

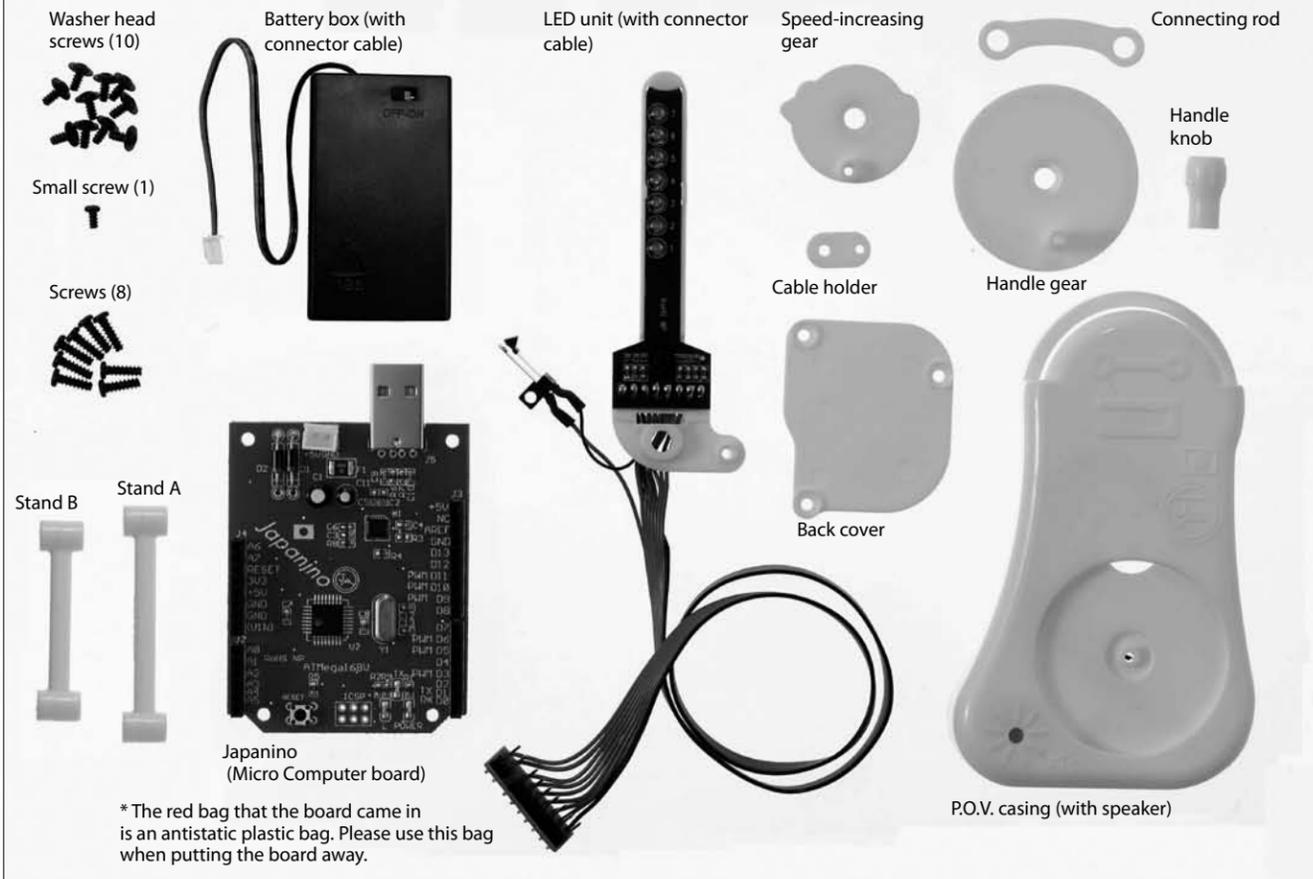
How to Assemble and Use the Supplement

8-bit Micro Computer "Japanino" & the P.O.V. (Persistence of Vision)

How to assemble the supplement

Assembly time for the P.O.V.:
Approximately 30 minutes

Parts in the Kit



* Left over screws are spares.

Things you will need

A screwdriver, three new AAA alkaline batteries, or three zinc-carbon batteries

(* Oxyride batteries have high voltage. Using these batteries may break the circuit, so please refrain from using them.)

* Please use a USB extension cable if necessary. A USB 2.0-compliant cable that is 1 m or less in length works well.

* Please purchase one from a shop, if you need one.

Materials used in this kit

Micro Computer board (red): Epoxy, Connector on the Micro Computer board (white or black), connector on the battery box (white), and connector, etc. on the LED unit (black); PA66, LED unit board: Phenol

P.O.V. casing (white), handle gear (white), handle knob (white), speed-increasing gear (white), connecting rod (white), LED holders (white), back cover (white), cable holder (white), stand A (white), and stand B (white): POM

Screws, washer head screws (black): Iron (with chromate plating)

Battery contacts: Copper (with nickel plating). Terminals on the board: Copper (with tin plating)

* Please dispose of this product in accordance with local regulations.

Notes for tightening screws

When tightening screws, firmly press the screwdriver straight against the screw and turn. It is said that 70 percent of the force applied is used for pushing against the screw and 30 percent for turning it. The types of screws used for the supplement are those that carve grooves into the plastic as they are inserted (self-threading). For this reason, the screw hole may be damaged if you exert too much force when tightening the screw. Use a small screwdriver with a grip diameter of about 2 cm.



Full-scale image of a screwdriver

CAUTION

Please be sure to read the following instructions before assembling this kit.

