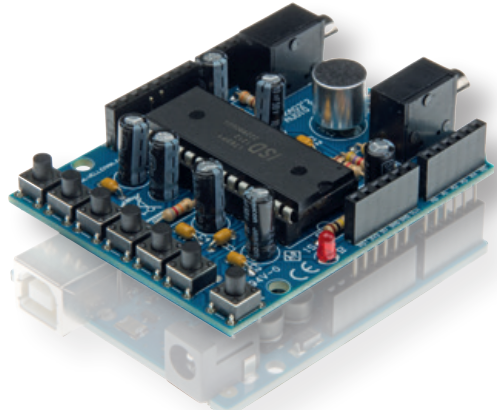
KA02

ILLUSTRATED ASSEMBLY MANUAL HKA02IP'1

Audio shield for Arduino®

velleman® projects



Record your voice via a built-in microphone or a line input.

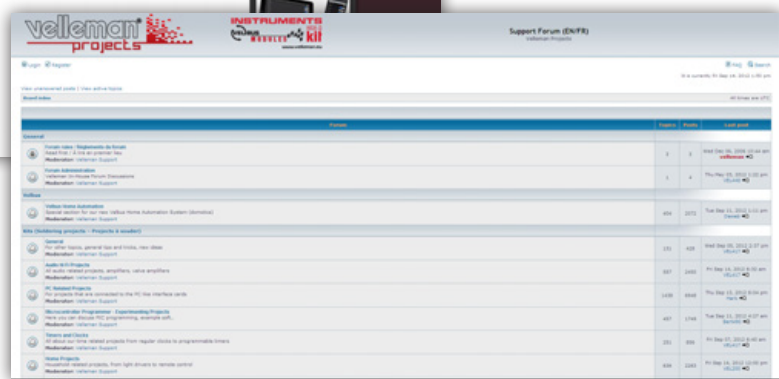
Features

- For use with Arduino Due™, Arduino Uno™, Arduino Mega™
- Based on ISD1760PY integrated circuit
- With pushbuttons for REC, PLAY, FWD, ERASE, VOL, RESET and FEEDTROUGH
- Built-in microphone
- 3.5mm stereo LINE IN/OUT female jacks
- Speaker output

Specifications

- Recording time: 60s
- Power supply: from ArduinoTM
- Dimensions: 71 x 53mm / 2.79 x 2.08"'

Made for ARDUINO™



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assembly hints

1. Assembly (Skipping this can lead to troubles !)

Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.

1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip.
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin raisin-core solder. Do not use any flux or grease.
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.
- Needle nose pliers, for bending leads, or to hold components in place.
- Small blade and Phillips screwdrivers. A basic range is fine.

For some projects, a basic multi-meter is required, or might be handy

1.2 Assembly Hints :

- Make sure the skill level matches your experience, to avoid disappointments.
- Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- Perform the assembly in the correct order as stated in this manual
- Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
- Values on the circuit diagram are subject to changes, the values in this assembly guide are correct*
- Use the check-boxes to mark your progress.
- Please read the included information on safety and customer service

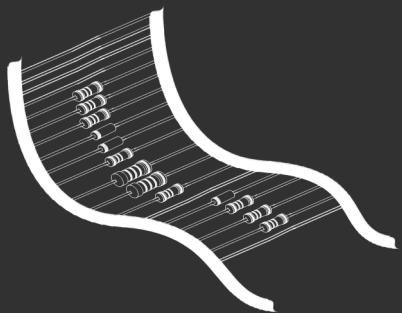
* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

