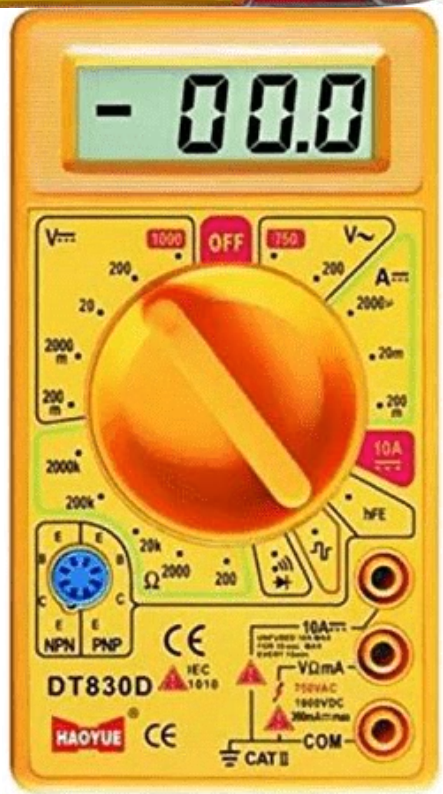
AE 242
Aerospace Measurements Laboratory

S.No.	List of the Compoment	Qty
1	Arduino Uno R3 with USB cable	1
2	Lm741 DIP Package	3
3	LM324 DIP Pakcage	5
4	7400 IC	3
5	7420 IC	4
6	IC 7404 Not Gate	3
7	Digital IC AND GATE 7408 (2 input)	3
8	Digital IC OR GATE 7402 (2 input)	3
9	JK FlipFlop IC 7476	3
10	Conter IC -74169	3
11	7 Segment Display driver Common Cathode 7448	3
12	7 segment display (CC)	2
13	Male to Male Jumper Wire	40
14	Male to Female Jumper Wire	30
15	Female to Female Jumper Wire	30
16	IC socket 8 Pin	2
17	IC socket 16 Pin	2
18	IC socket 14 Pin	2

Null and Deflection methods

19	Resistor 220 Ohm 1/4 Watt	10
20	Resistor 330 Ohm 1/4 Watt	10
21	Resistor 1K Ohm 1/4 Watt	10
22	Resistor 10K Ohm 1/4 Watt	10
23	Resistor 15K Ohm 1/4 Watt	10
24	Resistor 100K Ohm 1/4 Watt	10
25	10k Rotary pot (3 pin with wire soldered on connector)	2
26	7805 Voltage regulator	2
27	5 mm Red Led	5
28	5 mm Green Led	5
29	Bread Borad	1
30	Multimeter	1
31	9V battery with connecting wire socket	2
32	Light Dependent Register (LDR)	2
33	IR Transmitter / Receiver LED	3



Multimeter

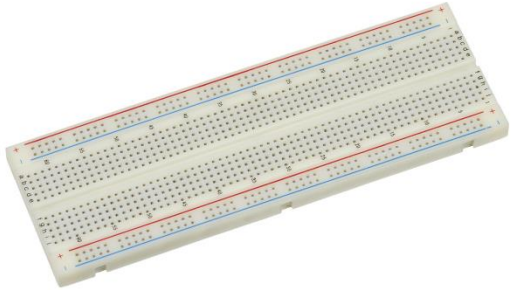
FUNCTION	RANGE	RESOLUTION	ACCURATE	MEMO
DCV	200mV	100uV	±(0.5%+3)	MAX.1000V
	2000mV	1mV		
	20V	10mV		
	200V	100mV		
	1000V	1V	±(0.8%+5)	
ACV	200V	100mV	±(1.2%+8)	MAX.750V
	750V	1V		
DCA	200uV	100uA	±(1.0%+5)	MAX.200mA
	2000uV	1uA		
	20mV	10uA		
	200mV	100uA	±(1.2%+8)	
	10A	10mA	±(2.0%+8)	MAX.10A
RESITANCE	200 Ω	0.1 Ω	±(1.0%+8)	MAXIMUM OPEN CIRCUIT VOLTAGE:3.0V
	2000 Ω	1 Ω	±(1.0%+2)	
	20K Ω	10 Ω		
	200K Ω	100K Ω		
	2000K Ω	1K Ω		
DIODE	→|		TEST CURRENT 1.5mA	
hFE	NPN PNP	0-1000	Vce≈2.8V Ib≈10uA	
BUZZER	BUILT-IN BUZZER SOUNDS IF RESISTANCE IS LESS THAN 30±20 Ω			

