

SIEMENS

Getting started

Basic Installation and Start-up Guide for
MASTERDRIVES MC and GMC Software Packages

Distributed Technological Functions

Documentation

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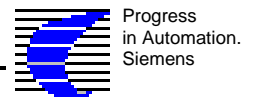
We have examined the contents of the publication for compliance with the hardware and software described therein. However, deviations cannot be totally excluded, and we do not guarantee complete conformity. The information in this publication, however, is regularly examined, and any necessary corrections appear in subsequent editions. Suggestions for improvement are appreciated.

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Order No.: **Fehler! Verweisquelle konnte nicht gefunden werden.**
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<p>We are aware of the need to constantly improve our documentation and are grateful for any feedback, ideas or suggestions for improvement.</p>

1 Introduction

1.1 Objectives

This guide is intended to give you a quick introduction to the world of SIEMENS-General-Motion. With its help, you should be able to progress in only a few steps to a MASTERDRIVES MC drive system. For these few steps, you will be using powerful, user-friendly software packages. These include SIMOVIS, GMC, STEP 7 and PROTOOL.

SIMOVIS is used to initialize SIMOVERT drives.

GMC (General Motion Control) represents the "Technology with positioning and synchronism" system solution as distributed solution (MASTERDRIVES MC target system with technology software). The GMC software packages provide a user-friendly link to SIMATIC S7 and SIMATIC HMI. The interface to your user program is handled mainly by well-proven communication concepts, the intention being to reduce interfacing overhead as much as possible.

STEP 7 is the configuring and programming tool for SIMATIC S7 programmable controllers.

PROTOOL is used to configure SIMATIC operator panels.

This guide leads you step by step from hardware configuration to an executable drive system which can be controlled via an operator panel. Should you decide not to go through all the steps, you can stop wherever you wish. In such cases, you need, of course, install only the required software packages. In order to keep the guide as brief and clear as possible, only one possible configuration was described. For other configurations, please refer to the more detailed manuals.



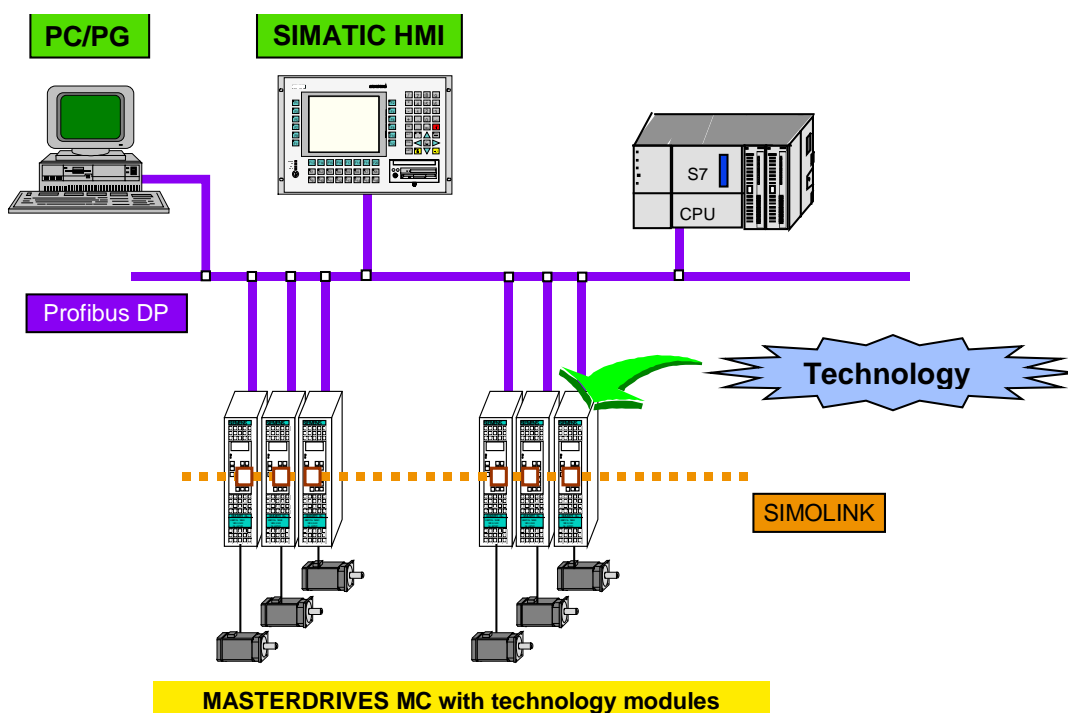
Various control functions for the drives in the software packages can cause movement of the axes!

Please observe the relevant safety regulations !!

1.2 Validity

GMC_Basic requires an S7 CPU as PROFIBUS master (S7 CPU 315-2DP in the example).
PROFIBUS CPs are not supported!

1.3 Hardware Overview



2 Prerequisites

2.1 PG/PC

CPU 80486 \geq 100 MHz and RAM \geq 16 MB (Windows 95) or \geq 32 MB (Windows NT)
MPI-ISA Card or CP5511 or CP5611

2.2 Software

Product	Version	Memory requirements	Order No.
SIMOVIS for MASTERDRIVES	\geq 5.3	40 MB	6SX7010-0FA01
STEP 7	\geq 4.02	105 MB	On PG
GMC_BASIC includes:	1.01		6AT1880-0AA00-1AA0 (G) ①
BASIC	1.01	4.5 MB	6AT1880-0AA00-1BA0 (E)
DPV1	2.1	0.5 MB	
Object Manager-MASTERDRIVES	1.0	4 MB	
GMC_CONTROL	\geq 1.1	1 MB	①
GMC_OP_OAM	\geq 1.00	7.3 MB	6AT1880-0AA10-1YA0
PROTOOL	\geq 4.00	\geq 60 MB	6AV9620-1AA07-1AA0

① Also included on the SIMOVIS CD beginning version 5.3!

Attention: To function properly, STEP 7 requires at least 128 MB for the Swap file plus free space on the hard disk equaling twice the project size following installation of the required software. Additional hard disk space is required for simultaneously executing Windows applications.

2.3 Sample Hardware

2.3.1 MASTERDRIVES MC

Product	Order No.
MASTERDRIVES MC Compact Plus AC-AC/1.5A frequency converter, with integrated technology modules , SBM encoder/multiturn sensor module, SLB SIMOLINK board and CBP PROFIBUS communications module	6SE7011-5EP50-Z Order No. extension: -F01 -C53 -G42 -G11
MASTERDRIVES MC Compact Plus DC-AC/1.5A inverter, With integrated technology modules , SBR2 resolver module, SLB SIMOLINK board and CBP PROFIBUS communications module	6SE7012-0TP50-Z Order No. extension: -F01 -C33 -G42 -G11
1FT6 motor incl. encoder	1FT6031-4AK71-4AA0
1FK6 motor incl. resolver	1FK6032-6AK71-1TG0

Components such as radio interference filter, interface module, and braking resistors are not listed.

