

USER MANUAL

PMAC 32-Bit Communication Driver

Installing 32-Bit Driver for PMAC

3xx-W32DRV-xUxx

September 13, 2006



DELTA TAU

Data Systems, Inc.

NEW IDEAS IN MOTION ...

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Operating Conditions

All Delta Tau Data Systems, Inc. motion controller products, accessories, and amplifiers contain static sensitive components that can be damaged by incorrect handling. When installing or handling Delta Tau Data Systems, Inc. products, avoid contact with highly insulated materials. Only qualified personnel should be allowed to handle this equipment.

In the case of industrial applications, we expect our products to be protected from hazardous or conductive materials and/or environments that could cause harm to the controller by damaging components or causing electrical shorts. When our products are used in an industrial environment, install them into an industrial electrical cabinet or industrial PC to protect them from excessive or corrosive moisture, abnormal ambient temperatures, and conductive materials. If Delta Tau Data Systems, Inc. products are exposed to hazardous or conductive materials and/or environments, we cannot guarantee their operation.

REVISION HISTORY				
REV.	DESCRIPTION	DATE	CHG	APPVD
1	REVISED MULTIHOST & BENCHMARK INFO	09/13/06	CP	F. AHMAD

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INTRODUCTION

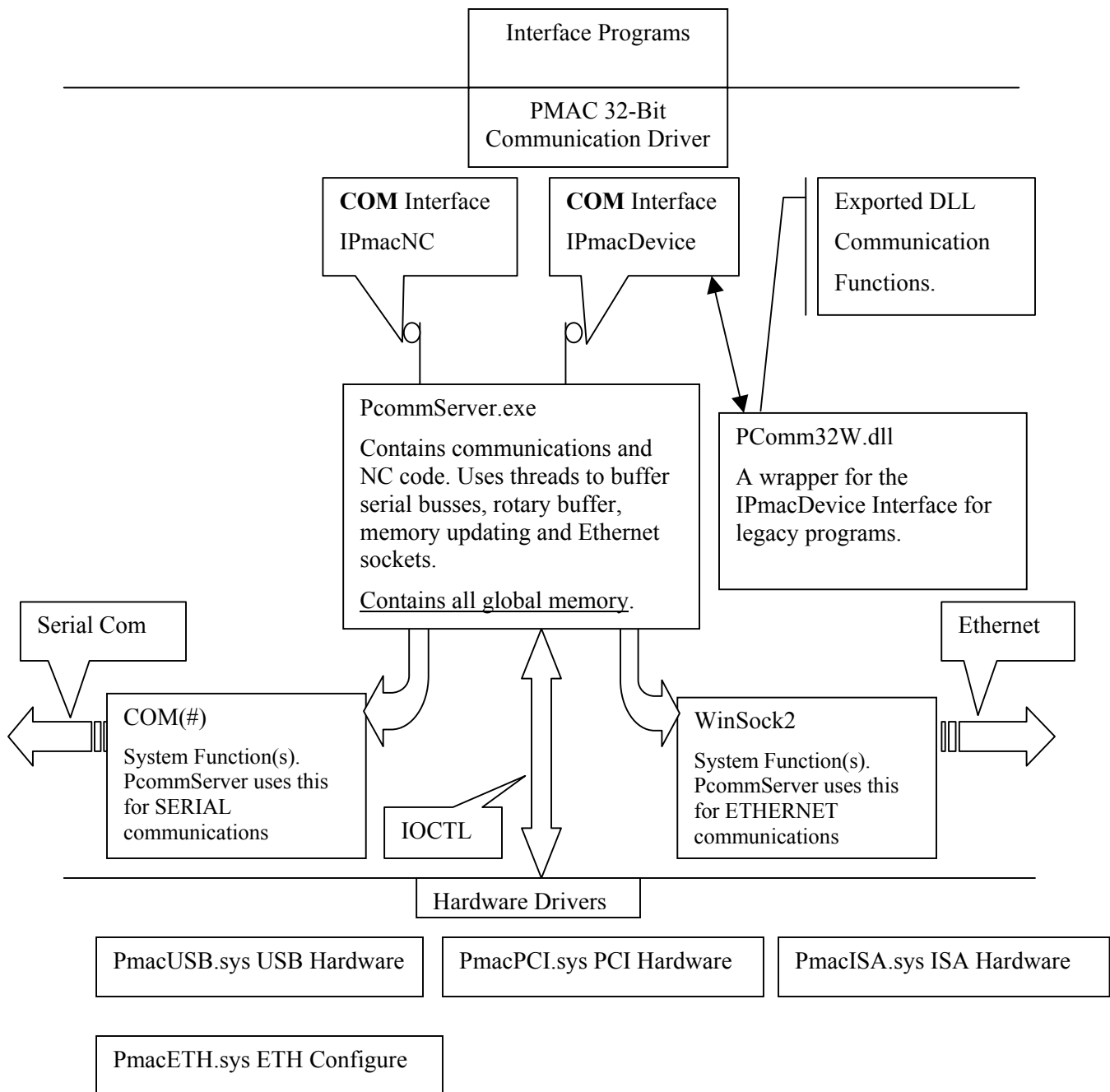
The PMAC 32-bit communication driver provides all channel of communication between the host computer and PMAC controllers. All methods of communication to PMAC are included. All types of PMACs (Turbo and non-Turbo) use this driver for communication to the host computer.

A Global View of the Driver

The driver can be used for Windows 2000/XP application development. The driver consists of the following sets of files:

- PcommServer.exe – A Server application, responsible for core communication and transferring the Data between the host computer and PMAC controllers.
- PmacISA.SYS, PmacPCI.SYS, PmacUSB.SYS – Windows 2000/XP kernel drivers.
- PmacISA.INF, PmacPCI.INF or PmacUSB.INF – Windows Setup Information files.
- ETHConfigure.EXE, USBConfigure.EXE and USBETHConfigure.EXE – Ethernet and USB configuration applications are responsible for boot firmware download and the IP configuration application is responsible for USB and Ethernet modes of communication. Furthermore, PmacETH.SYS loads the Ethernet mode at startup.
- A complete Source Code along with a simple User Interface for Linux operating system is packed in the file pmac_Linux.tgz.

The illustration below shows how these modules are related.



Supported Operating Systems

The following operating systems are supported:

- Windows 2000
- Windows XP

Hardware Requirements

The PMAC 32-Bit Communication Driver for Windows requires a minimum specification of hardware for reliable operation and acceptable performance. These requirements include:

- 500 MHz Pentium III and above (of course, a faster computer will yield better throughput.)
- At least 35 MB of free disk space and 128 MB of RAM (PRO Suite2 requires a minimum of 50 MB of free disk space.)
- A free serial communications port, USB port, Ethernet port, PCI BUS slot, or ISA BUS slot to talk to PMAC for on-line processing
- Any monitor with SVGA resolution (800x600 with at least 256 colors)

APPLICATION INSTALLATION AND SETUP

This is a generic procedure for installing and setting up the application and driver for all Delta Tau products. This procedure is applicable for all Delta Tau software packages.

Software Installation

1. Uninstall all old Delta Tau software applications including Pewin32 Pro, PmacPlotPro, NCUI32, PComm32 Pro, Ptalk DT Pro and the setup programs (P1Setup32Pro, P2Setup32Pro and TurboSetup32Pro and other programs based on Pcomm32Pro or Ptalk DT Pro) before beginning the new Driver based applications.
2. Install PMAC Executive Pro2 Suite, PMAC HMI, PMAC NC 5.x. A setup application is provided on a CD-ROM or floppy disk with the Setup.EXE application. Follow the steps provided by the setup application.
3. Restart the computer.

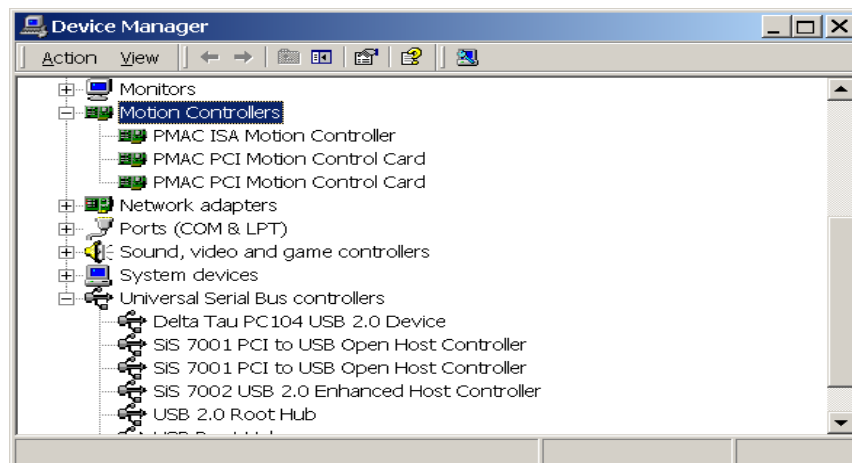
Automatic Detection of Plug and Play Devices

1. Perform the steps outlined in the Software Installation section.

USB and PCI Plug and Play devices are configured automatically at boot time. In addition, the USB communications port is configured automatically whenever it is plugged in.

Note:

- USB devices are listed in the Universal Serial Bus Controllers class while ISA and PCI devices are listed in the Motion Class in the device manager as shown in the screen below.
- USB PMAC can be plugged in at any time once the computer has been restarted after the ProSuite2 installation.
- Serial and Ethernet devices are not listed in any category. No device drivers are required to communicate to PMAC over serial or Ethernet modes. Follow the instructions for the Ethernet configuration as outlined in the Non-Plug and Play (Ethernet) devices section of this manual.



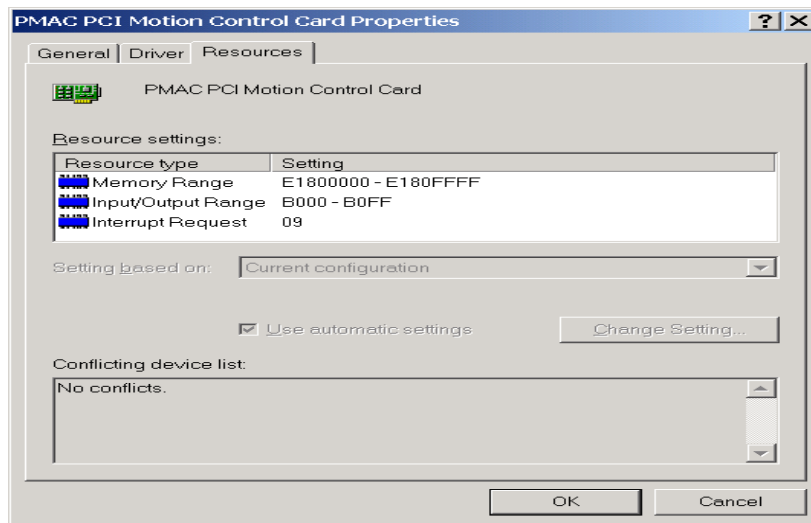
2. Restart the computer.
3. The computer will recognize and configure the new hardware. If prompted, give the path of driver files. Depending on the operating systems, these files are in the following folders by default:

Windows XP: c:\windows\system32\drivers
Windows 2000: c:\winnt\system32\drivers

4. Proceed to the First Time User Registration section of this manual.

Note:

- a) For Plug and Play devices, the I/O port, DPRAM base address, and Interrupt are assigned by the operating system. There is not an option to change or disable these parameters. However, the parameters assigned by the operating system can be reviewed in the Resources page of the Windows[®] device manager as shown in the screen below.
- b) From the latest driver, the interrupts can be enabled or disabled from the properties option of the **PmacSelect ()** function. Proceed to the First Time User Registration section of this manual for details.



