



CP-01



MANUAL

CLASSICAL PIANO



www.arexx.com

V20179

CLASSICAL PIANO CP-01

Product information:

This piano is an electronic miniature version of the well-known classical piano, containing 49 keys and 23 preprogrammed melodies. The red keys are control keys for the volume, tempo, style and for many other functions. The piano is preprogrammed with 5 different tone-styles and provides a repeat and demo key. The system allows playing preprogrammed melodies, but also allows saving and playing your own melodies.

The piano is available as a pre-assembled model but also as a kit for customers who may be prepared to use soldering equipment. The pre-assembled piano model is a wonderful business present, a marvellous toy for young and old, for music-lovers and beginners. This booklet not only contains a step-by-step instruction manual, but also ample information concerning the world of music.

Our product line involves several educational electronic and robotic systems, for youngsters and adults. Have a look at our websites: www.arexx.com.

Specifications:

Soundrange F ~ $\overset{\circ}{F}$ (2 Octaves with a chromatic scale)

15 Volume steps

23 Registered melodies

5 Drum rhythms

4 Percussion sounds

4 Animal sounds

19 Tempo differences

Record and play function

Power supply 4.5 Volt (3 pcs AA batteries)

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The specifications, form, and contents of this product are subject to change without prior notice.

We are not liable for disadvantage or damage caused by improper use or assembly.

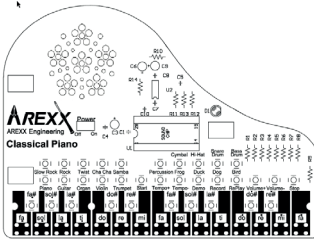
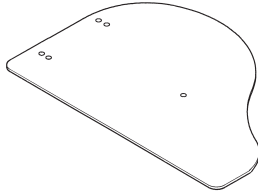
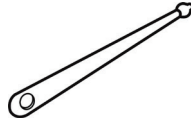

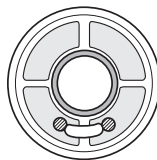
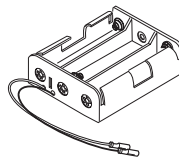

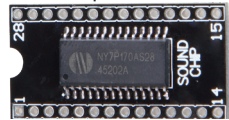



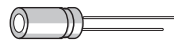


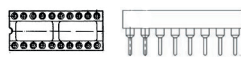






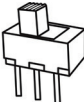






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- * When you open the plastic bags of the parts the return right will be disposed
- * Read before you start assembly the complete instruction manual
- * Be careful with tools and always keep it away from little children!
- * Keep this product out of reach of children and do not build this kit when children are in the neighbourhood, the tools and parts are dangerous for children
- * Check the polarity of the batteries
- * Keep the batteries dry, when the PIANO gets wet remove the batteries and let the PIANO dry for some time
- * Remove the batteries when you are not using the PIANO for a longer period

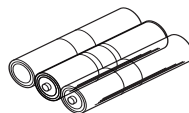
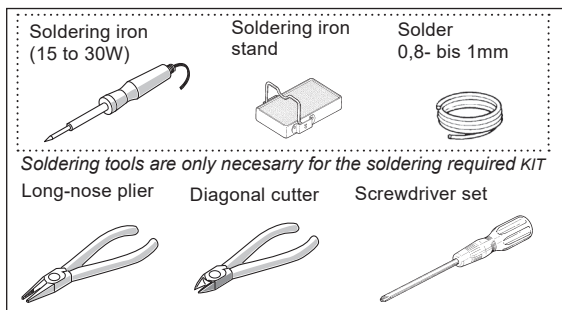
2. PARTLIST

