

GluemachineHC11

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COLLABORATORS

	<i>TITLE :</i> GluemachineHC11		
<i>ACTION</i>	<i>NAME</i>	<i>DATE</i>	<i>SIGNATURE</i>
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Chapter 1

GluemachineHC11

1.1 GluemachineHC11

```

*****
*                               \ | /                               *
*                               @ @                               *
*-----ooO- ( ) -Ooo-----*
*                               *                               *
*                               GluemachineHC11                   *
*                               *                               *
*-----*-----*
*                               *                               *
*      a simple controller based on Motorola 68HC11              *
*      © 1995 by Lars 'Gluemaster' Malmberg                      *
*                               *                               *
*                               FreeWare                          *
*                               *                               *
*****

```

Introduction
 Features
 Construction
 Software
 Bugs
 Author
 History
 Future

1.2 introduction

This is a hardware project to build a simple yet usable single-chip computer. The GluemachineHC11 is not at all as complex as the other similar controllers around (MiniBoard, HandyBoard, Fl-Board, ...) and is therefor cheaper and easier to build. It is contained on a 85x85 mm PCB. The trade off is most significantly the drivers for step

motors. My motivation for this project was to make a small tool to take with me that could do some neat flashing and such. Some of the things I've done so far is supplied here.

Further information on programming the 68HC11 can be found in Motorola's books on the issue and from the 'Introduction to 6811 Programming' by Fred G. Martin, which I really recomend you to read. The latter can be found via anonymous ftp on 'cherupakha.media.mit.edu', where you also can find loads of other related stuff concerning 68HC11.

1.3 features

- * Simple to build. Single-sided PCB.
- * Easy to use. On board RS-232 interface. The processor has RAM and EEPROM built in and is programmable directly through the serial port. (Only an assembler and a simple download program is necessary.)
- * All the goodies in the Motorola 68HC11 right at your fingertips. A/D converter, digital I/O, timers, edge counters, SPI and strobed parallel ports.

1.4 building

N.B. I assume you have the knowledge in all steps involved in making the board.
Therefor I won't get into any details at all.

First of all you will have to make the PCB.
There is a PostScript file included called 'PCB.ps' which is what you need to make the mask for the PCB.

Then you will have to get the Components.

Solder it together and connect it to the serial port of your host computer.

The pins of the ports on the board are arranged as follows:

Port A,B,C

Port D

Port E

```

-----
|      |
|D6  D7 |
|      |
|D4  D5 |
|      |
|D2  D3 |
|      |
|D0  D1 |

```

```

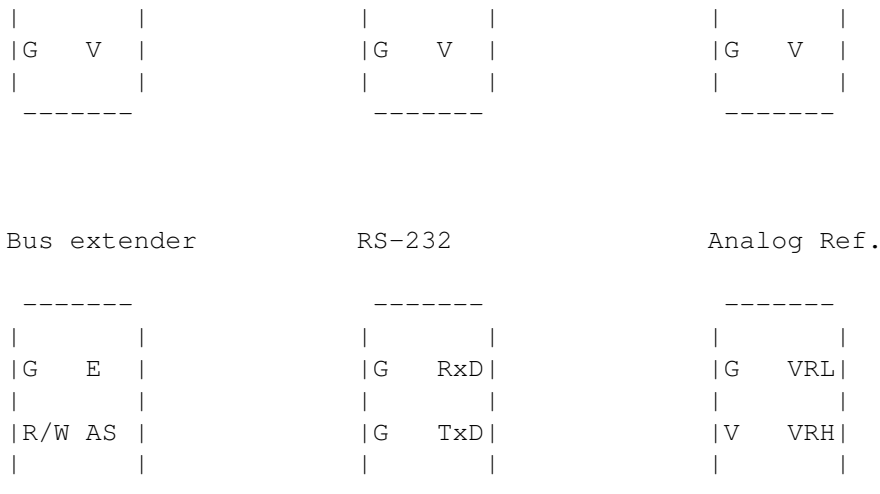
-----
|D4  D5 |
|      |
|D2  D3 |
|      |
|D0  D1 |

```

```

-----
|D0  D4 |
|      |
|D1  D5 |
|      |
|D2  D6 |
|      |
|D3  D7 |

```



This is all summarized on a small sticker which fits on the board between the processor and PortB - PortE. It is an EncapsulatedPostScript file called 'Sticker.eps'.

Remeber to mark where the G and V is on the connector so you won't screw things up by connecting the wrong way.

1.5 components

I live in Sweden and order from ELFA. I have supplied their order number where such is motivated.

