1 2 3 4			1 2 3 4						

Balls/minute		A			B			C			D			Place	Ball Type		
		Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.				
Play	Pause														A	B	C	D
		1 2 3 4			1 2 3 4			1 2 3 4			1 2 3 4						

Balls/minute		A			B			C			D			Place	Ball Type		
		Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.	Spd.	Spin	Dist.				
Play	Pause														A	B	C	D
		1 2 3 4			1 2 3 4			1 2 3 4			1 2 3 4						

Notes: Ball Type Modes: Program (Pr): Robot delivers balls in the order you've selected (A, B, C, D, etc.)
                                     Random (Rnd): Robot randomly delivers balls from types you've selected

           Ball Placement: Program (Pr): Ball A to position A, B to B, C to C, D to D
                                     Separate (Separ): example: A1 to A, A2 to B, B1 to A, C1 to B, repeat
   Random (Rnd): Robot randomly delivers balls to positions you've selected

APPENDIX II

Practical exercises

The following examples of exercises for the TT ball machine Amicus 3000 Plus were prepared by a licensed trainer. All of the exercises, with the exception of the exercise 'Timo Boll' are shown for right-handed players. If the training player is left-handed, the ball paths must be changed accordingly.

The description of the settings on the control unit of the ball machine are shown as examples of an appropriate implementation of the exercises. They can be individually adjusted to the performance level of the player, e.g. by changing the ball frequency. All of the ball parts are shown by arrows. The description above the graphic - solid arrows - refers to the balls of the TT ball machine Amicus 3000 Plus. The designations below the graphics - dashed arrows - refer to the balls and placing alternatives of the player.

1. 'Getting used to the ball'

Counter ball   Amicus 3000 Plus

Counter ball/topspin   'Player'
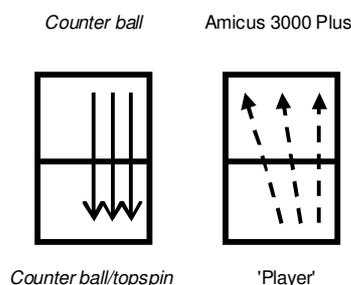
The TT ball machine Amicus 3000 Plus play counter balls according to the random principle onto a specific area of the table (e.g. half table). The beginner plays these balls back distributed over the whole table. Due to the random placing of the balls, the beginner's attention is drawn at an early stage to the necessity for movement and correct position play. The rate and the number of balls per minute should correspond to the particular performance level. The following settings on the control unit show an example of implementation.

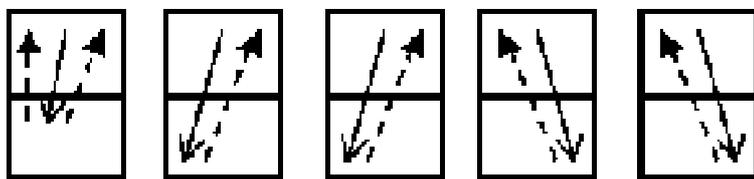|	'Ball A'	'Ball B'	'Ball C'	'Ball D'
Ball	1 2 3 4	1 2 3 4	1 2 3 4	
Speed	5	5	5	
Spin	1.5	1.5	1.5	
Long-Short	5	5	5	
Left-Right	Left 3.5	Left 2.5	Left 1.5	
Ball/min.	20			
Cycle	Play 60 s / pause 30 s			
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

2. Right/Left

'Amicus 3000 Plus
Service   *Counter ball*   *Counter ball*   *Counter ball*   *Counter ball*

Flip   *Counter / topspin*   *Counter / topspin*   *Counter / topspin*   *Counter / topspin*
'Player'

This regular exercise begins with a service from the TT ball machine. After that, two counter balls onto the forehand and onto the backhand of the player follow. Depending on the playing system they are played back diagonally as a counter ball or as a topspin.

