

Micro:Bit Robot

We are using [makecode](#) to program the microbits.

Workarounds on Ubuntu

Unfortunately setting up the WebUSB mechanism needed to program the microbits via USB from Chrome, Chromium or Edge on Linux is causing some trouble.

- Shreya's and copilot's howto:

[microbit_troubleshooting.pdf](#)

Download the .sh (bash script) file below to your Downloads folder by clicking on the blue title.

[prep_microbit_on_ubuntu.sh](#)

```
set -x
wget https://dl.google.com/linux/direct/google-chrome-
stable_current_amd64.deb

apt update
apt install ./google-chrome-stable_current_amd64.deb -y
apt install google-chrome-stable -y

echo 'SUBSYSTEM=="usb", ATTR{idVendor}=="0d28",
ATTR{idProduct}=="0204", MODE="0666"' > /etc/udev/rules.d/99-
microbit.rules

udevadm control --reload-rules
udevadm trigger
```

Then follow the steps given here:

```
cd ~/Downloads
chmod 755 prep_microbit_on_ubuntu.sh
sudo ./prep_microbit_on_ubuntu.sh
```

Goal

Building our own micro:bit robot kit.

Requirements:

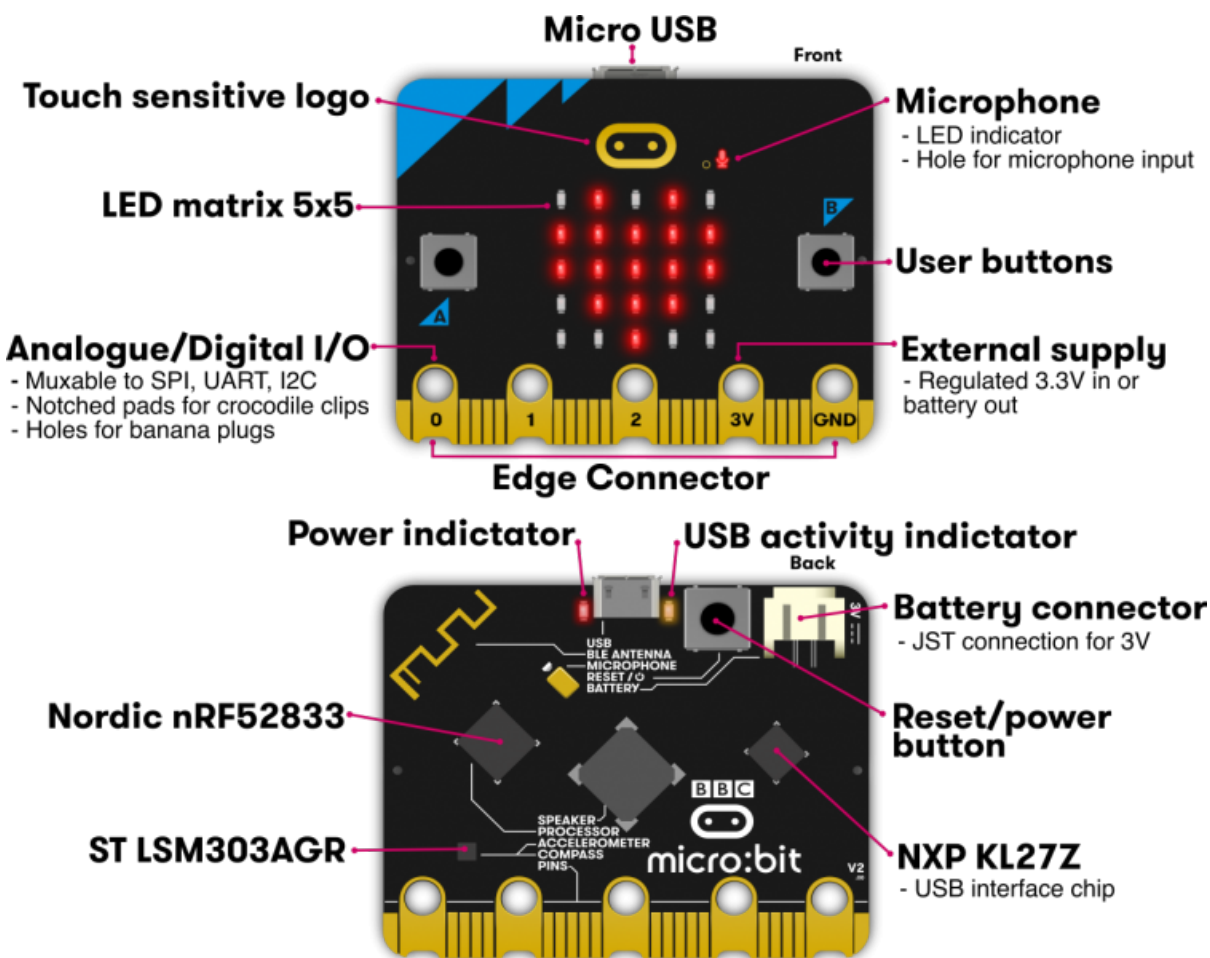
- powered by a mini **5V USB powerbank** (e.g. 2000 - 3000 mAh),
- The **Micro:Bit power input is 3.3V regulated**, via the 3V skew connector (conductive

