



Build your Hive - R14

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introduction

on the following pages describes step by step the construction of the hive. This guidance should also serve newcomers to the matter to build a hive. Professionals may therefore away read about the course displayed messages and go their own way.

Especially for beginners in the matter, it is advisable to understand the steps individually as they are described here. Any errors can be found so much faster than if the hive is built in one piece. In addition, one has a feeling of success much faster, since you already from [step](#) can experiment on your own and program 3.

The individual steps are each divided so that initially the components are listed and described thereafter the process. Details of the components can be the [parts](#) found in list. There is an exemplary link to a provider of the component is also stored in each, so that you can look the part as an image with uncertainties. There is to the individual steps and structure videos on YouTube with lots of additional information. The videos are linked in the respective steps, often directly from the sequence.

These instructions you can print out and put it directly onto the work table. If you have a tablet or the like, the instructions can open it, of course. This has the advantage that you can also directly access the YouTube videos and you always use the latest version of this set-up instructions. This guide is sure to grow even in some respects, as the project look for yourself So every now and here's what changed.

Before we go just some information

Experiment! I have built the hive within a week without a schematic and thereby learned much of what you about this particular microcontroller. learn have to The structure of the device is not a necessary evil, but gives the ever-possible experiment all the basics to keep up with the propeller and the overall system - deal - the Hive. I have a temporary software package tied together, which at each stage a small possibility offers to the created breathe a little "life". Spin and Propeller Tool offers the opportunity almost interactively (the upload into the system only takes moments) to experiment. Each propeller chip is in a functioning system. Thus, the test code runs for the LAN interface only in Administrator chip, without the involvement of Bellatrix or Regnatix! On the other hand: If you have a new test programs, which has solved with you a problem setting up or just cool, you should send it to us so we can make it available to everyone in the test package programs.

About legends documents, software and other files

- test video¹ version: The test programs as they are and here presented and

¹ <http://hive-project.de/downloads/66>

used in the construction video in the tutorial programs.

- test²Taking a collection of thematically ordered code snippets to the Hive piecewise operating, test and experiment version.!
- Old Please preferably the video version use to which reference is made in the text Manual.
- Propeller³The latest version is available as a PDF free at Parallax Tool.
- Software Propeller⁴Is Free also available from Parallax BOM.
- pinout⁵ of the three propeller chips in the Hive
- ⁶ all components
- circuit diagram 1⁷ - power supply and host interface
- circuit diagram 2⁸ - Bellatrix and administration
- Schematic 3⁹ - Regnatix and external SRAM
- circuit diagram 4¹⁰ - Ethernet controller
- assembly diagram¹¹
- schematics and layout¹² in high resolution
- datasheet 8bit latch¹³
- datasheet RAM 512K x 8bit¹⁴
- datasheet EEPROM¹⁵
- data sheet Ethernet Controller¹⁶
- Data Sheet housing¹⁷
- datasheet RS232 Driver¹⁸
- Data Sheet propeller¹⁹
- sheet 5V voltage regulator²⁰

² <http://hive-project.de/downloads/5>

³ <http://www.parallax.com/Portals/0/Downloads/docs/prod/prop/WebPM-v1.1.pdf>

⁴ <http://www.parallax.com/Portals/0/Downloads/sw/propeller/Setup-Propeller-Tool-v1.2.6.exe>

⁵ <http://hive-project.de/wp-content/gallery/prototyp-entwurf/pinout.jpg>

⁶ <http://drive.google.com/open?id=0An9wTQSuMY2KdEx6dk1oOGZuWTJWTC1LbU5MRVhfenc>

⁷ <http://hive-project.de/wp-content/gallery/prototyp-entwurf/hive-r13-plan1.jpg>

⁸ <http://hive-project.de/wp-content/gallery/prototyp-entwurf/hive-r13-plan2.jpg>

⁹ <http://hive-project.de/wp-content/gallery/prototyp-entwurf/hive-r13-plan3.jpg>

¹⁰ <http://hive-project.de/wp-content/gallery/prototyp-entwurf/hive-r13-plan4.jpg>

¹¹ <http://hive-project.de/wp-content/gallery/prototyp-entwurf/hive-r13-best.jpg>

¹² <http://hive-project.de/downloads/8>

¹³ <http://hive-project.de/downloads/9>

¹⁴ <http://hive-project.de/downloads/10>

¹⁵ <http://hive-project.de/downloads/11>

¹⁶ <http://hive-project.de/downloads/12>

¹⁷ <http://hive-project.de/downloads/13>

¹⁸ <http://hive-project.de/downloads/14>

¹⁹ <http://hive-project.de/downloads/15>

²⁰ <http://hive-project.de/downloads/16>

- datasheet 3.3V voltage regulator²¹
- start-up files²² - This package only the very basic files no tools are included to start the Hive,
- SD Card mini²³ - or Maxi (These sets of conditions contain in addition to the necessary start-up files a collection of tools and demos)

More Advanced information on electronics and to subcircuits:

On the subject Lötten:

http://www.youtube.com/watch?v=I_NU2ruzyc4

<http://www.youtube.com/watch?v=AgRo2IJS3Kk>

<http://www.elektronik-kompodium.de/sites/grd/0705261.htm>

Wichtig especially for polarized components such as electrolytic capacitors, diodes, LEDs, transistors:

<http://www.elektronik-kompodium.de/sites/bau/index.htm>

partial assembly and

- variations, it is possible to let the network interface unequipped, if you have no interest an Ethernet interface has. Advantage: five I / O ports on administration are free for other hardware. You can tap these signals comfortable with a male connector which you einlötet to pin 4, 6, 7, 8, 9 instead of the ENC-chipdrive.
- External SD card Instead resistors R58/59 R62/63 and equip a Pinheader and the signals tapping with a cable. On the external board with the SD connector above resistors must then of course be used panel.
- LEDs on the front How not fit the LED's in the card drive and replace it with a pin header which supplies the LED's on a small cable ports.
- More I / O : Who can do without for experiments on VGA, video or external RAM, has the opportunity to make the appropriate resistors or circuits without equipment. In the released pads you can easily add a correspondingly wide Pinheader solder to the following ports to tap: VGA 8 bit, video 3 bits, External Ram 11 bits System:.
- Modular Due to the expansion port, it is possible to connect a backplane for multiple cards in different ways. Since for very large extensions, the power supply to the motherboard is not enough, its own power supply should be implemented for the expansion cards. This can also easily dine with the motherboard, if the power supply is not fitted there, or separated via the jumpers.

The order

It is convenient to solder some flat parts as the first to have enough space left for this work. This includes, first, the SD connector, which is only glued on and then soldered. This

²¹ <http://hive-project.de/downloads/17>

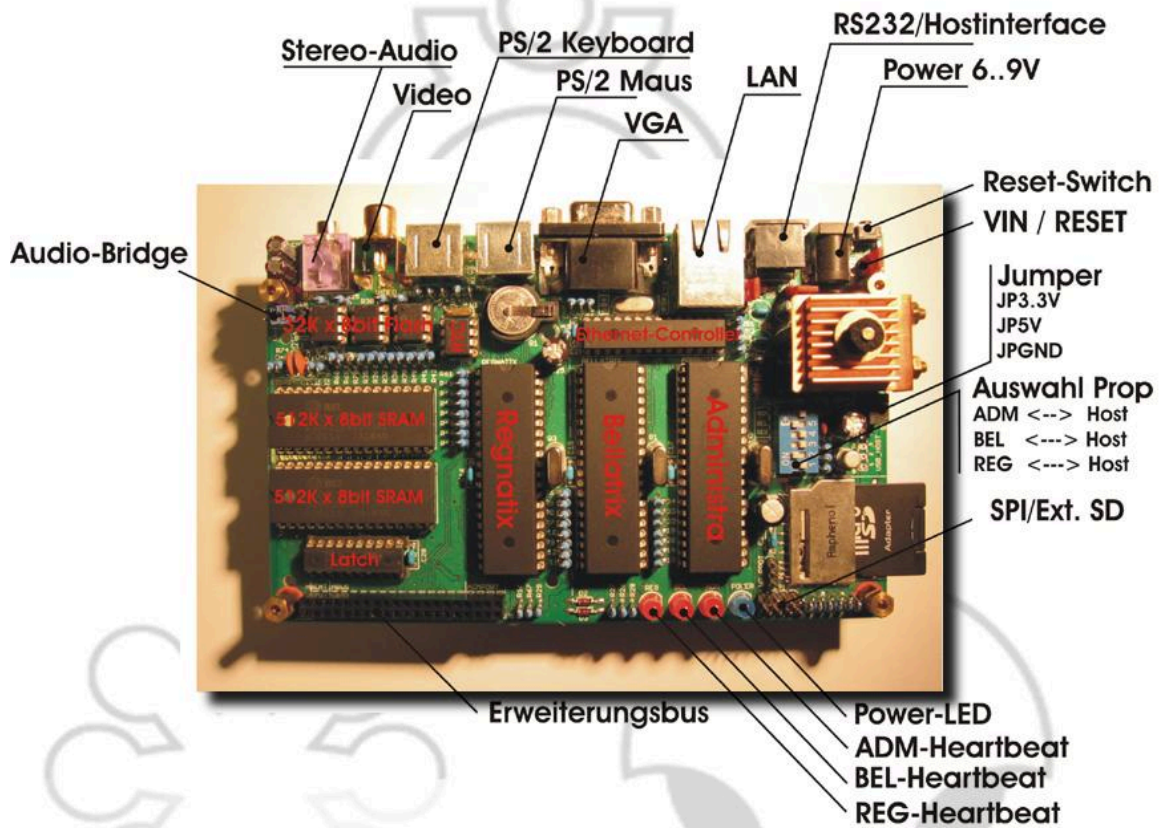
²² <http://hive-project.de/downloads/3>

²³ <http://hive-project.de/downloads/6>

connector also has the smallest solder pads, which is likely to cause the most trouble Lötneulingen. Next, you could all IC socket solder, which makes also good without the rest of the components as you can to lay the board flat on the tableorder:.

seems useful to me for the further development following Bellatrix - Administration - Regnatix. Bellatrix is the beginning, because it is with this chip immediately display and keyboard as well as basic terminal functions are available, which appeared to me important for other functions and experiments. Administrator makes acoustically - even so you can experiment easily. therefore it is taken in a last step in operating- but Regnatix is dependent on their slaves, Bellatrix used (the terminal functions) in order to reveal its features and realized the bus to merge all parts into a whole.

