

# Jens Dyekjær Madsen

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## Asynkron VLSI design:

- [8-transistor delay-insensitive memory cell \(engelsk\).](#)
- [An asynchronous processor \(engelsk\).](#)
- [Some processor background, preliminary \(engelsk\).](#)  
(High Speed Processor, delay < ns per instruction (GHz)).

## Master project:

- [Two phase.](#)
- [Example of part of master project containing standard CVSL logic.](#)

## Elektronik:

- [Hardware simulator for Turbo Pascal \(engelsk\).](#)
- [PIC16C84 Programmer \(engelsk\).](#)
- [Tegnestiftastatur.](#)
- [Z80 bootloader \(engelsk\).](#)
- [Metastabilitet \(engelsk\).](#)

## Andet:

- [Printal / Multitasking.](#)
- [Kalenderprogram.](#)
- [PCB-layout utility.](#)

## Links til andre servere:

- [Asynchronous Logic Home Page.](#)
- [Asynchronous Processor Design.](#)
- [Caltech Asynchronous VLSI Group.](#)
- [The Event Controlled Systems Project.](#)
- [Counterflow Pipeline Processor Architecture.](#)
- [Avalanche Scalable Parallel Processor Project.](#)

## Andre links:

- [Klaus Hartnegg Pascal Page. Free pascal, BP7 compatible.](#)
- [Electric VLSI CAD software. Binaries. Just to run.](#)
- [Static free software - free VLSI design software.3d.](#)
- [Satelitmodtagning af vejret!](#)
- [Z80 homepage.](#)

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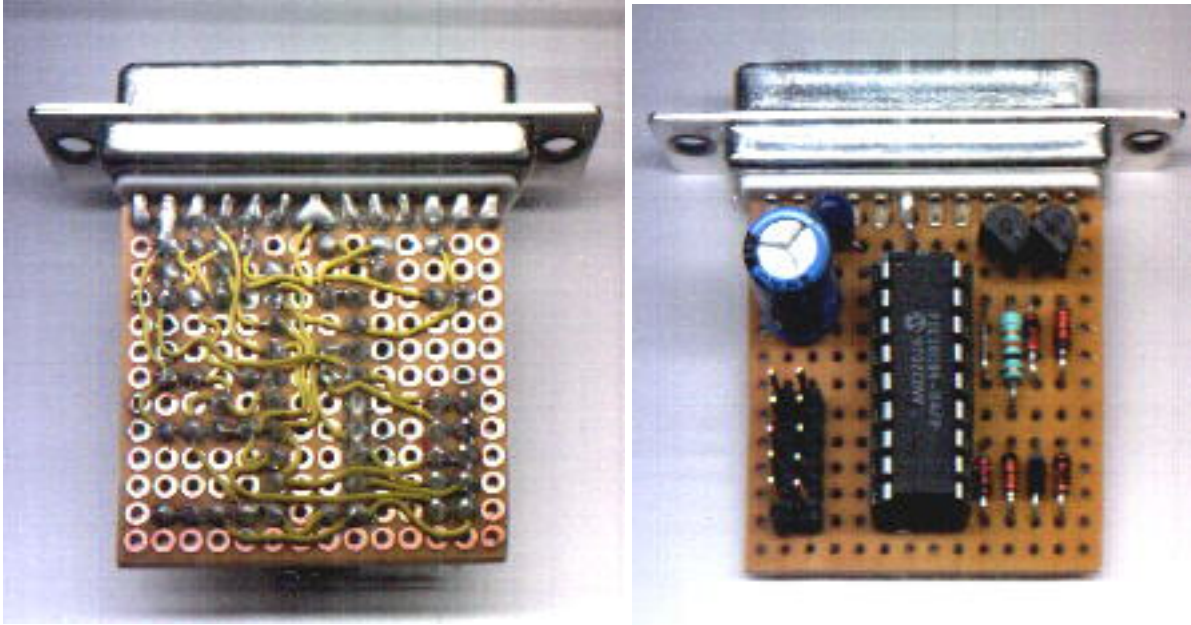
E-post adresse: [Gæstebog.](#)

# PIC-Programmer 2 for PIC16C84 etc.

This Programmer is powered by the RS-232 and it works with RS-232 levels at only  $< \pm 8.6V$ . It programs PIC12C5XX, 12C67X, 24CXX, 16C55X, 16C61, 16C62X, 16C71, 16C71X, 16C8X, 16F8X and ISO-CARD's with ASF. Other serial programmable chips by adapter.

[Schematic](#)

How to connect the wires.



The high  $V_{pp}$  is obtained by using negative voltage to drive the chip. The voltage is stabilized with zener diodes. They do not need voltage drop as if a voltage regulator, or has much offset current. This makes it possible to use extra low input voltage. Transistor driver guarantee output level  $> \pm 3V$ .