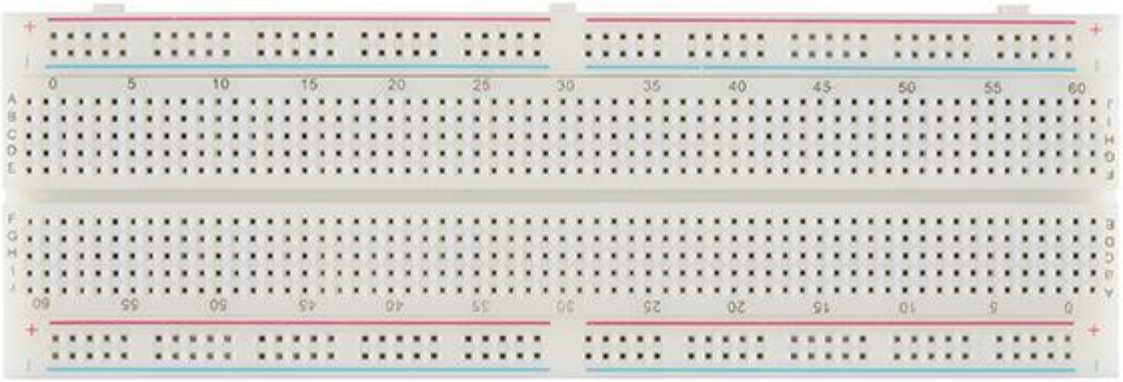
CONNECT THE RED LEAD TO "VΩmA" JACK AND BLACK LEAD TO "COM", WHEN MEASUREMENT DCV, ACV, DCA, RESITANCE, DIODE, AND BUZZER
SET THE RANGE SWITCH TO PROPER RANGE.

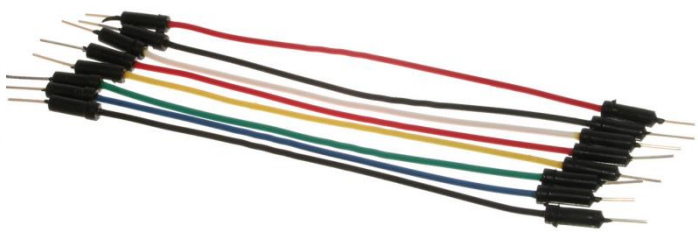
CONNECT THE RED LEAD TO "10A" JACK AND BLACK LEAD TO "COM", WHEN MEASUREMENT DC CURRENT UPTO 200mA, AND SET THE RANGE SWITCH TO 10A RANGE.

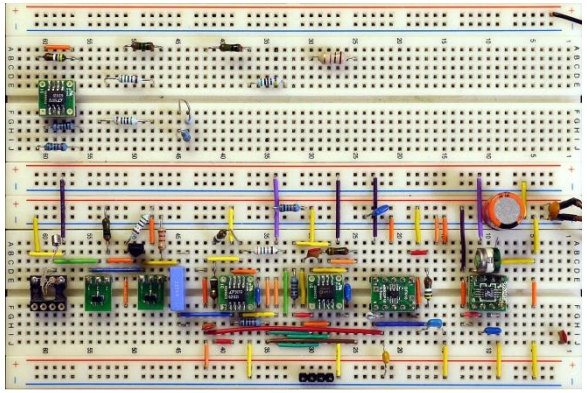
CONNECT THE PNP'S OR NPN'S PIN TO THE PROPER E, B,C SOCKET, AND SET THE RANGE SWITCH TO hFE RANGE.

