

Digital Puppet

Instruction Manual

Rev 1.01



Digital Cube Co., Ltd.



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1 First of all

Thank you for purchasing a digital puppet. Please read this instruction manual carefully and use it correctly. Be sure to read "Precautions for Use" before use. A digital puppet is a kit that consists of pedestals (two-axis movable) and a controller for mounting paper craft. Download your favorite paper craft from our HP and create it. Cute puppets created with paper craft will begin to dance digitally. If you connect multiple controllers, you can manipulate many puppets with one fingertip. Please enjoy the movement unique to digital control.



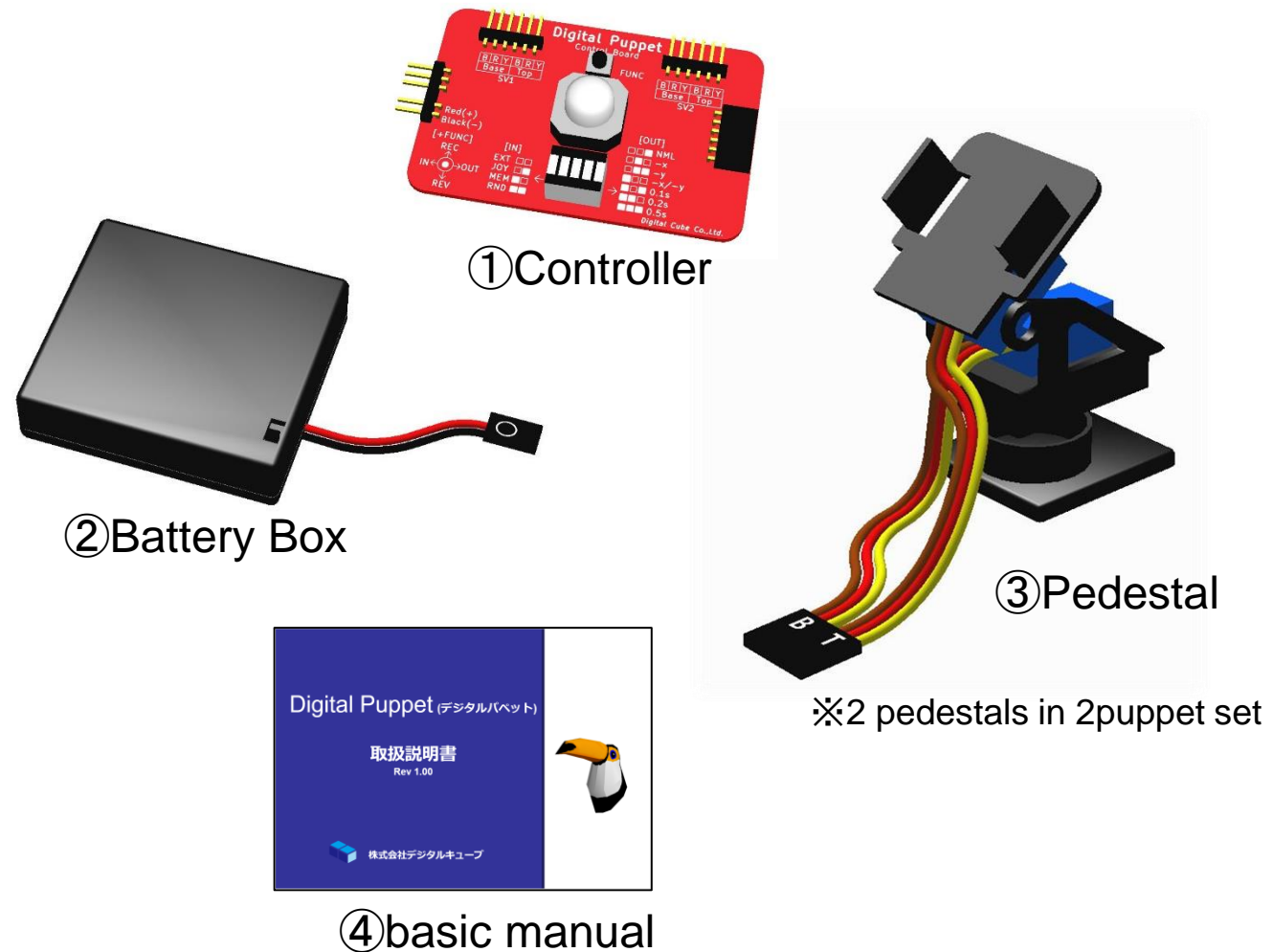
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1-1 Contents of the set

Set includes ①controller, ②battery box, ③pedestal, and ④basic manual. Paper craft is not included.



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1-2 Definition of terms

- Servo motor: A motor controlled to stop at a specified rotation angle.
- Paper craft: A three-dimensional model created with paper.
- Puppet: "Puppet" in the broad sense. Here, it refers to a paper craft attached to a pedestal that moves in two axes.
- Joystick: One of the positioning sensors. Outputs position information in two directions with your fingertips, and is the basis for puppet movement information.
- Flash memory: A type of memory that retains values even when the power is turned off. Used to record puppet movement information.
- Pin header: A general term for components with multiple pins that can be mounted on a board. Connect the pin connector.
- (Pin) Connector: A rectangular parallelepiped female socket for connection to the pin header.



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2 Precautions for use

Do not perform the following operations as they may cause malfunctions.

- Insert the battery in the reverse direction (in the battery box)
- Mounting the power supply and pedestal connector in the reverse direction
- Pull the connector by holding the cable instead of the plastic housing.
- Move the pedestal directly by hand (motor movement direction)
- Use in a wet or humid environment
- Touch the back of the controller while the power is on
- Touch the pin header or backside parts on the controller with tweezers or scissors while the power is on.
- Modification of the controller and the pedestal
- Applying a strong impact to the controller or the pedestal such as dropping

In addition, if you move the motor with your finger between the pedestal gaps, you may be injured. Please be careful. Please use small children with parents.

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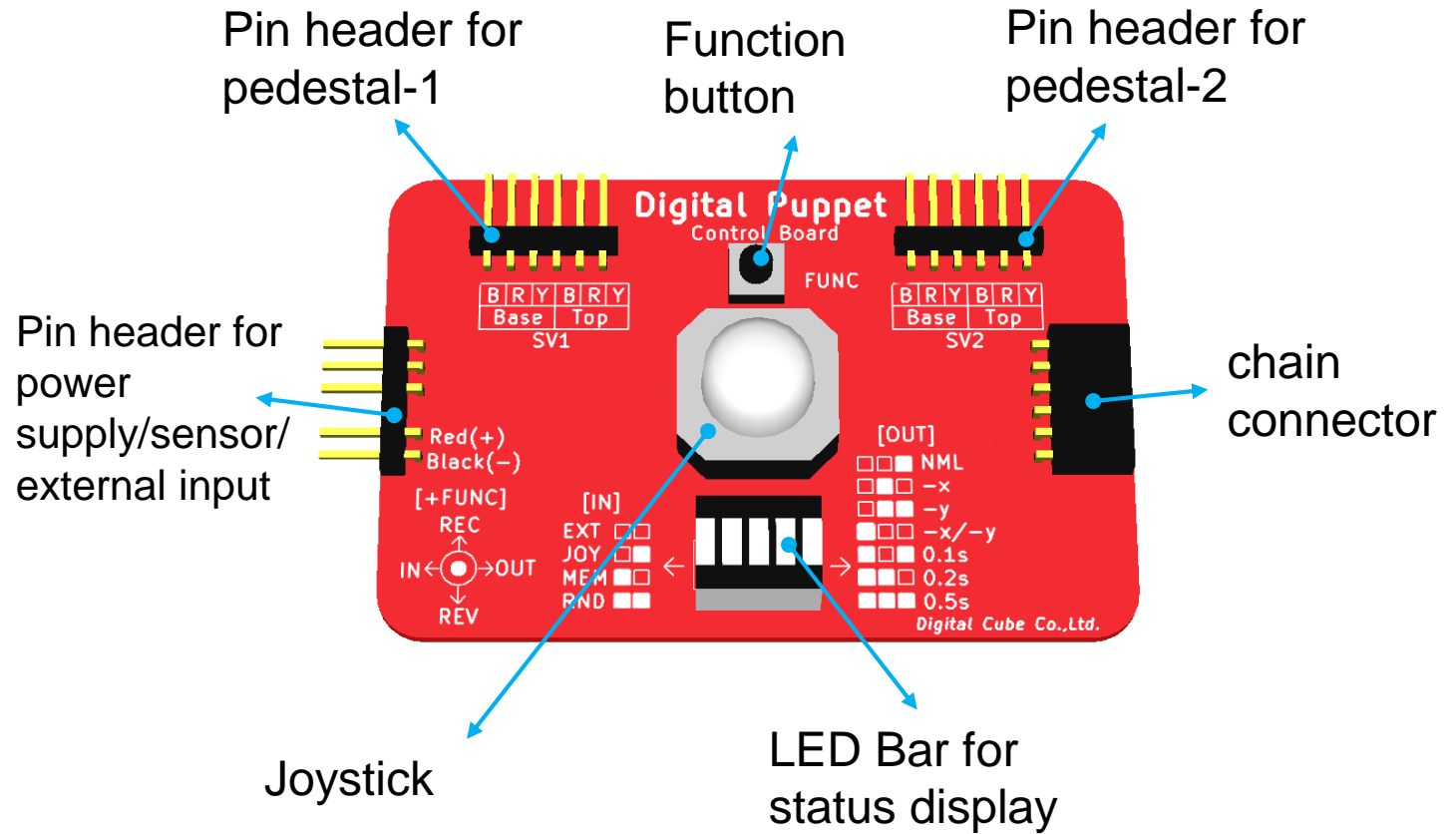
3 Prepare Electric and Mecha