Features: Utilities now work on Dos, Windows 3.1, Windows 95, Windows 98 and are expected to work on all other operating systems. All software does modemcheck to ensure that modems flash are not programmed by programmer, e.g. if you forgot to swap cable between programmer and modem. It is now possible to program more chips at same time using more of the communication port's while multitasking under Windows. The software automatic optimize delay for cable length and works with modem cables up to 100m. It use the RS232 controler chip only, and does not invoke use of other timers. Also short programming pulses are now hardware controled. Laptops only tested with PIC16C8x and 24Cxx.

The Programmer supports [ICSP](#), In-Circuit Serial Programming.

D5 and D7 may be replaced by a BC557B. Emitter to MCLR and Collector to Vss.

[EEPROM adapter for this programmer. \(Supports Automatic Switch Function and LC types.\)](#)

[Schematic for the programmer.](#)

[PCB for this programmer.](#)

[Detailed Funtional Describtion.](#)

[Download PIP02 beta driver, JDM84V33.ZIP \(5K\).](#)

Works with windows too.

[Download PIC16C84 utilities, PGM84V34.ZIP \(38K\).](#)

[Download PIC16C84 utilities, PGM84V35.ZIP \(38K\). \(Beta version\)](#)

[New PIC12C508 algorithm, P50XV21.ZIP \(32K\).](#)

[New PIC12C508 algorithm, P50XV22.ZIP \(32K\).](#)

The utilities is inclusive source. If problems, then use slow version.

Updated 16 dec. 1999.

[Most easy PIC-Programmer ever.](#)

[Most easy PIC-Programmer ever, w. 220V lamp edition.](#)

[Ultra lowcost for PIC16C84 only.](#)

[Simple programmer for PIC16C84 and 24Cxx only.](#)

Applications:

[How to use the programmer with In Circuit Serial Programming.](#)

[Connection to ISO-CARD with Automatic EEPROM Switch.](#)

[Which programmer to choose?](#)

[Problems?](#)

You may need a diode in RS232 ground, but 24Cxx programming does not work when connecting a diode. Mail if diode is needed. I am not sure if it is computers that need the diode.

[Schematic.](#)

Always use last version of software. PGM84V29 has been improved to work better with laptops, and P50X has been updated to use a better algorithm. PGM84V32 and P50XV19 work better - and problems has been solved. P50XV20 is much slower, old versions was too fast.

New in PGM84V34: Small bug, according to Sebastian Edman and Malte Kiesel is corrected.

Also changed to be able to be compiled with [free pascal](#). (Still able to be compiled with Borland Pascal).

Last update: 16. dec 1999.

In case you develop your own routines, and do support my programmers, you do need to check voltage during read, and also programming voltages, since it depends on delays too. Test with more cable lengths are needed and must not result in programming / reading problems. Very slow interrupts, as e.g. exists in multitasking environments, must not make the voltages drop. An easy multitask test is to program more chips at same time using multiple ports.

Notice: If delays are too short, will PIC12C50X hang and need to be unplugged (Power removed) - and inserted again. Then it works. Use slower version (new versions or PROG50XS.BAT). If 3FFF at read, also use the slower versions. (READ50XS.BAT). Else does it hang, and reads blank.

|  |
|--|
| <p><b>Free routines:</b> You may use my routines for the PIC-programmer in your own software, but only if your software is free- or if it is shareware. If any changes in my programming routines, it should be described with the documentation of your software package.</p> |
|--|

You may comment troubles in my [guestbook](#), or just write how you solve it.

I have added a parameter table at <http://www.jdm.homepage.dk/param.htm>

## References:

- [PIX Programmer.](#)
- [PIP-02 software.](#)
- [Original PICBLASTER / Erik Herman.](#)
- [COMPIC-1 serial PIC and I2C serial EEPROMs programmer, designed by ORMIX Ltd.](#)
- [ICPROG Windows software, version 0.9b02, beta. May not work. But works.](#)

## Links:

- [Microchip Net resources by Alexey Vladimirov.](#)
- [David Tait, PICLINKS.](#)
- [Malte Kiesel, additional info and software for the PP2.](#)
- [Jacob Blichfeldt, smartcard programming.](#)

[How to make a processor with the delay between instructions less than a half nano second in standard 1u CMOS. \(GHz instruction frequency.\)](#)

[Z80: Use RESET, NMI and CLOCK to bootload a romless system \(RAM only\).](#)

## Guestbook.

I am sorry, but I have stopped to answer e-mails.

