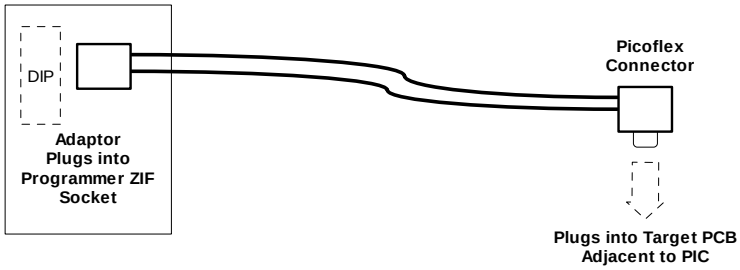
PIC IN CIRCUIT SERIAL PROGRAM ADAPTOR ISPICR1

- In Circuit Programming of PIC Micros
- Direct Connection from Any PIC Programmer
- Easy programming of any Package!
- Connects directly to Programmer ZIF Socket
- Connects directly to Target Board



Description

The ISPIC Adaptor enables the In Circuit programming of PIC Microcontrollers. In circuit programming can be applied to any serially programmable part including One Time Programmable (OTP) and Flash devices.

It consists of an adaptor which plugs into the ZIF socket of the users existing programmer (e.g. PICSTART+, MEL EPICA etc), and connecting cable which connects to the target board (adjacent to the PIC Micro to be programmed).

The ISPIC adaptor is shipped with a low cost Molex Picoflex flying socket (on the end of the cable). A mating Picoflex PCB mounting plug (also supplied) is mounted on the target PCB. This provides easy connection for the programming cable. Alternatively any custom connection can be used

Programming of a device using the ICSP technique is achieved by powering up the device and then holding RB6 and RB7 low while raising the MCLR/Vpp pin to +13 volts. This places the PIC in programming mode and a clock signal on RB6 is then used to clock data into, and out of RB7.

Operation

The user simply connects one end of the ISP to the standard PIC Programmer ZIF socket and the other end to the target board containing the target PIC.

The PIC is simply programmed in the same way as programming a device mounted in the ZIF socket.

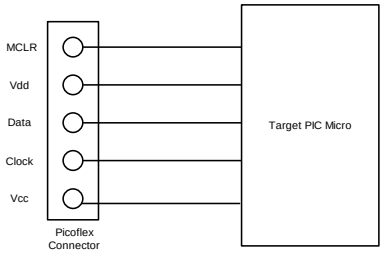
Programming Device List (Correct at Jan '2002)

PIC devices which can be programmed using this adaptor include the following;

12C508A, 12C509A, 12CE518, 12CE519, 12C671, 12C672, 12CE673, 12CE674.
14000.
16C505
16C554, 16C558, 16C6XX, 16C7XX.
16FXXX
Note that 16C5x parts cannot be serially programmed.

Configuration of ISPIC/ Programming Selector

In order to serially program a PIC Micro the following connections are required from the programmer to the target PIC.



Target Board Connections

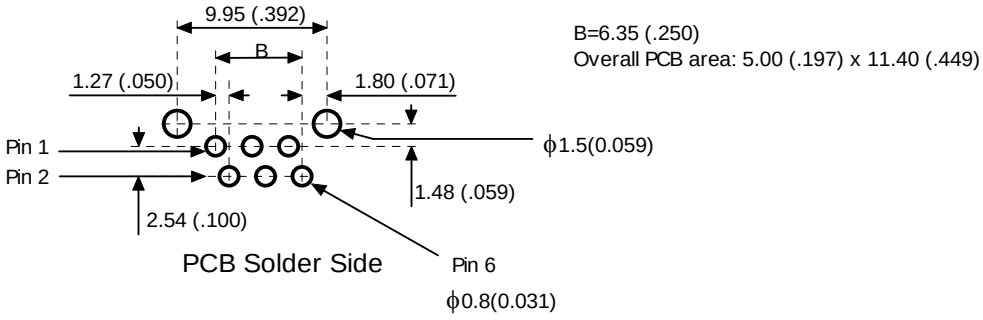
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ICSP pin	Signal	Function	PIC Connections		
			8pin	18pin	28/40
4	Vdd	+ve supply to target PIC.	1	14	20/11,32
5/6	Vss	ground reference.	8	5	8,19/12,31
1	Vpp	connection to the MCLR/Vpp pin on target PIC.	4	4	1/1
3	CLK	clock connection to RB6 on the target PIC. (GP1 in 12C parts)	6	12	27/39
2	DATA	data connection to RB7 on the target PIC. (GP0 in 12C parts)	7	13	28/40

