Table Tennis Robot

AMICUS 1000Plus

developed by Csaba Lukács  Patent Number: HU 200 947 B

Operation Manual
Important: Please read these operating instructions carefully before operation!

The chapter Control Panel (Summary Description) explains the basic preparations for the operation of the Table Tennis Robot Amicus 1000. Detailed instructions follow in the chapter Operation. The necessary preparations and steps of operation are explained in these parts. It is recommended to have the assembled robot at hand (at first, without balls) while reading the operation manual. Like that, it is possible to try out the different operational devices in order to get familiar with them, until you can make the most of all functions of this ball throwing machine.

| 1. Assembly                        | p. 4-5 |
| 2. Control Panel (Summary Description) | p. 6  |
| 3. Operation                      | p. 7-10          |
| Turning the Machine on            | p. 7             |
| Adjustments                       | p. 8             |
| Speed and Spin                    | p. 8             |
| Trajectory and Throwing Length    | p. 9             |
| Ball Placement                    | p. 9             |
| Sidespin, Ball Frequency,         | p. 10            |
| Height adjustment, Remote Control,| p. 10            |
| Turning the Machine off           |                 |
| 4. Maintenance and Repair        | p. 11            |
| 5. Error Management               | p. 12            |
| 6. List of Replacement Parts      | p. 13            |
| 7. Technical Data                 | p. 13            |

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Table Tennis Robot Amicus 1000plus...

from novice to professional,
from defender to forward player,

... optimally suitable for every type of player and every game level.

- Ball throw discs made of rigid foam with special coating for long life
- Solid, functional workmanship
- Well thought-out and easy to use control panel
- Placement of the balls with chosen rotation and speed on different spots
- Random function
- Computer-controlled adaptation of ball placement in length (throws of equal length into the corners and the centre of the table)
- Torsion bar allows recycling of the balls without disturbing interruptions
- Remote control
- Large collection net with side catch for optimal ball recycling
- Robot Hotline: +49-2841-9053223
- Height adjustable ball tube

You are now the owner of a Table Tennis Robot by Butterfly, developed by Csaba Lukács. We take every effort to offer products of highest quality and to deliver them complete and free from defects. If it should occur that some parts are missing or defective, please contact your specialist supplier or directly Butterfly (see page 12 for the address).

The manufacturer offers a 2 year full warranty and a 5 year service for repairs and replacement parts, starting with the date of purchase. Please keep your receipt.

Please note:
- Please read this operation manual carefully before putting the machine into service!
- The ball machine may only be connected to an earthed mains with 230 V voltage!
- The ball throw discs rotate at high speed. For that reason, avoid to touch these discs during operation!
- The Table Robot Amicus 1000plus should only be used in closed and dry rooms!

If you take this advice into account, your "Amicus 1000plus" will always be a great training partner and a friend (Amicus, Latin for „Friend“).
OPERATION MANUAL

1. Assembly

The following parts must be assembled:

a) Ball container  
b) Ball transport tube  
c) Sheath tube  
d) Robot head  
e) Control panel  
f) Ball collection net

Figure: Supplied parts

Accessories: Allen key, 2 x replacement fuses, replacement rubber bands for the collection net

ATTENTION: Make sure that the mains plug is unplugged before assembling the parts.

1. Fix the ball container to the robot base with the Phillips screws delivered together with the other parts (Figure 1). Make sure that the screws cannot fall into the ball transport opening (for example, by temporarily blocking it with a piece of cloth).

2. Slip the ball transport tube onto the connecting tube piece at the robot base (The shoulder bolts must be situated at the lower end) and tighten the two shoulder bolts with a small screwdriver (Figure 2). Pay attention to put the ball transport tube on the connecting tube piece as far as it will go!

3. Fix the cable connecting the robot base and the control panel to the upper end of the inner tube with the rubber band (Figure 3).
4. Slip the sheath tube over the inner ball transport tube (with cable) as far as it will go. Make sure that the groove on the sheath tube is directed upwards and that the cable fixed to the inner tube leaves the sheath tube exactly at this groove (Figure 4).

5. Slip the robot head onto the inner tube so that the two cables cannot be caught (Both cables come out downwards) (Figure 5). By simple turning, adjust the head so that it is fixed above the ball container. Make sure that there ist no gap between the robot head and the sheath tube. Tighten the lower one of the two screws of the clamp with the Allen key.