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[Systems Without Memory](#) | [Running unknown look-up's](#) | [Z80 Bootload](#)  
[Most PICs](#) | [Easy 16C84](#) | [Extra lowcost](#) | [Simple+](#) | [EEPROM](#) | [ISP](#) | [ISO](#)  
[PQ-Programmer](#) | [Refresh it](#) | [DRAM](#) | [CPU](#) | [Hardware Simulator](#) | [Old files](#)

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[Newpic3 arrives.](#)

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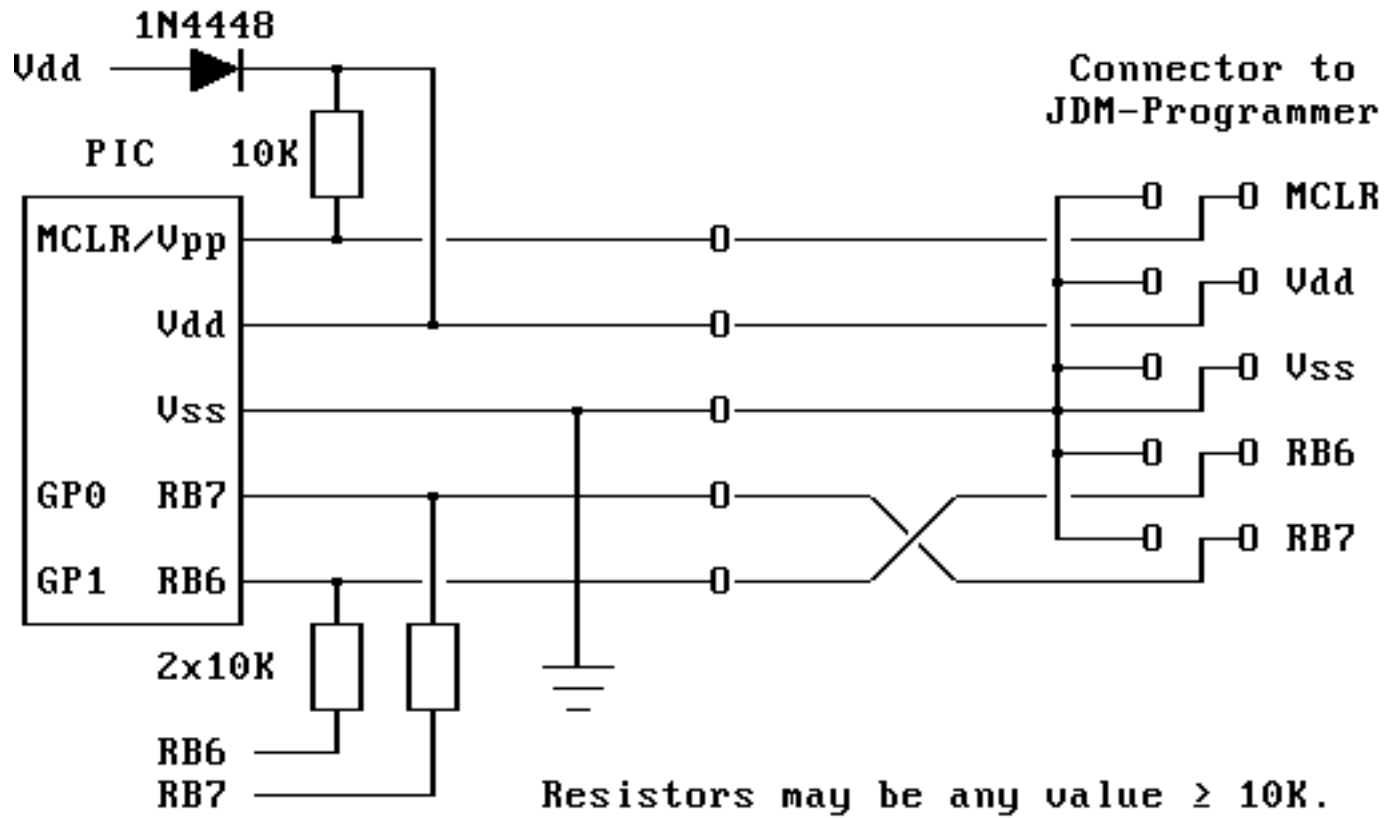
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Last updated 3 February 2000.

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# In Circuit Serial Programming.



Ext. Power Supply should not be added. Programming power is applied by the PIC-Programmer.

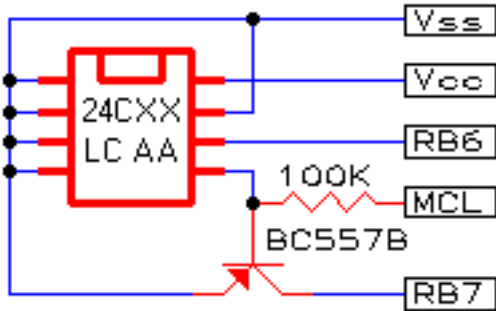
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# PIC-Programmer, EEPROM adapter.

