K149F – Serial Port PIC Programmer

This documentation updated September 24th, 2007

K149F is the latest version of the K149 series of PIC programmers produced by DIY Electronics. It was re-designed to overcome an electrical noise problem in the K149BC programmers – a problem that was intermittent from one programmer and PC setup to another. This made it impossible to guarantee correct operation of the programmer.

The noise problem was due mainly to the PCB layout but was also affected by other factors such as the USB interface and the common sharing of the 6MHz crystal between the USB chip and the microcontroller.

In redesigning the programmer the following changes were made:

1. USB interface removed – serial port only.
2. Crystal replaced with 3-pin resonator.
3. Some current limit protection added to the Vpp supply to try and eliminate blowing up the switching transistors.
4. Extra LED added to indicate communications with the PC.
5. ICSP programming header changed to 6-pin for compatibility with K150.
6. Smaller PCB – 70 x 68mm

In all other ways K149F is electrically equivalent to K149BC. It uses the same Windows interface and the same firmware chip.

K149F is supplied fully assembled and tested.

POWER SUPPLY REQUIREMENTS

Programming PICs requires a programming voltage of around 13 volts. This voltage is generated using an onboard voltage regulator. This regulator needs at least 15.5V at its input to work correctly. In addition the programmer has a diode for reverse polarity protection. When all added up the minimum voltage needed to power the programmer is 16V.

It is recommended to use a supply with at least 16.5VDC to allow for component tolerance and variation.

Most **unregulated** 12VDC plug packs usually have a much higher open circuit voltage than 12V. These are suitable for use with this programmer. A current rating of 150mA is more than enough.

Avoid using 'switchmode' type supplies. These tend to generate electrical noise that can interfere with the programmer's operation.

PROGRAMMING SOCKET.

The programming socket is a 40-pin wide slot ZIF (zero insertion force) socket. It is **not supplied** with the programmer and must be ordered separately if required. See website for details.

WINDOWS INTERFACE SOFTWARE

This is called '**MicroBrn**' and is distributed as part of a package that includes the matching firmware files for each of the various DIY programmers. The latest version is called 'DIYpack25EP.zip' and can be downloaded from

www.ozitronics.com/download/diypack25ep.zip

After downloading, unzip the file to any folder you like – no installation required. Create a shortcut to 'microbrn.exe' on the desktop for easy access.

Note: This is the same interface used with all DIY programmers – K128, K149BC, K150 and K182.

USING THE PROGRAMMER

Power up the programmer and connect to a PC serial port using a 'straight through' 9-way serial cable. Do not use a 'crossover' type cable.

Start MicroBrn. The PWR LED will light.

If running for the first time you may need to set the COM port number that the programmer is connected to. You can do this under '**File → Port**'. MicroBrn saves this setting so it should be right for next time.

MicroBrn automatically detects the programmer and displays the type in the title bar, along with the firmware version number.

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Remember – K149F is equivalent to K149BC so 'K149-BC' will be displayed in the title bar. This is normal.

Once MicroBrn is running and has identified the programmer, select the PIC chip to be programmed using the '**Chip Selector**' drop down menu. Once selected the chip's position in the programming socket will be displayed.

Click on the '**Load**' button to load the HEX file to be programmed. Insert the chip and click the '**Program**' button to start programming. MicroBrn will automatically verify after programming.

The PRG LED will blink as data is transferred back and forth between the programmer and PC.

NO KEYPRESS PROGRAMMING

This operating mode allows programming multiple chips without having to press the program button all the time. The programmer will automatically detect the chip when inserted into the programming socket and start programming. Flash chips are automatically erased in this mode if they are not blank.

Click on '**Options → Auto Program**' to enable this mode. Press the '**Cancel**' button beneath the chip selector menu to turn this feature off and return to normal mode.

USING WITH USB

The programmer can be connected via USB using a USB-to-serial converter cable. In this case you will need to install the USB driver that is supplied with the cable.

You may need to change the port number in MicroBrn when using a USB cable. Windows allocates a COM port number to this USB interface when the cable is plugged in. You can find the allocated port number in 'Device Manager' under 'Ports'.

ICSP PROGRAMMING

Click on '**Options → ICSP Mode**'. The programmer will now use the ICSP programming header to connect to the PIC to be programmed.

You can use this mode to program a PIC in a target board without having to remove it. Be sure that the connections to the PIC on the target board do not interfere with the programmer eg. output to output.

If using the target boards power supply then do not connect the 'VCCP' line. The ground pin (pin 1) **MUST** be connected to provide a common reference point.

Note: This mode does not support low voltage programming.

The LOW pin is an open collector output, which when active will pull the LOW pin to ground. It can be used in ICSP to hold the LVP pin low while programming, or the OSC1 pin, or any part on the target board which may need control (in this manner) during programming.