- This kit includes screws and other small parts. Be careful not to swallow them. There is a risk of suffocation.
- There are parts with pointed edges on the Micro Computer board (Japanino) and the LED unit (the edges of the circuit boards, the edges of connectors, cut sections of parts on the backside of the circuit boards, circuit board pins, etc.). There is a risk of unexpected injury, so be careful when handling parts with pointed edges. Place this kit out of the reach of small children when not in use.
- Staring at flashing LEDs for long periods of time may cause you to exhibit symptoms of feeling sick such as nausea, etc. (The extent of this may vary from person to person.) Take caution when using the P.O.V. for long periods of time. Take extra precautions when showing the P.O.V. to small children, in particular, by not allowing them to view it for long periods of time, etc.
- The Japanino is constructed using parts that have been deemed safe to use; however, please take care when using the Japanino, by ensuring that small children do not lick the printed circuit boards or wiring cords (The Japanino and P.O.V. meet the safety standards for heavy metals and PVC.)
- Do not connect the Japanino to a 100 VAC power supply as it would be extremely dangerous to do so.
- Do not touch the Japanino with wet hands. Doing so may cause the Japanino to malfunction due to rusting, etc.
- Do not let the Japanino get wet as it is not waterproof. Should the Japanino happen to get wet, wipe away any moisture with a moisture-absorbent cloth.
- Do not store the Japanino in locations that are high-temperature, have high humidity, or have a lot of dust.
- Remove the Japanino from the USB terminal on the PC when there are lightning strikes, etc. happening. There is a risk of electric shock.
- The Japanino is a precision device. Do not place it in locations where temperatures are too high or too low, such as in direct sunlight, near heating or air conditioning equipment, etc.
- The Japanino is constructed using precision electronic parts. To prevent breakdown from static electricity, make sure to touch something metal to remove static electricity from your body before touching the main unit. In particular, if you touch the main unit during battery-powered operation without discharging static electricity from your body, there is a risk of the Japanino breaking.
- Be sure to use the versions designated by GAKKEN for the OS software used in your computer. The Japanino may not operate properly if you use versions other than those designated.
- When using the battery box, please make sure to remove the Japanino from the USB terminal on your computer before using.
- Do not use the battery box for any device other than the Japanino. Using it for another device carries a risk of heat being generated, etc. due to improper use such as short-circuiting.
- Do not connect the battery box directly to the P.O.V. without going through the Japanino. Doing so may cause the P.O.V. to break.
- If metal objects (coins, paper clips, staples, wires, metal belts of watches, etc.) make contact with the front or back of the Japanino, there is a risk of heat generating due to malfunction or short-circuiting. Take care not to let metal touch the surface of the circuit board.
- The Japanino uses a resettable fuse. For safety reasons, please use under conditions where the amount of current flowing from the USB terminal or batteries is 0.4 A or less (the Japanino is rated for 0.5 A, but it is not recommended that you use it at an amount close to the limit). If you use the Japanino at a value that exceeds this, the internal resistance will increase, generating heat. Unlike with an ordinary fuse, the resettable fuse can be used again if the temperature returns to normal and the Japanino reverts to initial conditions; however, heat will again be generated until the cause of the problem is eliminated. Because not knowing the cause of the malfunction could lead to accidents, please stop/discontinue use in such cases (you might burn yourself if you touch the resettable fuse while it is generating heat).
- The part on the Japanino labeled "+5V" provides about 4.6 V of voltage during USB connection and about 4 V of voltage with a reduction of about 0.4 V from the battery voltage during connection to the battery box. Use under such conditions that the current from this part does not exceed 0.4 A.
- The part on the Japanino labeled with "3V3" has not been stabilized. If using USB connection, check the voltage before using when connecting the battery box.
- The ICSP terminal on the Japanino is a part that is to be purchased by the customer separately and soldered on

by hand. Please be advised that if attaching an ICSP terminal, you are doing so at your own risk. GAKKEN will not offer any support with regard to this matter. When soldering on the part, please be careful that you do not burn yourself or start any fires.

- Please do not short together the places on the Japanino marked GND, 5V, and 3V3 with a pin, etc.
- Please make sure to have a parent or other adult supervise any children age 15 and under who are going to use the Japanino. GAKKEN will not take any responsibility for accidents, incidents, etc. that may occur should a child use the kit unsupervised.
- Do not modify the Japanino. GAKKEN will not perform repairs, etc. to modifications.
- Putting together your own circuits for the Japanino to try out, or putting together your own circuit for controlling a dynamic power source not listed in this booklet (such as a 100 VAC power supply, an engine, other batteries, etc.), is done at your own risk. There is a risk of heat being generated, fire breaking out, the circuit board being broken, etc. if circuits that you built yourself short out, etc.
- Do not attempt to put together circuits for controlling devices that can end a human life including ones that generate fire or make equipment that can cause serious injury for use with the Japanino. GAKKEN will not take any responsibility for accidents, incidents, etc. occurring with devices that are capable of causing serious injury to human beings.
- Please be advised that GAKKEN and copyright holders of software, etc. in this kit will not take any responsibility for problems occurring either directly or indirectly as a result of the use of this kit.

- Three AAA batteries are used in this kit. Incorrect use of the batteries may cause the generation of heat, explosions or liquid leakage. The following precautions should be taken.
- Do not use oxyride batteries. Using such batteries may cause the Japanino to break.
 - Ensure that the positive and negative terminals of the batteries are aligned correctly.
 - If liquid that leaked from the batteries gets into your eyes, rinse them well with plenty of water and consult a doctor immediately. If liquid leaks onto your skin or clothes, wash it off immediately.
 - Always remove the batteries after use.
 - Do not mix old and new batteries.