2.3.2 Programmable Controller

Product	Order No.
S7-300 mounting rail	6ES7390-1□□□0-0AA0
PS307-5A power supply	6ES7307-1EA00-0AA0
S7-300, CPU 315-2DP	6ES7315-2AF01-0AB0

2.3.3 Operator Panel

Product	Order No.
OP 27 operator panel	6AV3627-1LK00-1AX0

2.3.4 Accessories

Motor – converter cable

Encoder – SBM cable

Resolver – SBR2 cable

PROFIBUS cable with PROFIBUS connectors

Cable for COM2 interface on PG to USS interface 1

Cable for COM1 interface on PG to config/printer int. IF2 on OP27

MPI cable

(Order No. dependent on length)

(Order No. dependent on length)

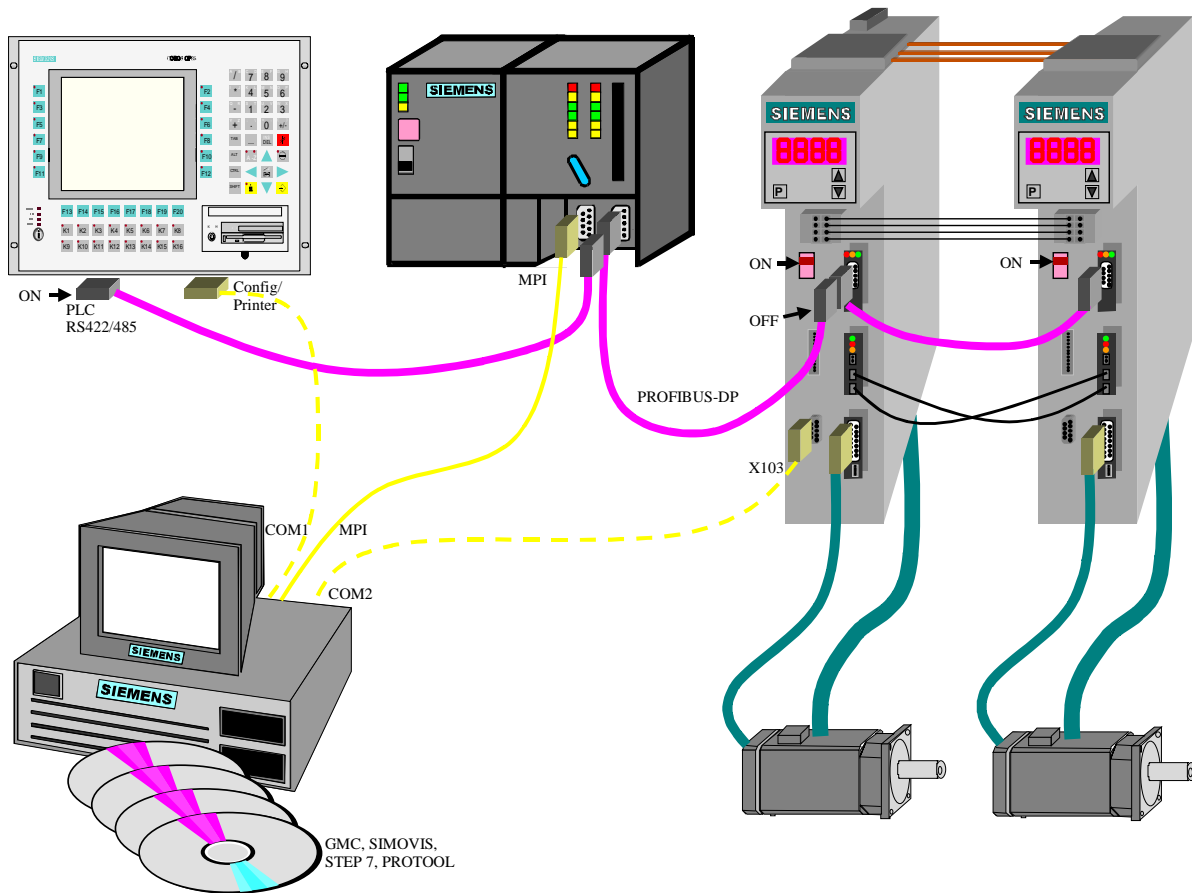
(Order No. dependent on length)

Order No. 6SX7005-0AB00

Order No. 6ES5734-2BF00

(included with PG)

2.3.5 Sample Hardware Configuration



3 Reaching the Goal Step by Step

Although you will be guided step by step, you need not necessarily continue through to the end. For example, if you do not want to use an OP, start-up ends with the installation of GMC control. In the following, MASTERDRIVES MC will be referred to simply as MC.

To make things easier, it is recommended that the steps be executed in the suggested order, even when a different order would seem more expedient. Each completed step can be checked, and is the basis for subsequent steps.

Please observe the entries in the relevant screen forms carefully!

3.1 Step 1 Installing the Software

The required software is installed in this step. It goes without saying that it is not necessary to install the software packages for functionalities that you do not need.

Every software installation begins by calling "SETUP.EXE" (with the exception of SIMOVIS). This file is located on the CD in the directory for "Disk1" or in the directory of the CD drive. It is recommended that all applications (Word, Excel, and so on) be terminated prior to starting an installation run.

At the end of each installation, the installation script gives the user the option of rebooting the system. When several packages are installed at the same time, the system needs to be rebooted only following installation of the last software package.

We recommend that the software packages be installed in the preset directories.

Important additional information for each product can be found in that product's "readme" file.

3.1.1 SIMOVIS

With its parameter initialization menus and default settings, this product greatly simplifies the assignment of parameter values for MASTERDRIVES MC devices. This software package must be installed, as it is part of our example.

Beginning with version 5.3, SIMOVIS includes an installation interface called Autoplay.exe. This operator interface allows you to install the GMC-Basic packages together with SIMOVIS.

3.1.2 STEP 7

STEP 7 contains all functions for creating, transferring and testing control programs, configuring the hardware, and so on.

In our example, STEP 7 is also required as platform for GMC.

3.1.3 GMC Software Package (included on SIMOVIS CD beginning version V5.3)

GMC is subdivided into a number of different function packages:

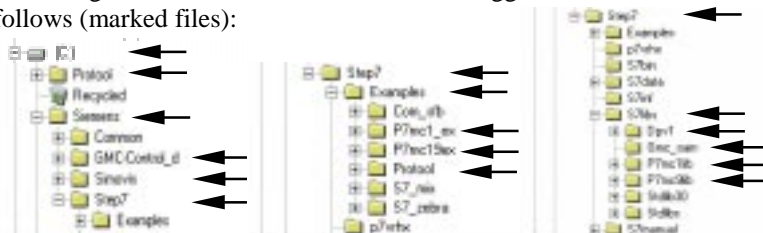
- **GMC-BASIC**, **Masterdrives DPV1** and the **Object Manager** must be installed as providers of the basic functions.
- The CD also includes **GMC-Control**, a tool which allows the user to control the drive and monitor the status signals from the interface from within Windows (GMC_Control is available as freeware).
- **GMC-OP-OAM** is required for visualization and control via an operator panel.

3.1.4 PROTOOL

PROTOOL must be installed when the user wants to use an OP for drive visualization and control. In our example, we use an OP project integrated in the S7 project, which means **integrated** installation of PROTOOL.

