Table Tennis Robot

**AMICUS pro**

developed by Csaba Lukács

Patent Number: HU 200 947 B

**Operation Manual**

Œ controlled!
**Important:** Please read instructions carefully prior to use

The chapter **Control Panel (Summary Description)** explains the basic preparations for the operation of the Table Tennis Robot AMICUSpro.

Detailed instructions follow in the chapter **Operation.** The necessary preparations and steps of operation are explained. It is recommended to have the assembled robot ready (without balls) while reading the operation manual. Therefore, it is possible to try out the different operational devices in order to become familiar with the robot and the range of options open.

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Table Tennis Robot AMICUSpro

from novice to professional, from defender to attacker, … ideal for every type of player and every level of play.

- World novelty: A unique head with 3 discs
- Discs made of rigid foam with a special coating for longevity
- Compact, solid, functional workmanship
- Well thought-out and easy to use control panel
- Placement of the balls with chosen rotation and speed to different targets
- Random directional function
- Computer-controlled adaptation for length (equal length to corners and the centre of the table)
- Torsion bar allows recycling of balls without interruptions
- Remote control
- Large collection net
- Height adjustable ball tube

You are now the owner of a Table Tennis Robot by Butterfly, developed by Csaba Lukács. We make 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 Butterfly directly (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 using the machine!
- The ball machine may only be connected 100-230 V voltage!
- The ball throw discs rotate at high speed. For that reason, avoid touching the discs during operation!
- The Table Robot AMICUSpro should only be used in closed and dry rooms!

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

1. Assembly

You should assemble the following main parts of the machine:

a) Integrated shooting mechanism with net
b) DC 24V adapter
c) Control box
d) Extension cord
e) Control box holder

Other belongings: Allan keys, shooting disc, tube for setting distance, reserve rubber for the net, sticker velcro for fixing the robot

1. Put the machine on the table with the net closed and with the connectors towards you. (Fig. 1.)

2. Connect the cable coming from the shooting had to the 15 pole connector found on robot body (the upper one), then connect the coaxial DC plug of the adapter close near the 15 pole connector, finally connect one end (the smaller connector)of the extension cord in the 26 pole connector found under the 15 pole one. (Fig. 2).

Attention: Connect the cables very carefully, because the pins could get wrapped (twisted) very easily.
3. Turn down the net keeping poles until the first collision, then turn out the hanging poles (used for hanging the machine on the table) in the position seen on the photo, and put the adapter and the extension cord on the floor. (Fig. 3.)

4. Hang the machine on the table as you can see on the photo and turn the head in the opposite direction with the help of the big screw found on the stand. (Figure 4.)

**Please note:** A sticker velcro can be found a on the inner surface of the hanging unit that is mounted to the table. It is advised to stick this on the table, because so the machine stand much more stable on the table. It is important to do that especially when children play around the table. (Fig. 4a.)

5. Turn down the net keeping poles of the net until the second collision.(Fig. 5.) (Fig. 5a.)
6. Then turn up the steel rods (which serve for straining the net), and snap up the hooks found on the bottom part of the steel rods in the recesses found on the corners of the net keeping poles (Fig. 6.)

**Attention:** It is possible to snap and to take out the steel rods serving for straining the net in the recesses found on the corners of the net keeping poles only in case the net is not tight. That is possible in case the poles described point 5. are in the middle position (Fig. 5a.) and not in the lowest one, like (Fig. 6a.)

**Please not:** The easiest way of snapping in the steel rods to their place seen on Fig. 6b. The movement of snapping out it is on Fig. 6c.
7. Turn down the poles of the net until the plastic items found on their ends and used for positioning suit to the corners of the table. (Fig. 7.)

**Please note:** There can be found sticker velcros on the inner surface of the positioning items which is advisable to stick on the corners of the table.

![Fig. 7.](image)

8. 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 (Fig. 8). If you do not fasten the net as described, the balls can easily roll down from the table near the net.

![Fig. 8.](image)

9. Push the extension cord - put earlier on the floor - to the opposite side of the table near it, then hang the control box to the with the help of its holder. (Fig. 9.)

![Fig. 9.](image)
2. Control Panel (Summary Description)

With the help of the upper 1-6 rotary switches and the buttons, it is possible to program six different hitting points, for example Ball 1 ⇒ centre, Ball 2 ⇒ left, Ball 3 ⇒ right, Ball 4 ⇒ right … As it is on the drawing

**Button A:** Switching from normal function to two types of random function
**Button B:** Optional activation of up to six balls (maximum)
**Button C:** Resetting from six balls (maximum) to one ball (minimum)
**Rotary switch I:** Spin control
**Rotary switch II:** Speed control
**Rotary switch III:** Side spin control
**Rotary switch IV:** Trajectory control
**Rotary switch V:** Regulation of the ball frequency (balls 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 ejected next.
**The green light will only glow if the random function works (at least two different balls must be activated in RND function).**

3. Operation

**Turning the Machine On**

Fill the “net container” with a sufficient quantity of balls (50-60 balls) and then plug in the power unit.