* Please read the instructions and cautions thoroughly before use.

* For your safety, be sure to follow the instructions in this manual. In addition, do not use any parts that have become damaged or deformed during use.

Supported computer models

OS: Windows XP (SP2 or later)/Vista/Windows 7; Mac OS X10.4 or later

Interface: USB 2.0

* Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and in other countries.

● Note 1: For instructions on how to operate your own computer, please refer to the operator's manual for that computer.

● Note: In the explanations, screen shots for Windows 7 and Mac OS X are used; however, the expressions used in those screen shots may differ from what is actually shown on the screen depending on the OS version or settings, etc. for the screen browser used. Please check your computer's OS and the operator's manual for that OS.

* Company and product names in this booklet

● Company names and product names written in this booklet are generally registered trademarks of the development manufacturer. Please note that we do not use the symbols, TM, ©, or ®, in this booklet.

* About GAKKEN's "Japanino" Micro Computer board

- GAKKEN'S Micro Computer board, "Japanino," is made to be plug-compatible with the Arduino, but it does not have the exact same hardware configuration. GAKKEN is not able to guarantee 100% that sketches that work with the Arduino will also work normally with the Japanino. GAKKEN can also offer no guarantee that sketches that work on the Japanino will also work on the Arduino 100% of the time.
- The specifications for and ways to use the Japanino may change later on without prior notice.
- Please be aware that neither GAKKEN nor the copyright holders or manufacturers of software, etc. used in this kit will not take any

responsibility for any damages, etc. occurring as a result of the use of technical information provided in this booklet.

* About the IDE

- The IDE introduced in this booklet was completely produced by the Arduino team.
- * The Arduino team: Massimo Banzi, David Cuartielles, Gianluca Martin, Tom Igoe, and David Mellis

* Other

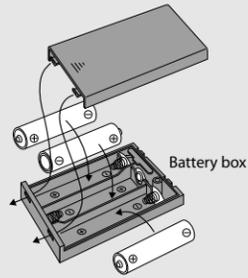
- Copyrights for the driver software belong to CP Corporation in the United States.

Checking operations before assembly

Operating the Japanino and LED unit with batteries

1 Insert three new AAA batteries into the battery box.

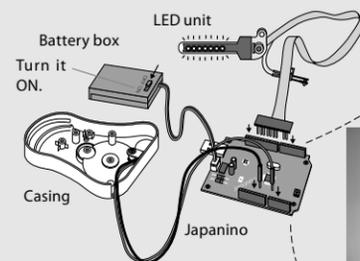
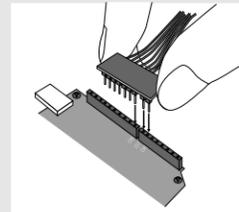
* Be sure to check the orientation of the batteries.



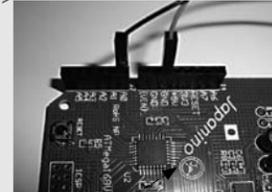
2 Insert the connectors from the battery box, the LED unit, and the speaker in the main unit casing into the relevant connector plugs on the Japanino as shown in the diagram, and then turn the switch for the battery box on. If the LEDs are flashing, then everything should be working.

How to hold the connector.

Insert the connector into pins D6 to GND.

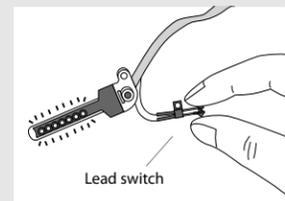


Insert the connector into pins A0 and GND.



* Either of the wires, grey or black, can be inserted into the GND pin.

3 Touch the lead switch. If a beep sound is emitted, everything should be working.



* If the beep sound continues even after you've taken your hand away, adjust the amount of space between the terminals on the lead switch so that there is about 0.5 mm of space between them.

Once you've checked everything, turn the battery box OFF, and unplug the connectors from the Japanino.

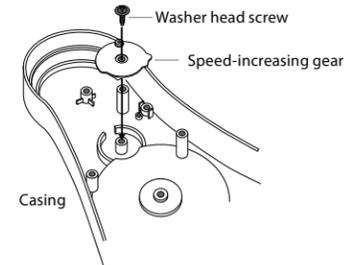
If something isn't working properly...Check the following!

- Are the batteries new, and have they been inserted in the right direction?
- Did you plug in each connector in the right place and push each all the way in?
- Is the switch for the battery box turned ON?
- Is the power supply LED on the Japanino main unit (see page 6) lit up?

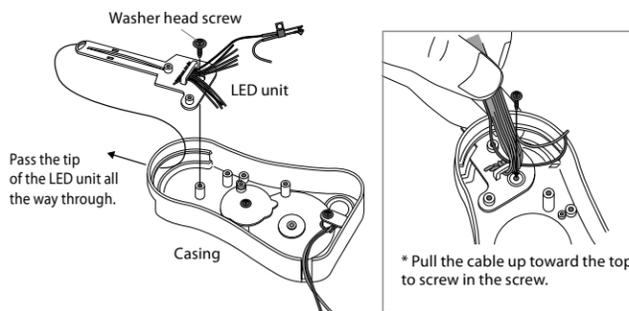
Note: If you are unable to check that these operations are working correctly, you will not be able to check the operations on page 6. Please make sure to check.

Assembling the P.O.V.

