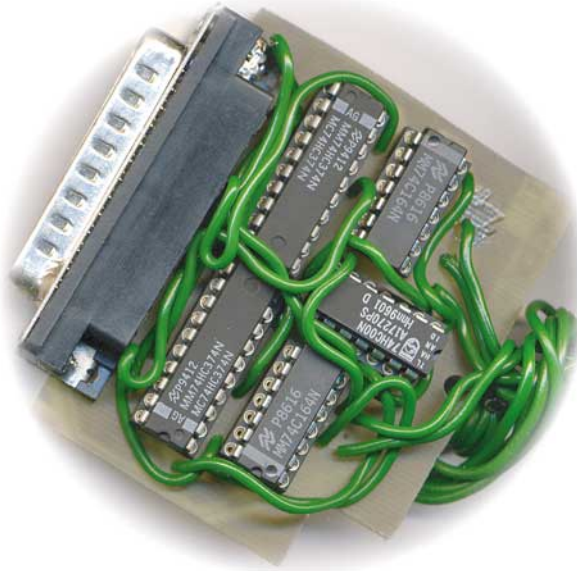


Adlib-DigiSnap



Building and using guide

VERSION 2000.3.4

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1. Introduction

Adlib-DigiSnap ¹ is a device that enables digital recording of sound from an Adlib sound card or old 8-bit Sound Blasters or a Sound Blaster Pro 1, or any other device that has the original Yamaha YM3812 OPL2 FM-music chip on it.

Physically, Adlib-DigiSnap is a simple board you stick in the printer port, (just like the good old Covox) and a bunch of wires go to the soundcard you want to record from. ²

Practical requirements for running the device:

- Two PC's, one for playing, one for recording. The recording PC has to be a fast one and have lots of memory (3MB for one minute) for storing the data during recording. You need two PC's because recording is a very critical task and requires the computer's full attention – even doing any disk operations would disturb the recording and cause clicks. Though, single Adlib tones could perhaps be recorded and played on a single PC.
- MSDOS in the recording PC, because that's the operating system i've written a driver for. Don't try to run the driver under WIN95, because it'll just crash...
- EPP, Enhanced Parallel Port in the recording PC. Adlib-DigiSnap uses EPP handshaking with the PC, so be sure to enable EPP mode from BIOS setup.

You may have thought that Adlib is entirely analog – oh no, it is entirely digital until the point of converting the digital signal to analog. And that's the where Adlib-DigiSnap puts its tentacles in the picture.

OK, what's the big deal anyway? Well uh erm...Allrite, you get 100% digital sound from Adlib, isn't that great enough as such?!? My original idea was to utilize the device in making an Adlib emulator by recording the original waveforms and doing other snooping around as well. It's great for recording Adlib "classics" too (like Dune, Wolfenstein, Mortal Kombat, Doom, Commander Keen, Ultima Underworld etc).

Go to my homepage and search around to find everything you need to build one of these babes for yourself! (The PCB film and software drivers are there)

¹The name has nothing to do with the author of XM2WAV – it just sounded the nicest, so i picked it.

²Hardware geeks would perhaps gain from knowing that Adlib-DigiSnap is just a 16-bit serial to parallel converter with EPP handshaking that divides the output to two times 8 bits. It generates parallel port interrupts when it has a new 16-bit set ready and waits for the computer to read it by using EPP data read and EPP address read.

2. Building

Here are instructions for building the device. One Adlib-DigiSnap has already been built (by me) with these instructions so, don't fear this would be just bullshit! The PCB film can be found from my homepage.

Essential requirements for building the device:

- Experience in building printed circuit boards, or a knowledgeable friend or daddy!
- Possibility to print the film (Epson Stylus Color 740 fooled to print a photo on a glossy film with full quality did just fine on an InkJet transparent)
- Possibility to make a single-sided PCB with down to 0.3mm line thickness.
- Possibility to do all the drilling, sawing and soldering stuff
- Some money (very little!) for the parts – or perhaps you have them already!

There are three main parts in the device. The board, the cable and the soundcard-side connector. (See cover page pictures!)

