PIC Network interface Card Kit
ピックネットワークインターフェースカードキット

What is PICNIC

PICNIC, PIC Network Interface Card, is a kit for a remote I/O board to connect to Ethernet. Ver.2 is small-sized, 100mm × 700mm.

Connecting to LAN in the same way as PC, you can control by programming, switching on and off I/O through PC Web browser. The types of computers or OS are not required with a simple ON and OFF device.

Program needs a tool of language development, which you can buy at astore. As to a simple I/O control, no language knowledge is required since

it can control by clicking through Web browser, and can be used jointly with several users.

Features

- RTL8019AS: 1 chip Ethernet controller
- Microchip: PIC16F877
- Main IC, resistors and condensers are already soldered. Easy assembling.

Necessary environment and software

- Power source around 8V 100mA (e.g. AC adaptor)
- Personal Computer (connectable to network with 10Base-T)

OS with Windows 95/98/2000, Windows NT 4.0, Linux, and FreeBSD etc.

- Hub (or cross cable)
- Development tools, such as Visual BASIC, Visual C++, gcc

(can be controlled through browser without them.)

* Software with ver.2 can be downloaded through internet:

URL: http://www.tristate.ne.jp/

[Ver.2] kit description.

Corresponding measure	Ethernet 10BaseT		
Access formula	CSMA/CD		
Controler	RTL-8019AS(NE2000 compatible)		
Control CPU	PIC16F877 20MHz		
F	Analog	Input 4ch+temperature sensor 1ch Input range0-5 V solution capacity 10bit Temperature sensor measuring range: 0-100	
	Digital	Output 4ch, input 4ch Output 6ch,input 2ch(using a liquid crystal module) * I/O setup can be changed through PC program	
	Serial	Input and output 1ch (no flow control)	
Built-in protocol	arp,ip,udp,tcp,http,icmp,dhcp		
Peripheral function	RS232C interface(SP232ACP)		
	Temperature sensor (LM35DZ)		
	16 letters x 2 lines liquid crystal module (SC1602B) * liquid crystal module is not attached		
Default IP address	**192.168.0.200 / 255.255.255.0**		
Firmware souce	**open**		
PC software	All can be downloaded through INTERNET. Source is OPEN (recording media is not attached.) *Sample program (pictest.exe) *DLL control (picnic.dll) *ActiveX control (picocx.ocx)		
Corresponding buffer	Around 16 Kbites		
LEDindicating function	Transmission, receiving, LINK, RB4-7		
RS232Ccorresponding speed	9600bps 115,200bps		
Power source	Over 8V (built-in bridge diode and 5V 3 terminal regulator)		

List of parts

mark means already assembled On Board

Article	Number	OB	Model	Qnt	Note
	U1		ADM232 equivalent	1	MAX232,SP202 or SP232 or (equivalent)
	U2		93C46 equivalent	1	EEPROM (with MAC address)
	U3		PIC16F877-20/P	1	PIC Micro controller (with firmware)
	U4		RTL-8019AS	1	Ethernet controller
	U5		7805 LM340T	1	+5V 3 terminal regulator
Trans	U6		20F001N(equivalent)	1	10base-T Pulse-trans
Sensor	U7		LM35DZ	1	Temperature sensor(3legs)
Diode	BD1		WL02 equivalent	1	Bridge diode
Resistor	R1,R2,R3 R15 18		1K	7	indication 102
	R20		10	1	Indication 100
	R4,R5,R9,19		4.7K	3	Indication 472
	(R6,R7)		200	1	Indication 201
	R8		47K	1	Indication 473
	R10 13		1M	4	Indication 105
	R14		10K	1	indication 103
Condenser	C1 4, C7,C9,C10, C17 C22		0.1μ F	13	Tip type condenser
	C5,C6		22pF	2	indication 22
	C8		47μ F	1	Electrolyze condenser (with polar)
	C11,12		0.01μ F 100pF 1kV 2kV	2	indication 103 2kV etc. high pressure condenser
	C13,14,15		0.01μ F	3	Tip type condenser
	C16,23		10μ F	2	Electrolyze condenser (with polar)
LED	LED1		green	1	LINK for monitor
	LED2		yellow	1	RECEIVE for monitor
	LED3		red	1	TRANSMITTING for monitor
	LED4 7		red and more	4	RB4 7 for monitor
VR	VR1		10K	1	indication 103 or 10
Crystal	X1		20MHz	1	indication 20.0
Switch	TS1		Tact	1	Reset button
Connector	CN1		Dsub9P-F	1	Dsub-9 pin -F
	CN4		DC jack	1	For plug 2.1mm
	CN6		8pin modular jack	1	For 10baseT LAN
	CN2,JP1, CN3		double pin header	bits	Cut along with connectors pins
IC socket			40p	1	For PIC16F877
			8p	1	For 93C46
Board			TS-PICNIC02	1	For PICNIC
others			jumper short pin	bits	

- 14 pin connector with CN5 is attached in liquid crystal module.