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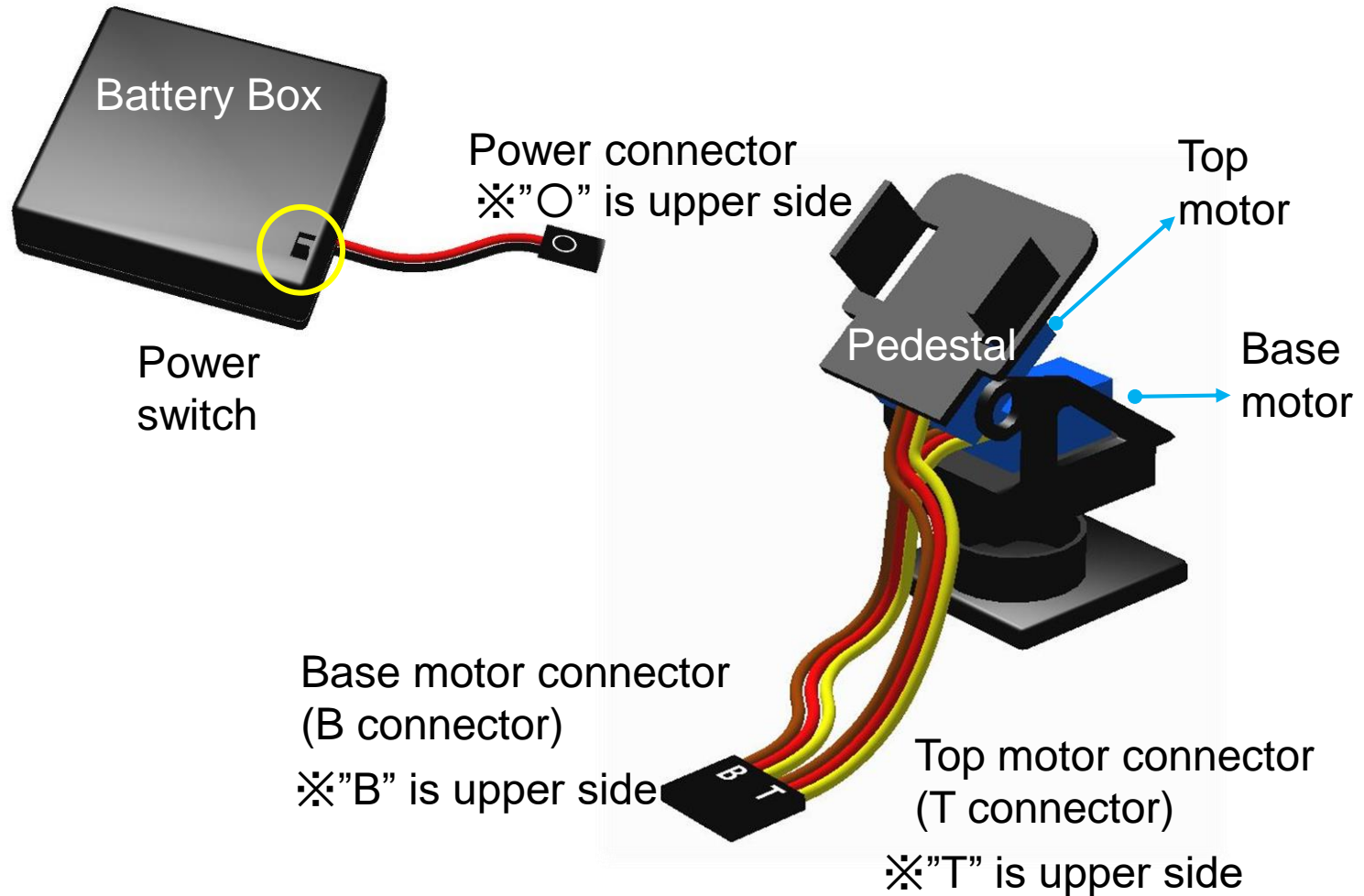
3-1 Part names of controller



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3-2 Part names of Pedestal & Battery Box



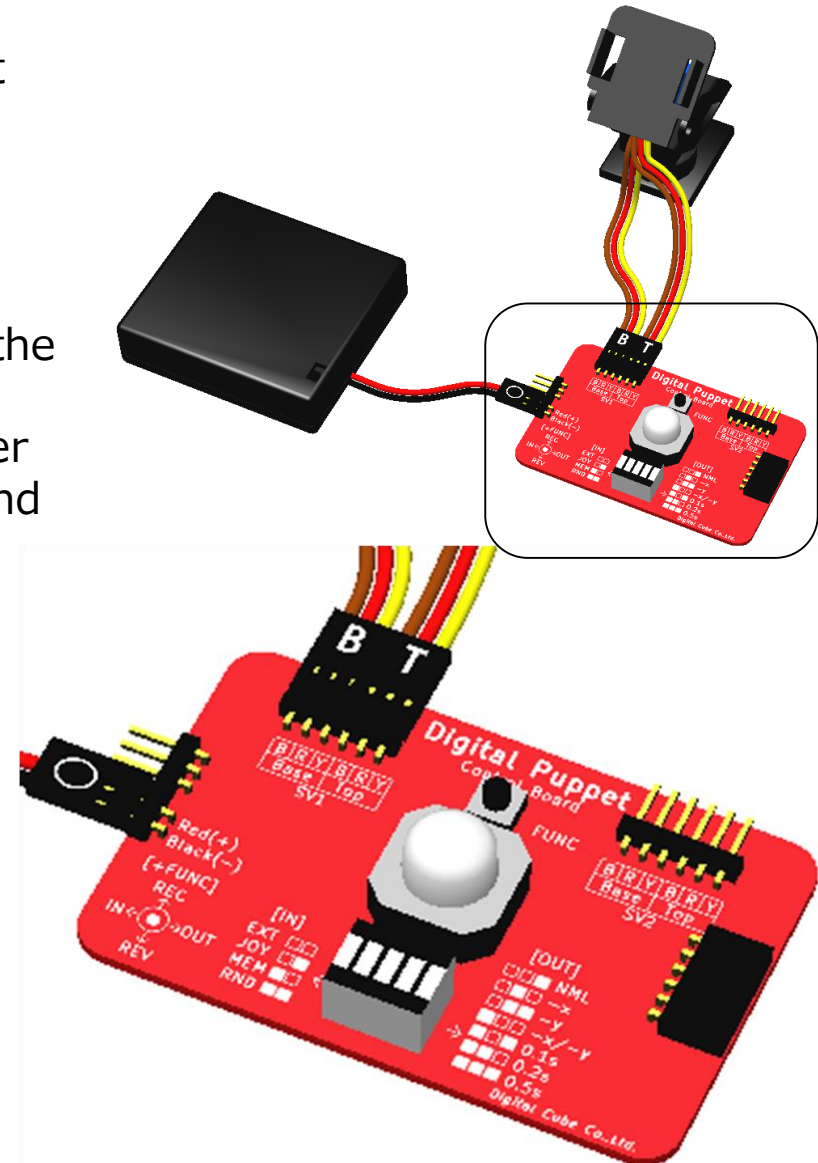
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3-3 Connect to single pedestal

- Plug the battery box power connector into the lower left pin header of the controller. The top of the connector is marked with a circle.
- Insert the B connector and the T connector of the pedestal into the upper left pin header of the controller so that B and T are from the left.



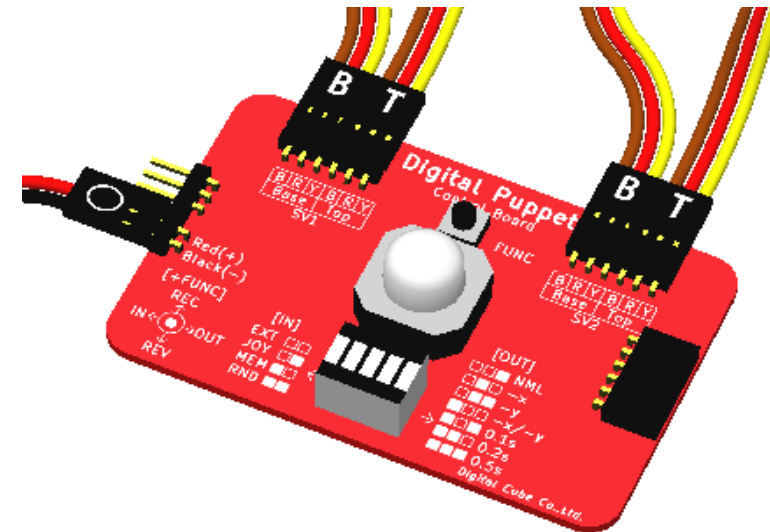
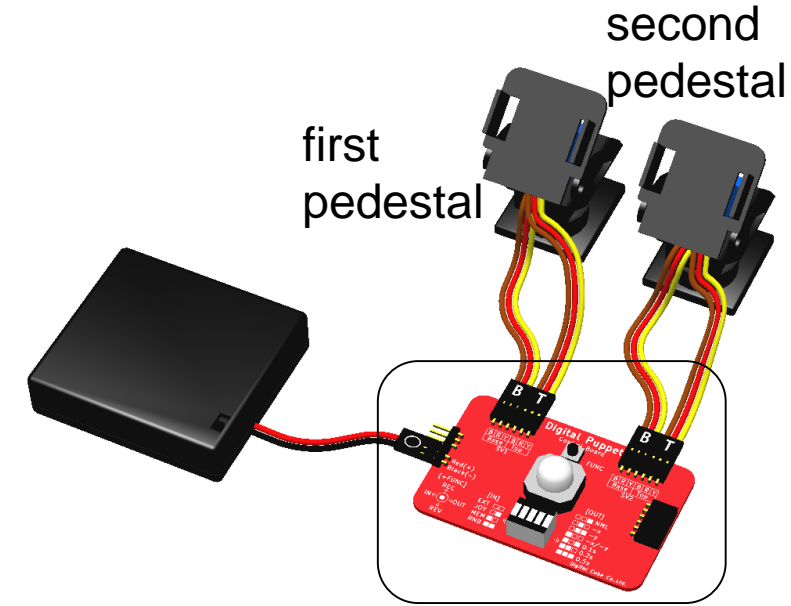
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3-4 Connect to two pedestals

- Plug the battery box power connector into the lower left pin header of the controller. The top of the connector is marked with a circle.
- Insert the B and T connectors of the first pedestal into the upper left pin header of the controller so that they are B and T from the left.
- Insert the B and T connector of the second pedestal into the upper right pin header of the controller so that they are B and T from the left.