Breadboard



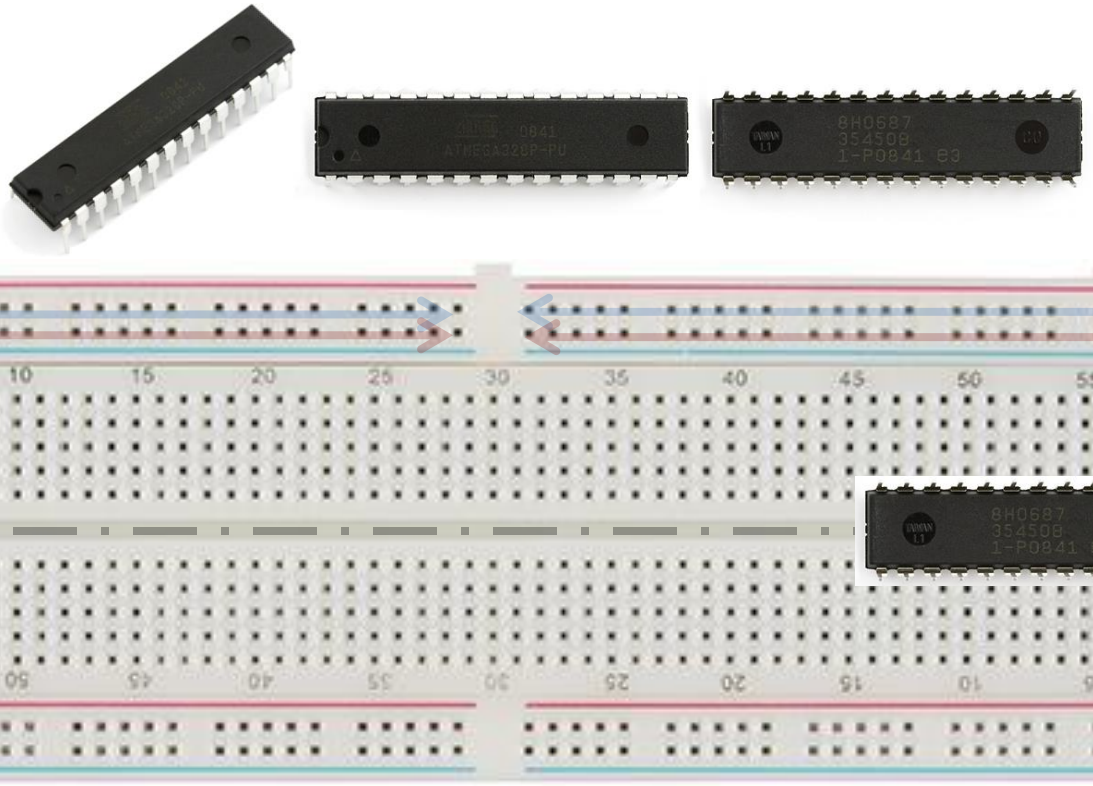






https://en.wikipedia.org/wiki/Breadboard

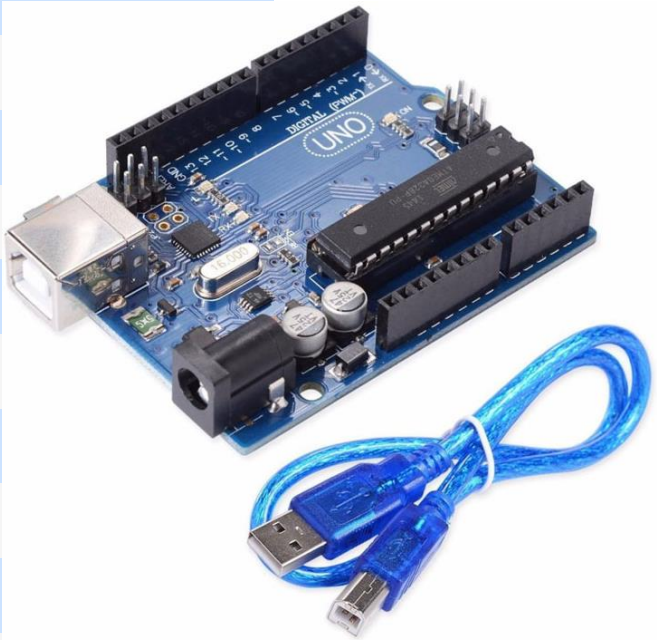
Breadboard



Internal horizontal and vertical connections. Connections are symmetric about the horizontal line shown at the center. These two sides are independent. Two sides of IC can be separated by the horizontal line shown above.