1.3 Soldering Hints :

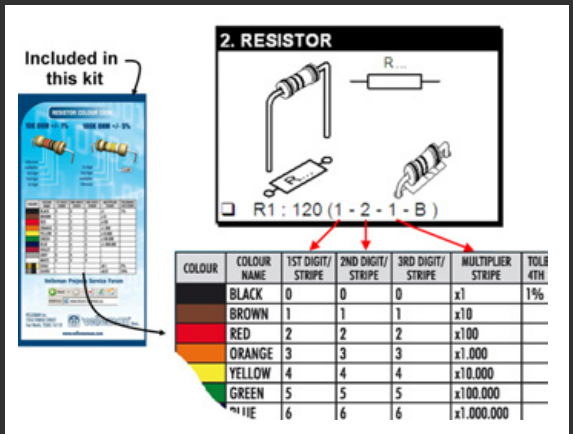
1. Mount the component against the PCB surface and carefully solder the leads

2. Make sure the solder joints are cone-shaped and shiny

3. Trim excess leads as close as possible to the solder joint



REMOVE THEM FROM THE TAPE ONE AT A TIME !

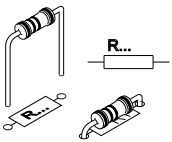


COLOUR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOLE 4TH
	BLACK	0	0	0	x1	1%
	BROWN	1	1	1	x10	
	RED	2	2	2	x100	
	ORANGE	3	3	3	x1.000	
	YELLOW	4	4	4	x10.000	
	GREEN	5	5	5	x100.000	
	BLUE	6	6	6	x1.000.000	

DO NOT BLINDLY FOLLOW THE ORDER OF THE COMPONENTS ONTO THE TAPE. ALWAYS CHECK THEIR VALUE ON THE PARTS LIST!

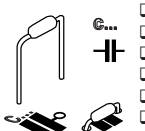
I CONSTRUCTION

1 Resistors



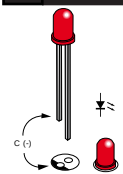
- ❑ R1: 1K (1 - 0 - 2 - B)
- ❑ R2: 4K7 (4 - 7 - 2 - B)
- ❑ R3: 100K (1 - 0 - 4 - B)
- ❑ R4: 82K (8 - 2 - 3 - B)
- ❑ R5: 4K7 (4 - 7 - 2 - B)
- ❑ R6: 4K7 (4 - 7 - 2 - B)
- ❑ R7: 390 (3 - 9 - 1 - B)

2 Ceramic capacitors



- ❑ C1: 100nF (104)
- ❑ C2: 100nF (104)
- ❑ C4: 100nF (104)
- ❑ C6: 100nF (104)
- ❑ C8: 100nF (104)
- ❑ C12: 100nF (104)
- ❑ C13: 100nF (104)
- ❑ C16: 100nF (104)
- ❑ C17: 100nF (104)

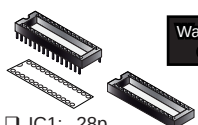
3 LED



Watch the polarity!

- ❑ LD1: Red

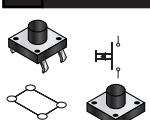
4 IC socket



Watch the position of the notch!

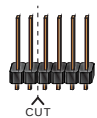
- ❑ IC1: 28p

5 Push buttons



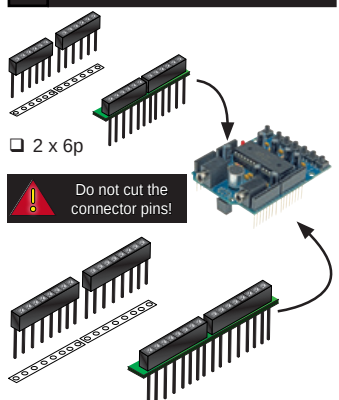
- ❑ SW1: Reset
- ❑ SW2: Forward
- ❑ SW3: Erase
- ❑ SW4: Record
- ❑ SW5: Play
- ❑ SW6: Feed trough
- ❑ SW7: Volume