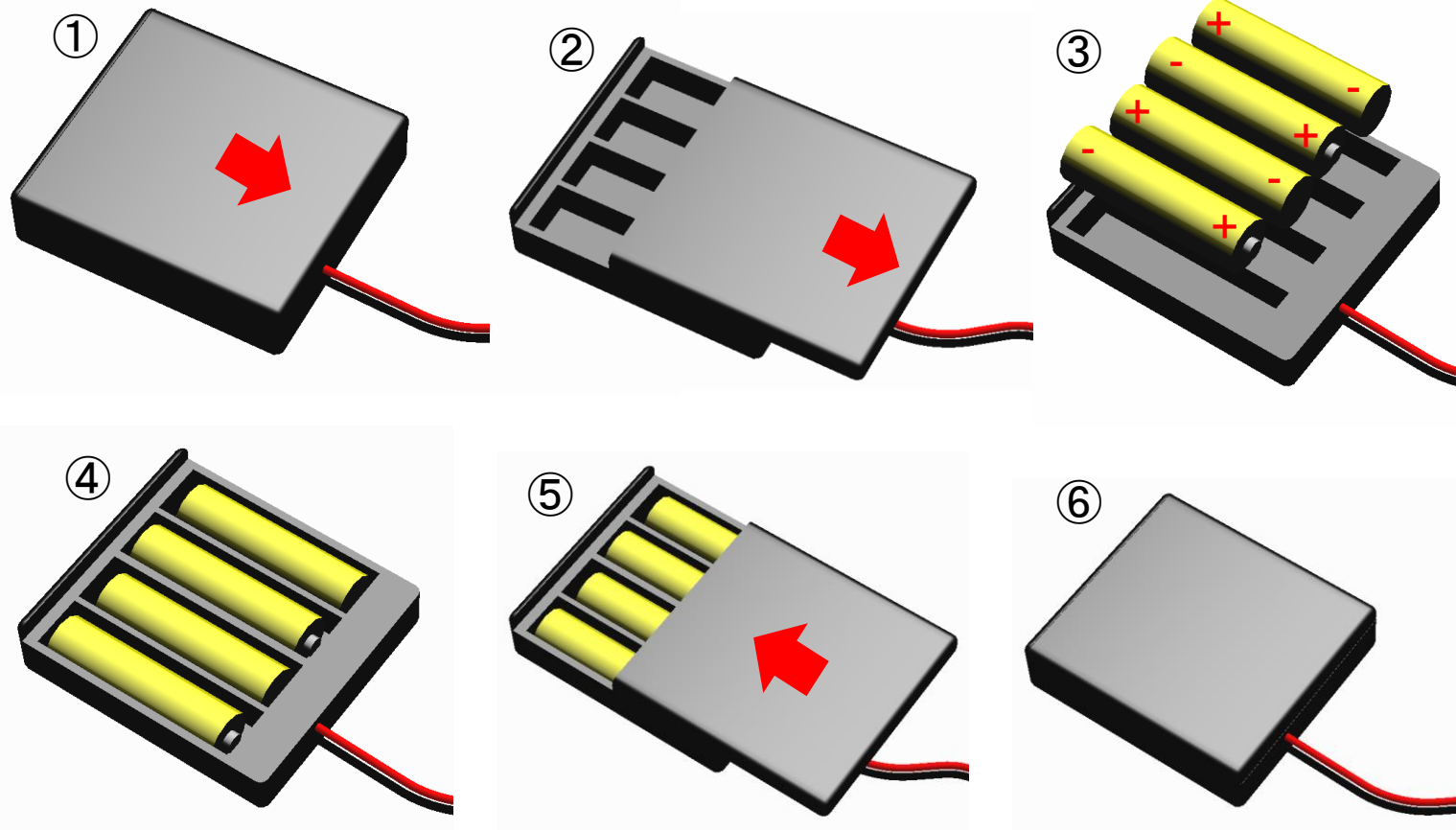
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3-5 Insert batteries

- ①② Slide the top cover of the battery box and remove it.
- ③④ Place 4 AA batteries in the battery box with attention to the polarity.
- ⑤⑥ Slide the battery box top cover in the opposite direction and insert.
- ※ Both normal batteries and rechargeable batteries such as enloop are acceptable.

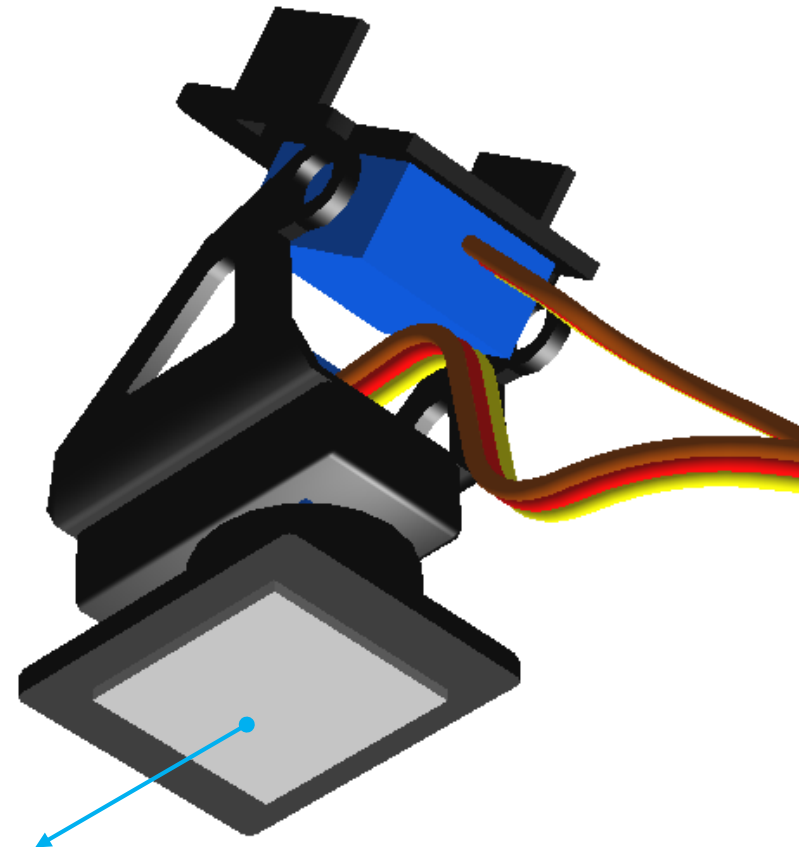


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3-6 Fix the pedestals

- There is a gel sheet on the back of the pedestal. Remove the transparent sticker and paste it on a flat surface such as a table.
- You can paste and remove as many times as you like.
- If the surface of the gel sheet becomes dirty, the adhesion weakens. In that case, peel off the sheet from the main body and wash with neutral detergent.



adhesive gel sheet



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4 Prepare paper craft



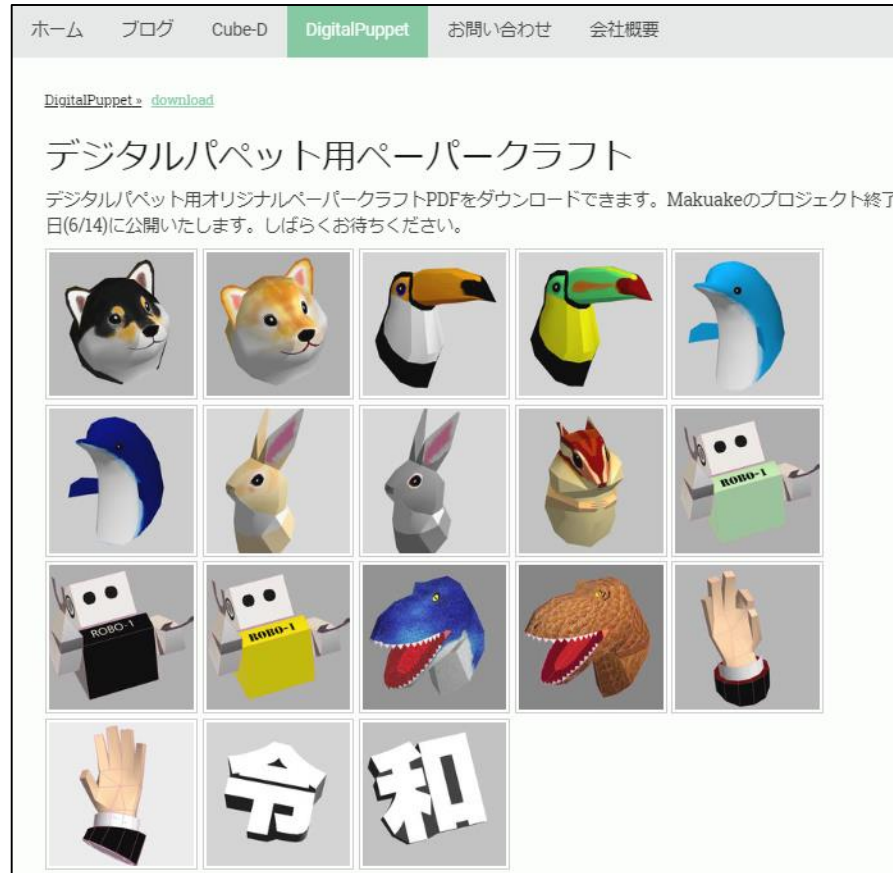
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4-1 Download

Please download your favorite paper craft from the following URL.

<https://www.cube-d.co.jp/digitalpuppet/download/>



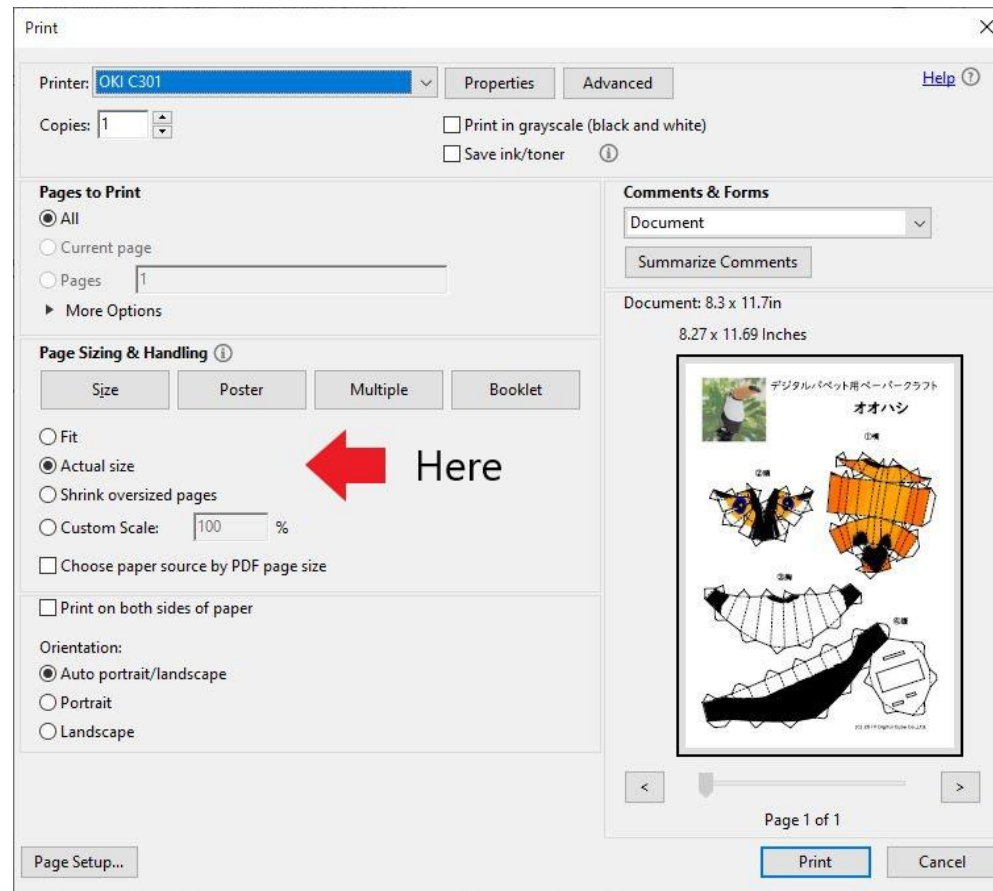
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4-2 Print out

- Print the downloaded PDF file on A4 thick paper (0.1 mm or more) with a printer (recommended for paper craft).
- When printing, select "Actual size" for page size processing. If you print to "fit" the paper, the size may shift and it may not fit on the pedestal.