	'Ball A'	**'Ball B'**	**'Ball C'**	**'Ball D'**
Ball	1 2 3 4	1 2 3 4	1 2 3 4	
Speed	3	14	14	
Spin	-3	4	4	
Long-Short	1	5	5	
Left-Right	0	Right 3.5	Left 3.5	
Ball/min.	35			
Cycle	Play 40 s / pause 20 s			
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

3. 'Technique'

Service   *Backspin*   *'Amicus 3000*
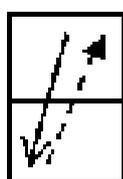
Chop/flip   *Topspin*   *'Player*

This exercise is suitable for learning a technique. In this example the backhand topspin from a service/return situation is trained. A service from the ball machine is followed by a long backspin ball onto the backhand of the player who returns this ball as a backhand topspin. (Also suitable for training forehand topspin)

	'Ball A'	**'Ball B'**	**'Ball C'**	**'Ball D'**
Ball	1 2 3 4	1 2 3 4		
Speed	2	6		
Spin	-1.5	-1.5		
Long-Short	2	4		
Left-Right	Left 2	Right 4		
Ball/min.	20			
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

4. 'Primorac'

Service	Backspin	Topspin	'Amicus 3000'

Flip / chop	Backhand topspin	Forehand topspin	'Player
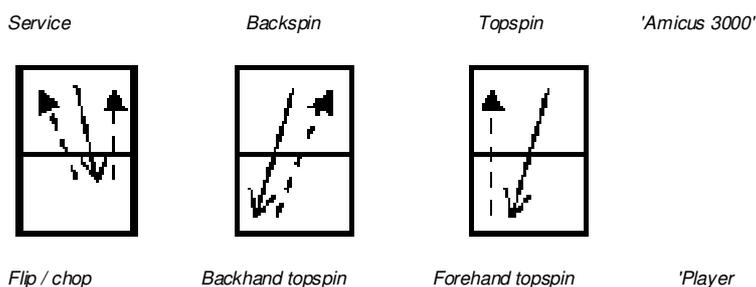
With the help of this exercise a service / return situation is trained. A short service of 'Amicus 3000 Plus' is followed by an aggressive chop ball or flip from the player (preferably on elbow/backhand), in order to avoid a hard topspin of the server. In reply to the following long backspin ball the player opens with a placed backhand topspin as a preparation for the down-the-line forehand topspin. The concluding forehand topspin is played as a smash and should as early as possible end the rally.

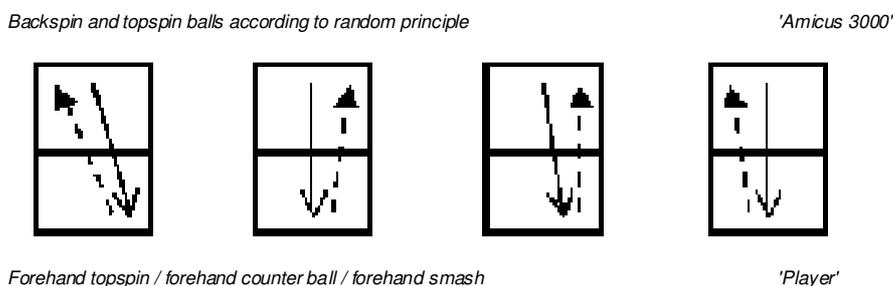|	**'Ball A'**	**'Ball B'**	**'Ball C'**	**'Ball D'**
Ball	1 2 3 4	1 2 3 4		
Speed	2	6		
Spin	-1	-2		
Long-Short	1	4		
Left-Right	Left 1	Right 4		
Ball/min.	25			
Cycle	Play 40 s / pause 20 s			
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

5. 'Random'

Backspin and topspin balls according to random principle   *'Amicus 3000'*

Forehand topspin / forehand counter ball / forehand smash   *'Player'*

This exercise makes it possible to train the perceptiveness of the player. The balls are played onto a certain part of the table (e.g. 3/4 of the forehand area) according to the random principle. The player does not know the order of the topspin and backspin balls. Thus the perception and ability of the player to differentiate is effectively trained.