3.1.5 Monitoring

Following installation of the software in the suggested directories, the directory structure on your PG should be as follows (marked files):



Bravo! You've taken the first hurdle brilliantly!

It's off to the next!

3.2 Step 2 Visual Inspection of the Hardware (see Fig. in Section 2.3.5)

Before continuing, a visual inspection should be made of the hardware. Particular attention should be paid to the following::

Proper insertion of the connectors, complete and correct cabling (SIMOLINK: transmitter to receiver!), terminating resistors !

ATTENTION: The transition of the terminating resistors should be done with the electronic box off-circuit!!

Is everything OK ? Then on to the next milestone ->

3.3 Step 3 Initializing the MASTERDRIVES MC Axes using SIMOVIS

When initializing the MASTERDRIVES MC axes, we, and you as well, take as a starting point the so-called factory settings, which are the settings a device has when it leaves the factory. (-> **Background Information – MC Factory Settings**)

3.3.1 Connecting the PG to MASTERDRIVES MC

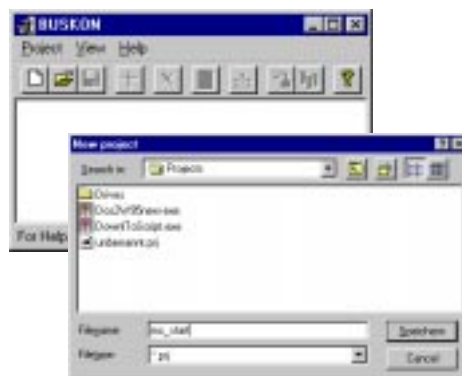
To initialize our axes, we use the connecting cable to interface X103 on the relevant MASTERDRIVES MC.

3.3.2 Calling SIMOVIS

3.3.2.1 Creating a New SIMOVIS Project

Start SIMOVIS.

First, we want to create a new project with the corresponding file name (in this case: **mc_start**).



Select **"Project"** – **"New"**

3.3.2.2 Setting the PG Interface to COM2

Connect your PG to the first MASTERDRIVES MC axis using a standard cable.

Set the interface to the device. Normally, the connection is made via a standard cable to the PG's COM2 interface. (For our example: COM2 and 9600 baud)



Select **"Process"** – **"Interface"**

Note:

Leave the setting in the field Baudrate at the default setting 9600 Baud. The setting in this dialog of SIMOVIS must match the setting in the drives. Otherwise the communication will fail.

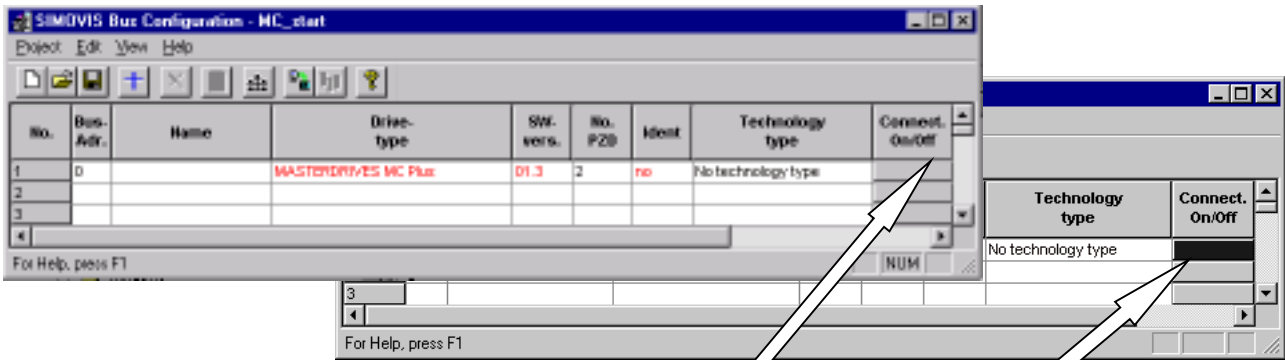
3.3.2.3 Adding a MASTERDRIVES MC Device

Now add the MASTERDRIVES MC device.



Select **"Edit"** – **"Add Drive"**

The result appears as shown below:



The connection to the device can be established for verification purposes by clicking on "Connection on/off".

This results in the color of the activation field being switched to:

- Green: OK
- Red: Fault
- Yellow: Warning
- Black: Communication interrupted.

The black status can be caused by one of the following:

Device not set to factory settings, cable connection faulty, different interface parameters (Please check your setup, interface parameters etc. again).

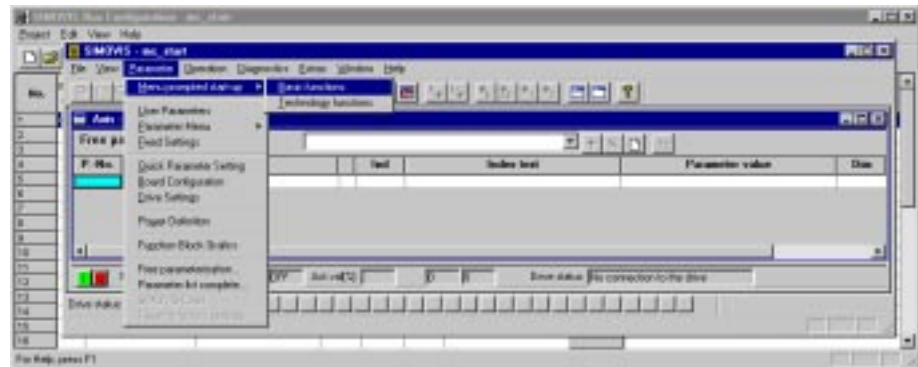
None of the other colors impede the continuation of the process.

3.3.3 Initializing Basic Functions

The device can now be initialized. For our purposes, we will do so by selecting "Edit" – "Parameterize Drive". This opens the "SIMOVIS" window.

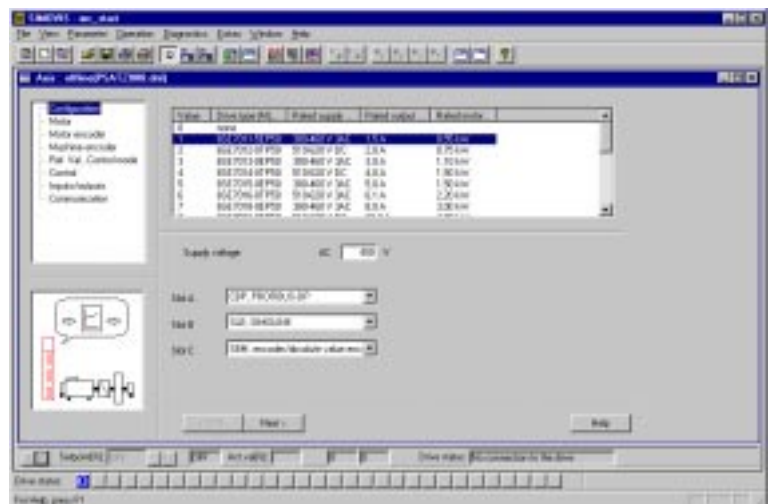
The MC is initialized via the menus "Parameters" – "Menu prompted start-up" – "Basic Functions", i.e. there is no need to initialize specific parameters.