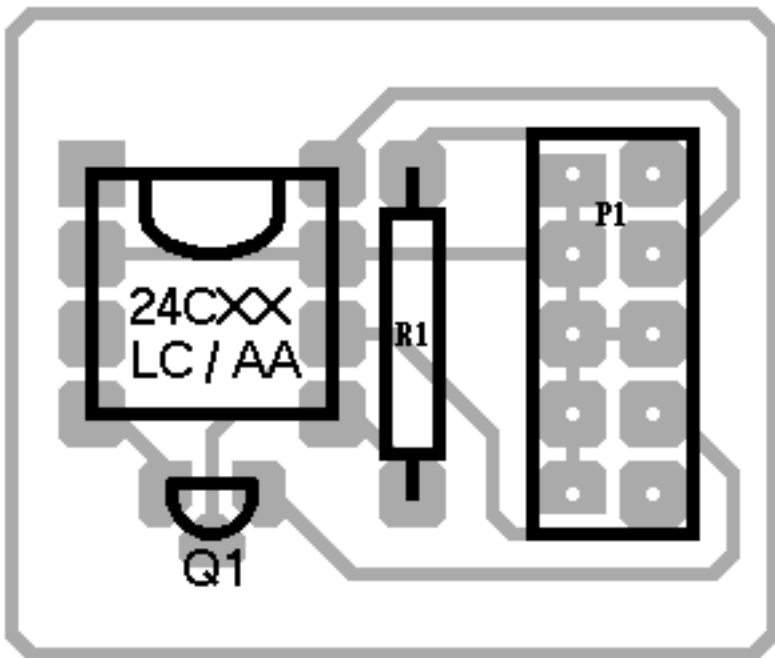
This EEPROM adapter programs 24CXX and 24LCXXB. It improves output drive of sda, and works with 24CXXB with writeprotect.

The adapter allows both PIC16C84 and 24CXX to stay in socket simultaneously and you does not need to remove the eeprom when programming PIC16C84. (Automatic Switch Function).

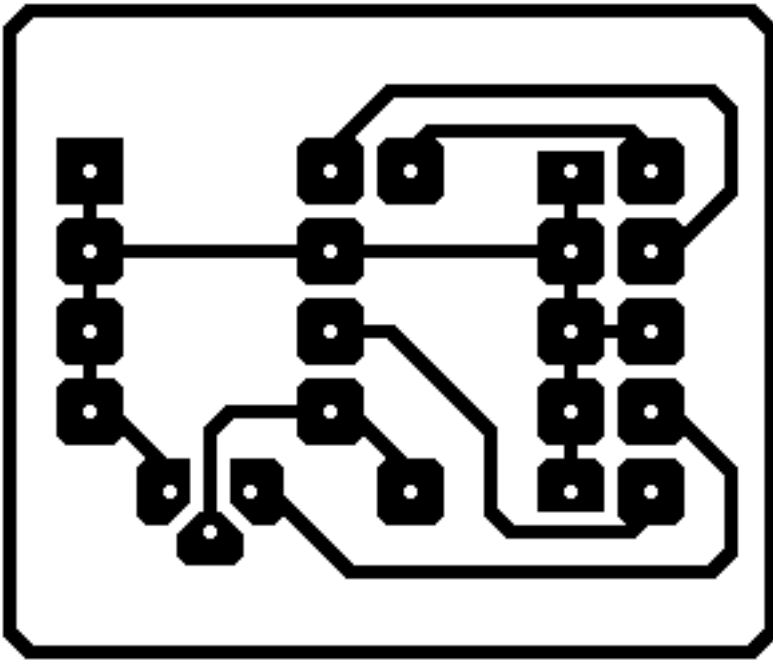


The idea is to use a BC557B transistor as an emitter follower, but turned around to be a collector follower. This reduces the amplification and reduces the current to pull the SDA high trough the collector base diode. The transistor buffers the SDA output and it works as an automatic switch that turn off when MCLR is high. If MCLR is low is SDA pulled low trough R1 and high by the collector base diode in the BC557B. The impedance on collector is about 1/5 of base impedance. Resistor on base need to be high (>47K) to not pull much current from MCLR.

## PCB layout.



## Component placement.



Solder side.

## Components:

|    |        |                         |
|----|--------|-------------------------|
| R1 | 100K   | Resistor                |
| Q1 | BC557B | Transistor, pnp         |
| P1 |        | Connector to programmer |