 <p>AREXX Classical Piano</p>		 <p>O Piano arm 1 pc.</p>  <p>O Feet 4 pcs. each</p>	
 <p>O Speaker 1 pc.</p>	 <p>O Battery holder 1 pc.</p>	 <p>O Condensator 6 pcs.</p>	 <p>Sound chip O AREXX IC 1 pc. LM386</p>  <p>Feet</p>
 <p>O Resistor 14 pcs.</p>  <p>O Wire Red 1 pc. Black 1 pc.</p>	 <p>O ELCO 3 pcs.</p>	 <p>O LED 1 pc.</p>	 <p>O Opamp IC 1 pc.</p>  <p>O IC Socket 2 Pcs.</p>
 <p>O Roundhead Screw M2 x 5 13 pcs.</p>  <p>O Flathead-screw M3 x 8 2 pcs.</p>	 <p>O Nut M2 10 pcs.</p>	 <p>Push switch</p>	<p>O White 15 pcs. O Black 10 pcs. O Red 14 pcs. O Blue 10 pcs.</p>
 <p>O Screw long M3 4 pcs.</p>	 <p>O Nut M3 6 pcs.</p>	 <p>O On/Off Switch 1 pc.</p>	 <p>O Rubber tube 5 pcs.</p>
 <p>O O-Ring or Distance holder</p>  <p>O Hinge 3 pcs.</p>	 <p>O Hinge 3 pcs.</p>	 <p>O Rivet 3 pcs.</p>	 <p>O Mounting for speaker 3 pcs.</p>

CAUTION

- Read this manual carefully in advance to fully understand how to assemble this product.
- Children below 14 may only assemble this product with the help of adults.
- Be careful with the tools. Especially be careful with sharp tools such as nippers or cutter knife to prevent any injuries or accidents.
- Never assemble the kit when a younger child is around. The child might touch sharp tools or swallow parts or a vinyl bag.
- Be careful with sharp edges of parts.
- * Do not mix old and new or rechargeable and non rechargeable batteries.
- Take out the batteries when you do not use the Piano for more than a week
- The specification, shape and size of the product are be subject to change without prior notice.

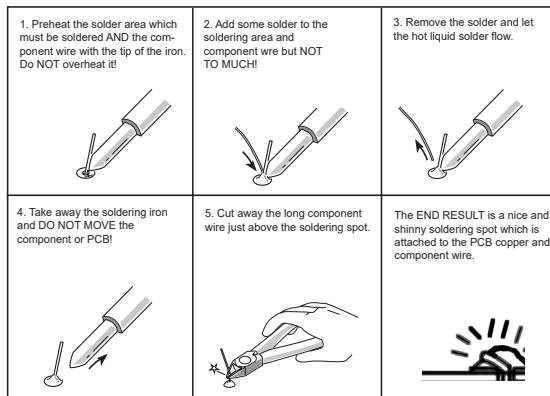
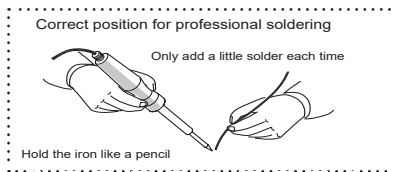
3. Necessary tools



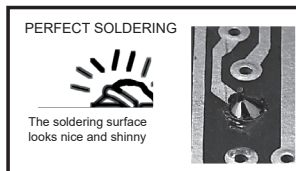
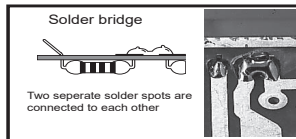
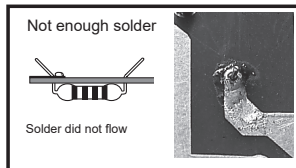
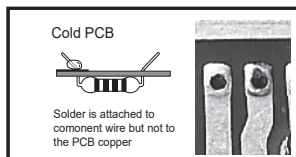
Necessary Batteries:
AA Batteries, 3 Pieces
(not included)

3.1 Soldering techniques:

Only use leadfree ROSIN CORE solder!
Never use any liquid- or paste flux!