Turn the Ball/min button to “0 “ position before applying electrical power.
After plugging to an electrical source, the robot executes a brief self control (approximately three seconds). Then the control unit automatically switches to the basic setting. The first yellow indicator light flashes. The machine is now ready to play.

**Attention:** If there are no balls in the machine, it can take up to approximately 10 seconds (depending on the chosen ball frequency) until the first ball is released!

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

**Adjustments**

The machine can release balls according to the following main characteristics:

a. ) Spin (side-spin)  
b. ) Speed  
c. ) Trajectory (Height)  
d. ) Left – Right Placement

**Ball Type**

**Ball Placement**

**Speed and Spin**

**Speed controls** – rotary switch I- (range: 1 to 22) Controls the speed of the ball. Set to "22" for very fast, "1" for very slow

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

The setting of spin and speed are totally separate in this model; a built in program enables this facility. Therefore, it is necessary to choose the spin of the ball with the Spin button and the speed of the ball with the Speed button.

**Side spin controls** – rotary switch III- (left – right spin) Controls the sidespin of the ball.

**The height of the release head**

Most table tennis robots do not have this possibility; however, with this machine the ball is returned at different heights in a realistic match play manner.
In case of the AMICUSpro the release height is adjusted in the following way: it is quite easy to push down the net thanks to its spring holding mechanism (Fig. 10.), then grip the curved tube which holds the release shooting head. This tube can be pulled up and down in the ball tube found under it when the hand screw is loosened (Fig. 10a). Finally adjust the desired height and tighten the hand screw.

Please note: Adjust the silver marks found on the internal grey tube to the top margin of the external tube in order to enable the robot to release the balls surely, without omission.

Trajectory

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

The trajectory is determined with the help of the rotary switch IV-
- Turn the knob clockwise – the trajectory will become higher
- Turn the knob anticlockwise – the trajectory will become lower

Advice: In order to practice the service, the trajectory and the speed of the ball must be adjusted in low position and the height of the head in high position in order to enable the ball to jump on the other half of the table.
Ball Placement

1. Ball release 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 release the balls to 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 release to various points of the table

With button B "⇒", at least two yellow indicator lights must be activated. Then the various targets 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 release starts again from the beginning. Example according to the setting of the control panel on page 5, if all six balls are activated (all six lamps are glowing):
First ball to the centre of the table, second ball to the left half of the table, third and fourth ball onto the right half of the table, fifth and sixth balls to the table centre.

3. “rnd” Random ball throw onto various points around the set point

With button B "⇒", again, it is enough for 1 indicator light to be activated (the first green indicator light lits) in order to activate the “rnd” random function. In this case the robot releases the balls randomly around the set points in a 40 cm diameter circle, simulating the real game.

4. “RND” 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 twice. The 2. 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 target points of the balls are chosen with the corresponding left/right rotary switches. The balls are now released at random. Here, too, the flashlight shows which ball will be thrown out next. With button C "⇐", single balls can be cancelled. Pushing again button C it is possible to exit from the random function.

INFO: The ball placement to the corners of the table is adapted automatically with regard to the centre of the table by our patented invention. This means that the ball length need not to be altered 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.

Advice: It can happen during the play that a ball hits the ball placing element found on the robot head and moves it. In this case the answer is to stop the ball feeding (Ball/min = 0) and turn the button above which the light is flashing to the right then to the left until collision. Then turn the button to its original position. The play can be started again.
Sidespin

With rotary switch "III.", for the adjustment of the sidespin. It is possible to change the speed rate of the two upper discs with the help of this button, so this way the ball can get sidespin.

INFO: The AMICUS robots shoot the balls positioned to the right or to the left with slight side spin because of their special placing mechanism. In order to avoid this symptom, the AMICUSpro shoots each ball placed to the sides with a slight contra-sidespin (this is enabled by its special shooting head), so that the side spin coming originally from the placement is eliminated this way.

Ball Frequency (Balls per Minute)

With rotary switch "V.", 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 released.

When turning the Ball/min button in “0” position, in addition to the feeding motor also the three shooting motors will stop.

Attention: In this case it seems like the robot is switched off, because the motors stop turning and the robot is silent, however the whole robot remains under current which can be seen from the fact that the lights found on the control panel are still on. Plug off the adapter from the current if you want to switch off the machine entirely.

Turning the AMICUSpro off and Putting out of Service

1. Pull the adapter from current when going out from the place where the machine works. Do not let the robot switched on without control.
2. If the robot is taken temporarily from the table, then put the adapter, the control box and the extension cord in the ball holder part, fold the net and get down the robot from the table. The robot can be put away until the next practice.

Transport

When the robot is to be transported to another place, then after snapping out the net ends (the hooks) the net keeping poles have to be turned until the second lock.

Turn in the net keeping poles (Fig. 6c), let down the head and turn it back, turn the hanging poles above the ball holder and close the net completely.

Put the robot in such position in its transport device. In this regard, we recommend the particular AMICUSPro transport bag offered by Butterfly.

Do not forget to pack the adapter, the control box and the extension cord.
4. Maintenance and Repair

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

- During the operation of the ball machine, make sure that no small parts (for example hairs, indented balls, etc.) get into the collection net and thus into the machine, because they can lead to ball jams.

