

SIEMENS

SIMATIC

WinAC MP for MP370

User Manual

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Edition: 1

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Preface

WinAC MP is a software S7 PLC for the SIMATIC MP370 and MP370Touch Multi Panels. WinAC MP controls a network of PROFIBUS-DP devices, and ProTool provides user process visualization and control.

WinAC MP consists of the following elements:

- WinAC MP software for the MP370/MP370Touch
- STEP 7 projects for MP370/MP370Touch
- ProTool projects with WinAC MP example screens for MP370/MP370Touch
- *SIMATIC WinAC MP for MP370 User Manual* (electronic)
- Authorization diskette
- Product ID letter

Audience

This manual is intended for engineers, programmers, and maintenance personnel who have a general knowledge of SIMATIC programmable logic controllers. Knowledge of STEP 7 programming, ProTool, and WinAC is also required.

Scope of the Manual

This manual describes the features and the operation of version 3.0 of WinAC MP.

How to Use This Manual

This manual provides the following information:

- [Product Overview](#)
- [System Requirements for WinAC MP](#)
- [Transferring WinAC MP to the Multi Panel](#)
- [Transferring Authorization for WinAC MP](#)
- [Removing WinAC MP and WinAC MP Authorization](#)
- [Downloading a STEP 7 Project to WinAC MP on the Multi Panel](#)
- [Controlling Your Process with WinAC MP](#)
- [Customizing WinAC MP for Your Application](#)
- [Reference Information](#)

Other Manuals

For additional information, refer to the following manuals:

Related Manuals	
Title	Content
STEP 7 User Manual	This manual provides information on programming in STEP 7.
ProTool User Manuals	These manuals provide basic information about the configuration of ProTool user interface screens and ProTool on the multi panel.

Contacting Customer Support

You can find additional information about WinAC MP and updates to this user manual at the Siemens Energy & Automation web site:

www.sea.siemens.com/software

This web site includes useful information, such as application notes, in the Technical Service area.

Customer Support	
North America	
Telephone	(800) 333-7421 (option #3)
E-mail	ISBU.Hotline@sea.siemens.com simatic.hotline@sea.siemens.com
Internet	http://www.sea.siemens.com
Europe	
Telephone	++49 (0) 180 50 50 222
E-Mail	support@siemens.com
Internet	http://www.ad.siemens.de/support
Fax	++49 (0) 180 50 50 223

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Product Overview

WinAC MP and ProTool CS

WinAC MP consists of a control engine and add-in components for ProTool CS, an example ProTool project, and an example STEP 7 project. You work in ProTool CS on your configuration computer (personal computer or programming device) to customize your ProTool project as desired. Then you download the control engine and your ProTool project to the multi panel. From STEP 7 on the configuration computer, you develop program logic, configure your hardware devices, and download the STEP 7 project to the multi panel. The control engine on the multi panel uses the STEP 7 program logic and acts as the controller for a network of PROFIBUS-DP devices. The ProTool project with WinAC MP components offers process control and visualization on the multi panel as the control engine operates.

When you install WinAC MP on your configuration computer, ProTool CS is automatically modified: WinAC MP functions and ActiveX controls are added. Example ProTool projects ("MP370" for the keyboard unit and "MP370Touch" for the touch panel) are also installed. The example ProTool projects contain WinAC MP functions, ActiveX controls, and two screens with WinAC MP components.

The first example screen is the WinAC_MP_Panel:

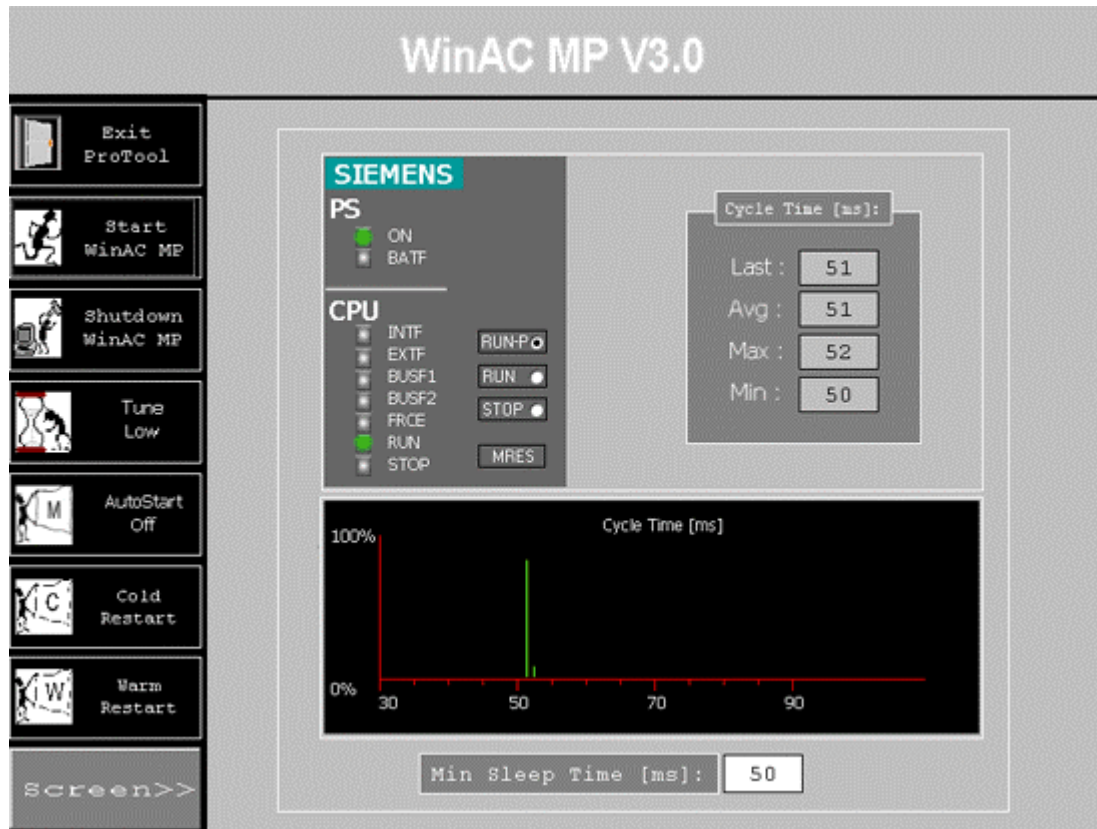


Figure: WinAC_MP_Panel Screen

The WinAC_MP_Panel screen uses a combination of ActiveX controls and screen objects with WinAC MP functions attached:

- The "WinAC MP" ActiveX control provides a control panel that serves as your interface to the WinAC MP control engine. The control panel provides everything you need to monitor and operate the WinAC MP control engine: all the status indicators, plus a key switch that allows you to change the operating mode.
- The Cycle Time area and the Min Sleep Time field are screen objects with WinAC MP functionality. When the WinAC MP control engine is running, you can watch the last cycle time, average cycle time, maximum cycle time, and minimum cycle time update in the Cycle Time area. The Cycle Time screen objects are read-only. You can set the minimum sleep time value (ms) in the Min Sleep Time field, which is a read/write field. These are some examples of how you can configure WinAC MP functionality for your own buttons, bitmaps, or other screen objects.
- The "Histogram" ActiveX control provides visual information about cycle time (when the WinAC MP control engine is running) in the form of a histogram.

The second example screen is the WinAC_MP_Function example screen:

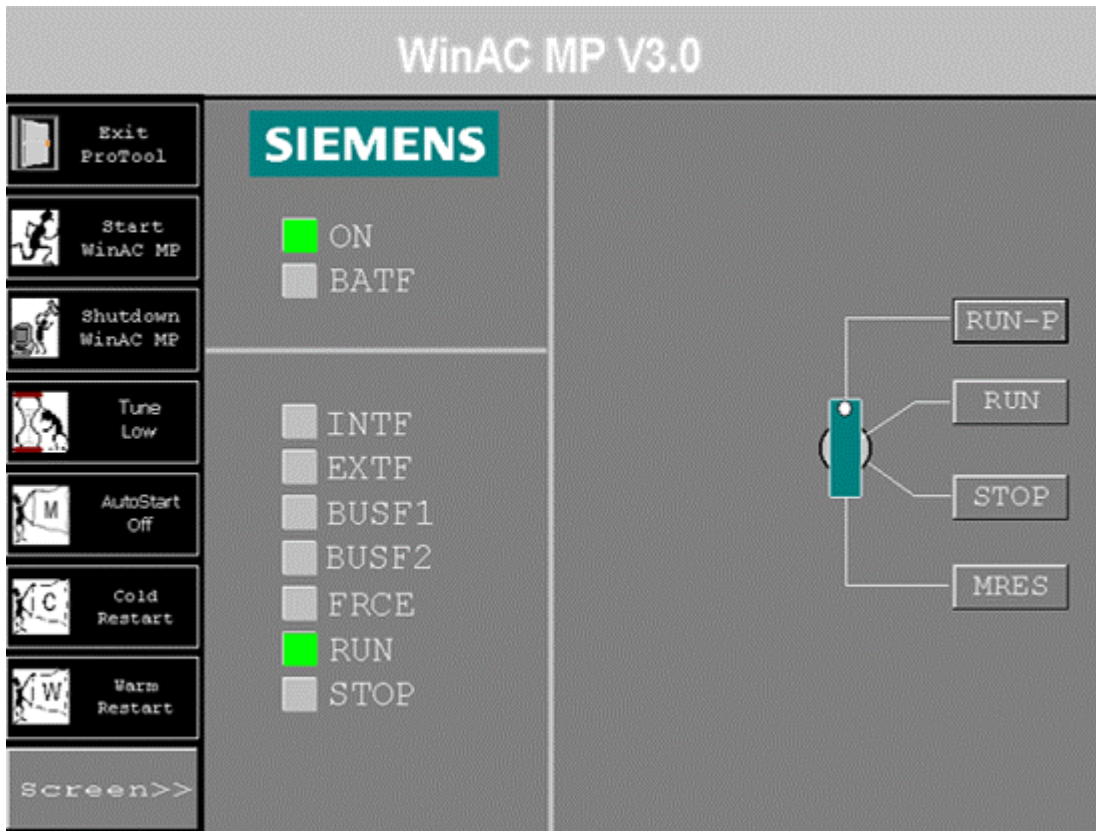




Figure: WinAC_MP_Function Screen

This screen shows how to use screen objects such as buttons and bitmaps, rather than the "WinAC MP" ActiveX control, to provide a control panel interface for the WinAC MP control engine. This is an example of how you can customize WinAC MP functionality when you build your own screens.

You can use ProTool CS to create new screens or modify the existing screens in the example project. To insert a "Histogram" ActiveX control, use the Histogram  object on the Screen Objects toolbar in ProTool CS. To insert a "WinAC MP" ActiveX control, use the WinAC MP  object on the Screen Objects toolbar. The WinAC MP functions available from ProTool CS are explained in the topic [Controlling Your Process with WinAC MP](#).

Introduction to Process Control with WinAC MP

System Overview

Your control system consists of these elements:

- MP370 or MP370Touch with WinAC MP
- PROFIBUS-DP subnet
- PROFIBUS-DP I/O devices

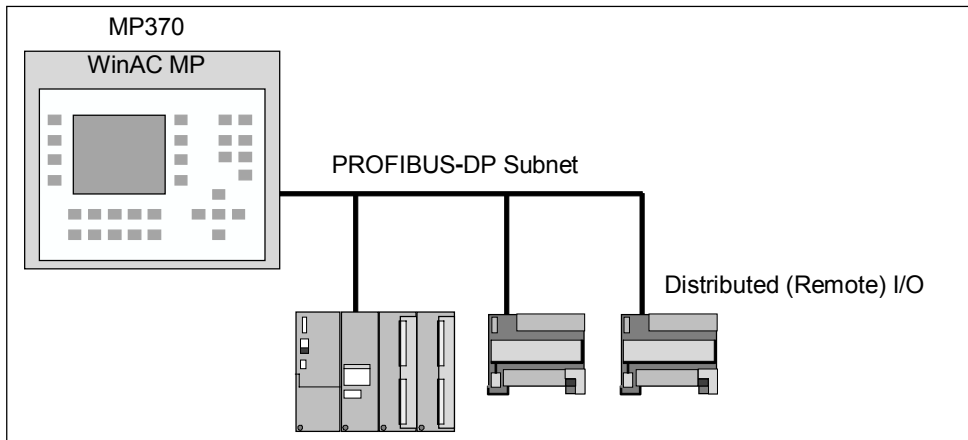


Figure: System Overview

Getting Started

The multi panel can control your process with WinAC MP after you perform these tasks:

- Set up your system according to the [system requirements](#).
- Use the WinAC MP software CD to install the WinAC MP software on your configuration computer.
- Use ProSave and ProTool CS, respectively, to download [the WinAC MP runtime files](#) and [ProTool project](#) to the multi panel.
- Use STEP 7 to develop the program logic and configure the PROFIBUS-DP devices that are to be controlled by WinAC MP, then [download the STEP 7 project to the multi panel](#).
- Use ProTool CS to develop any additional process screens. You can then download these screens to the multi panel. Refer to the documentation on ProTool that was delivered with that software. You can also use ProTool CS to modify the WinAC MP example screens in the ProTool project that is provided when you install WinAC MP. See the topic [Using ProTool CS to Customize the Application](#).

When you have completed these steps, the multi panel is ready for process control. See the topic [Controlling Your Process with WinAC MP](#) for control information.

The following diagram illustrates the connections and data paths needed for WinAC MP installation and transfer, STEP 7 user program development and download, ProTool screen development, and process control:

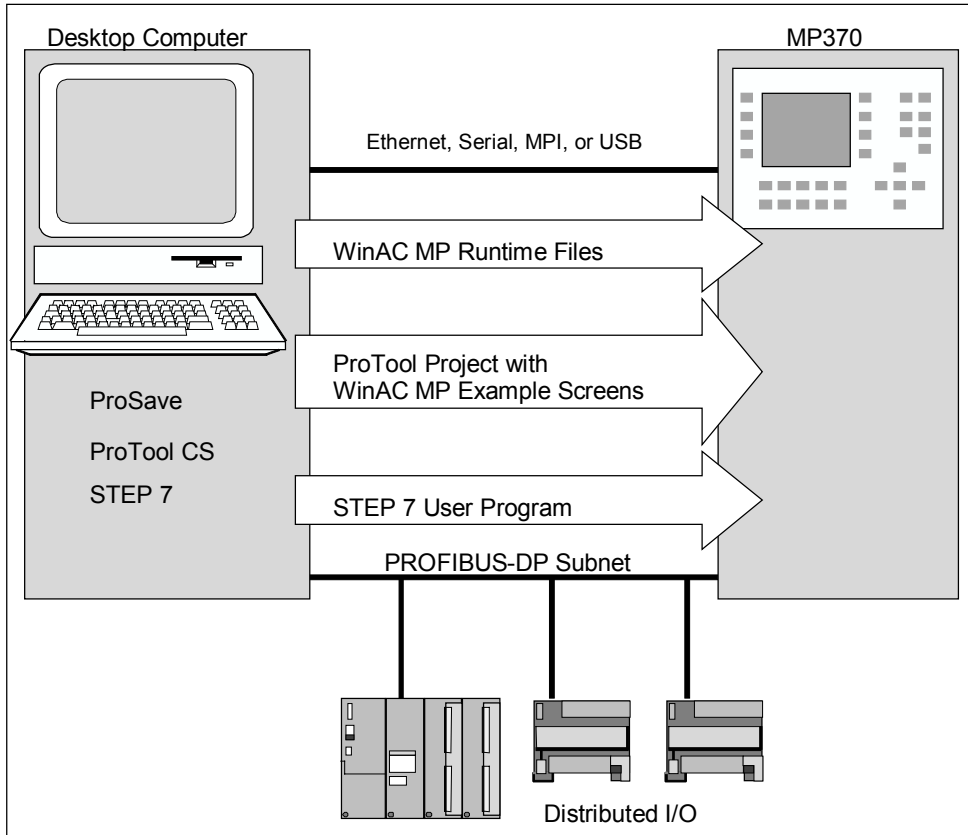


Figure: Overview of Transfers

System Requirements

To install and use WinAC MP, you must have a configuration computer (personal computer or programming device) with one of the following operating systems:

- Microsoft Windows 98 Second Edition
- Microsoft Windows Me
- Microsoft Windows NT 4.0 with Service Pack 5 or higher
- Microsoft Windows 2000 with Service Pack 2 or higher
- Microsoft Windows XP (Professional or Home Edition)

This configuration computer must also have the following:

- 10 Mbytes or more on the hard disk drive
- 32 Mbytes or more work memory

This configuration computer must have the following software installed, in the sequence shown:

- STEP 7 V 5.1 SP2 or higher
- ProTool CS V 6.0 or ProTool/Pro CS V 6.0

You also need:

- An MP370 or MP370Touch multi panel with 4 MB free flash memory for user application
- A standard cable connecting the Ethernet, serial, MPI, or USB ports of the configuration computer and the multi panel
- A PROFIBUS-DP network of devices connected to the multi panel (necessary for process control)

WinAC MP provides the following items:

- WinAC MP installation CD
- WinAC MP authorization diskette
- Product ID letter
- Electronic documentation (*SIMATIC WinAC MP for MP370 User Manual*)

Transferring WinAC MP to the Multi Panel

Transfer Overview

To transfer WinAC MP from the configuration computer to the multi panel, you are required to perform the following actions on your configuration computer and on the multi panel:

- [Set parameters](#) on the configuration computer and the multi panel for the communications interface.
- Connect the multi panel to the configuration computer and set the multi panel to Transfer mode. (See the hardware manual for your multi panel.)
- Use ProSave to [download WinAC MP runtime files](#) from the configuration computer to the multi panel.
- Use ProSave to [download authorization for WinAC MP](#) from the configuration computer to the multi panel.
- Use ProTool CS to download your ProTool project (for instance, [the example project with WinAC MP screens](#)) from the configuration computer to the multi panel.