6. Fix the control panel on its console and insert the plugs of the cables into the connections of the control panel.

7. Fix the net holders at the corners of the table (Figure 6) and slip the tension tubes on the tube pieces (Figure 7). Slip the 6 sown-on stoppers into the respective end of the extension tubes (Figure 8) and in the tube pieces of the corner profiles. Take care to place the part of the net cut out for the robot head approximately 20 cm. above the table with the Butterfly logo being easily visible by the player. Then pull the ends of the ball collection net over the net holder and fix the rubber bands at the fastening screws of the table tennis net (Figure 9). If you do not fasten the net as described, the balls cannot roll off correctly, especially in the side parts.
2. Control Panel (Summary Description)

With the help of the rotary switches and the buttons, it is possible to program six different hitting points, for example Ball 1 ⇒ left, Ball 2 ⇒ right, Ball 3 ⇒ centre, Ball 4 ⇒ right…

Button A: Switching from normal function to random function
Button B: Optional activation of up to six balls (maximally)
Button C: Resetting from four balls (maximally) to one ball (minimally)
Rotary switch 1: control of spin (negative numbers: backspin)
Rotary switch 2: control of speed
Rotary switch 3: Regulation of the ball frequency (ball throws per minute)

The six yellow indicator lights show how many balls are activated at a given time. The flashing light indicates the ball that will be thrown out next.
The green light will only glow if the random function works (at least two different balls must be activated!).
3. Operation

Turning the Machine On

Before switching the machine on and before plugging the mains plug into the socket, make sure once again that the two plugs on the bottom of the control panel are plugged in!

Place the machine under the network so that the ball container is situated under the cut out part of the net. Fill the container with a sufficient quantity of balls (at least 50-60 balls) and switch the robot on at the robot base.

When switching the machine on, have the remote control at hand in order to be able to interrupt the ball transportation immediately, if necessary, or set the ball frequency (‘Ball/min’) at 0 balls per minute. This assures that no ball is thrown out uncontrolled because of a wrong setting of the robot.

After being switched on, the robot executes a brief self control (approximately 3 seconds). Then the control unit automatically switches to the basic setting. The first yellow indicator light is flashing. The ball throwing machine is now ready to play.

Attention: If there are no balls in the machine, it can take up to approximately 30 seconds (depending on the chosen ball frequency) until the first ball can be thrown out!

For a better understanding and to guarantee the correct operation of the machine, the basic functions offered by "Amicus 1000Plus" will be described in detail in the following.

Be careful: Do not get too near to the ball throw discs with your eyes or your hair. Risk of injury! Do not let children use the robot without supervision.
Adjustments

The ball throwing machine can throw out the balls according to the following main characteristics:

- **Spin**
- **Speed**
- **Height (Trajectory)**
  
- **Left – Right Placement**

The ball placement on the table corners facing the table centre is adapted automatically by a patented invention. This means that it is not necessary to adapt the trajectory of the balls manually if the placement of the balls is programmed with the same throw length at different spots. By computer control, the ball in the centre of the table will have the same length as the balls to the side so that no ball will hit behind the table.

Speed and Spin

If you observe the following instructions, it is very easy to set the speed and the spin of the balls:

- **Spin**: Negative numbers mean the amount of backspin imparted on the ball (-4: strong backspin); positive numbers mean forward spin (the higher the number, the more spin). If the rotary switch is set on “0”, the ball is thrown out without spin.
- **Speed**: The higher the number is set, the more speed the player will face.

Examples:

<table>
<thead>
<tr>
<th>Setting of Spin</th>
<th>Setting of Speed</th>
<th>Ball throw-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>7</td>
<td>little topspin, medium speed</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>much topspin, high speed</td>
</tr>
<tr>
<td>-4</td>
<td>16</td>
<td>much backspin</td>
</tr>
<tr>
<td>-1</td>
<td>7</td>
<td>few backspin</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
<td>no spin, medium speed shot</td>
</tr>
</tbody>
</table>

A reasonable setting of the trajectory is absolutely necessary in order to allow the balls to reach the other half of the table!
Trajectory and Throw Length

The trajectory is determined with the help of the knurled screw at the highest point of the robot. Turn the screw until you get the desired trajectory.

- Turn the screw clockwise – the trajectory will become lower
- Turn the screw anticlockwise – the trajectory will become higher

In order to set the throw length correctly, turn the knurled screw until the balls approximately hit the desired point. Fine tuning can then be executed by careful use of the rotary switches for spin and speed on the control unit.

Ball Placement

1. Ball throw always onto the same point of the table

After turning the robot on, the control unit has automatically switched to the basic setting. The first yellow indicator light is flashing. This means that the ball machine is automatically ready to throw the balls onto a particular point of the table. This point on the table can be set continuously with the rotary switch for left/right placement.

2. Programmed ball throw onto various points of the table

With button B "⇒", at least two yellow indicator lights must be activated. Then the various hit points of the balls can be chosen with the corresponding left/right rotary switches. The flashlight indicates which ball will be thrown out next. With button C "⇐", single balls can be cancelled. After the end of a “round”, the ball throw-out starts again from the beginning.