Troubleshoot soldering mistakes:



4. Electronic assembly

- Please study the soldering instructions on the previous page first
- Check ✓ all individual components with the help of the parts checklist.
- Start soldering the resistors and capacitors (passive components) and solder the diode, transistors and IC's (active components) after that.
- Insert the parts on the PCB top (printed side) and solder the component wire on the bottom to the PCB (Copper side).

4.1. Soldering of the parts

First please check if all parts are complete with help of the partlist.

The markings on the PCB show exactly on which position you should solder the parts. If you need more information please check the drawing of the PCB.






We always start to solder the lowest parts and end normally this are the resistors. We advise to cut the component wires directly after soldering so they will be out of the way when you start soldering other parts.








Before you start to solder we advise to check if the IC's fit correctly, when necessary align the IC pins with a flat nose plier or bend them over all together when all pins rest on the table.

THE POSITION AND POLARITY OF THE IC'S IS MOST IMPORTANT!



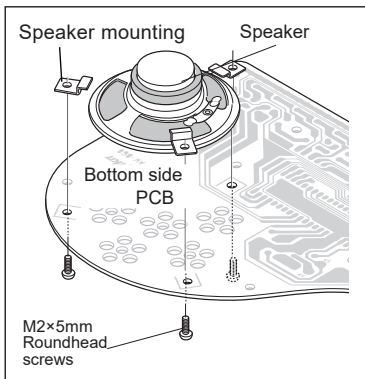
Remarks	Resistor	Switch	IC
Polarity & Marking position	No polarity. In professional soldering it is common use, to have all accuracy (gold) rings at the right side.	No polarity.	Position the IC's in the good direction (see markings!). FIRST SOLDER THE IC FEET!
PCB marking			
Partnumber <input type="checkbox"/> R1, R2, R3, R4, R5, R6, R7, R8 <input type="checkbox"/> R9, R12 <input type="checkbox"/> R10, R13 <input type="checkbox"/> R14 <input type="checkbox"/> R11	 The colored rings show the resistor value! 330Ω or, or, bl, gold 470Ω vio, yel, bl, gold 1KΩ brn, bl, rd, gold 10Ω brn, bl, bl, gold 3,3KΩ or, or, rd gold	POWER OFF ON	IC Marking Be sure marking is 100% OK, this marking can also be found on the PCB! <input type="checkbox"/> U1 sound chip <input type="checkbox"/> U2 LM386

Notice	Push switch White 15 Pcs.	Push switch Black 10 Pcs.	Push switch Red 14 Pcs.	Push switch Blue 10 Pcs.
Polarity & Marking	No polarity	No polarity	No polarity	No polarity
PCB marking	 □ 1st row (Fa - Fa)	 □ 2nd row (fa# - re#)	 □ 3th row (tone & function)	 □ 4th row (rithme)
Part number	 SEE PAGE 8 Solder the 4 switch pins			

Remarks	Capacitor	ELCO (ELEktrolyt condensator)	LED (Red)
Polarity & Marking position	No polarity.	Important! insert the LED in the correct way, see length of the wires.	Polarity of the elco is important otherwise you can damage the circuit or it will not have a correct function.
PCB marking		 The long leg is marking the ⊕  The white band on this part is marking the ⊖ lead.	Important: notice the correct Polarity A and K.  The long leg is the anode. The flat side on the led marks the cathode.
Partnumber	□ C1,C4,C5 100nF □ C7,C8 (104)  □ C10 33nF (334)	□ C3 220µF/--V □ C6 220µF/--V □ C9 220µF/--V  --V Must be higher than 6V	□ D1 

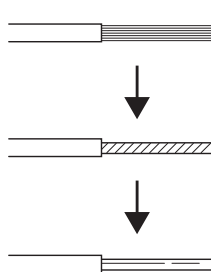
5. Final assembly of the Piano

5.1. Assemble the speaker to the PCB



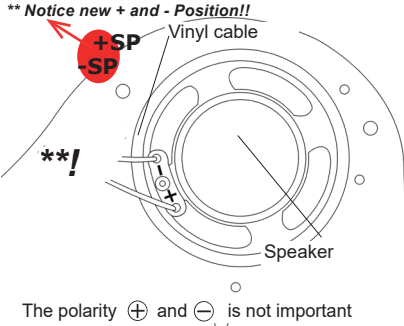
Wire preparation

For the wiring of the speaker you need a red and black wire. When necessary you have to prepare them in the following way.