6 Male header



- ❑ SK7: 2p

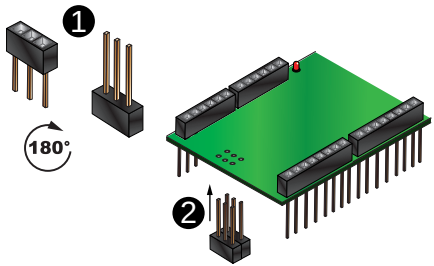
7 Female header

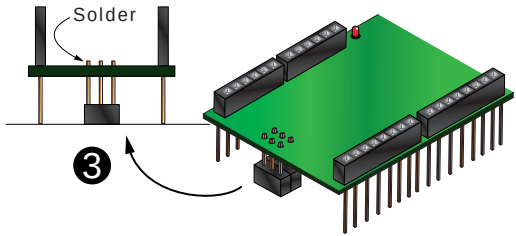


- ❑ 2 x 6p

Do not cut the connector pins!

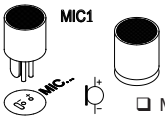
- ❑ 2 x 8p





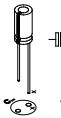
❑ SK8: 2 x 3p

8 Microphone



❑ MIC1

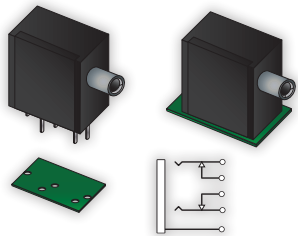
9 Electrolytic capacitors



Watch the polarity!

❑ C3: 10µF
❑ C5: 10µF
❑ C7: 10µF
❑ C9: 10µF
❑ C10: 4,7µF
❑ C11: 2,2µF
❑ C18: 4,7µF

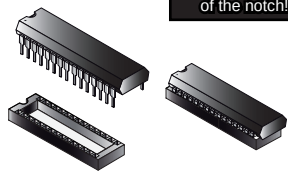
10 Stereo Phone Jack



❑ SK5: IN
❑ SK6: OUT

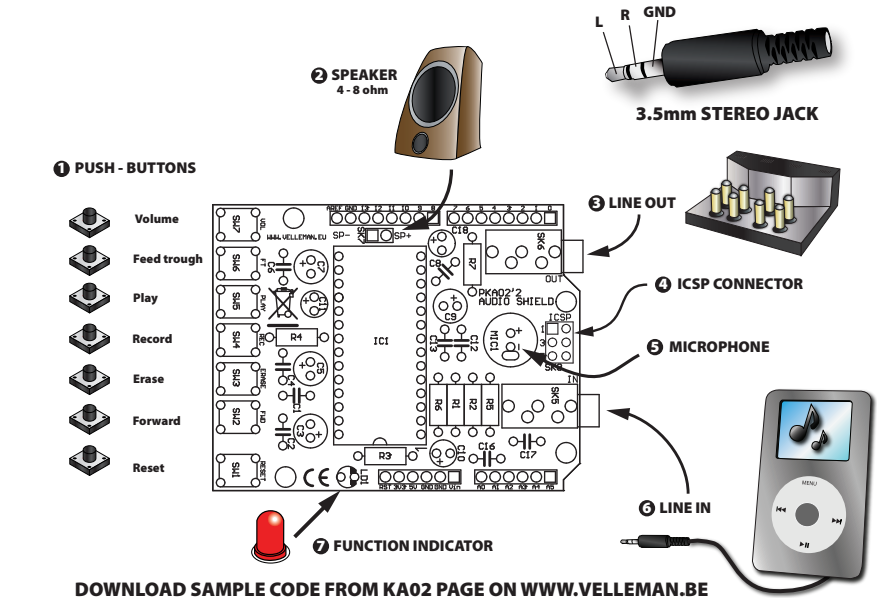
11 IC

Watch the position of the notch!