* Make sure if anything is missing or defective before assembling. Contact us if you have any trouble in the parts.

Please understand that some units and parts may be replaced for more improved ones without a notice.

Checking

Please make sure if the assembled board will work properly. Have the hub   and computer turned on beforehand.
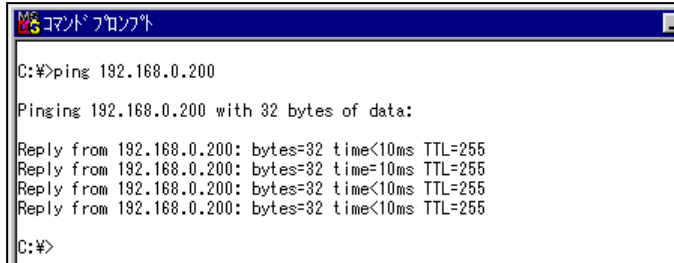
Put an AC adaptor into the DC plug. Do not worry about an electrode of   the power because a bridge current adjustment tool is built in. Set the

power voltage between 8V and 12V. Then connect a cable from the hub. (Or   connect a cross cable to PC.)

You will see a green light from LINK LED on the board turned on. If you   do not, please turn off the power and check whether there should be

something wrong in assembling. After Led is on, try sending PING(*1) from   PC.

Set up PC IP address to 192.168.0.1 and Net Mask to "255.255.255.0". If   IP address is originally fixed, consult a network manager or person in   charge.

[DOS] C:¥>ping 192.168.0.200
**[UNIX] % ping 192.168.0.200**

"192.168.0.200" is IP address of PICNIC in the default. Then you will see RX (yellow) and TX (red) of LED flashing, and receive a reply on the picture to the left. This shows that the PICNIC board works properly.

Next, start web browser software such as Internet Explorer and Netscape Navigator, and input IP address.

You will see "PIC Network Interface Card . . ." and remote I/O screen will come out.

This is showing the direction of I/O pin, the state of each pin, IP address, Net Mask, port number set-up on the browser.
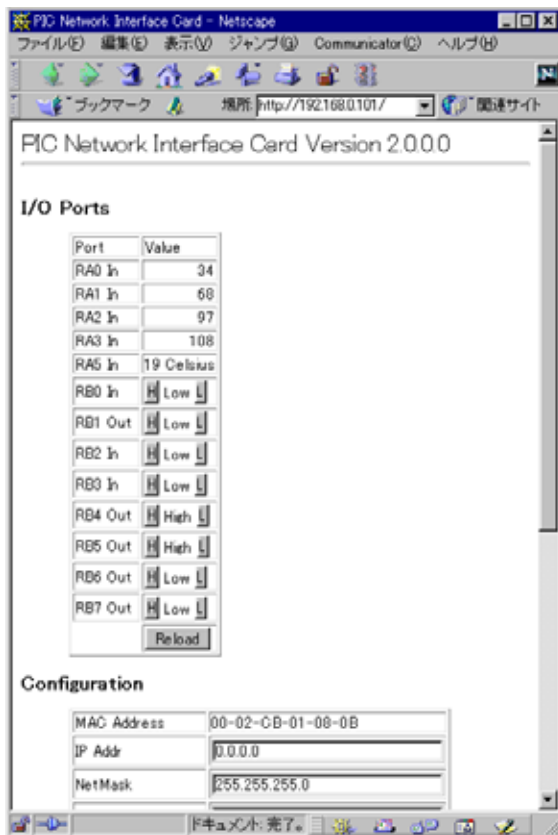
*1 PING: PING stands for Packet InterNet Groper, which can test the availability of connecting to the other network host. It is often used to check the use of network and the connection with others.

Operation on remote I/O screen

I/O Ports

Port	Value
RA0 In	0
RA1 In	0
RA2 In	0
RA3 In	1
RA5 In	25 Celsius
RB0 In	H Low L
RB1 In	H Low L
RB2 In	H Low L
RB3 In	H Low L
RB4 Out	H Low L
RB5 Out	H Low L
RB6 Out	H Low L
RB7 Out	H Low L
	Reload

Ports

The picture to the left is in the initial state, and the indication are varied by connecting a liquid crystal module or changing the port through programming.

The current status of I/O ports is indicated. The state of each pin is set at the time read by a browser. The value is not updated until pressing Reload in the browser or Reload on the screen.

RA0-5, RB0-7 are corresponded to I/O pin number on the PICNIC board. The port indicating "In" is defined as current input port and "Out" as output port.

