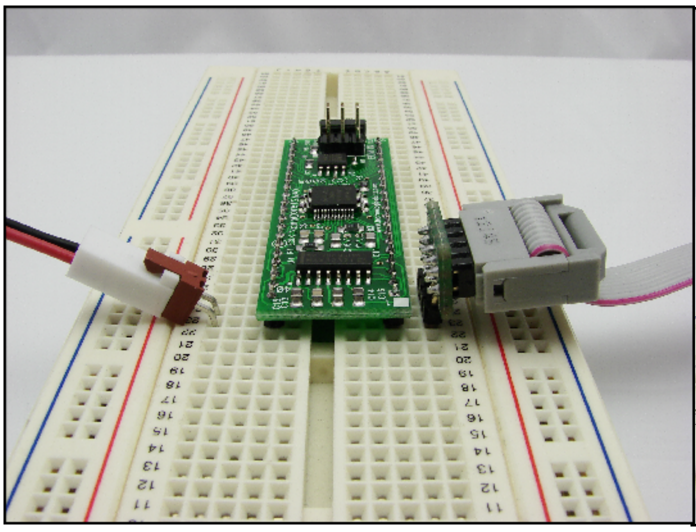
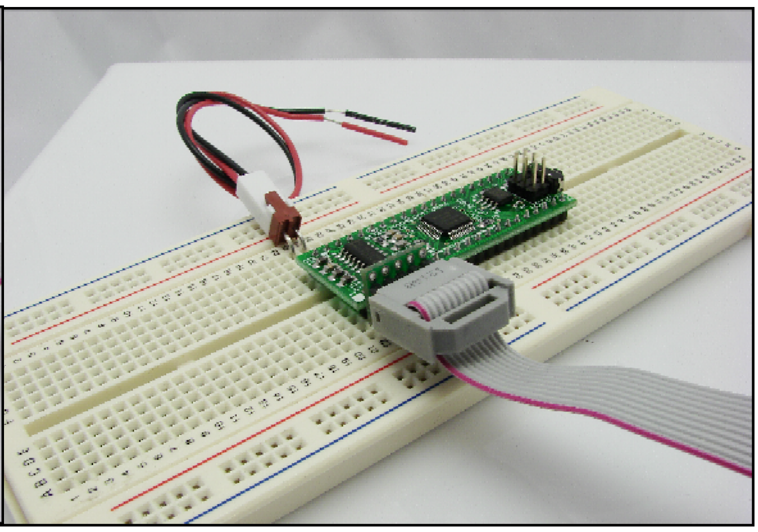




Using your NanoCore12MAX QuickStart Package

1. Getting Started

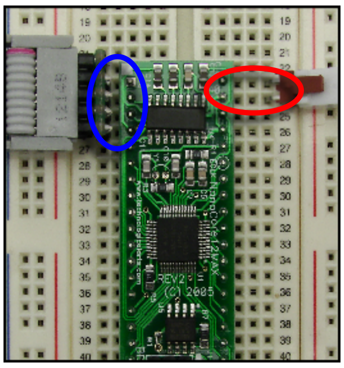
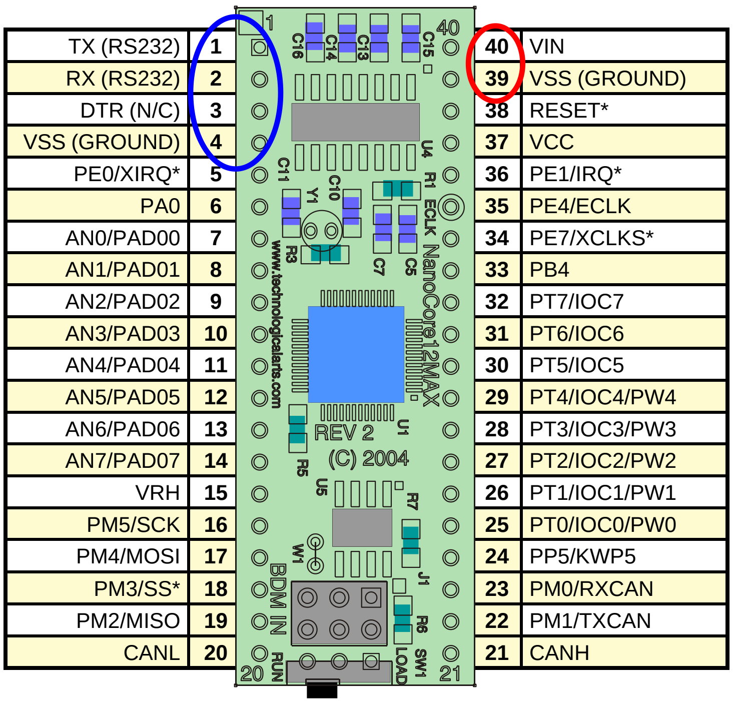


