

## cvbox :: 88 channel analogue to digital converter on parport

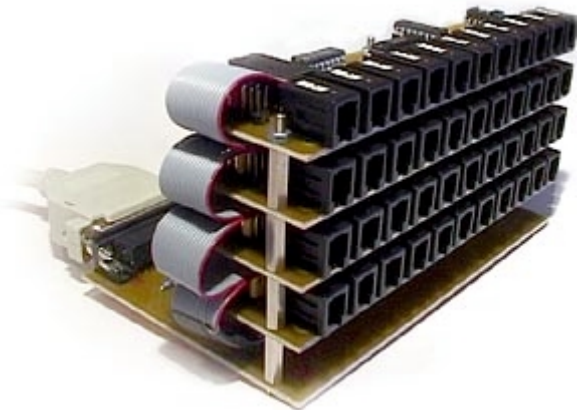
The *cvbox* analogue to digital converter designed by Christian Klippel is featuring up to 88 inputs with 8, 10 or 12 bits of resolution. It is capable of measuring input voltages between 0 and +5 Volts and connects to the PC's parallel port. To get it working a bidirectional parallel port is needed!

To acquire the input data, special externals for *Max* from *Cycling '74*, *Pure Data* and *jMax* from *IRCAM* are available. These objects allow to read in data from all the inputs and also provide some additional functionality (like scaling) to make the data more useful.

Due to the do-it-yourself approach and the flexible design the *cvbox* can be build to suit different needs in terms of input channels and resolution. There is one interface board that connect to the PC's parallel port and one AD converter board for every 11 input ports. The maximum number of AD converter boards that can be connected to the interface board is 8, giving a maximum of 88 input channels. Output will be supported in the forthcoming USB version of the *cvbox* as well.

The picture on the right shows my *cvbox* with 44 input channels (interface board with 4 AD boards hooked up to it). To get clean results from the AD converters it's essential to mount everything in an RF-tight housing.

The input plugs used for connecting the sensors are standard 4-4 western plugs known from telephone connection cables.



### Installation:

No special installation procedure is needed to use the *cvin* object. It works like any other external object. However, for the Windows version of the *cvin* external (*Max* and *Pure Data*) a system driver is needed to access the parallel port. This driver can be found in the *drv* folder of the distribution.

To install the driver:

1. Double-click the *Add/Remove Hardware Wizard* applet in Control Panel.
2. Select *Add/Troubleshoot a Device*.
3. Select *Add a new device*.
4. Select *No, I Want to Select the Hardware from a list*.
5. Select *Audio, Video and Gamecontroller* and then click *Next*.
6. Click *Have Disk* and point to the directory that contains *cvboxLPT.inf* file.

The system copies the *cvboxLPT.sys* file to `%systemroot%\system32\drivers` directory and loads the driver. After a successful installation the driver will be listed in the *Sound and Multimedia Hardware* list in Control Panel (where it can also be removed).

For the Linux versions of *cvin* (*Pure Data* and *jMax*) no driver is needed.

### Usage:

The *cvin* external has 8 outlets for the 8 AD boards that can be connected to the interface board. Each outlet outputs a list for every port consisting of '`<port number> <value>`'. Using the *route* object it's possible to get access to the values of individual ports.

Creation arguments determine the hardware port *cvin* is using. Possible settings are *LPT1* (0x378) and *LPT2* (0x278). Additional arguments set the poll interval and the resolution of the AD chips (depending on the ICs used when building the device).

By default, cvin reads one port every 10 milliseconds. Thus it takes 110 milliseconds to read in all values. The read in speed can significantly slow down in case of high CPU load caused by the audio processing. Displaying the values by a lot of number boxes also slows output down a bit.