Value is in the state of current I/O port. RA0-3 is a port with analog input and the result of A/D conversion is indicated by 10 log (0-1023). RA5 reads a temperature sensor on the board and shows the temperature by Centigrade. The temperature is not proofread, and it may cause a minor error in the actual temperature by a few degrees.

RB0-7 is defined as digital I/O pins. The current state is indicated by High, Low. High, Low can be changed in each port by clicking [H] or [L]
* [H],[L] in input pins are not changed by pushing the buttons.
* The direction of port I/O cannot be changed on the Web, but only be changed through the PC software. Please see more detail on the internet.

Configuration

Configuration	
MAC Address	00-02-CB-00-02-17
IP Addr	192.168.0.200
NetMask	255.255.255.0
GateWay	0.0.0.0
http Port TCP:#	80
LCD Port UDP:#	0
Parallel Port UDP:#	10000
Serial Port UDP:#	10001
	Update & Save Initial Value

You can change IP address and port number, but MAC address cannot be changed. To change it, input the changed value in a text box and save. The changed content is recorded in non-volatile memory (EEPROM), and it is preserved even after turning the power off.

Set-up is effective once the power is turned off.

Be careful not to input a wrong data, or it can make connection to PC impossible. If this happens, you can re-set up by a boot strap mode Configuration.

Setup items
- MAC address
It indicates MAC address on PICNIC board. This is the only identification code existing. This address was recorded when manufactured, and there is no way to change it.
- IP Addr

Current IP address is indicated. To change this, input a new address you want to be changed in a text box and save it. The new address is recorded in PIC micro computer, and then the current page is reloaded. Input IP address

by 10 log dots. Each figure has to be between 0 and 255. Unnecessary numbers or characters, or spaces will not cause errors but may be set as uncertain address. It can be corrected by starting it over and typing it correctly.

You need to reset to make IP address effective. IP can be changed as many times as it can be until resetting. To reset, press the reset switch, or turn off the power.

If you input "0.0.0.0" in the address, it leads to DHCP mode and you receive IP address from a DHCP server. You should not set up to "0.0.0.0" when there is no DHCP server.
*IP address will not be set up properly if you do not input anything in a text box. Input "0.0.0.0" in that case.

- NetMask
This sets up Netmask of IP address. Class C, set it to "255.255.255.0".

- GateWay
This sets up IP address of default gateway. Set it to the same way as IP address. If none, input "0.0.0.0".

- http Port TCP#
This sets up the TCP port number of http. The regular number of http default port is 80. It is not necessary to change the number. If changed, indication cannot work in the browser. The possible range of setting is from 0 to 65535.

- LCD Port UDP#
This sets up UDP port number in a optional liquid crystal module. This port has 0 in the initial setup. "0" means it does not use the liquid crystal module. In this case, RB0-3 is input port and RB4-7 is output port after reset.
The liquid crystal module works by designating the port number other than "0". It also indicates IP address on the liquid crystal in starting up.
Optional characters can be indicated on the liquid crystal by sending the data to this port number through programming. In this state, RB0-1 is input port and RB2-7 is output port after reset. RB2-7 is used for controlling the
liquid crystal. Only RA and RB 0.1 can be used freely by users. Protocol supports only UDP and does not support TCP.

- Parallel Port UDP#
This designates the port to control RA0-5 and RB0-7 through the program. The program changes the direction of I/O but not default, and make I/O pin poling. Protocol supports only UDP and does not support TCP.

- Serial Port UDP#
This designates the port to control RS232C on the board through the program. You can control the RS232C tool through LAN by making a PC program. Protocol supports only UDP and does not support TCP.

If you click "Default", you can reset it to the initial state in which PICNIC is assembled. There is no confirming message when clicking it, so be careful not to press it. The setup becomes effective after resetting

- Status

This indicates the state of current TCP socket and the number packet of transmission packet. Please see more details about this item on internet.

Bootstrap mode

Changing IP address can be made through the remote I/O screen. But if you cannot do this because you cannot connect through Web browser, or you have forgot or lost IP address, try this mode through RS232C.

First, connect serial port (COM1 or COM2) of PC and 232C terminal of the board to 232C cable. Start up a corresponding software (hyper terminal, etc.). Set it to the picture to the left.

Then, turn on 1 to 2 of jumper pin J2 on the board (connected) and then the power. The message of starting up will be shown in the corresponding software.

"PICNIC>" is a prompt to input. **help** [ENTER] or **?**[ENTER] outputs a simple help.