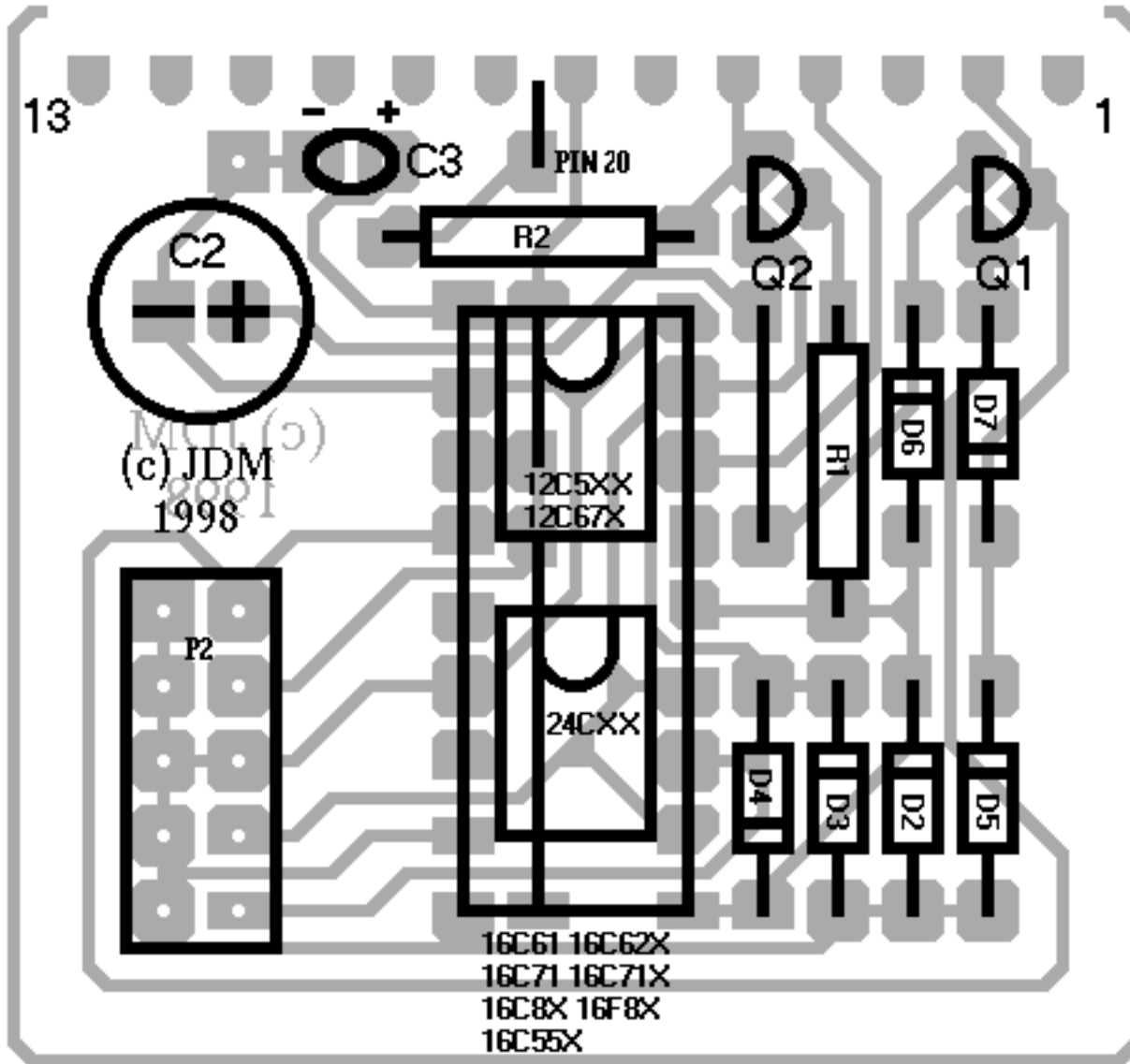
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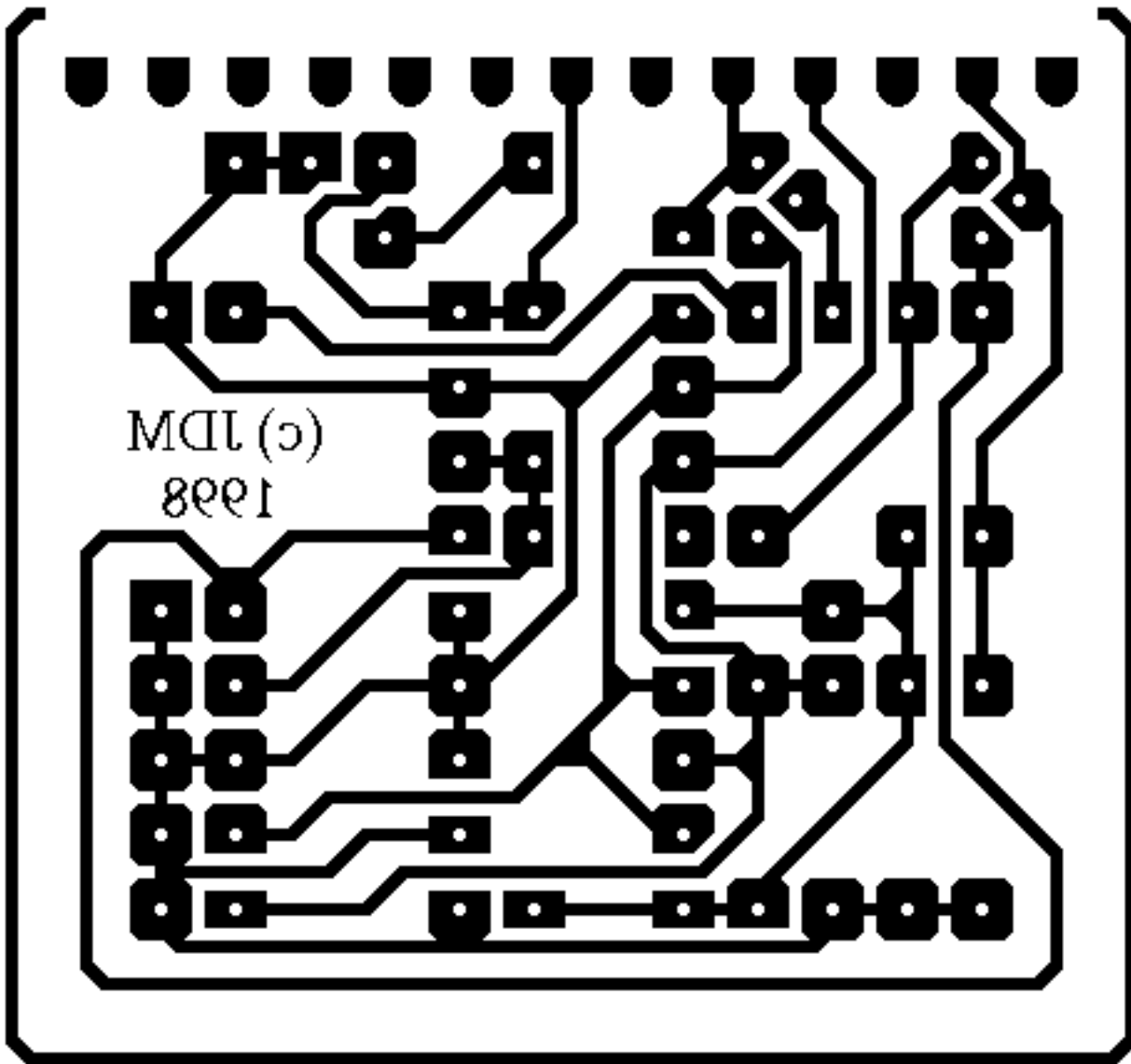