Non-Plug and Play [ISA] Devices

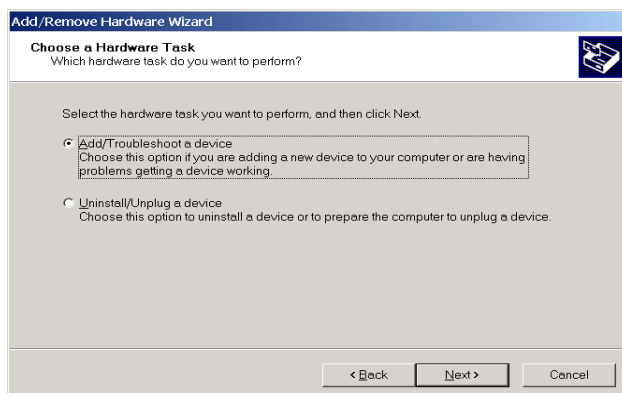
Non-plug and play (ISA) devices are configured through the standard Add or Remove New Hardware wizard. The next section describes all the necessary steps involved in configuring Delta Tau devices under Windows 2000 or XP.

Windows 2000/XP Installation Steps (Non-Plug and Play [ISA] Devices)

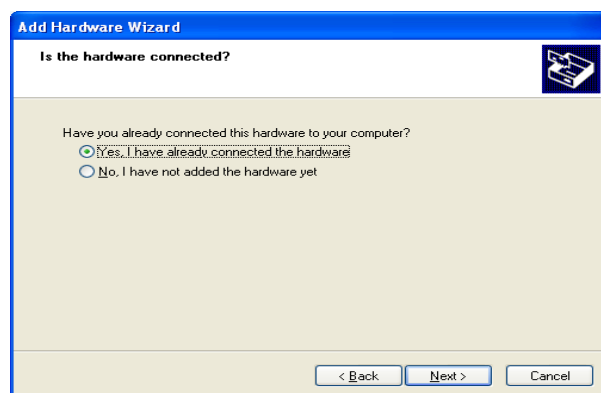
1. Perform the first three steps outlined in the Software Installation section of this manual.
2. Select **Add/Remove New Hardware** from the Control Panel.



3. From the Choose a Hardware Task window, select **Add/Troubleshoot a Device**.

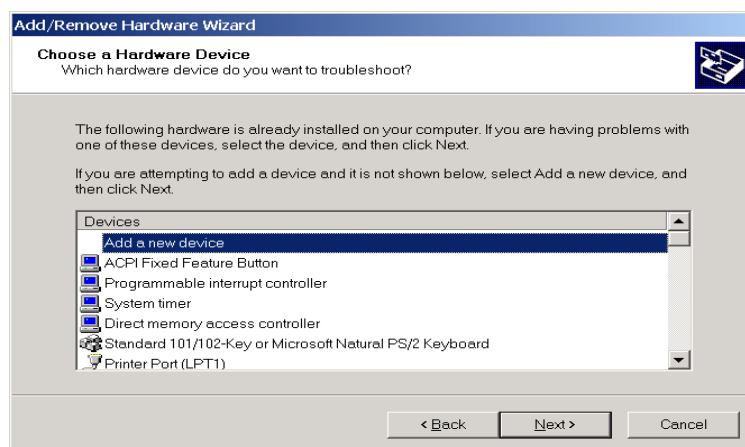


This screen is for Windows 2000

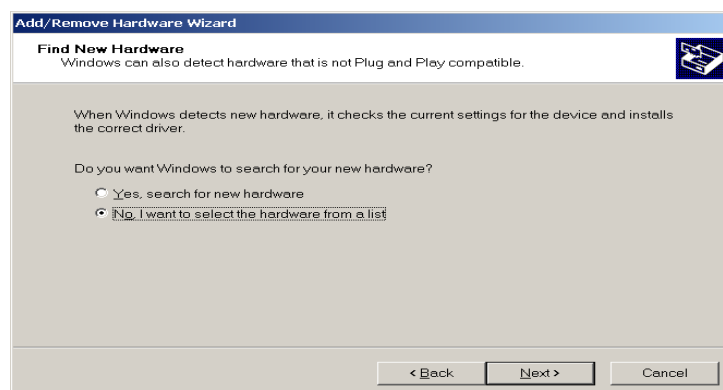


This screen is for Windows XP

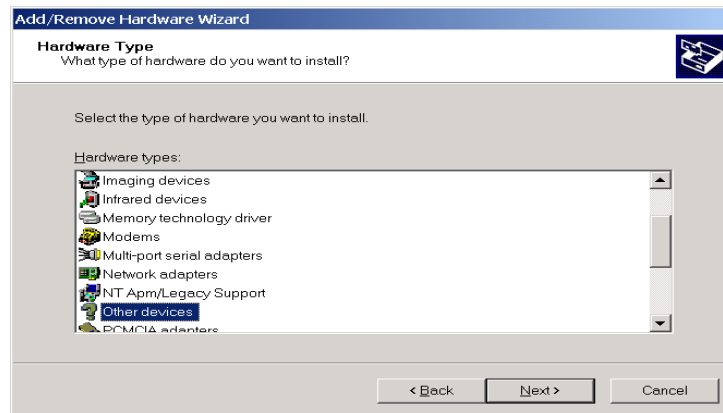
4. From the Choose a Hardware Device window, select **Add a New Device**.



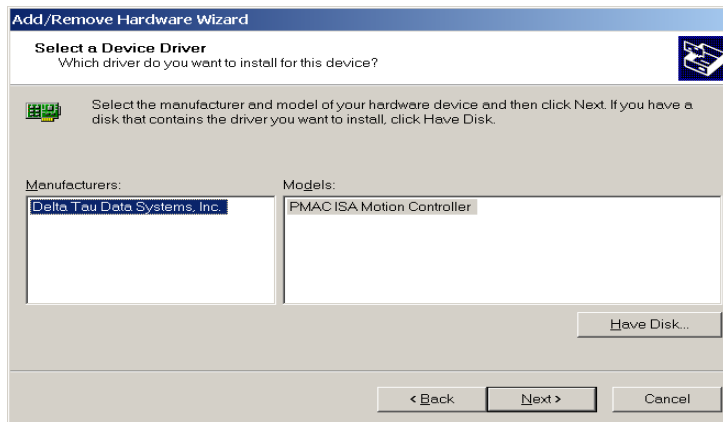
5. From the Find New Hardware window, select **No** to auto-detect options and continue.



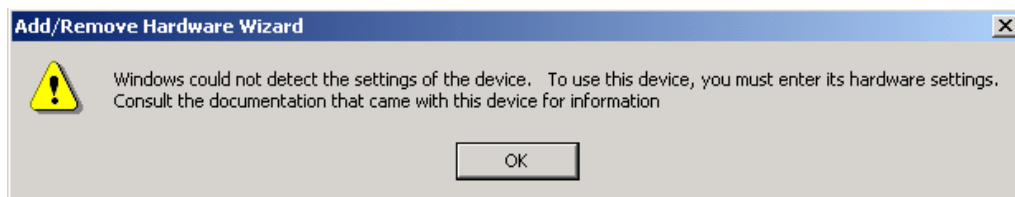
6. From the Hardware Type window, select **Other devices** (this is done for the first installation only). Once the operating system's device database is updated, all motion controllers will be listed in the hardware types list. Use this for future PMAC hardware device additions.



7. Once the device database is compiled, Delta Tau Data Systems, Inc. will be added to the manufacturers list. Scroll through the manufacturers list and select **Delta Tau Data Systems, Inc.**



8. Select the model from the available list (PMAC ISA Motion Controller). Windows 2000/XP allows resource configuration during installation. At this stage, base address, DPRAM configuration and/or IRQ assignments can be configured.

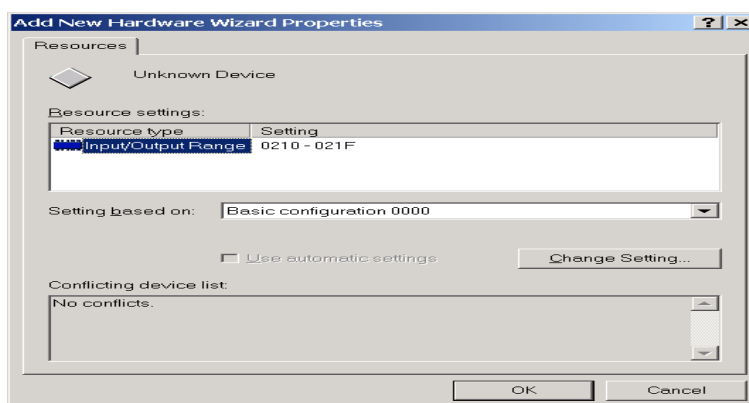


9. Click OK and Continue with the configurations.

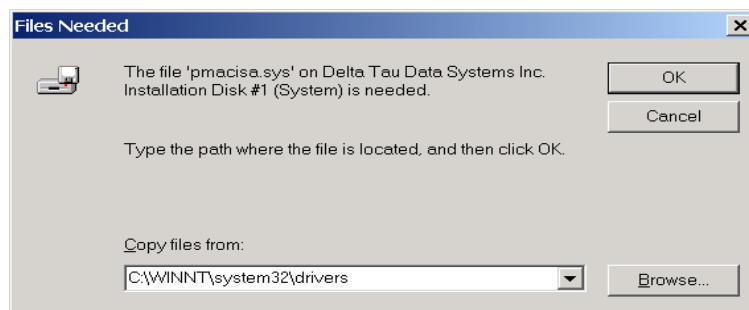
The following table gives details of all configurations. By default, the basic configuration 0 is selected.

Configuration Number	Modes of Communication
Basic Configuration 0	Communication through host port only
Basic Configuration 1	Communication through host port with DPRAM (regular size) enabled
Basic Configuration 2	Communication through host port with DPRAM (regular size) and interrupts enabled
Basic Configuration 3	Communication through host port with interrupts enabled
Basic Configuration 4	Communication through host port with DPRAM (large size) enabled
Basic Configuration 5	Communication through host port with DPRAM (large size) and interrupts enabled

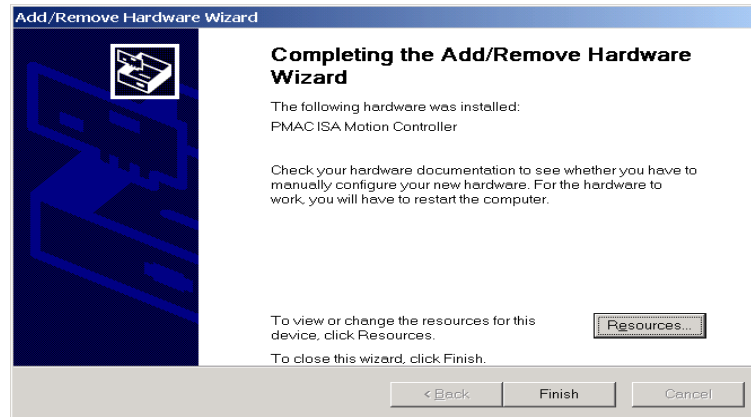
10. Select the appropriate configuration and after highlighting the resource, click on **Change Setting** to set the values.



11. Select the driver file PMACISA.SYS. Browse to the correct folder. For Windows 2000, it is located in C:\WINNT\System32\Drivers and for Windows XP, it is located in C:\Windows\System32\Drivers folder.