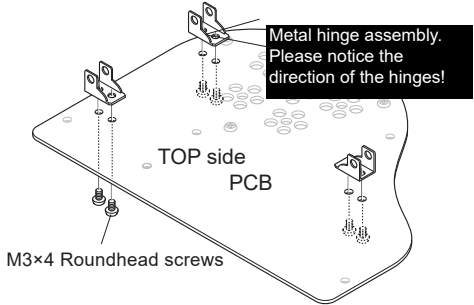


- 1) Remove about 5mm of the plastic wire insulation
- 2) Twist the copper wires
- 3) Presolder the copper wire. If this step is done, it will be more easy to solder the wire in a later step.

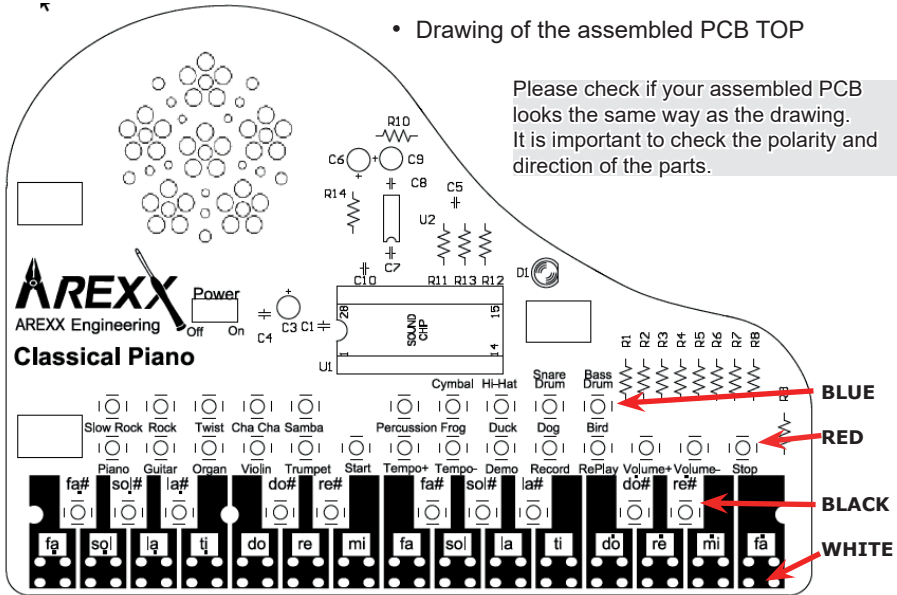
5.2. Solder the speaker wire in red spot as shown in the drawing below



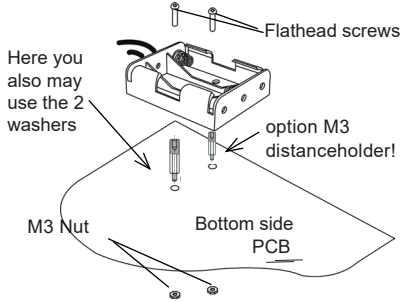
5.3. Assemble the tree hinges halves to the PCB top



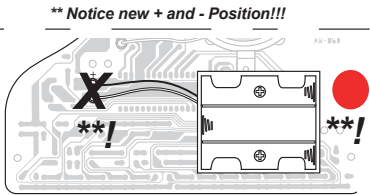
• Drawing of the assembled PCB TOP



5.4. Installing the batteryholder to the PCB.



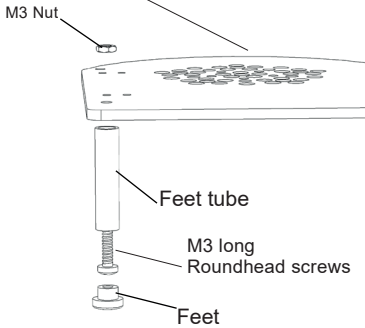
- Solder the red wire to the + spot on the PCB.
- Solder the black wire to the - spot on the PCB.