UPGRADING

This programmer is supplied with the latest firmware already installed. To upgrade to any later versions:

1. Download the latest HEX file or DIYpack.
   If a DIYpack then you will need to unzip it first. The latest HEX file will be in the 'unzip' folder.
2. Use your existing MicroBrn software to program another 16F628 chip with the latest HEX file. You can also use 16F628A or 16F648A chips.
3. Replace the 16F628 chip on your programmer with the new one and verify that it works.

If you do not have a spare 16F628 chip then you will need to use another PIC programmer to reprogram the existing chip.

OTHER PIC PROGRAMMERS

K128 – Flash only PIC USB programmer.

- Only supports flash (F series) PICs.
- Powered from the USB port itself so no external power supply is needed. Handy for portable use with laptops, etc.
- Mounted on a plastic box.
- ICSP supported (5 pin).

See website for details.

USER FORUM

DIY Electronics have set up a forum for users to ask questions and find information. The forum is at:
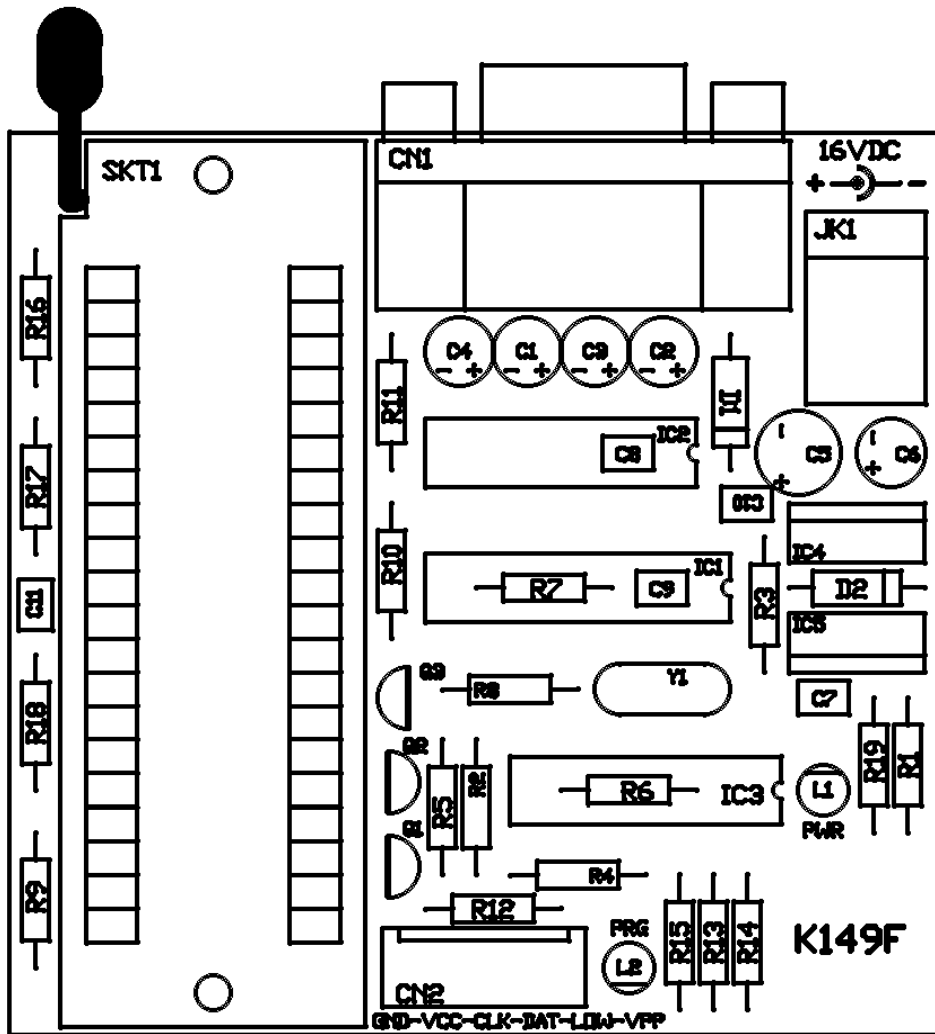
http://www.websitetoolbox.com/tool/mb/diykit

PROBLEMS WITH THE PROGRAMMER

Contact the kit developer via email on the website.