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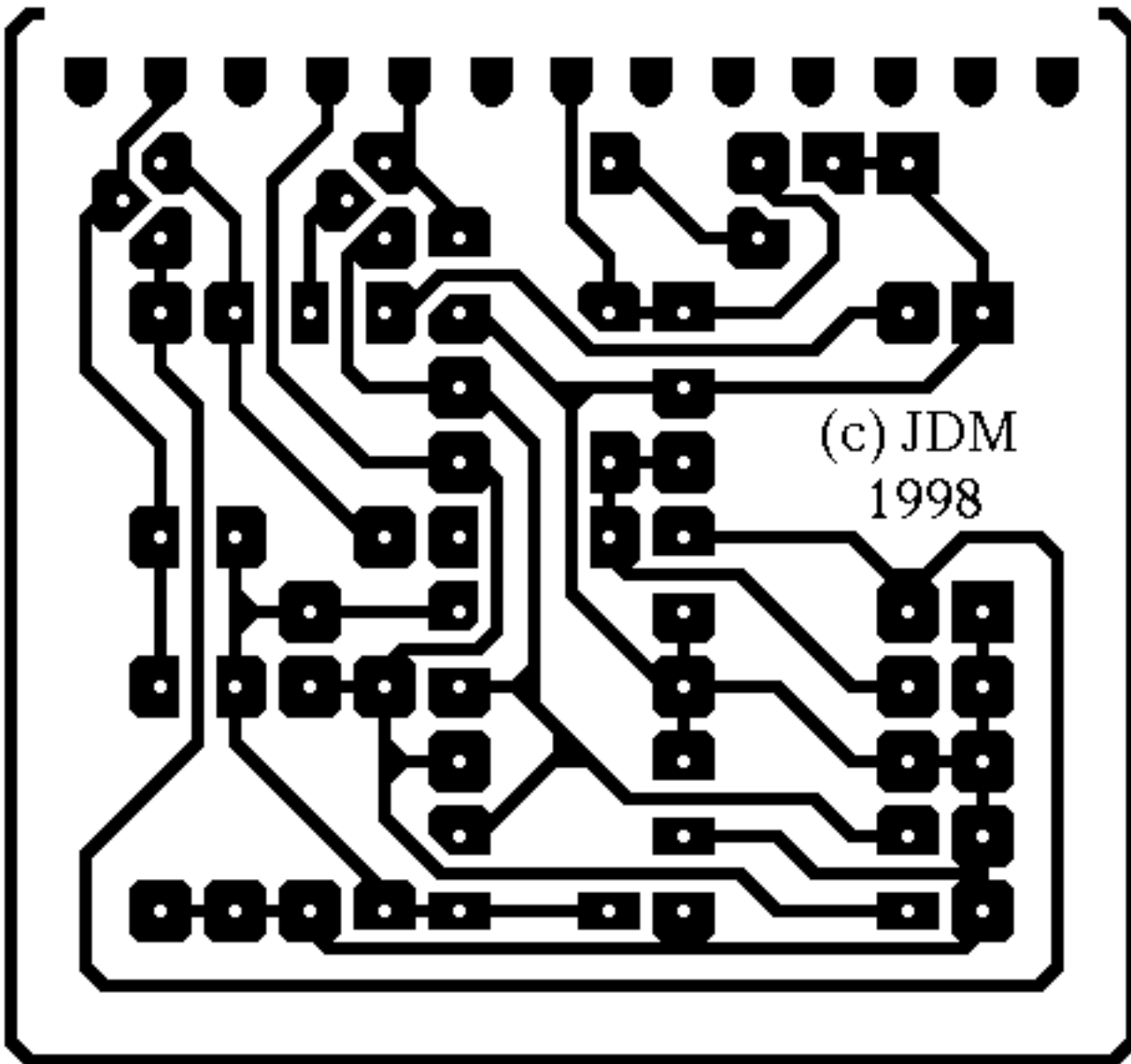
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# PIC-Programmer 2, PCB.