The current state of the configuration is indicated at first. You will see it at the time of starting up. It can also be shown by typing **config** [ENTER] through the prompt.
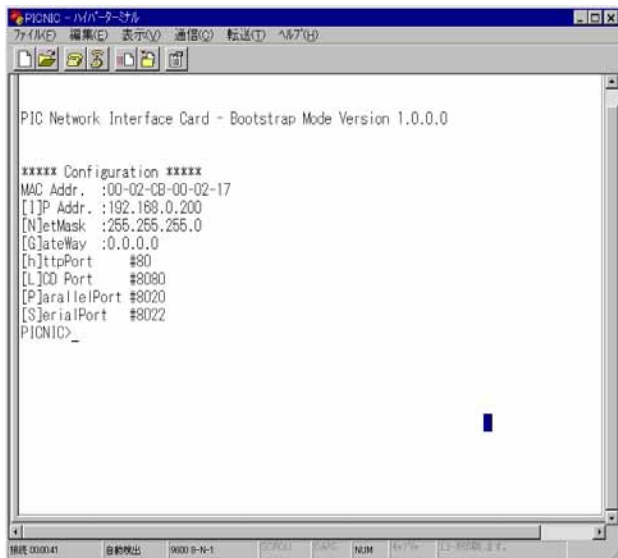
Setup

The key words are the characters bracketed at the configuration. Change the setting with the characters following:

e.g.#1 Set the IP address to 192.168.12.123
  PICNIC>i=192.168.12.123 [ENTER]

e.g.#2 Set the http port number to 8080.
  PICNIC>h=8080 [ENTER]

e.g.#3 Set the LCD port number to 10000.
  PICNIC>p=10000 [ENTER]

After pressing ENTER, the setup is saved in the non-volatile memory (EEPROM). Use config command to confirm the setup.

Turn off the power when the setup has been done. Reset JP2 and turn on the power, then the new setup will be started. LAN connection cannot be made with JP2 on. After finishing the setup, do not fail to turn back the jumper setup.

* Bootstrap mode does not have any particular termination command. Turning off the power while the prompt is indicated does not cause any troubles .

How to use LCD module

This kit makes it possible to indicate IP address and optional characters by connecting an LCD module, size of 16 x 2 lines, which can be available at a store.

You need the following procedure to activate it.

1) Set LCD port number to the number except zero through the remote I/O screen or the bootstrap mode.

2) Turn off the power, and then connect the liquid crystal module to its socket.

3) Turn the VR of contrast fully to the right.

4) Turn on the power.

This procedure enables IP address to be indicated on the liquid crystal module. You can adjust the color and contrast by turning VR to the right, in order to see the liquid crystal more clearly.

The positions of CN2 pins

26	25	24	23	22	21	20	19	18	17	16	15	14
G	G	G	G	G	G	G	G	G	G	G	G	G
RA0	RA1	RA2	RA3	RB0	RB1	RB2	RB3	RB4	RB5	RB6	RB7	+5V
1	2	3	4	5	6	7	8	9	10	11	12	13

- RA0-RA3   analog input
- RB0-RB7   digital input and output
- +5V   3 terminal regulators, 5V output, max 100mA
- G   grand

Illustration on the simple program (the layout of the control picture may look different with a new version.)

Applied examples

We are going to show applied examples of this PICNIC in our homepage.

Please look forward to it. The article about this PICNIC was published in January issue, 2001 on Transistor Technique Journal (CQ Publishing Corp.)Please refer to it.

Checkpoint in case of trouble

These are checklists for some possible main troubles.

- Is your soldering good enough?

Most of the defects by assembling this kit are caused by soldering.

- Does the power voltage work properly?

This kit has a built-in three terminal regulator, bridge diode. It does not work properly unless the power voltage has more than DC 8V through DC jack.

If you have a stabilized 5V power source, remove the 3 terminal regulator and connect the 5V directly to O terminal.

- Is the direction of IC, Trans correct?

Confirm the number 1 pin and check if the IC socket is set to the correct direction.

- Does the packet really reach PICNIC?

If the network condition is complicated, the packet may not reach due to the problem on gateway set up. Test it by connecting a cross cable 1:1.

- Slow response?

The packet may take a long time due to the corresponding speed of PIC micro computer. Please retry or reload it.

- Response sometimes and no response other times.

If the PICNIC board has many connecting requests simultaneously from host process, it gets buffer overflow and makes no responses for a time. Retry with a software.

- Not operating through rooter

There is a possibility that "www/top" packet and "udp" packet are filtered.

- No ping passing through

It may look not working because some rooter setup can make ping packet filtering.

Changed features of Ver.2

- Retry function is added in DHCP.

- Hardware flow control function is built in RS232C

Notice for users

We have no obligation and warranty for damages, losses caused by using this board software, whether the trouble rises directly or indirectly.

We have no obligation of repairing or improving any software with bugs or defects. We provide the updated version in our homepage, when the version is updated, but we don't have services of exchanging micro computers and program filling. We cannot also answer the questions regarding firm filling of PIC micro computer.

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http://www.tristate.ne.jp