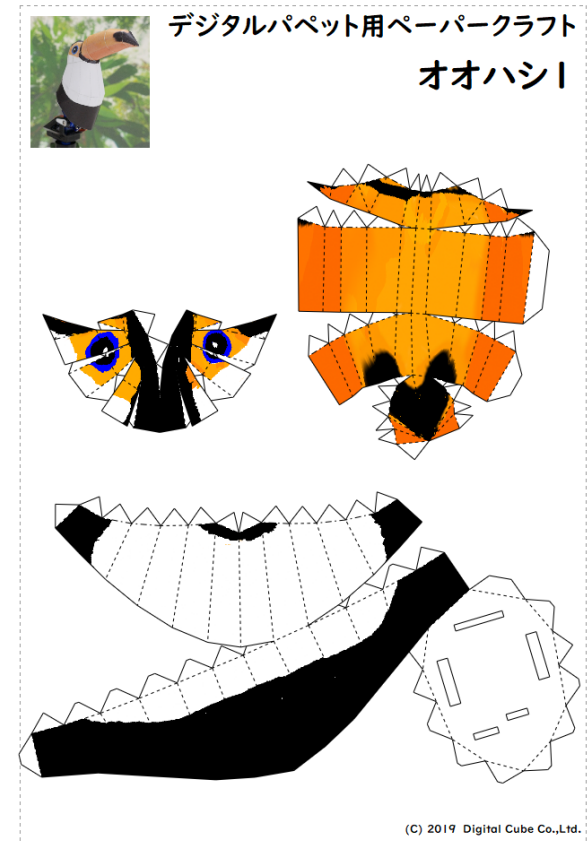
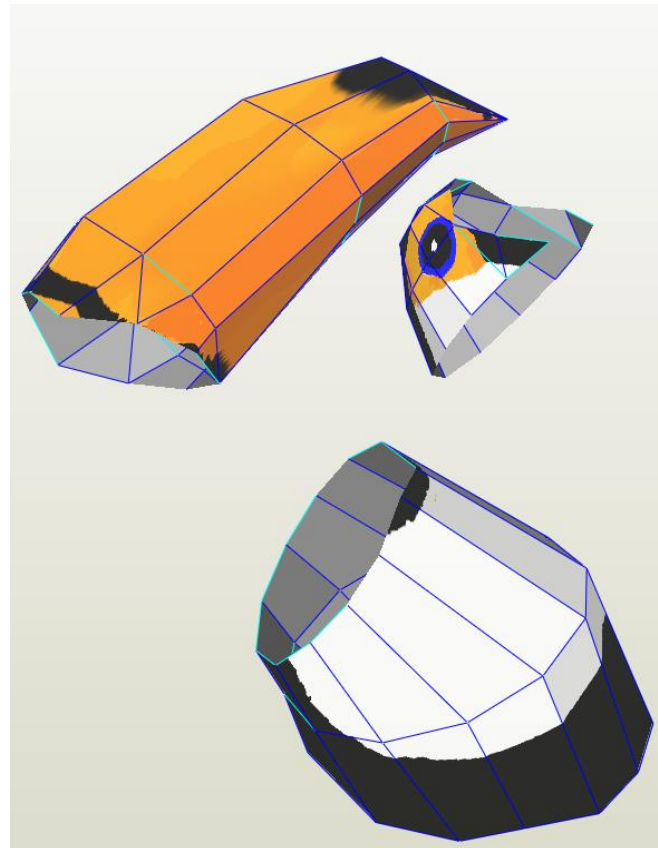
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4-3 Make

- Cut parts from the printed paper along the solid line with scissors or a cutter.
- The broken line is a mountain fold, and the alternate long and short dash line is a valley fold.
- Glue the glue on the margin and assemble it in three dimensions. The production time is about 1-2 hours.



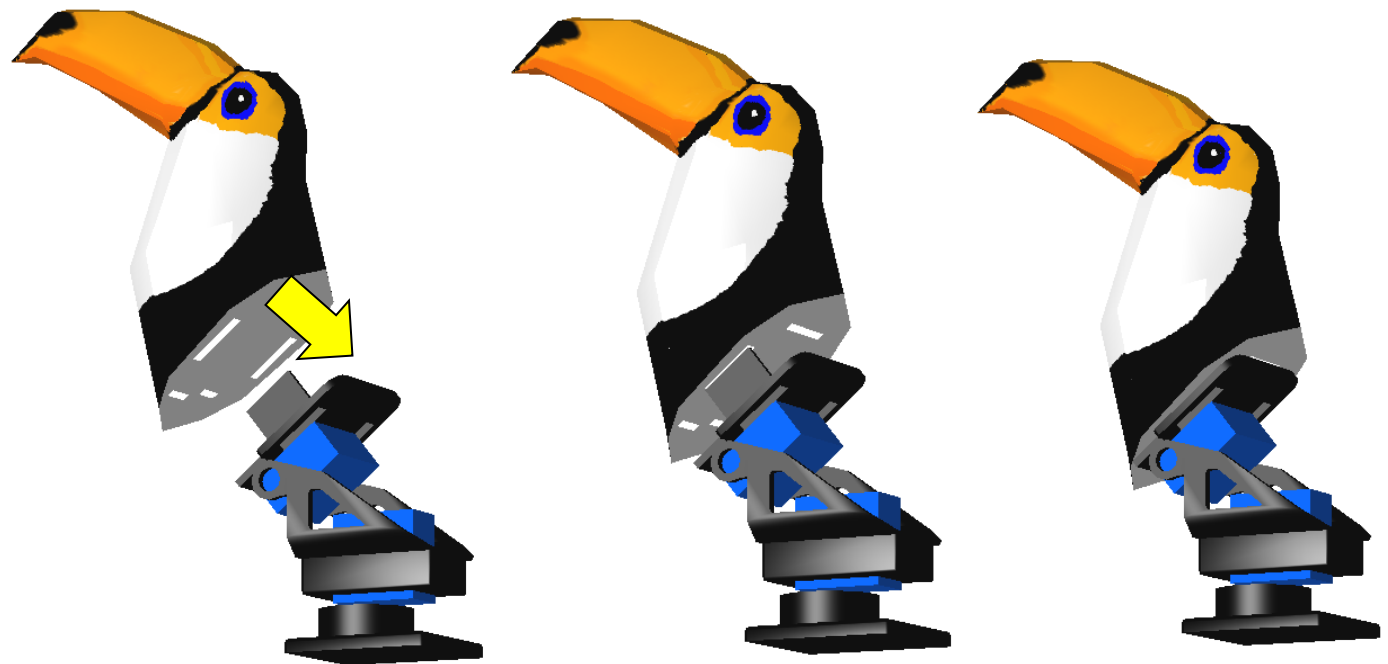
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4-4 Attach

There is a hole for mounting the base on the back of the paper craft. Attach so that the protrusion on the top plate of the base fits into this hole. If it is loose, fix the base and the back of the paper craft with tape.



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5 Let's try

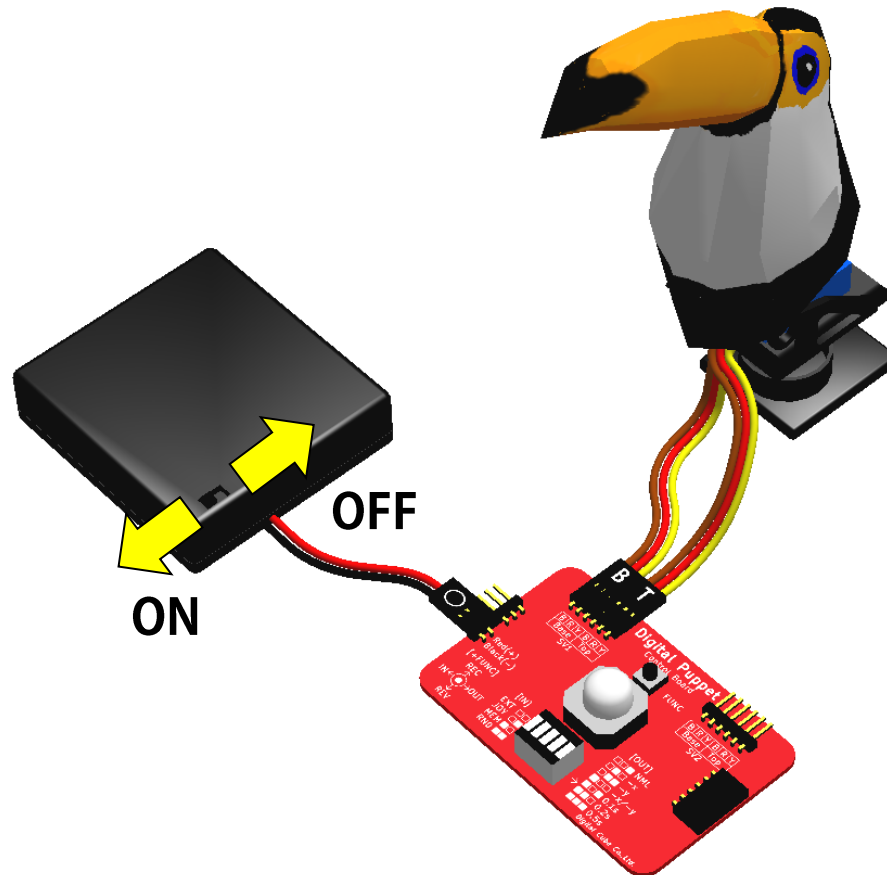


ch. 5

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5-1 Turn the power on

- Slide the switch on the battery box down to turn it on.
- When the power is turned on, one of the 5 LEDs on the LED bar lights up.
 - If the LED does not light up, check the polarity of connector or batteries.
 - The joystick control mode is set immediately after the power is turned on.
- To turn off the power, slide the switch up.