- holes),
- driving two **SG90 micro servo motors (360°)** with wheels (not the yellow DC motors), **powered by 5V**
- **level shifter** for the servo control signal from Micro:Bit 3.3V to 5V for the servos
- driving at least one additional servo motor (360° or 180°) for further action,

The Micro:Bit Board - Info from Keystudio

Pictures from the Keystudio Wiki:

https://wiki.keystudio.com/MB0102_Keystudio_Microbit_Main_Board_%2BUSB_Cable%2BBattery_Holder_with_Batteries



GPIO	P0, P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P19, P20
ADC/DAC	P0, P1, P2, P3, P4, P10
I2C	P19(SCL), P20(SDA)
SPI	P13(SCK), P14(MISO), P15(MOSI)
PWM	P0, P1, P2, P3, P4, P10
Occupied	P3(LED Col1), P4(LED Col2), P5(BUTTON A), P6(LED Col9), P7(LED Col8), P9(LED Col7), P10(LED Col3), P11(Button B)



Micro:Bit V2 Schematics

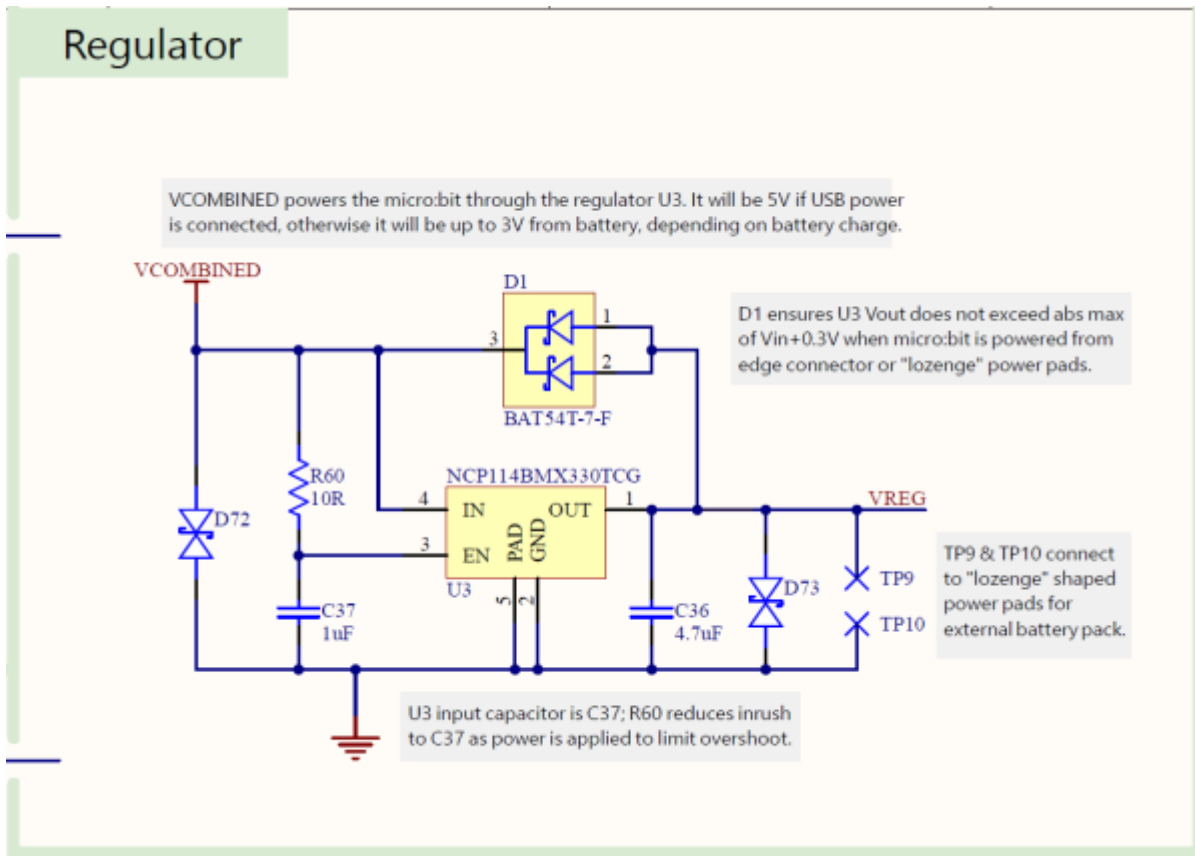
- <https://github.com/microbit-foundation/microbit-v2-hardware>
 - microbit_v2.2.1_nrf52820_schematic.pdf