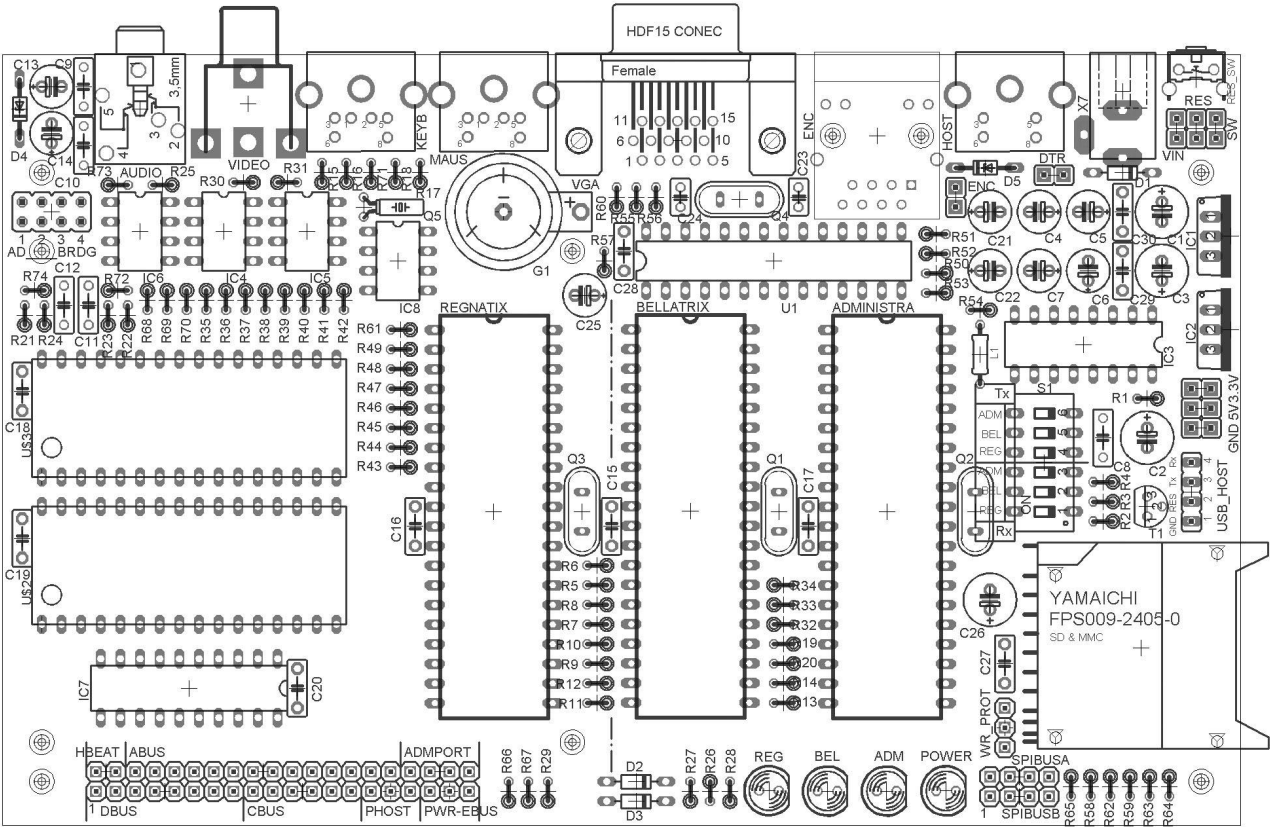
Overview



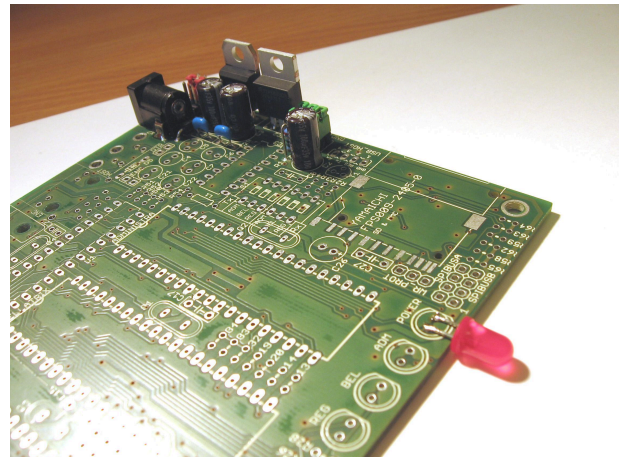
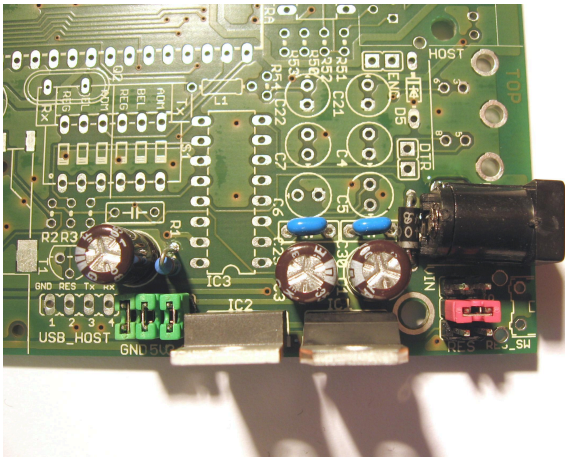
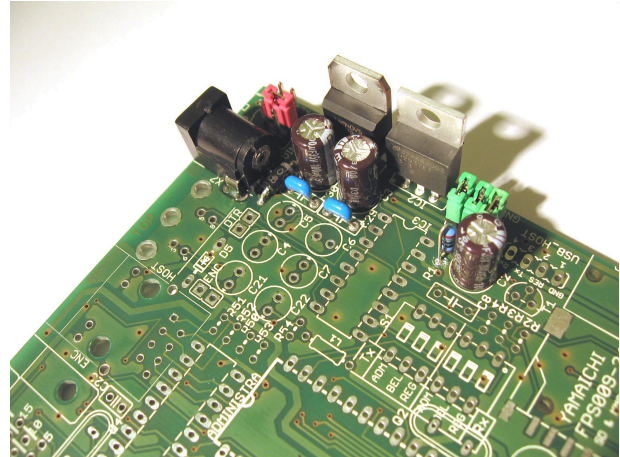
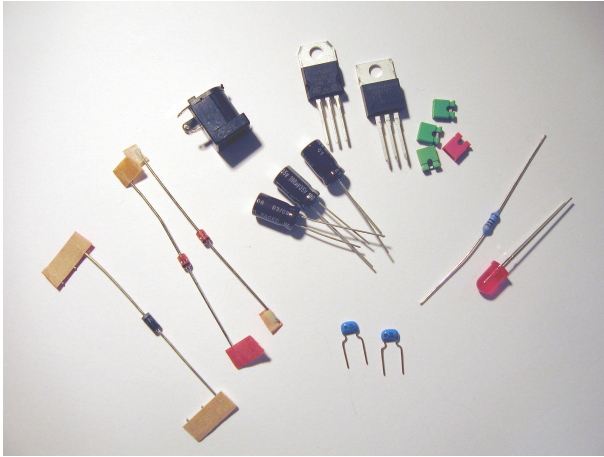
a video-tour of the various components on the board can also be found [on Youtube](https://www.youtube.com/watch?v=8CO4pcVTn5k#t=26m34s)²⁴.

²⁴ <https://www.youtube.com/watch?v=8CO4pcVTn5k#t=26m34s>

diagram



Step 1 supply



components

- X7 hollow socket
- diode D1 (occupancy anode / cathode note)
- C1 to C3 Elektrolytkondensator (note polarity)
- C29 and C30 Ceramic Capacitors
- IC1 and IC2 voltage regulator
- Power LED light-emitting diode (polarity)
- R1 resistor
- 2-pin pin header for SW pin header
- jumpers
- D4 and D5 Zener diode
- universal power supply

circuit diagram: [number 1 - schema1.jpg](#)²⁵

sequence [[build video on](#)²⁶ Youtube]

As unstabilized power supply is a power supply with an output voltage of 6 to 9 volt suitable. After the assembly of the components is first thing in the Pinhead for the power switch to check with a voltmeter, if the input voltage is applied. It is now a jumper or equal to a switch on the Pinheader "Switch" (which separates the entire circuit from the supply voltage) and secure measure to the corresponding lower Pinheadern whether the 3.3 or 5 volts is applied. If one of the voltages are not correct, must be the assembly precisely checked and the soldered joints to be examined carefully for shorts to find the error. The power LED should now light up, and do not forget to equip them for the test: In order for the two controllers can work, must there be a consumer. Without the power LED, no current flows and the controller can not control, which leads to the result that the output voltage is too high also.

CAUTION: An incorrect voltage may destroy the entire circuit! Therefore, it is important to be very conscientious to consider this work to avoid damage! Only when the supply voltages are correct should be based on the three Pinheadern "3.3V", "5V" and "GND" per a jumper attached. Thus, the actual circuit with the two supply voltages is supplied.

Now the time has come to zener diodes D4 and D5 to solder. These are designed to protect circuit against

overvoltage., There is additional information about rectifier²⁷ circuits, smoothing smoothing step²⁸ and integrated fixed voltage regulator²⁹ (78xx/79xx).

Layout variant

If the hive later be incorporated into a case, then it makes depending on housing being used sense, the not directly to solder power LED on the board, but to be soldered in place of a LED version. During the Hive construction one can put the LED directly into the socket. Later on, the LED to link this with a cable + plug with the socket. The same gillt course for the heartbeat LEDs (HBx) in the following chapters.

Anyone who wants to use instead of the red LED prefer a different color, this can make naturally. Please note: Then the series resistor R1 must be adjusted to the LED used. The correct value of the resistor can allowed to the net³⁰ be calculate-.

²⁵ <http://hive-project.de/downloads/29>

²⁶ <https://www.youtube.com/watch?v=npasgDs7ojQ>

²⁷ <http://www.elektronik-kompodium.de/sites/slt/0201071.htm>

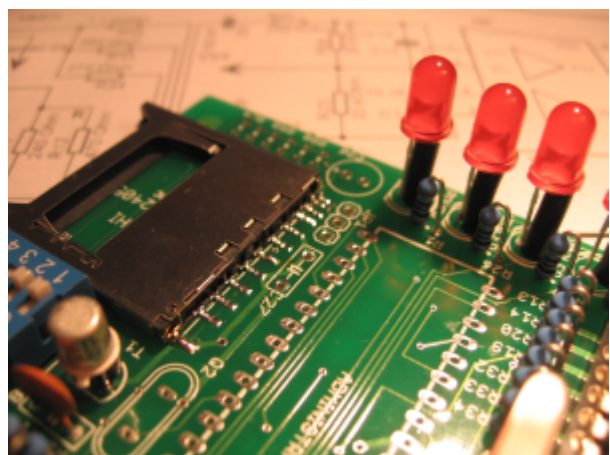
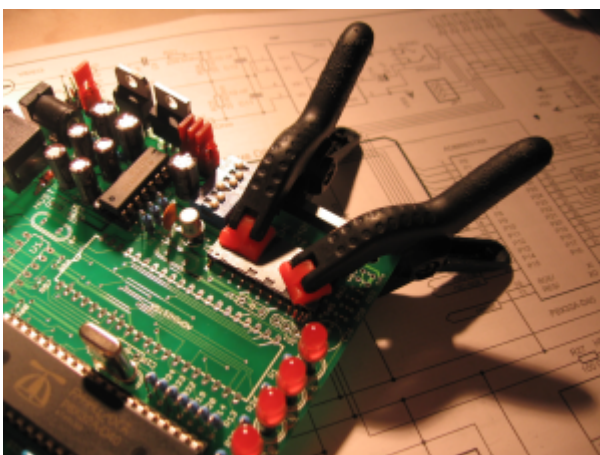
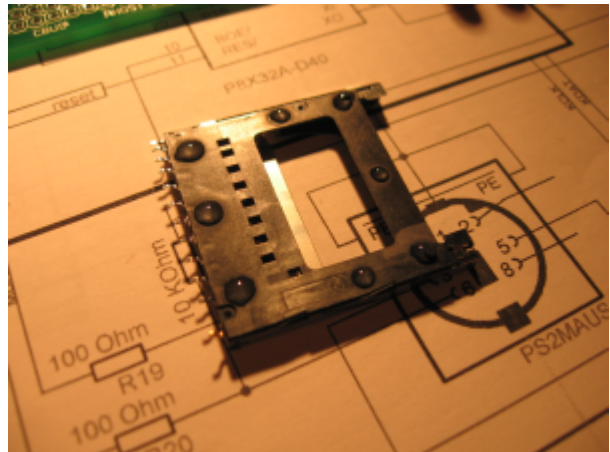
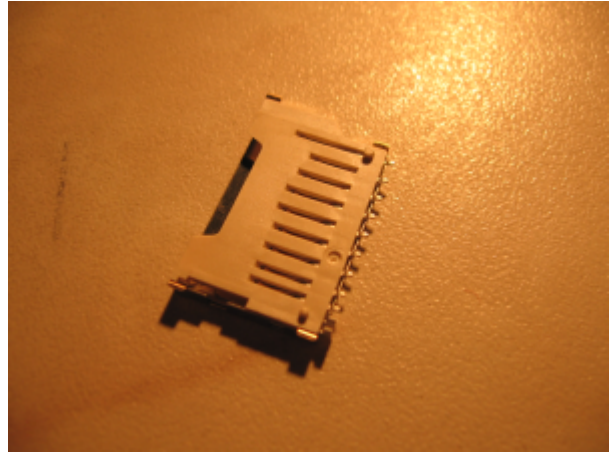
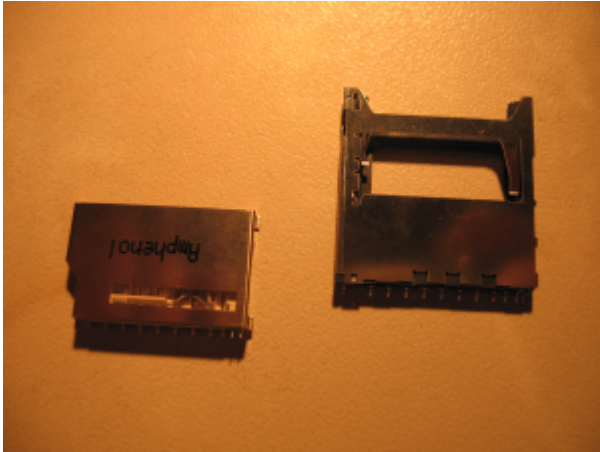
²⁸ <http://www.elektronik-kompodium.de/sites/slt/0210251.htm>

²⁹ <http://www.elektronik-kompodium.de/sites/bau/0204301.htm>

³⁰ <http://www.elektronik-kompodium.de/sites/bau/1109111.htm>

Step 2 SD slot and Host Interface

Step 2.1 - SD slot



components

- C26 and C27 buffer capacitors for Card SD

- SD& MMC card holder
- R31, R58, R59, R62 to R65

Circuit diagram: [number 2 - schema2.jpg](#)³¹

expiration

for Card Connector applies: Please note that there is no short circuit by metal elements. However, I must say that I was using previously refereed types, the bottom was designed fully insulating plastic for all three of.

The SD connector is fixed with superglue on the circuit board to intercept the mechanical forces. It seems sensible to stick the connector before soldering. Before the little plastic nipple on the bottom should be removed, if they do not fit into the corresponding holes. When sticking but must be used very carefully, the pads must sit exactly and the connector be just as it is impossible especially with superglue after a very short time to move the component yet. If the splice fixed (fix for a few minutes with clips!) Can be soldered quite relaxed. If it handet a short version, so it can be considered on the connector to glue a plastic guide when the whole is mounted in a housing. This prevents the lands the map when mating with the connector. The long types protrude in part a small piece on the edge of the board and provide sufficient guidance, but they are also significantly more expensive2.2.

step - Host Interface

The host interface used to connect the Hive for programming the propeller with the PC can be realized in two ways:

1. via a MAX232 circuit that realizes a serial interfacewhat..
2. on a PropPlug³² by Parallax via

USB,depending on for variant you decide it is in the appropriate step:

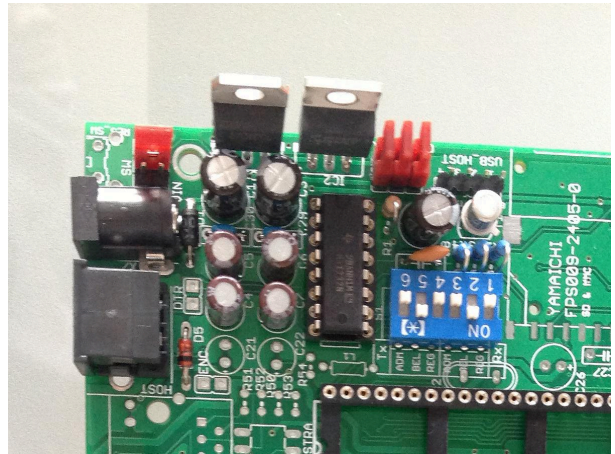
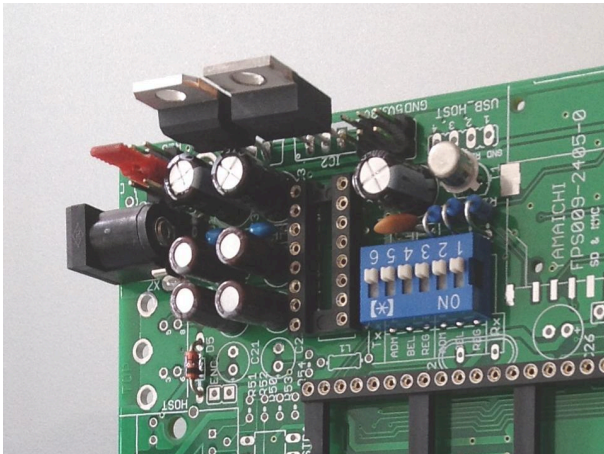
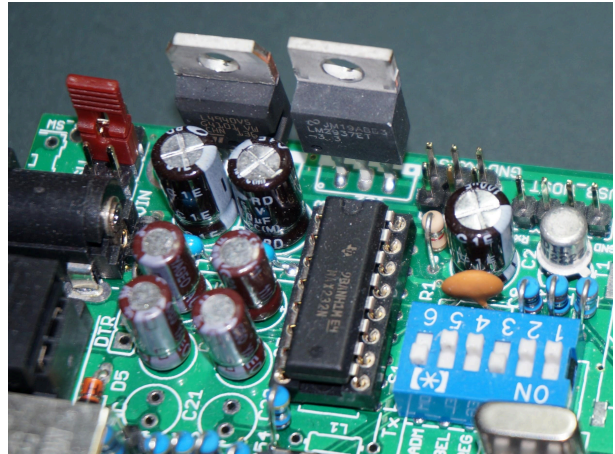
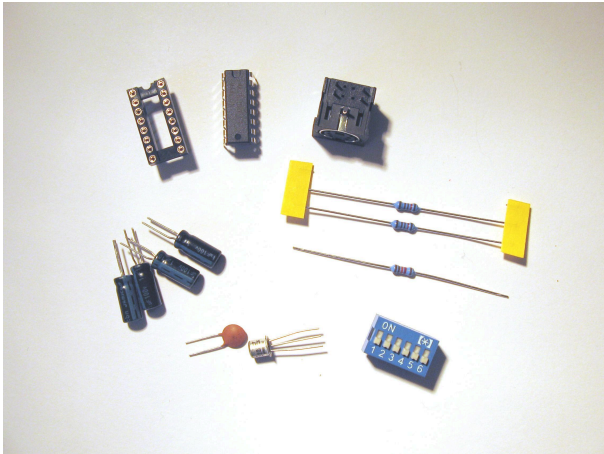
- Step 2.1a + 2.1b, when the MAX232 circuit to be set upversions..
- or
- step 2.2 if the hive is to be prepared for the use of the PropPlug

course can also easily manage both be equipped-.