Arduino board

Model Type	*UNO Rev R3*
Microcontroller Chip	*ATmega328*
Operating Voltage (VDC)	*5*
Input Voltage(Recommended)	*7-12V*
Input Voltage (limit)	*6-20V*
Analog I/O Pins	*6*
Digital I/O Pins	*14 (of which 6 provide PWM output)*
PWM Digital I/O Pins	*6*
DC Current per I/O Pin (mA)	*40*
DC Current for 3.3V Pin (mA)	*50*
Clock Speed	*16 MHz*
SRAM (KB)	*2*
EEPROM	*1 KB (ATmega328)*
Flash Memory	*32 KB*
On Board LEDs	*On/Off, L (PIN 13), TX, RX*



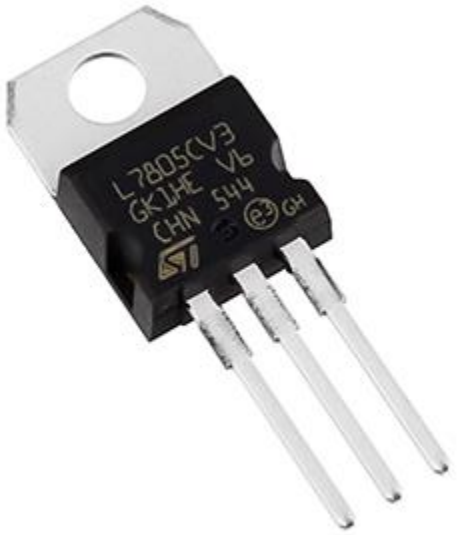
https://www.arduino.cc/

Will be used as oscilloscope. There is no DAC on the board, will design using arduino.

7805 voltage regulator

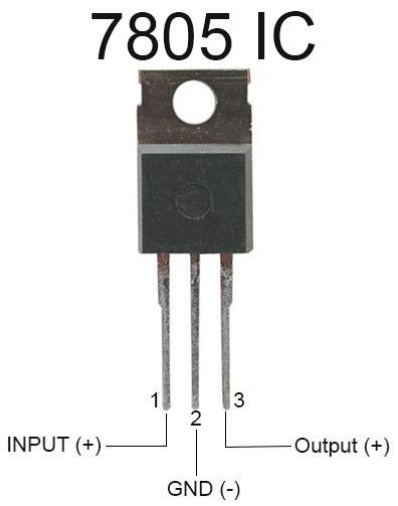
Specification

- Input voltage: 7v to 25v
- Output voltage range: 4.8 v to 5.2v
- Typical output voltage: 5v
- Maximum output current: 1.5A

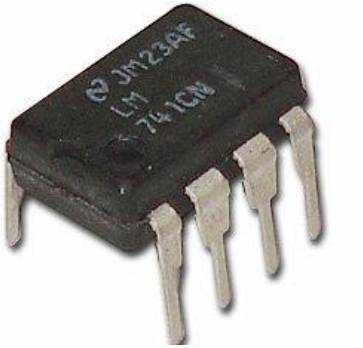


Pin Description

- Input (7v to 25v)
- Gnd
- Out (5V)