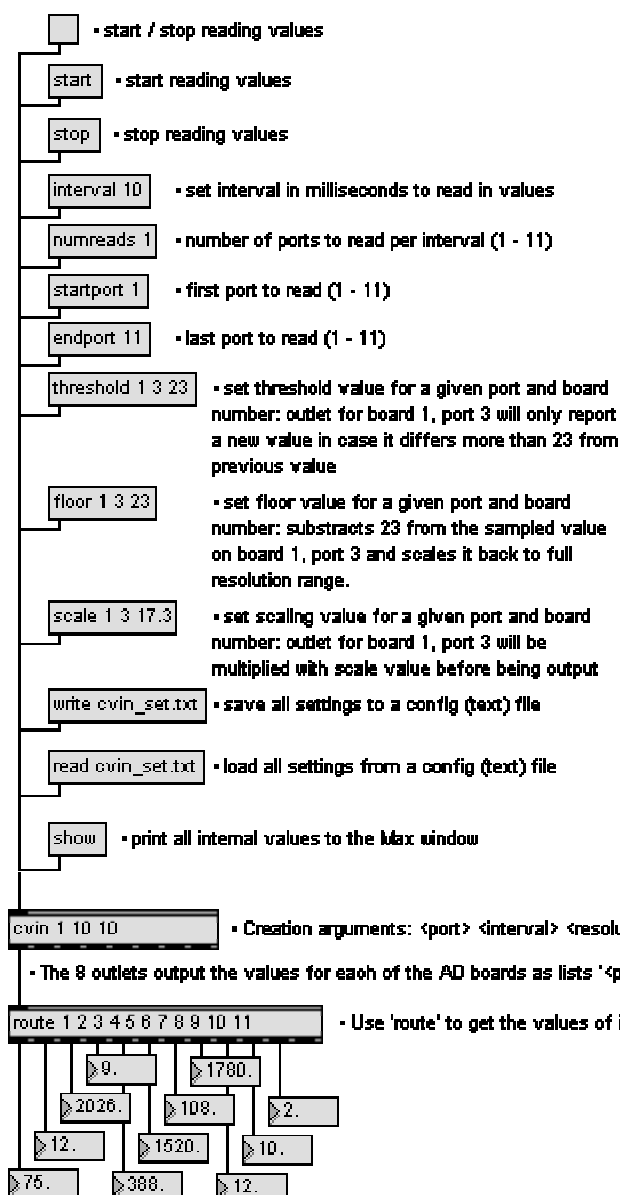
To gain better performance in case only a few inputs are needed, it is better to use only a few ports on each AD board instead of using all ports on one AD board. Reading the values for a given port is done on all boards in parallel, so in case port 1 on board 1 is read, port 1 on all other boards is read as well. So it is a good idea to use these ports as well. The messages 'startport' and 'endport' allow to narrow down the number of ports that are read.

To show how easy it is to obtain the data of any desired input port we'll show the Max help patch below. The 11 number boxes at the bottom display the (float) values of the corresponding ports on AD board 1:

## cvin

version 1.1, © 2003 by Olaf Matthes

### Read in data from 'cvbox' analogue to digital interface on parallel port.



The cvbox interface has been designed by Christian Klippel <ch\_klippel@gmx.net>. It features up to 88 input channels for 0 - 5 volt with 8, 10 or 12 bit resolution depending on the AD converter chips used.

Schematics and pictures for making the PCBs can be found at: <http://mamalala.de/files/electronic.html>

Use of creation arguments: if only one creation argument is specified, it determines the interval time. cvin then defaults to LPT1 (0x378).

Two creation arguments specify <port> <interval>, three give <port> <interval> <resolution>. The default bit resolution is 10bit.

All internal settings (start- endport, interval, numreads, threshold, floor and scale) can be saved to a config file. This file get's saved to the same folder the patch was loaded from. Since it is in text format, it is also possible to change settings directly in this file.

The port can be specified either by using numbers (1 for LPT1, 2 for LPT2) or the hex port address using the C-like spelling with prepended '0x' to indicate hex numbers. Otherwise you'd have to find the equivalent number in decimal spelling.

This object works with the Windows version of Max/MSP only. Or does your Mac have one of these 26-pin parallel port connectors? Please note that a bidirectional parport is needed to get this working!

Before being able to use this object a Windows device driver must be installed! Refer to the README for details about installing the driver.

above: the 'cvin' help patch for Max 4.3 (Windows version)