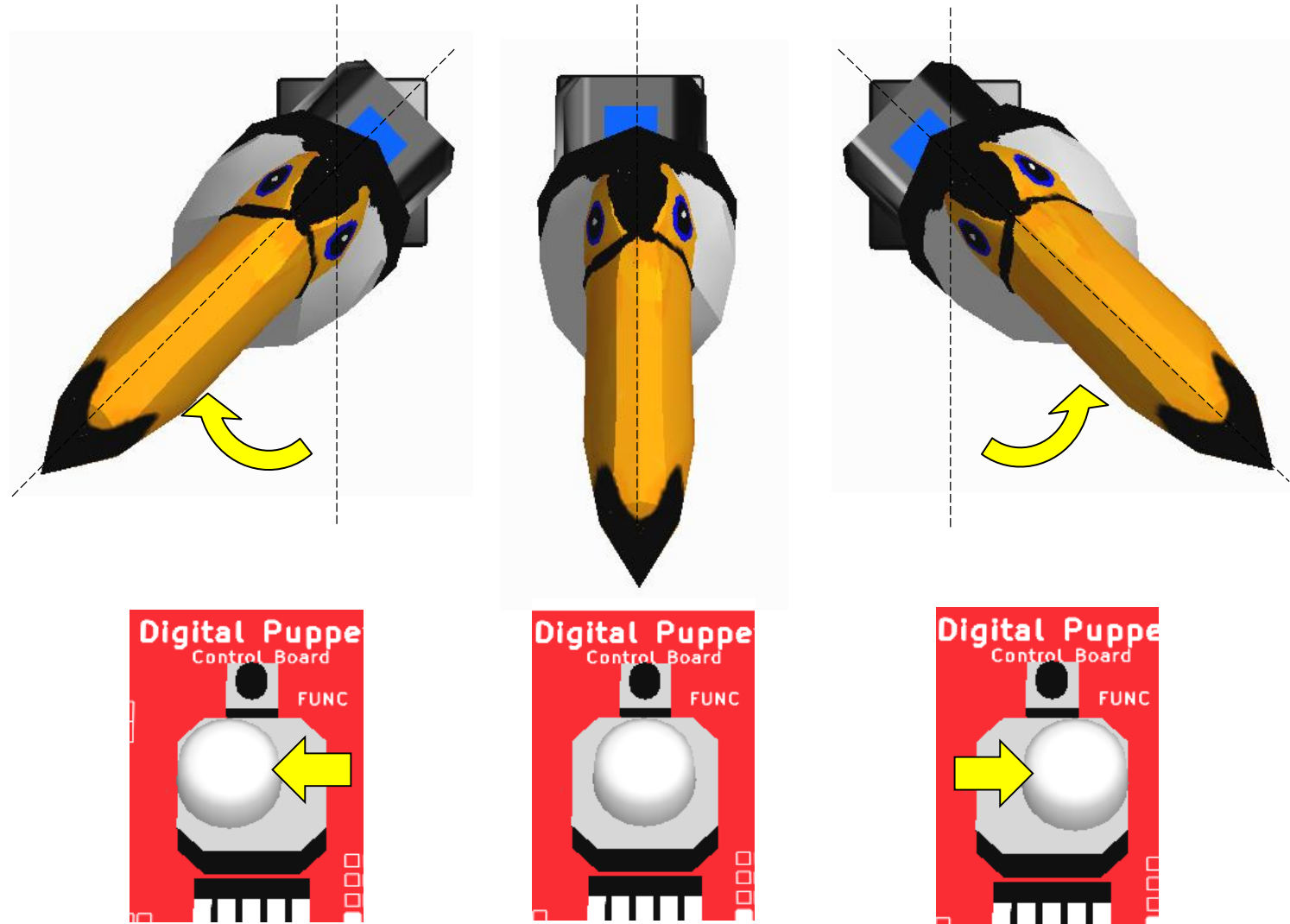
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5-2 Move the base motor

In the joystick control mode, when the joystick is moved left or right, the base motor rotates according to the amount of the movement.



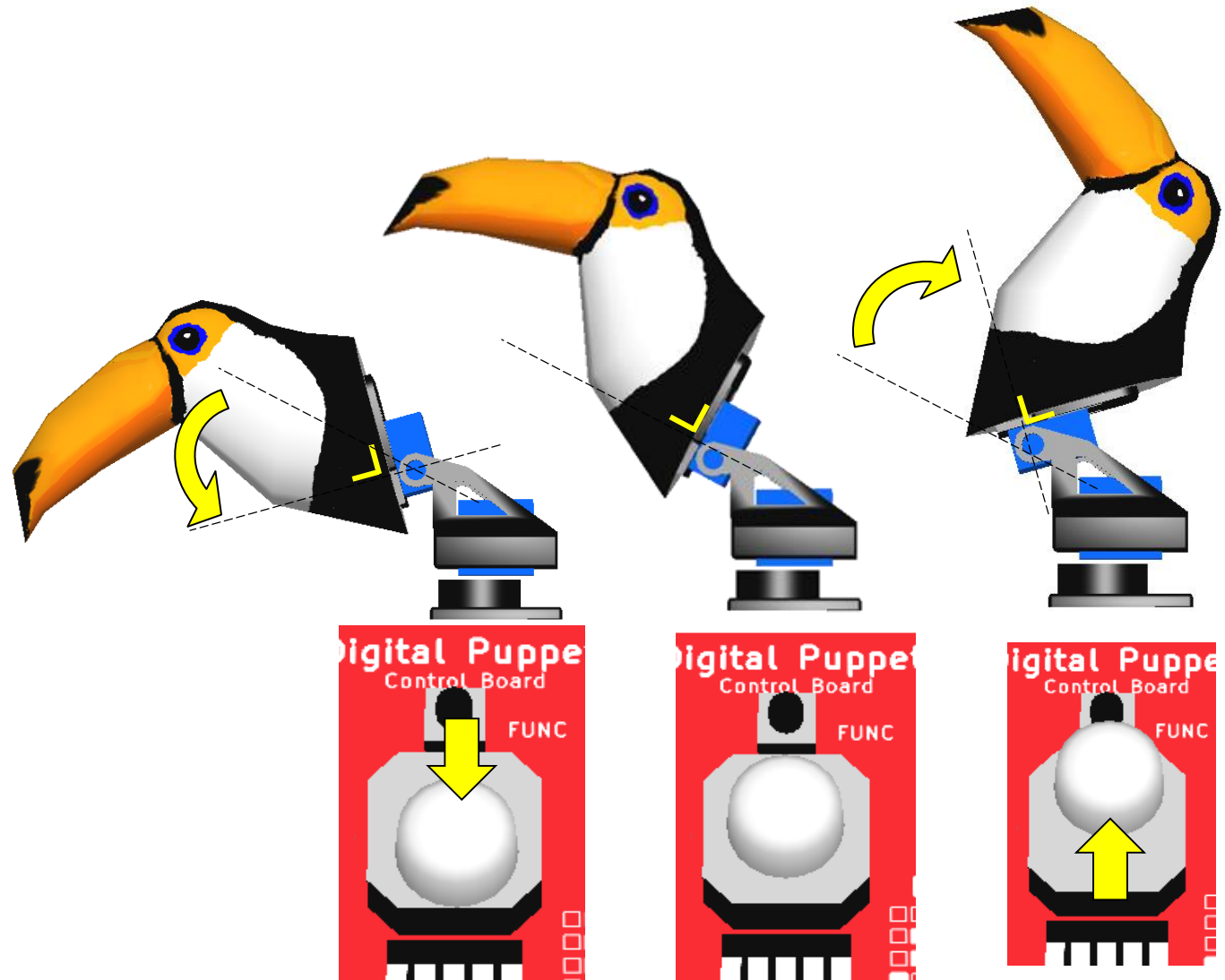
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5-3 Move the top motor

In the joystick control mode, when the joystick is moved up and down, the top motor rotates according to the amount of the movement.



ch. **5**

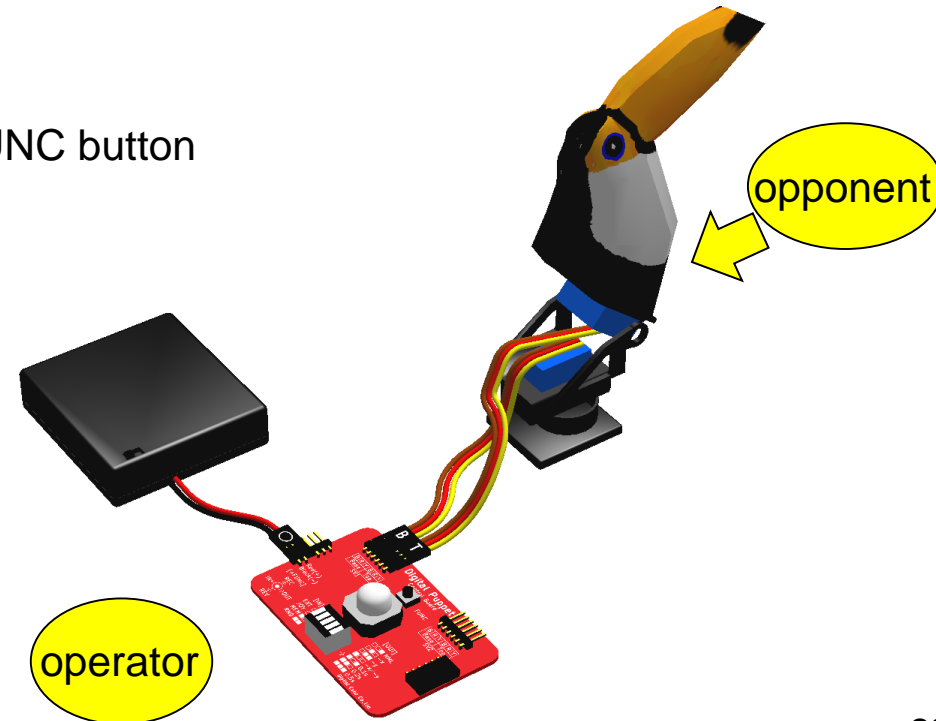
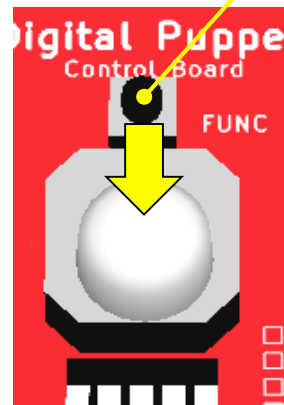
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5-4 Show to the other party

- In the initial state, it is assumed that the operation is performed with the operator and the puppet facing each other.
- On the other hand, when showing the movement of the puppet to someone, the joystick operation is reversed because the pedestal is rotated 180 degrees, making it difficult to operate.
- In this case, move the joystick down while holding down the FUNC button to return it to the reverse mode, and you can move the pedestal with the joystick upside down and left and right reversed.
- To return to the original state, set the reverse mode again or turn the power on again.

While holding down the FUNC button



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6 Record & playback



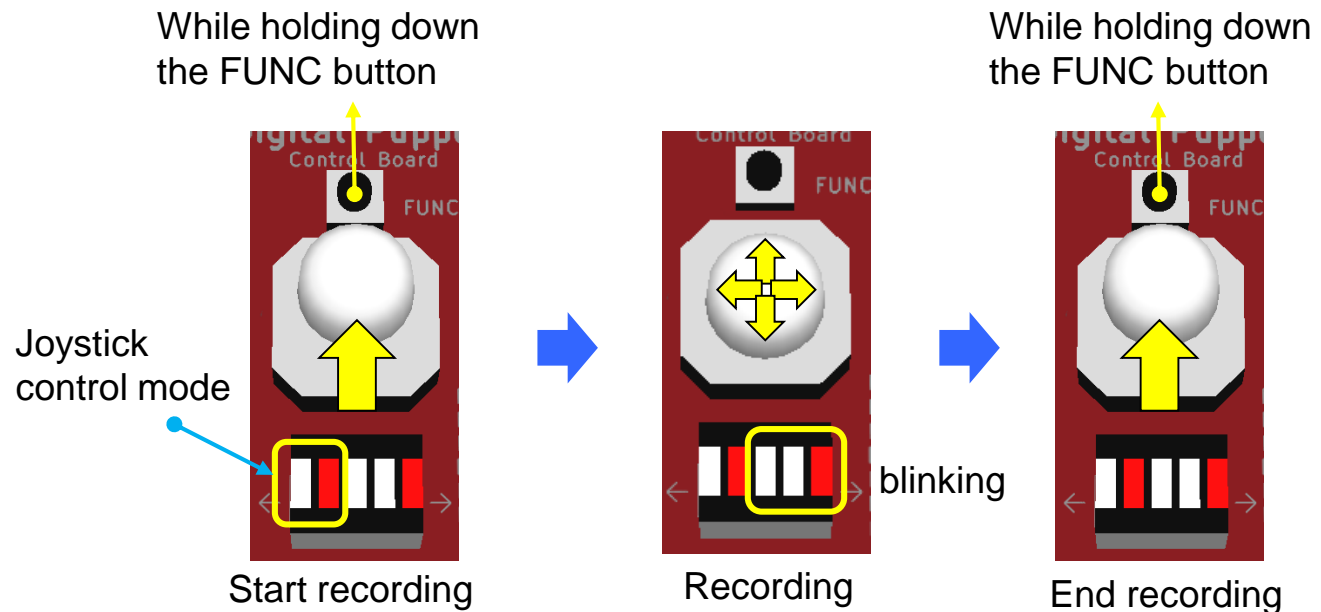
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6-1 Record movement

- Puppet movement can be written to flash memory for up to 20 seconds.
- Confirm that the mode is the joystick control mode (LED display in the figure below), and start recording when the joystick is moved up while holding down the FUNC button.
- Move the puppet using the joystick. During recording, at least one of the three LED bars on the right flashes.
- Recording will end when 20 seconds elapses or when the joystick is moved up while pressing the FUNC button again.