PCB Layout Requirements

The following drawing shows the PCB layout required to accept the Picoflex connector
The PCB mounting plug is commonly available from most suppliers, part numbers are as follows

Molex :90325-0006, Farnell: 673-225, RS: 324-8110



How the ICSP Works

Programming of a device using the ICSP technique is achieved by powering up the device and then holding RB6 and RB7 low while raising the MCLR/Vpp pin to +13 volts. This places the PIC in programming mode and a clock signal on RB7 is then used to clock data into, and out of RB6.

Limitations

Programming any device in circuit requires a direct connection between programmer and target PIC Micro.
Note that there are limitations in using any ICSP – which are mainly related to target circuitry and users should read this document completely before attempting to use the adaptor. In addition, it is recommended that users confirm all details of device pin-out, target circuitry and programming specifications with the Microchip In-Circuit Programming Guide - DS30277. This guide can be downloaded from the Microchip web site at www.microchip.com

Care should be observed when programming any device in circuit. Other components can drain away the programming signals and cause program fail. The programming adaptor should be viewed as an extension to the ZIF socket which has been designed to program an I/C without any external circuitry. This is the reason why the length of ISPIC cable is 15cm (not longer).

The ICSP connection does not take account of any other connections which may be made to the PIC pins on the target circuit board. For example, in some cases, RB6 and RB7 pins may be used to drive say LED's or to sense switch inputs and often the MCLR/Vpp pin may be directly connected to the +ve supply

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(when the internal reset generator is used). All connections to Vdd, RB6, RB7 and MCLR/Vpp pins must be examined with care before ICSP is attempted. Specifically the following precautions must be taken:-

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Vdd (+ve supply): if the target PIC operates at other than +5 volts then this pin and the MCLR/Vpp, RB6 and RB7 programming pins must be totally isolated from the target during programming.
If the target operates at +5 volts and a PICSTART+ programmer is used then the target PIC may be left connected to the target circuitry. If however the target loads the 5 volt ICSP supply by more than a few mA then it will not be possible to perform ICSP. In such cases programming may be possible by powering the target from its normal +5 volt supply during programming but this is **not** recommended.
If the target operates at +5 volts and a programmer is used which checks for correct programming at other than 5 volts (a PROMATE for instance) then this pin and the MCLR/Vpp, RB6 and RB7 programming pins must be totally isolated from the target during programming.

RB6, RB7: the loading of these pins by the application circuit must be zero or low. Ideally the pins should be open circuit and often this can be accomplished by using the pins as switch inputs with internal pull-ups. (assuming normally open switches)

MCLR/Vpp: this pin is pulled to +13 volts during programming and must be isolated from the rest of the circuit during programming.
Where the pin is simply pulled high to Vdd, a simple solution is to use a resistor of say 47K between the pin and the Vdd rail. This will clamp the reset line during normal running but allow the ICSP signal to pull the pin to the programming voltage and without damaging other circuitry on the target board. A better solution is to use a Schottky diode to connect the pin directly to the Vdd rail with the cathode connected to MCLR/Vpp pin of the PIC.
Where an external RC reset circuit is employed then it will be necessary to introduce a Schottky diode between the pin and the RC reset 'point'. (cathode connected to PIC)

Programmer types and target circuit
When using any ICSP adaptor, selection of the device programmer and the configuration of the target circuitry is critical if successful programming is to be achieved. At worst, it may be possible to damage both the target and the programmer if care is not taken. The problem arises from the fact that after programming is complete, many programmers check the device at voltages other than 5 volts and if the device is connected in the target to a fixed 5 volt supply then this may cause incorrect measurements to be taken or in extreme cases, device and programmer damage. In these cases the user must ensure that the target PIC pins Vdd, Vpp, RB6 and RB7 are completely isolated from the target application during programming.

Note that the PICSTART Plus development programmer checks for correct programming at +5 volts only and that in most applications running on a 5 volt supply this limitation does not apply.

Disclaimer
Information given in these instructions is intended for guidance only and no liability is accepted for any loss or damage which may be caused either by use of the adaptor or by errors or omissions in these instructions. No representation or warranty is given. Use of R.F.Solutions as critical components in life support systems is not authorised except with express written approval from R.F.Solutions Ltd.

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