step 2.2a MAX232 circuit

³¹ <http://hive-project.de/downloads/29>

³² <http://www.parallax.com/product/32201>

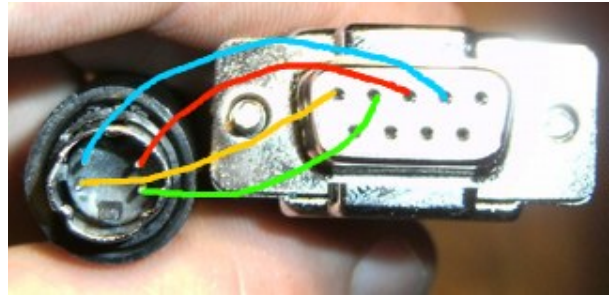
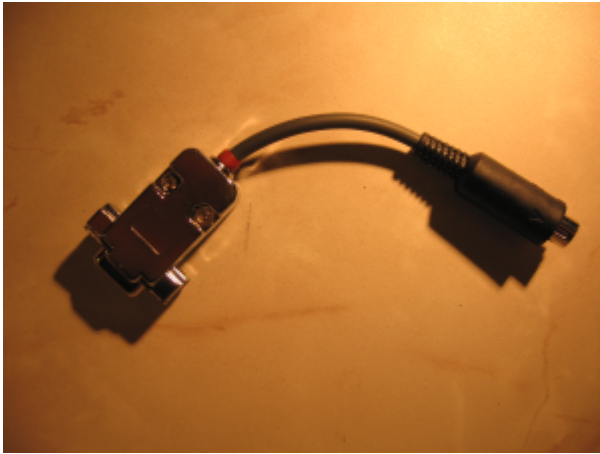


Semiconductors

- (note Pin1!) for MAX232
- C4 (note the polarity!) to C8 capacitors
- resistors R2 to R4
- S1 DIP switch (possibly socketed)
- T1 transistor (occupancy of emitter / base / ! Collector note)
- HOST mini DIN socket
- IC3 MAX232 (pin 1 note) diagram:
- 2-pin pin header for DTR jumper
- 2-pin pin header for reset
- jumper

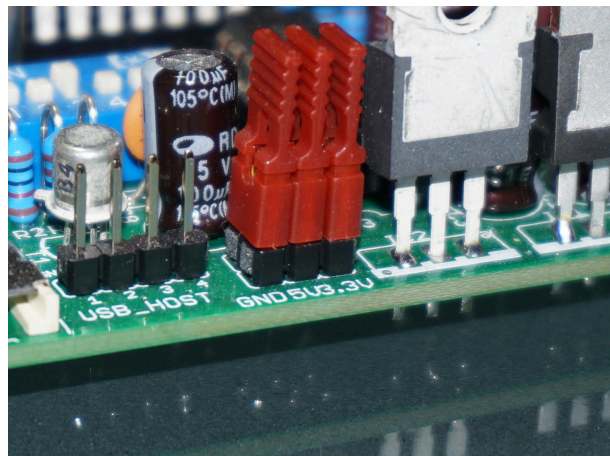
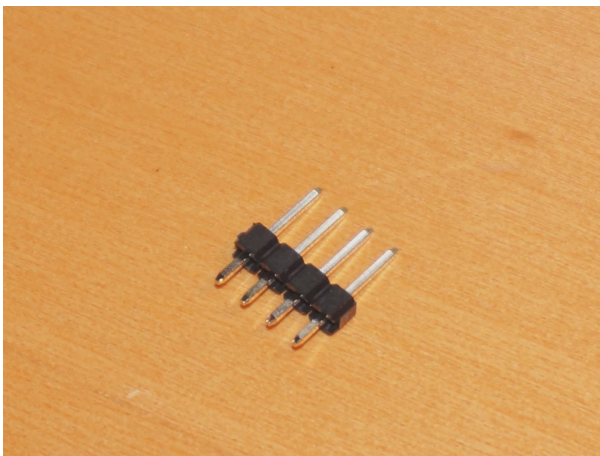
[number 1 - schema1.jpg](#)³³

³³ <http://hive-project.de/downloads/29>



The assignment of the adapter cable is listed on the wiring diagram 1

Step 2.3 - PropPlug



components

- 4pol Pinheader for Parallax Prop Plug

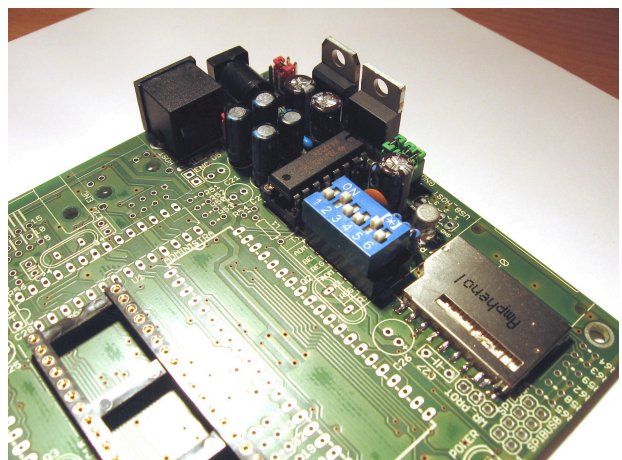
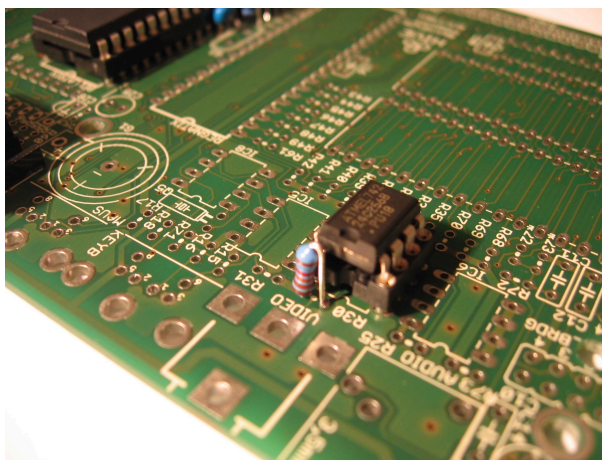
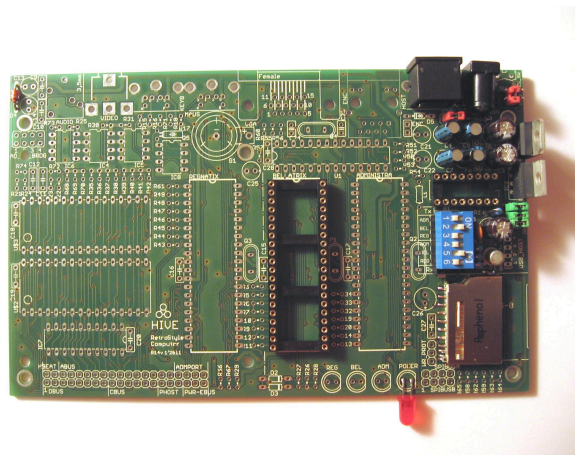
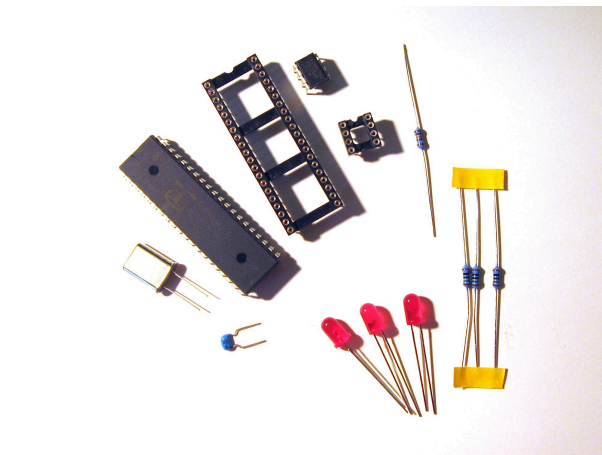
wiring [# 1 - schema1.jpg](#)³⁵

expiration

The pin strip is soldered with USB_HOST. Then the PropPlug by Parallax is later inserted. The PropPlug also contains the same serial-to-USB converter one and, since inserted as a module for other projects can be used-.

³⁵ <http://hive-project.de/downloads/29>

Step 3 Bellatrix



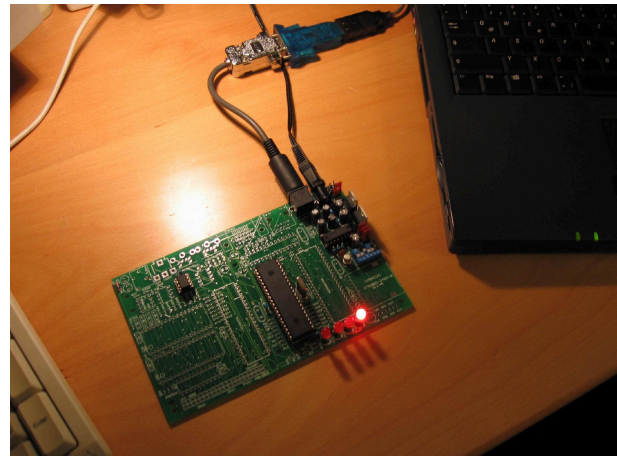
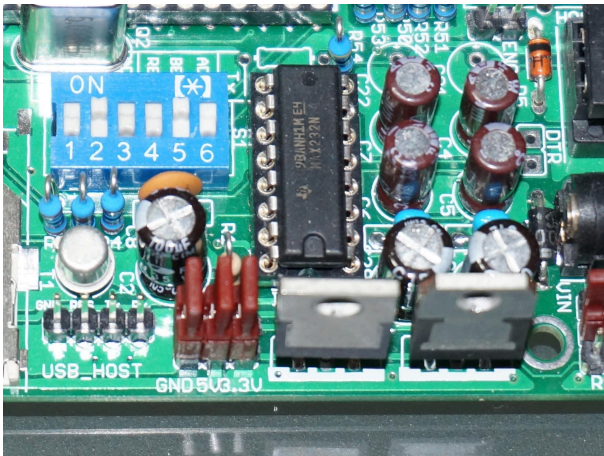
components

- 40-pin socket for Bellatrix (Pin1 note)
- Propeller chip (Bellatrix)
- 8-pin socket for the EEPROM (Pin1 note)
- IC4 EEPROM
- Q1 5 MHz quartz
- C15 back-up capacitor next to the socket of the chip
- LED HB1 (BEL) (observe polarity!)
- R26 to R28 resistors
- R30 pullup resistor on EEPROM

wiring diagram: [number 2 - schema2.jpg](#)³⁶

³⁶ <http://hive-project.de/downloads/29>

sequence [build- [Video on](#)³⁷ Youtube]



After loading should be first, the operating voltage checked at the base of the propeller chip and at the bases of the EEPROMs. Both circuits are supplied with 3.3 volts. Only when the supply voltage is checked, the two circuits to be connected. The flash memory is in their arrangement in accordance with the arrangement of the propeller chips, which means the flash for Bellatrix is the mean IC. For the test itself but the flash is not absolutely necessary, but desirable, because the programs can also be transmitted as a test in the HubRAM of the propeller. If you want the code to be stored permanently, of course, is ultimately the Flash required.



the first test [video [on Youtube for the test and programming](#)³⁸ entry]

StartThe Propeller Tool and check with the F7 key if the propeller chip is detected. For this, the two DIP switch for the chip Bellatrix ON, all other switches must be set to OFF. Switches assignment is also given on the board. So it must be # 2 and # 5 are set to ON, the rest OFF (see picture).,If the tool will display an appropriate message, we can be sure that the supply circuit, the host interface and the adapter cable works. If an error message appears, these circuits must be examined closely. For a more detailed consideration of the function of the notes by Parallax for Minimum wiring are³⁹ helpful. The DTR signal on the serial interface thereby dissolves to start the boot process of the chip a reset. In this phase, the following actions occur:

1. The Propeller chip is trying to pins 30/31 a serial connection to the Propeller Tool to

³⁷ <https://www.youtube.com/watch?v=yi1b1Bgur8c>

³⁸ <https://www.youtube.com/watch?v=Qr8Em4eSYBE>

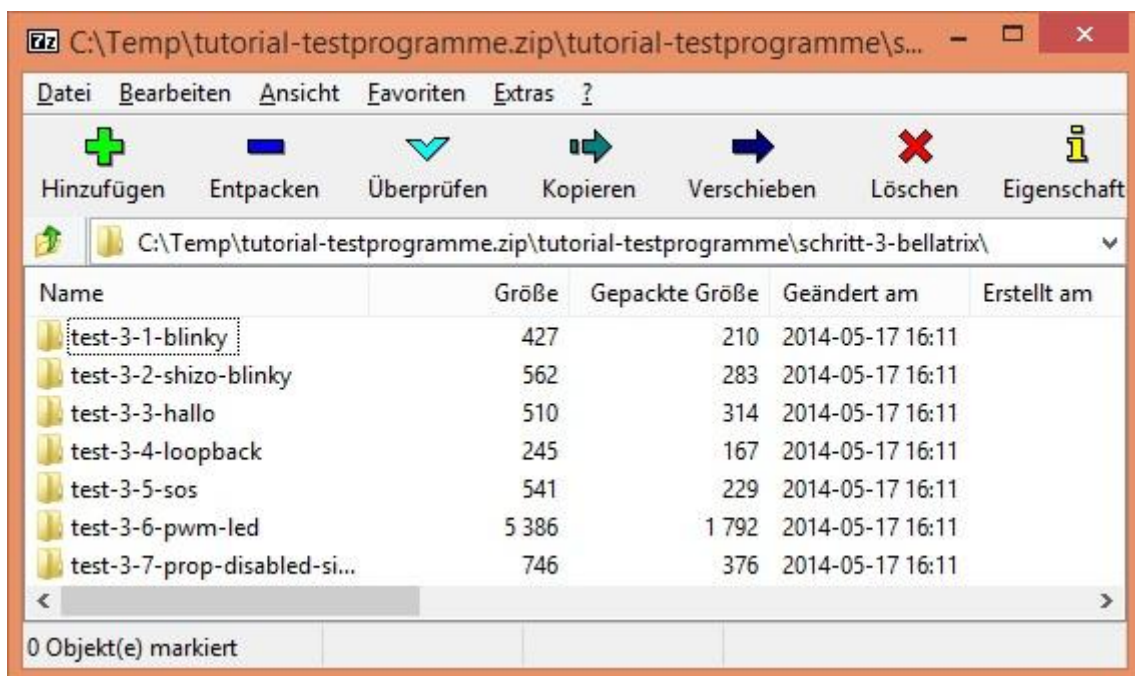
³⁹ <http://www.parallax.com/tabid/254/Default.aspx>

build. If this succeeds, a 32KB image loaded into the HubRAM and started either immediately (F10) or only flashed and then started (F11).

2. Could a serial connection to be established, the chip via pins 28/29 tried a EEPROM via I2C on the to address the lowest address. For an existing ROM now a 32K Image is also gelaten and launched in the HubRAM.
3. If the first two phases were unsuccessful, the chip is clocked lower and goes into a shutdown mode.

This process should be kept in the experiments always in mind. It should be noted the following in the Hive: The appropriate connection of the pins 30/31 (RX / TX) are switchable via the DIP switch from the host interface to the appropriate propeller chip. Thus it can be selected which the chip communicates with the interface to the host computer. However, the reset signal is equal for all propeller chips.