WEBSITE

http://www.ozitronics.com

Component Overlay

Resistors, 1/4W 5%
2R2	1	R19
1K	8	R1,2,4,5,6
		R7,8,12
3K3	3	R13,14,15
10K	7	R3,9,10,11
		R16,17,18

Capacitors
1nF mono, 0.1"	1	C11
100nF mono, 0.1"	4	C7,8,9,10
1uF 16V electro	4	C1,2,3,4
10uF 25V electro	1	C6
100uF 25V electro	1	C5

Other
IC socket, 18 pin	1	for IC1
IC socket, 16 pin	2	for IC2, IC3
Resonator, 6MHz, 3 pin	1	Y1
DC JACK, 2.5mm	1	JK1
Connector, DB9	1	CN1
Right Angle, Female		

Semiconductors
1N4004	1	D1
1N4148	1	D2
BC327	3	Q1,2,3
LED, 3mm	2	L1,2
PIC16F628A Programmed	1	IC1
ICL232	1	IC2
ULN2003A	1	IC3
7812	1	IC4
7805	1	IC5

Connector, 6 pin polarised	1	CN2
Wire harness, 6-way	1	to suit CN2
Rubber Feet, square	4	
PCB, K149F		

Parts List

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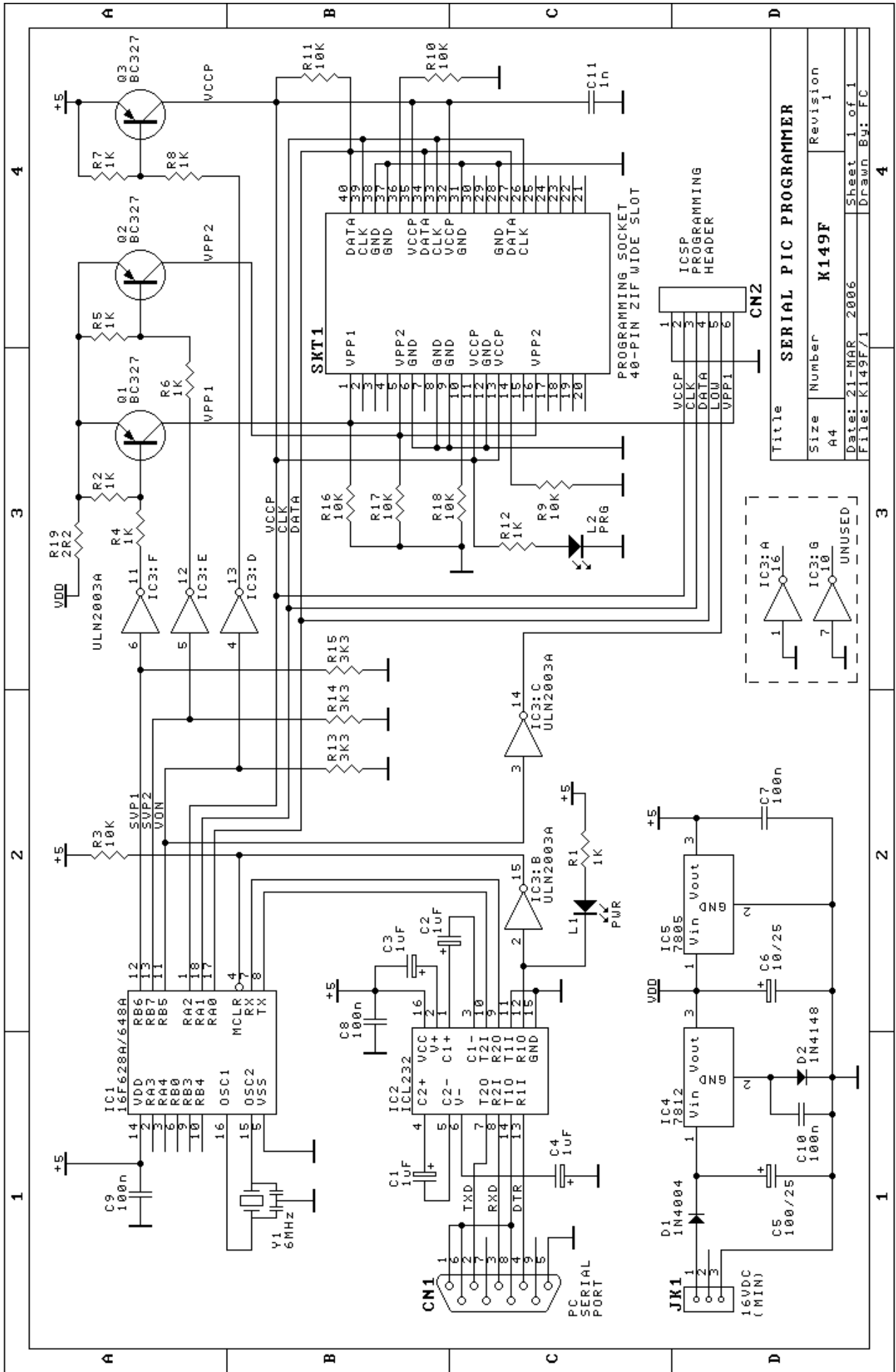
K149F – Serial Port PIC Programmer schematic (Page 4 of 4). Title block: SERIAL PIC PROGRAMMER, K149F, Size A4, Number, Revision 1, Date: 21-MAR-2006, Sheet 1 of 1, Drawn By: FC, File: K149F/1.