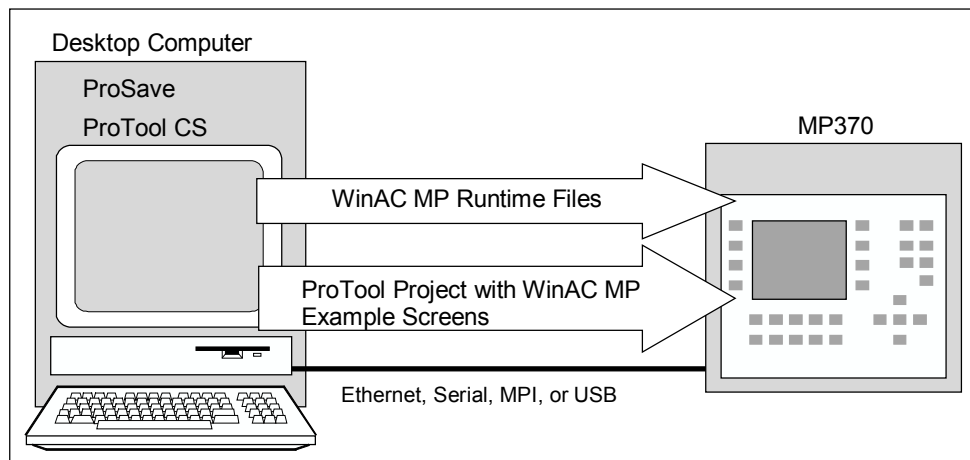


Figure: Download WinAC MP

After you complete these tasks, you can configure hardware devices and write program logic in STEP 7 and [download your STEP 7 project](#) to the WinAC MP control engine on the multi panel.

Setting Parameters for Communications

Four interfaces are supported for communications between the configuration computer and the multi panel:

- [Ethernet](#)
- [Serial](#)
- [MPI](#)
- [USB](#)

You must set parameters in the appropriate software package (such as ProSave or ProTool) of the configuration computer and also in the Control Panel utilities of the multi panel in order for the devices to communicate successfully. For instance, when you download WinAC MP runtime files or WinAC MP authorization, you use ProSave, so you must configure communications parameters in both ProSave and the multi panel. Likewise, when you download a ProTool project, you must ensure that the communications parameters match for ProTool and for the multi panel. (It is not necessary for ProSave and ProTool to use the same communications protocol, unless you wish it.)

Remote Control Option

When you edit transfer settings for the multi panel, you have the option of enabling Remote Control. The advantage of enabling Remote Control is that you can download from the configuration computer without having to walk over to the multi panel, physically close your ProTool project, and set the multi panel to Transfer mode. With Remote Control, when you initiate a download from the configuration computer, the ProTool project on the multi panel is automatically closed and the multi panel is set to Transfer mode for you. The disadvantage is that someone could perform a Remote Control download when the multi panel was performing control activities with WinAC MP, thereby interrupting process activities.



If you select the Remote Control transfer option, it is possible for a user to download from the configuration computer to the multi panel while the control engine is running.

If the control engine is connected to field equipment, interrupting its operation could cause death or serious injury to personnel and/or damage to equipment.

Ensure that only qualified personnel have access to the configuration computer. Ensure that your equipment is in a safe state before proceeding with a download. Always install a physical emergency stop circuit for your machine or process.

To enable Remote Control on the multi panel, follow these steps:

1. From the Control Panel on the multi panel, open the Transfer utility.
2. Under Channel 1 (Serial), ensure that the Remote Control check box is selected.

Direct Connection

For all of the communication options described below, you must enable a direct connection on the multi panel to the configuration computer. Follow these steps:

1. From the Control Panel on the multi panel, open the Communications utility and select the PC Connection tab.
2. Ensure that the Enable Direct Connections To The Desktop Computer check box is selected.

Ethernet Communication Parameters

To set up Ethernet communication, you must fill out the following parameters:

Ethernet Communication Parameters	
On Your Configuration Computer...	On the Multi Panel...
<p>To Connect from ProSave</p> <ol style="list-style-type: none">1. From the General tab of ProSave, select the correct Device Type (MP370 or MP370 Touch) for your multi panel.2. From the Connection list box, select Ethernet.3. Under Connection Parameters, supply the IP Address or Computer Name of the multi panel.	<p>Edit Network Configuration</p> <ol style="list-style-type: none">1. From the Control Panel, open the Network Configuration utility.2. From the Adapters tab, click on the Properties button.3. Supply an IP address. (This is the IP address referenced in ProTool and ProSave.) <p>* If you obtain an IP address by choosing DHCP, you must restart the multi panel and type <code>ipconfig</code> at the MS-DOS command prompt in order to see what the address is.</p> <p>* If you specify an IP address, you must use one provided by your network administrator if your multi panel is part of an Ethernet network. You can only create your own IP address if your multi panel is not networked, and in that case you must use a crossover cable connection between the multi panel and the configuration computer.</p> <p>Edit Transfer Settings</p> <ol style="list-style-type: none">1. From the Control Panel, open the Transfer utility.2. Under Channel 2, select Ethernet from the list box.3. Select the Enable Channel check box. <p>Save Your New Settings</p> <ol style="list-style-type: none">1. From the Control Panel, open the OP utility.2. Click on the Save Registry button to ensure that your configuration will be saved. Otherwise, your settings are reset to the default after the next power cycle.

How to Cable An Ethernet Connection

For a networked Ethernet connection, you connect the configuration computer to the multi panel using a hub and twisted-pair, category 5 cables. For a non-networked Ethernet connection, you do not use a hub, and you use crossover, twisted-pair, Category 5 cables. To create a crossover cable, you need a length of Category 5 cable, an RJ-45 connector for each end, and a crimping tool. Wire one end normally; at the other end, connect 1 to pin 3 and 2 to pin 6.

Serial Communication Parameters

To set up serial communication, you must connect a serial cable between the serial port on your configuration computer and the Config/Printer port on the multi panel, and fill out the following parameters:

Serial Communication Parameters	
On Your Configuration Computer...	On the Multi Panel...
<p>To Connect from ProSave</p> <ol style="list-style-type: none">1. From the General tab of ProSave, select the correct Device Type (MP370 or MP370 Touch) for your multi panel.2. From the Connection list box, select Serial.3. Under Connection Parameters, select the COM port that you are using on your configuration computer for this connection.4. Select the baud rate that is appropriate for your connection.	<p>Edit the Transfer Settings</p> <ol style="list-style-type: none">1. From the Control Panel, open the Transfer utility.2. Under Channel 1 (Serial), ensure that the Enable Channel check box is selected. <p>Save Your New Settings</p> <ol style="list-style-type: none">1. From the Control Panel, open the OP utility.2. Click on the Save Registry button to ensure that your configuration will be saved. Otherwise, your settings are reset to the default after the next power cycle.
<p>To Connect from ProTool</p> <ol style="list-style-type: none">1. Open the Download Preferences (File > Download > Preferences). The Set Download dialog box opens.2. Select Serial from the list box.3. Select the COM port that you are using on your configuration computer for this connection.4. Select the baud rate that is appropriate for your connection.5. (Optional) Select the Enable Upload check box only if you need to be able to upload ProTool projects from the multi panel to the configuration computer.	

MPI Communication Parameters

To set up MPI communication, you must install a card (such as CP 5611 for desktop PCs or CP 5511 for laptops) and driver on the configuration computer. You connect an MPI/PROFIBUS cable between the 9-pin port of the card on the configuration computer and the DP/MPI/PPI port on the multi panel, and fill out the following parameters:

Note

You cannot perform MPI/PROFIBUS-DP downloads from ProTool if the PG/PC interface in STEP 7 is set to either MPI or PROFIBUS. If you want to perform an MPI/PROFIBUS-DP download from ProTool, you must change the PG/PC interface in STEP 7 to something else.

MPI Communication Parameters	
On Your Configuration Computer...	On the Multi Panel...
To Connect from ProSave <ol style="list-style-type: none">1. From the General tab of ProSave, select the correct Device Type (MP370 or MP370 Touch) for your multi panel.2. From the Connection list box, select MPI/PROFIBUS DP.3. Under Connection Parameters, supply the OP address that has been assigned to the multi panel. (The OP address is the same as the Address parameter in the S7-Transfer Settings utility.)	Edit the S7-Transfer Settings <ol style="list-style-type: none">1. From the Control Panel, open the S7-Transfer Settings utility.2. Select MPI from the list box.3. Click on the Properties button.4. Edit the Address field to assign an appropriate station address to the multi panel. (This is the OP address used by the configuration computer.)
To Connect from ProTool <ol style="list-style-type: none">1. Open the Download Preferences (File > Download > Preferences). The Set Download dialog box opens.2. Select MPI/PROFIBUS DP from the list box.3. Supply the OP address that has been assigned to the multi panel. (The OP address is the same as the Address parameter in the S7-Transfer Settings utility.)4. (Optional) Select the Enable Upload check box only if you need to be able to upload ProTool projects from the multi panel to the configuration computer.	Edit the Transfer Settings <ol style="list-style-type: none">1. From the Control Panel, open the Transfer utility.2. Under Channel 2, select MPI from the list box.3. Select the Enable Channel check box. Save Your New Settings <ol style="list-style-type: none">1. From the Control Panel, open the OP utility.2. Click on the Save Registry button to ensure that your configuration will be saved. Otherwise, your settings are reset to the default after the next power cycle.

USB Communication Parameters

To set up USB communication, you must connect a USB cable between the USB port on the configuration computer and the USB port on the multi panel, and fill out the following parameters:

USB Communication Parameters	
On Your Configuration Computer...	On the Multi Panel...
<p>To Connect from ProSave</p> <ol style="list-style-type: none">1. From the General tab of ProSave, select the correct Device Type (MP370 or MP370 Touch) for your multi panel.2. From the Connection list box, select USB. (There are no other parameters to configure.)	<p>Edit Transfer Settings</p> <ol style="list-style-type: none">1. From the Control Panel, open the Transfer utility.2. Under Channel 2, select USB from the list box.3. Select the Enable Channel check box.
<p>To Connect from ProTool</p> <ol style="list-style-type: none">1. Open the Download Preferences (File > Download > Preferences). The Set Download dialog box opens.2. Select USB from the list box.3. (Optional) Select the Enable Upload check box only if you need to be able to upload ProTool projects from the multi panel to the configuration computer.	<p>Save Your New Settings</p> <ol style="list-style-type: none">1. From the Control Panel, open the OP utility.2. Click on the Save Registry button to ensure that your configuration will be saved. Otherwise, your settings are reset to the default after the next power cycle.

Downloading WinAC MP Runtime Files

Before you can download any ProTool project with WinAC MP components to the multi panel, you need to download the WinAC MP runtime files. The WinAC MP runtime files include the WinAC MP control engine.

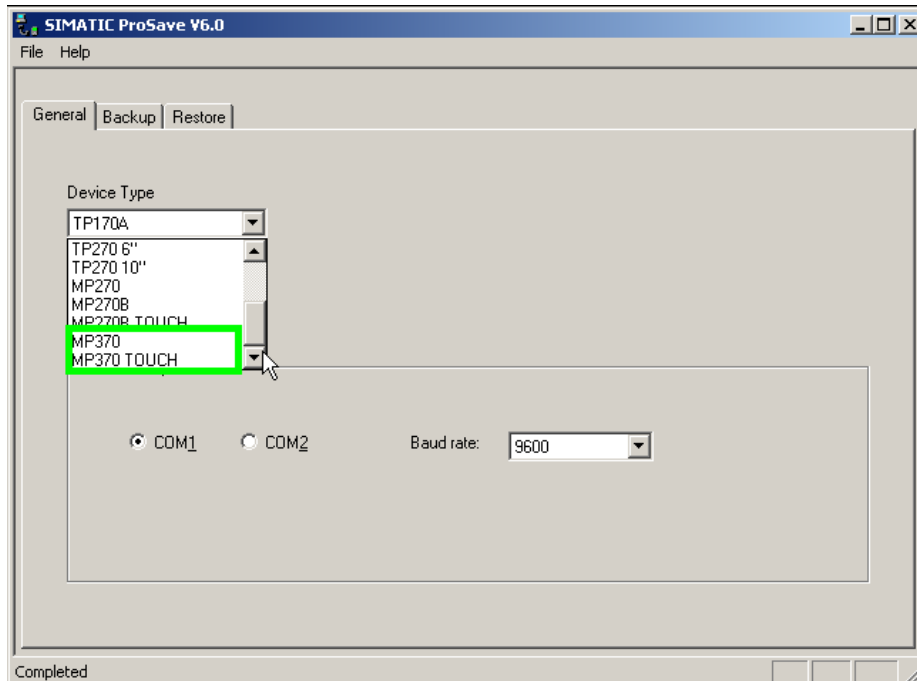
To download the WinAC MP runtime files from your configuration computer to the multi panel, you use ProSave. From the Windows Start menu, click **SIMATIC > ProSave V6.0 > ProSave** to open ProSave.

Note

Make sure that Transfer has been selected from the Loader dialog box on the MP370 or automatic transfer ("Remote Control") on the MP370 is enabled so that the MP370 opens a connection for your configuration computer. You should see the message "Connecting to host" on the MP370.

Then follow these steps.

1. Click on the General tab and select the correct device (MP370 or MP370Touch) from the Device Type list box.

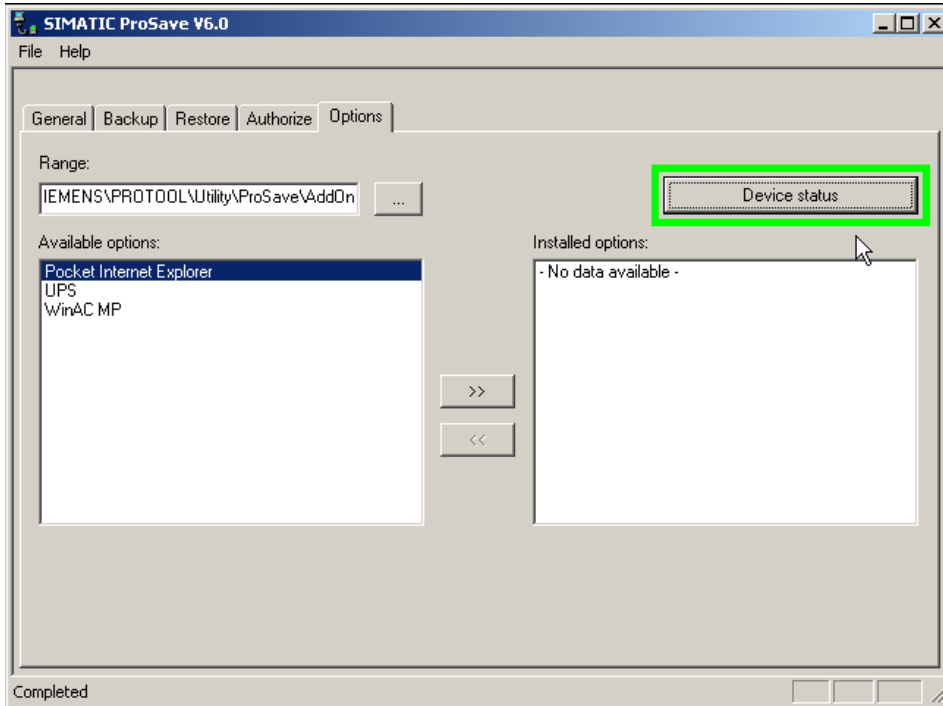


2. In the Connection list box, select the type of connection that you are using between the configuration computer and the multi panel. (See the topic [Setting Parameters for Communications.](#))
3. Complete the Connection Parameters.

- Click on the Options tab and click on the Device Status button to verify the connection.

Note

If you have a communications problem and the MP370 is in Transfer mode, check your physical cable connections, and check to make sure that your settings in ProSave and on the MP370 are correct for your connection. See the topic [Setting Parameters for Communications](#).



- Click on WinAC MP in the Available Options (left pane) to select it, then click on the >> button to add it to the installed options of the MP370 (right pane). This causes the WinAC MP runtime files to begin downloading from your configuration computer to the multi panel.

Note

If an earlier version of WinAC MP has already been installed, you are warned that this option is already installed. You must use the << button to remove it from the Installed Options pane first. Then you can select WinAC MP from the Available Options and add (re-install) it to the MP370.

For several minutes (depending on your communication method), the configuration computer transfers files to the multi panel. The multi panel receives the files, uncompresses them, and stores them in the RAM/flash memory storage system. While the transfer is in progress, the configuration computer displays progress on the transfer. On the multi panel, the Transfer dialog box updates with messages containing progress on the files that the multi panel is receiving, uncompressing and writing to the flash file system. At the end of the transfer, a message box confirms the success of the transfer. When the download is finished, you are prompted to reboot the multi panel (optional).

The WinAC MP control engine is now installed on the multi panel (but you do not have a human-machine interface to the control engine until you download a ProTool project with WinAC MP screens).

Do not close ProSave. You still need to [download WinAC MP authorization](#) to the MP370.

Downloading Authorization for WinAC MP

You use ProSave to transfer WinAC MP authorization from an authorization diskette inserted in the drive of your configuration computer to the multi panel. If ProSave is not already open, click **SIMATIC > ProSave V6.0 > ProSave** from the Windows Start menu.

Note

Make sure that Transfer has been selected from the Loader dialog box on the MP370 or automatic transfer ("Remote Control") on the MP370 is enabled so that the MP370 opens a connection for your configuration computer. You should see the message "Connecting to host" on the MP370.

Note

You must ensure that the WinAC MP control engine is shut down when you use ProSave to download files.

If you attempt to perform downloads from ProSave while the WinAC MP control engine is running, the control engine process interferes with the download process. The control engine process takes precedence and the other operation fails. You may not receive any notification that the process has failed.

Always shut down the WinAC MP control engine before you download files from ProSave.

To transfer WinAC MP authorization to the multi panel using ProSave, follow these steps:

1. Click on the Authorize tab in ProSave.
2. Select the correct drive letter for the drive where you have inserted the authorization diskette. The authorization is displayed in the Selection pane. The License counter should display a value of 001 for the WinAC MP authorization, indicating that the license is present on the diskette. (You can use the Device Status button to read the multi panel in order to see whether an authorization has already been installed.)
3. To transfer the authorization from the diskette to the multi panel, select the product authorization in the Selection pane and use the >> button to add it to the Installed Options.

After the authorization transfer completes, you can exit ProSave.