Article	Component	Amount
	Resistor 10kOhm.....	5
	Resistor 1-20MOhm.....	1
	Capacitor 25pF.....	2
	Capacitor 220mF (Polyester).....	1
	Capacitor 1uF (Polyester).....	1
	Capacitor 4.7uF.....	2
	Capacitor 10uF.....	3
74-504-48	X-tal 8MHz.....	1
42-054-07	Battery connector 1.3mm.....	1
35-655-04	Button switch (Reset button).....	1
35-214-08	Switch (Mode switches).....	2
	2-pin DIP-switch.....	1
43-708-70	Connector array 2x20 (Cutable)...	2
73-023-26	MAX232CPE (RS232 converter).....	1
73-090-40	7805 (Voltage regulator).....	1
	MC68HC11E2FN (Any 52-pin PLCC)...	1

You will also need som other stuff to get going...

- * All the stuff to make the PCB. These depend on what method you choose. Single sided is enough.
- * Some connectors to connect to the board.
- * (25-pin) connector to connect the board with your computer.

* ...

ELFA (Sweden+rest of the world):
Orders +46-8-735 35 35
Fax orders +46-8-730 30 88
Telex 104 79 ELFA S (They really ARE reachable! :)
Mail ELFA
171 17 SOLNA
SWEDEN

ELFA (Norway):
Orders 800-101 35
Fax orders 800-101 36

1.6 computer

You need a host computer with an RS-232 port to program the board. Furthermore will you need an assembler and a simple download program.

1.7 assembler

There are several ways to create code for the 68HC11.
For the Amiga I must recommend ADev11 by Stan Burton.
It is a complete development environment for the 68HC11.

Another environment for the Amiga is the HC11Dev by Richard Karlsson, which contains HitAsm and HitMon11. It is an assembler and a kind of on-line debugger.

Furthermore there is Motorola's AS11 ported to Amiga by T. Grover.

For PC-clones there are, among others, AS11, and the same goes for UNIX-clones and MacDonald's I believe.

You will have to see for yourself what you can find for your platform. Look for 'Motorola', 'HC11' or '6811'.

1.8 download

The downloader in ADev11 environment is called 'HCLoad'.
Motorola's own is called dlm11 and is ported to Amiga by Henner Bartels.

1.9 adev11

ADev11 is a complete development environment containing C compiler, assembler, linker, librarian, simulator and downloader for the Amiga. It is maintained and partly programmed by Stan Burton, with assistance and cooperation of a number of people and it is freely redistributable. Just get it! Got it? :)

1.10 software

Here is a little test program which reads the serial port and writes out the recieved character on a LCD screen on Port B and write the recieved data on the serial line five times.

The program uses two link libraries made by me. One includes setup, read and write of the serial port and the other is an interface to the LCD display. The LCD display runs in 4-bit mode with the 68HC11 to avoid hogging more than one port. All this is done in the ADev11 environment and should be quite easy to port to any other assembler you might prefer, or at least state an example of what it might look like when programming assembler for the 68HC11.

```
Test
SerLib
LCDLib
```

Include files used in Test:

```
hc11reg.i
Ser.i
LCD.i
```

1.11 gluemachinehc11

The GluemachineHC11's main part is a Motorola 68HC11. The one I've used is 68HC11E2 which contains 2kbytes EEPROM and 256 bytes of RAM. The Board is quite handy for most small projects. The picture contained is of a Board of v1.0, a battery and a 7-segment display, with suitable driver electronics, fitted on Port B. Other expansions are in production right now, so if there is good response from this release, it might also see the light.

1.12 future

Please let me know if you are interested in expansions for this piece of hardware. The future is only up to you. If I won't get any response, I will drop public availability of further developments.

Right now I have:

- * a simple 7-segment card. (As seen on the Board.)
- * a soldering socket for analog input.
- * a MIDI interface. (IN, OUT, THRU)
- * a Bus extender. (To get the full bus for further expansions of addressable peripherals such as more RAM, EPROM, sound chips and so on.)

Planned in the (near) future is:

- * IR sensor and transmitter.
- * RAM, EPROM and Sound generation through 6581 (SID) on the expanded bus.
- * Unwired communication for RC boats. (Not NEAR future but nevertheless! :)

1.13 bugs

No known bugs...

The circuit has been tested fairly well without any sign of any fault so there doesn't seem to be anything seriously wrong.

I take no responsibility what so ever for your equipment, health or whatever!

1.14 author

The GluemachineHC11 is designed by Lars Malmberg using an Amiga 4000. I would really like (make that 'demand' :) to hear your comments concerning this piece of hardware and software.

I can be reached at:

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dat93lma@ludat.lth.se

or

snail: Lars Malmberg
Nobelvägen 147C
212 15 MALMÖ
SWEDEN

I can also be found on www:

<http://www.ludat.lth.se/~dat93lma>

1.15 history

v1.0 - No public realease. Only for my own testing testing.

v1.1 - This text.

- Added a switch to disconnect the Rx and Tx from MAX232 so it won't interfere with the signal on the PortD connector.
- Cutified the layout for a nicer appearance! :)

1.16 empty