	'Ball A'	**'Ball B'**	**'Ball C'**	**'Ball D'**
Ball	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Speed	6	6	8	8
Spin	-1.5	-1.5	3	3
Long-Short	4.5	4.5	4.5	4.5
Left-Right	Left 2.5	Right 2.5	Left 2.5	Right 2.5
Ball/min.	25			
Cycle	Play 40 s / pause 20 s			
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

6. 'Nicole Struse'

Service	*Backspin*	*Topspin*	*Topspin*	*'Amicus 3000'*

Topspin	*Topspin*	*Topspin*	*Topspin*	*'Player'*
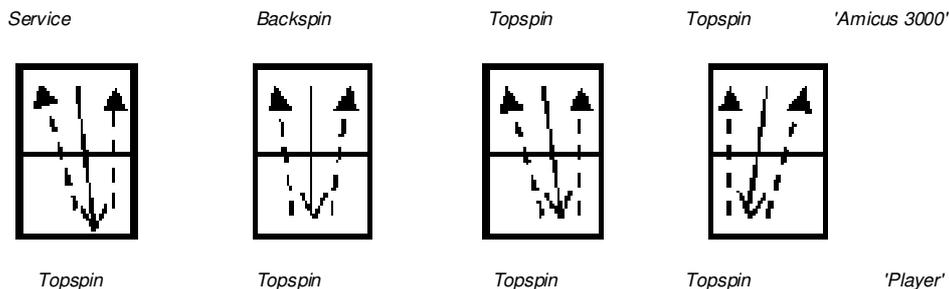
This exercise for the footwork starts with a long service from 'Amicus 3000 Plus'. After a backspin ball onto the middle of the table a fast topspin of the ball machine onto the forehand and one onto the backhand of the player follow. These balls are played back with a topspi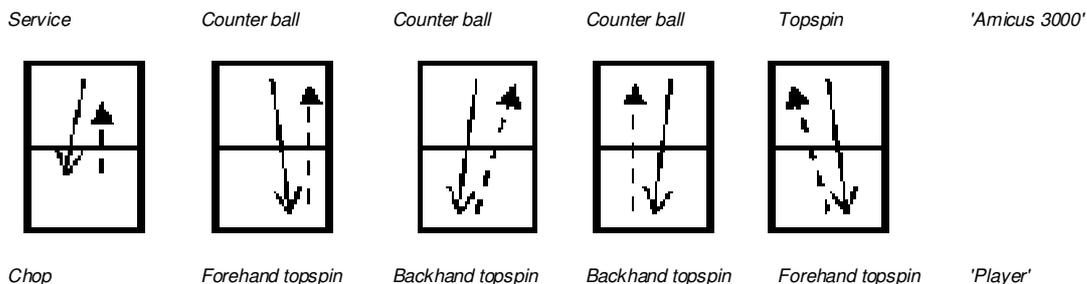n. This exercise is played at a time interval of 40 seconds, the service being played only once. After a pause of 20 seconds, the exercise starts again with a single service.

	'Ball A'	**'Ball B'**	**'Ball C'**	**'Ball D'**
Ball	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Speed	1.5	6	11	11
Spin	-1	-1.5	3	3
Long-Short	1	4.5	4.5	4.5
Left-Right	Left 3	0	Left 2	Right 2
Ball/min.	35			
Cycle	Play 40 s / pause 20 s			
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

7. 'Kong Linghui'

Service	*Counter ball*	*Counter ball*	*Counter ball*	*Topspin*	*'Amicus 3000'*

Chop	*Forehand topspin*	*Backhand topspin*	*Backhand topspin*	*Forehand topspin*	*'Player'*

For the short/short situation, a ball placed by 'Amicus 3000 Plus' onto the wide forehand of the player results. This should as far as possible be played with a down-the-line forehand topspin. The next two balls of the TT ball machine are simulated blocks onto the variable backhand topspin of the player. By means of a diagonal, hard 'counter topspin' the player should end the rally.

