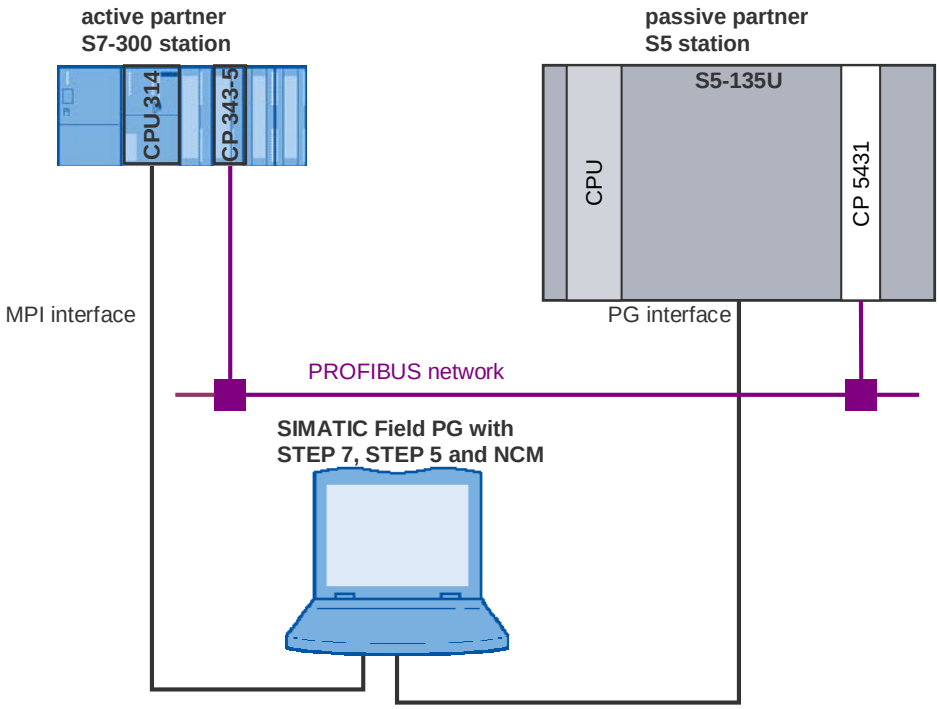
2 Overview of the Sample Program

Plant Configuration

Figure 2-1



Checking the function of the sample program

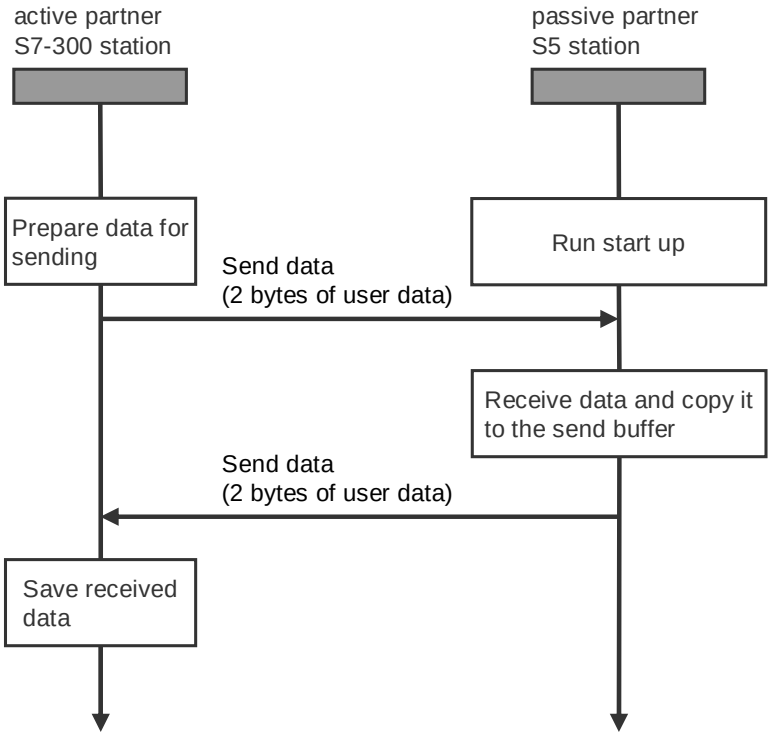
You can see whether the sample program is functioning correctly from variable table of the active S7-300 station. The variable table is included in the block folder of the STEP 7 project.

The data sent and received changes its value constantly (see chapter 5).

Overview of functions

The overview of functions shows the principal working method of the sample program.