Figure 1

1.1 Hardware Setup:

Plug the NanoCore12MAX module into your solderless breadboard. Attach the supplied serial cable (style may vary) between the **TX**, **RX**, and **GROUND** pins of the module (pins 1, 2, and 4, respectively) and your PC's Com Port (i.e. serial port). (see Fig. 1). If your PC does not have a Com Port, you'll also need a USB-to-Comport adapter (*#USB2COM*).



TX (RS232)	1	40	VIN
RX (RS232)	2	39	VSS (GROUND)
DTR (N/C)	3	38	RESET*
VSS (GROUND)	4	37	VCC
PE0/XIRQ*	5	36	PE1/IRQ*
PA0	6	35	PE4/ECLK
AN0/PAD00	7	34	PE7/XCLKS*
AN1/PAD01	8	33	PB4
AN2/PAD02	9	32	PT7/IOC7
AN3/PAD03	10	31	PT6/IOC6
AN4/PAD04	11	30	PT5/IOC5
AN5/PAD05	12	29	PT4/IOC4/PW4
AN6/PAD06	13	28	PT3/IOC3/PW3
AN7/PAD07	14	27	PT2/IOC2/PW2
VRH	15	26	PT1/IOC1/PW1
PM5/SCK	16	25	PT0/IOC0/PW0
PM4/MOSI	17	24	PP5/KWP5
PM3/SS*	18	23	PM0/RXCAN
PM2/MISO	19	22	PM1/TXCAN
CANL	20	21	CANH

Figure 2

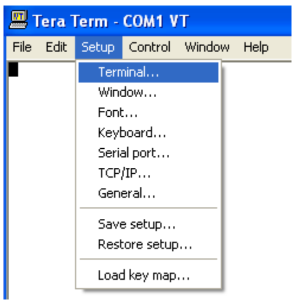


Figure 3

You'll need a DC power supply of at least 6V and not exceeding about 9V. With the power off, attach or splice your power supply onto the red and black power cable assembly that came with your kit. Red is positive and black is negative. This cable assembly was designed to plug conveniently into your solderless breadboard next to the Vin and Ground pins on NanoCore12MAX. The Vin (+) pin (40) goes to the red wire, and VSS/Ground (-) pin (39) goes to the black wire. Refer to Figure 2. *(Note: if you have a regulated 3V or 5V power supply, you can connect it between Vcc (pin 37, positive) and Vss (pin 39, negative) instead.*

Do not apply power yet.