5.5. Install the piano feet to the PCB

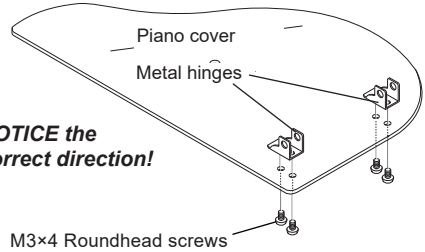
Install 4 Pcs.

Top side
(side with the parts).



5.6. Installing the hinges to the piano cover. NOTICE the correct direction!

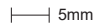
NOTICE the correct direction!



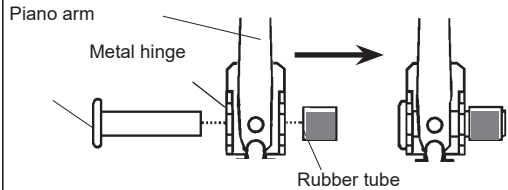
5.7. Assembly of the cover and piano arm

a. Cut 3 pcs of the plastic tube with a length of about 5 mm, you can use the simple measurement line:

Simple measurement line:

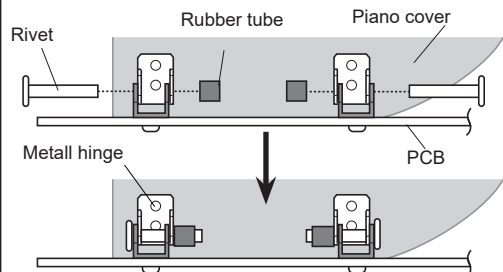


b. Connect the piano arm to the PCB hinge



c. Connect the piano cover to the PCB

Assemble the piano cover to the PCB, be sure that the metal hinges are connected exactly as shown on the pictures.



The assembled piano

6. FUNCTION TEST

a. Insert the batteries into the battery holder. PLEASE NOTICE the correct polarity of the batteries!

b. Lift the piano cover and place the piano arm

NOTICE: you can stop all playing actions directly with the STOP button!

c. Switch on the ON/OFF switch (you will hear a starting tune)

CAUTION... if there is any smoke or a component getting very hot, switch off the piano immediately and check all part directions!

d. Push any of the white or black push buttons, you must hear a sound. If not, check batteries first and then all part assembly.

e. Push the black DEMO button, then you should hear a melody. Push for more.

f. During a DEMO melody you can check the VOLUME + and VOLUME - buttons to see if the soundlevel changes

g. Push the START button. When the tune stops, randomly push the white buttons. Now you hear the tune like you play it yourself.

h. Push the RHYTHM button, then you will hear the rhythm section. You can change the speed with the TEMPO buttons

i. When another rhythm button is pushed, the rhythm will change

j. When playing a rhythm, you can change the TEMPO with the TEMPO - and + buttons

k. Play a DEMO tune and change the instruments by pushing the INSTRUMENT button. You should hear different instruments now

l. Push the RECORD button and play your own melody

m. Push the REPLAY button to listen back your own melody

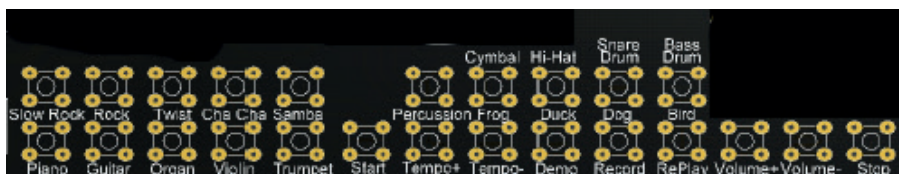
More about the keyboard functions, see chapter 7
How does a synthesizer work, see chapter 8