	'Ball A'	**'Ball B'**	**'Ball C'**	**'Ball D'**
Ball	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Speed	1.5	11	12	12
Spin	-1	2	2	5
Long-Short	1	4	4	6
Left-Right	Right 3	Left 2.5	Right 3.5	Left 2.5
Ball/min.	35			
Cycle				
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

8. 'Falkenberg'

Topspin	Topspin	Topspin	'Amicus 3000'

Backhand topspin	Forehand topspin	Forehand topspin	'Player'
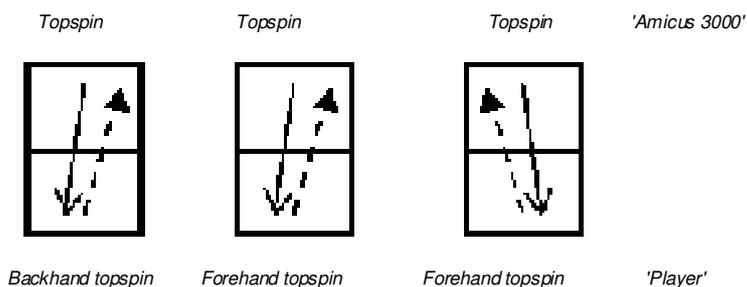
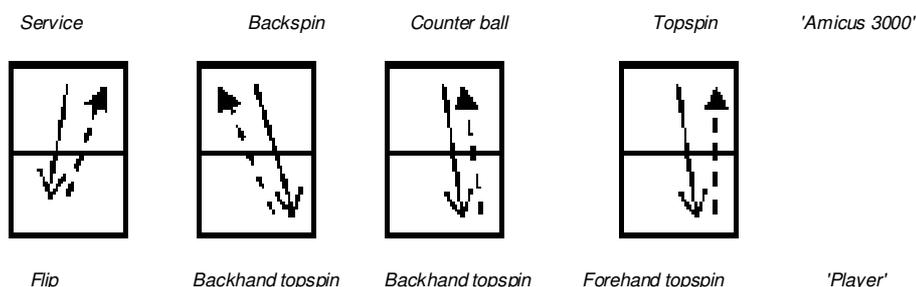Regular exercise for training the footwork. The player can, instead of the topspin ball, also play counter balls. From the backhand side in each case a backhand topspin and a forehand topspin are played. After that one ball onto the wide forehand follows which is also played back with a topspin.

	'Ball A'	'Ball B'	'Ball C'	'Ball D'
Ball	1 2 3 4	1 2 3 4		
Speed	12	12		
Spin	4	4		
Long-Short	6	6		
Left-Right	Right 3.5	Left 2.5		
Ball/min.	35			
Cycle	Play 40 s / pause 20 s			
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

9. 'Timo Boll'

Service	Backspin	Counter ball	Topspin	'Amicus 3000'

Flip	Backhand topspin	Backhand topspin	Forehand topspin	'Player'

This exercise is for a left-handed player who is training against a right-handed player. After a service of 'Amicus 3000 Plus' the left-handed player plays a diagonal backhand topspin. This is played back with a block by the ball machine. The player now plays a backhand topspin onto the centre/elbow as preparation for the concluding forehand topspin. With the down-the-line forehand topspin from the backhand the player must win a point.