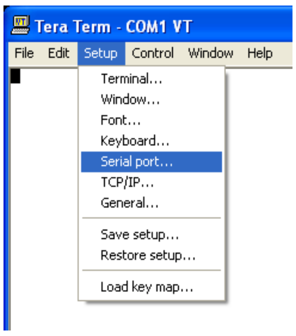
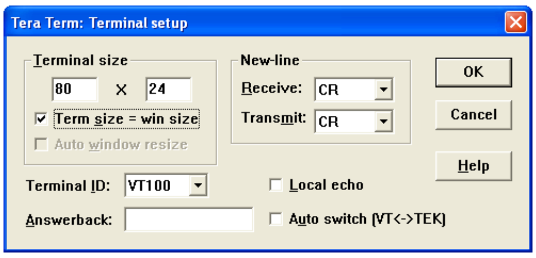


Figure 5



Tera Term: Terminal setup

Terminal size: 80 × 24
☑ Term size = win size
☐ Auto window resize
New-line Receive: CR
Transmit: CR
Terminal ID: VT100
☐ Local echo
Answerback:
☐ Auto switch (VT<->TEK)

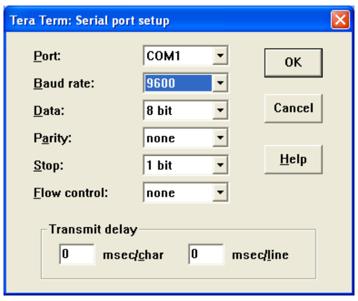
Figure 4

1.2 Verifying your Setup.

At this point, you should have your hardware all set up and ready to test.

Each NanoCore12MAX module is shipped from the factory with a demo program loaded into memory. To use the demo program, you will need to launch a terminal program on your PC. Some examples of terminal programs you can use are: HyperTerminal (included with Windows), TeraTermPro, MiniIDE, and the terminal program inside ImageCraft's C compiler (ICC12 or ICC for CPU12). In this guide, we will use TeraTermPro, available on the Resources page of www.NanoCore12.com, or here: *http://support.technologicalarts.ca/docs/Third%20Party/TeraTermPro/Tera%20Term%20Pro%202.3.zip*

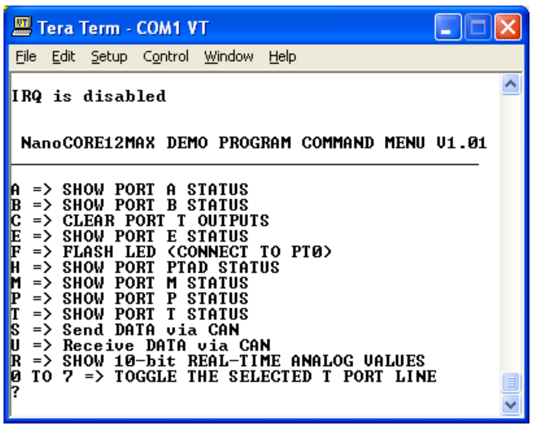
After unZIPping and installing TeraTermPro, launch it and select **Setup** from the drop-down menu. Select **Terminal** (see Figure 3) and click on the button next to **Term size = win size**, then click *OK* (see Figure 4). Again from **Setup**, select **Serial Port** (see Figure 5) and select the com **Port** you are using, **9600** for **Baud rate**, **Data: 8 bit**, **Parity: none**, **Stop: 1 bit**, **Flow control: none** (see Figure 6). Now, make sure the **Load/Run** switch on NanoCore12MAX is in the **RUN** position and apply power to your module, as described in 1.1, above. You should immediately see a menu displayed in your terminal window (see Figure 7). If you don't see the menu, momentarily bring the **RESET** pin (pin 30) on the module to *logic low* (i.e. temporarily connect it to **GROUND**). If that doesn't work, re-read the above and verify your power supply voltage and connections.