LM 741



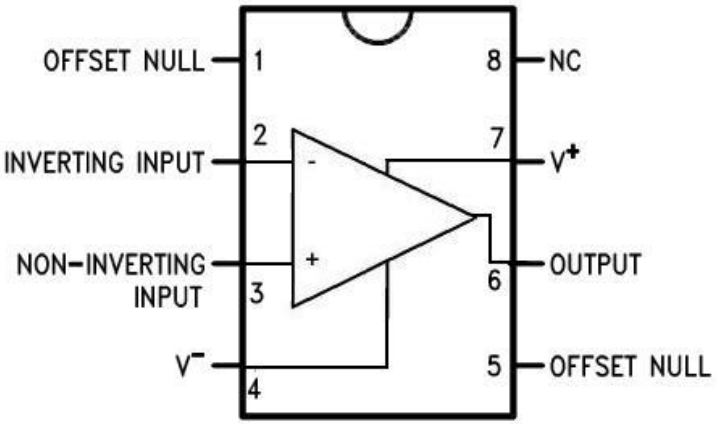
2 Applications

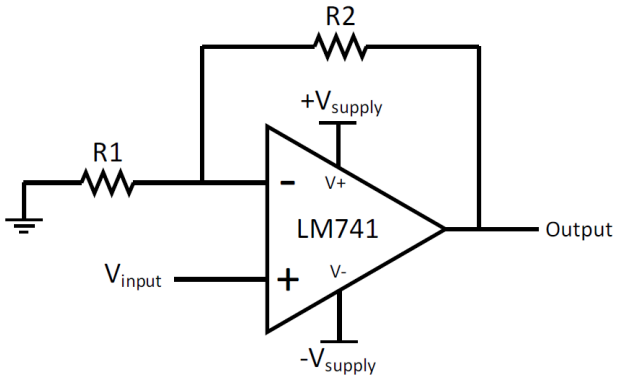
- Comparators
- Multivibrators
- DC Amplifiers
- Summing Amplifiers
- Integrator or Differentiators
- Active Filters

Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
INVERTING INPUT	2	I	Inverting signal input
NC	8	N/A	No Connect, should be left floating
NONINVERTING INPUT	3	I	Noninverting signal input
OFFSET NULL	1, 5	I	Offset null pin used to eliminate the offset voltage and balance the input voltages.
OFFSET NULL			
OUTPUT	6	O	Amplified signal output
V+	7	I	Positive supply voltage
V–	4	I	Negative supply voltage

LM741 Pinout Diagram

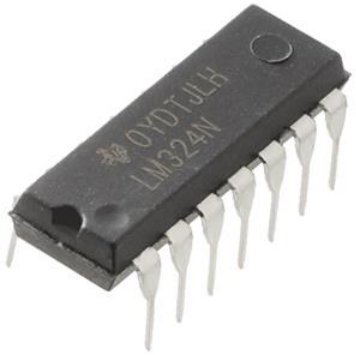




LM 324

Features

- Short Circuited Protected Outputs
- True Differential Input Stage
- Single Supply Operation: 3.0 V to 32 V
- Low Input Bias Currents: 100 nA Maximum (LM324A)
- Four Amplifiers Per Package
- Internally Compensated
- Common Mode Range Extends to Negative Supply



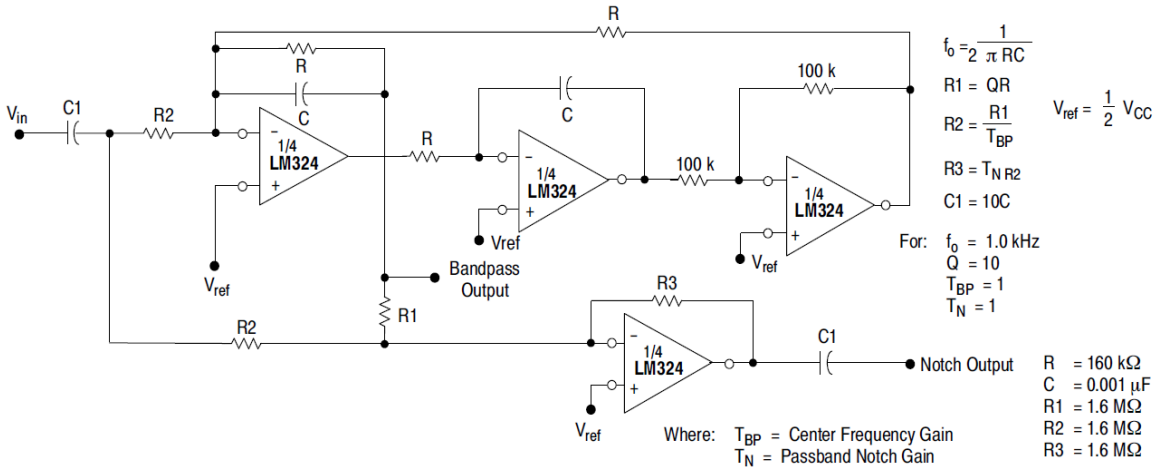


Figure 15. Bi−Quad Filter