Do not dispose of your authorization diskette! If you later want to reload the ProTool image on the multi panel, or perform a backup restore, you must first remove the authorization for WinAC MP from the multi panel (that is, transfer it back onto the diskette). The authorization can only be transferred back onto the original authorization diskette. See the section on removing authorization in the topic [Removing WinAC MP](#).

Authorization for WinAC MP is not backed up when you back up the flash memory of the multi panel, nor is it a part of the image on the multi panel. Consequently, if you do not uninstall the existing authorization (restore it from the multi panel to the diskette) before loading a new image or restoring from backup to the multi panel, the authorization information is erased during the load operation, effectively causing you to lose the authorization.

From the Authorize tab in ProSave, use the << button to move an authorization license from the multi panel (Installed Options, right pane) back to the diskette (Selection, left pane). Should your authorization be lost, you would need to contact Siemens technical support for assistance. See the topic [Contacting Customer Support](#).

Downloading WinAC MP Example ProTool Project

Note

Make sure that Transfer has been selected from the Loader dialog box on the MP370 or automatic transfer ("Remote Control") on the MP370 is enabled so that the MP370 opens a connection for your configuration computer. You should see the message "Connecting to host" on the MP370.

Open the Example Project

From the Windows Start menu, click **Start > SIMATIC > ProTool CS V6.0 > ProTool Pro CS** to open ProTool CS. There are separate ProTool example projects for the MP370 and the MP370Touch. The way that you access the example projects depends on whether or not you have selected "ProTool Integration in STEP 7" (from the File menu in ProTool).

To open the example project that is appropriate for your multi panel, use the **File > Open** menu command to access the Open dialog box. Then choose the procedure that is right for you:

If you have selected ProTool Integration into STEP 7,

1. In the Entry Point list box, select Project.
2. In the Name list box, select the project that is appropriate for your multi panel ("MP370" for the keyboard unit, or "MP370Touch" for the touch panel). The project should appear in the Storage Path field. (The default storage path for the example projects is C:\Siemens\PROTOOL\SAMPLES, with subdirectories for the MP370 and MP370 Touch.)
3. Click on the MP370 or MP370Touch icon to automatically display its name in the Object Name field and its type (SIMATIC OP) in the Object Type field.
4. Click on the OK button to confirm your work and open the example project.


If you have not selected ProTool Integration into STEP 7,

1. From the Open dialog box, navigate to the PRO.PDB file that is located in the right subdirectory for your multi panel ("MP370" subdirectory for the keyboard unit, "MP370Touch" for the touch panel unit).

If you used the default installation locations for WinAC MP:

- The correct project for the keyboard unit is located under this path:
C:\Siemens\PROTOOL\SAMPLES\Win_AC_MP\MP370\TDOP
 - The correct project for the touch panel unit is located under this path:
C:\Siemens\PROTOOL\SAMPLES\Win_AC_MP\MP370 Touch\TDOP
2. Click on the Open button to open the PRO.PDB example project file that you have selected.

Download the Example Project

To download the example project to the multi panel, click on the Download button . If there are communication difficulties, try these troubleshooting tips:

- Make sure that power is on to the multi panel and the multi panel is in Transfer mode or automatic transfer ("Remote Control") on the MP370 is enabled. You can check the Transfer settings on the MP370 in the Control Panel.
- Check that the cable is connected properly to the configuration computer and to the multi panel.
- Review the topic [Setting Parameters for Communications](#) to ensure that you have configured the connection properly.

A message box displays the status of the download, and the output window in ProTool CS states whether the download is successful.

After a successful download, the multi panel displays a screen from the example project. The default is the WinAC_MP_Panel screen:

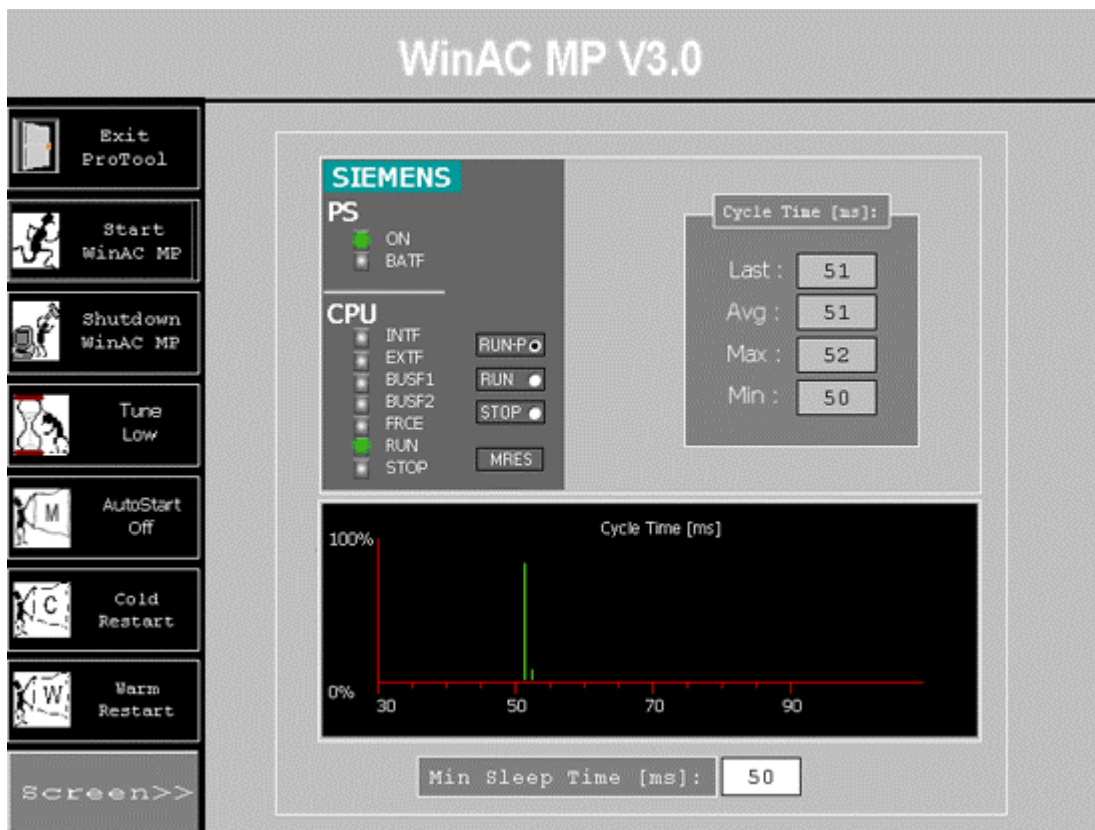


Figure: WinAC_MP_Panel Screen

The topic [Controlling Your Process with WinAC MP](#) describes the contents of the example project in more detail.

The topic [Using Your Project on the Multi Panel](#) gives information about how to start and exit your ProTool project, and how to start and shut down the WinAC MP control engine. However, you must download a STEP 7 project to program the control engine before WinAC MP can be used for process control. You can leave the example project open on the multi panel while you download your STEP 7 project to the multi panel.

Using Your ProTool Project on the Multi Panel

After you install the runtime files and download a ProTool project (such as the example project with WinAC MP screens) that provides some type of control panel representation for the WinAC MP control engine, you can view and experiment with the user interface of the control engine. The instructions below assume that you have installed the example ProTool project on your multi panel.

Remember that the control engine does not actually contain any program logic until after you download a STEP 7 user program.

Start the Project on the Multi Panel

It is easy to start your ProTool project on the multi panel:

1. Ensure that the multi panel is powered on.
2. From the Loader dialog box on the multi panel, click on the Start button. ProTool opens and your project is displayed.

Start the Control Engine

The type of multi panel you have determines how you start the control engine:

- Keyboard units: press the S3 key to start the control engine.
- Touch panel units: touch "Start WinAC MP" to start the control engine.

While the Control Engine Is Running:

The following restrictions apply while the control engine is running:

- The multi panel cannot connect to other PLCs. The WinAC MP control engine is configured to talk to the local IP address.
- You should not perform ProSave operations or use utilities from the Control Panel of the multi panel. (The WinAC MP control engine has priority over these other operations on the multi panel. Such operations, if attempted, may fail without notice. Shut down the control engine and re-attempt the ProSave or Control Panel operation.)

Note

Ensure that the WinAC MP control engine is shut down when you use ProSave to download files (or when you use utilities in the Control Panel of the multi panel).

If you attempt to perform downloads from ProSave or use utilities in the Control Panel while the WinAC MP control engine is running, the control engine process interferes with the download and/or Control Panel processes. The control engine process takes precedence and the other operations fail. You may not receive any notification that the process has failed.

Always shut down the WinAC MP control engine before you perform a download from ProSave or use a utility in the Control Panel of the multi panel.

- You must not attempt to download a project from ProTool CS on the configuration computer to the multi panel when the control engine is in RUN or RUN-P mode.



Downloading a ProTool CS configuration to the multi panel while the WinAC MP control engine is in RUN or RUN-P mode interrupts the execution of the process.

If process equipment is not in a safe state, interrupting the execution of the process could result in death or serious injury to personnel, and/or damage to equipment.

Shut down the WinAC MP control engine or set it to STOP mode prior to downloading any ProTool CS configuration. Ensure that your equipment is in a safe state. Always install a physical emergency stop circuit for your machine or process.

Shut Down the Control Engine

The type of multi panel you have determines how you shut down the control engine:

- Keyboard units: press the S4 key to shut down the control engine.
- Touch panel units: touch "Shutdown WinAC MP" to shut down the control engine.

Exit the Project

The type of multi panel you have determines how you exit the project:

- Keyboard units: press the S2 key to exit ProTool.
- Touch panel units: touch "Exit ProTool" to exit ProTool.

The Difference Between Shutting Down WinAC MP and Exiting ProTool

Exiting ProTool has no effect on the operation of the WinAC MP control engine. When you exit ProTool, you close the project that provides you with an interface to WinAC MP. You cannot see a representation of the control engine any longer. However, the control engine can run even if the ProTool project is closed.

When you start the WinAC MP control engine, the power LED on the control panel representation in the example ProTool project turns green, and it stays green until you issue the "Shutdown WinAC MP" (S4) command. You can exit and restart ProTool on the multi panel and the power LED will remain green.

If you want to shut down the control engine, you need to issue the "Shutdown WinAC MP" (S4) command, which is entirely separate from the "Exit ProTool" (S2) command.

Developing and Downloading a STEP 7 Project for WinAC MP on the Multi Panel

Working with STEP 7

To use the WinAC MP control engine as a master on a PROFIBUS-DP network, you must perform the following tasks:

- Create a project and a SIMATIC PC station with the SIMATIC Manager.
- Use the HW Config editor to configure the WinAC MP control engine as a WinLC controller and configure the distributed I/O.
- Create a user program for the control program logic.
- Edit the PG/PC interface in STEP 7 so that you can use an MPI/PROFIBUS or an Ethernet connection to download the hardware configuration and user program to the multi panel.

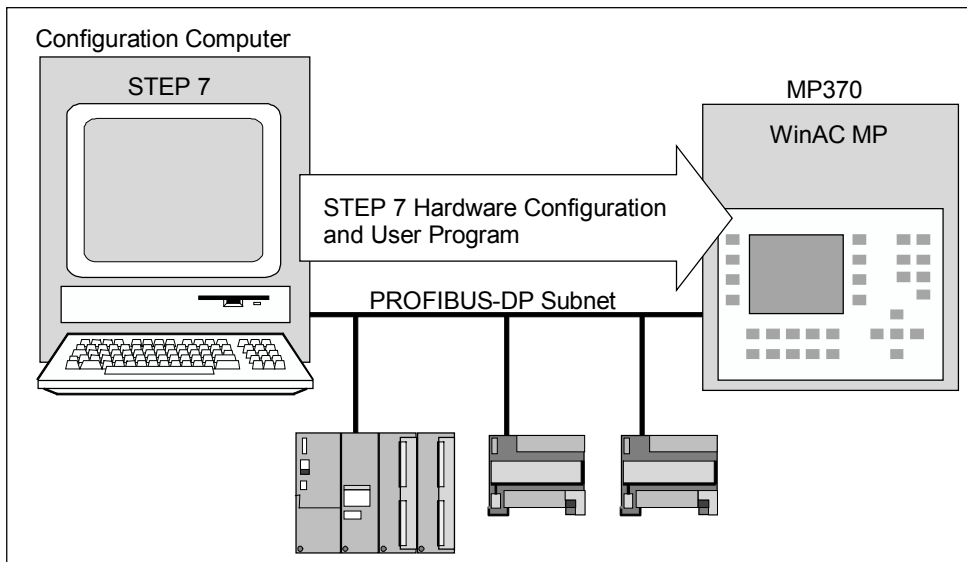


Figure: Download STEP 7 Hardware Configuration and User Program

STEP 7 Connection Options

You can use either an MPI/PROFIBUS connection or an Ethernet connection to communicate from STEP 7 on the configuration computer to the WinAC MP control engine on the multi panel:

- **MPI/PROFIBUS** The default setting of the MPI/PROFIBUS interface of the multi panel is MPI with a transmission rate of 187.5 Kbps. However, when you configure the control engine on the multi panel as a PROFIBUS-DP master, the MPI/PROFIBUS interface on the multi panel is automatically set to PROFIBUS-DP communications. This means that if you use an MPI connection to download to the multi panel, you must take an extra step in order to be able to perform subsequent downloads from STEP 7. You must edit the PG/PC interface settings (change them from MPI to PROFIBUS with the corresponding configured settings) before you can communicate from STEP 7 to the multi panel again.
- **Ethernet** If you use an Ethernet connection to download the PROFIBUS-DP master configuration to the multi panel, you do not need to change your PG/PC interface settings in order to be able to perform subsequent downloads from STEP 7. Your STEP 7 connection uses the Ethernet port of the multi panel, and is unaffected by the configuration of the MPI/PROFIBUS interface.

Note:

In order to configure STEP 7 to use an Industrial Ethernet connection to the multi panel, you must have the SIMATIC NET networking software installed on your configuration computer. (No networking software is needed on the multi panel.)

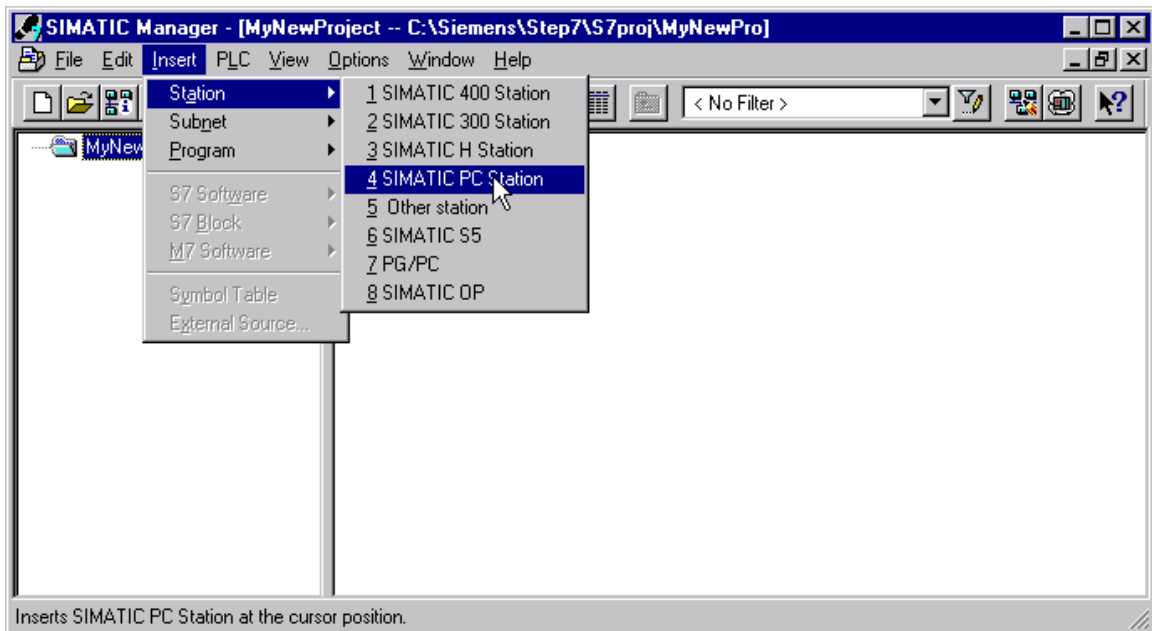
Configuring the SIMATIC PC Station and the PROFIBUS-DP Network

Configuring a SIMATIC PC Station in STEP 7

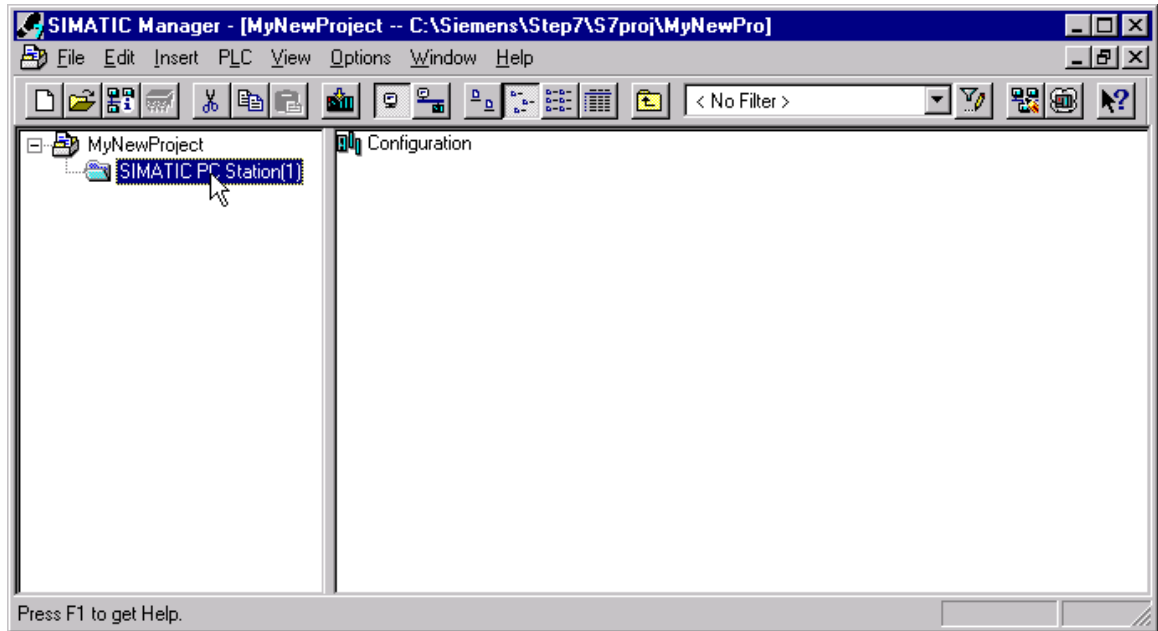
When you install WinAC MP on your configuration computer, the setup process installs two STEP 7 sample projects: "MP370" and "MP370Touch"; use the one that is appropriate for your multi panel. The sample projects are located under your ProTool installation folder: ..\ProTool\Samples\WinAC_MP\. If you wish to use the sample project, open it now and proceed to the section entitled [Defining Communication Settings and Network Properties](#), later in this topic.