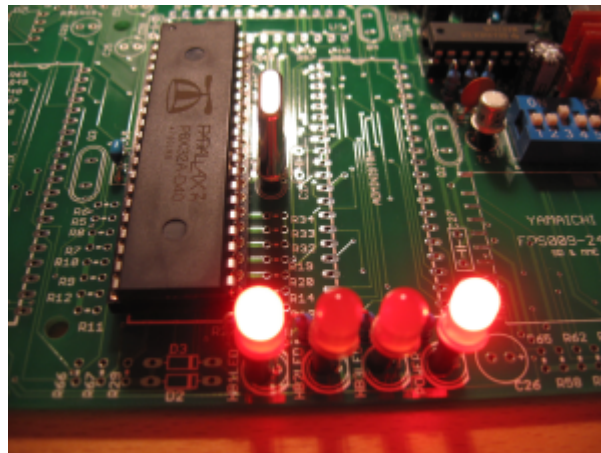
Least now it makes sense to the [test](#)⁴⁰ download program, if not already done. Unzip this file on the PC and to the subfolder to [step-3-bellatrix](#). go There are various test programs:



First test program to offers [start-blinky.spin](#) in the [test-3-1-blinky](#) subdirectory This little program works equally with each propeller chip in the hive, because the LED's are connected to the same pins. Or experimenting itself: In the Propeller Manual is from Chapter 3 quite wild with blinking LEDs and thereby explains the fundamentals of the spin. In the pinout you can look at which port the LED is connected. With F10, the program is transferred to the HubRAM the propeller chip, F11 reflashing it for permanent use. It is best to try both versions to also test equal to the EEPROM. Displays Bellatrix their lives with a flashing heartbeat LED on the structure has been successful - the first subsystem is therefore ready

⁴⁰ <http://hive-project.de/downloads/66>

now quietly take the time to walk around a bit to experiment with all test programs which are in the subdirectories *test-3*. .. are MAX232:..



troubleshooting when the propeller chip is not identified:

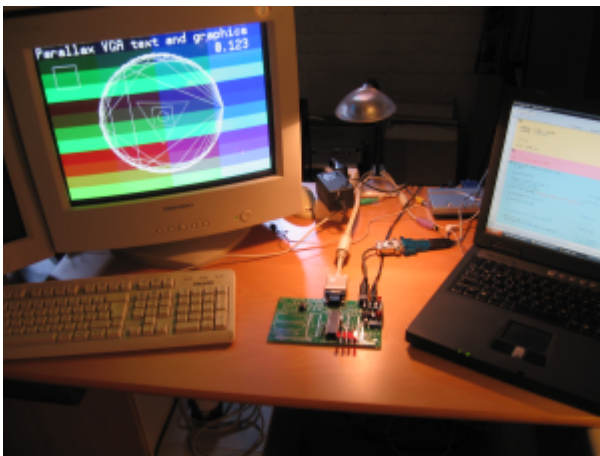
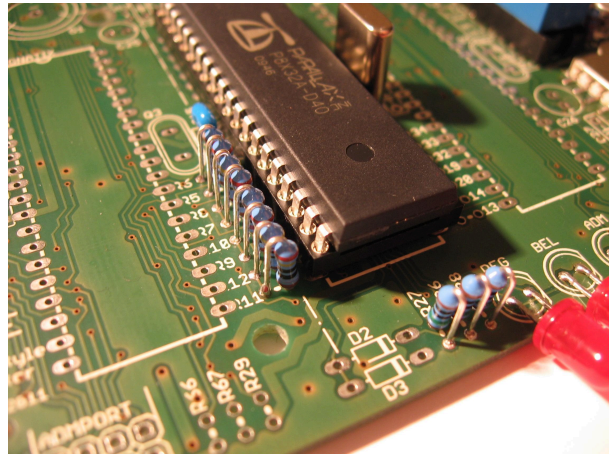
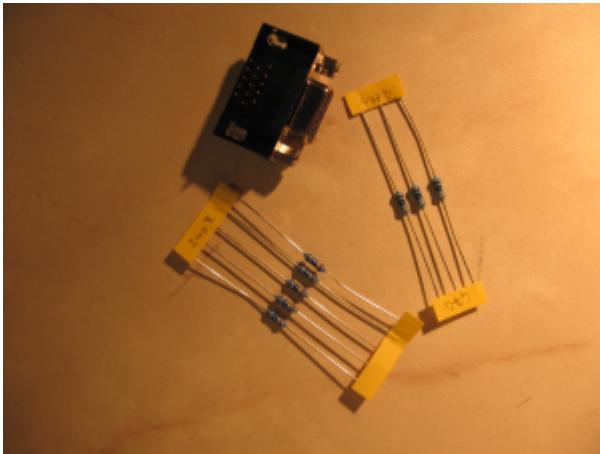
Cable test:

1. MAX232 and Bellatrix remove from the socket
2. jumper attach the base of the MAX232: MAX232: pin7 -> Pin13 (TxD -> RxD)
3. Using a terminal program, you can now send characters that are received by the loopback again. . Removing the bridge will no longer receivesign
4. thedoes not work, the problem is in MiniDin/DB9-Adapterkabel or generally on the cabling between Hive and hosttest.

MAX232

1. Equip MAX232, the Propeller chip stays outsideof.
2. jumper in the base Bellatrix install: BEL: pin39 → BEL: pin40 (port 30 -> 31)
3. with a terminal program you can now as the cable test results send characters that are sent by the bridge right back. . Unlike the cable test but the MAX232 IC and the link is here also tested to the base of the propeller chip
4. does not work the transmission, so there is the error between propeller and adapter cable (if the cable test was successful)-.

Step 4 VGA interface



components

- R5 to R12
- VGA connector

wiring diagram: [number 2 - schema2.jpg](#)⁴¹

sequence [Construction [video at](#)⁴² Youtube]

So now it is time to bring a little life to the place and this requires the propeller no great effort resistors.

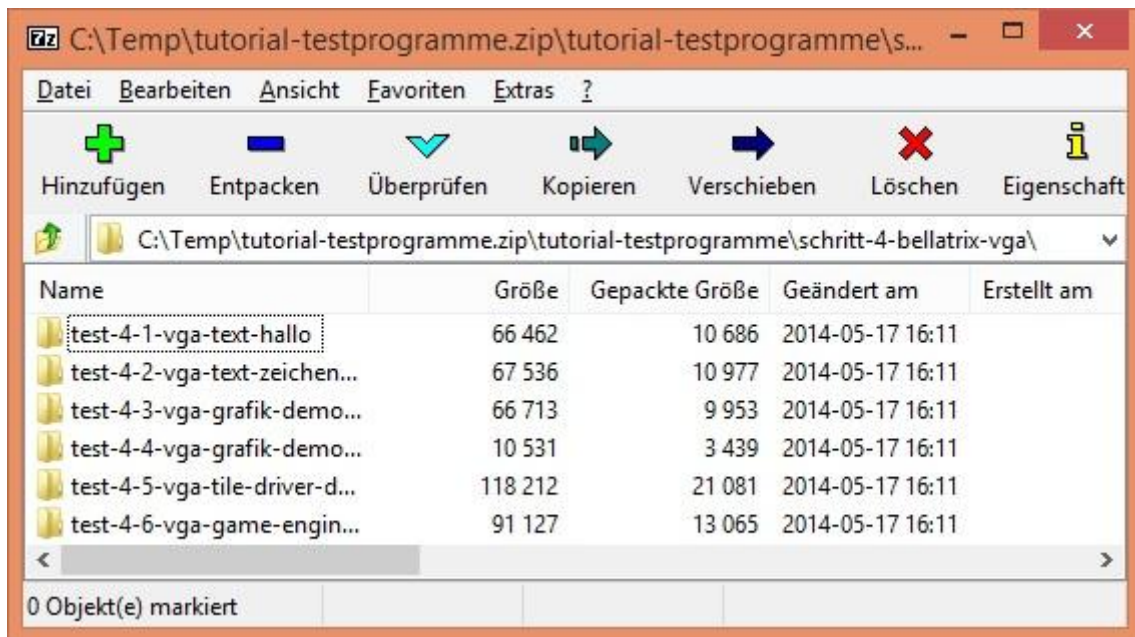
During placement of the must be embarrassing attention to the values: you swapped them, it may cause synchronization problems, or, in the case funniest to different color values. To experiment with are included in the package of the [test programs](#)⁴³ several example programs available, some demos of Parallax, which are adapted to the pinout in

⁴¹ <http://hive-project.de/downloads/29>

⁴² <https://www.youtube.com/watch?v=31ty-MjSuzw>

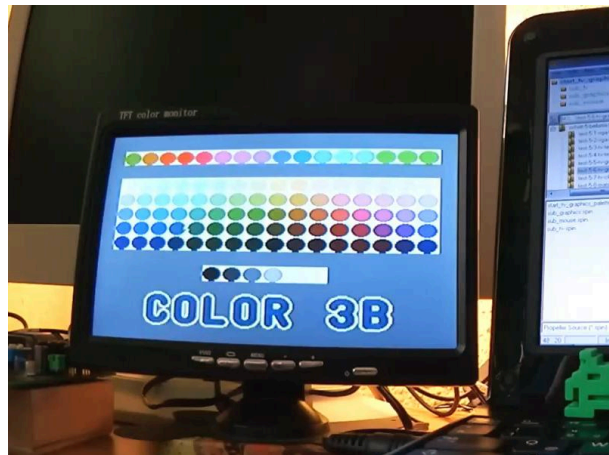
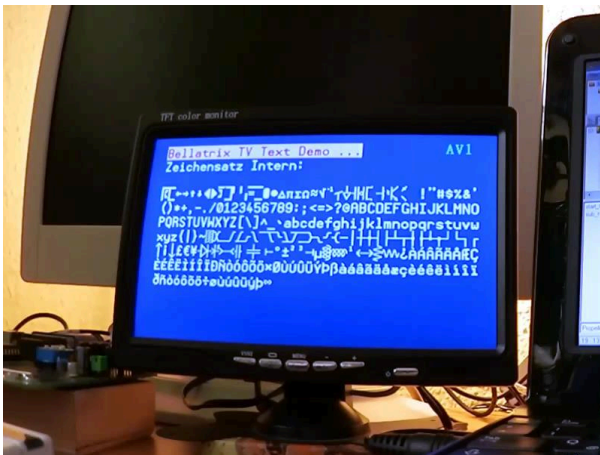
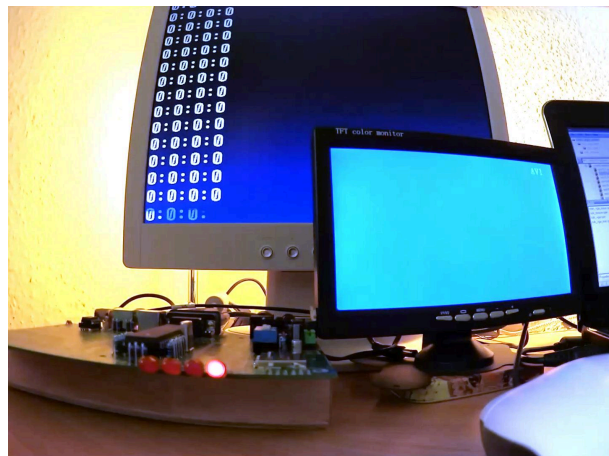
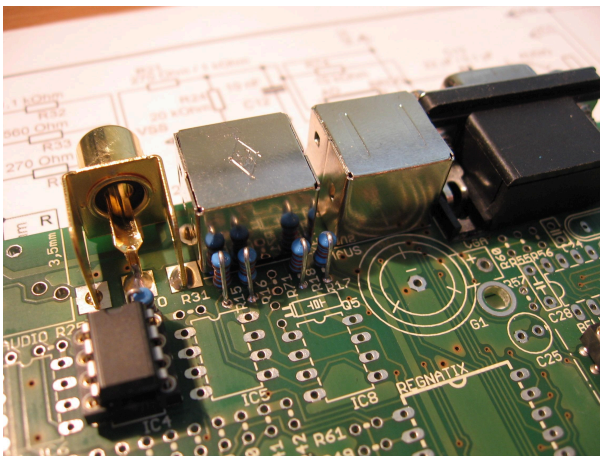
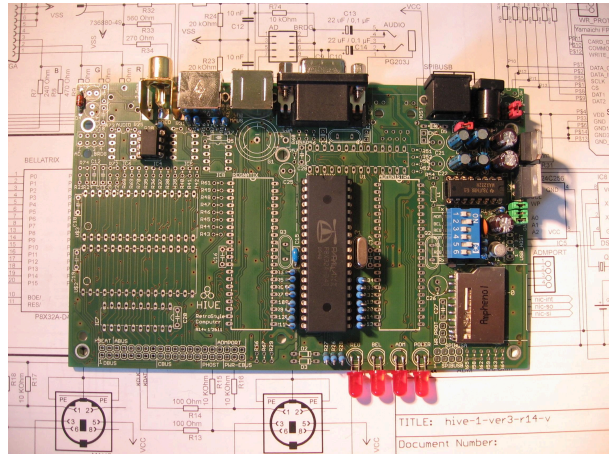
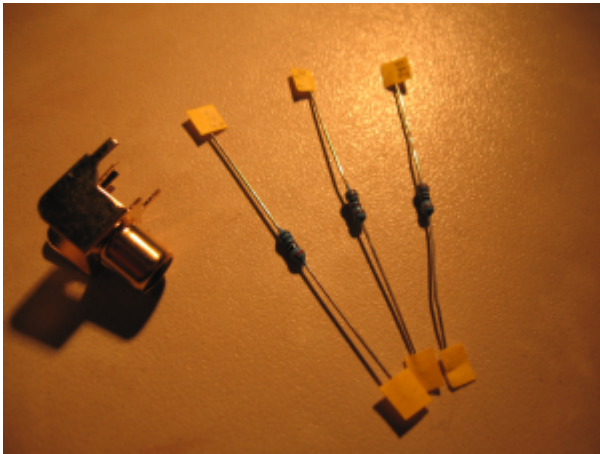
⁴³ <http://hive-project.de/downloads/66>

the hive. Are to be found in this subdirectory *step-4-bellatrix-vga*:



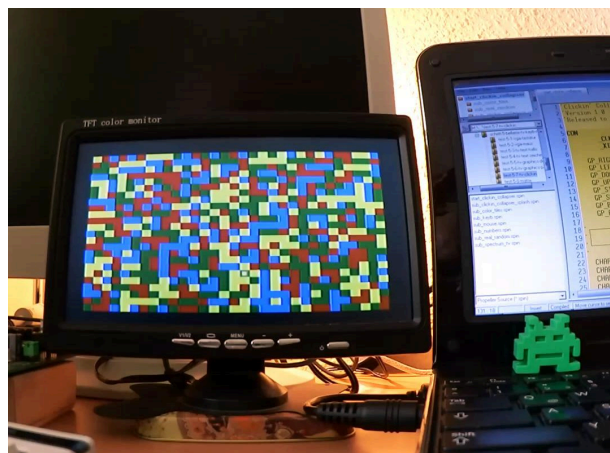
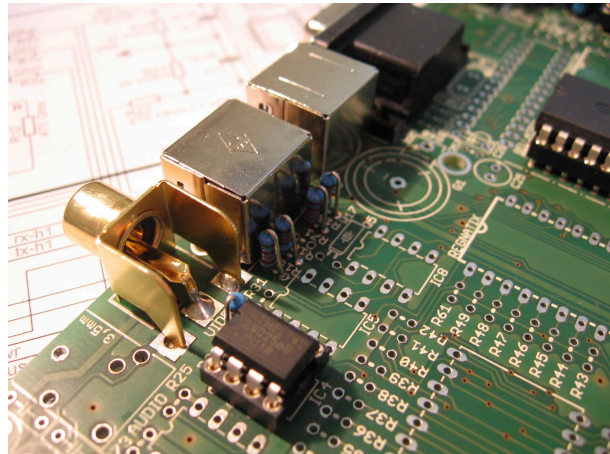
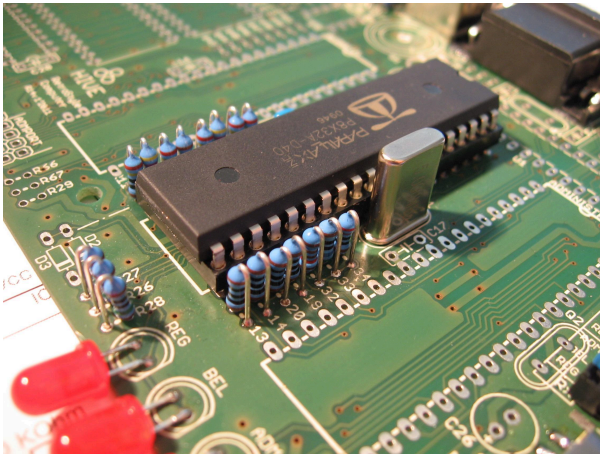
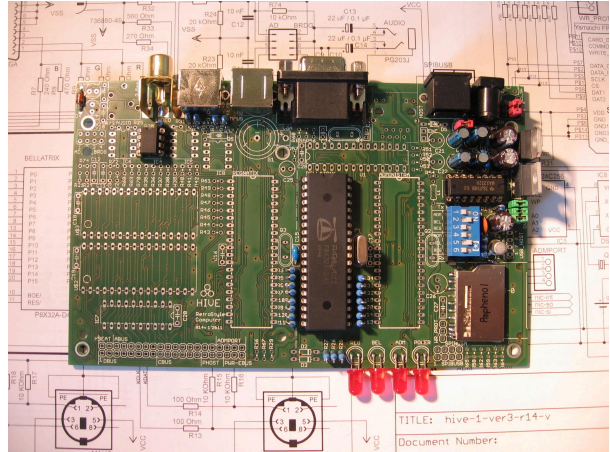
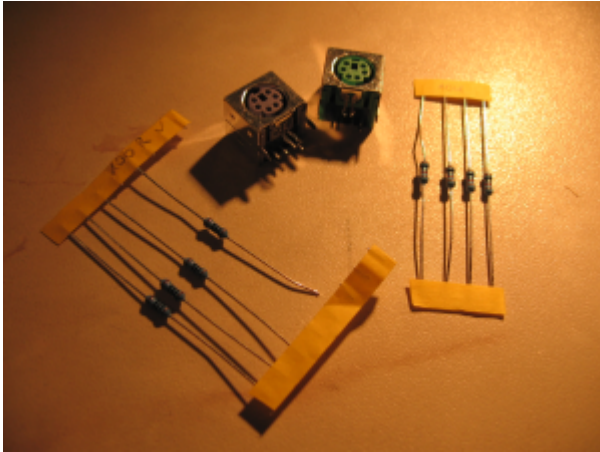
In most cases, a resolution of 1024 x 768 pixels provides a good basis to work, but it is also easily 1280 x 1024 pixels in text mode possible. The text modes are tilebasierte driver to realize the smallest possible frame buffer full graphics in these resolutions only with Bellatrix not possible due to the high memory consumption. For fast graphics and a corresponding color palette the TV mode is the first choice to work but the VGA mode is a fine thing. A nice simple text mode with the feeling of C64 and Atari800, only with an absolutely clean and flicker-free representation-.

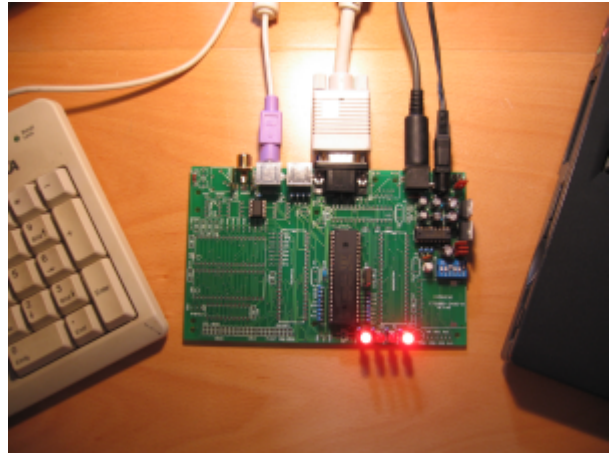
Step 5 Television and PS / 2 interfaces



Who has a TV available should test the video output. At this, the propeller provides a composite video signal that can be represented on TV, if it has a SCART socket with appropriate programming. If just one monochrome image appear, the software provides an NTSC signal. Most of today's TV sets can, however, represent both PAL and NTSC and recognize the corresponding signal automatically. Can the TV but only PAL, you have to switch to the corresponding mode in the source code of the demos. How to recognize it, the graphics output is on the propeller almost completely by software, only a 32-bit video

Shifter is the minimalist hardware in the core. Thus, the system is very flexible: What am I in which screen line where, how and when performing, only determines the software running in one or more Cog's. How tile-and grid-based display modes, as well as every conceivable mixed form can be realized. The only limit is the available HubRAM, in which the Bildwiderholungspeicher is. Sprites are superimposed by Cog's in sync with the image output in real time and also real-time oriented Vektormodus similar to the Vectrex console would be conceivable. For fast and of many colors of the TV's video mode is compared to the VGA mode the first choice, if only due to the small screen buffer required diagram.





components

- R32 to R34
- RCA jack
- R13 to R20
- x 2 PS/2-socket

[No. 2 - schema2.jpg](#)⁴⁴

sequence [Construction [video at](#)⁴⁵ Youtube]

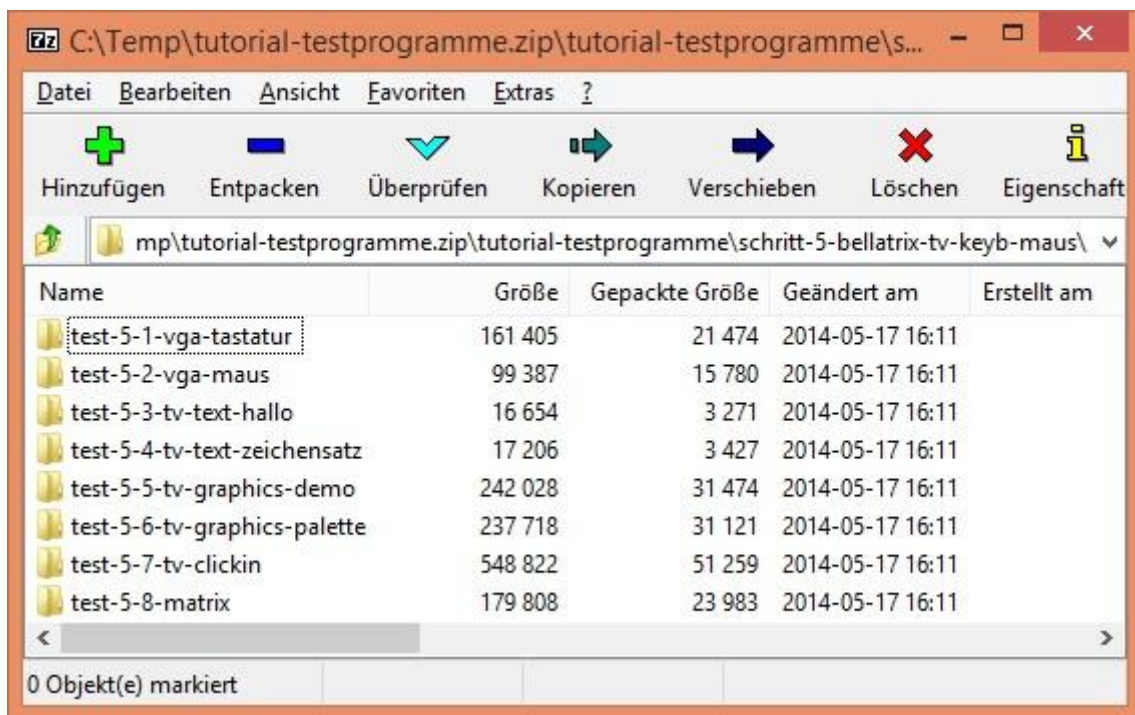
Three resistors, an RCA jack and even spits Bellatrix graphics demos from -. easier it is no longer In addition, within Regnatix nor the remaining resistors and the two PS/2-Buchsen loaded from the list of devices. So then the PS/2-ports can be put into operation in order to connect to it keyboard and mouse.

The test software to be found in the [test programs](#)⁴⁶ in the subdirectory *step-5-bellatrix-tv-keyb-mouse*:

⁴⁴ <http://hive-project.de/downloads/29>

⁴⁵ <https://www.youtube.com/watch?v=nn69UIHuci4>

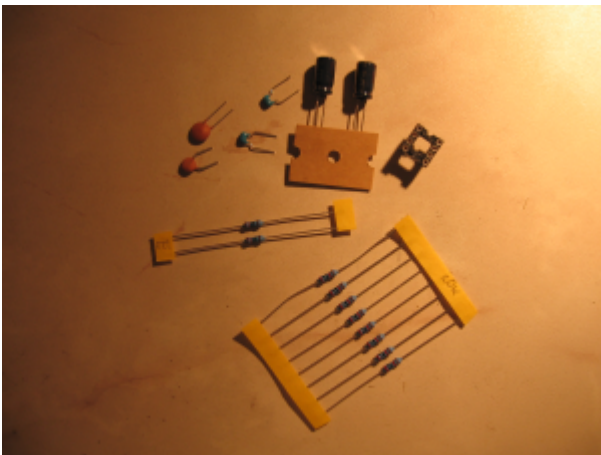
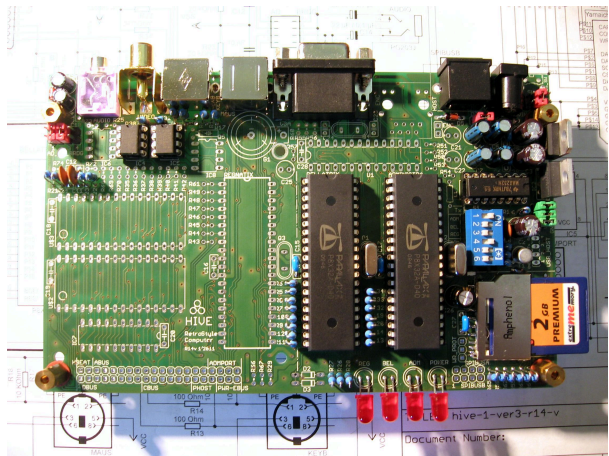
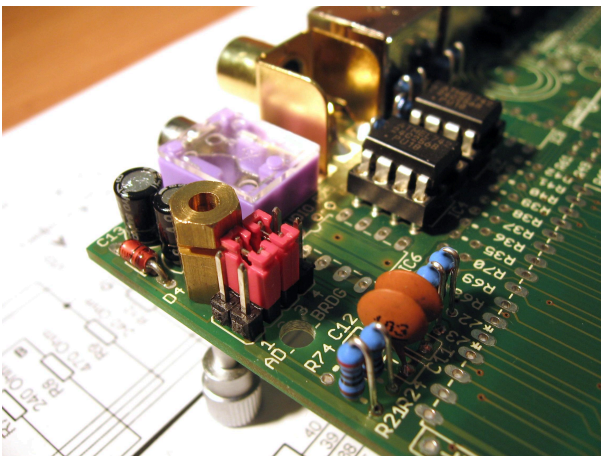
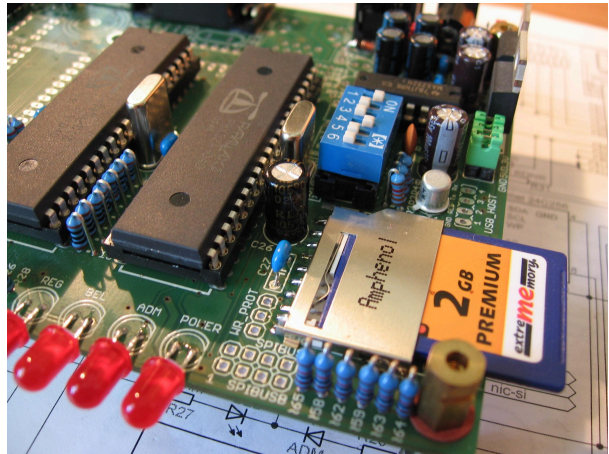
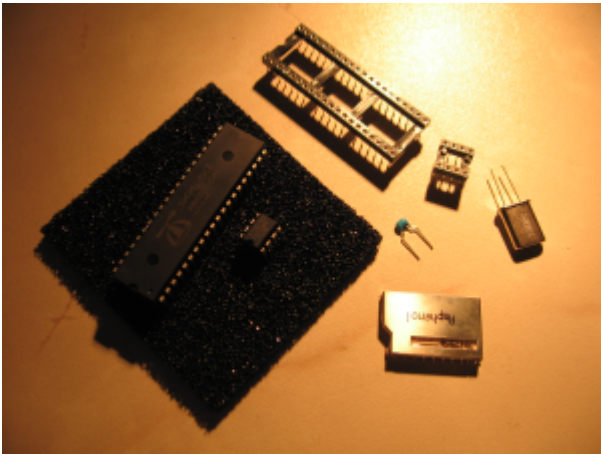
⁴⁶ <http://hive-project.de/downloads/66>



The first two programs to test keyboard and mouse and produce some output on the VGA interface. The other test programs including the TV out of the hive and demonstrate what now everything can start with the Hive. The best just try all of the test programs and see what happens.

Thus, the first propeller chip is fully stocked and we can turn to administrators. A parenthetical remark should, however, allow me at this point: to write such a tutorial takes significantly longer than to build a hive and just because I am a very obedient drone I prefer the time now by. ;)

Step 6 - Administration and sound



devices

- 40-pin socket for administrator (pin 1 note)
- Propeller chip (Administrata)
- 8-pin socket for the EEPROM (Pin1 note)

- IC5 EEPROM
- jack
- R21 to R24
- C11 to C14 (polarity of the electrolytic capacitors note)
- C17
- HB2 LED (ADM) (observe polarity!)
- Q2 quartz
- 2x 4-pin male connector
- 2x jumper

wiring diagram: [number 2 - schema2.jpg](#)⁴⁷

sequence [[Build video on](#)⁴⁸ Youtube]

The placement of administration is thus analogous to the first propeller chip and should now quickly go out of hand. As can be verified with the heartbeat LED with the same test program, the function of the propeller and chips from the flash ROM. Do not forget on the DIP switch to change the settings of Bellatrix on administrator, otherwise the wrong propeller chip is addressed variants:

The wiring diagram for the audio circuit includes a plurality of mounting

- the "original" version with a small headphone amplifier (TDA7050 - was very sensitive and how not even necessary) and out put
- a simple variant without the amplifier is still but strong enough for connecting to powered speakers.