Figure 2-2



Data Communication

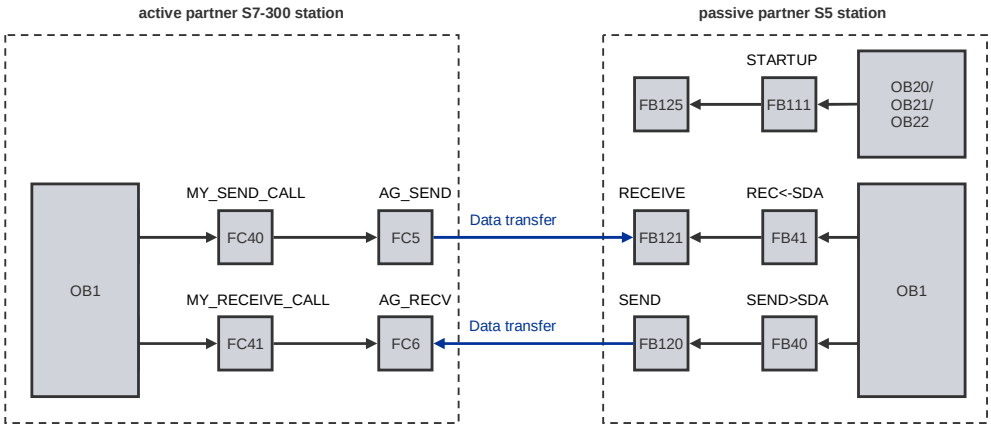
6 bytes of data are exchanged cyclically between the two stations involved in the communication. The 6 bytes of data consist of 4 bytes of header and 2 bytes of user data. The 4-byte header specifies the communication partner.

Active partner and passive partner

The active S7-300 station initiates establishing of the connection and sending of the new data. The passive S5 station receives the data from the active S7-300 and copies it into its send buffer, i.e. after the passive partner has completely received a data block, the passive partner sends it back to the active partner.

Program overview

Figure 2-3



User program of the active partner S7-300 station

The function FC5 "AG_SEND" is called in each cycle to send 2 bytes of user data.

The function FC6 "AG_RECV" is called in parallel to the send job to fetch a received data block from the CP.

Once a data block has been received completely, the data is saved.

If the receive job has been completed successfully, then the send data is incremented by the value "1" and the send/receive cycle starts over.

User program of the passive partner S5 station

An FB121 "RECEIVE" is triggered in each cycle.

When the FB121 "RECEIVE" receives a new data block, the data received triggers an FB 120 "SEND" to send back the data received.

Operating and monitoring

The operating and monitoring of the sample program is possible using the variable table provided.

The following requirements must be fulfilled for the "Monitor and modify variables" program.

- An online connection to the CPU must be established.
- The "Monitor variables" function must be activated.
- The control values must be marked as valid.

If the above-mentioned conditions are fulfilled, then you can tell that the sample program is working properly by the fact that the sent and received data changes constantly in the active partner.

3 Plant Configuration

This chapter gives you an overview of the configuration and the hardware and software components used to create the sample program.

3.1 Overview

Table 3-1 gives an overview of the configuration used to create the sample program.

Table 3-1

Bus system	PROFIBUS
Communication protocol	FDL with free layer 2 access
FMS Client	SIMATIC S7
FMS Server	SIMATIC S5
Communications processors	CP342-5 and CP5431
Services	SDA (Send Data with Acknowledge)

In this sample program the SDA (Send Data with Acknowledge) service and the free layer 2 access of the FDL protocol are used for data communication between a SIMATIC S7 and a SIMATIC S5.

In the active partner S7-300 station a CP342-5 communications processor is used for data communication using the FDL protocol and the SDA (Send Data with Acknowledge) service.

A CP5431 communications processor is used in the passive partner S5 station.

3.2 Hardware and Software Components Used

Hardware components

The following modules in the active partner S7-300 station were used to create the sample program.

Table 3-2

Slot	Module	Order number
1	PS 307 10A	6ES7307-1KA00-0AA0
3	CPU314	6ES7314-1AE02-0AB0
4	CP342-5	6GK7342-5DA00-0XE0

The following modules in the passive partner S5 station were used to create the sample program.

Table 3-3

Slot	Module	Order number
1	S5-135U/155U (CPU 928)	6ES5 928-3UA12
2	CP5431	6GK1543-1AA01