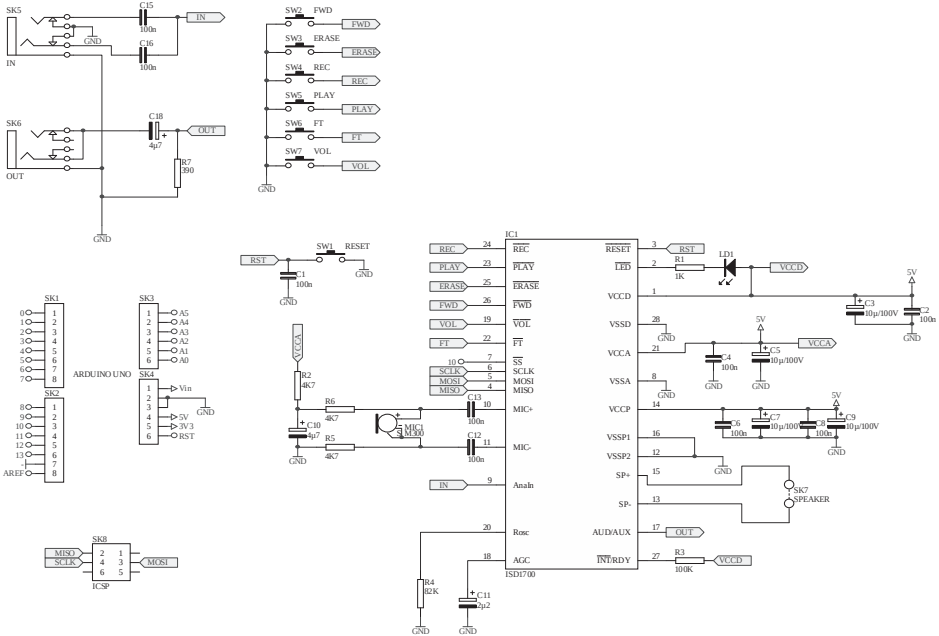


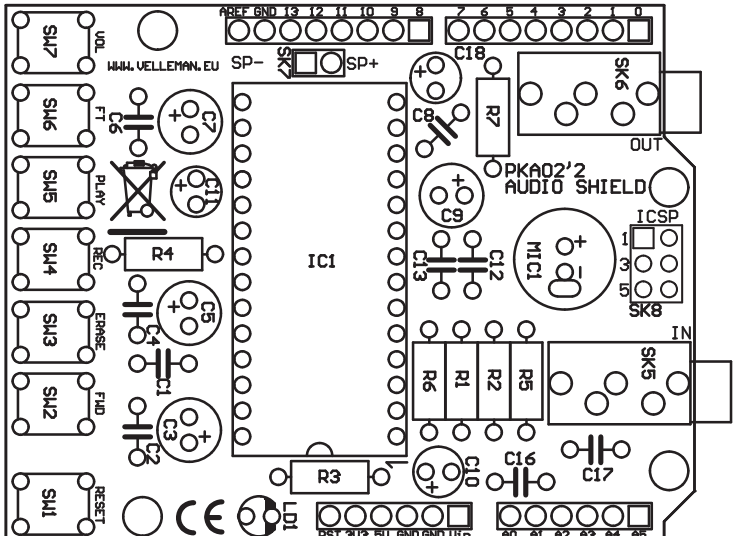
❑ IC1: ISD1760PY

II CONNECTION DIAGRAM

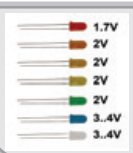


DOWNLOAD SAMPLE CODE FROM KA02 PAGE ON WWW.VELLEMAN.BE

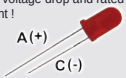

SK5
C15
100n
IN
GND
C16
100n
IN
SK6
C18
4µ7
OUT
R7
180
OUT
GND
SW2 FWD
FWD
SW3 ERASE
ERASE
SW4 REC
REC
SW5 PLAY
PLAY
SW6 FT
FT
SW7 VOL
VOL
GND
SW1 RESET
RST
C1
100n
GND
IC1
REC
PLAY
ERASE
FWD
VOL
FT
SS
SCLK
MOSI
MISO
MIC+
MIC-
Anain
Rosc
AGC
ISD1700
RESET
LED
VCCD
VSSD
VCCA
VSSA
VCCP
VSSP1
VSSP2
SP+
SP-
AUD/AUX
INTRDY
RST
R1
1K
LD1
VCCD
5V
C3
10µ/100V
C2
100n
GND
5V
VCCA
C4
100n
C5
10µ/100V
GND
GND
5V
C7
10µ/100V
C6
100n
C8
100n
C9
10µ/100V
GND
GND
SK7
SPEAKER
OUT
R3
100K
VCCD
SK1
SK3
ARDUINO UNO
SK4
Vin
5V
3V3
RST
GND
SK2
AREF
A5
A4
A3
A2
A1
A0
VCCA
R2
4K7
R6
4K7
R5
4K7
C10
1µ7
GND
MIC1
MIC9700
C13
100n
C12
100n
R4
82K
C11
2µ2
GND
GND
SK8
MISO
SCLK
MOSI
ICSP

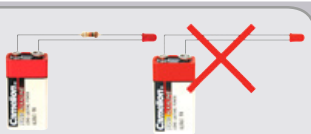

AREF GND 13 12 11 10 9 8
7 6 5 4 3 2 1 0
SW7
VOL
WWW.VELLEMAN.EU
SP-
SK7
SP+
C18
SK6
OUT
SW6
FT
C6
C7
C8
R7
PKA02'2
AUDIO SHIELD
SW5
PLAY
C11
C9
ICSP
SW4
REC
R4
IC1
C13
C12
MIC1
1
3
5
SK8
C5
SW3
ERASE
C4
IN
R6
R1
R2
R5
SK5
C1
SW2
FWD
C3
C2
R3
C10
C16
C17
SW1
RESET
LD1
RST 3V3 5V GND GND Vin
A0 A1 A2 A3 A4 A5

Leds and how to use them

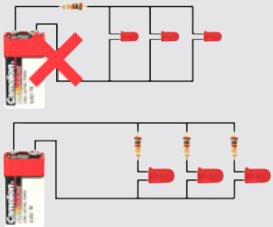