Main LDO and Regulator Circuit: NCP114

NCP114

- out: $V_{out} = 3.3V$ fixed,
- in: $V_{in} = 5.5V$ max,
- current: $I_{max} = 300mA$
- datasheet: [NCP114BMX330TCG](#)

Micro:Bit Regulator Circuit




NOTES:

Read the annotations on the regulator schematic! The board can have **FOUR power input sources**.

1. 5V USB via USB connector
2. 3V - 4.5V via battery connector (skew terminals)
3. "lozenge" (Pastille, Raute) shaped power pad, connected to Vout of NCP114
4. 3V - 5V typ. from edge connector

Findings

 It is weird that the power input from the edge connector is directly connected to the voltage output pin of the LDO! Do I (rb) understand this correctly?

Compass and Accelerometer: LSM303AGR

- [lsm303agr.pdf](#)

Expansion Boards / Parts

BBC micro:bit GPIO Expansion Board/Adapter

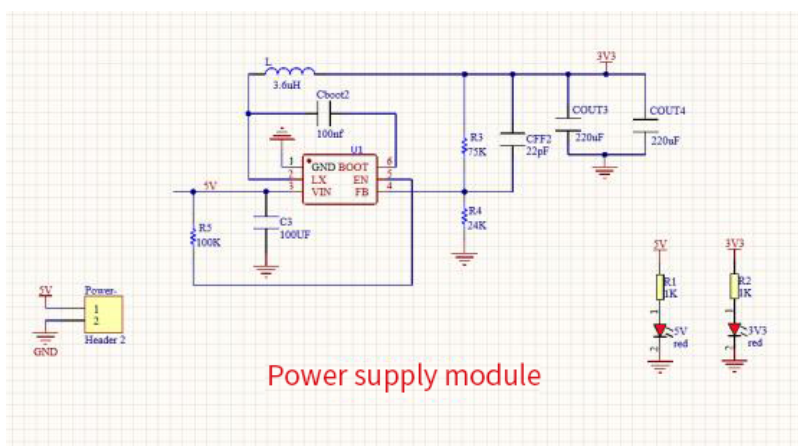
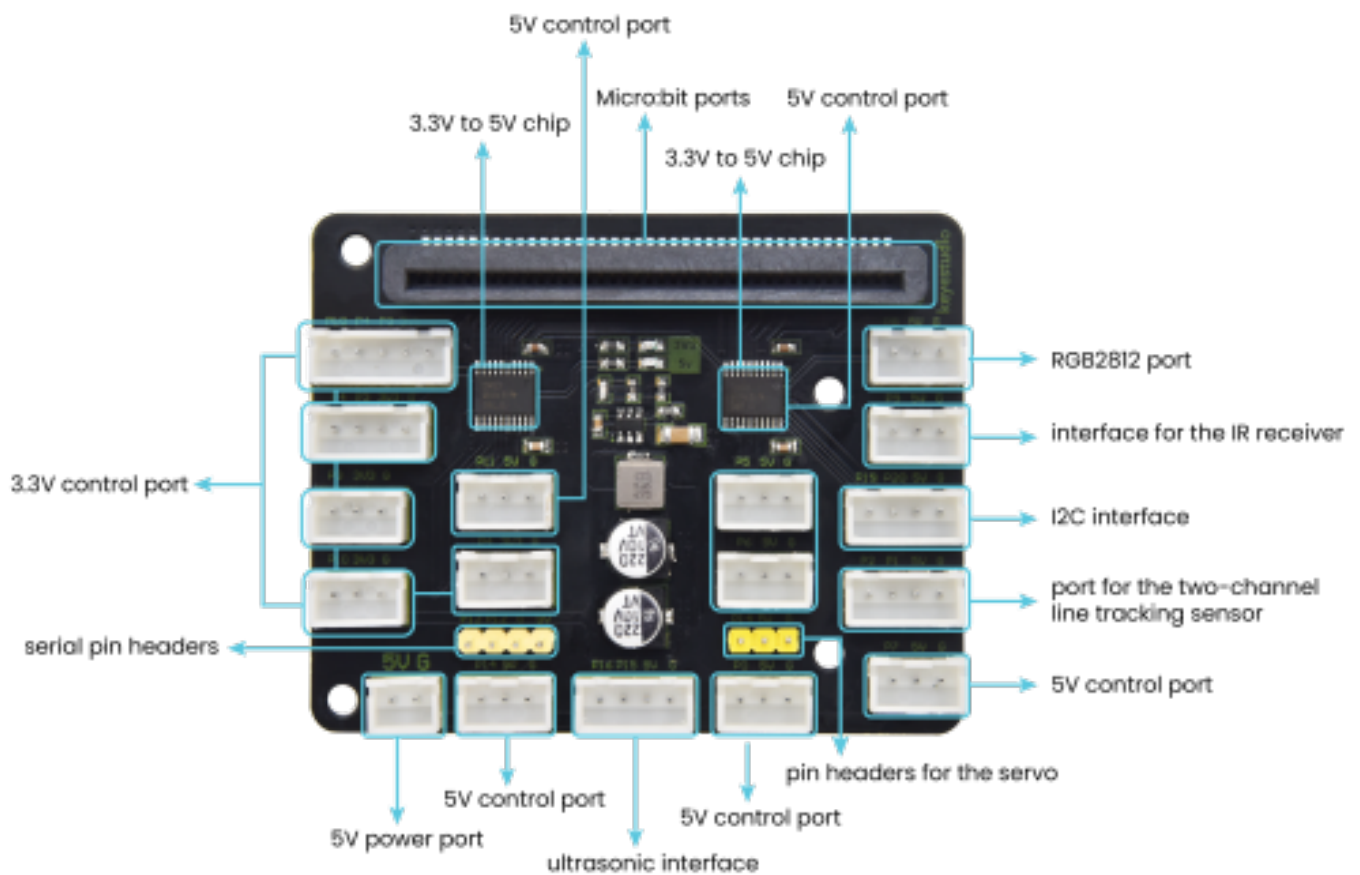
- no power regulator

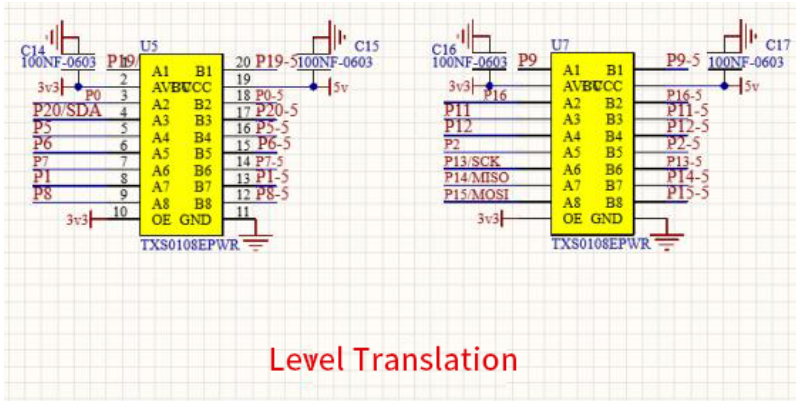
- no motor drivers
- just a buzzer
- works for V1 and V2
- <https://www.electroschematics.com/microbit-2/>



