UNO R3 USB-C

lonely binary
open-source is love

An ATmega328P at 16 MHz, a CH340C for USB serial, and the UNO's four header strips.

5 V logic, 20 mA a pin Every HIGH is close to 5 V: a 3.3 V module's input may not survive it. Design to 20 mA a pin; 40 mA a pin and 200 mA for the whole chip are **absolute maximums**. A wire from a pin set as OUTPUT to GND or 5V is a short.

Every header hole

Seen from above, USB-C on the left. Teal holes are pins a sketch drives or reads; grey ones are supplies, ground, reset and the reference.

A USB-C
power and upload, 0.5 A fuse

B RESET
restarts the sketch

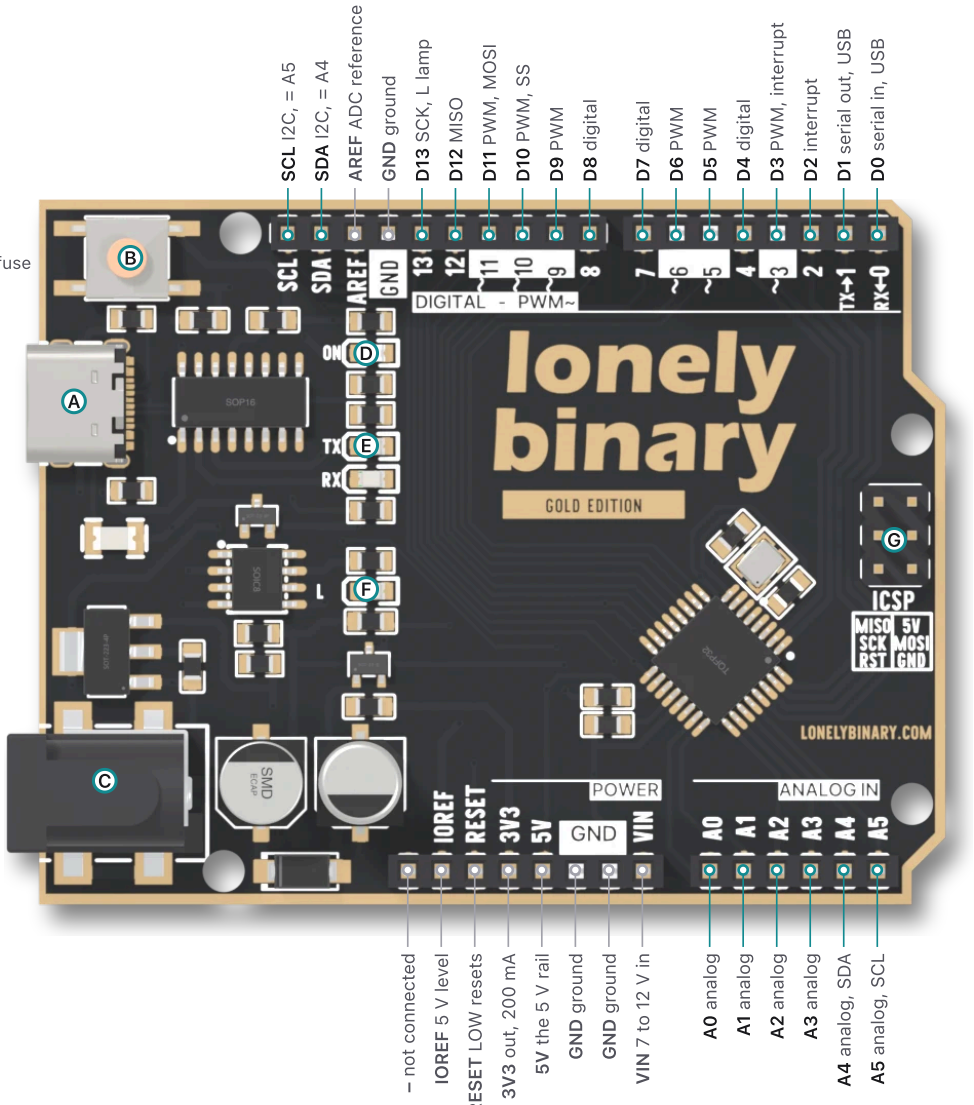
C DC jack
7 to 12 V in

D ON
green: 5 V is up

E TX RX
red: serial traffic

F L
red: follows D13

G ICSP
SPI and reset, 2 x 3



Four ways power comes in

USB-C 5 V	0.5 A resettable fuse, then a switch that opens when the jack is in use	`5V rail`
DC jack	7 to 12 V, a reverse-polarity diode, then the AMS1117-5.0	`VIN, 5V rail`
VIN pin	after the diode: no reverse-polarity protection	`5V rail`
5V pin	straight onto the rail: nothing between it and the chip	`5V rail`

D0 and D1 are the USB line They are wired straight to the CH340C. Anything that drives D0 stops uploads working, and the Serial Monitor uses both. Leave them free until the rest of the pins are used up. ICSP: 1 MISO · 2 5V · 3 SCK · 4 MOSI · 5 RST · 6 GND.

The first program, blink the L lamp

Arduino IDE · Board Arduino Uno · Port the CH340 port · Serial Monitor 9600 baud · no wiring

```
// UNO R3 USB-C: blink the L lamp and say so over USB.
//
// Wiring: none. The L lamp is on the board and follows pin 13.
//
// Arduino IDE, Tools menu:
//   Board  Arduino Uno (Arduino AVR Boards)
//   Port   the CH340 port that appears when the board is
//          plugged in
// Serial Monitor: 9600 baud. No library needed.

void setup() {
  pinMode(LED_BUILTIN, OUTPUT);   // LED_BUILTIN is pin 13
  Serial.begin(9600);