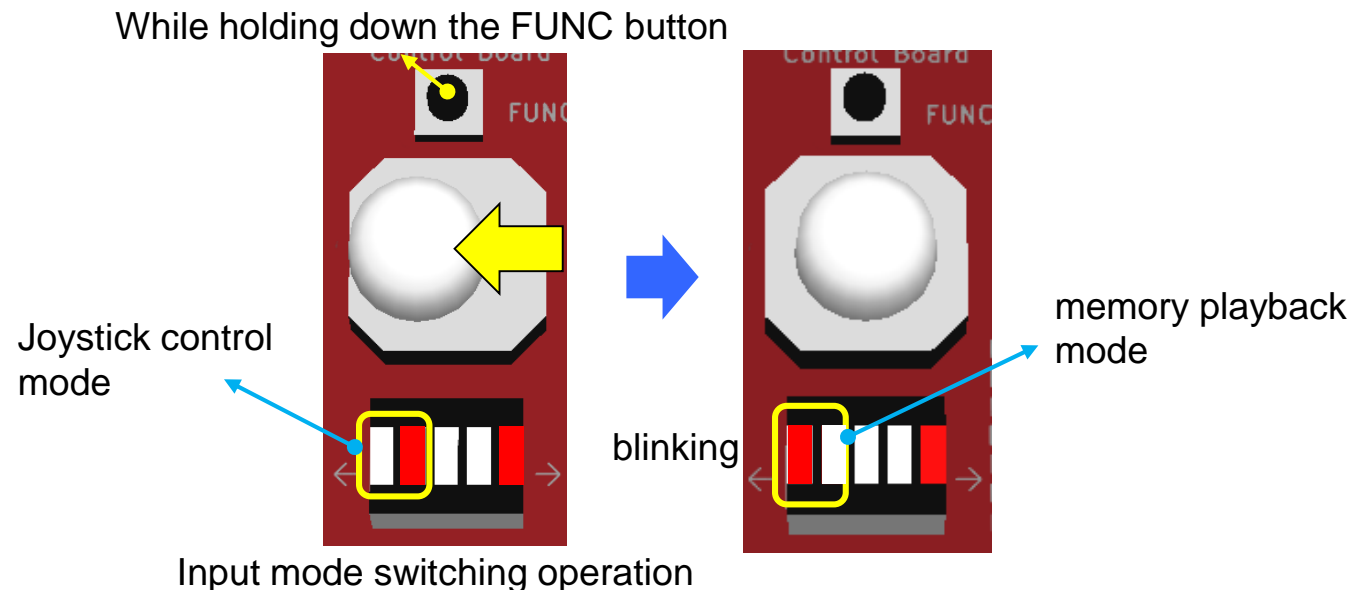
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6-2 Playback recorded movement

- In joystick mode, if you move the joystick to the left while pressing the FUNC button (input mode switching operation), it will enter the memory playback mode, and the operation information stored in the flash memory will be played repeatedly (LED bar is flashing on the left side).
- If you move the joystick to the right during playback, the playback speed will increase. Conversely, even if it moves to the left, if it returns to the original, the playback speed will decrease (the playback speed is linked to the blinking speed of the LED bar).
- To stop the playback operation, switch the input mode twice to return to the joystick control mode.



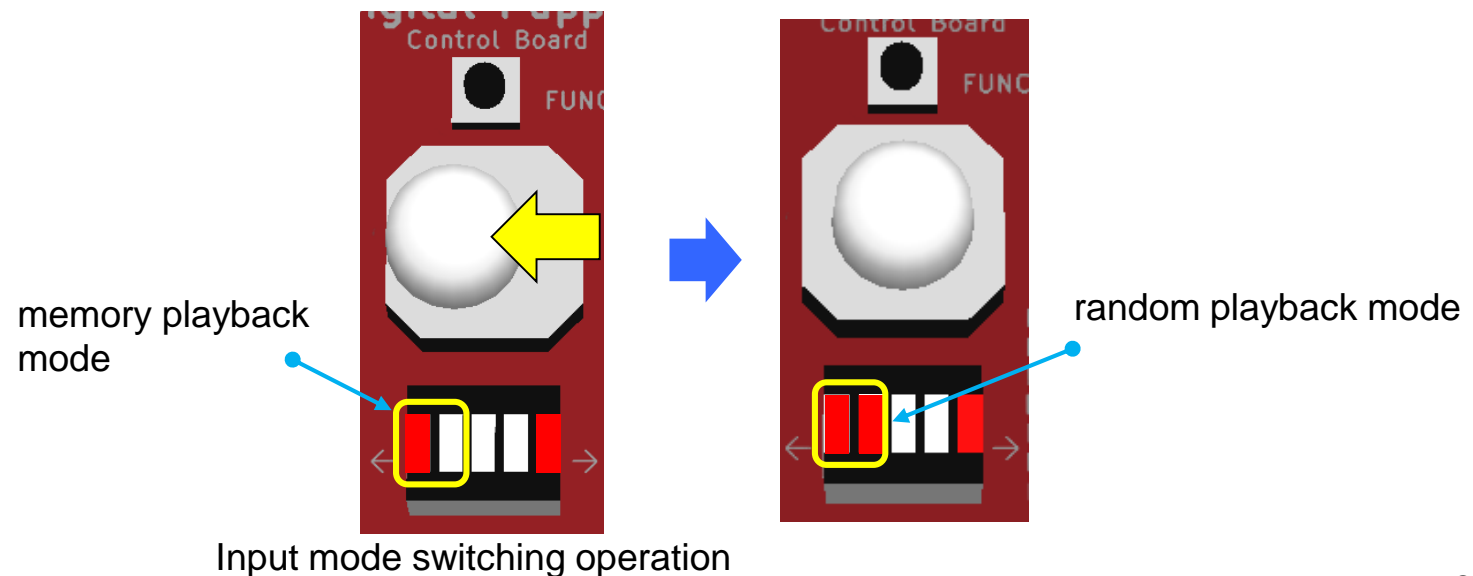
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6-3 Move randomly

- When the input mode switching operation is performed from the memory playback mode, the random playback mode is set.
- In this mode, the following 16 types of movements registered in the controller in advance are randomly called (1.Nod center, 2.Nod left, 3.Nod right, 4.No no, 5.Bow center, 6.Bow left, 7.Bow right, 8.Turn left, 9.Trun right, 10.Tremble horizontal, 11.Tremble vertical center, 12.Tremble vertical left, 13.Tremble vertical right, 14.Turn around counterclockwise, 15.Turn around clockwise, 16.yawn)



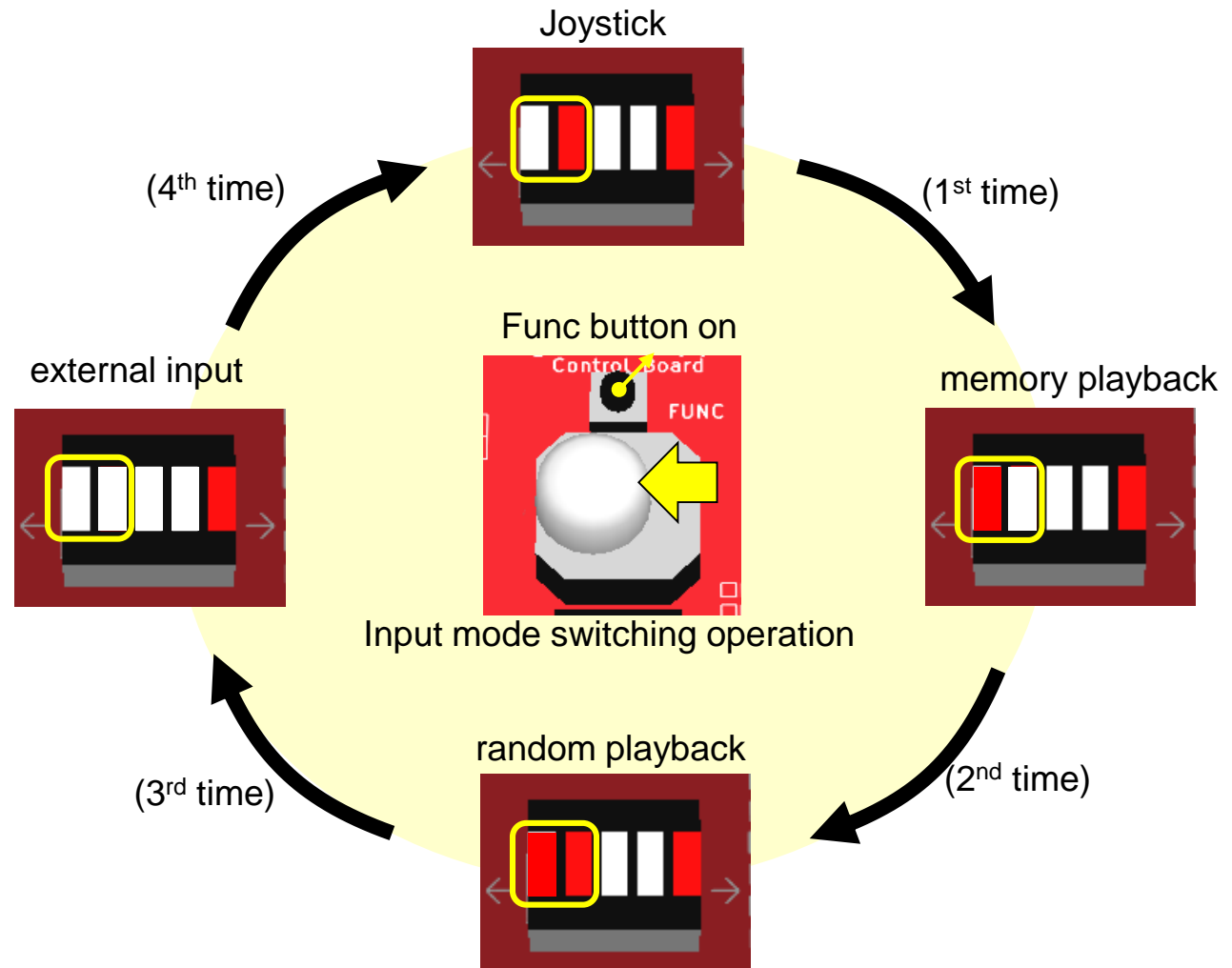
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6-4 Input mode transition

As described above, there are four types of input modes, and even if the mode is changed in order by the input mode switching operation, it returns to the original mode. If the controller is connected to the left side when the power is turned on, it will be in the external input mode, otherwise it will be in the joystick control mode.