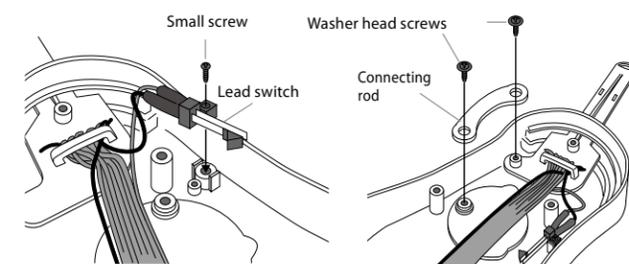
1 Affix the speed-increasing gear to the main unit casing with a washer head screw (being careful not to tighten them too tightly).



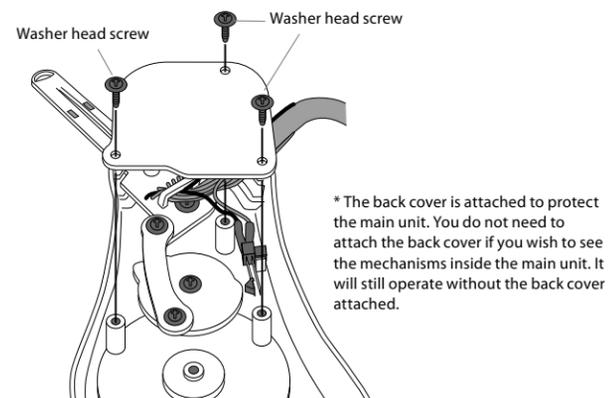
2 After passing the tip of the LED unit through the top of the main unit casing, affix the LED unit to the main unit casing with a washer head screw (being careful not to tighten them too tightly).



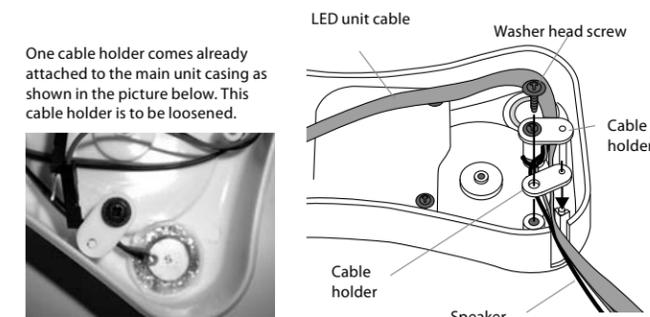
3 Screw the lead switch down with the screw (small). Next, screw in the connecting rod with washer head screws.



4 Pull the cable up as shown in the diagram, and then screw in the back cover using washer head screws.

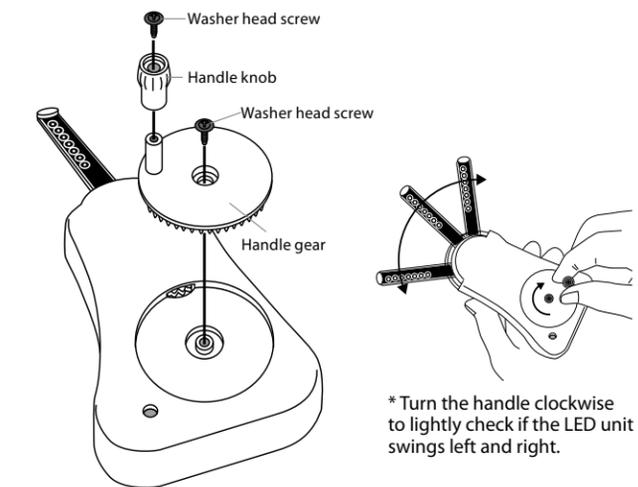


5 Loosen the cable holder that is wrapped around the speaker cable. After passing the LED unit and speaker cables through as shown in the diagram, affix the cable holder using a washer head screw. Tighten down the loosened cable holder once again.



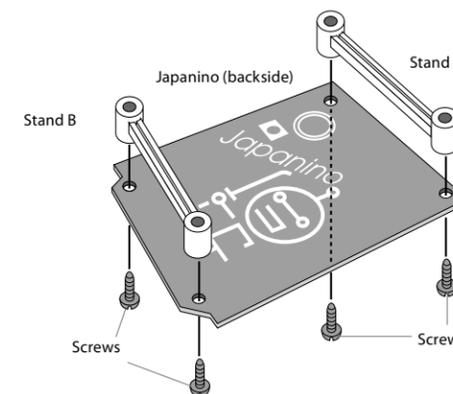
One cable holder comes already attached to the main unit casing as shown in the picture below. This cable holder is to be loosened.

6 Attach the handle gear and handle knob from the front side with washer head screws to complete.



When Attaching Stands to the Japanino...

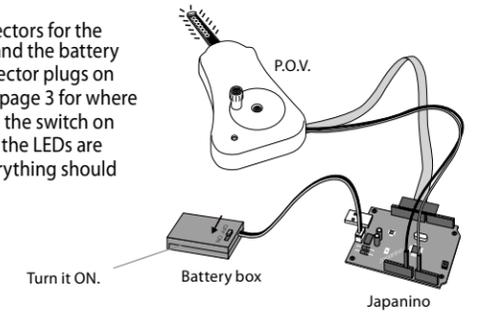
Attach stand A and stand B by screwing in screws in four places as shown in the diagram.



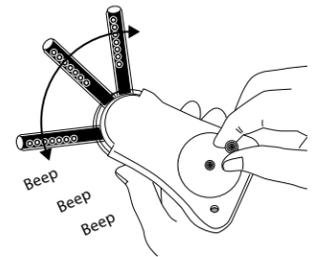
Note: You need not attach the stands if doing so prevents you from being able to insert the Japanino into the USB slot on your computer. However, in such cases, please take extra precautions to ensure that the back side of the Japanino does not come into contact with metal during use (if that should occur, electricity may flow unexpectedly, causing the board to break). Leftover screws can be used for other DIYs.