7. Description of keyboard functions

The synthesizer in the Classical Piano has been preprogrammed. Press the instrument key once or repeat the key to change the available instrument styles. Pressing the key will activate the processor to load the synthesizer control parameters from the chips memory into the synthesizer processor. This allows you to switch from playing a piano to playing a trumpet organ.

The Classical Piano synthesizer provides two independent tone generators, allowing you to hear two different tones at pressing two keys simultaneously. This function however will not be available for all instruments. Pressing more than two keys will result in playing the melodies for two initially activated keystrokes. Professional synthesizer systems of course provide more than two independent tone generators.

DESCRIPTION OF THE FUNCTION KEYS



Start

Select and start the first of the preprogrammed melodies

Rhythm box

5 different rhythm styles

Tempo+

9 faster tempo levels for percussion styles or preprogrammed melodies

Tempo-

9 slower tempo levels for percussion styles or preprogrammed melodies

Instrument

Select your preprogrammed instrument from piano to trumpet

Demo

Toggle between several preprogrammed melodies.

Select a preprogrammed melody by pushing the key again. While playing a melody, you may alter the instrument by pressing the tone key and alter the tempo by pressing the tempo keys. Starting another melody will start the tune in a standard tempo.

Percussion

Hitting this key will select a standard percussion style or an animal sound.

Record

Toggleing this key will activate / deactivate the recording system. Playing your own melodies will be recorded and may subsequently be played.

Play

Your previously recorded melodies will be played as long as the melody recorder/player is active. At the end of a tune you may record another melody, which will be concatenated to the previously recorded tune. Press the play key to play all recorded melodies.

Volume+

7 higher level playing volumes

Volume-

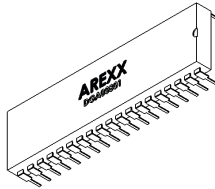
8 lower level playing volumes

Stop

All running activities will be stopped immediately

8. What is a synthesizer

The word “synthesize” may be translated to “put things together”. Obviously a synthesizer provides a system to produce any kind of sound, e.g. the sound of a musical instrument or even the sound of a thunderstorm.



A synthesizer transforms electrical energy into all kinds of tune signals. These tunes may be transformed by several special effects. A single chip will provide all these functions. In the end the signals may leave the synthesizer chip and enter the loudspeaker to be heard by the human ear.

A synthesizer provides a number of signal generators. Several tone generators will be used to produce pure frequencies at a predefined pitch, which will generate a clean acoustic wave at a loudspeaker. Synthesizers also provide a noise generator, which is used for producing hissing, whistling and percussion sounds. Of course the system will need a mixer to add several signals and a number of filters to eliminate or to enforce signal spectrums. Some synthesizers will contain a slow oscillator function, generating a slowly increasing and decreasing signal, used to modulate the volume or pitch of a tone generator. Modulating the frequency of a tone generator by a slow oscillator signal will result in a slowly increasing and decreasing frequency, which we will interpret as a siren signal. At a faster speed and at a lower level the tone generator will produce a vibrating tone and the effect is called “vibrato”. These functions will all be provided in a single chip!

In a synthesizer all functions may be altered or programmed, e.g. the pitch, the sustain period, pitch or volume alterations and filter parameters.

Using only four parameters you may imitate almost any instrument: Attack, Decay, Sustain and Release.

If a guitar player for instance strums one single chord, we will hear a “ploink“-sound, which will end abruptly as soon as he lays his finger on the chord. The sound wave starts suddenly with a “pl” in “ploink” (Attack), quickly decreasing (Decay), followed by a constant phase (“oin” = Sustain) and suddenly stopped by a finger at the chord (“k” = Release).