12. Finish the installation and restart the computer. Review and reconfigure the resources before restarting the computer. Furthermore, these resources can be changed at any time by launching the Device Manager and the Add/Remove Hardware Wizard and clicking **Resources**.



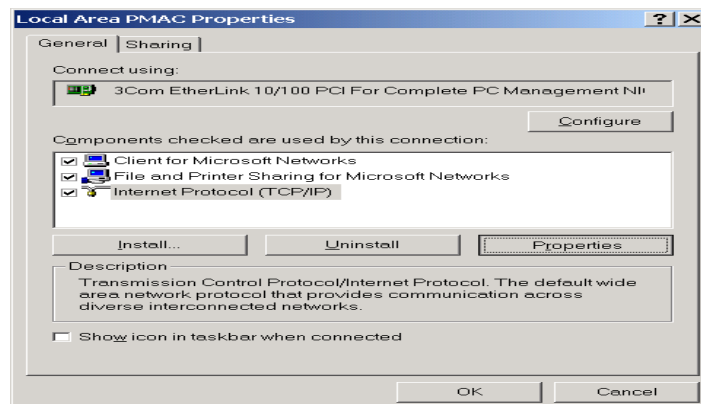
13. Proceed to the First Time User Registration section of this manual.

Non-Plug and Play [ETHERNET] Devices – Installation

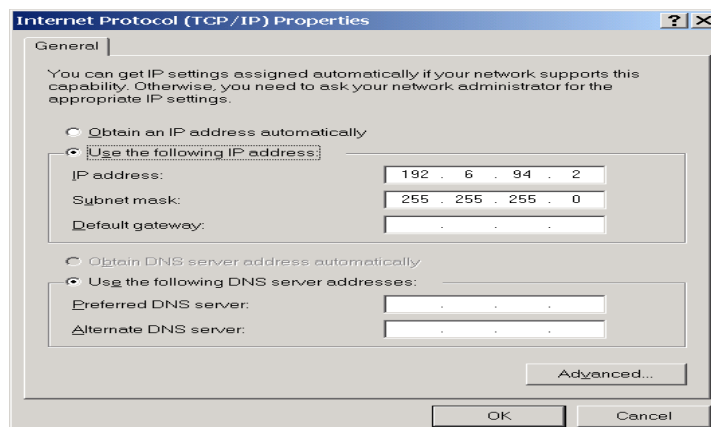
Configure the Ethernet devices by launching the ETHConfigure.EXE, USBETHConfigure.EXE for 10 Base-T and 100 Base-T applications, respectively. Delta Tau provides these files as part of the ProSuite2 or any other Delta Tau standard installations. Installation and configuration of Ethernet devices is independent of the operating system.

A network card must be configured on the computer with the PMAC connection before proceeding. Furthermore, a crossover Ethernet cable or a private hub along with two straight cables is required for this setup.

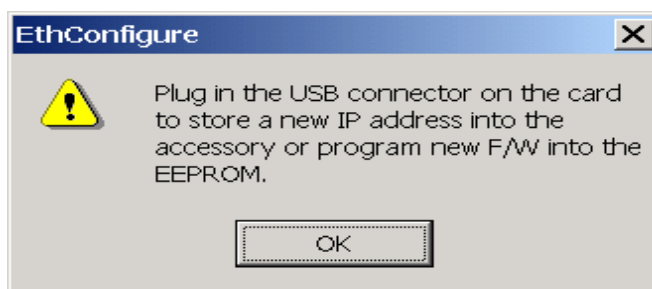
1. Perform the steps outlined in the Software Installation section of this manual.
2. From the control panel, select the properties of the network card that will communicate to the PMAC via the Ethernet. Highlight the Internet Protocol (TCP/IP) and select **Properties**.



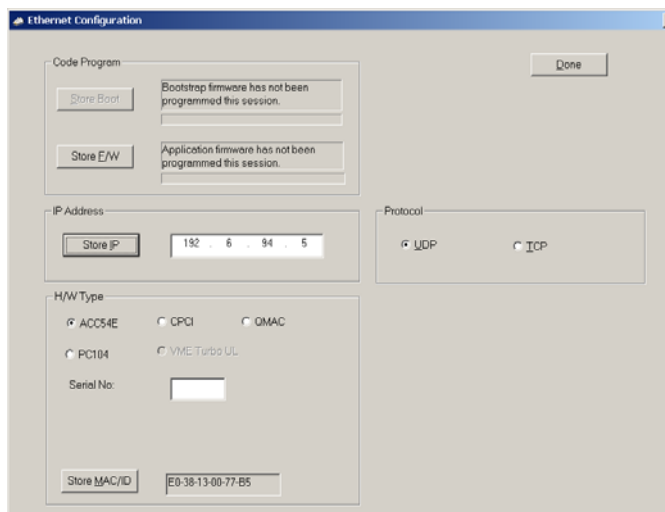
3. Type the private area IP address (e.g. 192.6.94.2) for this card and enter the subnet mask (255.255.255.0) in the provided spaces. Close the properties page and restart the computer. The Ethernet card configuration on the computer is now complete.



4. To configure the PMAC side, run the ETHConfigure.EXE(10 Base-T) or USBETHConfigure.EXE (USB+100 Base-T) from programs\PMAC Executive Pro2 Suite\Delta Tau Common\ program group. These applications are provided as part of the standard installation and are placed in the c:\Program files\Delta Tau\Common\ folder. Proceed to the main screen by clicking **OK**.

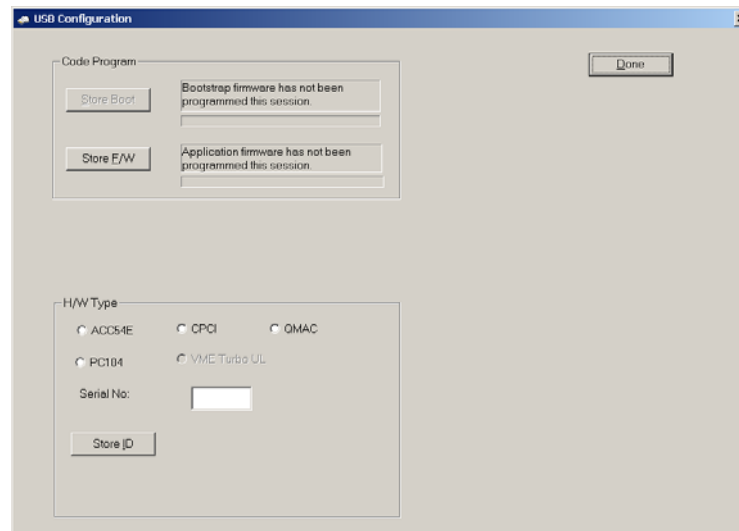


The following setup screen will appear:



5. Select the appropriate settings from the following:
 - a. Enter the IP address (e.g. 192.6.94.5) in the Store IP row. Make sure that this address is in the same subnet as the IP address in the PC NIC card. The last entry must be different from the one in the PC (Ethernet Card).
 - b. Select the correct protocol between (UDP and TCP). Delta Tau recommends only TCP mode for all Ethernet communications.

- c. Select the correct hardware type.
- d. Click the **Store IP** button.
6. Click **Yes** to store the IP address in the registry. Close the main screen. The Ethernet PMAC has been added to the device list.
7. The new boards support both USB and Ethernet mode of communication and do not require a change of firmware. A special firmware file and USB cable is required (not provided with standard installation). Contact Technical Support to change the mode of communication. For detailed instructions on how to switch the communication mode between USB and Ethernet on an ACC-54E board or any other PMAC supporting Ethernet and USB mode, refer to the ACC-54E user manual.
8. Similar to the Ethernet configuration utility, a USB configuration utility is also provided with any standard installation. The USB configuration utility configures the communication card for USB provided that the correct hardware type and serial number are selected.

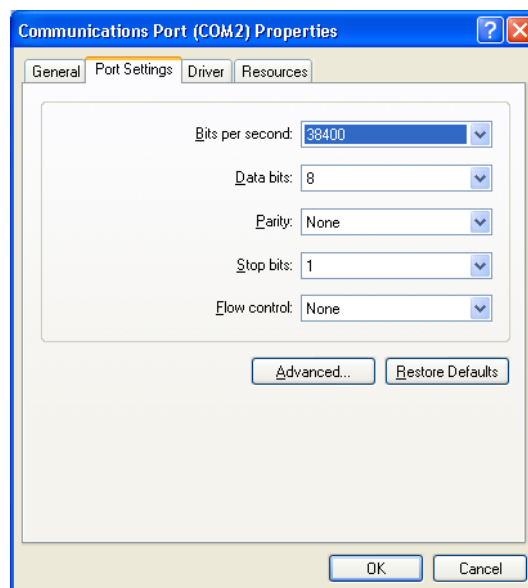


9. Proceed to the First Time User Registration section of this manual.

Installing [Serial] Devices in Windows Operating Systems

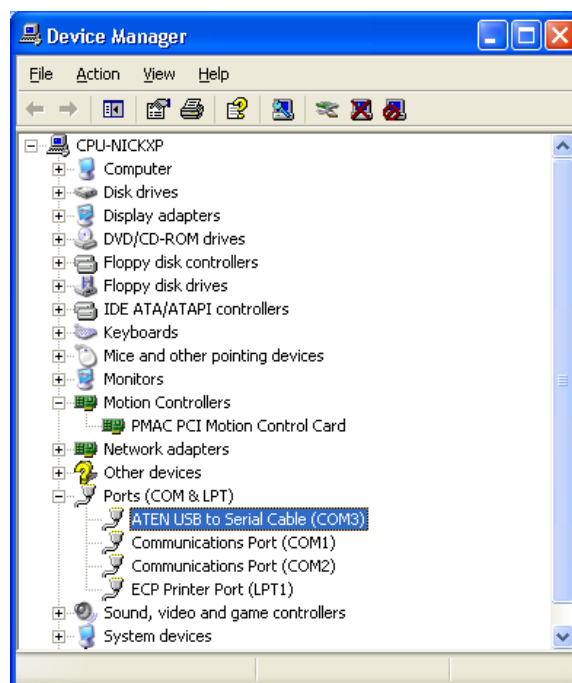
Configure the Serial Device to accept a Delta Tau product and identify which COM port each product is connected to (PMAC, UMAC etc.).

1. Open the Device Manager in the Control Panel. Go to Ports (COM&LPT) and highlight the port being configured.
2. Right click and select **Properties**.
3. Click on the Port Settings tab and verify that the settings are as follows:
 - Bits per Second: 38400 (default)
 - Data Bit: 8 (default)
 - Parity: None (default)
 - Stop bits: 1 (default)
 - Flow Control: None (default)



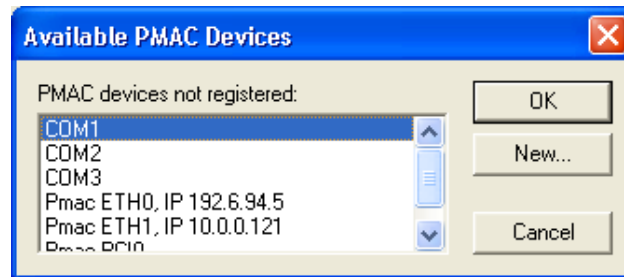
Computers without Built-in COM Ports: Installing USB to Serial COM Port [Plug and Play]

After installing the USB to the serial device in Windows successfully, the newly added COM port displays in the Device Manager (e.g., ATEN USB to serial cable [COM3]) with the new COM port number.