Here are the simple assembly for connecting to powered speakers will be presented at the jack. This simple version is perfectly made, I myself use exactly this circuit and have an excellent sound quality. So please fit exactly and with these values, let all the additional components from the main circuit diagram simply unequipped!⁴⁹

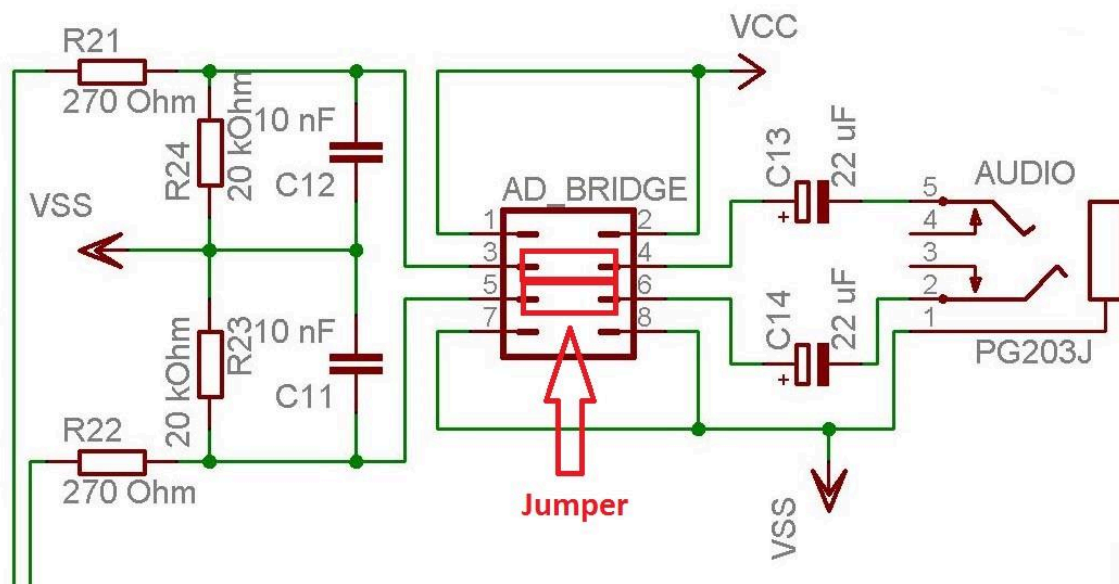
In AD_BRDG 2x 4pin pin headers are soldered. Need to activate the audio circuit uses pins 2/7 and 4/6 of AD_BRDG connected by jumpers. It is applying the left and right channels on the jack.

Whoever wants to process the signal itself in the Hive, this can tap on AD_BRDG pin header and feed it back to the phone jack. Conceivable, such a case would be with a built-in Hive housing amplifier with speakers.

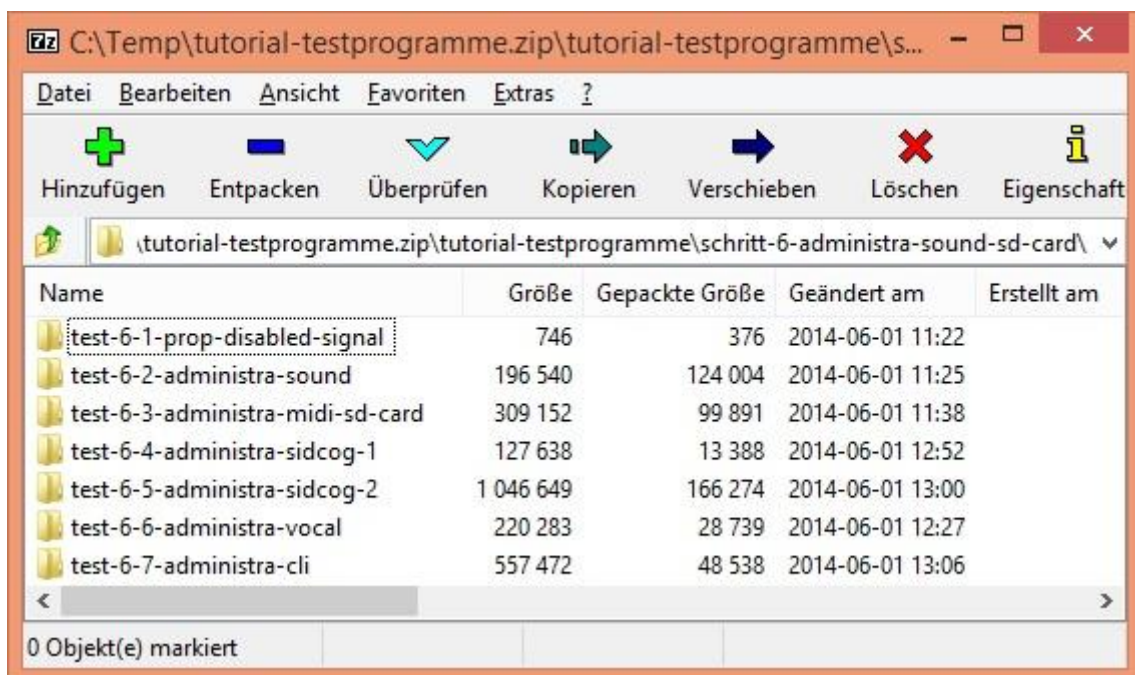
⁴⁷ <http://hive-project.de/downloads/29>

⁴⁸ <https://www.youtube.com/watch?v=tRlJmJhv6Kk>

⁴⁹ D. h. Kondensatoren C9/C10 sowie die und Widerstände R72/R74 nicht bestücken!



Once this work is done you can start the test, administration was supposed to run in principle as we have already checked with the LED test. The test software can be found as usual at the [test programs](#)⁵⁰ in the subdirectory *step-6adminis-sound-sd-card*:



test-6-2-adminis-sound - Plays an HSS tracker file with the Hydra Sound System from the. One may in the source code, Select HSS file (comment out), which is played on the player. This test checks only the sound hardware, as the MOD file is compiled into the data

⁵⁰ <http://hive-project.de/downloads/66>

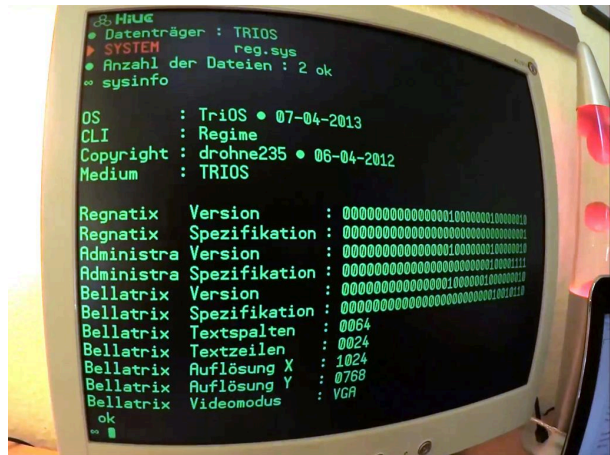
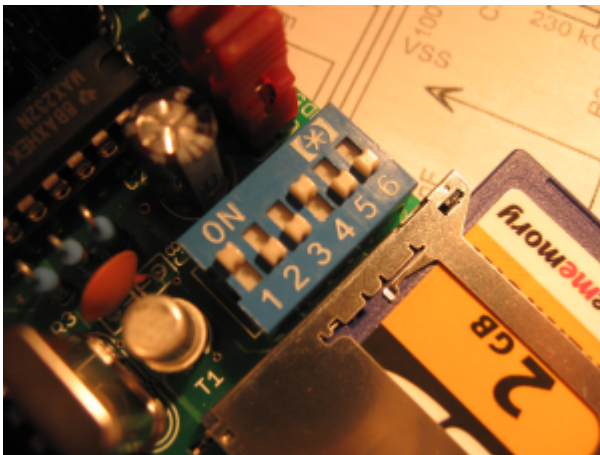
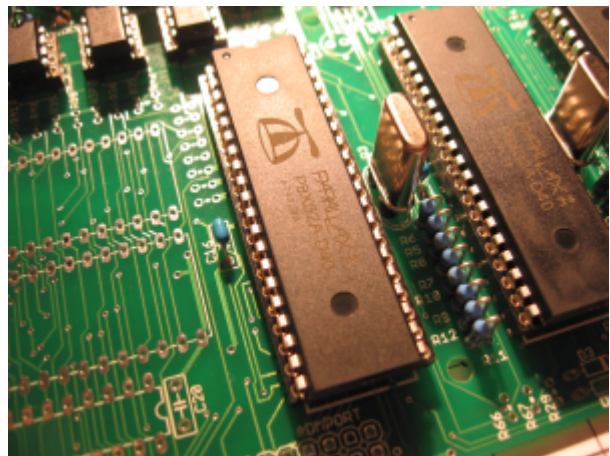
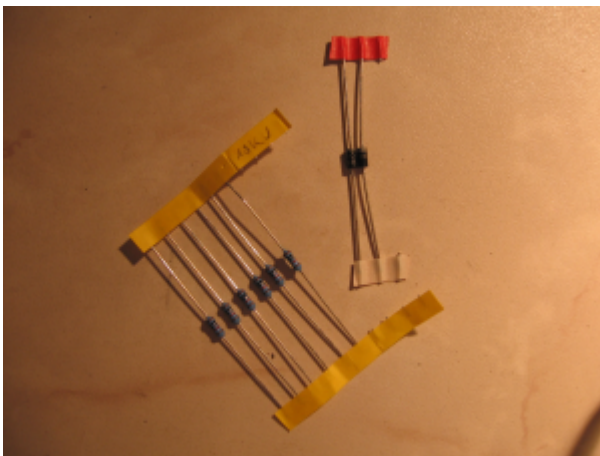
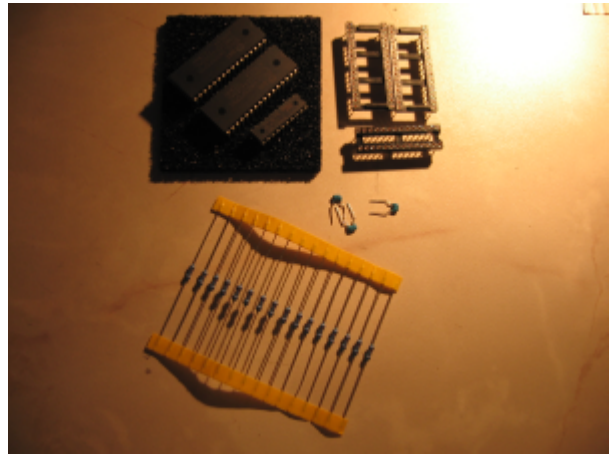
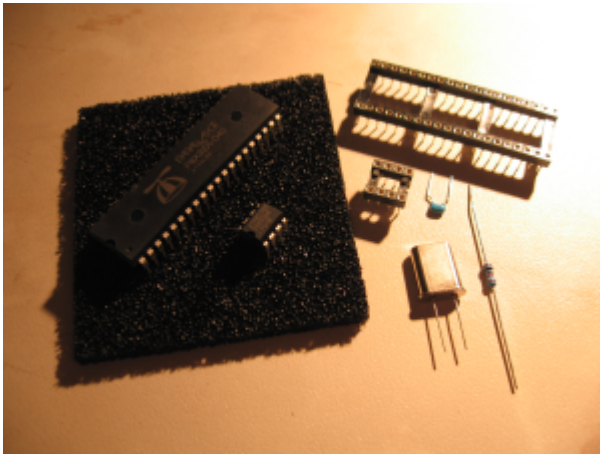
block - so he will not be charged in this demo at runtime by the drive-.

test-6-3-adminis-midi-sd-card Plays in turn the Midi files on the SD card. Before that, of course, need these files are copied to a maximum of 2 GB (FAT16!) large SD card and this must of course also stuck in the connector. Sounding of the Midi's, the sound hardware and the connection is ready to the SD card.

Besides, there are other programs to produce audio output. By means of the programs in *test-6-4-administrative sidcog-1/2* you can play SID files. In this case, the audio signal is synthesized directly in the Propeller chip. A Bundestag atmosphere can be triggered with the files *test-6-6-adminis-vocal* provide.

Should there be problems with the test programs, a look into the directory *test-6-7-adminis-cli* help. With the program *start_admcli.spin* you can open a command line on the serial port at the Hive in order to be able to about the problem (hopefully) narrow somewhat-.

Step 7 Regnatrix, latch and SRAM



components

- 40pin. Sockets for Regnatrix (Pin1 note)
- Propeller chip (Regnatrix)
- 8pin Socket for EEPROM (Pin1 note)

- EEPROM IC6
- 20pin socket latch for
- 2 x 32-pin. Base for the Rams
- R25, R29, R35 to R49, R61, R68 to R70, R73,
- HB3 LED (REG) (note the polarity!)
- Q3 quartz
- D2 and D3 (note polarity)
- C16, C18 to C20 decoupling capacitors next to the bases of the chips
- U \$ 2 U \$ 3 RAM modules
- IC7 latch 8bit
- SD card - size is (almost) no matter, for example, 2 GB

wiring diagram: [number 3 - schema3.jpg](#)⁵¹

sequence [[Build video on](#)⁵² Youtube]

The layout and the basic test (LED) of Regnatix and the external RAM must now like a no-brainer. Note, as always, the housing from the quartz and the correct orientation of the base markings of pin 1 and of course the circuits themselves Besides their sockets supporting capacitor each soldered. During the examination of the supply voltages at the bases is important to note that both the latch as the two memory circuits are supplied with 5V. Propeller however, run at 3.3 V. If you want to know more how does that square is under construction video for more information.

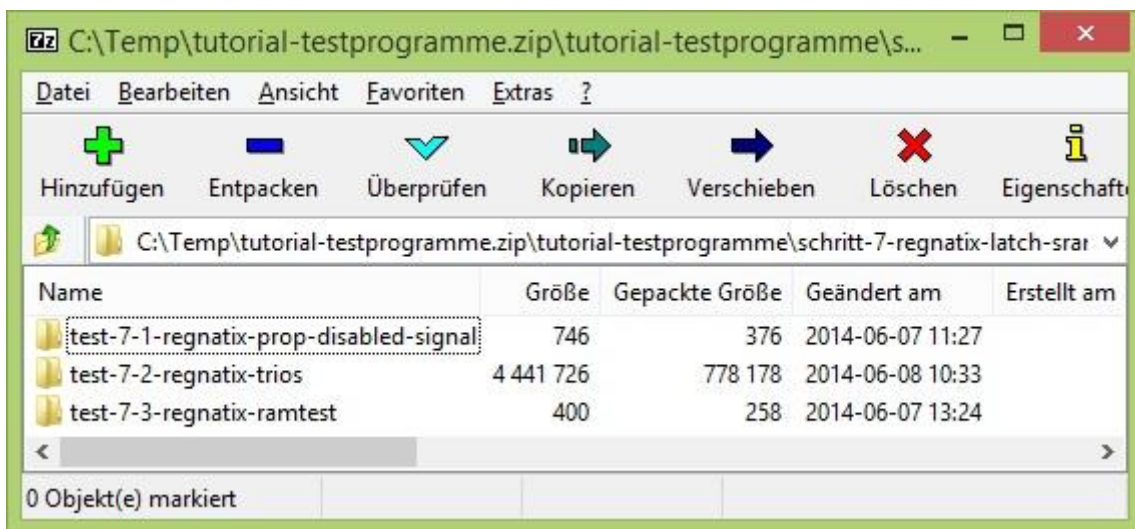
The test is designed in two stages. First, it is tested with a small test program to determine whether Regnatix basically works. All other tests are then now directly in TriOS, the operating system for our hive instead. The test software can be found as usual at the [test programs](#)⁵³ in the subdirectory *step sram-7 regnatix-latch-*.