Tera Term: Serial port setup

Port: COM1
Baud rate: 9600
Data: 8 bit
Parity: none
Stop: 1 bit
Flow control: none
Transmit delay: 0 msec/char 0 msec/line

Figure 6



```
IRQ is disabled

 NanoCORE12MAX DEMO PROGRAM COMMAND MENU V1.01

A => SHOW PORT A STATUS
B => SHOW PORT B STATUS
C => CLEAR PORT T OUTPUTS
E => SHOW PORT E STATUS
F => FLASH LED (CONNECT TO PT0)
H => SHOW PORT PTAD STATUS
M => SHOW PORT M STATUS
P => SHOW PORT P STATUS
T => SHOW PORT T STATUS
S => Send DATA via CAN
U => Receive DATA via CAN
R => SHOW 10-bit REAL-TIME ANALOG VALUES
0 TO 7 => TOGGLE THE SELECTED T PORT LINE
?
```

Figure 7

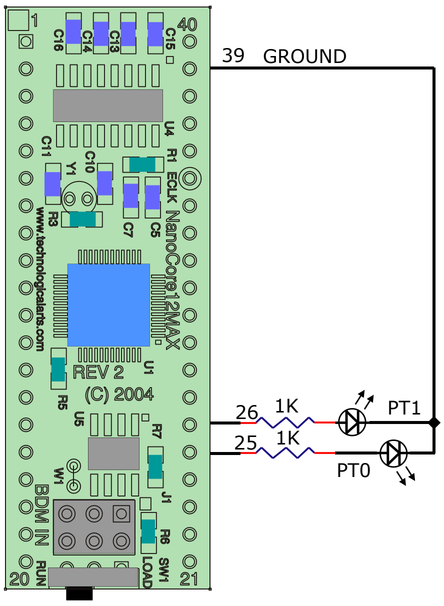


Figure 8 - LEDs on PT0 and PT1

Now press the *Enter* key on your PC keyboard, and NanoCore12MAX will re-send the Demo Menu to your terminal window. If you got this far, it means that your module is successfully powered up and running, and communication is working in both directions (i.e. transmit and receive).

1.3 Using the Demo Program:

Now it’s a good idea to attach a couple of LEDs to see the results of some of the Demo Program commands. Refer to Figure 8 for the connection details. The current-limiting resistor value should be no less than 680 Ohms, to avoid drawing too much current from the pin.

•Type the digit 0 repeatedly and observe that the LED connected to PT0 (pin 25) toggles on and off.
•Type the digit *1* repeatedly and observe that the LED connected to PT1 (pin 26) toggles on and off.
•Type the letter *F* to cause the LED connected to PT0 (pin 25) to flash twice.

Typing *E*, *H*, *M*, or *T* will cause a hexadecimal number to be displayed, whose bit values represent the logic levels of the respective port pins. Those pins which are not connected to external circuitry (i.e. floating pins) will assume a logic 1 level, due to internal pullup resistors. You can connect any one or more of these pins to logic low (GROUND) and type the corresponding command to see how the displayed value changes.

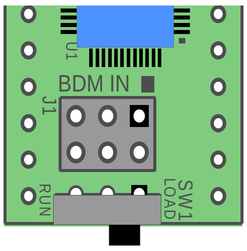
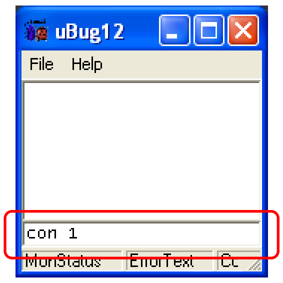


Figure 9 - Switch to Load Mode

1.4 Loading a New Program Into Memory:

Whenever power is applied to the board, or whenever the Reset signal is brought to logic low and released, the microcontroller resets. The startup code in the Serial Monitor first examines the position of the LOAD/RUN switch to determine whether to run the monitor or to jump to the user program. If the switch is in the LOAD position, the Serial Monitor becomes active, waiting to receive commands via the com port. To use the Serial Monitor to send commands, you'll first need to install and launch uBug12.

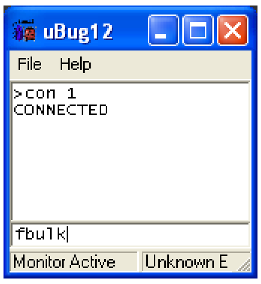


```
con 1
```

Figure 10 - Command Window

1.41 Using uBug12. Download uBug12 from http://support.technologicalarts.ca/docs/uBug12/uBug12.zip, unZIP it, and install it.