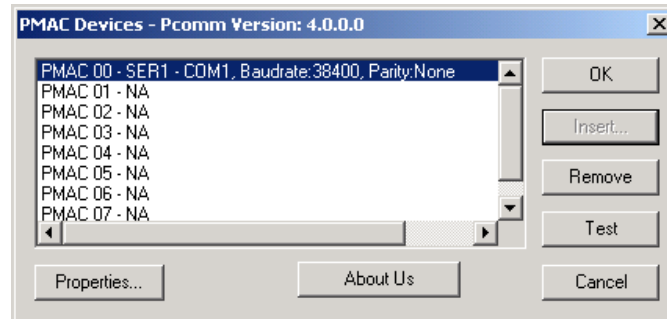


Setting up COM Port in Pewin 32 Pro2

1. Open any of the Pro Suite 2 programs and select **Setup** from the Menu option.
2. From Pewin 32 Pro2, go to General Setup and Options and click the **Select** button and select **Insert**. All available devices and COM numbers will display.



3. Select the COM port from the PMAC Devices dialog box. Click **Test** to verify communication with a PMAC device.

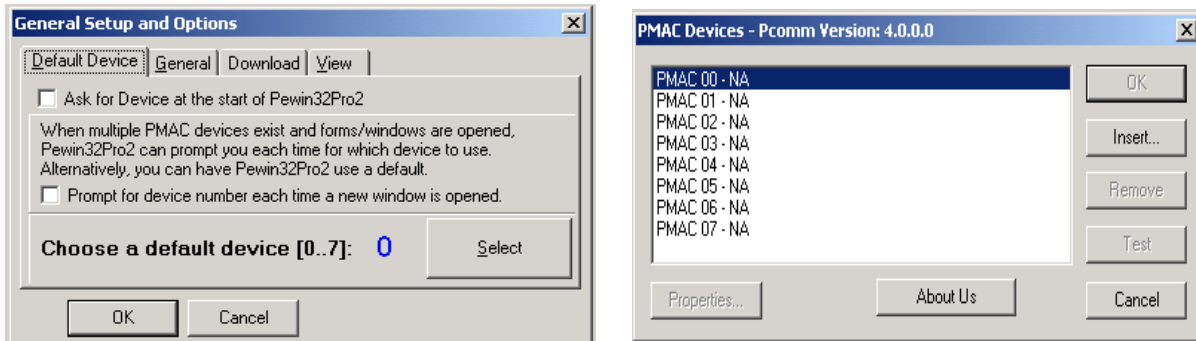


FIRST TIME USER REGISTRATION

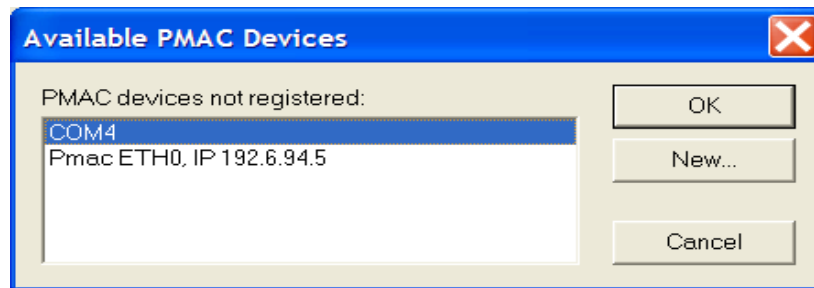
Once the device driver is installed, use the PmacSelect() dialog to continue with additional configurations.

PMACSelect () Dialog

The PmacSelect dialog is accessible by all programs created with the driver (via the **PmacSelect ()** method). Launch the supplied Delta Tau applications (Pewin32 Pro2, PmacTuningPro2 or other setup programs) from the program menu and display the PmacSelect dialog.



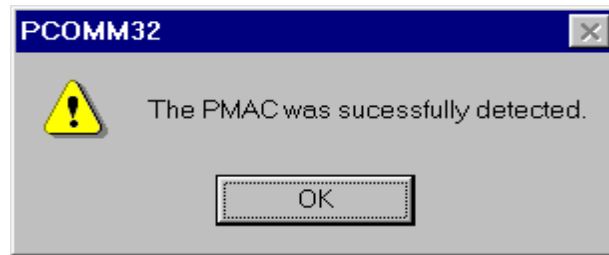
1. From the PMAC Devices screen, select the device number and click **Insert**. The following window listing all configured devices will appear:



2. Select the device to be configured and click **OK**.



- Once a PMAC is listed in the PMACSelect () window, it is registered. After a device is registered, it should be tested. At this time, the following screen displays and the device is ready to use in any application.

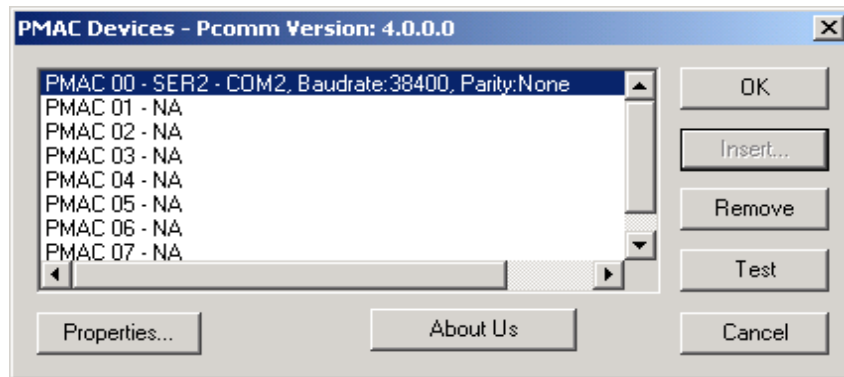


Note:

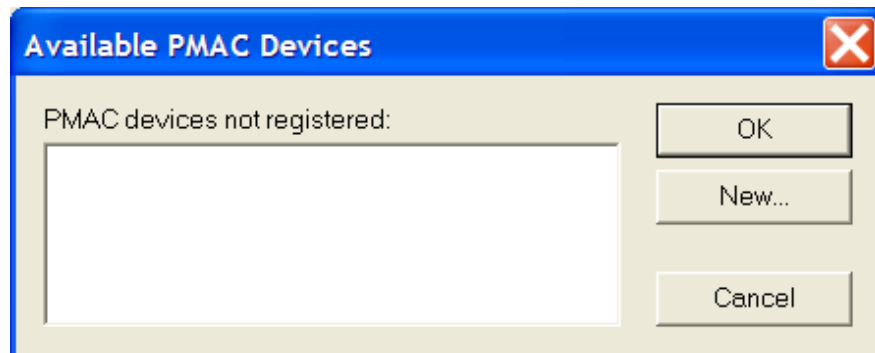
To add a previously configured Ethernet device, follow the instructions below.

Insert a Pre-configured Ethernet Devices in Delta Tau Applications

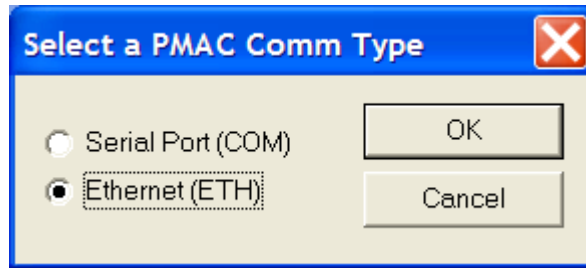
- Connect the USB cable between the PMAC and the host computer.
- Power cycle the PMAC unit.
- Launch any Delta Tau application and select the **PmacSelect ()** method.



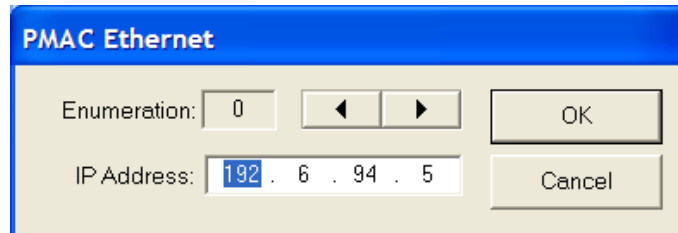
- Select any available (NA) device number and click **Insert**. The following window will appear.



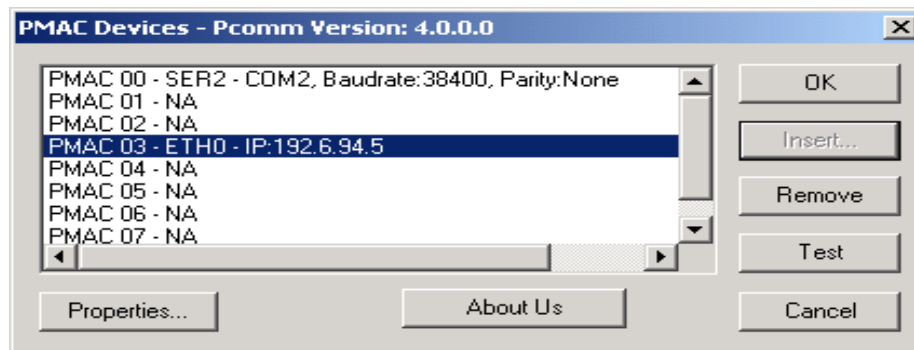
5. Select any available (NA) device number and click **Insert**. The following window will appear.



6. Select the **Ethernet** radio button and click **OK**.



7. Enter the previously configured IP address and click **OK**. This will add an Ethernet device to the registered device list.



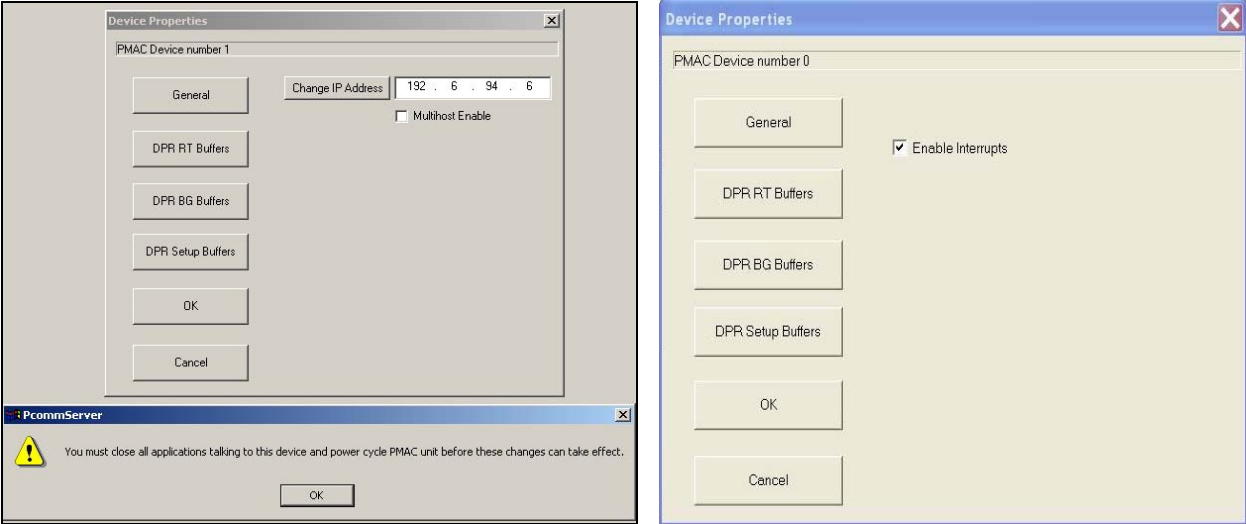
Note:

- The above procedure only adds a previously configured device in the host computer's registry. It does not reconfigure the PMAC device.
- All PMACs with Ethernet port are pre-configured for Ethernet mode of communication and the default IP address of 192.6.94.5.
- The above procedure requires that the device is connected to the host computer via a USB cable and visible in the Device Manager with no errors.