The synthesizer will be able to imitate any acoustic source by generating a sound wave and varying the duration of these four parameters for this sound wave.

Varying the 4 parameters in a noise generator wave results in a good imitation of percussion instruments and adjusting the filter parameters for a noise generator wave allows us to imitate almost any whistling sound.

Overview of the standard synthesizer modules and parameters:

Oscillator:

A wave generator providing a programmable frequency and wave amplitude

Envelope:

The wave amplitude as a function of time

Filter:

A module for emphasizing, weakening, or removing a frequency spectrum

Lowfrequency oscillator:

A slowly varying and adjustable signal source, used to control a pitch or volume of an oscillator.

Attack:

A „stroke“, suddenly raising the sound wave up to a maximum level.

Decay:

Decreasing phase (from a maximum to a constant level).

Sustain:

A constant level phase

Release:

Extinction phase of a sound wave

Mixer:

Module, used for mixing several sound waves.

Amplifier:

Module, used for amplifying the weak synthesizer signals up to a loudspeaker level.

Early synthesizer versions were voluminous boxes and cabinets, containing a great number of analog modules and a lot of connecting cabling. Modern integrated circuits and digital signal processing in software tools allowed minimizing size and cabling of the synthesizer equipment.

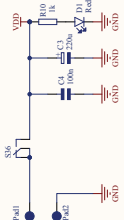
MIDI

In order to interconnect different synthesizer modules or synthesizers we use a standard synthesizer-language, called MIDI (Musical Instrument Digital Interface).

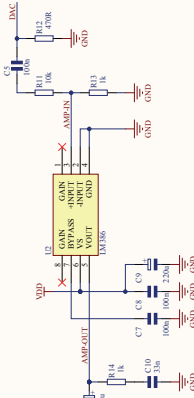
MIDI-words may be understood as special codes. One of these codes is used to control the pitch and another code controls the duration of a tone. A computer may easily store code sequences in a MIDI-file and send the MIDI-file to a synthesizer. The synthesizer equipment however must contain a so-called sequencer to process MIDI-codes and to activate all synthesizer modules at exactly the right moment.

Of course a sequencer may also be a computer program. Some computer programs may even imitate or emulate a synthesizer. Complex sound modules in a standard PC may already be equipped with a midi-interface (sequencer) and a (more or less complex) synthesizer module.

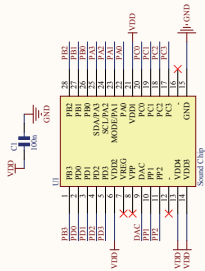
Power Entry



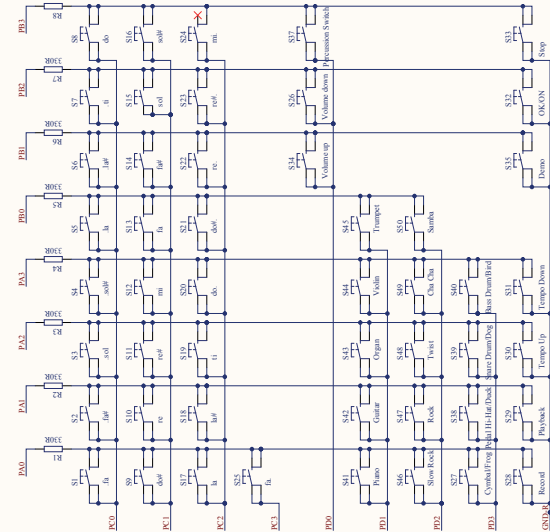
Amplifier



Sound Chip



Buttons



AREXX Engineering
 Manufactured by
 the MicroMasters

AREXX Engineering
 Piano Board

Document Number: AR_C001_01_5-04
 Revision: 1
 Date: 01-08-2017
 Created by: BSC
 Checked by: BSC
 Approved by: BSC