1.42 Establishing a Serial Port Connection. Once you have launched uBug12, place the NanoCore12MAX switch in the **LOAD** position (see Figure 9) and reset your NanoCore12MAX (by bringing the **Reset** pin momentarily to logic low, as described earlier). Then click inside the command window of uBug12 (see Figure 10) and type the command *con 1* in order to establish communication between uBug12 and the NanoCore12MAX module. If you're using a com port other than 1, substitute the correct number (eg. type *con 3* if you are using com port 3). A CONNECTED message will appear in the uBug12 display window showing that the connection was successful.



```
>con 1
CONNECTED
```

```
fbulk
```

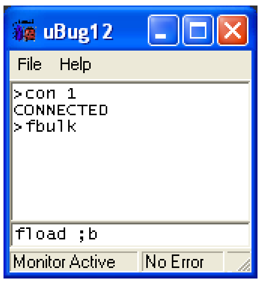
Monitor Active | Unknown E

Figure 11

1.43 Loading a Program. Loading a new program into Flash memory is a two-step process--first you must erase any existing program from memory and then you load in your new program. Here's how to do it:

Type ***fbulk*** followed by <Enter>.
After erasing has finished, type ***fload ;b*** followed by <Enter>.

When the Windows file browser pops up, navigate to the file you want to load and click *OK*. After loading has finished, move switch SW2 to the **RUN** position and reset NanoCore12MAX. If the program you just loaded uses the serial port (like the Demo Program, for example), you can just type the command ***term*** in uBug12 to launch a TeraTerm window (assuming you have previously installed it). To use a different terminal program, close uBug12 and open the terminal program of your choice.



```
>con 1
CONNECTED
>fbulk
```

```
fload ;b
```

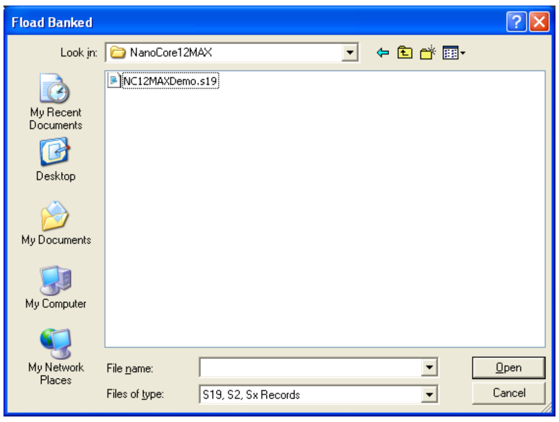
Monitor Active | No Error

Figure 12

For a list of all uBug12 commands, type ***help*** at the uBug12 command prompt. For more details on uBug12 and its commands, refer to the ***ABCs of NanoCore12***, found on the Documentation page of www.NanoCore12.com.

1.44 Using the Sample Programs. Several simple programs have been created to get you started. They can be found on the Documentation page of www.nanocore12.com. Follow the steps outlined in 1.43 to load and run them one by one. Here are the names of the simple programs and a brief description of what they do:

simple1: turn on an LED connected to PT0
simple2: flash an LED connected to PT0
simple3: alternately flash LEDs connected to PT0 and PT1
simple4: send the message *Hello World!* out the serial port
simple5: combines the above into a single menu-driven program



Look in: NanoCore12MAX

NC12MAXDemo.s19

File name:

Files of type: S19, S2, Sx Records

Figure 13

1.45 Going Further. For troubleshooting help, or to start writing your own programs for NanoCore12MAX, refer to the ***ABCs of NanoCore12***, found on the Documentation page of www.NanoCore12.com. Not only does it cover all hardware details of the NanoCore12 family and accessories, but it contains thorough tutorials and numerous examples for using Assembler, BASIC, and C.

Visit the Resources page on www.NanoCore12.com for updates to this document and related material

Rev. 1