Attention: When the controlled parameters are transferred to the MASTERDRIVES, the MC initializes to the factory settings. Previously modified parameters are returned to their factory settings!



Note: When controlled initialization is initiated, the MC goes to error "F061". However, this is irrelevant at this time!

The initial display for "Menu prompted start-up" is as follows:



Because of the on-line connection to the MC during parameter initialization, a number of parameters, such as device type and current board, already have default values.

The converter and current boards parameters are thus already initialized. No further entries are required in this menu!

The **"Next"** button brings us to the motor parameters.

If the motor in question is a Siemens motor, it can be simply selected by Order No. from the motor list once either **"Synchronous Motor"** or **"Asynchronous Motor"** has been specified. The rotational speed need not be changed in this case, as SIMOVIS does this automatically.

Clicking on the **"Next"** button screens the parameter assignment window for the motor sensor.

After making the appropriate selections, clicking on **"Next"** screens the menu window for **"Setpoints, Control Mode"**. For our example, it is important to select the line **"PROFIBUS-DP and Terminal Strip"** in **"Setpoints"**.

The remaining menu windows are initialized as required. For our example, we need now only specify the **"ProfiBus Address"** in the **"Communication"** window. (In our example, we have set bus address **11** for axis 1 and bus address **12** for axis 2).

(**Note:** The baud rate for PROFIBUS communication need not be set, as the CBP board automatically detects the data signaling rate and adapts itself accordingly).

Attention: If you click on **"Previous"** to view previous screen forms, you have to reenter the bus address in the **"Communication"** menu window because the address is automatically reset to 3.

SIMOVIS then shows the chosen basic configuration. The basic parameters are transferred to the MC by clicking on **"Accept Configuration"**. Prior to the transfer, the screen shows a follow-up screen form for selecting a Script file. This selection is not necessary for our example.

Any parameters already on the MC are overwritten (factory settings).

And that's ALL !!! The basic parameters for the MC are complete. It would be hard for it to be any easier.

3.3.4 Initializing Technology Functions

Next we are going to initialize the technology functions using the same method.

You will find the **"Technology Functions"** under menu item **"Parameters" – "Menu prompted start-up"**.

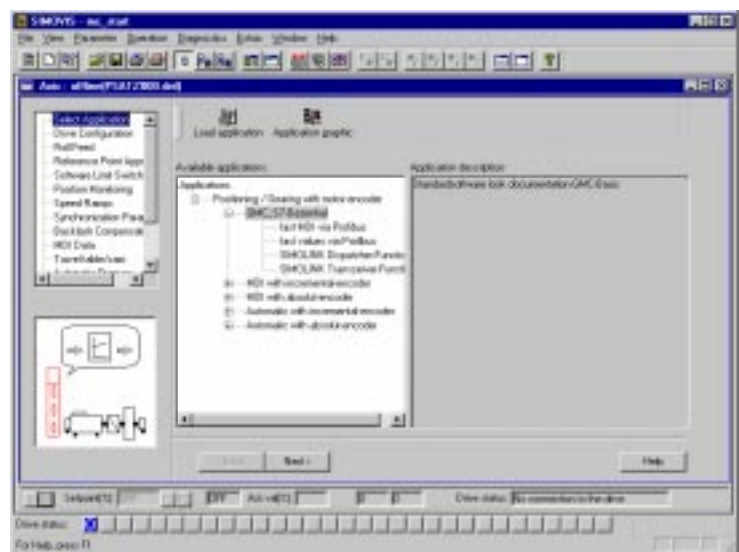
3.3.4.1 GMC_BASIC Technology for Individual Axes

First you have to select the application. Under **"Applications"** and **"Positioning / Synchronism with Motor Sensor"**, you will find **"GMC_S7-Dezentral"**.

For our example, click on **"GMC_S7-Dezentral"**. This gives you access to the Script files, which allow use of GMC-Basic. Click on **"Load Application"** to transfer these Script files to the MASTERDRIVES.

The functions under GMC_S7-Dezentral can also be transferred to the MASTERDRIVES. These are the parameter settings for: **"Fast MDI via PROFIBUS"** and **"Fast Values via PROFIBUS"**, as well as the SIMOLINK functions, which are described in the next chapter.

The other configuration settings need not be changed for our example.



3.3.4.2 GMC_BASIC Technology for Synchronous Axes with SIMOLINK

In addition to the GMC_S7-Dezentral functionality loaded in the last menu, the SIMOLINK-Parametrisation must also be loaded to provide gearing functionality for MASTERDRIVES MC.

Click on the "**SIMOLINK Dispatcher Function**" menu for the master axis. Select "**SIMOLINK Transceiver Function**" and transfer it to the MASTERDRIVES for the slave axis.

Only the relevant Script may be selected or transferred to the appropriate axis.

Note: These Scripts work with standard addresses, number of channels, etc., in order to obtain an executable example. You will find information for modified settings or additional synchronized axes in the Manual.

Now that our MASTERDRIVES has also been assigned with the parameters required for GMC-Basic, the initialization of MASTERDRIVES axis 1 for our example is complete. You can continue the parameter initialization process if you wish by resuming "Menu prompted start-up" of the technological functions, but this is not necessary for our example.

For the purpose of data backup, it is recommended that the parameters for each MC be loaded into an appropriately named file with "**Upread**" "**Base unit: all ...**". You can then close this screen form.

If necessary, connect your serial cable with the next MC's X103 and initialize the **second axis** as described above. (Begin again with cap. 3.3)

Caution: If you have uploaded the relevant SIMOLINK interconnection to the devices, the devices will display the error message "F056". Acknowledge this message on the device by clicking button "P" before you continue!

Is everything OK? Good! We have now completed initialization of MASTERDRIVES MC(s) for our example.

3.4 Step 4 Creating the S7 Project and Integrating GMC-Basic

The "Project Assistant", which is displayed automatically following the initial installation of the STEP 7 software, can help you create a new STEP 7 project. You can view the project structure by clicking on "Preview".



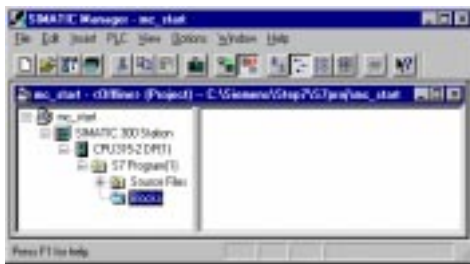
Select the appropriate CPU (CPU 315-2DP). The MPI address remains unchanged.

In the next screen form, please deactivate OB1 by deselecting the check mark. OB1 should not be selected. Then assign a name to your S7 project (in this case mc_start).



In the screen form in which you chose your project name, click on "Make" and your project will be created.

Your S7 project should look like this:



3.4.1 Generating the Hardware Configuration

In the SIMATIC S7, the modules are no longer equipped with address switches or anything similar to them. Today, these hardware settings are all specified via configuration software, then transferred to the CPU. It is for this reason that you now have to define the hardware configuration for your programmable controller.

Click on the SIMATIC 300 Station in the left-hand window. In the right-hand window you will see, among other things, an object named "Hardware". Double-click on this object to open the hardware configuration (depending on your PG, this can take a while!).