|                                      |                                      |
|--------------------------------------|--------------------------------------|
| R1 10K                               | Resistor                             |
| R2 1.5K                              | Resistor                             |
| D2 5.1V/0.5W                         | Zener                                |
| D3 1N4148 or 1N4448                  | Diode                                |
| D4 1N4148 or 1N4448                  | Diode                                |
| D5 1N4148 or 1N4448                  | Diode                                |
| D6 8.2V/0.5W                         | Zener                                |
| D7 1N4148 or 1N4448                  | Diode                                |
| C2 100 $\mu$ F/25V                   | Capacitor electrolytic               |
| C3 22 $\mu$ F/16V or 47 $\mu$ F/6.3V | Capacitor tantal                     |
| Q1 BC547B                            | Transistor NPN                       |
| Q2 BC547B                            | Transistor NPN                       |
| P1 DS25 (female)                     | 25 pol DSUB connector                |
| P2                                   | Connector for In Circuit Programming |

Remember the two jumpers under the socket.

PCB Generatet by [PCBTOPCX](#). (Able to generate 600dpi and 720 dpi too.)

[Download layout files, PCB23.ZIP \(22K\)](#). (Includes files for [PCBTOPCX](#).)

## How to print out and scale PCB:

The files are saved as 300 dpi.

If you like to print out in 300 dpi,

go directly to how to print PCB with imaging for windows.

**Scale:** If you like to scale PCB use **Irfanview**. (It is downloadable as freeware.)

If you like to scale for a canon printer (180dpi, 360dpi, 720 dpi, 1440 dpi or 2880 dpi etc.) Then first scale to 360 dpi, using resize/resample with "B-Spline filter" option and scale with 120%.

Now you have 360 dpi resolution. To get higher resolution, scale again, "B-Spline filter" on again. At last, you need to Enhance Collors and convert to black/white. Use Enhance Collors, do not change Brightness, but change contrast to max (127.). Set gamma correction to a low value for a "hard" pcb, or to a high value for more round style/edges. Use Enchance Collors finaly again, to get a black / white pcb. Again with max. contrast, this with gamma set to e.g zero. Finaly you have a black/white pcb, ready to print out. With round edges if you like. Other software than irfanview may not be able to produce exact same results.

If you have a HP, Lexmark, etc. (with 300dpi, 600dpi, 1200dpi or 2400 dpi): Do as above, but not scale to 360 dpi first. Just resize to desired size using resize/resample, and "B-Spline filter". Sometimes, it may be better to scale to 600 dpi, before scaling to 1200 dpi.

At last, Enhance Collors with changing contrast to maximum, and gamma corrections to the desired roundness. And use Enhance Collors at a last time, with maximum contrast, gamma=0, to obtain black / white only. You may like to decrease collar depth to two.

Other software than irfanview may not be able to produce same results.

## How to print out, with imaging for windows (win 98)

Load the file, change to 100% view for looking how print looks.

Then use PRINT, and select "PIXEL to PIXEL"!.

From the printer configuration, select B/W, and resolution dpi. (300 dpi if not scaled only, else scale).

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# The Circuit Description:

RS232 outputs is current limited and it protects the PIC if it is bad inserted.

The input voltage on clock is limited by D3 and D4. No current limiting resistors is needed.

The build in clamp-diodes protects the inputs too, and D3 + D4 is not needed. But 24CXX has no clamp diode to Vdd, and then D4 is absolutely needed.

Q2 amplifies the output voltage to RS232 levels. Then it works as common base. R2 is the pull-up but it is not needed due to the limited current of the RS232 port. ([See extra lowcost programmer](#)).