DPRAM, IP Address and Interrupt Configuration

In order to configure DPRAM Real-time and Background Automatic Data reporting functions, the following properties dialog box is launched from the properties tab of the select device dialog box. For ISA/PCI/USB and Ethernet modes of communication, DPRAM properties are categorized in four sections.

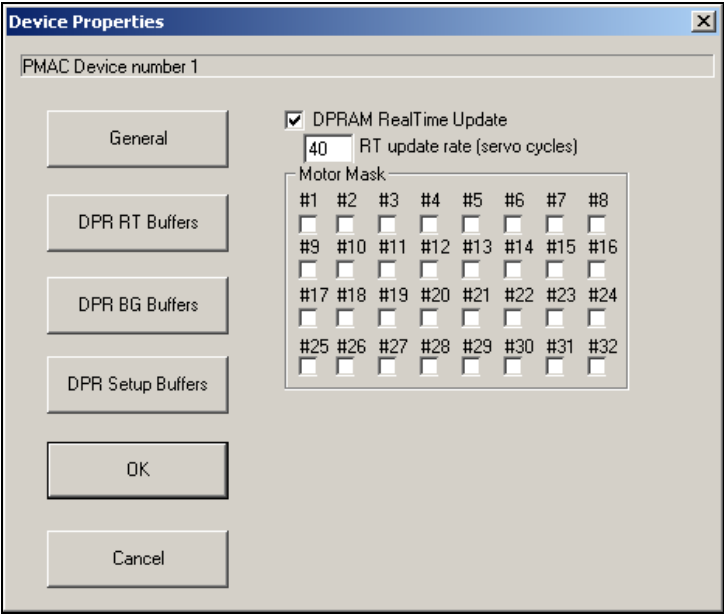
General properties include enable/disable checkbox for Interrupts, IP address change settings, and a checkbox to enable Multihost.



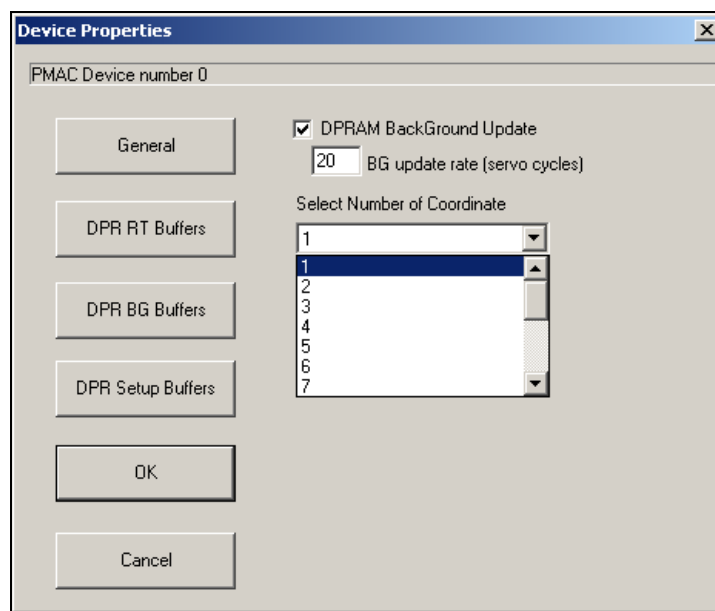
Note:

For IP Change to take effect user must close all applications and power cycle PMAC unit before these changes can take effect.

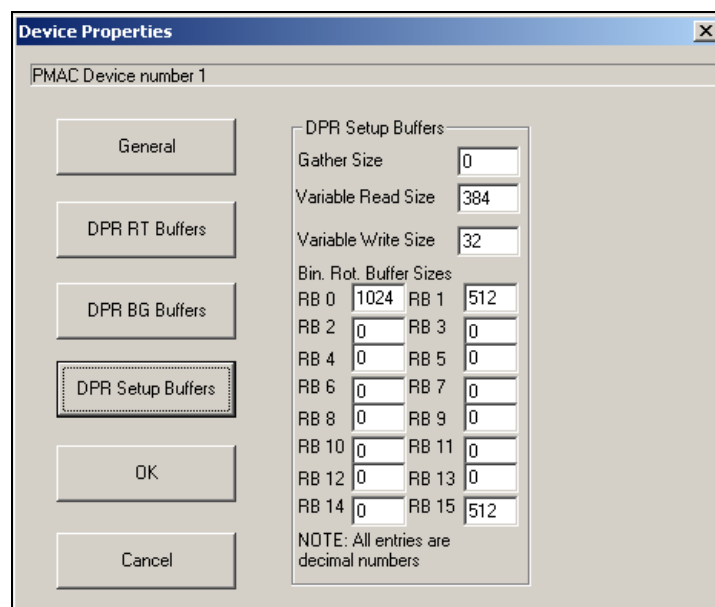
DPR RT Buffers: DPRAM Real-Time Automatic Data Reporting Buffers Setup includes enable/disable checkbox along with monitor period in servo cycles and the motor mask setup check boxes.



DPR BG Buffers: DPRAM Background Automatic Data Reporting Buffers Setup includes enable/disable checkbox along with monitor period in servo cycles and a combo box showing number of coordinate systems to update data in the DPRAM.



DPR Setup Buffers provide setup screen for Binary Rotary buffers.



Notes

1. Once these parameters are setup. It is highly recommended to close all applications and restart to have these changes initialize the PcommServer on startup.
 2. Both Real-Time and Background updates run on separate threads at the start of application.
 3. The above functions are therefore not exported through the interface. Rather the status structures are available at the interface and a VB.NET example project is provided for users' reference.
-

Ethernet Port Change IP Address

For Ethernet mode of communication along with DPRAM automatic update functions configuration, the previously configured IP address can be viewed and changed. This requires a successful communication to previously configured IP address through Ethernet cable. A power cycle to the PMAC/UMAC and communication board is required to implement the IP address change. The Ethernet configuration utility can also be used to set the Ethernet mode of communication or change the IP address.

ASCII Communication from Multiple Host Computers to a single UMAC*

Delta Tau driver now allows communication between a single UMAC controller and multiple hosts.

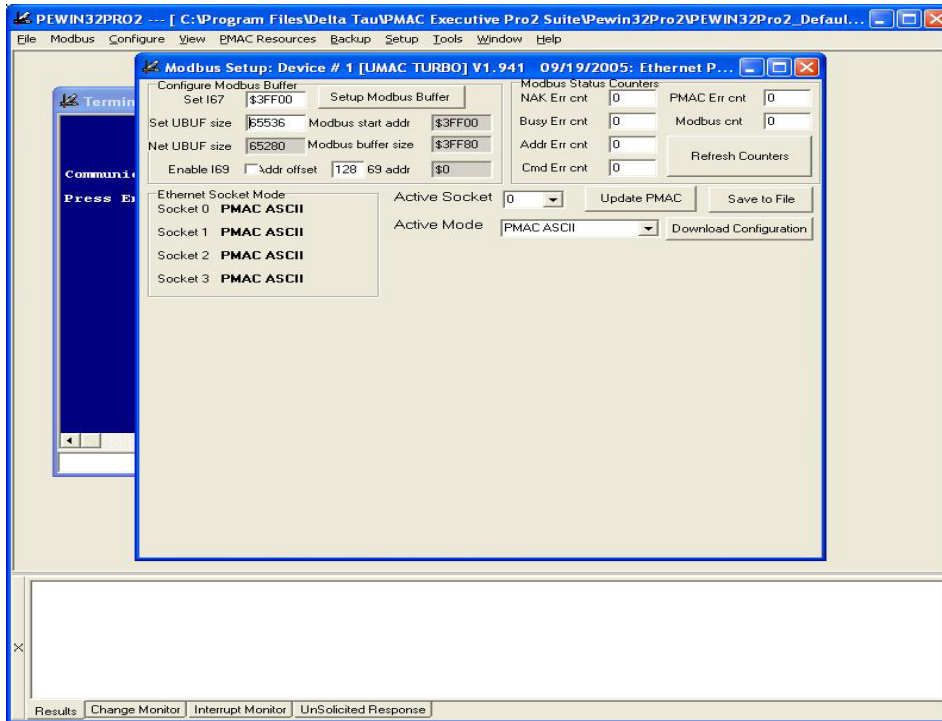
Requirements

1. UMAC Firmware must be version 1.942
 2. USB Ethernet communication firmware must be Version 3.04
 3. Pewin32Pro2 Must be version 4.2.2 or greater
- * Multi-host communication is only for applications that use PcommServer.exe directly, i.e., Pewin32Pro2 or any Pcomm32Pro2 customer-written application. Legacy programs such as PmacTuningPro2, UMACConfigPro2 and TurboSetup32Pro2 will not work simultaneously with other applications.

Steps to enable multiple host communication

Use Pwin32 Pro2 to setup multiple Ethernet socket I variables I67 and I69.

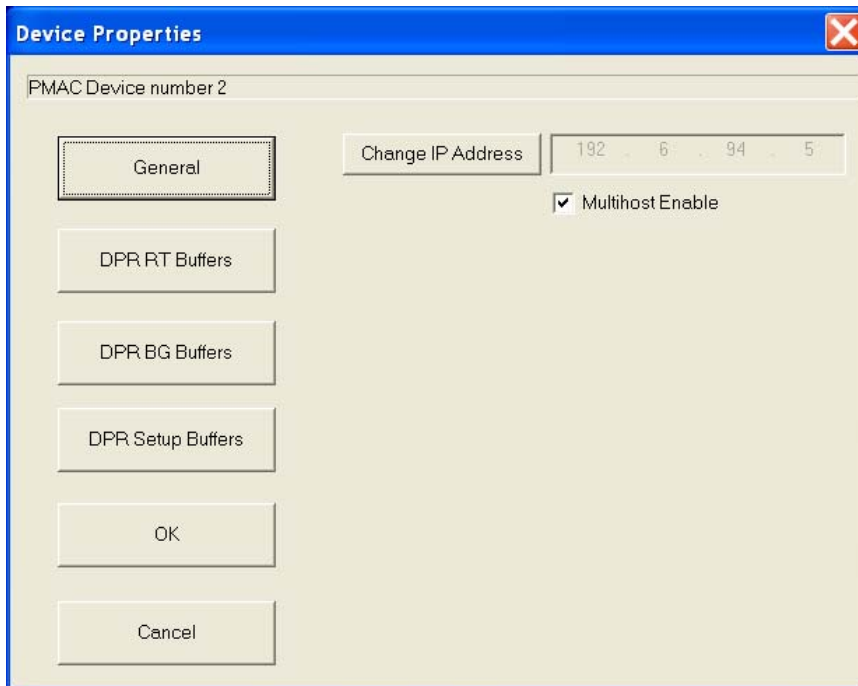
1. Click the **Configure** item on the main menu.
2. Click **Modbus Setup**.
3. Select Active Socket 0-3 then change the Active Mode to PMAC ASCII for as many simultaneous ASCII socket connections you would like. Four is the maximum allowed and cannot be increased.



Note

Above setup screen “Modbus Setup” requires Modbus option [**Modbus option must be purchased**].

4. Enable Mod. **IMPORTANT!** This step is setting up the registry entries for the Windows Host PC and therefore must be performed on each and every Host PC used to communicate to the UMAC.