Connecting the Completed P.O.V. to the Japanino to Check Operations

1 Insert the connectors for the completed P.O.V. and the battery box into the connector plugs on the Japanino (see page 3 for where to insert). Turn ON the switch on the battery box. If the LEDs are flashing, then everything should be working.

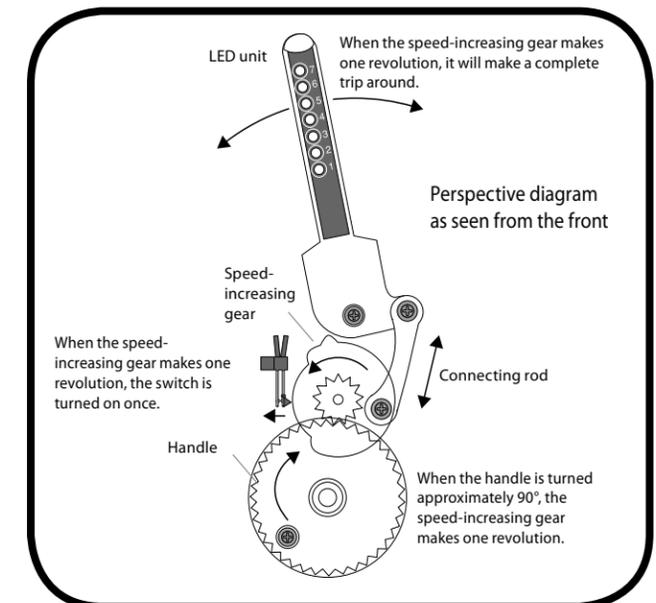


2 Turn the handle on the P.O.V. to make the LED unit swing slowly left and right. If a beep, beep, beep sound is emitted on the left side, then everything should be working.



* If the LED unit is left on the left side, the speaker continues to emit the beep sound.

How the P.O.V. works



If something isn't working properly...Check the following!

- Did you plug in each of the pins on the connector firmly into the right place?
- The speaker will emit sound if the lead switch makes contact with the speed-increasing gear when the projection on the gear is on the left side. Slowly turn the gear to check it.

Note: If you are unable to check that these operations are working correctly, you will not be able to try out the experiments on page 9. Please make sure to confirm that these operations are working.

Components in the Japanino and Their Functions

There are quite a few characters and symbols imprinted on the Japanino, but there are not so many of which you actually need to know the meanings. Most of the parts you should be familiar with are pins*. The types of pins are roughly divided into three groups, digital input/output pins, analog input pins, and power supply pins. Normally, pins are wired in accordance with the sketch (program).

Analog input pins

There are a total of 8 analog input pins, including A6 and A7 in addition to A0 to A5 (the A is short for Analog). The input voltage is read out from 0 to the power supply voltage (5 V, normally) in 1024 steps. You can connect sensors, volume dials, etc. to these pins. In addition, you can also use these analog input pins as digital input/output pins by changing the settings in a sketch (program).

Symbol	Description
A6	Analog input pin no. 6.
A7	Analog input pin no. 7.
RESET	Adds a RESET button
3V3	3.3 V power supply pin. Not usually used.
+5V	Power supply pin. Supplies a 5 V power supply.
GND	Ground. Negative (-) on power supply.
GND	Ground. Negative (-) on power supply.
(VIN)	Not used.
A0	Analog input pin no. 0. Can also be used as digital pin no. 14.
A1	Analog input pin no. 1. Can also be used as digital pin no. 15.
A2	Analog input pin no. 2. Can also be used as digital pin no. 16.
A3	Analog input pin no. 3. Can also be used as digital pin no. 17.
A4	Analog input pin no. 4. Can also be used as digital pin no. 18.
A5	Analog input pin no. 5. Can also be used as digital pin no. 19.