Keystudio KS4030

- voltage regulator 5V → 3.3V
- logic level shifter
- https://wiki.keyestudio.com/KS4030_Keyestudio_Microbit_Expansion_Board





Monk Makes Micro:Bit Servo Controller Board

! **ATTENTION: 180° ONLY!**

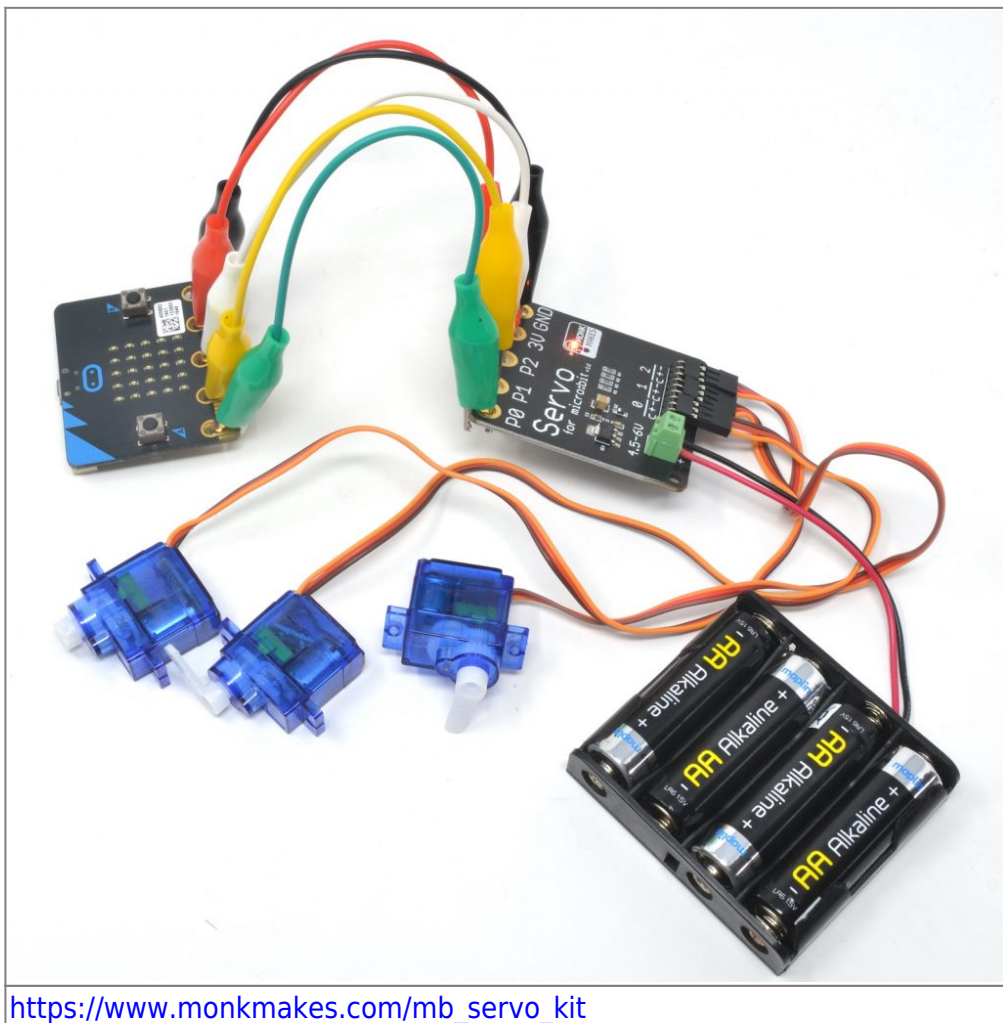
Original source: https://www.monkmakes.com/mb_servo_kit

Distributors:

RS Online: <https://de.rs-online.com/web/p/bbc-micro-bit-add-ons/2048260>

RobotShop: <https://eu.robotshop.com/products/servo-controller-microbit-monk-makes>

okdo: <https://www.okdo.com/de/p/servo-kit-for-microbit/>



https://www.monkmakes.com/mb_servo_kit



<https://eu.robotshop.com/de/products/servo-controller-microbit-monk-makes>

Kitronik Simple Servo Control Board

Original source:

<https://kitronik.co.uk/products/5673-kitronik-simple-servo-control-board-for-bbc-micro-bit>



<https://kitronik.co.uk/products/5673-kitronik-simple-servo-control-board-for-bbc-micro-bit>

- Datasheet: [5673-kitronik-create-simple-servo-control-board-datasheet.pdf](#)

Distributors:

- RS Online: <https://de.rs-online.com/web/p/bbc-micro-bit-add-ons/2663768>
- RobotShop: <https://eu.robotshop.com/products/kitronik-simple-servo-control-board-for-bbc-microbit>
- ...

Kitronik Compact 16 Servo Driver Board (PCA9685 I2C PWM driver IC)

Original source:

<https://kitronik.co.uk/products/5694-compact-16-servo-driver-board-for-the-bbc-micro-bit>

Datasheet:

[5694-kitronik-compact-16-servo-driver-board-for-microbit-datasheet.pdf](#)

Datasheet of PCA9865 at NXP:

[PCA9685.pdf](#)

Adafruit tutorial on PCA9865:

<https://learn.adafruit.com/16-channel-pwm-servo-driver/overview>

Features:

- Operating Voltage (Vcc): 3V to 12V
- Number of Servo channels: 16
- Servo Voltage: Same as input Voltage
- Max continuous current (all servos): 10A



SG90 Micro Servo Motor 9G

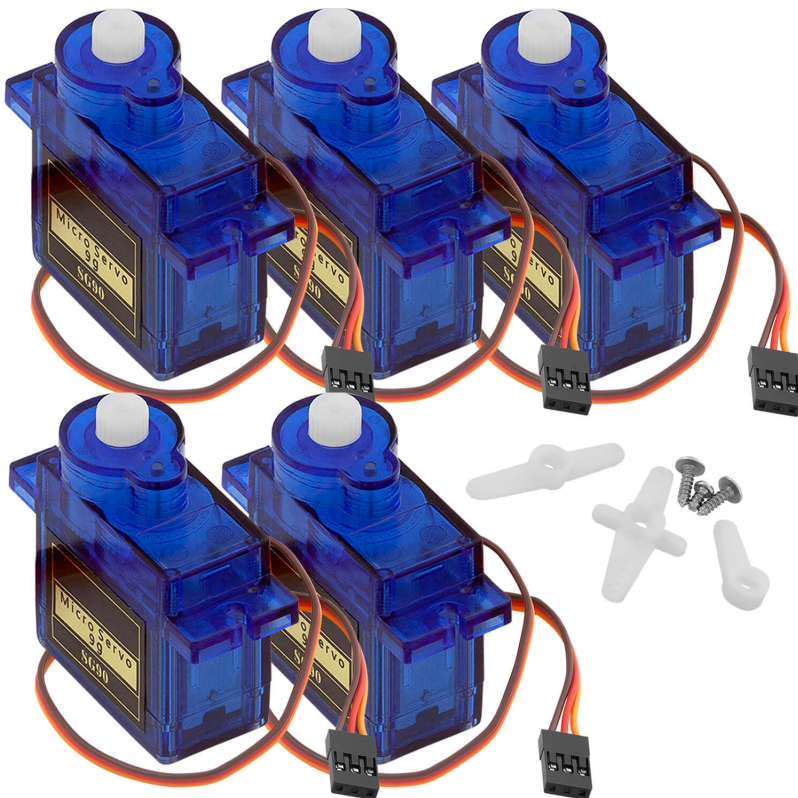


ATTENTION: 180° ONLY!

Distributors:

AZ-Delivery:

<https://www.az-delivery.de/en/products/az-delivery-micro-servo-sg90?variant=12236813336672>



Technical Infos / Video Tutorials

Servo Motors



Video

Servos - Funktionsweise und Eigenbauten



Video

Servos - working principle and homemade types



Video

Using Servo Motors with Arduino

Other Topics



Video

Funktionsweise von Kippstufen



Video

Flip-flop / multivibrator



Video

Pulsweitenmodulation (PWM)



Video

Pulse-width modulation (PWM)

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https://wiki.eolab.de/doku.php?id=eolab:projects:microbit_robot:start

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