You can manually create a project for the WinAC MP control engine by following these steps:


1. Create a new project from the SIMATIC Manager. Select **File > New** and enter a project name such as MyNewProject.
2. From the left pane of the SIMATIC Manager, select the project folder for the project created in Step 1.
3. Use the menu command **Insert > Station > Simatic PC Station** to create your own SIMATIC PC station.

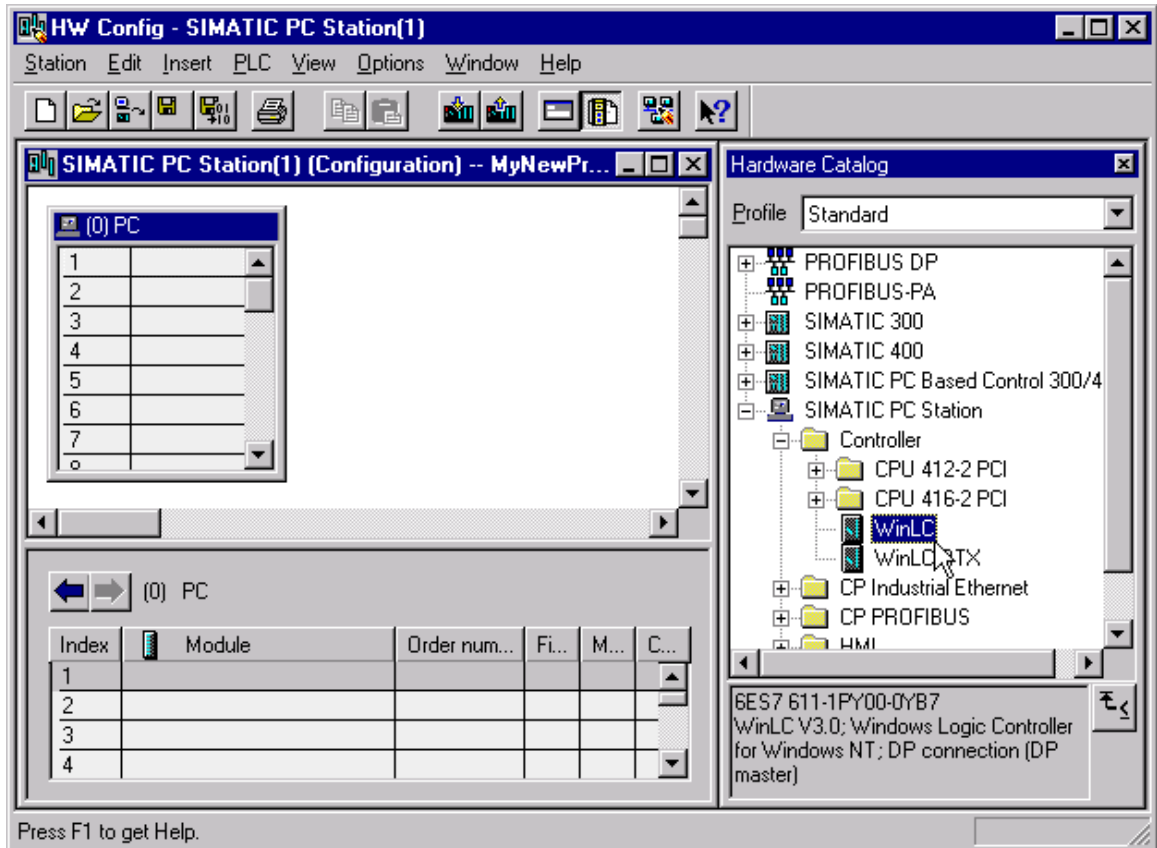


4. In the left pane of the SIMATIC Manager, double-click on the newly created station. This causes the Configuration icon to appear in the right pane.



5. Double-click on the Configuration icon to enter the HW Config editor.

6. If the HW Catalog is not already open, click on the  icon to open it.

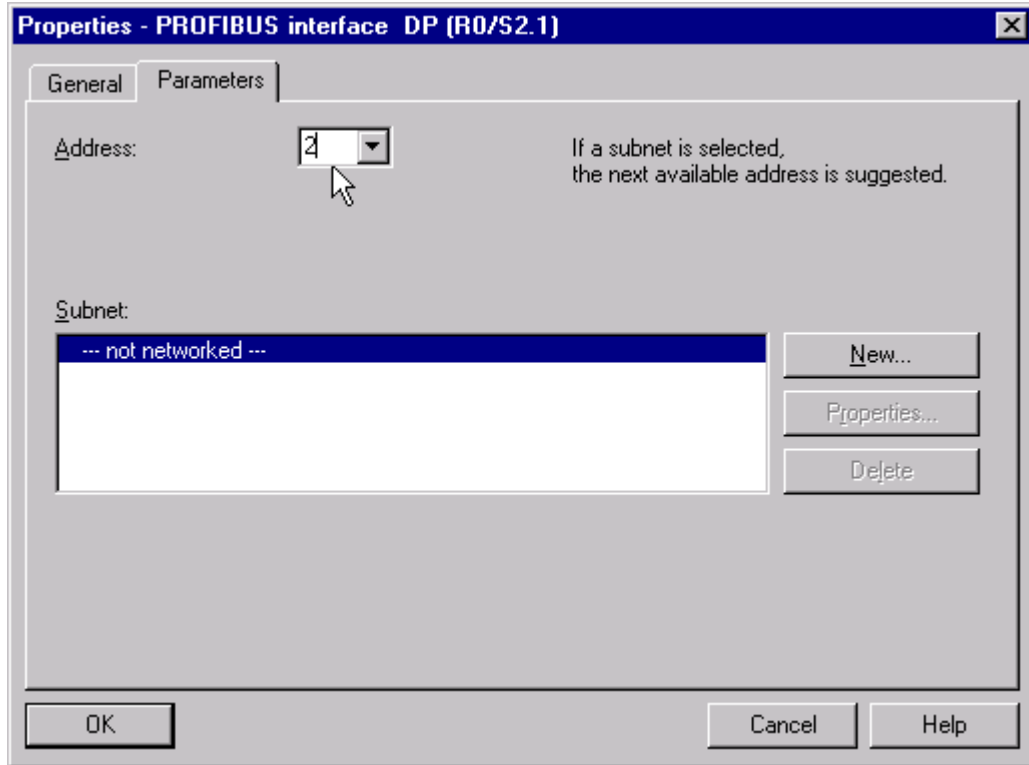


7. From the HW Catalog, navigate to SIMATIC PC Station\Controller\WinLC. Drag the WinLC controller to slot 2. The Properties – PROFIBUS interface DP dialog box appears.

Defining Communication Settings and Network Properties

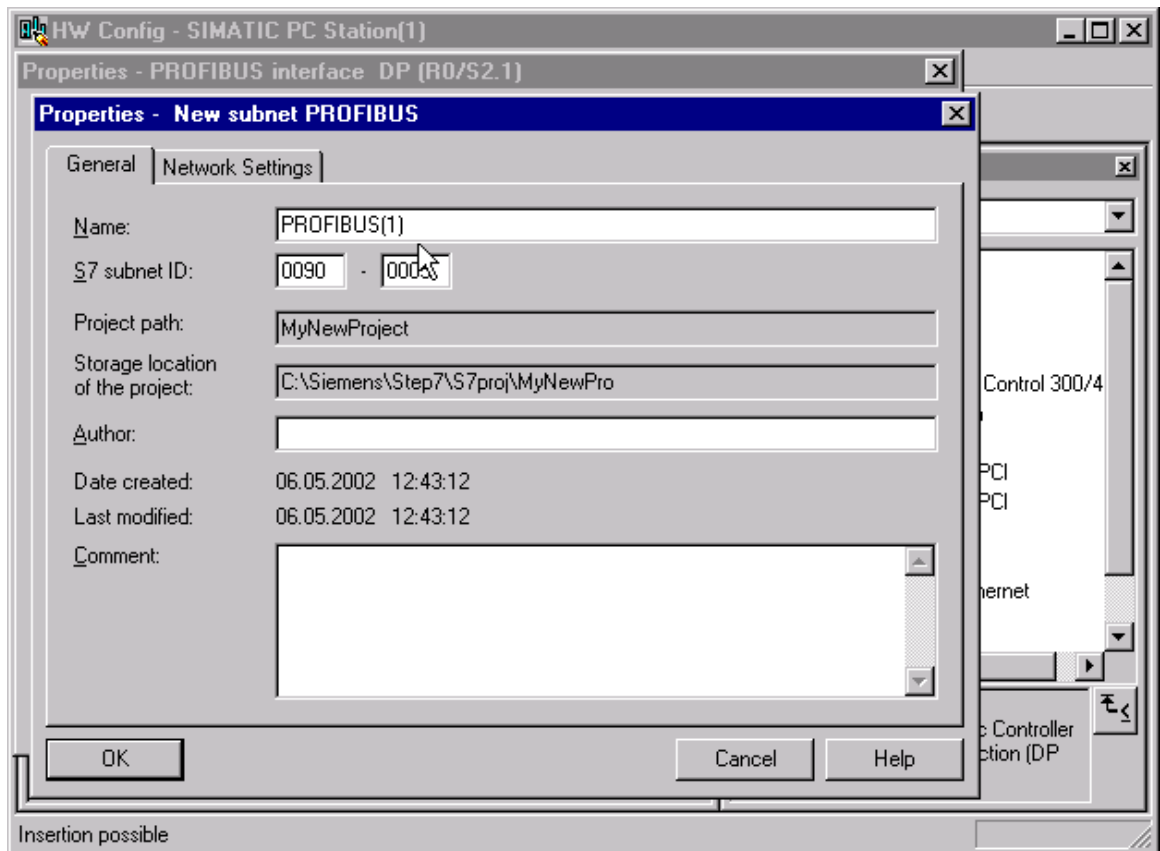
To configure the SIMATIC PC station as a DP master that can be downloaded to the WinAC MP control engine on the multi panel, you must perform the following steps:

1. From the Parameters tab of the Properties – PROFIBUS interface DP dialog box, enter the node address for the WinAC MP control engine on the multi panel. The default address for the DP master is 2. Each node on the network must have a unique node address between 0 and 125.



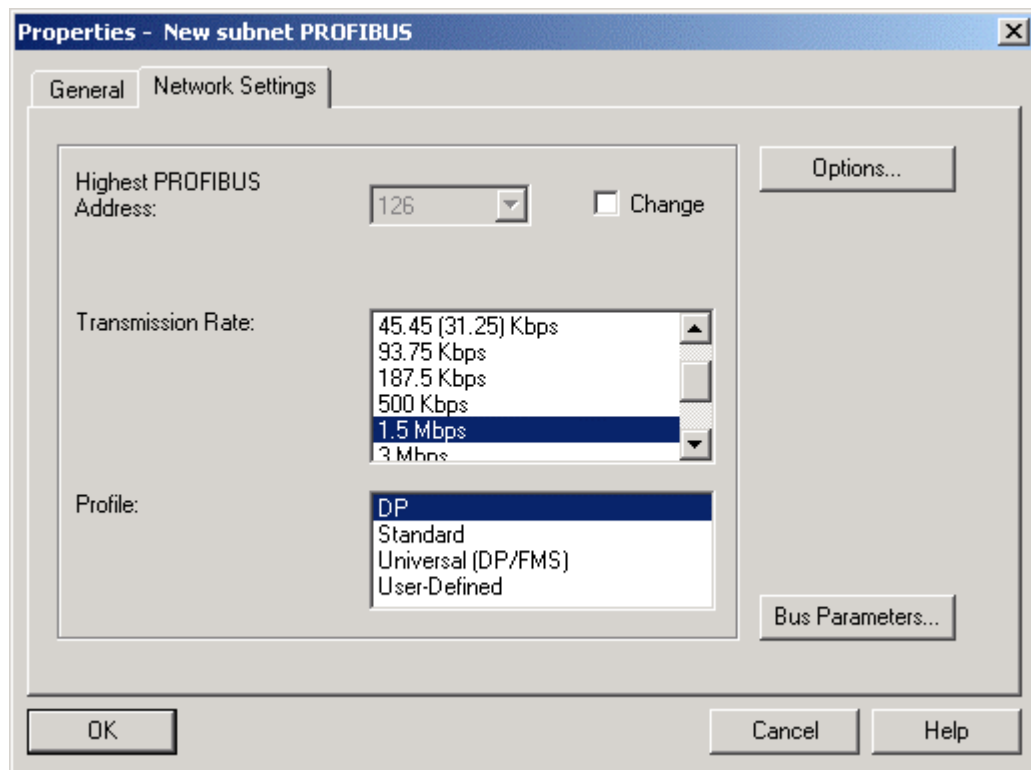
2. Click on the New button to open the Properties – New subnet PROFIBUS dialog box.

3. From the General tab, assign a name for the network.



4. Select the Network Settings tab. Examine the following settings and make changes if desired:
 - Highest PROFIBUS Address
(Can be reduced to improve polling speed, if you are certain you will never exceed a certain number of stations.)
 - Transmission Rate
(Default is 1.5 Mbps. Adjustable up to 12 Mbps depending on the speed requirement of the application.)
 - Profile
(Default is DP.)


For more information about PROFIBUS-DP communications and how to set up PROFIBUS networks, refer to the SIMATIC NET PROFIBUS User Manual.



5. Click on the OK button to confirm the name and any changes to the network settings that you have configured for the PROFIBUS subnet and close the Properties – New subnet PROFIBUS dialog box.
6. Click on the OK button to confirm the node address that you have configured for the SIMATIC PC station and close the Properties – PROFIBUS interface DP dialog box.

7. (Optional) If you are using an Ethernet (TCP/IP) connection, you have to perform additional tasks before proceeding to the next step. As an example for general TCP/IP communication using fixed addresses, perform the following steps:
 - Select an IE General from the SIMATIC PC Station folder in the Hardware Catalog and drop it in slot 3 of the SIMATIC PC Station rack. The Properties - Ethernet Interface IE General dialog box opens.
 - In the IP Address field, enter the IP address of the multi panel. Click on the OK button. The Properties - IE General dialog box opens.
 - In the Interface Parameter Assignment Used (TCP/IP) field on the Assignment tab of the dialog box, enter S7ONLINE. Click on the OK button.
 - When the prompt "The module is not yet assigned to a network" appears, click OK. (You do not need to assign the multi panel to a network for Ethernet communication.)

For more information about Ethernet communications and setting up Ethernet networks, refer to the *SIMATIC NET Ethernet User Manual*.

Before you close the HW Config editor, configure your additional PROFIBUS nodes (slaves) according to your application requirements. Then click on the  icon to save and compile the configuration.

Downloading the Configuration

To download the hardware configuration to the WinAC MP control engine on the multi panel, you must first set the PG/PC interface on the configuration computer to the type of connection, MPI/PROFIBUS or Ethernet (TCP/IP), that you are using between the configuration computer and the multi panel. Follow these steps to ensure that your PG/PC interface is set correctly:


1. From the SIMATIC Manager, select **Options > Set PG/PC Interface**.
2. Examine the Interface Parameter Assignment Used field. If it does not show the appropriate interface parameter, click on the Select button to change the interface selection. For example, you might need to set it to CP5611(MPI) or CP5611(PROFIBUS) for a CP5611 card, or to a TCP/IP option that corresponds to an Ethernet card in your PC.

Note

If you use an MPI connection for the first download, make sure that the baud rate is set to 187.5 Kbps.

3. Click on the OK button to accept the card configuration and close the window.

To download the configuration, follow these steps:

1. Click on the  icon to download the configuration.
2. On the Select Target Module dialog box, ensure that the WinLC module (which corresponds to the WinAC MP control engine on the multi panel) is highlighted and click on the OK button.
3. For MPI or PROFIBUS connections, you are prompted for the Station Address of the multi panel: use the address that is currently configured for the multi panel, not the new address that you are assigning. (The default multi panel address, if you have not previously made an address assignment, is MPI 2 or PROFIBUS 2.) For Ethernet connections, you are prompted to provide the IP address of the multi panel.

A dialog box confirms whether the download is successful.

At this point, the WinAC MP control engine has received its hardware configuration, and the MPI/PROFIBUS interface on the multi panel has been set to PROFIBUS-DP. If you used an Ethernet connection to the multi panel, you can continue to perform Ethernet downloads to the multi panel and do not need to make changes to the PG/PC interface settings in STEP 7.