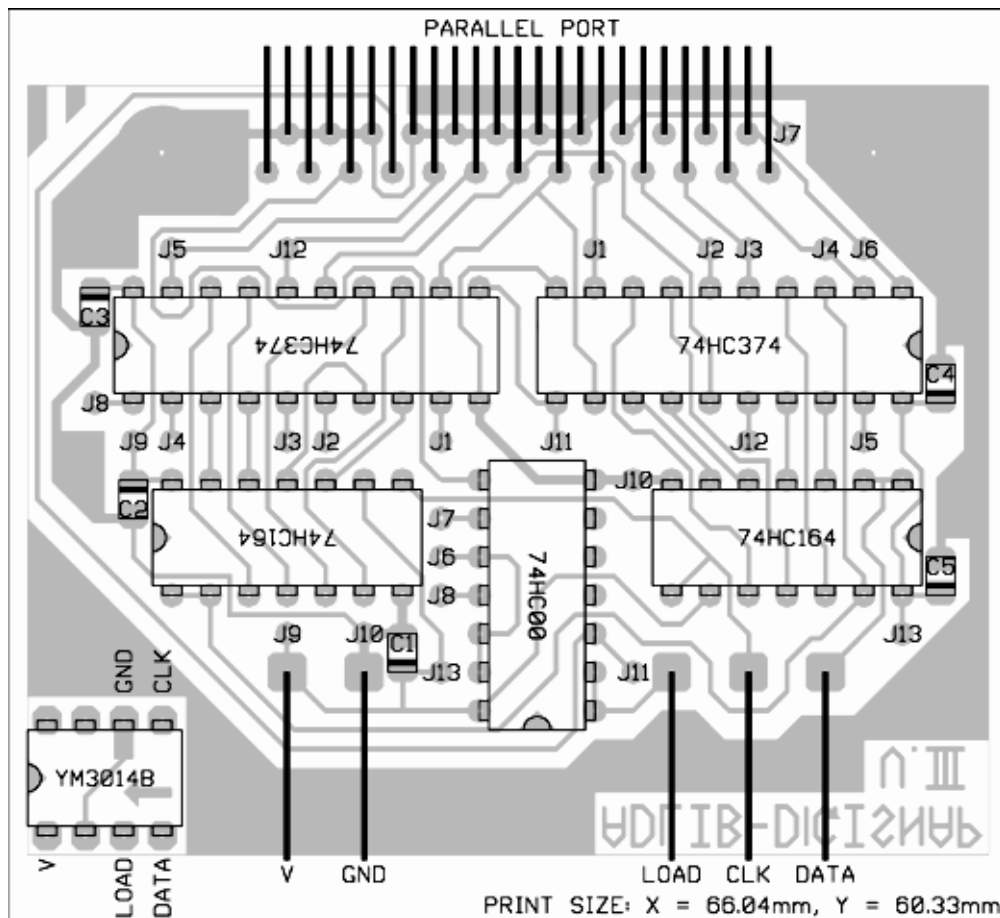
Shopping list:

- For the board and the connector:
 - 1 x Blank board at least 50mm x 63mm in size
 - 1 x 90-degree 25-pin male D-connector (for connecting to printer port)
 - 2 x 74HC374 standard logic IC (10 legpairs)
 - 2 x 74HC164 standard logic IC (7 legpairs)
 - 1 x 74HC00 standard logic IC (7 legpairs)
 - Sockets for the IC's: 2 x 10 legpairs, 3 x 7 legpairs, 1 x 4 legpairs (for the YM3014B DAC ¹ you'll pull off from the soundcard and attach to the soundcard-side connector). You can use longer sockets too, but then you have to cut them shorter.
 - 5 x Any type of surface-mount capacitor (I used ones with markings 225, 20V)
 - 1m of jump wire
- For the cable between the board and a soundcard:

¹Digital to Analog Converter

- 5 x cable length plus a little over of plastic coated single core copper wire (I used Finnish army detonation cable). This sort, because the soundcard-side connector is easy to make when it's solid-core.
- Possibly a roll of all-around air conditioning tape for bunching the wires in the cable.
- Some label stickers for marking the wires "DATA, CLK, GND, V, LOAD". (I used cut-up video cassette label stickers)

Here's a picture (should prove well worth the ink) that will be referred to many times in the rest of the text:



Overview

2.1 Preparation of the PCB

First, you need to print the picture of the film. (You should just have grabbed it from my homepage) Check, from the bottom of the picture, for the right print size. The size typed there is for the whole picture, not just the circuit part.

When you have it printed, and on a transparent, you got the film ready! The right orientation for it is such that the text "ADLIB-DIGISNAP" will show properly on the copper side of the board. The components (except for the surface-mount) will be inserted on the other side.

Now do the stuff you need to to print the board.