5. Cycle power on the UMAC and reboot the Host PC.
6. If Modbus option is not present then do the following steps:
 - a. To setup multiple sockets requires the use of I67.
 - b. Find the end of open memory with I4908.
 - c. Define a user buffer
def ubuf 256
 - d. Find new end of open memory
I4908
\$3FF00
 - e. Set socket setup I variable
I67=I4908
WL:\$3FF00,\$100000000000 <---- enable socket 0 for TCP ascii
WL:\$3FF03,\$200000000000 <---- enable socket 1 for interrupt
WL:\$3FF06,\$100000000000 <---- enable socket 2 for TCP ascii
WL:\$3FF09,\$100000000000 <---- enable socket 3 for TCP ascii

Notes:

1. The values are 1 for TCP ascii comm., 2 for Interrupt, 3 for Modbus Server, 4 for Modbus Client, 5 for UDP ascii.
 2. By default socket 0 is always TCP ascii, unless changed then saved. This means configuration data need not be set up in the user buffer to be able to begin communicating with the card over TCP ascii mode. When adding additional sockets, it is recommended to always keep socket 0 at TCP ascii.
 3. Also note that if a \$\$\$*** is issued it is the users responsibility to restore the user buffer and additional sockets.
-
7. After setting up the 4 sockets appropriately for an application a save command must be issued to the UMAC then the system should be power cycled.
 8. This setup will allow simultaneous Ethernet communication from 3 separate PC's.

Setup UMAC for data integrity

If a command may exceed a full packet length, the spin lock socket command must be used to insure coherent data. Or if a VR_FWDOWNLOAD, VR_PMAC_WRITEBUFFER is going to be used, the new VR_PMAC_SPINLOCK must be used. It is strongly recommended when setting multiple host communication on the UMAC that the application always uses VR_PMAC_SPINLOCK before accessing the UMAC.

Example:

Run the Hercules socket program from two computers (www.hw-group.com). Use the VR_PMAC_SPINLOCK code D7 to block out the second computer.

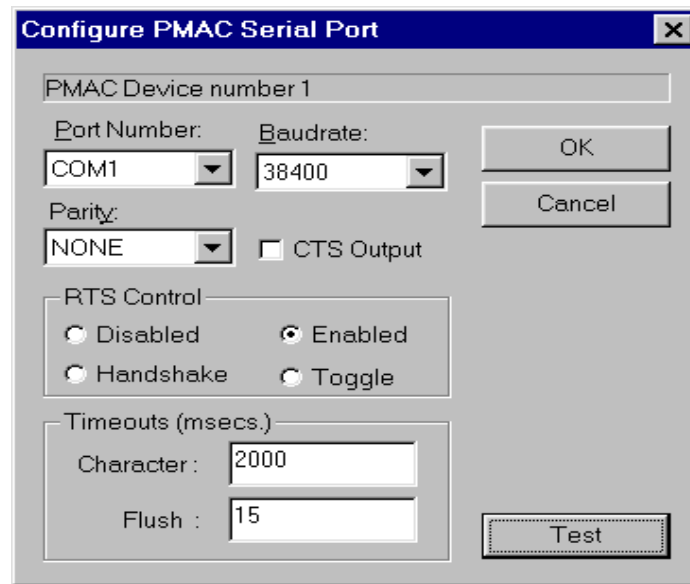
From each computer, issue the VR_PMAC_SPINLOCK - **ON** command,. Note that the first computer to issue the command gets a return character from VR_PMAC_SPINLOCK, while the second computer is stuck waiting for the command to complete.

From the first computer, you can freely issue commands to communicate to the UMAC that will not be interrupted by the second PC.

Once the first PC is done communicating, it issues a VR_PMAC_SPINLOCK - **OFF**. The second PC now returns from the VR_PMAC_SPINLOCK ON command when the first PC issues its VR_PMAC_SPINLOCK OFF command and the second PC can freely communicate with the UMAC.

Serial Port Configuration

Select the **Properties** option in the Serial Devices menu to set the port number, baud rate, timeouts, handshake options, and other settings such as odd/even parity checks.



The image shows a Windows-style dialog box titled "Configure PMAC Serial Port". It contains several configuration options for a serial port. At the top, there is a text field labeled "PMAC Device number 1". Below this, there are two dropdown menus: "Port Number:" set to "COM1" and "Baudrate:" set to "38400". To the right of these are "OK" and "Cancel" buttons. Below the baudrate dropdown is a "Parity:" dropdown set to "NONE" and a checkbox for "CTS Output" which is currently unchecked. Further down is a section for "RTS Control" with four radio buttons: "Disabled", "Enabled" (which is selected), "Handshake", and "Toggle". At the bottom, there is a "Timeouts (msecs.)" section with two text fields: "Character:" set to "2000" and "Flush:" set to "15". A "Test" button is located at the bottom right of the dialog.

Configure PMAC Serial Port

PMAC Device number 1

Port Number: COM1 Baudrate: 38400

Parity: NONE ☐ CTS Output

RTS Control

☐ Disabled ☒ Enabled

☐ Handshake ☐ Toggle

Timeouts (msecs.)

Character: 2000

Flush: 15

OK Cancel Test

TROUBLESHOOTING THE DRIVER CONFIGURATION

This section covers the issues of communication, firmware download and others related to changing the card.

Registry Issues under Windows 2000 and XP

Part I

Give the appropriate group or user the right to load and unload device drivers in Windows XP (classic view is required) or Windows 2000.

1. Log on to Windows with administrator rights.
2. Open the Start Menu, go to the Settings Menu Item, and then open the Control Panel.
3. Open the Administrative Tools.
4. Open the Local Security Policy.
5. From the Local Security Settings window, expand the Local Policies Tree.
6. Click the User Rights Assignment folder.
7. In the windowpane on the right side, double click the Load and Unload Device Drivers policy setting. This will open the Local Security Policy Setting window.
8. Click the **Add** button in the dialog box and add whatever group or user that will have the capability to load and unload the drivers (that is anyone who will run software that communicates to Delta Tau Hardware).

Part II

Give the appropriate group or user the right to read and write to the HKEY_LOCAL_MACHINE/System/CurrentControlSet/Services/PMAC key

1. From the Run menu, execute the program REGEDT32.EXE in Windows 2000 or REGEDIT.EXE in Windows XP.
2. From the Windows pull-down menu in the registry editor, select HKEY_LOCAL_MACHINE. (This step applies only to Windows 2000. Skip this step for XP.)
3. Expand the tree in the left panel to HKEY_LOCAL_MACHINE/System/CurrentControlSet/Services/PMAC.
4. Highlight the PMAC key in the left panel.
5. Click the Security Menu item in the Registry Editor and select **Permissions** from the menu in Windows 2000. In Windows XP, the Permission option is in the Edit menu.
6. The Permissions for the PMAC dialog box will be displayed. From that window, click the **Add** button and then select the group or user to run Delta Tau Software.

Note:

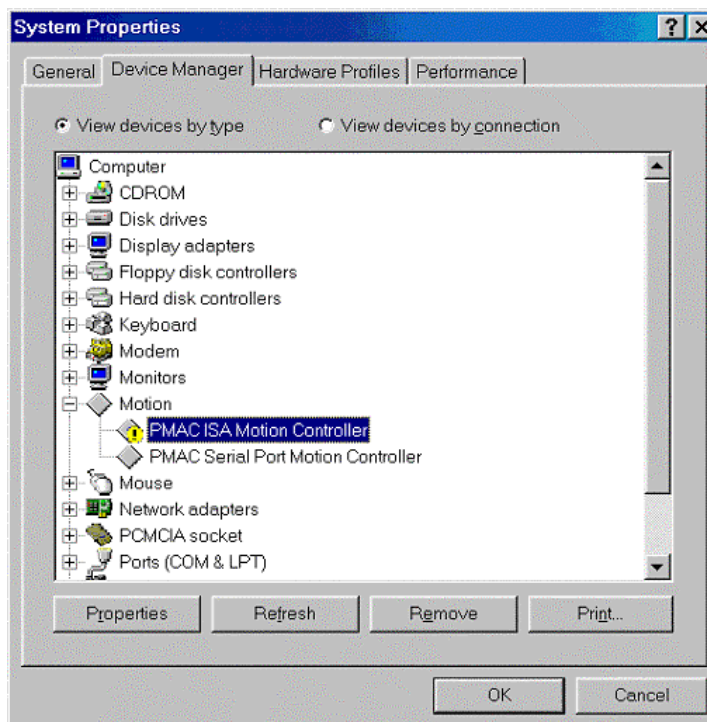
Under XP, if the Select Device from Pewin32PRO or the application cannot see a COM port, locate the HKEY_LOCAL_MACHINE/Hardware/DeviceMap/SerialComm key and give permission to all users to have full control over this key and all entries in it.

Configure/Reconfigure Parameters

Here are some of the issues that user may come across during launching a PMAC application where the applications may fail to establish communication. The following items cover different modes of communication individually.

ISA PMACs: I/O Port Address, DPRAM and Interrupt Assignment

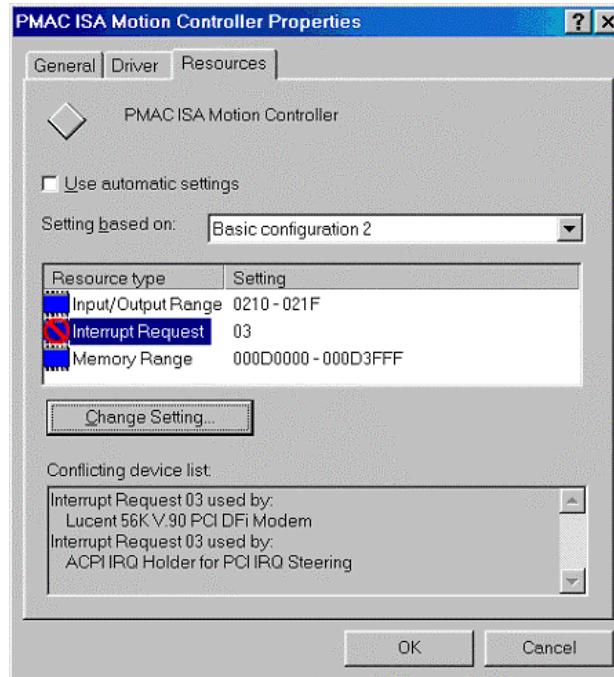
The full configuration of all ISA PMACs can be viewed and modified from the Device Manager. A yellow or a red sign next to the PMAC ISA controller means that either there is a conflict between the parameters on PMAC and the host computer or DPRAM is not present while the card has been configured to use DPRAM.