(Optional) Changing the PG/PC Interface to PROFIBUS-DP

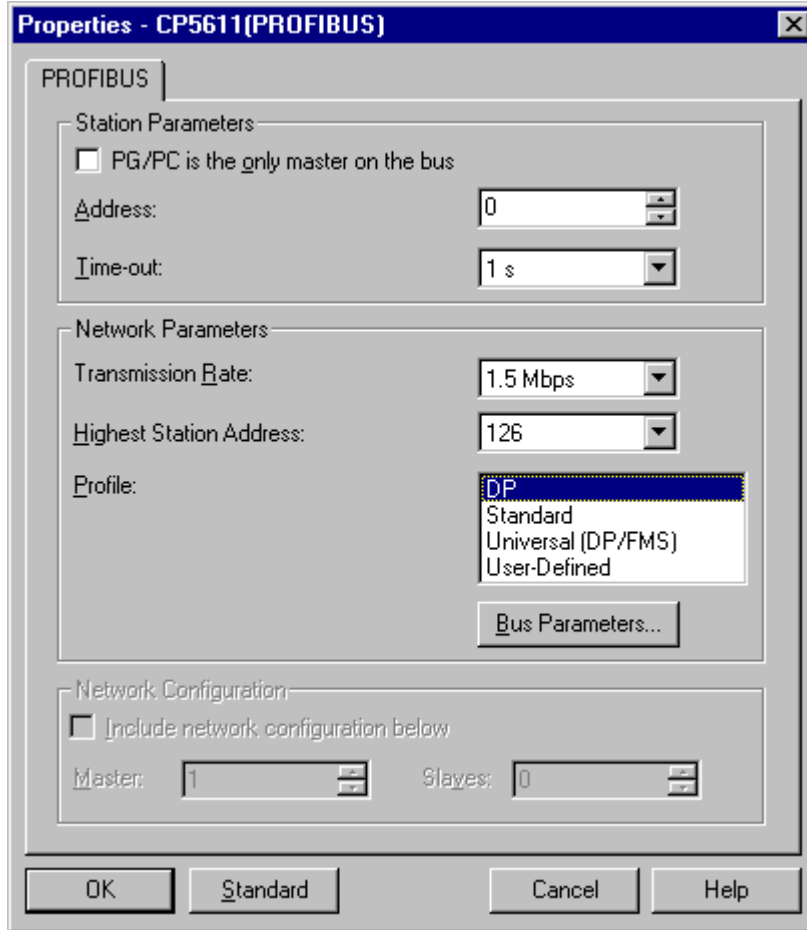
If you used an MPI connection to the multi panel, that connection is no longer functional (because the port protocol on the multi panel changed from MPI to PROFIBUS-DP when you downloaded the DP master hardware configuration).

In order to perform subsequent downloads to the WinAC MP control engine from STEP 7, you must switch your PG/PC interface to PROFIBUS-DP, and define the communications settings from the values you noted in the subnet properties of the PROFIBUS-DP master. Follow these steps:

1. From the SIMATIC Manager, select **Options > Set PG/PC Interface**.
2. Select the interface parameter corresponding to the CP card in your configuration computer using the PROFIBUS-DP bus profile, for example, CP5611(PROFIBUS).
3. Click on the Properties button.
4. In the Properties dialog box, enter the same values for Network Parameters that you noted for the subnet properties:
 - Transmission Rate
 - Highest Station Address (was highest PROFIBUS address in subnet properties)
 - Profile (DP)

Note



The Address (0) is the address of the configuration computer, not the address of the SIMATIC PC station.



5. Click on the OK button to confirm your work and close the Properties dialog box.
6. Click on the OK button to confirm your work and close the PG/PC Interface dialog box.

Testing the Online Connection

After you complete the network configuration, verify that the connection between STEP 7 and the WinAC MP station is operational.

Testing the Online Connection	
	You can verify the connection from the SIMATIC Manager by pressing the online icon.
	If you are communicating directly over the PROFIBUS-DP network from the configuration computer to the multi panel (not using an Ethernet connection), you can also test the connection by selecting the Accessible Nodes icon. The PROFIBUS node of the multi panel should appear in the list of network nodes.

If the network configuration is not online, review the steps of the network configuration and correct any errors.

Developing and Downloading the User Program

You can now develop your control program in the STEP 7 project, creating and editing the blocks necessary for control of your process. Download the created blocks either from the SIMATIC Manager or from the STEP 7 option that you used to create the blocks. For detailed information about developing a project using STEP 7, refer to your STEP 7 documentation.

Customizing WinAC MP for Your Application

Controlling Your Process with WinAC MP

Note

This topic describes how to control your process with WinAC MP by using the example ProTool projects. The screens from these projects can be customized (see [Using ProTool CS to Customize the Application](#)) and so the examples in this topic may differ from your real project.

If you have successfully completed the procedures described in the topics [Transferring WinAC MP to the Multi Panel](#) and [Developing and Downloading the Project](#), you now have an executable control program loaded in the WinAC MP control engine, and an interface (the example ProTool project) from which to control it. Additionally, you may have developed screens with ProTool CS for your specific process application. The initial screen displayed on the multi panel when you download the example ProTool project is the WinAC_MP_Panel screen. From this screen, you can perform all of the WinAC MP functions and view all of the WinAC MP status indicators:

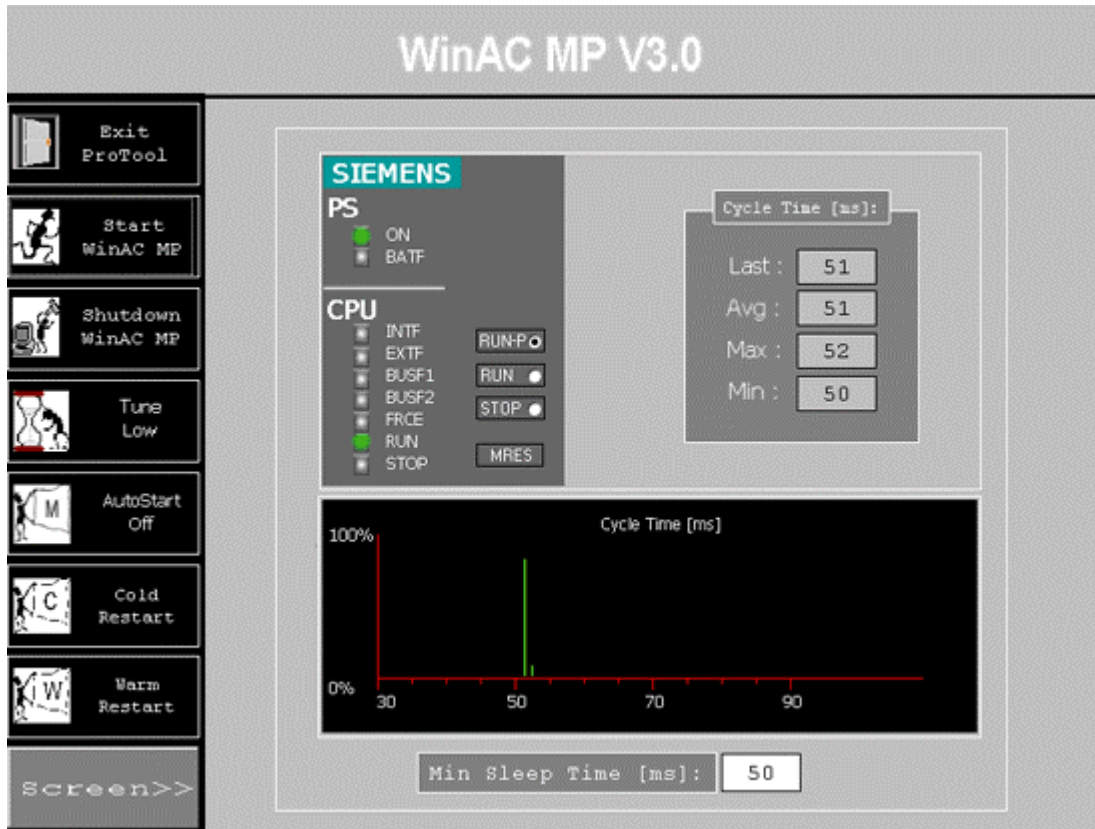



Figure: WinAC_MP_Panel Screen

Functions Available from the Example Screens

The table below describes the functions available from the WinAC MP example screens, and lists the key equivalents for the MP370 keyboard unit (not necessary for the MP370 touch panel unit, where you simply touch a function on the screen to select it).

Functions Available from the Example Screens		
Key	Function Name	Function Description
S2	Exit ProTool	Exits ProTool process visualization. This closes ProTool. It does not shut down the WinAC MP control engine.
S3	Start WinAC MP	Starts the WinAC MP control engine on the multi panel. Simply opening the ProTool interface of WinAC MP, although it may display a Control Panel screen, does not mean that the WinAC MP control engine is running.
S4	Shutdown WinAC MP	Shuts down the WinAC MP control engine on the multi panel. The ProTool interface is still open, but the control engine is no longer running.
S5	Tune High/ Tune Low	<p>Toggles between Tune High and Tune Low. If the Tune High function is displayed, that means it is not currently in use: the control engine is currently set to Tune Low (and vice versa).</p> <ul style="list-style-type: none"> • Tune High tunes WinAC MP to run at a higher priority than ProTool on the multi panel. • Tune Low tunes WinAC MP to run at the same priority as ProTool on the multi panel. <p>The Set_Priorities script in the example project sets the priority to Tune High or Tune Low based on the value of the WLC_PRIO tag.</p>
S6	Autostart Off/ Autostart On	<p>Toggles between Autostart Off and Autostart On. If the Autostart Off function is displayed, that means it is not currently in use: the control engine is currently set to Autostart On (and vice versa). These functions affect the operating mode and keyswitch position of the control engine when it is restarted after a power cycle or shutdown.</p> <ul style="list-style-type: none"> • Autostart Off means that when the control engine is restarted, the keyswitch remains in its previous position but regardless of what the previous mode was, the operating mode is set to STOP. The user has to manually change the control engine from STOP to any other mode. • Autostart On means that when the control engine is restarted, it uses the same keyswitch position and operating mode as when it last operated. <p>The Set_Start_Mode script in the example project sets the WinAC MP start mode to Autostart Off or Autostart On based on the value of the tag START_MODE.</p>
S7	Cold Restart	On the next startup, causes the WinAC MP control engine to perform a cold restart by calling OB102. (If you do not configure a restart method in WinAC MP, the control engine uses the startup method that is configured in STEP 7.)
S8	Warm Restart	On the next startup, causes the WinAC MP control engine to perform a warm restart by calling OB100. (If you do not configure a restart method in WinAC MP, the control engine uses the startup method that is configured in STEP 7.)

Functions Available from the Example Screens, continued		
Key	Function Name	Function Description
F1, F2	Switch Between Screens	Switches the display from one screen to the next on the multi panel.
S12	RUN-P	<p>Put the WinAC MP control engine in RUN-PROGRAM Mode. When the control engine is in RUN-P mode, you can:</p> <ul style="list-style-type: none"> • Upload a STEP 7 program from the control engine to your configuration computer. • Download a STEP 7 program from your configuration computer to the control engine. • Download individual STEP 7 blocks to the control engine. • Use external software (such as STEP 7) to change the operating mode of the control engine. <p> Warning! You must not attempt to download from ProTool CS to the multi panel when the control engine is in RUN-P mode: doing so would interrupt process control and could cause death or serious injury to personnel, and/or damage to equipment.</p>
S13	RUN	Puts the WinAC MP control engine in RUN Mode. In RUN mode you can upload a program from the control engine to your configuration computer, but you cannot download a program to the control engine.
S14	STOP	Puts the WinAC MP control engine in STOP Mode. The program stops executing. You can perform program uploads and downloads, and you can download from ProTool CS.
S15	MRES	<p>Resets the WinAC MP control engine memory. This includes resetting the hardware configuration, deleting the WinAC MP program, and resetting the memory areas (I,Q,M,T, and C).</p> <hr/> <p>Note When you reset the control engine memory from the MP370, you also reset the multi panel communication settings to the default (MPI, 187.5 Kbps). If you want to reset control engine memory but preserve communication settings, perform the reset from STEP 7 instead.</p>

Performing a Memory Reset

Any time that you perform a memory reset, you erase the STEP 7 project from the WinAC MP control engine on the MP370. You must download your project from STEP 7 again before the WinAC MP control engine can resume process control.

If you perform a memory reset from STEP 7 on the configuration computer, your STEP 7 communication settings are preserved. If you perform a memory reset from the multi panel, using the MRES (S15) function of WinAC MP, the multi panel reverts to the factory default communication settings (MPI, 187.5 Kbps). If you were not using the factory default settings for communication between STEP 7 and the WinAC MP control engine on the multi panel, you must edit the communication settings before you can download your project from STEP 7 again.

Understanding the Tuning Parameters

The multi panel processor must perform both WinAC MP program execution and ProTool screen updates and process visualization. There are two functions that affect the performance of the WinAC MP control engine:

- **Set_Priority** allows you to tune the WinAC MP control engine high or low with respect to ProTool on the multi panel.

High priority improves the performance of the WinAC MP control engine. It causes the WinAC MP control engine to have more processing time than ProTool on the multi panel.

Low priority improves the performance of ProTool on the multi panel. It causes the processing time of the WinAC MP control engine to be equal to the processing time of ProTool. The net effect is to raise the processing time of ProTool on the multi panel insofar as the processing time of the WinAC MP control engine is lowered.

The example project provides a Tune High/Tune Low toggle button that sets the priority of WinAC MP with respect to ProTool on the multi panel. You can use this button, or you can create your own screen object that uses the Set_Priority function.

- **Set_Sleep_Time** allows you to increase or decrease the execution time of the user program, which has an indirect effect on all other processes that are running on the multi panel.

A high sleep time value increases the execution time of the user program by enforcing a sleep interval between scan cycles. The higher the sleep time value, the more processing time that is available to processes other than the WinAC MP control engine. The net effect is to raise the processing time of ProTool on the multi panel insofar as the processing time of the WinAC MP control engine is lowered.

A low sleep time value decreases the execution time of the user program by decreasing or eliminating the sleep time between scan cycles. The lower the sleep time value, the less processing time that is available to processes other than the WinAC MP control engine. The net effect is to lower the processing time of ProTool on the multi panel insofar as the processing time of the WinAC MP control engine is raised.

The "minimum sleep time" value allows you to ensure that there is always a specified amount of processing time between scan cycles available to processes other than the WinAC MP control engine.

The WinAC_MP_Panel screen of the example project provides output fields that display the last cycle time, average cycle time, maximum cycle time, and minimum cycle time, as well as a tuning histogram (the Histogram control). The WinAC_MP_Panel screen also provides an input field where you can adjust the minimum sleep time value. You can use these fields or create your own screen object that uses the Set_Sleep_Time function and the other cycle time display functions.

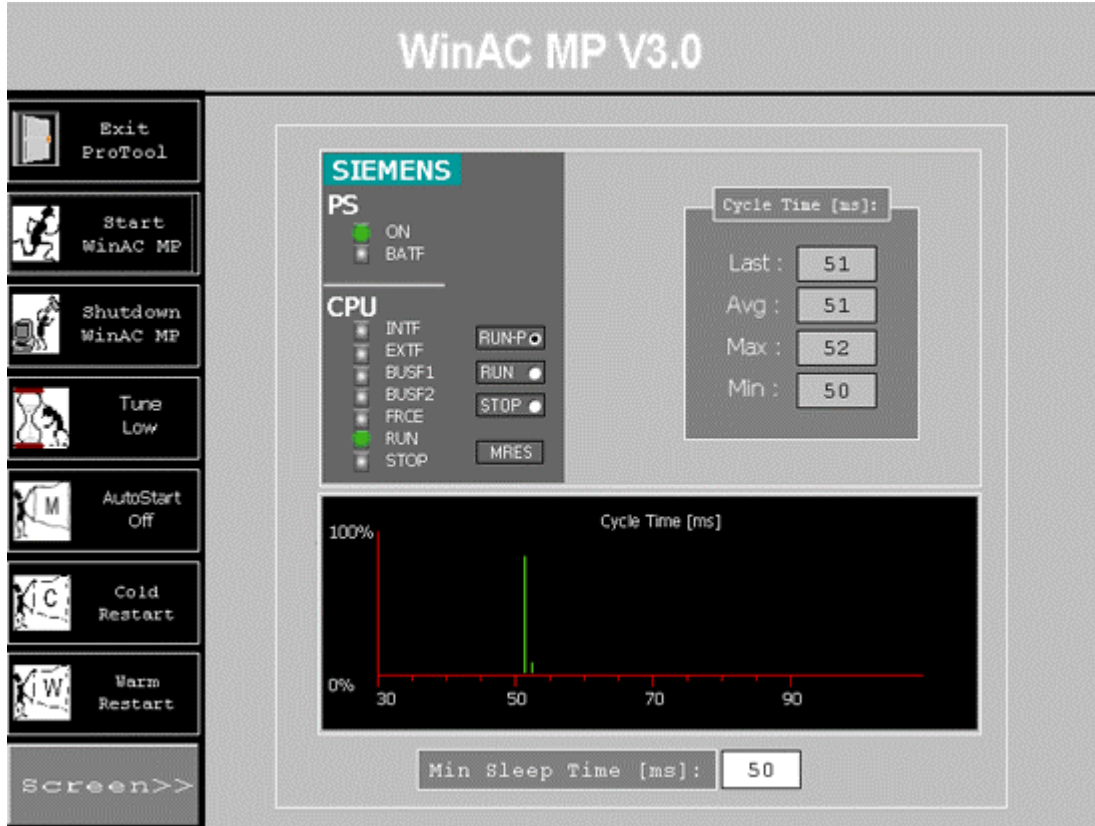


Figure: WinAC_MP_Panel Screen

Status Indicators

The WinAC MP Control Panel that is shown in the ProTool example project displays the normal status indicators found on a WinLC Control Panel or on an S7-300/400 controller. These indicators are view-only: you cannot use them to change modes or set faults in the WinAC MP control engine.