Q2 also limits the input voltage to the PIC when DTR is high. Then it works as an emitter follower and input voltage is reduced to  $V_{dd}-0.7V$ .

Turning DTR low, will make Q2 to work inverted and the amplification is only about 5. The equivalent resistance is about  $10K/5 = 2K$ . This reduces the input current on data to the PIC together with the resistor R2.

When DTR is turned from low to high, will Q2 switch from inverted, saturated mode to active emitter follower. This cause a spike on data, but the spike is dead when the clock changes. It makes sure that eeprom's is not turned into test mode.

Q1 works in a way as emitter follower too, but it is saturated when it is active. The voltage across it is very low. The transistor turns on or off the voltage at MCLR.

TxD powers C2 to be 13V trough the base collector diode of Q1. The voltage across C2 is limited by the zener D6 to be about  $5.1V+8.2V = 13.3V$ .

When TxD is high will the voltage on MCLR not exceed this voltage. Base is pulled higher, but Q1 is saturated and the output will not exceed the voltage on collector.

C2 decouples Vpp and Vdd trough the zener diode D6. But Vdd is decoupled only if the voltage on C2 is about 13V. If it is 8V, then it will be possible to control the power by turning RTS and DTR. The power on C2 is reduced to about 8V by holding TxD, DTR and RTS high for about 0.5s.

The extra diode, D5, limits the voltage on TxD. It is primary used, to power the eeprom when both DTR and RTS is high. It also guarantee that MCLR is higher than -0.2V when TxD low. The diode D7 pull's MCLR low when TxD is low.

The PIC is powered by RTS from D3 too. The input current on data also power the PIC to Vss. Both signals need to be negative to power the chip at highest possible current. C2 powers the PIC if the signals are positive. RTS and DTR is not critical when programming 24CXX, because the diode D5 pulls Vss down.

At programming PIC's will only D3 be used. RTS and DTR need to be low to power it, and they must not be high for long time. The current is extra high when reading a zero from the PIC, and the active reading time with DTR high must be short. To compensate the power used, will extra time at RTS low need to be inserted.

If replacing D5 and D7 with a BC557B, will it be important to know that base-emitter is a zener diode. Only D7 may be a zener, and MCLR need be connected to this emitter, while collector of BC557B is connected to Vss. The transistor works in a way as emitter follower, and it pulls down MCLR at extra high current.

The high current is not needed, and may even damage the BC557B if the programmer is connected to external power. Connecting the programmer to external power supply may always cause a risk, and it is not permitted for normal use.

Danger if connecting to external power supply: The internal zener diode reduces the voltage to 5.1V. It may be damaged if too high voltage is applied. External connections may cause problems due to the negative voltage too. (Vdd is connected to computer ground and may short-circuit programmers if an external circuit is grounded to computer, e.g. by grounding the main). Applying external power also cause problems with the safety if turning around PIC's or other components.

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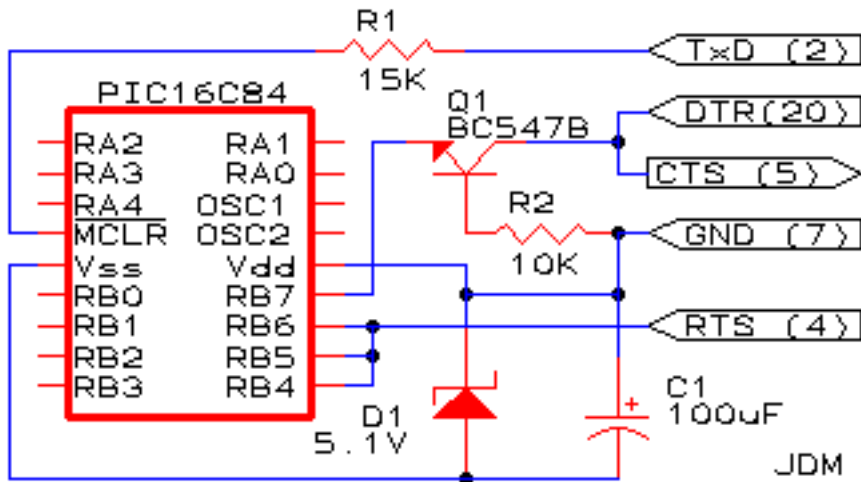
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# Extra Low cost PIC16C84 Programmer.



[Download utilities, PGM84V34.ZIP \(38K\).](#)

[Download PIP-02 beta driver, JDM84V33.ZIP \(5K\).](#)

Works with windows too ([ICPROG](#)).

[Most easy PIC-Programmer ever, w. 220V lamp edition.](#)

## References:

- [PIX Programmer.](#)
- [PIP-02 software.](#)

*Please mail if you has problems with programmers.*

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I am sorry, but I am not able to use money on keeping this page active. Please be patient.

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Please update your bookmarks, new location is <http://www.jdm.homepage.dk/newpic0.htm>.