	'Ball A'	'Ball B'	'Ball C'	'Ball D'
Ball	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Speed	3	6	12	12
Spin	-3	-1.5	2	5
Long-Short	1	5	4	6
Left-Right	Right 3.5	Left 2	Left 2.5	Left 1.5
Ball/min.	35			
Cycle				
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

10. 'Backhand opener'

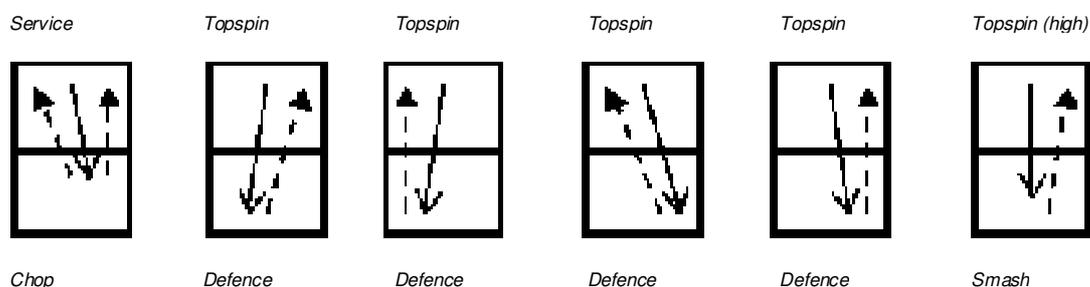|					
Service	*Backspin*	*Counter ball*	*Counter ball*	*Counter ball (high)*	*'Amicus 3000'*
Flip/chop	*Backhand topspin*	*Forehand topspin*	*Forehand topspin*	*Smash*	*'Player'*
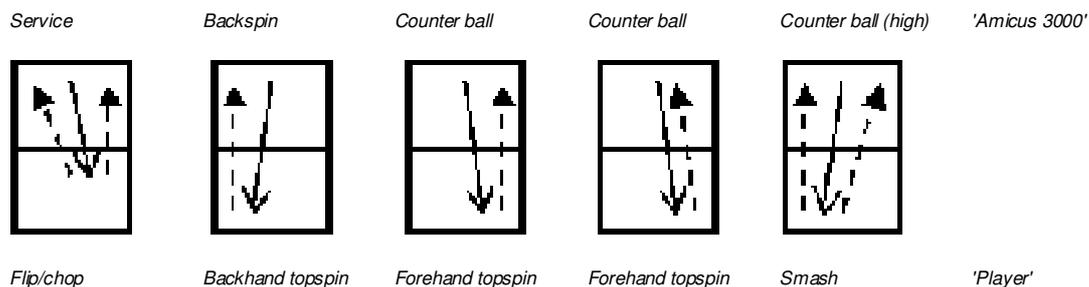
A complete rally according to a service/return situation is trained. The player opens after a service with a down-the-line backhand topspin. This ball is blocked into the forehand, whereupon a down-the-line forehand topspin then follows. The 'Amicus 3000 Plus' plays a further ball onto the forehand, which is played into the centre of the table. The rally ends with a smash by the player in response to the last high ball from 'Amicus 3000 Plus'.

	'Ball A'				'Ball B'				'Ball C'				'Ball D'			
Ball	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Speed		2				6				12				2		
Spin		-2				-2				3.5				4.5		
Long-Short		1				4				4				10		
Left-Right		Left 3				Right 3.5				Left 2.5				0		
Ball/min.		35														
Cycle																
Place	Pr	Separ	Rnd													
Ball type		Pr	Rnd													

11. 'Matsushita'

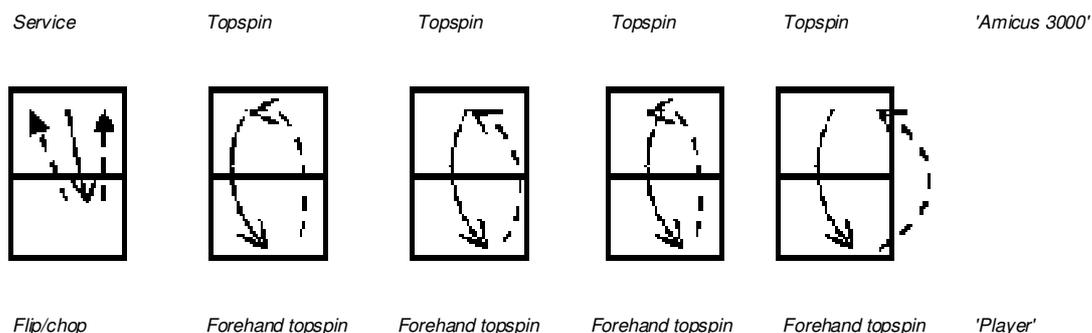|					
Service	*Topspin*	*Topspin*	*Topspin*	*Topspin*	*Topspin (high)*
Chop	*Defence*	*Defence*	*Defence*	*Defence*	*Smash*