The status indicators are as follows:

Status Indicators Available from the Example Screens	
Indicator	Description
ON	The ON indicator turns on when the WinAC MP control engine is running. The ON indicator turns off when a shutdown of the WinAC MP control engine finishes saving the program and states to the flash file system.
BATF	Battery fault. Always off for WinAC MP.
INTF	Internal fault. This indicator lights up (solid) to show error conditions that exist within the control engine, such as programming errors, firmware errors, arithmetic errors, and timer errors.
EXTF	External fault. This indicator lights up (solid) to show error conditions that exist outside of the control engine, such as hardware faults, parameter assignment errors, communication errors, and I/O fault errors.
BUSF1 BUSF2	These indicators light up (either solid or flashing) to identify fault conditions in the communication with the distributed I/O. Since WinAC MP supports only one PROFIBUS-DP network, BUSF1 is the only active indicator. BUSF2 is not applicable for WinAC MP.
FRCE	This indicator lights up (solid) to show that a force request is active. Not applicable for WinAC MP.
RUN STOP	The RUN indicator lights up when the operating mode is RUN. The STOP indicator lights up when the operating mode is STOP. The RUN indicator blinks with a single triangle and the STOP indicator is lighted (solid) when the WinAC MP control engine is executing a restart. The RUN indicator blinks with alternating triangles and the STOP indicator is lighted (solid) when the WinAC MP program has reached a breakpoint.
All status indicators flashing	When all of the status indicators are flashing, the WinAC MP control engine has encountered an error condition that cannot be fixed by resetting the memory (MRES). To recover from this condition, you must perform the following tasks: <ol style="list-style-type: none"> 1. Shut down the WinAC MP control engine. 2. Restart the WinAC MP control engine. 3. Reset the memory (MRES). <hr/> <p>Note When you reset the control engine memory from the MP370, you also reset the multi panel communication settings to the default (MPI). If you want to reset control engine memory but preserve communication settings, perform the reset from STEP 7 instead.</p>

The example project that is supplied with WinAC MP has all of the functionality described above. If you want to change anything on the example project screens, or put WinAC MP control functions or indicators on any of your other application screens, refer to the topic [Using ProTool CS to Customize the Application](#).

Using ProTool CS to Customize the Application

ProTool CS is the configuration system of ProTool and is used for the development of process visualization screens. The operator uses these screens on the multi panel for controlling and monitoring the process.

You do not need to do configuration in ProTool CS to be able to use the WinAC MP control engine; the example ProTool project with WinAC MP screens (as transferred during installation) contains everything you need for WinAC MP control. If you so choose, however, you can change the example project or create a new project with screens containing WinAC MP functions. You can also copy screens from the example project to an existing project of your own. The WinAC MP functions and status indicators can be used on any ProTool screen.

From the Windows Start menu, click **Start > SIMATIC > ProTool CS V6.0 > ProTool Pro CS** to open ProTool CS. Then you can edit your project as desired.

See the ProTool CS documentation for information about how to perform your configuration objectives, such as changing text, color, font, or position of screen objects, and downloading screens.

WinAC MP Functions

The following table describes all of the WinAC MP functions that are available as object properties when you build screens in ProTool CS. To update the display of values, you use the Update and Get functions. To set or change values, you use the Set functions.

WinAC MP Functions Available as Object Properties in ProTool CS	
Name	Description
Control_WinAC_MP	Start or shut down the WinAC MP control engine.
Get_Sleep_Time	Update the display of the minimum sleep time of the WinAC MP control engine (in milliseconds).
Get_WinAC_MP_Start_Mode	Updates the display of the WinAC MP start mode. (In the example ProTool project, because this function is assigned to a toggle button, if Autostart is on, the button on the function bar displays the choice Autostart Off. If Autostart is off, the button on the function bar displays the choice Autostart On.)
Set_Key_Switch	Set the key switch of the WinAC MP control engine to RUN-P, RUN, STOP, or MRES.
Set_Priority	Set priority of the WinAC MP control engine in comparison to ProTool on the multi panel. (Equivalent to Tune High and Tune Low in the example screens.)
Set_Restart_Method	Set the restart method either to cold restart (CRST) or to warm restart (WRST).
Set_Sleep_Time	Set the minimum sleep time of the WinAC MP control engine (in milliseconds).
Set_WinAC_MP_Start_Mode	Set the start mode of the WinAC MP control engine (turn Autostart on or off).
Update_Average_Cycle_Time	Update the display of the average cycle time variable (in milliseconds).
Update_Average_Exec_Time	Update the display of the average execution time variable (in milliseconds).
Update_BATF_LED_Variable	Update the status indicator of the BATF LED variable.
Update_BUSF1_LED_Variable	Update the status indicator of the BUSF1 LED variable.
Update_BUSF2_LED_Variable	Update the status indicator of the BUSF2 LED variable.
Update_EXTF_LED_Variable	Update the status indicator of the EXTF LED variable.
Update_FRCE_LED_Variable	Update the status indicator of the FRCE LED variable.
Update_INTF_LED_Variable	Update the status indicator of the INTF LED variable.
Update_Key_Switch_Setting	Update the display of the key switch setting.
Update_Last_Cycle_Time	Update the display of the last cycle time (in milliseconds).
Update_Maximum_Cycle_Time	Update the display of the maximum cycle time (in milliseconds).
Update_Minimum_Cycle_Time	Update the display of the minimum cycle time (in milliseconds).
Update_Power_LED_Variable	Update the ON/OFF status indicator of the Power LED variable.

WinAC MP Functions Available as Object Properties in ProTool CS, continued	
Name	Description
Update_Priority	Updates the display of the priority, in other words, whether WinAC MP is tuned high or low. (In the example ProTool project, because this function is assigned to a toggle button, if the current priority is Tune High, the button on the function bar displays the choice Tune Low. If the current priority is Tune Low, the button on the function bar displays the choice Tune High.)
Update_RUN_LED_Variable	Update the status indicator of the RUN LED variable.
Update_STOP_LED_Variable	Update the status indicator of the STOP LED variable.

You can use ProTool CS to configure any of the WinAC MP functions in your project. Your ProTool project must then be downloaded to the multi panel for process control.

To see how these functions are used with the WinAC MP control engine, see the topic [Controlling Your Process with WinAC MP](#).

Note

Functions that display a value (Get and Update functions) must be configured to the screen, or else the screen does not show the updates. (To configure a function to the screen, you use the Generate Screen event, which is available from the Functions tab of the screen properties.) See the figure "[Configure Get and Update Functions to the Screen](#)." This is an additional step (besides configuring the tag).

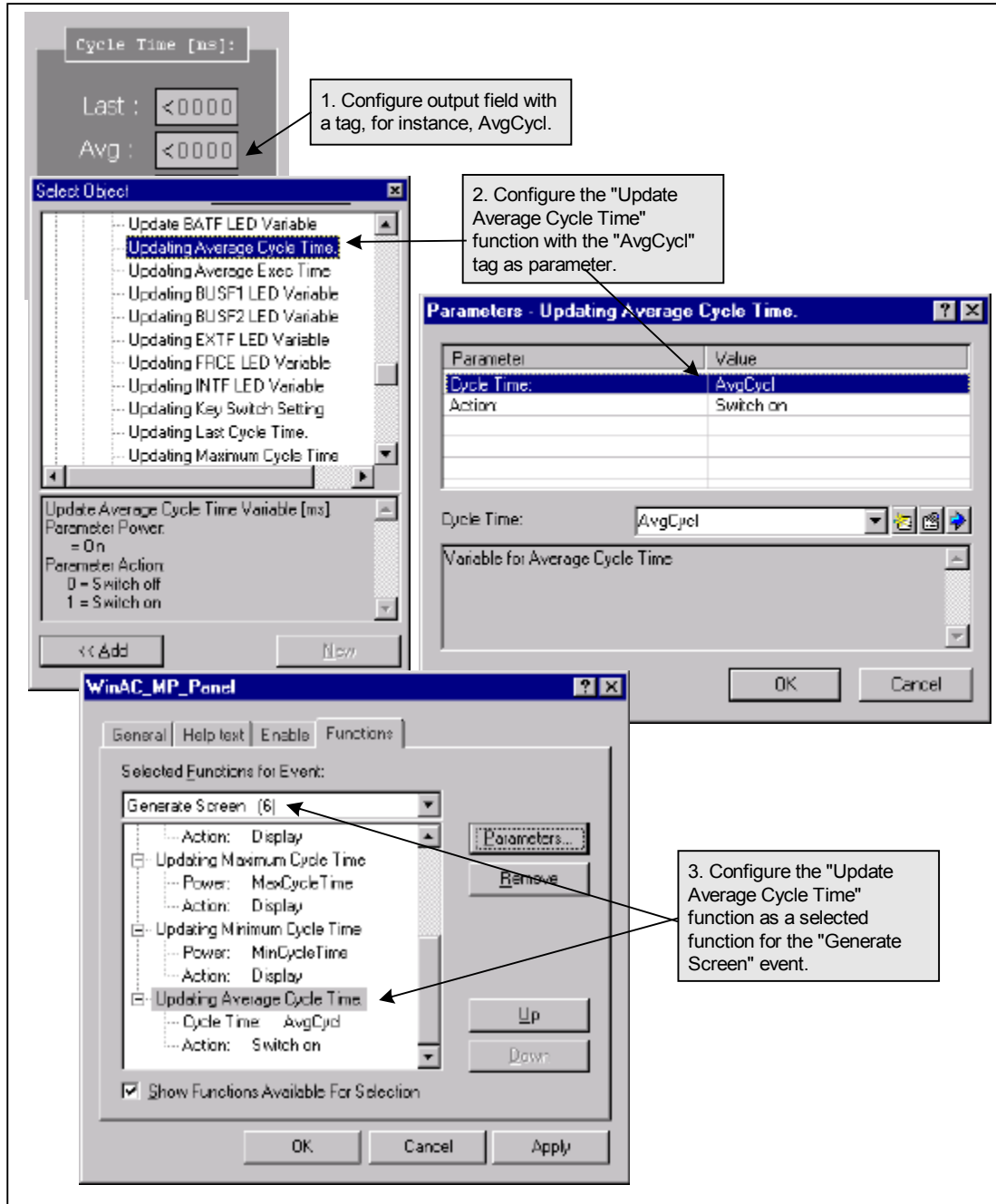


Figure: Configure Get and Update Functions to the Screen




Mapping Functions for the MP370 Application

You use ProTool CS on your configuration computer to specify how you activate any particular WinAC MP function from a ProTool application on the multi panel. During runtime, a function can be activated when a user presses a Global Key, Soft Key, or System Key, or when one of the following conditions occurs:

- A tag value changes
- A tag value is lower than the limit
- A tag value is higher than the limit
- A screen is entered
- A screen is exited
- A field is entered
- A field is exited
- An alarm message arrives
- An alarm message departs
- An alarm message is acknowledged
- An event message arrives
- An event message departs
- An event message is acknowledged
- An archive overflow occurs
- A screen overflow occurs
- A window overflow occurs
- A password overflow occurs

The installation of WinAC MP created a ProTool CS project that initially contains the WinAC MP Control Panel screen and an example screen. You can edit these screens from ProTool CS, or add additional screens to this WinAC MP project.

For mapping keys, screen changes, field changes, or any of the activation mechanisms described above, refer to your ProTool CS documentation. For an overview of the WinAC MP functions that you can map to activation mechanisms, see the topic [WinAC MP Functions](#). If you are mapping a function to an object in ProTool CS, you will be able to choose a WinAC MP function from a function list in the Select Object dialog box.

During configuration, you can press  or select **File > Save** at any time to save your file and you can press  or select **File > Compile** at any time to compile your work to date. When you have completed your screen changes, press  or select **File > Download** to download the ProTool CS project to the multi panel. A download also performs a save and compile of your configuration project.

 **Warning**

Downloading a ProTool CS configuration to the multi panel while the WinAC MP control engine is in RUN mode interrupts the execution of the process.

If process equipment is not in a safe state, interrupting the execution of the process could result in death or serious injury to personnel, and/or damage to equipment.

Shut down WinAC MP or set it to STOP mode prior to downloading any ProTool CS configuration. Ensure that your equipment is in a safe state. Always install a physical emergency stop circuit for your machine or process.

After the file is downloaded to the multi panel, you can begin using it for process control.

Note

When you download, make sure that Transfer has been selected from the Loader dialog box on the MP370 or automatic transfer ("Remote Control") on the MP370 is enabled so that the MP370 opens a connection for your configuration computer. You should see the message "Connecting to host" on the MP370.

For an example of how to do function mapping, see the example topics that demonstrate how to configure a [global key](#) or [global button](#) on the multi panel to shut down the WinAC MP control engine.

Example: Configuring a Global Key to Control WinAC MP (Keyboard Unit)


This example shows how to configure a function globally for a key on the MP370 keyboard unit. If you have a touch panel unit, see the topic [Example: Configuring a Global Button to Control WinAC MP \(Touch Panel Unit\)](#).

The Start WinAC MP and Shutdown WinAC MP functions are configured locally for each screen of the example project, but you might want to configure a global key that would work for every screen of the project. The Control_WinAC_MP function can be used to start the WinAC MP control engine or shut down the WinAC MP control engine. In this example, you learn how to configure a global key in ProTool CS that uses the Control_WinAC_MP function to shut down the WinAC MP control engine.

Start ProTool CS from the configuration computer by one of the following methods:

- Select **Start > Simatic > ProTool CS V6.0 > ProTool CS**.



- Click on  (the desktop icon for ProTool CS)

Follow these steps to open the WinAC MP ProTool CS project, and to configure a global function key on the multi panel to shut down WinAC MP:

1. Select **File > Open**. This displays the Open dialog box.
2. Select and double-click on your project in the name list. ProTool CS opens the project.
3. Select and double-click on any screen in the project from the list of screens. The Screen window opens to display the screen and all of the configurable keys that are available on the multi panel keyboard unit.
4. From the main ProTool CS menu, select **System > Screen/Keys**.
5. From the Screen/Keys dialog box, click on the function key that you want to map to the Shutdown WinAC MP function. The Function Key dialog box opens and the Select Object dialog box opens above it. (If the Select Object dialog box does not open automatically, check the Show Functions Available for Selection check box in order to cause the dialog box to display.) Drag the Select Object dialog box aside so it does not cover up the Function Key dialog box.
6. From the Function Key dialog box, click on the Selected Functions for Event drop-down list box and select Press Key (). (The number enclosed in the parenthesis marks indicates how many functions have been configured for this event on this key.)
7. From the Select Object dialog box, navigate to the WinAC MP function group, and click on Control_WinAC_MP.
8. Click on the <<Add button. The Parameters-Control_WinAC_MP dialog box opens.
9. From the Parameters-Control_WinAC_MP dialog box, click on the Action drop-down list box and select Shutdown WinAC MP.
10. Click on the OK button to dismiss the Parameters-Control_WinAC_MP dialog box.
11. Close the Select Object dialog box.

12. Click on the OK button to dismiss the Function Key dialog box.

The lower corner of the key that you have configured should now display a green triangle in the Screen/Keys dialog box, indicating that a function has been globally mapped to the key.

13. Click on the OK button to dismiss the Screen/Keys dialog box.

The screen in the Screen window should now display the green triangle, indicating that the key has been globally mapped. You can examine your other screens; all the screens in the project should also display the green triangle on this key.

You have just configured a global function key to shut down WinAC MP. You can now make any other changes that you want to the project in ProTool CS. After you finish your changes, you must save, compile and download your configuration to the multi panel as follows:

1. Shut down WinAC MP by pressing S3 on the multi panel.






Downloading a ProTool CS configuration to the multi panel while the WinAC MP control engine is in RUN mode interrupts the execution of the process.

If process equipment is not in a safe state, interrupting the execution of the process could result in death or serious injury to personnel, and/or damage to equipment.

Shut down the WinAC MP control engine or set it to STOP mode before you download any ProTool CS configuration. Ensure that your equipment is in a safe state. Always install a physical emergency stop circuit for your machine or process.

Note

Before you download, make sure that Transfer has been selected from the Loader dialog box on the MP370 or automatic transfer ("Remote Control") on the MP370 is enabled so that the MP370 opens a connection for your configuration computer. You should see the message "Connecting to host" on the MP370.

2. Click on the  icon or select **File > Save** to save your edited project.
3. Click on the  icon or select **File > Compile** to compile the project. You will see progress indicators on the compilation.
4. Click on the  icon or select **File > Download** to download your project to the multi panel. If you have not previously saved and compiled, you will be prompted by ProTool CS to save and compile your project first before downloading.

After you have successfully downloaded the project, you can use the global key that you have configured to shut down the WinAC MP control engine from any screen in WinAC MP.

For information on ProTool CS screen configuration, see your ProTool CS documentation. For an overview of the WinAC MP functions see the topic [WinAC MP Functions](#) and for general information about mapping these functions see the topic [Mapping Functions for the MP370 Application](#).

Example: Configuring a Global Button to Control WinAC MP (Touch Panel Unit)


This example shows how to configure a function globally for a button on the MP370 touch panel unit. If you have a keyboard unit, see the topic [Example: Configuring a Global Key to Control WinAC MP \(Keyboard Unit\)](#).

The Start WinAC MP and Shutdown WinAC MP functions are configured locally in each screen of the example project, but you might want to configure a global button that would work in every screen of the project. The Control_WinAC_MP function can be used to start the WinAC MP control engine or shut down the WinAC MP control engine. In this example, you learn how to configure a global button in ProTool CS that uses the Control_WinAC_MP function to shut down the WinAC MP control engine.

Start ProTool CS from the configuration computer by one of the following methods:

- Select **Start > Simatic > ProTool Pro CS V6.0 > ProTool Pro CS**.



- Click on  (the desktop icon for ProTool CS)

Follow these steps to open the WinAC MP ProTool CS project, and to configure a global function button on the multi panel to shut down WinAC MP:

1. Select **File > Open**. This displays the Open dialog box.
2. Select and double-click on your project in the name list. ProTool CS opens the project.
3. Select and double-click on any screen in the project from the list of screens. The Screen window opens to display the screen.
4. From the ProTool CS Screen Objects toolbar, click on the Button toolbar button, then click on the screen in the fixed window. (By placing the button in the fixed window, rather than the basic area, you are defining it as a global rather than a local object.) The button appears where you clicked and the Button dialog box opens.
5. From the General tab of the Button dialog box, replace the ? in the Text box with these words: Shut down WinAC MP.
6. Click on the Functions tab. The Select Object dialog box opens above the Button dialog box. (If the Select Object dialog box does not open automatically, check the Show Functions Available for Selection check box in order to cause the dialog box to display.) Drag the Select Object dialog box aside so it does not cover up the Button dialog box.
7. From the Functions tab of the Button dialog box, click on the Selected Functions for Event drop-down list box and select OnClick (). (The number enclosed in the parenthesis marks indicates how many functions have been configured for this event on this key.)
8. From the Select Object dialog box, navigate to the WinAC MP function group, and click on Control_WinAC_MP.
9. Click on the <<Add button. The Parameters-Control_WinAC_MP dialog box opens.
10. From the Parameters-Control_WinAC_MP dialog box, click on the Action drop-down list box and select Shutdown WinAC MP.
11. Click on the OK button to dismiss the Parameters-Control_WinAC_MP dialog box.
12. Close the Select Object dialog box.