The properties page of the PMAC ISA will reveal the details of the parameters. Configure the port address and add or remove DPRAM and interrupt according to the following table:

Configuration Number	Modes of Communication
Basic Configuration 0	Communication through host port only
Basic Configuration 1	Communication through host port with DPRAM (regular size) enabled
Basic Configuration 2	Communication through host port with DPRAM (regular size) and interrupts enabled
Basic configuration 3	Communication through host port with Interrupts enabled
Basic Configuration 4	Communication through host port with DPRAM (large size) enabled
Basic Configuration 5	Communication through host port with DPRAM (large size) and interrupts enabled

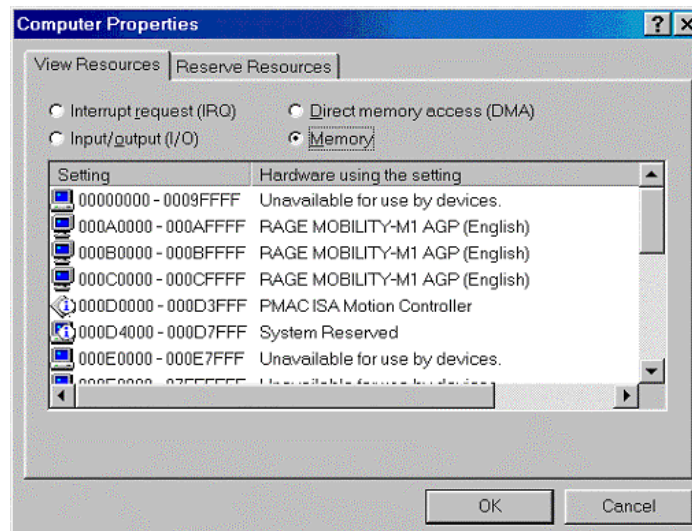
All ISA type PMACs are non-plug and play, and therefore require manual configuration for I/O address, DPRAM and Interrupt assignment. Match the port address to PMAC's jumper settings (or switch settings for PMAC2), map the DPRAM at an available space in the PC and assign an interrupt card. The following window shows the details of the parameters of the troubled PMAC ISA device.



Available or unavailable parameters are listed in the Device Manager.

Important Note:

- If an ISA PMAC is configured for DPRAM and after the firmware download has been completed, power cycle the PMAC before the DPRAM can be used.
- Large DPRAM (64Kbytes) is supported under ISA mode of communication. However, under Microsoft operating systems, it is configured at even addresses only and therefore only two ranges D0000-DFFFF and E0000-EFFFF are supported for large DPRAM option.



PMAC PCI: I/O Port Address, DPRAM and Interrupt Assignment

All PMAC PCIs are plug and play and therefore are configured at boot time. For PMAC PCIs, the interrupt is configured automatically. The driver works on the basis of shared interrupts. No steps are required in configuring the interrupts. Similarly, if the option is present, DPRAM is configured and mapped automatically.

Bootstrap mode is recognized automatically. The correct sequence for loading the device is to install the driver first and then add the PMAC PCI. On the next boot, the device will be recognized and the driver will be loaded by the operating system automatically.

If the PMAC PCI was added and then the software (driver) was installed later, once the driver files are loaded, update the driver manually. The driver can be loaded easily by entering the right path for the setup information file (PMACPCI.Inf) and the driver file (PMACPCI.SYS). These files are located in:

<WINDIR>\Inf and
<WINDIR>\System32\Drivers folders respectively.
where
<WINDIR> = c:\windows for Windows XP
<WINDIR> = c:\winnt for Windows 2000

The easiest way to reload a PMAC driver is to install the PC driver first. Then reinstall the hardware and reboot the host computer.

PMAC USB Configuration

PMAC USB behaves similar to the PMAC PCI with one exception: PMAC USB can be plugged in and out at any time. The device will be added to or removed from the Device Manager automatically. Sometimes it is possible to unplug the USB device even if an application is communicating to it.

DPRAM on PMAC USB

- For some of the old hardware, the USB communication boards had DPRAM present by default and the DPRAM was available for automatic DPR functions. For those boards, the DPRAM was mapped at \$6C000 instead of \$60000 (for ISA and PCI PMACs). I24 was used to determine the address of the DPRAM on those PMACs. I24 would give the start address of the DPRAM (\$6C000) to establish communication.
- For those boards, if the UMAC CPU has the onboard DPRAM option present, reinitialize with the E3 jumper and manually change the value of I24 to \$6C000.
- The latest generation of USB PMACs is available with and without DPRAM option configurations. See the ACC-54E User manual for detailed information.
- A universal method of determining the presence of DPRAM option is used. The two registers X:\$320f and X:\$3210 determine the starting address as well as the length of the DPRAM if present. The first register gives the starting address and the next register gives the end address. If the two have different values, then the PDRAM is present with size equal to the difference of the two. Otherwise, no DPRAM is present.

Serial Port Communication

Serial communication has its usual issues (baud rate, parity, and handshake signals). This driver requires all of these settings to be correct for successful communication. Baud rate is the most essential of all.

- The driver will not function correctly if the baud rate on the serial port of the host computer is different from the PMAC settings.
- Communicating via a Hyper-Terminal is a necessary but not sufficient test, in case there is a problem in establishing the communication.

- Normal PMAC firmwares, with few exceptions, do not support parity. Furthermore, this driver uses both RTS (enabled) and CTS (checked) handshake signals by default. However, it is possible to change these settings. Once changed, the serial port may require a reset. Reboot the host computer to ensure that the changes have taken effect.

Higher Baud Rate Considerations

To have a baud rate higher than 38400, the following table may be helpful:

PMAC CPU Speed	Supported Baud Rates
All PMACs	9600, 19200, 38400 BPS
60 MHz, 90 MHz, 120 MHz, 150 MHz	9600, 19200, 38400, 57600, 115200 BPS

Note:

Most PMACs support 76800 BPS. However, 76800 BPS is non-standard for most PCs and Microsoft Windows and is not listed in the Com Port settings.

USB to Serial Converter

Starting with Windows Service Pack 2, most of the USB-to-Serial converters are supported. The driver now supports the Microsoft serial driver.

PCMCIA/PCI to Serial Adapters

Similar to an USB-to-Serial converter, PCI-to-Serial converters can also be used, provided that the COM port is created in the Device Manager.

Ethernet Port Communication

Ethernet communication does not involve any Ring 0 driver. The commands are directed from the DLL directly to the Socket. Therefore, there is no Ethernet PMAC device listed in the Device Manager. Follow the installation steps in the Ethernet Basic Configuration section. The following additional steps can ensure reliable Ethernet communication:

1. Ping the Ethernet card from a command prompt.
2. For maximum speed, only the dedicated mode of communication is recommended.

Read the ACC-54E Revision 2 User manual for detailed information on the comparison of the two protocols, their advantages and disadvantages.

Ethernet RJ45 Connector

This connector is used for Ethernet communications from a UMAC to a PC. The PC must have a card dedicated solely to the UMAC network. The appropriate Category 5 10/100-Base-T network cable that mates to RJ45 can be purchased from any computer store. The type of network cable to purchase depends on the configuration of the host PC.

- When making a direct connection to a Host communication Ethernet card in a PC, a Category 5 networking crossover cable must be used. A standard Category 5 straight through networking cable cannot be used in this scenario. See the left section of the diagram below.
- When using a connection to a network Hub or switch, the standard Category 5 straight through networking cable must be used and not a crossover cable. See the right section of the diagram below.

Performance can be degraded seriously by the use of a hub or switch. Network hubs or the more intelligent network switches have processors inside them, which can add delays of at least 15 msec to UMAC communications.



Changing Mode of Communication between USB and Ethernet

UMAC, CPCI and PC104 with both USB and Ethernet options present allow changing the mode of communication between the two. Delta Tau Driver library and Pwin32PRO Suite come with two utility programs: USBConfigure.EXE and EthConfigure.EXE. To activate these utilities:

1. Enter the IP configuration, serial number and part identification number.
2. Download the boot firmware.

Procedures involving these updates are:

USB Boot Firmware

1. Call Delta Tau Technical Support to get the latest boot firmware file.
2. Connect a USB cable from PMAC's communication (USB) port to the computer's USB port.
3. Turn on power to the PMAC board.
4. Launch USBConfigure.EXE from the Programs menu.
5. Click the **Store F/W** button.
6. Browse to get the path of the PmacUSBxxxFx.iic file. Click **OK** to start the download.
7. On completion, select the correct hardware type (e.g., ACC-54E, CPCI, QMAC and PC104).
8. Enter the serial number from the communication board in the box provided and click **Store ID**.
9. Click **Done** to close the application.
10. Power cycle the PMAC and the communication board to complete the process.

Ethernet Boot Firmware

1. Call Delta Tau Technical Support to get the latest boot firmware file.
2. Connect a USB cable from PMAC's communication (USB) port to the computer's USB port.
3. Turn on power to the PMAC board.
4. Launch ETHConfigure.EXE from the Programs menu.
5. Click the **Store F/W** button.
6. Browse to get the path of the PmacETHxxxFx.iic file. Click **OK** to start the download.
7. On completion, select the correct hardware type (e.g., ACC-54E, CPCI, QMAC and PC104).
8. Enter the IP address in the address box and select the mode (either UDP – dedicated network or TCP – on the same subnet).
9. Click **Done** to close the application.
10. Remove the USB cable and power cycle the PMAC and the communication board to complete the process.

Delta Tau Driver Benchmark Times

The following tables provide detailed benchmark times for Delta Tau's (Pro and Pro2) drivers.

Delta Tau Pcomm32Pro Library(Pro driver) Benchmark Times†

Communication	ISA		PCI		USB	Ethernet	Serial
	Non-Turbo PMAC 40 MHz		Turbo PMAC 80 MHz		(2.0)	(100 base-T) No Data due to Panda	38400 bps (115200 bps)
Mode	Port	DPR ASCII	Port	DPR ASCII	Port only	Port only	Port only
GetResponse (3 cmds) "Type Ver Date"	0.76 ms	0.82 ms	0.282 ms	0.281 ms	1.48 ms Cpu: < 25%	2.2 ms Cpu: < 11%	11 ms (5 ms Cpu: < 50%)
Upload 8192 I-Variables	450 ms		400 ms		550 ms	640 ms	5.4 sec (2.5 sec Cpu: < 47%)
Download 8192 I-Variables	2.3 sec Cpu: < 69%		1.5 sec Cpu: < 54%		5.0 sec Cpu: < 13%	6.56 sec	30 sec (25 sec Cpu: < 75%)
SetMem 8Kbytes	9 ms		4 ms		122 ms	173 ms	N/A
GetMem 8Kbytes	12 ms		8 ms		94 ms	173 ms	N/A

Delta Tau PcommServer Library (Pro2 driver) Benchmark Times†

Communication	ISA		PCI		USB	Ethernet	Serial
	Non-Turbo PMAC 40 MHz		Turbo PMAC 80 MHz		(2.0)	(100 base-T)	38400 bps (115200 bps)
Mode	Port	DPR ASCII	Port	DPR ASCII	Port only	Port only	Port only
GetResponse (3 cmds) "Type Ver Date"	1.7 ms	0.79 ms	0.290 ms	0.297 ms	1.58 ms Cpu: < 33%	2 ms Cpu: < 12%	12 sec (5.3 ms Cpu: < 66%)
Upload 8192 I-Variables	950 ms Cpu: < 49%		220 ms Cpu: < 7%		406 ms Cpu: < 4%	560 ms Cpu: < 6%	4.0 sec (1.88 sec Cpu: < 36%)
Download 8192 I-Variables	1.5 sec Cpu: < 100%		625 ms Cpu: < 86%		2.74 sec Cpu: < 4%	4 sec Cpu: < 5%	15 sec (11.6 sec Cpu: < 100%)
SetMem 8Kbytes	8.8 ms		6 ms Cpu: < 50%		123 ms Cpu: < 4%	185 ms Cpu: < 2%	N/A
GetMem 8Kbytes	12 ms		10 ms Cpu: < 47%		94 ms Cpu: < 2%	183 ms Cpu: < 2%	N/A

†: A typical Intel Pentium 4, 2.66 GHz, 256MB computer with 4 other applications active.