}

void loop() {
  digitalWrite(LED_BUILTIN, HIGH);
  Serial.println("L on");
  delay(500);
  digitalWrite(LED_BUILTIN, LOW);
  delay(500);
}
```

```
L on
```

The red L lamp lights for half a second and goes out, and the line prints once a second. TX and RX flicker while the upload runs. If the lamp blinks and the monitor is empty, set the monitor's baud menu to 9600.

PWM: six pins, three timers

PINS	TIMER	ANALOGWRITE FREQUENCY	STOPS WORKING WHEN YOU USE
5, 6	Timer0	976.6 Hz	nothing: Timer0 also runs millis() and delay()
9, 10	Timer1	490.2 Hz	the Servo library
3, 11	Timer2	490.2 Hz	tone()

When it does not work

No port appears in the Tools menu

Use a USB-C cable that carries data; a charge-only one lights ON and nothing else. Then install the CH340 driver from WCH, the chip's maker, and plug the board in again.

The Serial Monitor prints garbage

The monitor's baud menu and Serial.begin() disagree. Set them to the same number.

analogWrite on a pin does nothing in between

Only 3, 5, 6, 9, 10 and 11 have PWM. On 9 and 10 it stops when Servo runs; on 3 and 11 when tone() runs.

The upload fails with not in sync

Check Board is Arduino Uno and the port is the one that comes and goes with the board. Unplug anything wired to D0 and D1, close other programs holding the port, and try again.

A pin reads HIGH and LOW at random

Nothing is driving it, so it floats. Use pinMode(pin, INPUT_PULLUP), and read LOW as pressed.

The board resets or the ON lamp dims

The load is too much for the supply. USB-C has a 0.5 A fuse; the 3V3 pin gives 200 mA. Power motors and strips from their own supply and share GND.

Specifications

Chip	ATmega328P, 16 MHz	**Memory**	32 KB flash (32256 for sketches), 2 KB SRAM, 1 KB EEPROM
USB	CH340C, USB-C	**Digital**	14 pins, 6 with PWM, interrupts on 2 and 3
Analog in	6 pins, 10-bit, 0 to 1023	**Pin current**	20 mA to design to
DC jack	7 to 12 V	**3V3 pin**	XC6206P332MR, 200 mA