Firstly, ie the gross Regnatix test with the program *start-prop-disable.spin* in the subfolder *test-7-1-regnatix-prop- disabled* signal. After transferring to the propeller (DIP switches set correctly!) Should Regnatix to blink with the famous report.

⁵¹ <http://hive-project.de/downloads/29>

⁵² <https://www.youtube.com/watch?v=EJyqtZR8dyc>

⁵³ <http://hive-project.de/downloads/66>

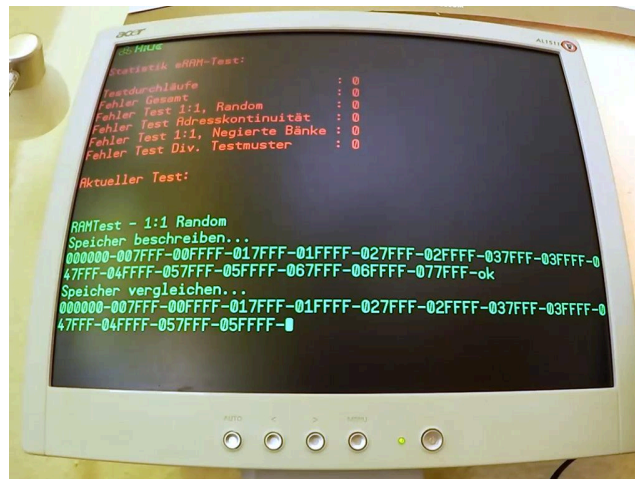


Has the function test of Regnatix delivered the desired result, is next to the installation of TriOS. Dazu in das Unterverzeichnis *test-7-2-regnatix-trios* wechseln. Dort findet sich das komplette TriOS, verteilt über einige Verzeichnisse. Für den Moment ist aber nur das Verzeichnis *bin* wichtig. Darin gibt es wieder zwei Verzeichnisse, die folgendermaßen verwendet werden:

- *flash* - wird in die EEPROMs der Propeller übertragen. Dazu wird das Propeller Tool von Parallax benötigt, mit BST geht es nicht! Wenn das Propeller Tool installiert ist, dann einfach auf die einzelnen Dateien doppelklicken um die Dateien damit zu öffnen. Wichtig: es reicht nicht den Code in den RAM zu übertragen, da bei jedem weiteren Übertragungsvorgang zu den anderen Propellern ein Reset ausgeführt wird und somit der Inhalt des RAM hinfällig ist – also ab jetzt zum testen immer **flashen!**
 - *admflash.binary* → Administra.
Nach der Übertragung sollte direkt ein anschwellender Ton zu hören sein (der Ton steht für das Mounten der SD-Karte).
 - *belflash.binary* → Bellatrix.
Nach der Übertragung meldet sich Bellatrix mit dem Hive-Logo in der linken oberen Ecke auf dem Bildschirm.
 - *regflash.binary* → Regnatix.
Nach der Übertragung hört man einen Herzschlag-Sound, der mit der Zeit abebbt. Außerdem erscheint eine Kommandozeile auf dem Bildschirm.
- *sdcard* - wird auf eine SD-Karte gespeichert. Die Speicheranforderungen sind nicht hoch, eine alte 2 GB-Karte reicht völlig aus. Die SD-Karte am Besten nochmal neu formatieren, als Dateisystem wird zwingend FAT16- oder FAT32 benötigt.
 - *reg.sys* kommt direkt ins Hauptverzeichnis der SD-Karte.
 - *system*-Ordner kommt so wie er ist als Unterordner auf die SD-Karte.

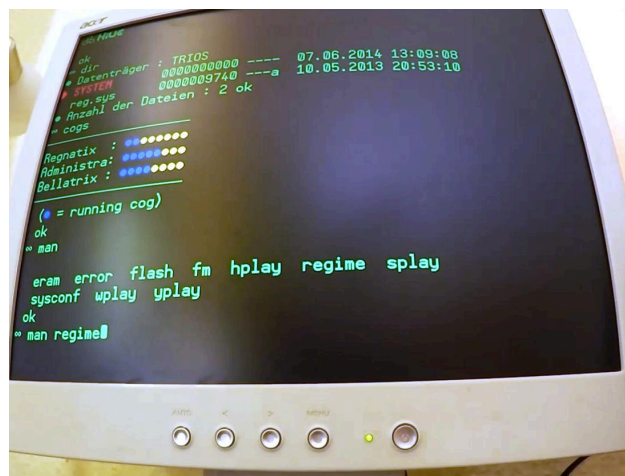
Mit dem flashen der einzelnen *...flash.binary*-Dateien hat man die jeweiligen Tests direkt mit gemacht. Im Anschluss daran geht es nun an den RAM-Test. Dazu auf dem Hive ins Unterverzeichnis *system* wechseln. Das geht mit den gängigen Kommandos, wie sie von Windows und Unix bekannt sind ("cd", "dir", usw.). Dort das Programm *ramtest* starten. Damit werden diverse Tests mit den externen Speicherbausteinen durchgeführt, was eine ganze Zeit lang dauert. Wenn das Programm keine Fehler anzeigt, dann ist alles in

Ordnung.



Sollte doch ein Fehler angezeigt werden, dann einfach nochmal prüfen ob evtl. irgendwo etwas nicht verlötet wurde, oder ob ein Kurzschluss eingebaut wurde. Falls TriOS gar nicht erst startet (denn ohne RAM startet es nicht), kann das *ramtest*-Programm nicht direkt gestartet werden. In diesem Fall kann man die Datei *ramtest.bin* aus dem *system*-Verzeichnis auch direkt mit Hilfe des Propeller Tools zu Regnatix übertragen und damit ausführen.

Nachdem alle Tests erfolgreich waren, kann man nun direkt erste Schritte in TriOS unternehmen. Einen ersten Einblick ins System bekommt man bspw. mit den Kommandos *cogs* und *sysinfo*. Mittels *one* kann man sich Hilfen zu den Programmen anzeigen lassen, etwa zur Kommandozeile Regime (*man regime*). Einige Bildschirm-Testausgaben gibt es in *beltest*. Am Besten einfach mal mit den Programmen im *system*-Verzeichnis spielen, um diese kennen zu lernen.

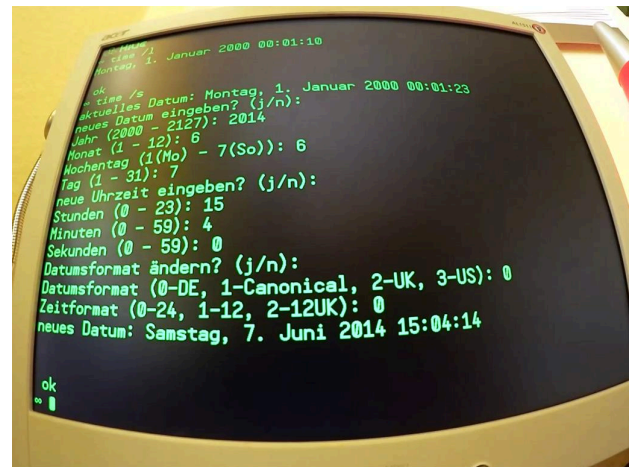
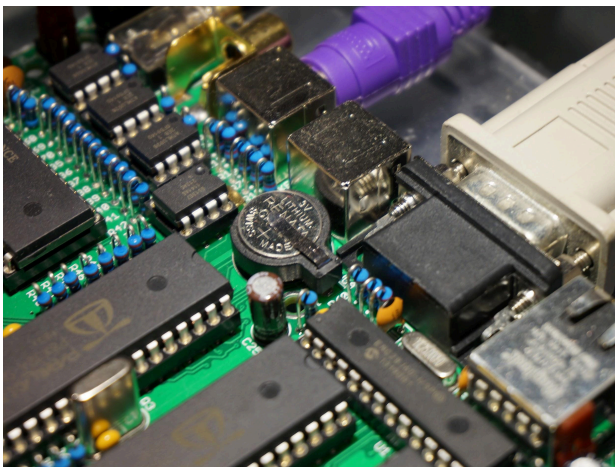
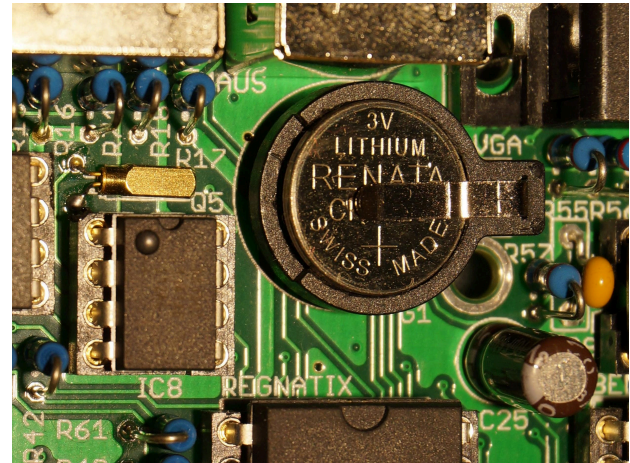
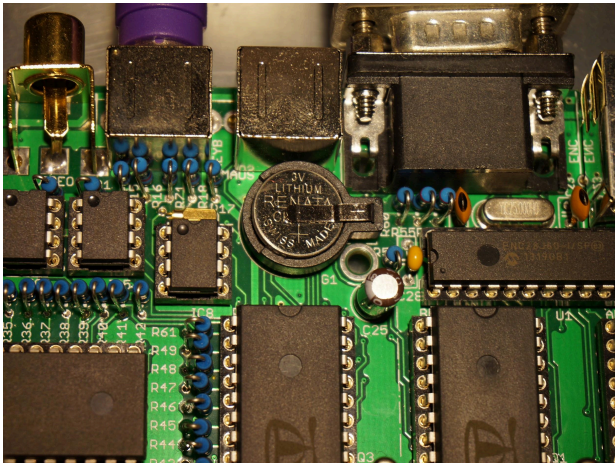


Im aktuellen Aufbauschnitt wurde ein großer Sprung gemacht vom einzelnen Propeller hin zu einem relativ komplexen Gesamtsystem. Wer sich die Zusammenhänge genauer

ansehen möchte, kann sich auf der [Hive-Webseite](#)⁵⁴ weitere Informationen dazu abrufen.

⁵⁴ <http://hive-project.de/support/build-your-os-der-regnatix-code-seite-1>

Schritt 8 – Uhr und Reset-Taster



Bauelemente

- IC8 Echtzeituhr
- Sockel DIP-8
- Q5 Uhrenquarz
- G1 Knopfzellenhalter
- Knopfzelle CR1225
- R71 PullUp-Widerstand (am Pin SCL des Uhr-Chips)
- RES_SW Reset-Taster

Schaltplan: [Nummer 3 - schema3.jpg](#)⁵⁵

⁵⁵ <http://hive-project.de/downloads/29>

Ablauf [[Aufbau-Video bei Youtube](#)⁵⁶]

Um nachher einen guten Vergleich zu haben, was sich durch die Bauteile in diesem Schritt am Hive verändert kann jetzt erst nochmal direkt den Hive starten, so wie er nach Schritt 7 ist. Auf der Kommandozeile nun die zwei Befehle eingeben und schauen, was ohne den in diesem Schritt eingebauten Chip für die Echtzeituhr passiert:

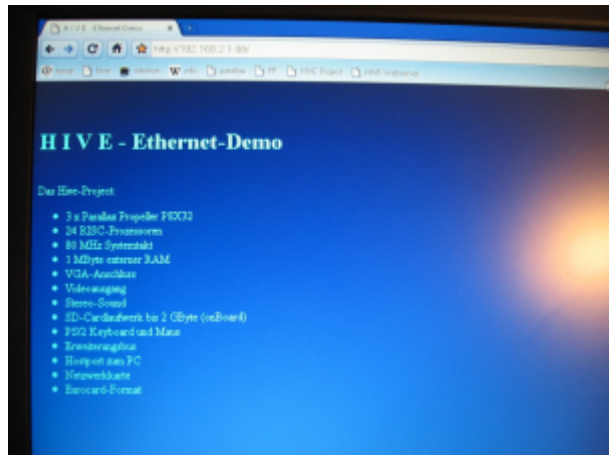
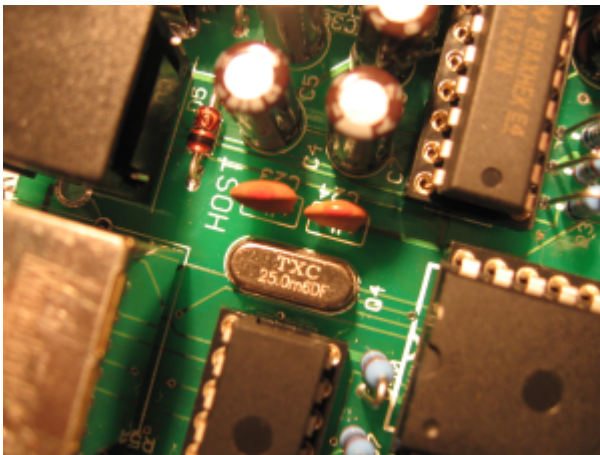
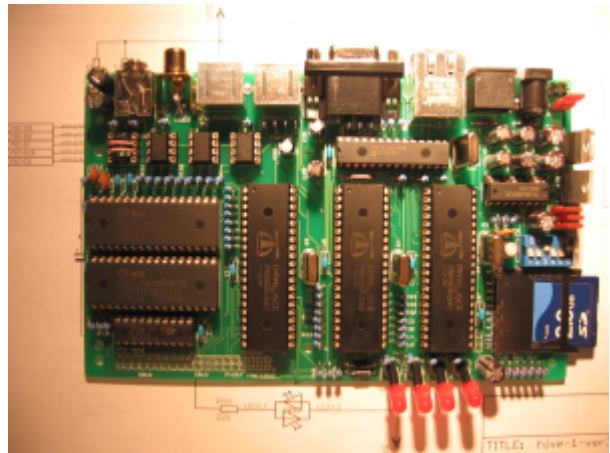
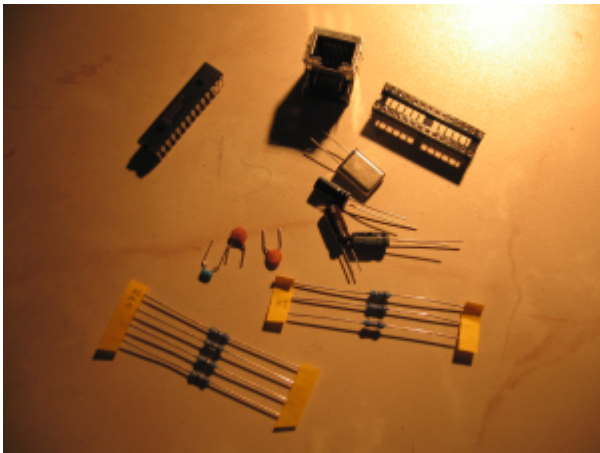
- `time /d` → liefert die Ausgabe "2065-65-66" als aktuelles Datum.
- `time /t` → liefert die Ausgabe "65:65:65" als aktuelle Zeit.
- `time /l` (kleines L) → liefert Datum und Uhrzeit als formatierten Text.