Example according to the setting of the control panel on page 5, if all six balls are activated (all four lamps are glowing):
First ball onto the centre of the table, second ball onto the left half of the table, third and fourth ball onto the right half of the table, fifth and sixth ball to the table centre.

3. Random ball throw onto various points of the table

With button B "⇒", again, at least two yellow indicator lights must be activated. In order to activate the random function, button A (Pr/Rnd) must be switched on. The green lamp will be glowing. If not at least two balls have been chosen, the green lamp cannot be switched on, even if button A was activated, because the random function would make no sense with only one ball.

Then again, the various hit points of the balls are chosen with the corresponding left/right rotary switches. The balls are now served at random. Here, too, the flashlight shows which ball will be thrown out next. With button C "⇐", single balls can be cancelled.

INFO: The ball placement onto the table corners is adapted automatically with regard to the centre of the table by our patented invention. This means that the ball length needs not to be adapted manually, if the balls are intended to be placed with the same length onto different spots. Because of the computer control, the ball in the middle will have the same length as the ball to the sides so that no ball will come down behind the table.
**Sidespin**

For the adjustment of the sidespin, loosen the small wheel on the left side of the robot. The ball throw head can now be turned in both directions approximately 45°. Take the metal braces so that the robot head can be easily turned with the hand and set it at the desired angle (Figure 10). Then tighten the wheel again.

![Figure 10](image)

**Ball Frequency (Balls per Minute)**

With rotary switch "3", the ball frequency can be chosen continuously. An adjustment of 0 to 80 balls per minute is possible. The higher the value is set, the more frequently the balls are thrown out one after the other.

**Height adjustment**

By setting the position of main tube, the height of robot can be adjusted. This can be executed in four different positions, which differ 16cm in total. Just lose the handwheel underneath the control unit, choose the desired position and fix the handwheel again.

**Attention:** The spring inside the handwheel needs to snap it, what you should check acustically. Otherwise the balls might be thrown out out irregularly.

**Remote Control**

With the remote control, the ball transportation and consequently the ball supply can be switched on and off. The player can thus take his position and switch the ball transportation of the ball throwing machine on and off with the remote control after having executed all necessary adjustments of the control panel.

**Please note:** With the remote control, you can only switch on and off the ball transportation. The ball throw discs will continue to turn!

**Turning the Amicus 1000Plus off and Putting out of Service**

If you want to turn off the ball machine, switch off the red main switch on the robot base and unplug the mains plug from the socket. Please remove the two cable plugs on the control panel only after turning off the robot. Store the Amicus 1000 in a dust-free, frost-free and dry place.

**Transport**

On the bottom of the robot, there are two small wheels for the transportation of the robot to do this, tip the ball machine slightly and roll it to the its place.
4. Maintenance and Repair

Important: Before executing maintenance and repair works, always first unplug the mains plug from the socket!

- During the operation of the ball machine, make sure that no small parts (for example, hairs, indented balls, etc.) get into the collection container and thus into the machine, because they can lead to disturbances (ball jams).
- The ball throw discs are very durable (at least 500 hours). Nevertheless, these discs will finally wear off after intense use. One sign for worn off discs is that the machine throws out the balls with irregular lengths at high speed. This means that the surface of the discs does not get enough hold of the balls. For that reason, the distance of the discs has to be adjusted. Screw off the coverings of the two throw out motors. Loosen the adjustment screws and set the right distance by slightly turning the holders (Figure 11). The correct distance is 36 mm. The throw out mechanism functions perfectly up to a distance of 39 mm.

- When the distance cannot be adjusted any more, the ball throw discs have to be replaced. For this purpose, the threaded pin of the disc holder is removed and the plastic disc is pulled off the motor shaft. Take out the shaft of the ball throw disc and insert it into the new disc (the fastening set can be disassembled). Slide the new disc onto the shaft and tighten the threaded pin. Make sure that the discs are centred exactly to each other and do not scrape against the holder.
- If a ball jam should occur, the machine tries automatically to remove the jam by turning the motor and the throw discs forwards and backwards (7-8 times). If this should not work, you have no other possibility than to disassemble the robot exactly in the reverse order as described on pages 4 and 5 and to remove the foreign body from the transport tube.
- Once every 4-6 months, the stop pin, which is needed to adjust the ball throw length, needs 1-2 drops of oil. The pin is easily accessible in the throw head. The rest of the machine needs no maintenance. However, it is recommended to remove dirt and dust from the surface of the robot with a moist cloth and a mild cleansing agent from time to time.
- If it should be impossible to turn on the machine, a fuse may be defect. The fuse can be replaced without problems: First unplug the mains plug from the socket, then take the control panel out of its console and carefully lay the robot on its side. On the bottom of the robot base, there are two fuse jacks. Screw out the fuse jacks with a screwdriver, replace the defect fuses (T400 mA) and screw the fuse jacks in again (two replacement fuses are part of the delivered machine).
## 5. Error Management