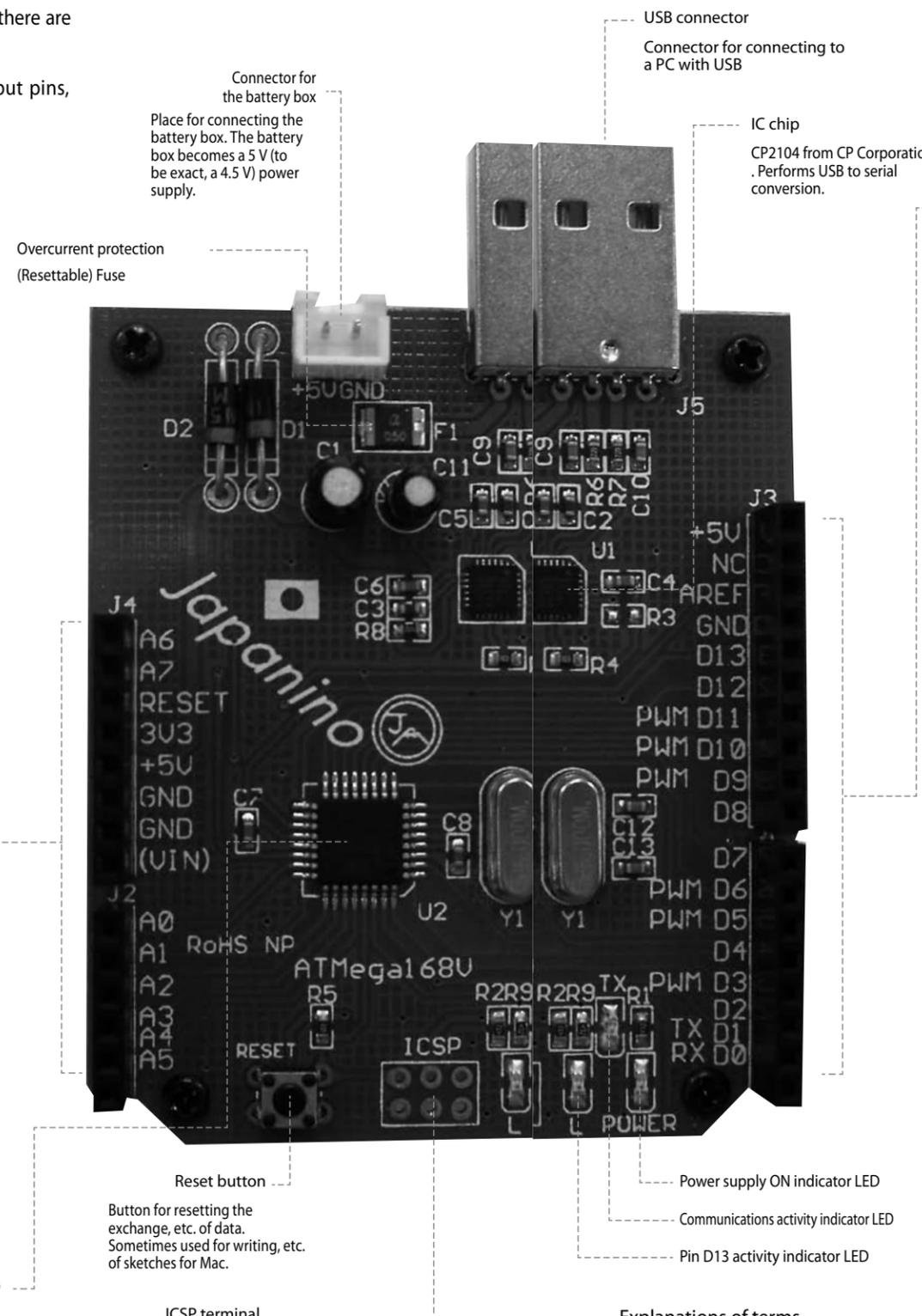
Specifications

5 V; microcomputer/ATmega168V; USB-serial conversion IC/CP2104; oscillating frequency, 8 MHz

Digital input/output pins

There are a total of 14 pins from D0 to D13 (the D stands for Digital). The input pins and output pins for digital values of HIGH and LOW can be set freely. The 6 pins of D3, D5, D6, D9, D10, and D11 that are marked with PWM (for Pulse Width Modulation) can be used as pulse width control output pins. Pins D0 and D1 can be connected to a PC via USB.

Symbol	Description
+5V	Power supply pin. Supplies a 5 V power supply.
NC	Not connected to anything.
AREF	Reference signal pin.
GND	Ground*. Negative (-) on power supply.
D13	Digital input/output pin no. 13 (can be used to monitor the L LEDs on the circuit board).
D12	Digital input/output pin no. 12.
PWM D11	Digital input/output pin no. 11 (can also be used to output PWM*).
PWM D10	Digital input/output pin no. 10 (can also be used to output PWM).
PWM D9	Digital input/output pin no. 9 (can also be used to output PWM).
D8	Digital input/output pin no. 8.
D7	Digital input/output pin no. 7.
PWM D6	Digital input/output pin no. 6 (can also be used to output PWM).
PWM D5	Digital input/output pin no. 5 (can also be used to output PWM).
D4	Digital input/output pin no. 4.
PWM D3	Digital input/output pin no. 3 (can also be used to output PWM).
D2	Digital input/output pin no. 2.
TX D1	Pin no. 1. For communications use, and therefore not used in digital input/output.
RX D0	Pin no. 0. For communications use, and therefore not used in digital input/output.



IC chip
An Atmel microcontroller ATmega168V is used. A power-saving type of IC chip.

ICSP terminal
A terminal used for writing, etc. to a boot loader. Not normally used.

Explanations of terms

- * Pin: For the Japanino, terminals are referred to in this way. Some terminals may also be called "ports" on other circuit boards. Some terminals may be in the form of sockets. The expression "I/O pin" is also sometimes used when to represent input/output. "I" stands for "Input" and "O" for "Output."
- * GND: This stands for "GROUND," the surface of the earth. Electrically speaking, ground refers to earth ground. The ground terminal is connected to the negative (-) on the power supply.
- * PWM: This is the abbreviation for "Pulse Width Modulation." By controlling the ratio between ON and OFF times for a given pulse, you can realize analog output with digital pins.

How to Use the Supplement

Preparation

Installing Software Required

(Before installing, check the following for the PC you are using)

- Check the OS of the PC you are using.
→ All of the software programs you need are compatible with the Windows XP (SP2 or later), Vista, Windows 7/Mac OS X10.4 or later operating systems.
 - Do you have a USB 2.0 port for the interface? → If not, you will not be able to use the supplement.
 - Do you have at least 200 MB of free space available on your hard disk drive? → If not, you will not be able to use the supplement.
 - Please reorganize, etc. your hard disk drive to free up disk space.
- * Please start the install procedures after checking the items given above.

1 Connect to the Internet, and download IDE ("Arduino 0018") and Driver Soft from the below and install them on your PC.

- Japanino webpage

<http://otonanokagaku.net/english/japanino/>

2 Check that the driver files installed correctly with the IDE screen.

For Windows

- 1) Open the IDE.
- 2) Open the [Board] folder from [Tools] and select [Arduino Pro Mini (3.3V,8MHz)w/ATmega168]. The mark will appear next to the selected item.
- 3) Insert the Japanino into the USB port on your PC.
- 4) Open [Serial Port] from [Tools] in the IDE, and write down the number from [COM].
- 5) Open [Serial Port] from [Tools] in the IDE, and select the checkbox for the number of the COM that was just added (it may take some time for the new COM number to appear in some cases).