Die Bestückung gestaltet sich in diesem Schritt relativ einfach. Einzig die Bestückung des Uhrenquarzes könnte sich als Geduldspiel erweisen, da dieser doch sehr klein ist. Man kann diesen ggf. zunächst mit einem winzigen Kleckser Sekundenkleber fixieren, bevor man ihn anschließend festlötet. Die restlichen Bauteile werden wie gehabt aufgelötet. Beim IC8 und dessen Sockel die Kennzeichnung von Pin 1 beachten. Die Batterie ebenfalls in den Knopfzellenhalter stecken, damit der Hive die Uhrzeit nicht wieder vergisst, wenn er ausgeschaltet wird.

Zum Test kann jetzt wieder ein Aufruf der `time`-Befehle erfolgen, bspw. von `time /l`. Nun sollte bereits ein - im Vergleich zum ersten Test - gültiges Datum erscheinen, wenn auch noch nicht das aktuelle Datum. Das aktuelle Datum und die Uhrzeit kann jetzt mit dem Befehl `time /s` gesetzt werden. Ein erneuter Aufruf von `time /l` zeigt an, ob der Hive die Daten wie erwartet in der Echtzeituhr gespeichert hat. Auch nach dem Aus- und Einschalten des Hives sollten Datum und Uhrzeit noch da sein und entsprechend dem Zeitverlauf fortgeschrieben werden.

⁵⁶ <https://www.youtube.com/watch?v=EJyqtZR8dyc>

Schritt 9 – Netzwerkinterface



Bauelemente

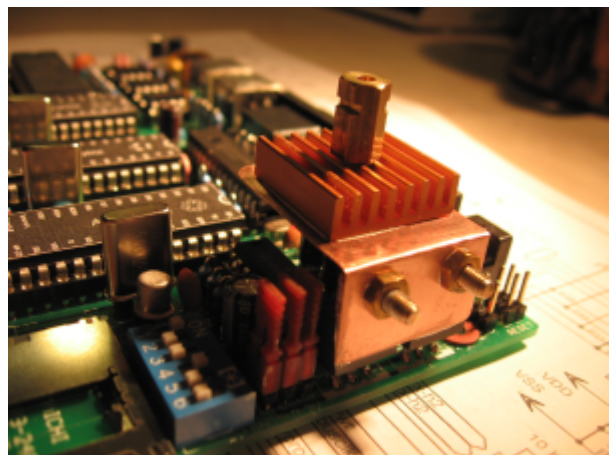
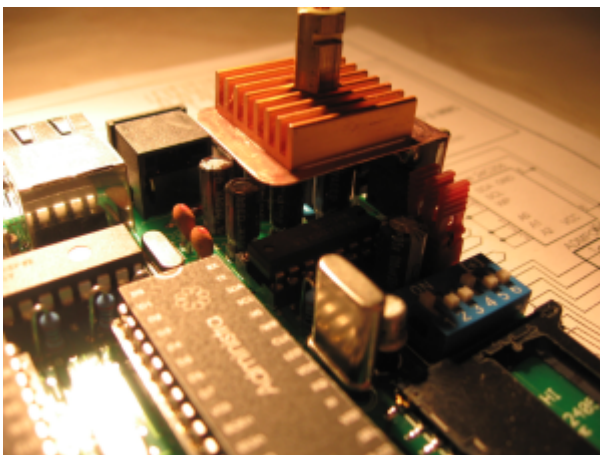
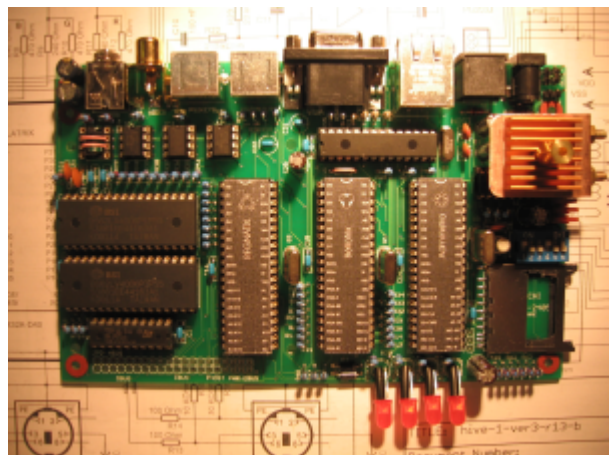
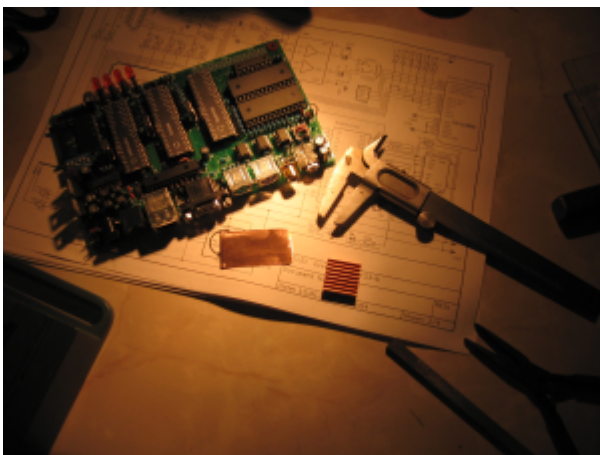
- 28pol. Sockel für NIC
- U1 Ethernet-Chip
- L1 Festinduktivität
- Q4 Quarz
- MagJack Netzwerkbuchse
- R50 bis R57, R60, R66 bis R67
- C21 bis C25, C28
- 2pol Stiftheiste für ENC-Pinheader
- Jumper
- 2x Kühlkörper für Spannungsregler

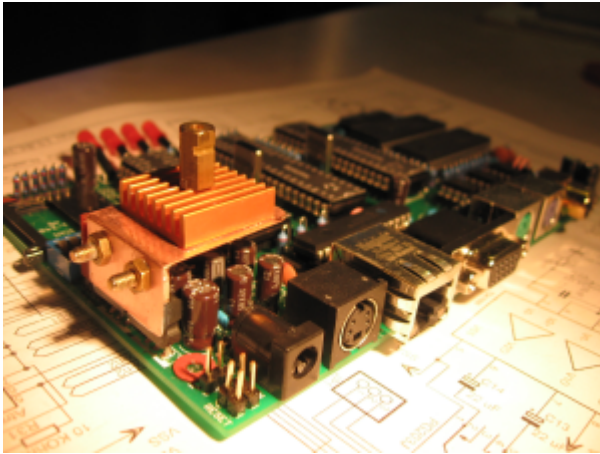
Ablauf

Achtung: Ausdrücklich nochmal der dringende Hinweis, auf die richtige Netzwerkbuchse zu achten! Es muss eine MagJack SI-60062-F oder SI-60024-F sein. Die einfache Buchse, wie sie im vorgefertigten Reichelt-Warenkorb enthalten ist **funktioniert nicht!**

Alle genannten Bauteile einlöten. Bevor es mit dem Test losgehen kann muss auf die eingelötete Stiftleiste bei ENC noch ein Jumper gesteckt werden. Dadurch wird die Stromversorgung des NIC hergestellt. Da der ENC-Chip einen relativ hohen Verbrauch hat, ist das Abschalten eventuell für einen mobilen Einsatz interessant.

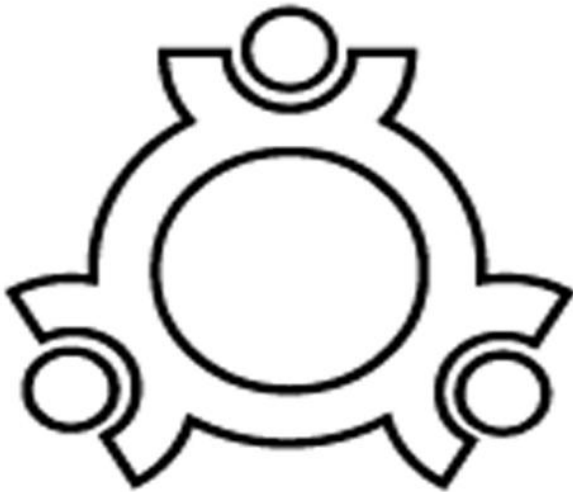
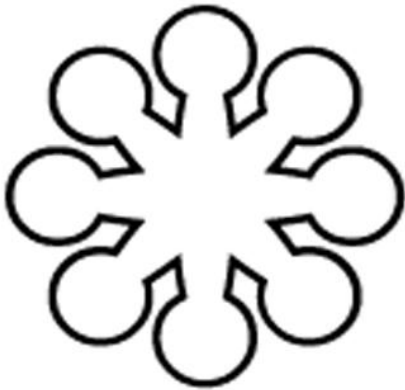
Das Testprogramm für den NIC läuft auf dem Administra-Chip. Die LAN-Schnittstelle ist dafür mit einem normalen LAN Kabel mit einem Switch, oder mit einem Crossover-Kabel direkt mit der Netzwerkbuchse eines anderen Computers zu verbinden. Bei einem erfolgreichen Connect leuchtet die in der Buchse des Hive integrierte LED. Jetzt kann der Testcode in Administra übertragen werden. Dieses kleine Programm enthält einen kompletten TCP/IP-Stack und einen minimalistischen Webserver. Die IP ist im Quelltext veränderbar und steht normalerweise auf dem Wert 192.168.2.1/24. Der Webserver lauscht auf dem Port 88. Nun kann man über einen anderen an das LAN angeschlossenen Computer im Browser unter folgender Adresse <http://192.168.2.1:88/> auf die Test-Webseite zugegriffen werden.





Bitte folgendes beachten: Mit bestücktem NIC sollte man den beiden Spannungsreglern einen **Kühlkörper** spendieren. Ein passendes Modell findet sich in der Stückliste bei den optionalen Bauteilen. Die Kühlfahnen beider Regler liegen auf dem gleichen Potential (GND) und können deshalb ohne Isolierung auf dem gleichen Kühlkörper verschraubt werden. Ich selbst habe dafür ein Stück verfügbares Kupferblech verwendet, welches ich abgewinkelt habe. Auf der Oberseite habe ich einen kleinen Kühlkörper von einer defekten Grafikkarte aufgeschraubt. Alle Kontaktflächen von dem Kupferblech zu den Reglern bzw. zu dem Kühlkörper habe ich mit ein wenig mit Wärmeleitpaste versehen.

Schritt 10 – Buchsenleisten



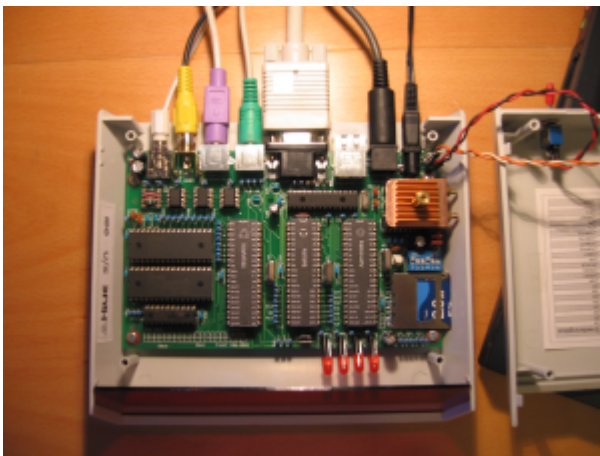
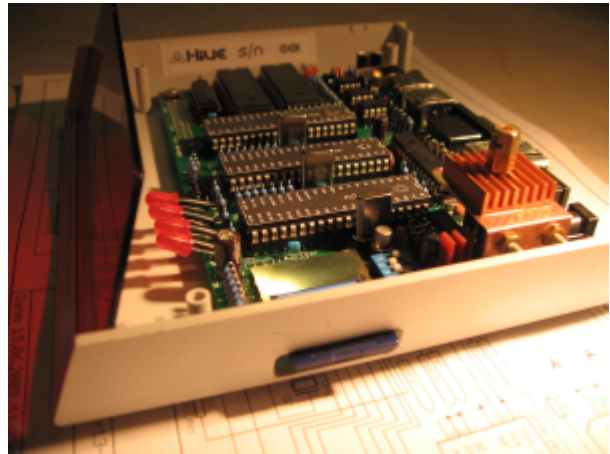
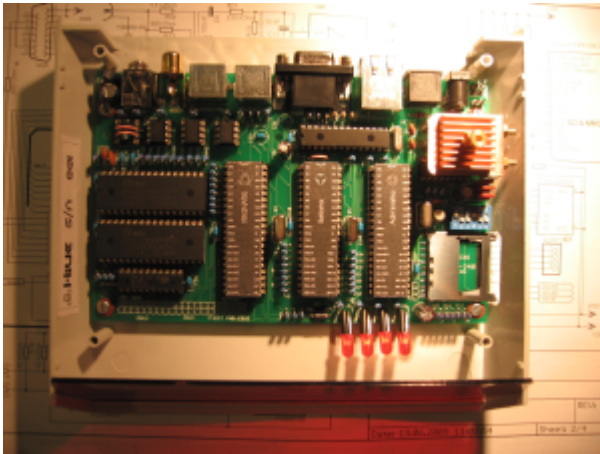
Bauelemente

- Buchsenleiste
-

Ablauf

folgt
(Erweiterungsbuss + SPIBUS)

Abschluß



Als letztes kannst du eine der Toolbox-Pakete downloaden, sie enthalten eine komplette Zusammenstellung an verfügbaren Tools, Demos und Spiele wie zum Beispiel das Game Boulder Dash oder den StarTracker.

Die Arbeiten am Gehäuse überlasse ich jedem Bastler selbst. Kurze Kabel für den Reset-Taster und den Einschalter mit einem zweipoligen Stecker findet man in jedem alten PC-Gehäuse – evtl. hilft da ja der nette Computerhändler um die Ecke aus. Verwendet man das abgebildete Teko-Gehäuse welches man auch bei Reichelt beziehen kann ([siehe Stückliste unter optionale Bauteile](#)), muss der hintere Durchbruch nach unten ein wenig erweitert werden und es fehlt ein seitlicher Schlitz für die SD-Karte. Mit einem Drehmel ist das in kürzester Zeit erledigt, aber man muss sehr vorsichtig sein bei dem weichen Kunststoff.

Zu beachten ist bei der Gehäusewahl auch eine spätere Aufrüstung, wie zum Beispiel durch die Sepia-Karte.

Zusätzliche Schaltpläne