13. If you want to modify any other properties of the button, such as color, do so now. When you are finished, click on the OK button to dismiss the Button dialog box.

You can examine your other screens; all the screens in the project should also display the global button that you have just configured.

You have just configured a global function button to shut down WinAC MP. You can now make any other changes that you want to the project in ProTool CS. After you finish your changes, you must save, compile and download your configuration to the multi panel as follows:

1. If you have already downloaded a project to the multi panel and the WinAC MP control engine is running, shut it down. (Both screens of the example project for WinAC MP have a Shutdown WinAC MP function that you can press in order to shut down the control engine.)

 **Warning**




Downloading a ProTool CS configuration to the multi panel while the WinAC MP control engine is in RUN mode interrupts the execution of the process.

If process equipment is not in a safe state, interrupting the execution of the process could result in death or serious injury to personnel, and/or damage to equipment.

Shut down the WinAC MP control engine or set it to STOP mode before you download any ProTool CS configuration. Ensure that your equipment is in a safe state. Always install a physical emergency stop circuit for your machine or process.

Note

Before you download, make sure that Transfer has been selected from the Loader dialog box on the MP370 or automatic transfer ("Remote Control") on the MP370 is enabled so that the MP370 opens a connection for your configuration computer. You should see the message "Connecting to host" on the MP370.

2. Click on the  icon or select **File > Save** to save your edited project.
3. Click on the  icon or select **File > Compile** to compile the project. You will see progress indicators on the compilation.
4. Click on the  icon or select **File > Download** to download your project to the multi panel. If you have not previously saved and compiled, you will be prompted by ProTool CS to save and compile your project first before downloading.

After you have successfully downloaded the project, you can use the global button that you have configured to shut down the WinAC MP control engine from any screen in WinAC MP.

For information on ProTool CS screen configuration, see your ProTool CS documentation. For an overview of the WinAC MP functions see the topic [WinAC MP Functions](#) and for general information about mapping these functions see the topic [Mapping Functions for the MP370 Application](#).

Reference

Removing WinAC MP

To remove WinAC MP from your system, you must perform all of the following tasks:

- Use ProSave to uninstall the authorization license from the multi panel. (You transfer it back to the authorization diskette. You must use the original diskette; you cannot transfer it to any other.)
- Use ProSave to uninstall the WinAC MP runtime files from the multi panel.
- Use the Windows Add/Remove Programs utility to remove WinAC MP from the configuration computer.

The ProTool project with WinAC MP components on the multi panel can simply be overwritten when you download a new project to the multi panel. After you uninstall the WinAC MP runtime files, there is no control engine on the multi panel, so the ProTool project cannot function.

Notes

Exit STEP 7 and ProTool on the configuration computer before uninstalling WinAC MP. If you have STEP 7 or ProTool open, the uninstall process cannot remove WinAC MP-related files from these applications.

Make sure that Transfer has been selected from the Loader dialog box on the MP370 or automatic transfer ("Remote Control") on the MP370 is enabled so that the MP370 opens a connection for your configuration computer. You should see the message "Connecting to host" on the MP370.

Removing Authorization for WinAC MP from the Multi Panel

To remove the authorization from the multi panel and restore it to the authorization diskette, follow these steps:

1. Insert the authorization diskette in the appropriate diskette drive of your configuration computer.
2. To open ProSave, click **SIMATIC > ProSave V6.0 > ProSave** from the Windows Start menu.
3. Click on the General tab in ProSave and select the correct multi panel (MP370 or MP370Touch) from the Device Type list box.
4. In the Connection list box, select the type of connection that you are using between the configuration computer and the multi panel.
5. Complete the Connection Parameters for your connection:
 - For an Ethernet connection, supply the IP address or computer name for the MP370.
 - For a serial connection, select the correct COM port and baud rate.
 - For an MPI connection, supply the OP address of the multi panel.
6. Click on the Authorize tab.

7. Click on the Device Status button to read the authorization from the multi panel. The authorization is listed in the Installed Options (right pane).

Note

If you have a communications problem and the multi panel is in Transfer mode, check your physical cable connections, and check to make sure that your settings in ProSave and on the multi panel are correct for your connection. See the topic [Setting Parameters for Communications](#).

8. Select the correct drive letter for the drive where you have inserted the authorization diskette. The contents of the authorization diskette are displayed in the Selection area (left pane). The License counter displays a value of 000 for the WinAC MP authorization, indicating that the license is not currently present on the diskette.
9. To transfer the authorization from the multi panel to the diskette, select the product authorization in the Installed Options (right pane) and use the << button to transfer it to the Selection area (left pane). When the transfer operation is complete, the License counter displays a value of 001, indicating that the license is present on the diskette.

Do not close ProSave. You still need to uninstall WinAC MP runtime files.

Removing WinAC MP from the Multi Panel

To remove the WinAC MP runtime files from the multi panel, follow these steps.

1. Shut down the WinAC MP control engine on the multi panel.
2. Exit ProTool.
3. Select Transfer mode from the Loader dialog box on the multi panel.
4. In ProSave, click on the Options tab.
5. From the Options tab, click on the Device Status button to read the WinAC MP runtime files from the multi panel. The runtime files appear in the Installed Options (right pane).
6. Click on WinAC MP in the Installed Options (right pane), then click on the "<<" button to remove the WinAC MP runtime files from the installed options of the multi panel. This causes the WinAC MP runtime files to be deleted from the multi panel.

Note

If the WinAC MP control engine is running on the multi panel (whether or not the ProTool project is closed), the WinAC MP files cannot be removed. If ProSave takes a suspiciously long time to remove WinAC MP from the multi panel, check the multi panel to see if there is an error message saying the files cannot be removed while a WinAC MP executable file is operating. This error message means you have not shut down the control engine. Shut it down, exit ProTool, switch to Transfer mode, and then go back to the configuration computer to redo the file removal from within ProSave.

7. Respond to the prompt on the multi panel about rebooting (click Yes to reboot now, No to reboot later).

After the runtime files are removed from the multi panel, you can exit ProSave. Your ProTool project with WinAC MP HMI components is still present on the multi panel, but it can no longer execute, because the control engine has been removed. The project will be overwritten the next time that you download a ProTool project from the configuration computer to the multi panel.

Removing WinAC MP from the Configuration Computer

You use the Windows Add/Remove Programs procedure to remove (uninstall) the WinAC MP software components from ProTool CS on your configuration computer. Follow these steps to remove WinAC MP from your configuration computer:

1. If ProSave, ProTool, and/or STEP 7 are running, exit them.
2. Select the **Start > Settings > Control Panel** menu command to display the Windows control panel.
3. Double-click on the Add/Remove Programs icon to display the Add/Remove Programs Properties dialog box.
4. Select the entry for SIMATIC WinAC MP V3.0 and click on the Add/Remove button.
5. Follow the instructions of the dialog boxes to remove the WinAC MP software. (If the Remove Enable File dialog box appears, click on the No button if you are unsure how to respond.)

Features of the WinAC MP Control Engine

The WinAC MP control engine has the following features:

- Accumulators: 4 (ACCU 1 to ACCU 4)
- Communications: PROFIBUS-DP master device
- Work memory
- Load memory (RAM)
- Distributed I/O only, no local I/O:

You can configure the size of the process-image I/O areas (I and Q memory areas) to be either 512 bytes or 1024 bytes. These memory areas can be accessed directly by the instructions in the user program.

Using Load (L) and Transfer (T) instructions (for statement list) or the Assign Value (MOVE) instruction (for ladder logic) to the peripheral I/O (PI and PQ memory areas), you can access up to 16384 bytes of inputs and 16384 bytes of outputs.

The WinAC MP control engine communicates with the distributed I/O as a PROFIBUS-DP master device. As a master device, the WinAC MP control engine can communicate with up to 32 slave devices (either S7-DP slaves or other DP slaves).

Technical Specifications

The table below describes performance characteristics and technical specifications of the WinAC MP control engine.

Performance Characteristics and Technical Specifications of WinAC MP Control Engine	
WinAC MP Control Engine	Description
Work memory	3 M bytes
Load memory (RAM)	1 M bytes
Accumulators	4 (ACCU 1 to ACCU 4)
Local data	16 K bytes per priority class
Clock	Real-time system clock, based on the hardware clock of the multi panel
Digital and Analog I/O	Address range is 16384 for inputs and outputs (but total amount supported is 1024 bytes for inputs and 1024 bytes for outputs)
Process image I/O (user configurable) <ul style="list-style-type: none"> • Inputs • Outputs 	512 bytes (inputs) and 512 bytes (outputs) or 1024 bytes (inputs) and 1024 bytes (outputs) <ul style="list-style-type: none"> • I 0.0 to I 511.7 or I 0.0 to I 1023.7 • Q0.0 to Q511.7 or Q0.0 to Q1023.7
Memory bits <ul style="list-style-type: none"> • Retentive range (configurable) • Preset as retentive 	2 Kbytes <ul style="list-style-type: none"> • MB0 to MB255 • 16 bytes (MB0 to MB15)
Counters <ul style="list-style-type: none"> • Retentive range (configurable) • Preset as retentive 	512 <ul style="list-style-type: none"> • C0 to C63 • 8 (C0 to C7)
Timers (only updated in OB1) <ul style="list-style-type: none"> • Retentive range (configurable) • Preset as retentive 	512 <ul style="list-style-type: none"> • T0 to T127 • None
Clock memory Bits of the clock memory byte toggle at specific times and are accessible from the user program.	8 bits of clock memory (1 byte) 8 frequencies within 1 byte of M memory: address is configurable

Performance Characteristics and Technical Specifications of WinAC MP Control Engine, continued	
WinAC MP Control Engine	Description
Number of blocks supported: <ul style="list-style-type: none"> • OB • SFB • SFC • Maximum number of asynchronous SFCs Address ranges for logic blocks: <ul style="list-style-type: none"> • FB • FC • DB • Total number of blocks that can be downloaded to WinAC MP 	<ul style="list-style-type: none"> • 15 • 7 • 52 • 20 <ul style="list-style-type: none"> • FB0 to FB65535 • FC0 to FC65535 • DB1 to DB65535 (DB0 is reserved) • 2500
Nesting depth	24 per OB, with 2 asynchronous OBs (OB121 and OB122) per priority class
PROFIBUS-DP interface: <ul style="list-style-type: none"> • DP address range • Number of DP slaves supported • Baud rate • Baud rate search (as a DP slave) • Transfer memory (as a DP slave) • Maximum segment distance 	<ul style="list-style-type: none"> • Address range is 16384 for inputs and outputs (but total amount supported is 1024 bytes for inputs and 1024 bytes for outputs) • 32 • Up to 12 MBPS (*) • Not applicable • Not applicable • Dependent on the baud rate (see table below)
(*) 9.6 KBPS, 19.2 KBPS, 45.45 (31.25) KBPS, 93.75 KBPS, 187.5 KBPS, 500 KBPS, 1.5 MBPS, 3 MBPS, 6 MBPS, 12 MBPS	

As shown in the table below, each segment of the PROFIBUS-DP network is limited to a maximum distance (or cable length), which is determined by the baud rate of the communication.

Maximum Segment Distance Dependent on Baud Rate	
Baud Rate	Maximum Cable Length
9.6, 19.2, 93.75 KBPS	1200 m (3936 ft.) with an isolated interface
187.5 KBPS	1000 m (3280 ft.) with an isolated interface
500 KBPS	400 m (1312 ft.)
1.5 MBPS	200 m (656 ft.)
3, 6, 12 MBPS	100 m (326 ft.)

Organization Blocks (OBs) Supported

OBs are the interface between the operating system of WinAC MP and the user program. The table below lists the OBs which are supported. The WinAC MP control engine executes OBs according to the priority class.

Organization Blocks (OBs) Supported		
OB	Description	Priority Class
OB1	Main program cycle	1 (lowest)
OB10	Time-of-day interrupt	2
OB20	Time-delay interrupt	3 to 6
OB35, OB36	Cyclic interrupt	7 to 15
OB40	Hardware interrupt	16 to 23
OB80	Time error	26
OB82	Diagnostic interrupt	24 to 26 (or 28) (*)
OB83	Module remove/insert interrupt	24 to 26 (or 28) (*)
OB85	Priority class error	24 to 26 (or 28) (*)
OB86	Rack failure	24 to 26 (or 28) (*)
OB100	Warm restart	27
OB102	Cold restart	27
OB121	Programming error	Priority class of the OB where the error occurred
OB122	I/O access error	Priority class of the OB that was interrupted
(*) Priority class 28 during STARTUP mode of The WinAC MP control engine, user-configurable priority class (from 24 to 26) in RUN mode.		

OBs for the Main Program Cycle, Cold Restart, and Warm Restart

The table below shows OBs for the main program cycle and cold and warm restarts. The WinAC MP control engine uses OB1 (main program cycle) for continuously executing the user program. On the transition from STOP mode to RUN mode (or RUN-P mode), the WinAC MP control engine executes OB100 (warm restart) or OB102 (cold restart), based either on the hardware configuration for the WinAC MP control engine or which restart option was selected from a dialog box displayed by the CPU panel. After OB100 (or OB102) has been successfully executed, the WinAC MP control engine executes OB1.

OBs for the Main Program Cycle, Cold Restart, and Warm Restart			
Organization Block (OB)		Start Event	Priority
Main program cycle	OB1	1101H, 1103H, 1104H	1
Warm restart	OB100	1381H, 1382H	27
Cold restart	OB102	1385H, 1386H	27

Interrupt OBs

The WinAC MP control engine provides a variety of OBs that interrupt the execution of OB1. The table below lists the different interrupt OBs which are supported by the WinAC MP control engine. These interrupts occur according to the type and configuration of the OB.

The priority class determines whether the WinAC MP control engine suspends the execution of the user program (or other OB) and executes the interrupting OB. You can change the priority class for the interrupt OBs (see the table entitled Organization Blocks (OBs) Supported, above).

Interrupt OBs			
Interrupts		Start Event	Default Priority
Time-of-Day Interrupt	OB10	1111H (OB10)	2 (Low)
Time-Delay Interrupt Range: 1 ms to 60000 ms	OB20	1121H (OB20)	3
Cyclic Interrupt Range: 1 ms to 60000 ms Recommended: > 10 ms	OB35 OB36	1136H 1137H	12 13
Hardware interrupt	OB40	1141H (channel 1)	16 (High)

If the WinAC MP control engine has been configured to execute a particular interrupt OB, but that OB has not been downloaded, the WinAC MP control engine reacts in the following manner:

- If OB10, OB20, or OB40 is missing and OB85 has not been downloaded, the WinAC MP control engine changes operating mode (from RUN to STOP).
- The WinAC MP control engine remains in RUN mode if OB35 or OB36 is missing or cannot be executed at the specified time.

Note

You can configure OB35 and OB36 to be executed as frequently as every 10 milliseconds (ms). If you schedule an OB to be executed every 10 ms, make certain that the program can be executed within the time frame and also that your WinAC MP application can process the OB within the allotted time.

Error OBs

As shown in the table below, the WinAC MP control engine supports a variety of error OBs. Some of these error OBs have the configured (user-assigned) priority class, while others (OB121 and OB122) inherit the priority class of the block where the error occurred.

The local variables for OB121 and OB122 contain the following information that can be used by the program to respond to the error:

- The type of block (byte 4) and the number (bytes 8 and 9) where the error occurred
- The address within the block (bytes 10 and 11) where the error occurred

If the start event occurs for a particular error OB that has not been downloaded, the WinAC MP control engine changes operating mode from RUN to STOP.

Error OBs			
Error or Fault	OB	Start Event	Default Priority
Time-out error	OB80	3501H, 3502H, 3505H, 3507H	26
Diagnostic Interrupt	OB82	3842H, 3942H	26
Insert/remove module interrupt	OB83	3861H, 3863H, 3864H, 3961H, 3865H	26
Priority class error: <ul style="list-style-type: none"> • Start event occurs for an OB that has not been downloaded. • During the I/O cycle, the WinAC MP control engine attempts to access a module or DP slave that is defective or not plugged in. • The WinAC MP control engine attempts to access a block (such as a DB) that has not been downloaded or has been deleted. 	OB85	35A1H, 35A3H, 39B1H, 39B2H	26
Distributed I/O failure: a node in the PROFIBUS-DP subnetwork has failed or been restored.	OB86	38C4H, 39C4H, 38C5H, 39C5H, 38C7H, 38C8H	26 (or 28)
Programming error (For example: the user program attempts to address a timer that does not exist.)	OB121	2521H, 2522H, 2523H, 2524H, 2525H, 2526H, 2527H, 2528H, 2529H, 2530H, 2531H, 2532H, 2533H, 2534H, 2535H, 253AH; 253CH, 253EH	Same priority class as the OB in which the error occurred
I/O access error (For example: the user program attempts to access a module that is defective or is not plugged in.)	OB122	2942H, 2943H	Same priority class as the OB that was interrupted

System Functions (SFCs) Supported

The WinAC MP control engine supports SFCs, which are logic blocks that perform basic tasks. The table below lists the SFCs which are supported. The user program calls the SFC and passes the required parameters; the SFC performs its task and returns the result.

The WinAC MP control engine allows a maximum of 20 asynchronous SFCs to be running. The following asynchronous SFCs are supported: SFC11, SFC13, SFC51 (index B1, B3), SFC55, SFC56, SFC57, SFC58, and SFC59.

Note

An asynchronous SFC is an SFC that has a "Busy" output parameter.