- The ball shooting discs are very durable (at least 500 hours). Nevertheless, these discs will finally wear off after intense use. One sign for a worn disc is that the machine releases the balls at irregular lengths at high speed. This means that the surface of the discs does not have enough grip on the balls. For that reason, the distance of the discs has to be adjusted.

Put the plastic adjusting tube in the release hole found between the discs (Fig. 11.). Loosen first, for example, the black imbus “adjusting” screw near the cover - with the bigger allan key found among the accessories - of the lower motor (Fig. 12.) and turn up the motor (gripping its cover) towards the adjusting tube until the disc touches it. (Fig. 13.) Do all these also with the other two motors.

![Fig. 11.](image1.jpg)  ![Fig. 12.](image2.jpg)  ![Fig. 13.](image3.jpg)

**Please note:** The correct distance is 35-36 mm. This is the diameter of the adjusting tube. The release mechanism functions perfectly up to a distance of 37-38 mm.

- When the distance cannot be adjusted any more, the ball shooting discs have to be replaced. Therefore loosen the worn screws (Fig. 14.) found in the plastic disc holders – with the smaller allan key found among the accessories - (at all the 3 discs), then remove the “adjusting screws” found at the two upper motors (it is not enough only to loosen those) (Fig. 15.) Then totally turn out the two upper motors with gripping their covers with turning those away from the shooting hole in order to be possible to push down the shooting discs from the shafts of the motors. (Fig. 16.)
Then the plastic disc is pulled off the motor shaft. *(Fig. 17.a,b,)* Take out the plastic disc of the ball shooting disc (it is held together by three screws) and insert it into the new foam disc (the fastening set can be disassembled).

Slide the new disc onto the shaft (easily until collision) and tighten the warm screw. Then adjust the correct distance of the discs with the help of the adjusting tube as it is described above.

- 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). In case the feeding motor and the two throwing motors jam for any reason the machine stops in self-defence. Then the fault signal is the following: all the 6 yellow lights start to flash on the control box. If this should not work, you have no other possibility than, to take out the head from the machine, to take out the offending balls from the bottom part of the robot with the help of a pencil or screwdriver, etc. *(Fig. 18.)*

- Once every 4-6 months, the stop pin, which is needed to adjust the ball throw length, needs a really slight application of silicon oil (just enough to cover the end of match-stick). The pin is easily accessible in the release 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.
## 5. Error Management

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
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| Az adaptert | a) Socket without current?  
b) Fuse defect ⇒ replace fuse (see page 10)  
Check whether the cable plugs on the bottom of the control unit have been plugged in correctly  
a) Remote control switched off?  
b) Rotary switch 3 for ball frequency set on "zero"? |
| Ball throw-out with irregular lengths | a) Check distance of ball throw discs, discs worn (see page 10)?  
b) Wrong assembly of the robot: Have the ball transport tube, the sheath tube or the robot head been slid on as far as possible?  
c) Stop pin for throw-out length regulation gets "caught" ⇒ oil slightly |
| Ball robot suddenly throws out balls irregularly and with different lengths | a) New start (Switch off the robot for a moment, then switch it on again)  
b) Foreign body or defect ball obstructs ball transport ⇒ remove (see page 10) |
| Ball jam; the yellow light flash on the control unit | Foreign body or defect ball obstructs ball transport ⇒ remove (see page ?) |
| Random function on the control panel cannot be activated, green indicator light cannot be switched on | At least two balls must be activated, at least two yellow indicator lights must glow (see page ?) |
| Ball gets stuck between ball shooting discs, control unit switches off | Pull out the adapter from current, remove ball from it between the shooting discs, adjust the Ball/min button to “0” position, then start the play again. |

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

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

| □ pro-1??   Control unit          | □ pro-1??  Ball speed motor       |
| □ pro-1??   Ball speed motor      | □ pro-1??  Oscillating head motor |
| □ pro-1??   Loading motor         | □ pro-1??  Shaft for ball throw disc |
| □ pro-1??   Ball throw disc       | □ pro-1 ??  DC adapter             |
| □ pro-1??   Oscillating head motor| □ pro-1??  Extension cable for     |
| □ pro-1??   Ball placement mechanism| □ pro-1??  Motor for height adjustment|
| □ pro-1??   Holder for control unit|                                      |

Further replacement parts on demand!

7. Technical Data

Supply current: 100-230 V, 50-60 Hz alternating current, approximately 40 W
The ball machine can be operated in a temperature range of 0 - 40 °C.
Weight: 6 kg (with net)
Overall dimensions (with net): Height 0.75 m; Width 0.28 m; Depth 0.25 m

A type examination test was done for the electrical adapter device

of conformity a Low Voltage directive 73/23/EEC
as last amended by EEC Directive 93/68/EEC
Registration No.: AN 50091861 0001
Report No.: 17004848 001

as is apparent from Test Report No. NTEK-2010NT1115351E
and NTEK-2010NT1115353SS

The robot AMICUSpro is permitted to bear the CE trademark.