Drill the holes – all hole positions are marked with a small non-copper dot. The two D-connector attaching holes require a large bit size. Check the D-connector and see what size you need.

Saw off the unused edges of the board. Also, as you see from the *overview*, on a corner of the board there is a separate square with pads (and an arrow marker in the middle), which you can use for making the soundcard-side connector. Saw it loose. Drill holes in it a little larger than in the rest of the board.

When you're done with the drilling, you may wish to do little gentle wiping with water and fine sandpaper.

2.2 Making the cable

Be sure to label the single wires properly near both ends. I coated the whole cable with a slice of air conditioning tape, and it holds together real well. I'm using a one-metre cable, but you may want to make it longer.

From *overview* you see that the labels "V, GND, LOAD, CLK, DATA" exist on both the board and the connector. Eventually, the cable should connect those points.

2.3 Assembly

Start soldering from the surface-mount capacitors (C1 - C5). Some types of capacitors require correct polarisation, see *overview* for that.

Then IC's. You may wish to connect only the IC sockets now, and leave the IC's to last (you don't need to solder them if you use sockets).

Then the jump wires (J1-J13). There are 13 of them, sorry for that (i mean the large number). On *overview* you see the right spots. For example, J3 must be connected to another J3 with a jump wire.

Then the D-connector.

Last, the cable wires (V, GND, LOAD, CLK, DATA). (At this point the cable should be finished!) Before soldering them, make a knot in the cable, drill a hole on the bottom of the board where it doesn't cause trouble and attach the knot and the hole with for example a piece of iron wire. This makes an efficient protection from

cable pulling:



Pull-protection

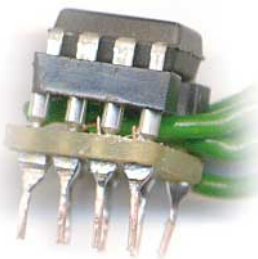
2.4 Soundcard-end connector

Now we focus on the other end of the cable. We have the piece of board with holes drilled on the pads and the V, GND, LOAD, CLK, DATA wires ready.

You have two options here. Do you want to hear sound when you do recording? In other words, do you want to drag the DAC along and make it do its job?

If no, just solder the cable wires to their appropriate pads, so that they stick about 5mm from the bottom – these will be stuck into the DAC socket on the soundcard. When recording, you'll put the DAC in a safe place somewhere. . . Add the missing legs to the connector from pieces of copper core.

If yes, scratch broke the arrow-pointed printed wire on the piece of board. This enables the DAC analog output (disconnecting it from ground). Attach the remaining 4-legpair IC socket (for the DAC) to the piece of board and stick the cable wires through the same holes (this is why you need wider holes here), again leaving about 5mm of plain copper stick from the bottom. Solder it all up, and add the missing legs to the connector from pieces of copper core. Done all this, and having installed the DAC from the soundcard (instructions later) on the connector, it should look like this:



Connector

3. Using

3.1 WARNING!

You'll be very sorry for the burnt hardware if you skip this section. When using two computers and improper grounding, there can be a voltage difference of something like 100V between the computers! Want to put 100V on your precious Adlib? No...?! Or the printer port...? You can avoid this by attaching the computer cases together with a cable. Additionally, i've attached my system to the water radiator, to make it grounded with the rest of the world. Now i don't even get a shock from touching the network card connector (did before)!

The Adlib-DigiSnap has itself proven to be quite an insensitive device. I have kept mine here and there, and handled it with no respect whatsoever, and it still works as new! (Huh...)

3.2 Connecting

Stick the device to the printer port. Good. The other end of the cable is more tricky. Looking at the soundcard, you should find a large IC with label "YAMAHA JAPAN YM3812" (may be hidden under a sticker, or scratched away). If you can't find it, see this picture for a hint of its shape and dimensions:



YM3812 (OPL2) and YM3014B (DAC)

If still no resemblance, you got the wrong soundcard pal!

OK, say you now have found it. Close to it, there should be a smaller chip, the DAC. It is labeled YM3014B, Y3014B or, again, covered with a sticker or scratched unidentifiable. Pull it off from its socket, and put on your connector (if you chose this option when making the connector), and put instead the connector into the socket. Remember to preserve polarisation. The small triangle on your connector is a polarisation mark.

3.3 Recording

Run the program "READER.EXE" (my MSDOS driver for the device) and start producing sound you wish to record with the soundcard. You should see a scope pumping with the sound. If you don't, something is wrong. Refer to the program's documentation on other issues.