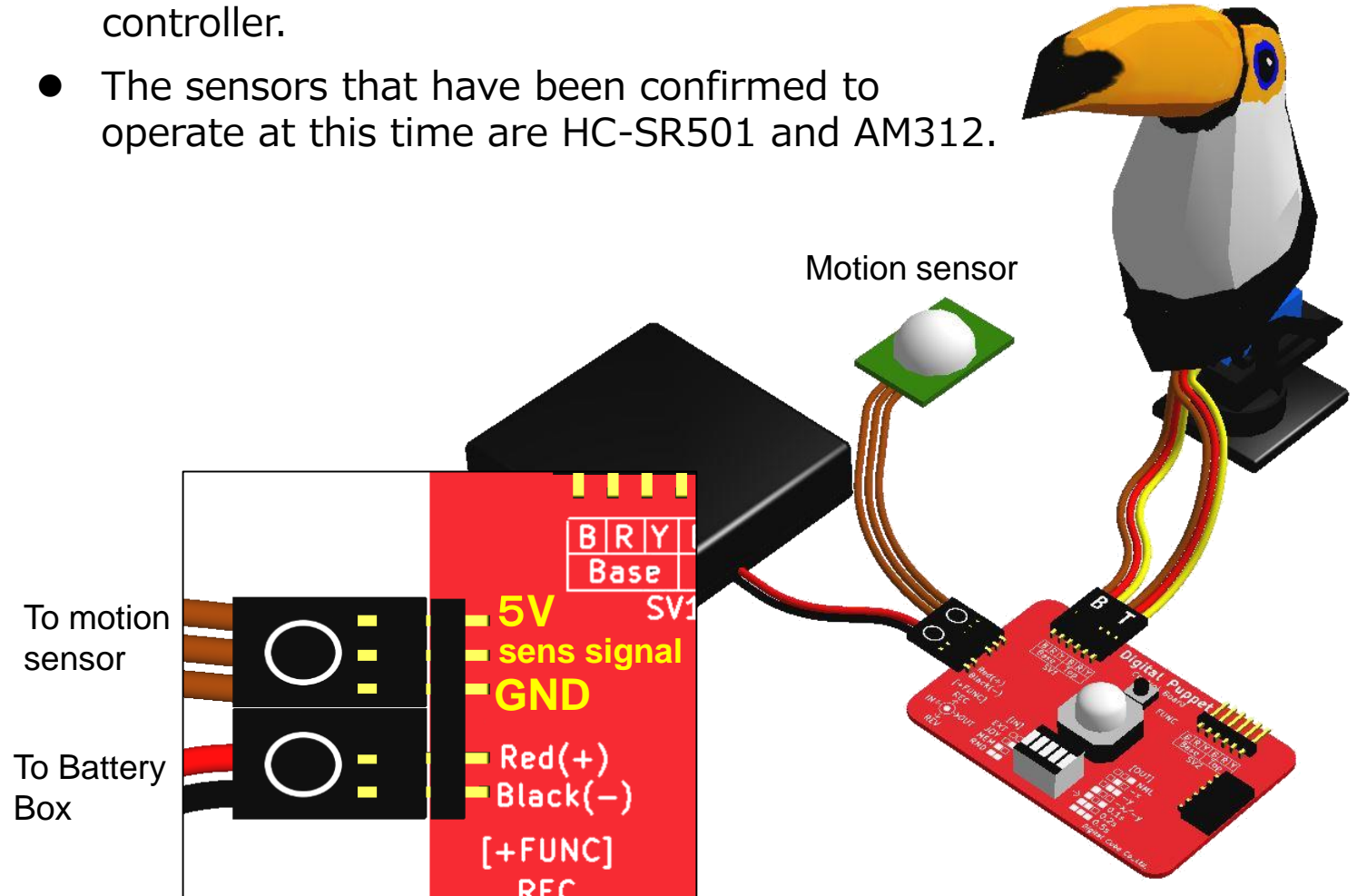


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6-5 Control by motion sensor

- If you install a motion sensor (sold separately), you can stop the operation and save battery power when not detecting human movement nearby (memory playback mode only)
- Attach the motion sensor connector on the power connector of the controller.
- The sensors that have been confirmed to operate at this time are HC-SR501 and AM312.



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7 Operate multiple puppets



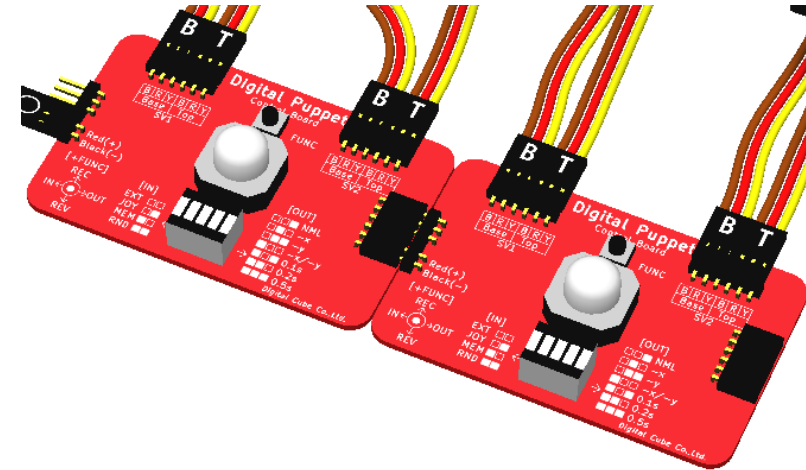
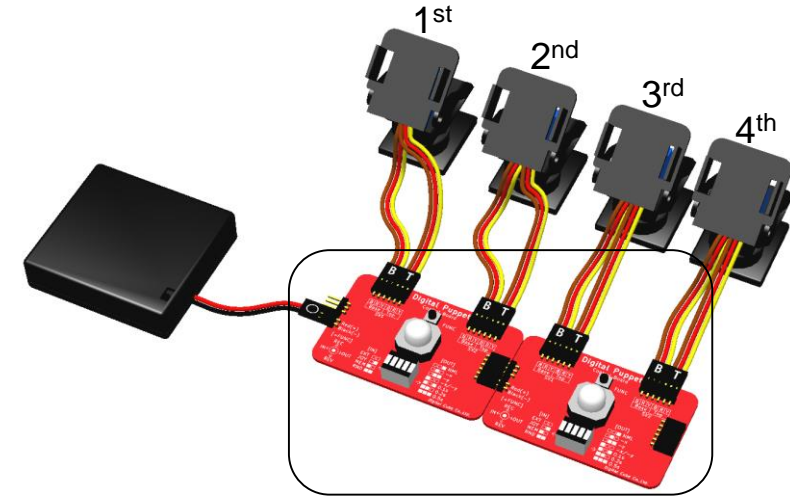
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7-1 Add more controllers

- Line up two controllers side by side and insert the connector into the pin header.
- Insert the B and T connectors of the 1st and 2nd pedestal into the pin header of the left controller (from left to B and T)
- Insert the B and T connectors of the 3rd and 3rd pedestal into the pin header of the right controller (in order of B and T from the left)
- Up to two pedestals can be controlled per controller. For 5 or more pedestals, connect the pedestal after arranging additional controllers side by side (up to 4 controllers and 8 pedestals).



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7-2 Operate together

- When two controllers are connected and the power is turned on, the left controller automatically becomes the main mode and the right controller automatically changes to the left mode.
- Here, it becomes straight mode that 4 puppets move in the same direction at the same time by the joystick operation of the left controller.
- In this straight mode, the LED bar looks like Figure b.

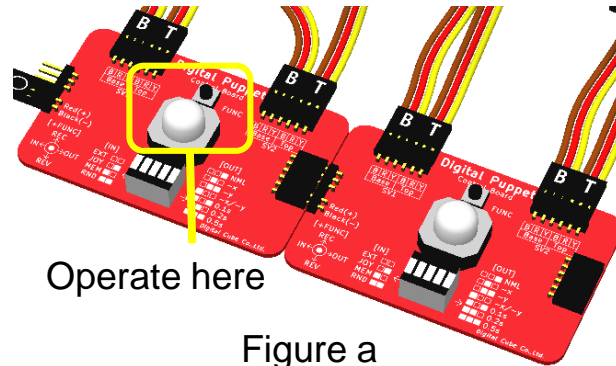


Figure a

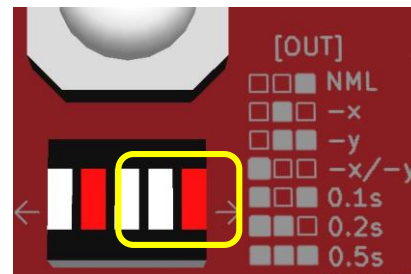


Figure b Straight mode

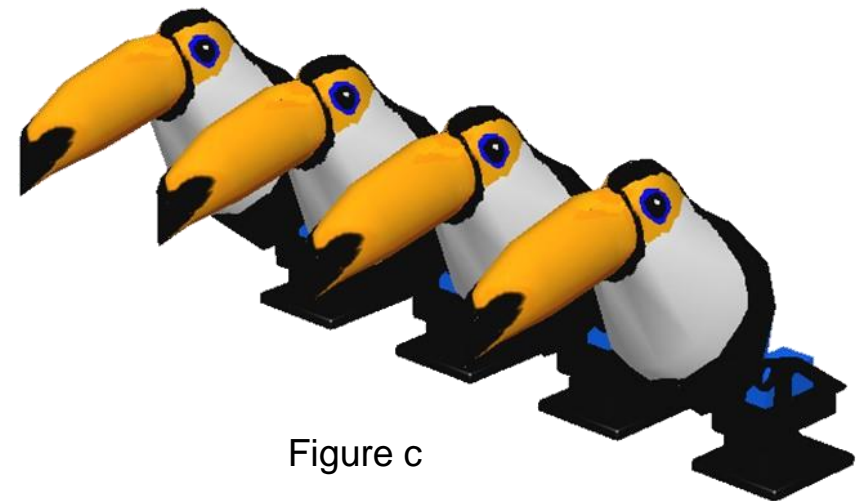


Figure c

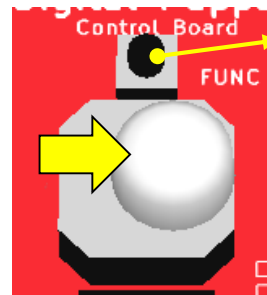
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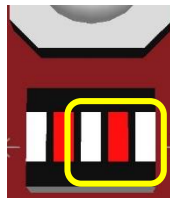
7-3 Inverse the movement of the adjacent puppet

- In straight mode, when the joystick is moved to the right while pressing the FUNC button (output mode switching operation), the base reversal mode in which the rotation directions of the base motors are reversed next to each other is entered.
- If this switching operation is performed again, it will be in the top reversal mode, and the rotation direction of the top motor will be reversed next to each other. If this switching operation is performed again, it will be in both reverse mode, and the rotation of both motors will be reversed in the next to each other.