This hardware configuration window is opened:



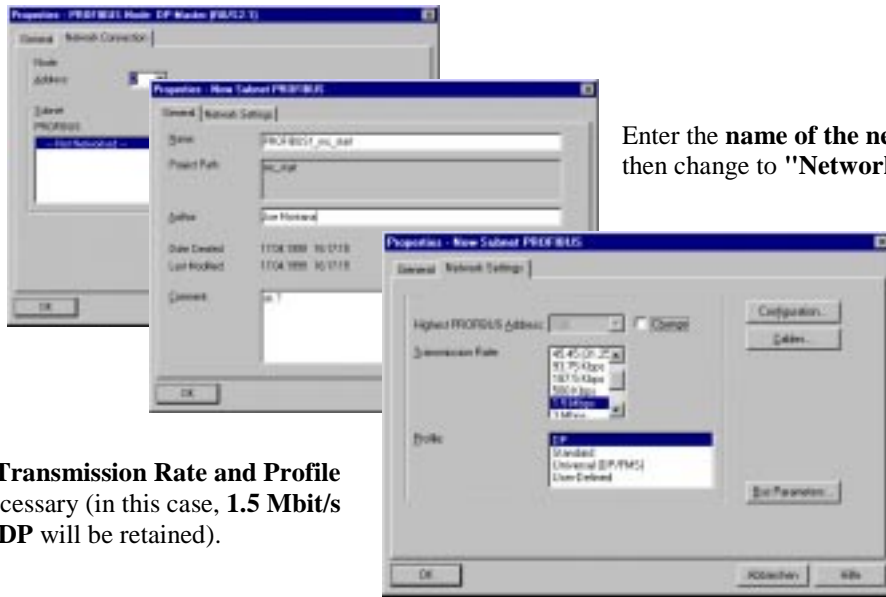
Select "Catalog" in the "View" menu. This opens the catalog of Siemens S7 hardware components.



Under "SIMATIC 300" - "PS 300", select the power supply module for the first slot (here the PS307 5A). Compare the order numbers of your hardware configuration with those in the programmable controller configuration. If there are any discrepancies, replace the relevant module(s) with the appropriate module(s) from the hardware catalog.

Next, click on 2.1 (DP Master) in the upper screen form of the hardware configuration menu, then click on "DP Master System" in the "Insert" menu.

Click on "New.."



Set **Transmission Rate and Profile** if necessary (in this case, **1.5 Mbit/s** and **DP** will be retained).

In the **Hardware Catalog**, open files "**PROFIBUS-DP**" – "**SIMOVERT**" – "**MASTERDRIVES CBP**".

By holding down the left mouse button, drag the "**Motion Control Plus**" symbol to the PROFIBUS line.



The window for the properties of PROFIBUS node CBP opens automatically:



Please enter the **PROFIBUS address (11)**. When you click on **OK**, the next screen form, which is for the properties of the DP slave, is displayed.

Enter the slave's "**Identifier**" and select **PPO Type5** !

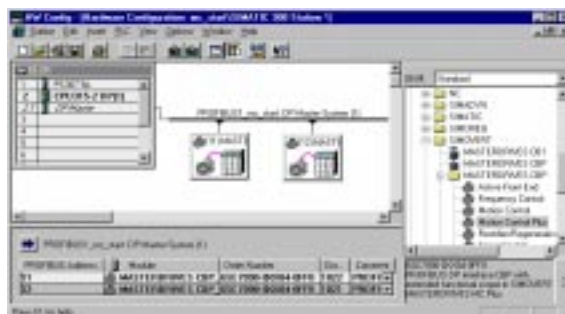


If you have specified other addresses, change the following values in the Table below:

Axis	PROFIBUS Address	PKW Address	PZD Address
1	11	256	264
2	12	284	292

Next, add the **2nd axis** to the PROFIBUS and supplement the table as necessary. Your hardware configuration should now look like this:

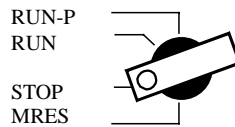
Save the configuration but do **not** close HW-Config, as we want to transfer the configuration to the CPU in the next section!



3.4.2 Transferring the Hardware Configuration

Before the hardware configuration defined in the preceding section is transferred to the CPU, we would recommend a "**General Reset**" in order to establish a defined initial state. To do this, proceed as follows:

CPU mode selector:
(key-operated switch)



1. Turn the keylock switch to the **STOP** position.
2. Turn the key to **MRES** and **hold** it in this position until the STOP LED lights up for the second time (around 3 seconds).
3. **Within 3 seconds**, you must return the key to the **MRES** position and hold it until the STOP LED starts flashing. When the CPU has completed the General Reset, the STOP LED stops flashing and lights up continuously.

The PG interface might have to be set, depending on how your PG is connected to the programmable controller. You can do this in the **SIMATIC Manager's "Options" – "Set PG/PC Interface"** menu.

Next, call "**PLC**" – "**Download**" in **HW-Config** and confirm the relevant CPU module (standard MPI address is 2). Then close the hardware configuration window.

The S7 CPU has now been configured! The various devices must be in the following states:

No red LED for SF, SF-DP or BUSF may be lit on the CPU!

(If an OP27 is connected, these LEDs might stay lit)

On the MASTERDRIVES, all 3 LEDs on the PROFIBUS board are flashing (simultaneous flashing of all three LEDs on an MC board serves as indication that the board is **not** faulty!)

This means that your PROFIBUS is working and that the connections between the MCs and the CPU are established.

Congratulations!! You have taken a huge step forward. And now, on to the software:

3.4.3 Inserting Symbol Tables

In this section, we are going to link the symbol tables for the GMC-Basic project.

Display the **SIMATIC Manager** window, then open project **P7mc1_ex** in the "**File**" – "**Open**" menu.

You will find the example in path:
"**Siemens\Step7\Examples**".

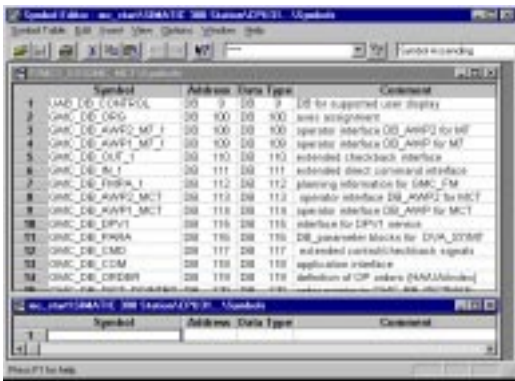


Double-click on project **P7mc1_ex** to open it.



Double-click on your **mc_start** project in "**S7 Program**" – "**Symbols**". This opens a window containing the symbol table for this project.

In the SIMATIC Manager, **double-click** on "**Symbole**" in "**Project P7MC1_EX**" to open this symbol table as well.



Mark all symbols for P7MC1_EX, copy them, and add them to your symbol table.

If you have started – as suggested – with a new project to create mc_start, you should not have any symbols shown in bold type. Symbol names or addresses in bold type indicate that those names and/or addresses were defined more than once.