For Mac

- 1) Open the IDE.
- 2) Insert the Japanino into the USB port on your PC.
- 3) Open the [Board] folder from [Tools] and select [Arduino Pro Mini (3.3V,8MHz)w/ATmega168]. The mark will appear next to the selected item.
- 4) Open [Serial Port] from [Tools] in the IDE, and select [/dev/tty.SLAB_USBtoUART].

* If using a USB port that you do not usually use, there are cases where it may not function properly due to being affected by dust or dirt. If the COM port cannot be seen, remove the Japanino from the USB port and remove any dust or dirt from the port before trying to reinsert it.

IMPORTANT

Please note that it is extremely important that you confirm that the COM port number assigned for the Japanino is the same on the PC and in the IDE and that the IDE recognizes that "the connected Micro Computer is a Japanino." If this is not done, you will not be able to upload sketches (programs) to the Japanino. Please make sure to confirm that this is done. If using two or more Japanino units, you will need to check the COM port numbers for each when inserting them into the PC as they will each be assigned to a different COM port.

Basics for How to Use an IDE

What an "IDE" is...The Japanino itself is nothing more than a simple device that is a hardware unit and cannot receive commands to be used to control something as a computer. To use the Japanino, you will need software for writing sketches (programs) and for writing data. An "IDE" is used with the Japanino.

Verify

Verify that a written sketch will work properly. This is referred to as "Compile" (which means, "translating a written sketch into machine language") in the terms used in Arduino.

Stop

New

Open

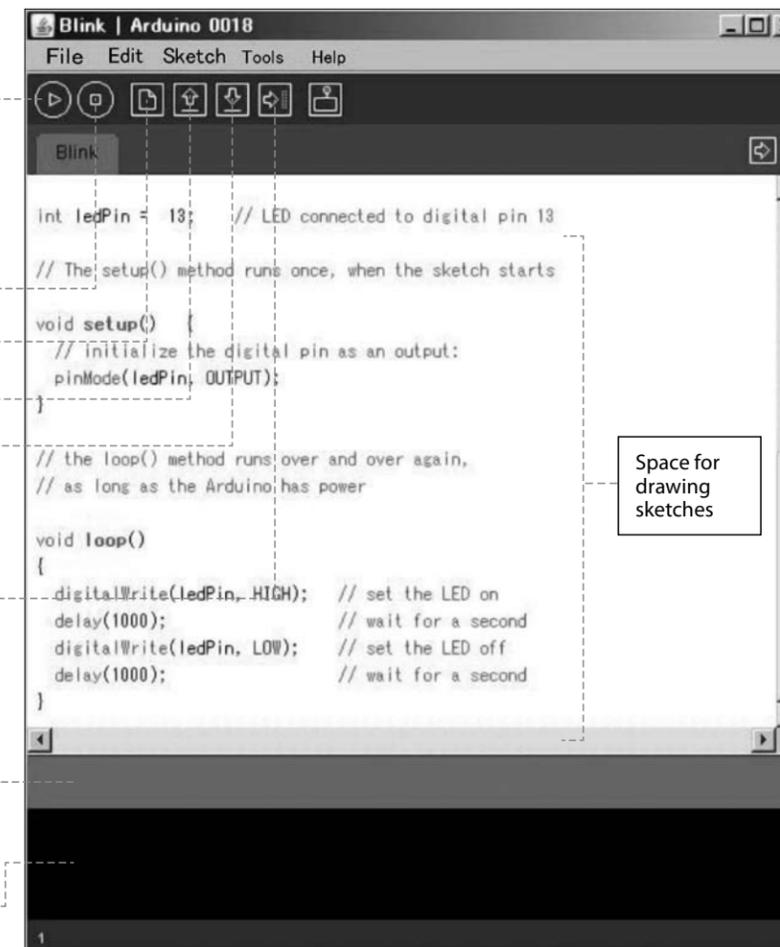
Save

Upload to Micro Computer board

Transmit the uploaded sketch to the circuit board.

Space for displaying details of operations and their results.

Space for displaying messages, such as error messages, etc. from the IDE side



Operate the P.O.V. with the Japanino

Experimenting with light using LEDs

Basic principal 1

Making one LED flash

- 1 Connect the Japanino to a PC. Next, connect the P.O.V. to the Japanino. Once you've connected everything, start up the IDE.
- 2 Click [File] [Examples] [Digital] [Blink] in order to open a sketch.
- 3 Click [Verify] to check to see if a sketch will work properly.

If completed successfully, the [Done compiling] message will appear.

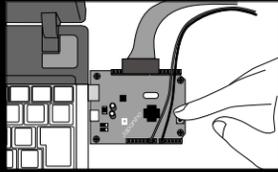
If the sketch fails, the background will turn red, and some kind of message will appear (the part displayed in yellow includes invalid content, or there is something lacking in the part directly before it. After fixing the problem, click [Verify] again).

- 4 Click [Upload] to upload the sketch to the board. Once uploading is done, the sketch will execute automatically, and an LED on the tip of the P.O.V. (the LED attached to pin no. 13) and the Pin D13 activity indicator LED on the Micro Computer board will flash.

IMPORTANT For Mac

If a "Size of sketch after compiling: bytes (max. capacity, bytes)" message appears in white letters in the Message Display box, immediately press the RESET switch as shown in the diagram for about 1 second (after pressing it for about 1 second, remove your hand).