System Functions (SFCs) Supported			
SFC	Name	Description	Execution Time in microseconds
SFC0	SET_CLK	Sets the system clock	44
SFC1	READ_CLK	Reads the system clock	16
SFC2	SET_RTM	Sets the run-time meter	9
SFC3	CTRL_RTM	Starts or stops the run-time meter	9
SFC4	READ_RTM	Reads the run-time meter	8
SFC5	GADR_LGC	Queries the logical address of a channel	16
SFC6	RD_SINFO	Reads the start information of an OB	15
SFC11	DPSYNC_FR	Synchronize groups of DP slaves	10
SFC13	DPNRM_DG	Reads the diagnostic data of a DP slave DP configuration tested: one ET 200M slave with one 8-input/8-output module and one 16-output module	30
SFC14	DPRD_DAT	Reads the consistent data from a DP slave	22
SFC15	DPWR_DAT	Writes the consistent data to a DP slave	22
SFC17	ALARM_SQ	Generates an acknowledgeable block-related message	43
SFC18	ALARM_S	Generates an unacknowledgeable block-related message	52
SFC19	ALARM_SC	Queries the status for the last message (SFC17 or SFC18)	15
SFC20	BLKMOVB	Copies variables	21
SFC21	FILL	Initializes a memory area 1 word 50 words 100 words	22 24 26
SFC22	CREAT_DB	Creates a data block	59
SFC23	DEL_DB	Deletes a data block	21
SFC24	TEST_DB	Provides information about a data block	10
SFC26	UPDAT_PI	Updates the process-image input table DP configuration tested: one ET 200M slave with one 8-input/8-output module and one 16-output module	33

System Functions (SFCs) Supported, continued			
SFC	Name	Description	Execution Time in microseconds
SFC27	UPDAT_PO	Updates the process-image output table DP configuration tested: one ET 200M slave with one 8-input/8-output module and one 16-output module	33
SFC28	SET_TINT	Sets the time-of-day interrupt (OB10)	26
SFC29	CAN_TINT	Cancels the time-of-day interrupt (OB10)	13
SFC30	ACT_TINT	Activates the time-of-day interrupt (OB10)	9
SFC31	QRY_TINT	Queries the time-of-day interrupt (OB10)	11
SFC32	SRT_DINT	Starts the time-delay interrupt (OB20)	33
SFC33	CAN_DINT	Cancels the time-delay interrupt (OB20)	19
SFC34	QRY_DINT	Queries the time-delay interrupt (OB20)	18
SFC36	K_FLT	Mask synchronous errors	15
SFC37	DK_FLT	Unmask synchronous errors	14
SFC38	READ_ERR	Read the error register	14
SFC39	DIS_IRT	Disables the processing of all new interrupts	13
SFC40	EN_IRT	Enables the processing of new interrupts	14
SFC41	DIS_AIRT	Disables the processing of new interrupts with higher priority than the current OB	9
SFC42	EN_AIRT	Enables the processing of new interrupts with higher priority than the current OB	18
SFC43	RE_TRIGR	Retriggers the watchdog timer (monitoring the cycle time)	68
SFC44	REPL_VAL	Transfers a value to ACCU1 (accumulator 1)	45
SFC46	STP	Changes the operating mode to STOP	Not applicable
SFC47	WAIT	Delays the execution of the user program	1000
SFC49	LGC_GADR	Queries the module slot belonging to a logical address	13
SFC50	RD_LGADR	Queries all of the logical addresses of a module	28
SFC51	RDSYSST	Reads all or part of a system status list	40
SFC52	WR_UMSG	Writes a user element to the diagnostics buffer	58
SFC54	RD_PARM	Read the defined parameter	29
SFC55	WR_PARM	Write the defined parameter	43
SFC56	WR_DPARM	Write the default parameter	32
SFC57	PARM_MOD	Assign the parameters to a module	30
SFC58	WR_REC	Write a data record	44
SFC59	RD_REC	Read a data record	43
SFC64	TIME_TCK	Reads the time from the system clock	7
SFC79	SET	Set a range of outputs	11
SFC80	RESET	Reset a range of outputs	11

System Function Blocks (SFBs) Supported

The WinAC MP control engine provides SFBs, which are logic blocks similar to SFCs. The table below lists the SFBs which are supported. When the user program calls an SFB, a data block (DB) must also be assigned.

System Function Blocks (SFBs) Supported			
SFB	Name	Description	Execution Time in microseconds
SFB0	CTU	Provides a "count up" timer	15
SFB1	CTD	Provides a "count down" timer	15
SFB2	CTUD	Provides a "count up/down" timer	19
SFB3	TP	Generates a pulse	16
SFB4	TON	Generates an on-delay timer	16
SFB5	TOF	Generates an off-delay timer	16
SFB32	DRUM	Implements a sequencer	48

Other S7 Blocks Supported

Like other S7 PLCs, the WinAC MP control engine provides several types of logic blocks for processing the user program: organization blocks (OBs), system functions (SFCs), and system function blocks (SFBs). These blocks are an integral part of the WinAC MP control engine. In addition to these system blocks, you can use the other S7 blocks to create the user program:

- Function (FC): the address range for FCs supported by the WinAC MP control engine is FC0 to FC65535. Each FC can contain up to 65,570 bytes.
- Function block (FB): the address range for FBs supported by the WinAC MP control engine is FB0 to FB65535. Each FB can contain up to 65,570 bytes.
- Data block (DB): the address range for DBs supported by the WinAC MP control engine is DB1 to DB65535. (DB0 is reserved.) Each DB can contain up to 65,534 bytes.

An OB can also contain 65,570 bytes.

Note

Although the address ranges higher than 2500 are supported, the WinAC MP control engine supports a maximum of 2500 blocks. (In other words, the total number of FBs, FCs, DBs, OBs, and SDBs, together, cannot exceed 2500.)

For more information about OBs, SFCs, and SFBs, see the *System Software for S7-300 and S7-400 System and Standard Functions Reference Manual*.

Execution Times of Instructions

The execution times listed in the tables below, Execution Times of Math Operations and Execution Times of Instructions, reflect the average execution times for STEP 7 programs running on the WinAC MP control engine. Actual execution times may vary, depending on your system.

For the performance test, a variety of software applications was run concurrently under the following conditions:

- The WinAC MP control engine executed a test program with 3000 Boolean operations, reading and writing data to I/O modules over a PROFIBUS-DP network consisting of three nodes (ET200M). In addition, the WinAC MP control engine performed calculations to determine the distribution of performance data.
- The priority for the WinAC MP control engine was set to High.

Execution Times of Math Operations (in microseconds)			
Math Operation	Integer	Real	Double Word
Addition (+)	0.14	0.21	0.14
Subtraction (-)	0.14	0.21	0.14
Multiplication (*)	0.15	0.24	0.34
Division (/)	0.42	0.36	0.34

Execution Times of Instructions (in microseconds)			
Instructions		Execution Time in microseconds	
		Direct addressing	Indirect addressing
Boolean operations: Memory areas: A, AN O, ON, X, XN	I	0.37	0.54
	M	0.37	0.85
	L	0.57	0.87
	DB	0.54	0.82
	T	1.05	1.44
	C	0.33	0.76
Boolean operations (on the accumulator): =I, <>I, >I, <I, >=I, <=I		0.34	0.34
Operations on the bits of the status word: A==0, A<>0, A>0, A<0, A>=0, A<=0		0.34	0.34
Transitional contacts: • Edge Positive FP • Edge Negative FN		0.64 0.64	0.64 0.64
Set/Reset operations (bit operands)			
	Set S	0.51	0.84
	Reset R	0.47	0.84
RLO Operations			
	Negate RLO NOT	0.31	0.31
	Set RLO SET	0.28	0.28
	Clear RLO CLR	0.28	0.28
	Save RLO SAVE	0.31	0.31
Operations on Timers			
	Pulse timer SP	1.18	1.58
	Reset (timer) R	0.35	0.77
	Extended pulse timer SE	1.18	1.58
	On-delay timer SD	1.18	1.58
	Retentive on-delay timer SS	1.19	1.61
	Off-delay timer SF	1.24	1.64
Miscellaneous:			
	Open DB OPN	1.01	1.01
	Load L	0.33	0.33
	Transfer T	0.34	0.34

System Status List (SZL)

The information in the system status list (SZL) is stored as a set of sublists. Each sublist has a two-word header that provides the following information about the sublist:

- The first word defines the length (size in bytes) of a record for the sublist.
- The second word defines the number of records contained in the sublist.

SFC51 (RDSYSST) accesses the entries in the system status list. For more information about the system status list, see the *System Software for S7-300 and S7-400 System and Standard Functions Reference Manual*.

The table below provides an overview of the SZL sublists, sorted according to the SZL-ID. You use the SZL-ID and index (as hexadecimal numbers: 16#) to access the records stored in the sublist.

Sublists of the System Status List (SZL) for the WinAC MP Control Engine			
SZL-ID (hexadecimal)	Sublist	Index (hexadecimal)	Record Contents
0000 0300	SZL-ID All available SZL-IDs Lists the available indices	0131 0132 0222	Information on all available SZL-IDs Indices for SZL-ID 0131 Indices for SZL-ID 0132 Indices for SZL-ID 0222
0011 0111 0F11	CPU identification All records of the sublist One record of the sublist Header information only	0001 0007	WinLC type and version number Identification of the module Identification of the firmware
0112 0F12	CPU features Only those records of a group of features Header information only	0100 0200 0300	Time system in WinLC System response Language description of WinLC
0013	User memory areas	Work memory, integrated Load memory, plugged-in Load memory, maximum number of plug-in Load memories, and size of backup memory	
0014	Operating system areas	Process-image input area (bytes), process-image output area (bytes), bit memory (bytes), timers, counters, size of the I/O address area, and total local data area for WinLC (bytes)	
0015 0115	Block types All records of the sublist One record, depending on the index	0800	OBs (number and size) DBs (number and size) SDBs (number and size) FCs (number and size) FBs (number and size) OBs (number and size)

Sublists of the System Status List (SZL) for the WinAC MP Control Engine, continued					
0019	State of the module LEDs Status of all LEDs				
0119		Status of each LED			
			0002	INTF	Internal failure
			0003	EXTF	External failure
			0004	RUN	Run
			0005	STOP	Stop
			0006	FRCE	Force
			0007	CRST	Complete restart
		0008	BAF	Battery failure	
		000B	BUSF1	Bus fault	
0F19	Header information only				
	Interrupt/error assignment (via number of assigned OBs)				
0021		All possible interrupts			
0F21	Header information only				
	Interrupt status				
0222		Record for specified interrupt	0001	Event that started OB1	
		0050	Event that started OB80		
	Priority class				
0023		Records for all priority classes	0000	Priority of possible OBs	
0123		Records for a specific priority class			
0223		Records for all configured priority classes			
0F23	Header information only				
	Operating status of the CPU				
0124		Last executed operating status transition			
0424		Current operating status	4520	Defective status	
0524		Specified operating status	5000	STOP status	
			5010	Startup status	
		5020	RUN status		
		5030	HOLD status		
	Communications performance parameters of the communications type specified				
0131			0001	Number of connections and baud rates	
			0002	Test and startup parameters	
			0003	Operator interface parameters	
			0004	Object management system (operating system function)	
			0005	Diagnostics functions and diagnostics entries	
		0009	Number of run-time meters		
	Communications status information of the communications type specified				
0132			0001	Number and type of connections	
			0002	Number of test jobs set up	
			0004	Protection levels of the WinLC	
			0008	Time system, correction factor, run-time meter, date and time of day	
			0009	Baud rate (set by means of the MPI)	
		000A	Baud rate (set by means of the S7-300 backplane bus)		

Sublists of the System Status List (SZL) for the WinAC MP Control Engine, continued			
0033	Diagnostic Station List All entries		
0782	Start-up events Start-up events of all OBs of a priority class before processing	Priority class	Event ID, priority class, and OB number
0A91	Module status information Status information of all DP subsystems and DP masters	Start address xxyy	Features and parameters of the module All the modules of station yy in the PROFIBUS-DP network xx
0C91	Status information of a module		
0D91	Status information for the specified station		
0F91	Header information only		
0092	Status information of the nodes in a DP network Target status of nodes in a subnetwork	0000	Status information for the nodes connected to a PROFIBUS-DP network
0292	Actual status of the nodes in a subnetwork	Subnetwork ID	
0692	DP slaves indicating failure of one or more modules		
0F92	Header information only		
00A0	Diagnostics buffer All entries (event information)	Event information (dependent on the event)	
01A0	Specified number of entries		
0FA0	Header information only		
00B1	Module diagnostics Data record 0 of the module diagnostics information	Start address	Module-dependent diagnostics information Starting address for the specific module Rack and slot number of the specific module
00B3	Data record 0 of the module diagnostics information (Complete module-dependent diagnostics)	Rack and slot number	
00B4	DP-norm diagnostics of a DP slave		
0FB1	Header information for 00B1		
0FB3	Header information for 00B3		

Allowing for Scan Time "Jitter"

Based on the hardware configuration of your multi panel, and also the CPU utilization by other software applications, the scan cycle for the WinAC MP control engine can experience "jitter" (where the scan cycle varies from the configured minimum scan time).

Examples of Jitter in the Scan Cycle

To show typical jitter, the performance of the WinAC MP control engine was tested by running a variety of software concurrently under the following conditions:

- The WinAC MP control engine executed a test program with 3000 Boolean operations, reading and writing data to I/O modules over a PROFIBUS-DP network consisting of three nodes (ET200M). In addition, the WinAC MP control engine performed calculations to determine the distribution of performance data.
- The priority for the WinAC MP control engine was set to High.

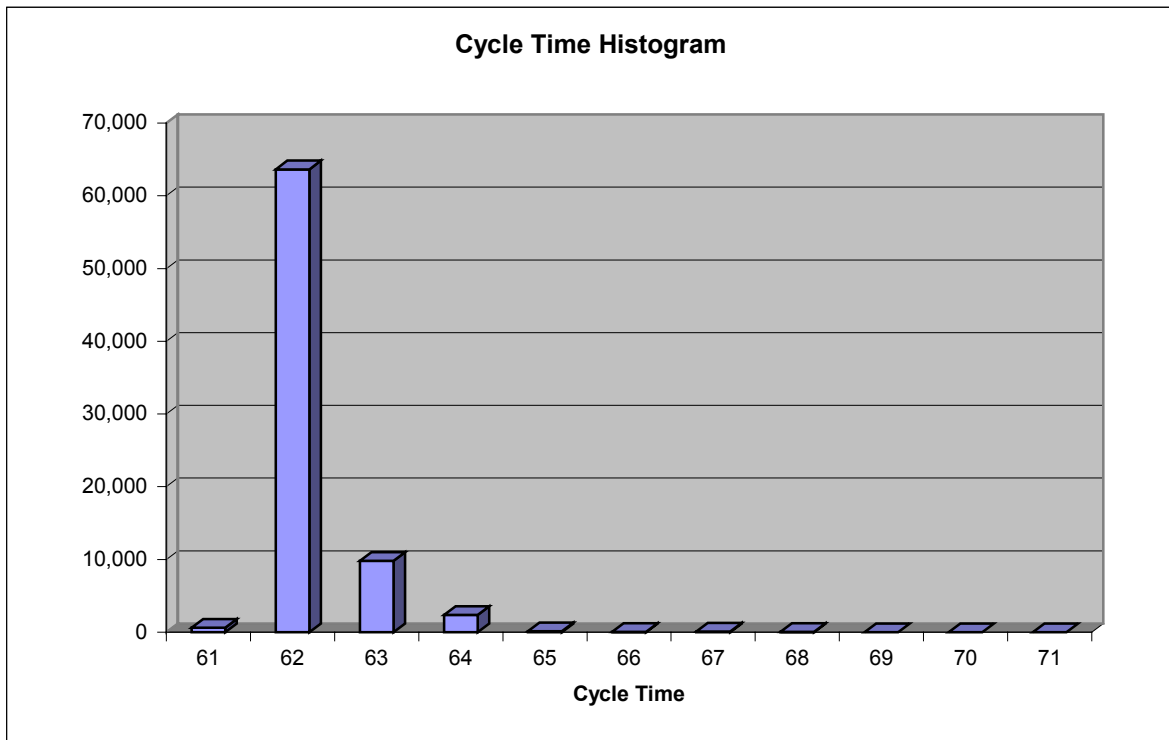


Figure: Sample Jitter

Troubleshooting

Use the table below to troubleshoot difficulties that you encounter.

Troubleshooting		
Problem	Cause	Remedy
I installed WinAC MP runtime files, but nothing displays on the multi panel.	You need a ProTool project that supplies a user interface in order to view and operate the WinAC MP control engine.	Install the example ProTool project with WinAC MP screens , or a customized project , on the multi panel.
The WinAC MP software did not transfer to the multi panel.	Wrong cable used, wrong ports connected, or wrong parameters specified.	Review the topic Setting Parameters for Communications and correct any errors.
Ethernet communication has stopped working.	Parameter mismatch.	Check the IP address of the multi panel by typing <code>ipconfig</code> at the MS-DOS control prompt of the multi panel. Make sure it matches the IP address used in your connection parameters on the configuration computer. Review the topic Setting Parameters for Communications .
I installed the WinAC MP runtime files and a ProTool project, but the control engine doesn't really do anything.	The control engine contains no program logic until you download a user program from STEP 7.	Review the topic Developing and Downloading the User Program .
The WinAC MP control engine is not communicating with PROFIBUS-DP device network.	Wrong network configuration.	Review the topic Configuring the SIMATIC PC Station on the PROFIBUS-DP Network and correct any errors.
ProTool performance on the multi panel is too low.	Ineffective tuning.	Either set the priority to Tune Low to make WinAC MP equal priority with ProTool on the multi panel, or increase the minimum sleep time. See the topic Controlling Your Process with WinAC MP .
WinAC MP performance is too low.	Ineffective tuning.	Either set the priority to Tune High to make WinAC MP higher priority than ProTool on the multi panel, or decrease the minimum sleep time. See the topic Controlling Your Process with WinAC MP .

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Please check any industry that applies to you:

- Automotive
 - Chemical
 - Electrical Machinery
 - Food
 - Instrument and Control
 - Non electrical Machinery
 - Petrochemical
 - Pharmaceutical
 - Plastic
 - Pulp and Paper
 - Textiles
 - Transportation
 - Other _____
-

Mail your response to:

SIEMENS ENERGY & AUTOMATION, INC
ATTN: TECHNICAL COMMUNICATIONS M/S 519
3000 BILL GARLAND ROAD
PO BOX 1255
JOHNSON CITY TN USA 37605-1255

Include this information:

From

Name: _____

Job Title: _____

Company Name _____

Street: _____

City and State: _____

Country: _____

Telephone: _____