In case of conflicts with your assignments for data-blocks, function blocks or symbol names, please refer to the documentation to resolve those conflicts. For details, see "Configuration package", part-number 6AT1880-0AA00-1BA0, tab 4 "GMC Basic Standard Software", section 8 "Expert/Knowledge/Tips", page 8-6 and up.

We generally recommend that you leave the GMC-Basic symbols and

addresses unchanged for easy cross-reference with the documentation.

You can then save and close the symbol table.

3.4.4 Integrating GMC-Basic Blocks

After inserting the symbol tables, we are going to transfer the STEP 7 blocks from GMC-Basic.

To do so, return to the **SIMATIC Manager** and mark all **Quellen** in the **P7MC1_EX** project. Copy these blocks and insert them in the **Source Container for your project**. Should you want to insert these blocks into an already existing project rather than in a newly generated project, be sure to check your project for identical block names. The SIMATIC Manager will ask you whether or not you want to overwrite the block !!

"**Bausteine**" also copy the blocks from the **P7MC1_EX** project's in "**Blocks**" of your project.



Open the "**Block**" container's **DB100 (DB_ORG_MCT)**.

If you have **2 axes** in your project, please add the additional values to **DB100**. If you have only one axis to configure, proceed to the next page to check and possibly modify the addresses of your axes.

Go to the **End** of the block and mark the beginning of the line with the statement **END_STRUCT** of the structure **X_axes**.



With the aid of menus "**Insert**" – "**Declaration Row**" – "**Before Selection**" add a **blank line**.

Add the following structure for your **second axis**:



In the "View" menu, change to "Data View" and enter the address data for your axes from the table above as shown at the right (arrays `x_axes.axis1` and `x_axes.axis2`).

Please do not forget "Array `X_axes.i_number_axes`". The number of axes must be entered here.

Address	Symbol	Access	Control	Value	Description
368.0	X_version.C_fb_act(1)	CONST			
369.0	X_version.C_fb_act(2)	CONST			
370.0	X_axes.i_number_axes	INT	D	2	Number of axes in MC-12.0mc
371.0	X_axes.X_axis1.i_axis_type	INT	D	2	<2> = NT, <3> = MCT, <0> = NT/MCT
374.0	X_axes.X_axis1.i_cmds_no_cmds	INT	D	0	Number of the commands
376.0	X_axes.X_axis1.i_nt_no	INT	D	0	Number of the NT (1..4)
378.0	X_axes.X_axis1.i_log_axis_no	INT	D	0	Logical axis number 1..4
380.0	X_axes.X_axis1.i_profibus_addr	INT	D	12	MCT PROFIBUS address
382.0	X_axes.X_axis1.i_ppho	INT	D	284	I/O area, PPM address of the MCT
384.0	X_axes.X_axis1.i_ppd	INT	D	284	I/O area, PPD address of the MCT
386.0	X_axes.X_axis1.cmdT	INT	D	0	
388.0	X_axes.X_axis2.i_axis_type	INT	D	2	<2> = NT, <3> = MCT, <0> = NT/MCT
390.0	X_axes.X_axis2.i_cmds_no_cmds	INT	D	0	Number of the commands
392.0	X_axes.X_axis2.i_nt_no	INT	D	0	Number of the NT (1..4)
394.0	X_axes.X_axis2.i_log_axis_no	INT	D	0	Logical axis number 1..4
396.0	X_axes.X_axis2.i_profibus_addr	INT	D	12	MCT PROFIBUS address
398.0	X_axes.X_axis2.i_ppho	INT	D	284	I/O area, PPM address of the MCT
400.0	X_axes.X_axis2.i_ppd	INT	D	282	I/O area, PPD address of the MCT
402.0	X_axes.X_axis2.cmdT	INT	D	0	

Note: If you have already loaded the OB100, (e.g. in order to test using only one axis) to the CPU, you must, if you first delete blocks DB 101 through DB118 if you subsequently want to insert a further axis (in the DB100).

Save the modified block and close the window.

Finished! You have now incorporated the full functionality of GMC-Basic in your control program. All you have to do now is introduce it to your S7 PLC.

3.4.5 Transferring the Control Program

Click on the "Blocks" container for your project and call the "PLC" – "Download" menu.

When the transfer has been completed, turn the keylock switch on the CPU to "RUN-P".

So far, we have completed the following tasks:

- The software has been installed on your PG.**
- The drive was initialized with SIMOVIS.**
- PROFIBUS is operational.**
- The GMC-Basic package has been linked to your project and is executing on your programmable controller.**

You now have the complete interface to the MC system available in your programmable controller, with 8 job mailboxes and the cyclic control and check-back signals to the MASTERDRIVES!!

And that's GREAT!!!!

Now proceed to the next step, where you will already be able to move the axes, for example in setting-up mode, using a Windows tool called GMC-Control.

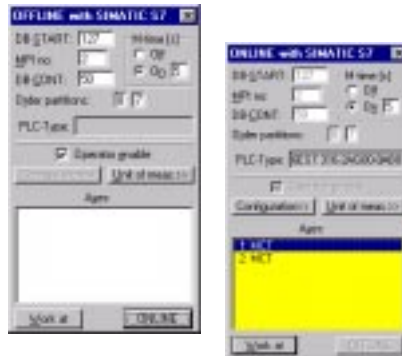
3.5 Step 5 GMC Control

Call the Windows tool "GMC-Control_e.exe". Click on "System" – "Online / Offline".

In the on-screen window you will see the Standard settings for communication with GMC_Basic.

If you have completed the installation as described, these settings will remain unchanged.

Click on "ONLINE"



GMC_Control now goes on-line to the controller and shows you the axes.

Exit this window by clicking on the "Work at" button and by opening "Control Desk" in the "Machine Control board" menu.

3.5.1 Machine Control Panel Menu

The main purpose of this menu is axis control. It also allows you to put together a customized machine control panel. All interactive areas in the "Machine Control Panel" menu are placed only in the main window, but have multialog capability, that is, you can place multiples of each of these interactive areas in the main window. The advantage is that you can display and process interactive areas for several axes at the same time.

Interactive control panel

This is the central interactive area, and shows you the control and status signals that are available to you for individual axis applications.

The "control signals" (the signals with which you control the axis) are at the left,



the "status signals" (the signals the axis uses to signal back its machining state) are at the right.

Example based on Setting-up Mode

The following control signals must be enabled: "OFF2", "OFF3", "ENC" and "LB".

"OFF1" must be selected as the last signal.

In addition, MODE_IN = Set-up mode must be selected.

Use the so-called "OVERRIDE" to determine the speed of the drive in % of nominal speed.

The following status signals must be displayed: "MODE_OUT" = "Setup", "IOP", "OFF2", "OFF3" and "ST_EN".

When you set "J_FWD" or "J_BWD", the axis should move and status signals "FWD" or "BWD" and "FUR" should be displayed.

The color "RED": The color "RED" is reserved for malfunctions and warnings. If the interactive area contains no "RED", the basic prerequisites for successful control have been met.

Fault diagnostics: If there is a number under "WARN" or "FAULT", you can display a plain text by positioning the mouse pointer to "WARN" or "FAULT". There is also a switch next to "WARN" with which you can display any additional warnings.