FIRMWARE DOWNLOADS

This section describes the step-by-step procedure used to update or change the firmware for any PMAC with flash memory (PMAC1, PMAC2, Ultralite, Turbo PMAC1, Turbo PMAC2, Turbo Ultralite, and UMAC). All of the information in this document assumes that the user has a legal copy of the firmware for the PMAC. If the user has any questions about uploading firmware, contact Delta Tau Data Systems, Inc.

To change the firmware, place the card into bootstrap mode by powering up the controller with the bootstrap jumper in place. The bootstrap jumpers are listed in the table in this section.

Use caution when changing firmware because all information will be erased from the PMAC memory before the firmware is downloaded. Make sure there are complete backup files for the application prior to downloading the new firmware file.

Note:

If downloading firmware via serial port communications, set the baud rate to 38400 regardless of the setting of the baud rate jumpers.

PMAC/PMAC2 Firmware Downloading Jumpers

PMAC1				
Type	CPU/Memory	Part Number	Re-Initialization	Bootstrap
PC/VME/STD	Battery backed ³	602 271/ 272/ 273/ 398-10x**	E51	Replace chip
PC/VME/STD	Flash only ⁴	602 401/ 403/ 405-10x**	E51 <CTRL-R>	E51 <CTRL-O>
PC/VME	Universal ⁵	602 705-10x**	E51	E4 (CPU)
PC/VME	Turbo ⁶	602866-10x**	E51	E7
Lite	Battery backed ³	602399-10x	E51	Replace chip
Lite	Flash only ⁴	602402-100/1/2	E51 <CTRL-R>	E51 <CTRL-O>
Lite	Universal ⁵	602402-103+	E51	E106 (2-3)
Mini	Universal ⁵	602812-10x	E51	E104

PMAC2				
Type	CPU/Memory	Part Number	Re-Initialization	Bootstrap
PC/VME	Flash only ⁴	602 401/ 403/ 405-10x**	E3 <CTRL-R>	E3 <CTRL-O>
PC/VME	Universal ⁵	602 705-10x**	E3	E4 (CPU)
PC/VME	Turbo ⁶	602866-10x**	E3	E7
Lite	Flash only ⁴	602406-100	E3 <CTRL-R>	E3 <CTRL-O>
Lite	Universal ⁵	602406-101+	E3	E0 (2-3)
Mini	Universal ⁵	602405-10x	E3	E0 (2-3)
VME Ultralite	Universal ⁵	602643-10x	E3 <CTRL-R>	E3 <CTRL-O>
PC Ultralite	Flash only ⁴	602415-10x	E3	E0
PC Ultralite	Universal ⁵	602182-182	E3	E23
UMAC	Turbo ⁶	603382-10x	E3	E23

Flex CPU PMAC1/PMAC2				
Type	CPU/Memory	Part Number	Re-Initialization	Bootstrap
P1 -PC/VME	Flash only ⁴	603605-10x	E51	E7
P2 -PC/VME	Flash only ⁴	603605-10x	E3	E7
Mini				
PC Ultralite				
VME Ultralite				

¹**Re-Initialization:** This copies the factory default values of I-variables, conversion table settings, and VME and DPRAM address settings from the firmware EPROM into active memory.

²**Bootstrap:** PMAC enters a special re-initialization mode that permits the downloading of new firmware on flash only CPUs. PMAC can communicate over the PC/STD bus port or over the serial port at a baud rate of 38,400, regardless of the setting of the baud rate jumpers.

³**Battery-Backed CPU:** There are EPROMs for the firmware, EEPROM for the basic variables (most I-variables, conversion table settings, and VME and DPRAM address settings), and battery-backed RAM for the rest of the I-variables, programs, definitions, buffers, and tables.

⁴**Flash Only CPU:** This has segmented flash EEPROM that consists of two sections: one holds the firmware and the second holds all the user settings. To bypass the firmware download procedure, send <CTRL-R>.

⁵**Universal CPU:** This is a CPU that can be built as a battery-backed or flash only CPU.

⁶**Turbo CPU:** This is similar to the flash only CPU.

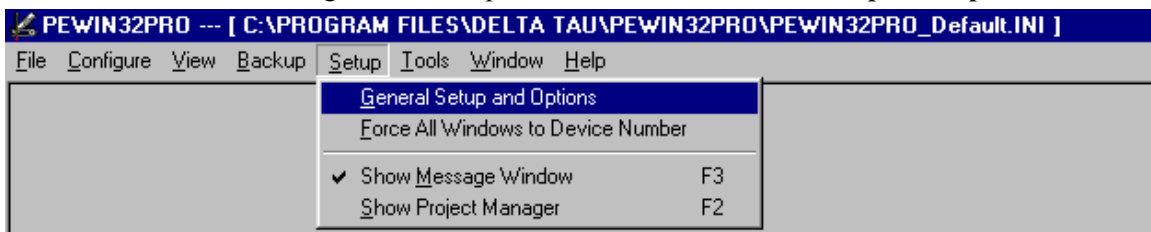
** CPU piggyback board

Firmware Download Supported Modes

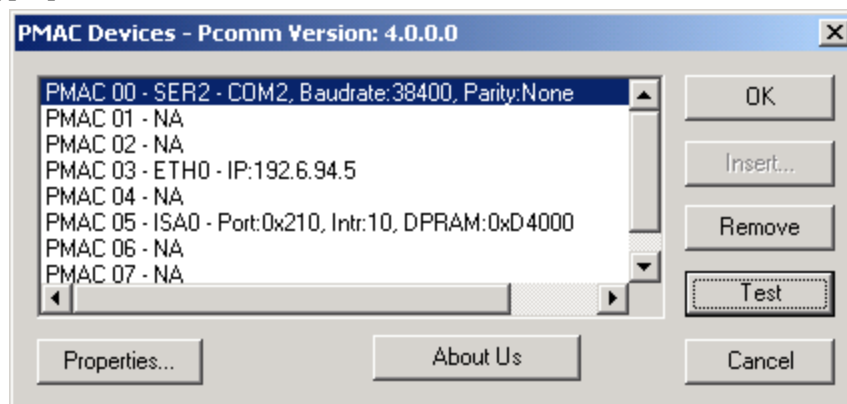
Starting with PRO Suite 2.0, all modes of communication support firmware downloads provided that a host port communication is available. For UMAC via USB and Ethernet, ACC-54E Revision 102 or above is required.

Firmware Download Steps

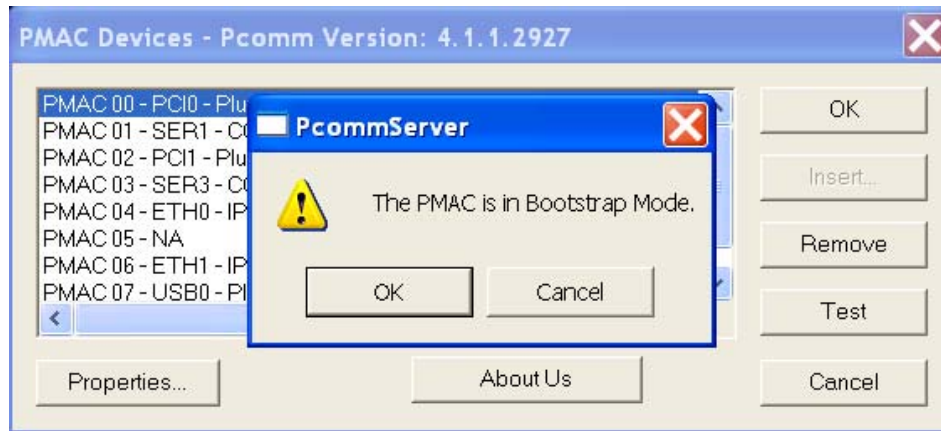
1. Apply the bootstrap jumper as described in the previous table.
2. From Pewin32PRO menu, go to the Setup menu and select **General Setup and Options**.



3. Select the appropriate device and then click on the **Test** button.



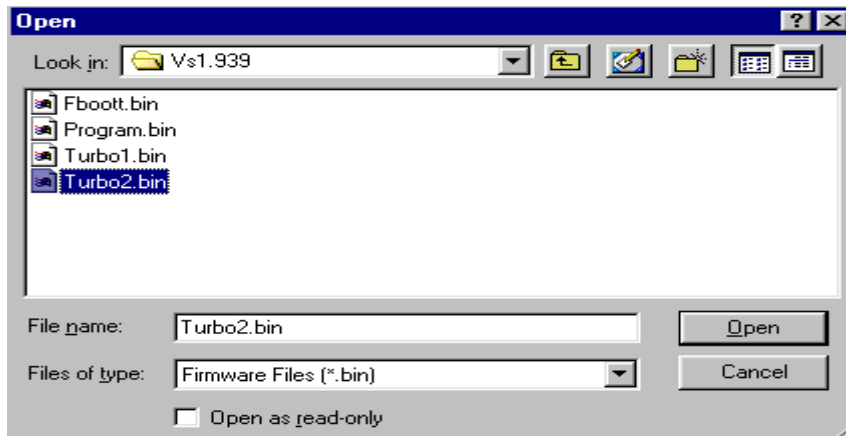
- The controller is now in bootstrap mode. Click the **OK** button. If **Cancel** is clicked, the system will issue a **CTRL^R** and restore normal operation to the PMAC.



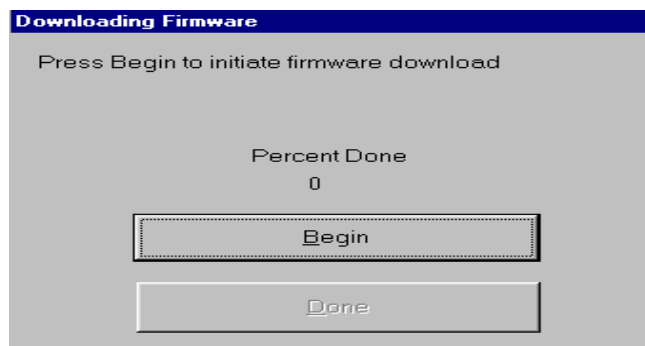
Important Note:

If a PMAC ISA is configured for DPRAM, power cycle the PMAC before the DPRAM is used after firmware download is complete.

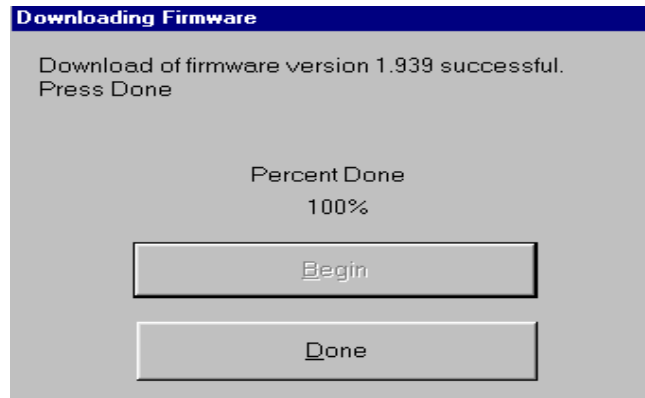
- The program will then ask for a bin file which is actually the firmware binary file. The firmware file (not provided with any installation) is required and can be purchased as an Delta Tau Option (OPT-10). For this example, the file is for a UMAC (Turbo PMAC2 type) and is called TURBO2.BIN. Once purchased, store the binary file in any directory. After the file is selected, click the **Open** button.



- The program will then ask for initiation of the download. Click the **Begin** button.



7. When the download file is complete, the following screen displays. There is a 5-second delay before the **Done** button is available. Click the **Done** button.



8. The program will then establish communications with the PMAC and the following window displays.



9. Power down the system and remove the bootstrap jumper. Restart the controller with the new firmware.