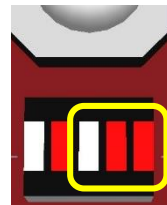


Func button on

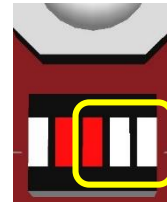
output mode switching operation



Base inversion

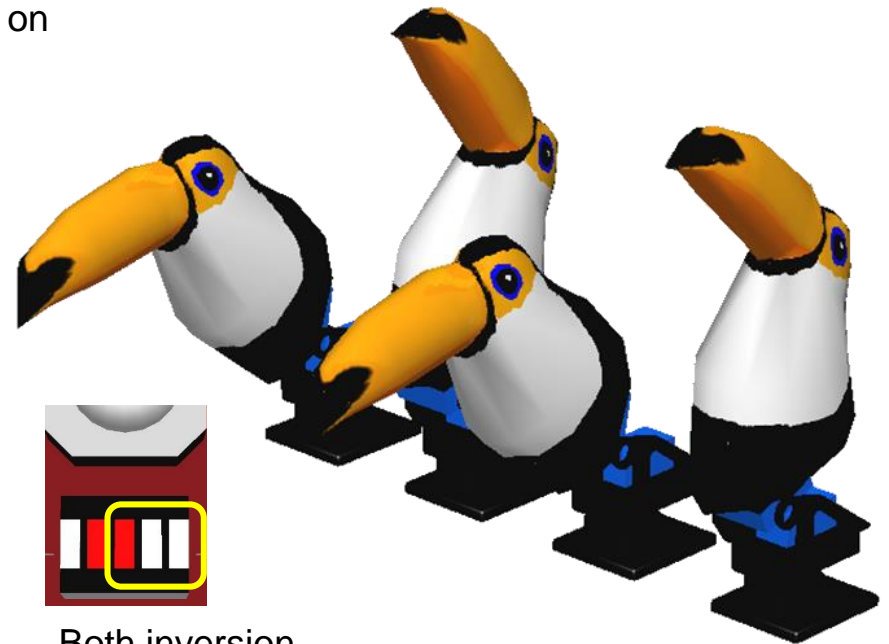


Top inversion



Both inversion

In case of top inversion mode



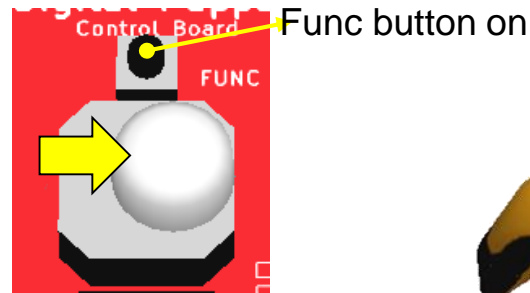
ch. **7**

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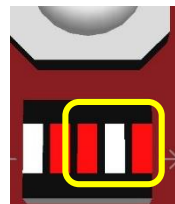


7-4 Delay the movement of the adjacent puppet

- If mode switching operation is performed 4 times from straight mode, it becomes 0.1 second delay mode.
- Adjacent puppets have the same time difference and can behave like waves.
- Changing the mode further will change to 0.2 second delay, 0.5 second delay and the first straight mode.



output mode switching operation



0.1s delay



0.2s delay



0.5s delay

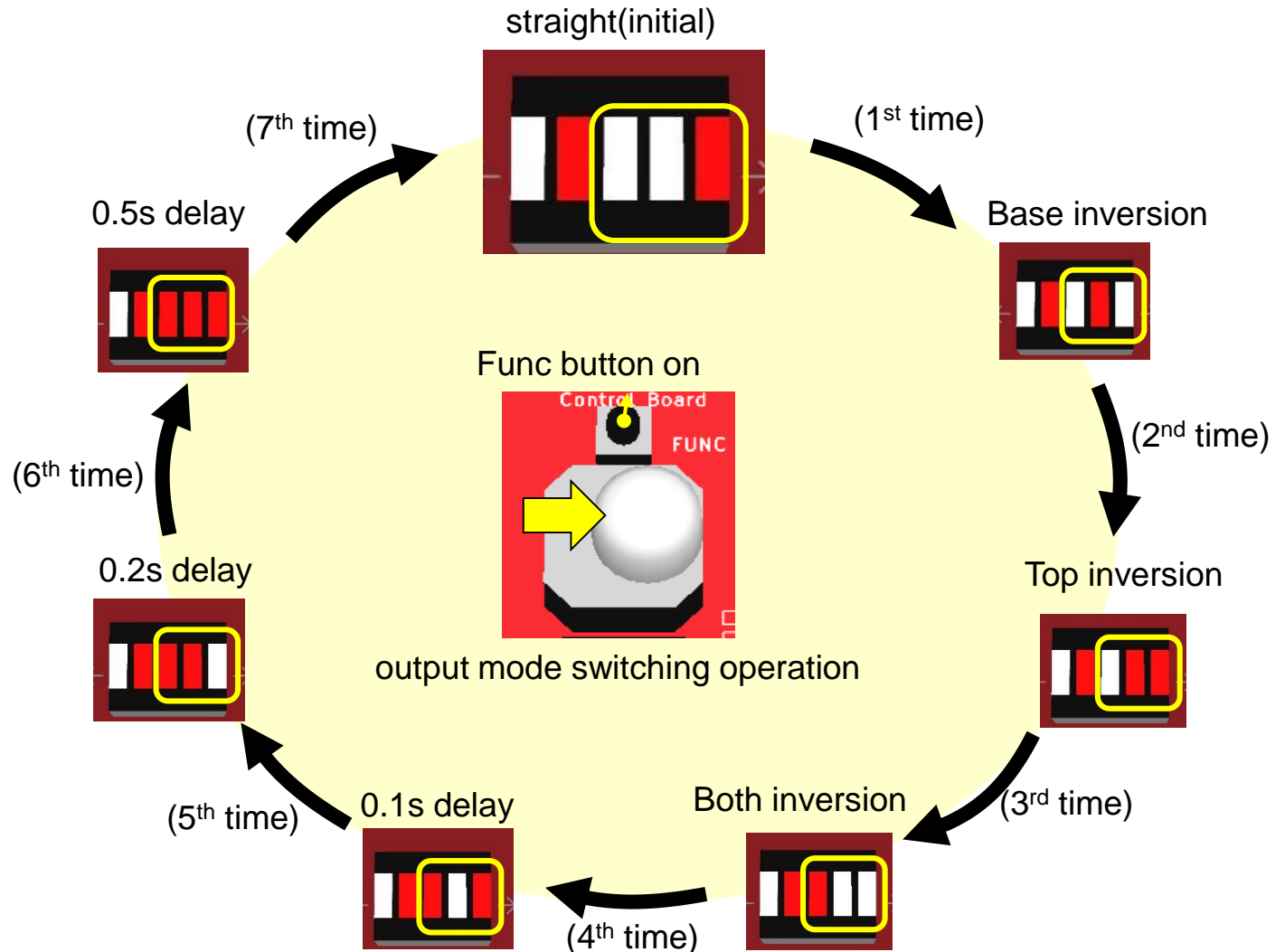
ch. **7**

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7-5 Output mode transition

There are 7 types of output modes. The output mode is changed in order by the output mode switching operation and returns to the first straight mode.



ch. **8**

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8 FAQ 1/3

Q Does the recorded operation data disappear when the power is turned off?

A No. The recorded data is transferred to the flash memory, so it will not disappear even if the power is turned off.

Q Is there a limit to the number of operation recordings?

A The upper limit is 10,000 times on the spec. In normal use it is rarely exceeded.

Q Is pedestal assembly or soldering required?

A No. Except for paper craft assembly, all you have to do is install the battery and insert three connectors.

Q Can I use both rechargeable and dry batteries?

A Yes, the voltage is different for both.

Q Does the puppet base need to be screwed to the floor?

A Gel sheet is attached to the back of the base. It can be pasted if it is smooth and flat. If it gets dirty, the adhesive strength will be restored by washing with water.

ch. **8**

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8 FAQ 2/3

Q When a controller is connected, which controller is used to operate it?

A This is the leftmost controller. When connected and turned on, the connection status is automatically checked and the leftmost controller is in joystick mode, and the other connected controllers are in external input mode. You can also switch manually.

Q How many puppets can be moved with one battery box?

A Up to 10 puppet operations have been confirmed with controller 5 connected. In terms of specifications, it is limited to 8 puppets with 4 controllers per power supply. However, theoretically, any number of 4 controllers can be moved simultaneously by connecting two control cables and GND with a 2-wire cable. The above two-wire cable is also available upon request.

Q Will it break if the connector is inserted in reverse?

A The male and female sides have been crafted so that they do not pierce the power connector. Also, the cable side connector is marked so that you can see the error.

ch. **8**

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8 FAQ 3/3

Q I want to rotate the puppet 180 degrees to show it to people. If so, does the controller operating direction reverse?

A If the joystick is moved forward while pressing the push button SW, the control polarity to the servo motor can be reversed. Please use in this state.

Q How long can I operate continuously with 4 batteries?

A It varies greatly depending on the weight of the puppet, how to operate the motor, and the type of battery, but when fully charged nickel metal hydride batteries were used and two puppets were operated continuously at maximum amplitude with a 1 second period, they operated for 17 hours..



ch. **9**

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9 Specifications

size

controller : 52mm x 80mm x 17mm
pedestal : 40mm x 50mm x 73mm cable length 25cm
battery box: 70mm x 64mm x 19mm cable length 16cm with switch

weight

Controller x1, puppet base x1, battery box x1 (without battery) total weight is 100g

solder

Pb free

function

- *Control up to two puppet bases with one controller
- *Servo motor angle control by 2-axis positioning sensor
- *Sensor information can be recorded for up to 20 seconds.
- *Playback (including slow and high speed), reverse operation, delay operation can be selected
- *By connecting controllers, puppets twice as many as the number of controllers can be controlled simultaneously.

Power supply

4 AA batteries. Operates from 4.8V to 6.4V

Microcomputer

ARM Cortex M0+

Country of manufacture

Japan