At the lower right of the selection field (next to the "End" button) you can specify whether you always want to display all control and status signals or only the ones that are relevant to the selected operating mode.

3.6 Step 6 Integrating OP Project GMC-OP-OAM

To round off the GMC functionality, we want to include the OP project GMC-OP-OAM in our project. Some of the actions needed to do so will already seem familiar to you. The OP27 operator interface can be connected to the SIMATIC S7 CPU via either MPI or PROFIBUS-DP. The PROFIBUS connection is described below. The MPI connection can be found at the end of the Guide in the section entitled Background Information – Interfacing the OP27 via MPI.

Note: A simultaneous operation of a axis with GMC_Control and GMC-OP-OAM is not possible!

3.6.1 Integrating OP Project GMC_OP_OAM

First we want to integrate the GMC-OP project in our sample project. The prerequisite is the **integrated** installation of PROTOOL. Please call **"PROTOOL"**. Select the **"File" – "Integrate"** menu.

The following screen form is displayed:

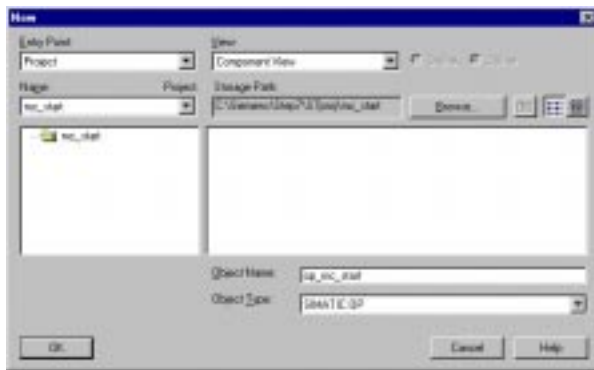


Select the directory structure shown here:

Select one of the appropriate OP projects and open it (here: **gmc_op27_v1_00.pdb**)



In the **"New"** form, select the **"Path"** that was used to store your project: See screenshot.



Enter the **"Object Name"** of your OP project (here: **op_mc_start**) and confirm with **"OK"**.

The OP objects will be integrated in your S7 project (this might take a moment).

Result:



Behind the **Status window"** is the window with the OP displays. Close the **"Status window"** with the Windows symbol **"X"**.

3.6.2 Integrating the OP27 in the PROFIBUS Network

Open the **"System" – "PLC"** menu in the following screen form:



Continue with **"Edit"**.

Continue with **"Parameters"**.



Click on **"profibus1_mc_start"** in the **"Connect OP with Network"** window. In the **"Choose a communication peer/symbol list"** window, open **"profibus1_mc_start"** and select **"CPU315-2 DP"**.

Under **"More"**, please check the **"Network Settings"**. The standard baud rate is **"1.5 Mbaud"**. We want to keep this value. When you return to the form at the left, set the bus address for the OP27 to **"5"**. (Should you already have done so, the program would have returned the field to its original value!!).

Terminate the dialog with **"OK" – "OK" – "Close"**.

3.6.3 Transferring the OP Project

We are going to transfer the integrated OP project via the serial cable from **PG-COM1** to **IF2-SS** (Config/Printer) to the OP27. On the OP27, please change the operating mode to **"Serial Data Transfer"**. You will find it in the **"System Settings"** menu. Set the OP's cursor to **"Operating Mode"** and press **"Enter"**. A small pull-down menu is displayed. Position the cursor to **"Serial Transfer"** and press **"Enter"** (should an OP error appear intermittently, acknowledge the error with ESC).

A short time later, the OP goes dark and the message **"Trans. Mode"** is displayed.

Next, check the transfer settings in PROTOOL. To do so, select the menu **"File" – "Settings" - "Download"**



The settings are entered as shown at left and confirmed with **"OK"**.

Now, start the transfer with **"File" – "Download"**. When you are prompted for the destination storage, you can choose between permanent **"Flash EPROM"** and temporary **"DRAM"**.

The OP data are now in the OP27, and we have to establish the PROFIBUS connection from our programmable controller to the OP. This is done with the aid of our HW-Config:

Set the **keylock switch** on the CPU to **"STOP"**. Then open HW-Config and call the **"Target System" – "Load in Module"** menu. Following the transfer of the hardware configuration, please leave the CPU in **"STOP"** mode!

3.6.4 Integrating GMC-OP-OAM Blocks, Adapting OB1 and GMC_DB_ORG

Go to the **"S7-Manager"** and open project **P7MC19EX** (from **"\Siemens\Step7\Examples"**).

The symbol table for this project need not be linked, as the symbols are identical to those for GMC-Basic.

Open the **"Source Files Container"** and copy the **"Sources"** to your project. Please do the same with the **"Blocks"** in the **"Block"** container. You may overwrite identical **UDT** blocks. Should blocks overlap with your own blocks, you should normally elect to rename your blocks (otherwise refer to the GMC-OP-OAM Guide and other reference literature on this subject).

Finally, insert the following call in OB1:

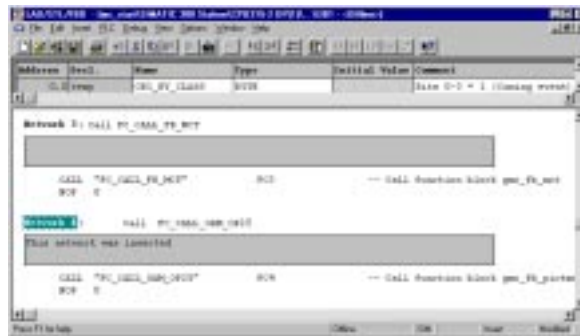
Open **"OB1"**.

Mark **"Network 3"**.

Select **"Insert" – "Network"**.

Supplement the statements in **"Network 4"**.

Save the block.



Now open your "**GMC_DB_ORG**" data block. In the basic package, the data block numbers for the GMC-OAM package have a default value of "**-1**" (e.g. they do not exist). Change to the "**Data View**" of the data block to fill in the data block numbers.

2.0	X_general.X_gmc_pict_pointer.i_db_no	INT	-1	120	DB_No
4.0	X_general.X_gmc_pict_pointer.i_dbw_no	INT	0	0	DBW_No
6.0	X_general.X_gmc_pict_pointer.i_res1	INT	0	0	
8.0	X_general.X_gmc_order.i_db_no	INT	-1	119	DB_No
10.0	X_general.X_gmc_order.i_dbw_no	INT	0	0	DBW_No
12.0	X_general.X_gmc_order.i_res1	INT	0	0	

When using the standard configuration, enter the number "**120**" for the "**GMC_DB_PICTPOINTER**" data block and the number "**119**" for the "**GMC_DB_ORDER**". **Save** the modified data block once again.

Note: Do **not** use the command "Process -> Initialize Data Block", as the initial values of the axis description (always 0) would overwrite the data. For this reason, always enter the values in the **Data View**.


Congratulations !!! You now have full access to the drive with GMC_OP_OAM. Beginning with the software installation, you made it in just six steps !!!

You will find more useful information in the section entitled Background Information, and detailed information in the Manuals.

4 Background Information

4.1 User-configured OP27 Display

In the OP27's start display you will find a user-configured display as an model OP configuration.