If uploading was not completed properly, please try again starting from the clicking on [Upload] step. If the sketch fails to write properly no matter how many times you try, please remove the Japanino from the PC and try reinserting it.



If completed successfully, the [Done uploading] message appears.

To save the sketch you made...

- 1) In [File] [Save as], assign a name to the sketch and save it to the [Sketchbook].
- 2) Check the save destination location, and assign a name to the sketch.
- 3) Once the sketch has been saved, the [Saved] message will appear at the bottom of the Sketch screen.

To bring up a saved sketch, open [File] [Sketchbook], and select the desired file from the folder.

To edit the sketchbook...
 The sketchbook folder is in [My Documents] (for Mac, it is saved in [Documents] in [Home]). To change the name or to delete the sketchbook, edit the file in this folder.

Basic principal 2

Making other LEDs blink

Change the "13" in [int ledPin = 13;] in the sketch to "12" (the second LED from the end of the P.O.V.). Click [Verify] to check that the sketch will work properly. After confirming, write the sketch to the Micro Computer board.

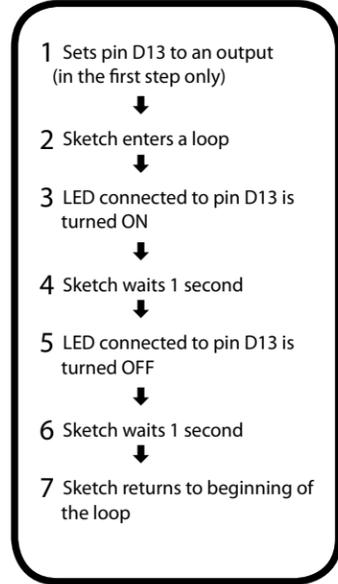
Basic principal 3

Changing the time of the LED flashing

Change [delay(1000)] in the sketch to [delay(100)]. Click [Verify] to check that the sketch will work properly. After confirming, upload the sketch to the Micro Computer board.

Description of a Sketch Used to Make One LED Flash

Details of the sketch to be operated



The word "sketch" (program) is a microcomputer term. Even though there are a lot of grammar rules that could apply to a sketch, IDEs are programming software applications for beginner programmers, so they are made to be comparatively simple. However, the number of grammar rules used increases as the sketch becomes more complex. First, "Flashing of one LED ([Blink] in the [Digital] section of the sketch example)" is described here.

As a basic structure, this sketch has two blocks. Actually, parts enclosed in the curly brackets, { }, are the blocks. The "{" indicates the start of a block, and the "}" indicates the end. The block name is written on the line before the "{." In other words, in this sketch, lines (3) to (5) make up one block, and the "void setup()" on line (2) is the name of that block. In the same way, lines (7) to (12) make up another block, and the "void loop()" on line (6) is the name of that block. These kinds of blocks are referred to as "functions." Once you make these functions, you will be able to execute the commands in the blocks. When execution of a function ends, the Japanino executes the next process in order after the lines for calling out the function. There are always two certain functions in any sketch. Those functions are setup() and loop(). The setup() function writes a code that can be executed, as desired, only when the sketch first begins operating, and the loop() function writes the central code that can be executed repeatedly. Words and numbers inside the parentheses, (), are referred to as "arguments." Comments written after the "//" are written so that the person writing the code can remember what a line is for, or so that a third party can understand what a line is for, when the code is being read later on.

Below, let's take a look at the details of the content of each line.

- (1) int ledPin = 13; / Command for instructing the Japanino to substitute a 13 in for the number where the word "led" comes up. Indicates that the LED is connected to pin D13.
- (2) void setup() / Specifies that the functions in the lines below are functions that can be executed once only, when the power is turned on or the Japanino is reset.
- (3) { / Indicates the start of a setup() function.
- (4) pinMode(ledPin, OUTPUT); / pinMode() is a function for indicating ON/OFF for pins set to outputs. Specifies ledPin = 13 (which already specifies in (1) that 13 should be substituted in for "led" automatically) as an OUTPUT, because output pins are needed to control the LED.

```
(1) --- int ledPin = 13; // LED connected to digital pin 13
(2) --- void setup()
(3) --- {
(4) --- pinMode(ledPin, OUTPUT); // Sets output for digital pins
(5) --- }
(6) --- void loop()
(7) --- {
(8) --- digitalWrite(ledPin, HIGH); // Set the LED on
(9) --- delay(1000); // Wait for a second
(10) --- digitalWrite(ledPin, LOW); // Set the LED off
(11) --- delay(1000); // Wait for a second
(12) --- }
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- (5) } / Indicates the end of a setup() function.
- (6) void loop() / Specifies that the functions in the lines below are functions that can be executed repeatedly.
- (7) { / Indicates the start of a loop() function.
- (8) digitalWrite(ledPin, HIGH); / digitalWrite() is a function for indicating ON/OFF of pins set as outputs (in a sketch, ON is a HIGH and OFF is a LOW). In this case, 5 V of electricity flows through the pin D13 connected to an LED, and the LED is turned on.

(9) delay(1000); / Indicates that operation of the Japanino is to stop (is not to proceed to the following step, that is, is to maintain the present state) only for the specified number of milliseconds (1 millisecond is 1/1000 seconds). In this case, because the number inside the parentheses, (), is 1000, operation is to stop for 1 second.

(10) digitalWrite(ledPin, LOW); / Turns the LED off when pin D13 is OFF (=LOW).

(11) Same as (9).

(12) } / Indicates the end of a loop() function.