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>On/off switch does not glow; ball robot cannot be turned on</td>
<td>a) Socket without current?</td>
</tr>
<tr>
<td></td>
<td>b) Fuse defect ⇒ replace fuse (see page 10)</td>
</tr>
<tr>
<td>On/off switch glows, but the ball throw discs do not turn; yellow indicator light on the control panel does not flash</td>
<td>Check whether the cable plugs on the bottom of the control unit have been plugged in correctly</td>
</tr>
<tr>
<td>On/off switch glows, yellow indicator light glows; no ball transport</td>
<td>a) Remote control switched off?</td>
</tr>
<tr>
<td></td>
<td>b) Rotary switch 3 for ball frequency set on &quot;zero&quot;?</td>
</tr>
<tr>
<td>Ball throw-out with irregular lengths</td>
<td>a) Check distance of ball throw discs, discs worn off (see page 10)?</td>
</tr>
<tr>
<td></td>
<td>b) Wrong assembly of the robot: Have the ball transport tube, the sheath tube or the robot head been slid on as far as it will go?</td>
</tr>
<tr>
<td></td>
<td>c) Stop pin for throw-out length regulation gets &quot;caught&quot; ⇒ oil slightly</td>
</tr>
<tr>
<td>Ball robot suddenly throws out balls irregularly and with different lengths</td>
<td>a) New start (Switch off the robot for a moment, then switch it on again)</td>
</tr>
<tr>
<td></td>
<td>b) Foreign body or defect ball obstructs ball transport ⇒ remove (see page 10)</td>
</tr>
<tr>
<td></td>
<td>c) the handwheel for height adjustment is not positioned exactly into one of the four steps (check snap-in acoustically!)</td>
</tr>
<tr>
<td>Ball jam; control unit switches off</td>
<td>a) Foreign body or defect ball obstructs ball transport ⇒ remove (see page 10)</td>
</tr>
<tr>
<td></td>
<td>b) there might be too many balls or too new balls inside. Fill in only 50-80 balls and clean new balls beforehand</td>
</tr>
<tr>
<td>Random function on the control panel cannot be activated, green indicator light cannot be switched on</td>
<td>At least two balls must be activated, at least two yellow indicator lights must glow (see page 8)</td>
</tr>
<tr>
<td>Ball gets stuck between ball throw discs, control unit switches off</td>
<td>Switch off main switch, remove ball from in between the throw discs, change setting of rotary switches 1 and 2 (see page 7), switch the robot on again</td>
</tr>
</tbody>
</table>

**Attention:** If you are not able to solve the problems with the help of this check list, an specialist must be consulted! Please contact your specialist supplier or the Butterfly service address (page 13).

Always consult a specialist, if the power cable is defect or if the fuses immediately blow again after having been replaced! Otherwise you will lose any warranty claim during the two year guarantee period.
6. List of Replacement Parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000-100</td>
<td>Control unit</td>
</tr>
<tr>
<td>1000-104</td>
<td>Loading motor</td>
</tr>
<tr>
<td>1000-108</td>
<td>Ball throw disc</td>
</tr>
<tr>
<td>1000-112</td>
<td>Ball placement mechanism</td>
</tr>
<tr>
<td>1000-116</td>
<td>Fuse (T 400 mA/250V)</td>
</tr>
<tr>
<td>1000-120</td>
<td>Casing for robot base</td>
</tr>
<tr>
<td>1000-124</td>
<td>Motor casing (2 pieces)</td>
</tr>
<tr>
<td>1000-128</td>
<td>Ball collection net</td>
</tr>
<tr>
<td>1000-132</td>
<td>Extension cable for remote control</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further replacement parts on demand!

7. Technical Data

Supply current: 230 V, 50 Hz alternating current, approximately 50 W
Class of touch protection (Germany): I.
The ball machine can be operated in a temperature range of 0 - 40 °C.
Fuses: 2 pieces T 400 mA
Weight: 10 kg (without net)
Overall dimensions (without net): Height 1.20 m; Width 0.35 m; Depth 0.68 m

A type examination test was done for the electrical device – Ball Machine AMICUS 1000Plus – and the type and construction of the presented series prototype was found to be in agreement with the indicated norms and standards

- 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 is apparent from Test Report No. E-00136 and E-00136/1.

This test report states that the robot AMICUS 1000Plus is permitted to bear the CE trade-mark.

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