Selecting this symbol  allows you to monitor and control the axes.

The control functions for the drives in this menu are not accessible to unauthorized persons. You can defeat this interlock in your control program by setting the "KEY-LOCK" bit (M0.7) to "LOG 1", for instance via "Control VAR".

4.2 Changing DP Addresses and Bus Parameters

If bus parameters are to be changed (PROFIBUS-DP, MPI), all participating components must also be assigned the new parameters, that is, MASTERDRIVES with SIMOVIS, the CPU with HW-Config, and the OP27 with PROTOOL.

4.3 Changing Block Numbers

Should numbers or symbols used in the GMC packages be identical to those used in your blocks, it is recommended that you rename your blocks and/or symbols. If this is not possible, or if it would require too much overhead, you can change the GMC block numbers. Please remember that, in this case, you must change the block calls and the DB numbers stored in DBs accordingly. This also applies to the GMC-Control settings. For more information, please refer to the GMC Manual.

4.4 User-configured Displays in the OP Project

With the aid of GMC_OP_OAM, you can integrate your own user-configured displays. You will find the applicable procedures as well as the interface to your S7 program in the GMC_OP:OAM documentation.

4.5 Parameters for USS Protocol

The parameters for the USS protocol (serial connection between PG and MASTERDRIVES MC) are set as follows at the factory:

Bus address:	P700 = 0
Baud rate:	P701 = 6 (9600 baud)
No. of PKWs:	P702 = 127
No. of PZDs:	P703 = 2
TLG extract:	P704 = 0

4.6 Factory Settings for MASTERDRIVES MC

The factory settings represent the defined initial state in which the devices are delivered.

Should it be necessary to regain these settings, proceed as follows:

Enable parameters:	P053 => 6
Select Settings menu:	P060 => 2
Start parameter RESET:	P970 => 0

The device assumes the factory settings and goes to status 5 (drive settings).

=> MASTERDRIVES compendium "Parameter reset to factory settings (6.1)

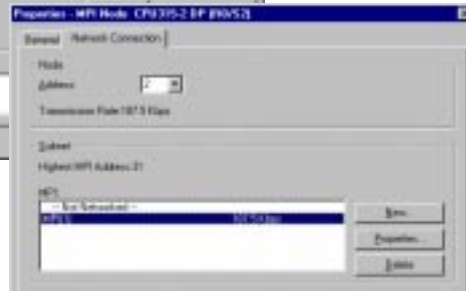
4.7 Linking the OP27 over MPI

First, the CPU must be interfaced to the MPI bus in the hardware configuration. So open "**HW-Config**" for your project. Mark line: "**2 CPU315-2 DP**". Select the "**Edit**" – "**Object Properties**" menu.

The form containing the CPU properties is displayed.

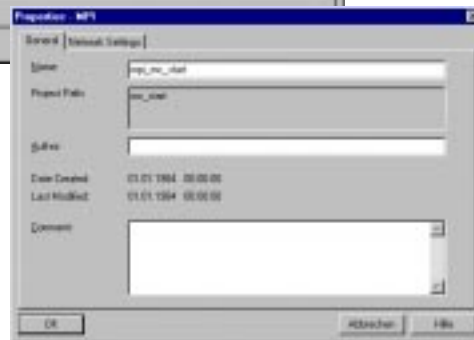


Click on "**MPI**".



Mark the line "**MPI(1)**".

Select "**Properties**".



Give the child a name.

Check the "**Network Settings**" tab to make sure that the baud rate is set to **187.5 Kbit/s**.

Go back to the basic HW-Config display by clicking on "**OK**" – "**OK**" – "**OK**".

Continue with the Chapter entitled "Integrating the OP27 in the PROFIBUS Network". Open the "**Target System**" – "**Controller**" in the following form:



Continue with "**Edit**".

Continue with "**Parameters**".



Click on "**mpi_mc_start**" in the "**Connect OP with Network**" window.

In the "**Choose a communication peer/symbol list**" window, open "**mpi_mc_start**" and select **CPU 315-2 DP**.

The bus address for the OP27 may also be changed, but we are going to leave the standard address "**1**".

Under "**More**", please check the "**Network Settings**".

The standard baud rate is "**187.5 Kbaud**", so you need not change it.

Now let's proceed to "Transferring the OP Project". Don't forget to connect the OP27 to the MPI bus!

5 Additional Documentation

Motion Control for MASTERDRIVES MC and SIMATIC M7 Manual MC Configuring Package on CD incl. Manual	MLFB: 6AT1880-0AA00-1AA0 (G) 6AT1880-0AA00-1BA0 (E)
SIMATIC S7 Software for S7-300 and S7-400 Reference Manual	MLFB: 6ES7810-4CA02-8AR0 (G) 6ES7810-4CA02-8BR0 (E)
PROFIBUS Profile PROFIDRIVE Variable-speed Drives PROFIBUS User Organization Karlsruhe	Order No.: 3.071
SIMOVIS, GMC-Basic, GMC_OP_OAM, GMC_Control Readme Files	Part of software installation package
MASTERDRIVES Motion Control Compendium (AC)	MLFB: 6SE7080-0QX50 (G) 6SE7087-6QX50 (E)
SIMATIC PROTOOL User's Guide	Part of the PROTOOL Software package
OP27 / OP37 Product Manual	6AV3991-1AK00-0AA0 (G) 6AV3991-1AK00-0AB0 (E)
Communication for OPs User's Guide V3.0	6AV3991-1BC06-0AA0 (G) 6AV3991-1BC06-0AB0 (E)

6 Abbreviations

AC	Alternating Current
BUSF	B us fault
BWD	B ackward (axis travelling backward)
CBP	Communication B oard PROFIBUS
CD	Compact D isk
CP	Communication P rocessor
CPU	Central P rocessing U nit
DB	D ata B lock
DP	D istributed P eripherals
DRAM	D ynamic r andom a ccess m emory
ENC	E nable C ontroller
FEPRM	F lash e rasable p rogrammable r ead o nly m emory
FUR	F unction r unning
FWD	F orward (axis travelling forward)
GMC	G eneral M otion C ontrol
HMI	H uman M achine I nterface
HW	H ardware
IF	I nterface
IOP	I n o peration
J_BWD	J og b ackward
J_FWD	J og f orward
LB	L ife B it
LED	L ight e mitting d iode
MB	M ega B yte
Mbit	M ega B it
MC	M otion C ontrol
MCT	M otion C ontrol with T echnology
MPI	M ulti- p oint i nterface
MRES	M emory R eset
OB	O rganization b lock
OP	O perator P anel
PG	P rogramming device
PKW	P arameter Identifier Value (German: P arameter K ennung W ert)
PPO	P arameter P rocess data O bject
PROFIBUS	P rocess F ield B us
PS	P ower S upply
PZD	P rocess d ata (German: P rozess d aten)
SBM	S ensor B oard M ultiturn
SBR	S ensor B oard R esolver
SF	S ystem f ault / S tation f ault
SLB	S IMOLINK B oard
SS	I nterface (German: S chnitt s telle)
ST_EN	S tart e nable
SW	S oftware
UDT	U ser d efined d atatypes
USS	U niversal S erial I nterface