Leds feature a specific voltage drop, depending on type and colour. Check the datasheet for exact voltage drop and rated current !





Never connect leds in parallel



How to Calculate the series resistor:

Example: operate a red led (1.7V) on a 9Vdc source.
Required led current for full brightness: 5mA (this can be found in the datasheet of the led)

$$\frac{\text{Supply voltage (V) - led voltage (V)}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

$$\frac{9V - 1.7V}{0.005A} = 1460 \text{ ohm}$$

closest value : use a 1k5 resistor

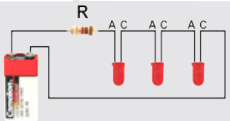
Required resistor power handling=
voltage over resistor x current passed trough resistor

(9V - 1.7V) x 0.005A = 0.036W

a standard 1/4W resistor will do the job

LEDs in series:

Example: 3 x red led (1.7V) on 9V battery
Required led current for full brightness: 5mA
(this can be found in the datasheet of the led)



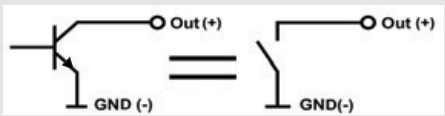
$$\frac{\text{Supply voltage (V) - (number of leds x led voltage (V))}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

$$\frac{9V - (3 \text{ x } 1.7V)}{0.005A} = 780 \text{ ohm}$$

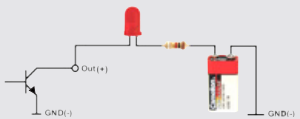
use an 820 ohm resistor

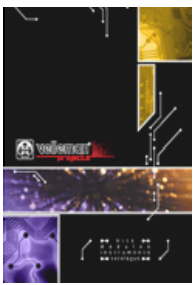
open collector outputs

An open collector output can be compared to a switch which switches to ground when operated



Example: How to switch an LED by means of an open collector output





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