In this exercise, the defensive player trains the exchange between defence and attack. After the service situation in each case two topspin balls from 'Amicus 3000 Plus' onto the backhand and onto the forehand follow. The defensive player wards these balls off. After a high and a shorter topspin to the table centre, the defensive player ends the rally with a forehand smash.

	'Ball A'				'Ball B'				'Ball C'				'Ball D'			
Ball	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Speed		2				8				10				2		
Spin		-2				6				6				4.5		
Long-Short		1				7				9				10		
Left-Right		Left 3				Right 3.5				Left 1.5				0		
Ball/min.		32														
Cycle																
Place	Pr	Separ	Rnd													
Ball type		Pr	Rnd													

12. 'Side spin'

Service	Topspin	Topspin	Topspin	Topspin	'Amicus 3000'

Flip/chop	Forehand topspin	Forehand topspin	Forehand topspin	Forehand topspin	'Player'

With this exercise, the topspin against topspin game as well as the assessment of 'side spin balls' is trained. After a service by 'Amicus 3000 Plus' and the return by the player, side spin balls are played onto the forehand. With topspins alternating between diagonal and onto the table centre, the balls are played back. The topspin player terminates the ball exchange with a parallel 'counter topspin'.

	'Ball A'	'Ball B'	'Ball C'	'Ball D'
Ball	1 2 3 4	1 2 3 4		
Speed	2	14		
Spin	-2	5		
Long-Short	1	6		
Left-Right	Left 1	Left 1.5		
Ball/min.	32			
Cycle				
Place	Pr Separ Rnd			
Ball type	Pr Rnd			

The side spin setting 3000 for the robot head is '45° to the right'

APPENDIX III

Technical data / spare parts list

Mains current: 110 V, 50 Hz AC voltage, approx. 50 w
Shock-hazard protection class: I.
The machine can be put into operation in the outdoor temperature range from 0 - 40 °C.
Fuses: 2 T 400 mA

Spare parts list

42.	3000-100	Control unit	43.	3000-102	Ball speed motor
44.	3000-104	Charging motor	45.	3000-106	Pivot head motor
46.	3000-108	Ejection disc	47.	3000-110	Axle for ejection disc
48.	3000-112	Ball placing mechanism	49.	3000-114	Remote control
50.	3000-116	Fuse (T 400 mA/250 V)	51.	3000-118	Transformer
52.	3000-120	Casing for robot foot	53.	3000-122	Shell tube
54.	3000-124	Motor casing (2 off)	55.	3000-126	Ball container
56.	3000128-	Collecting net	57.	3000-130	Net supporting frame
58.	3000-132	Extension cable for remote control	59.	3000-134	Holder for control unit Motor for height adjustment
			60.	3000-136	

Further spare parts on request!

The electric product - **ball machine AMICUS 3000 Plus** - was subject to a type test and the type and version of the designs presented were found to be in conformity with the standard stated.

EN 61010-1:1993+3000.2 (1995) = IEC 1010-1:1990 - 3000.1,2
EN 50081-1:1992   ENV 50140:1993
EN 55014:1993   EN 61000-4-2:1995
EN 61000-3-2:1995   EN 61000-4-4:1995
EN 61000-3-3:1995   EN 61000-4-5:1995
EN 55104:1995   EN 61000-4-11:1994

as can be seen from the test reports with the Nos. E-00136 and E-00136/1.

This test report states that the robot AMICUS 3000 Plus may bear **the CE mark**.

Website: www.butterfly-world.com