Note

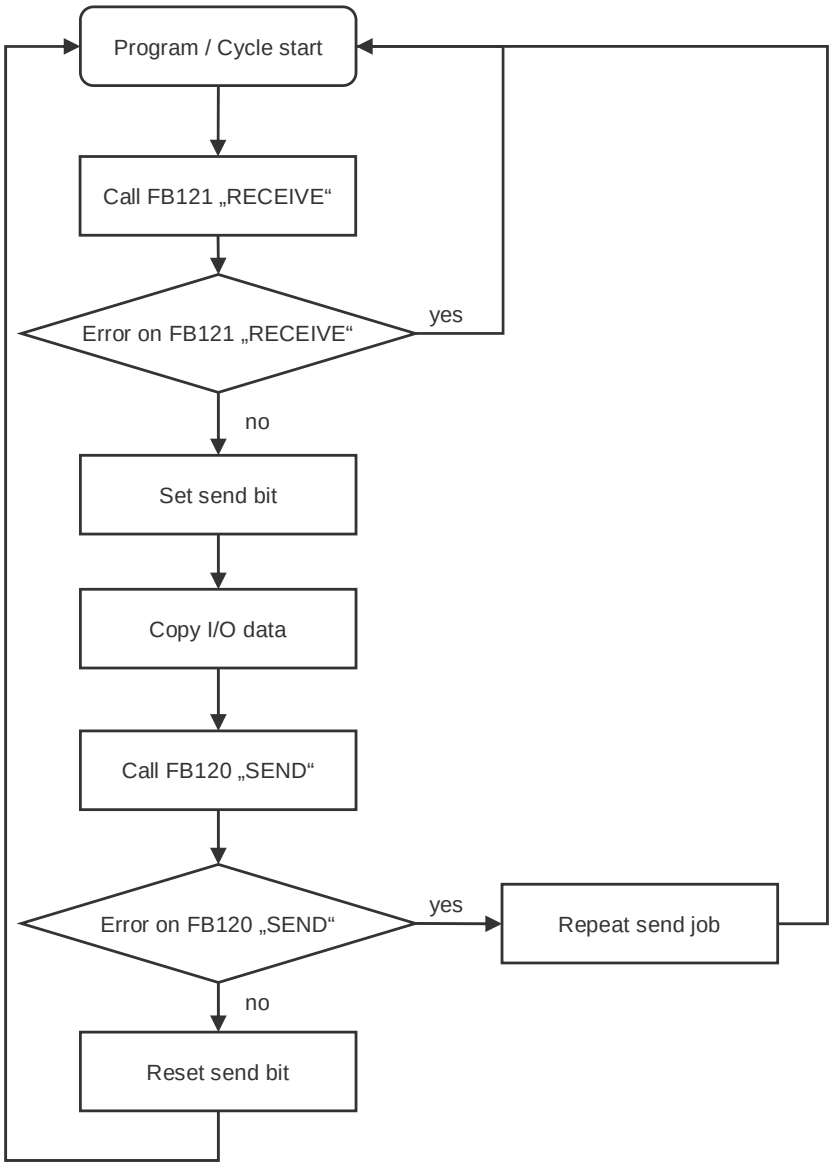
The sample project has been created with a specific hardware configuration. This must be maintained to ensure proper functioning.

If you use a different configuration, with a different CPU or CP, for example, then you must change the sample program accordingly.

4.4 Details of the User Program of the S5 station

4.4.1 Program Sequence

Figure 4-6



4.4.2 OB1

OB1 is the block responsible for cyclic processing of the user program. Function blocks FB40 "SEND>SDA" and FB41 "REC<-SDA" are called cyclically in OB1. These function blocks internally call the function blocks FB120 and FB121 to send and receive data.

Figure 4-7

```
      :JU  FB  41                              call receive-function
Name  :REC<-SDA
      :
      :JU FB  40                          call send function
Name  :SEND>SDA
      :
      :BE
```

4.4.3 Startup OBs (OB20, OB21 and OB22)

The startup OBs are required to program the different startup types of the CPU.

Depending on the startup type of the CPU, warm start or cold start, for example, the startup OBs OB20 to OB22 are called.
In this example the calls for all three types of startup are identical; in other words the startup OBs OB20, OB21 and OB22 each call the function block FB111 "STARTUP" to initialize the communications processor during startup of the CPU.

Overview

Figure 4-8

```
OB 20

      :JU FB 111                          synchron for CP 5431
Name  :STARTUP
ERR   :    F  200.0                        synchron error for CP 5431
      :
      :BE
```

4.4.4 FB111 "STARTUP"

The function block FB111 "STARTUP" is called by one of the startup OBs OB20, OB21 or OB22. In FB111 "STARTUP" the function block FB125 "SYNCHRONOUS" is called to initialize the communications processor.

Overview

Figure 4-9

```
 :
      :JU FB 125
Name  :SYNCHRON
SSNR  :    KY 0,0                              SSNR - CP5431
BLGR  :    KY 0,6
PAFE  :    FY 255
      :
      :A   F  255.0                            PAFE error ?
      :=   =ERR
      :
      :BE
```

4.4.5 FB40 "SEND>SDA"

The FB40 "SEND>SDA" is called cyclically in OB1.

Overview

Figure 4-10

```
Name      :SEND>SDA                send to remote-station 2 bytes

                  :A   F   45.7    "call-send-bit"
                  :JU FB 120
    Name : SEND
SSNR      :     KY 0,0
A-NR      :     KY 0,134           job number (ncm5431)
ANZW      :     FW  56
QTYP      :     KS DB              send buffer type is db
DBNR      :     KY 0,40            send buffer is db40
QANF      :     KF +1              send buffer offset is dw1
QLAE      :     KF +5              send length (5 words/10 bytes)
PAFE      :     FY  54
                  :
                  :A   F   57.2    anzw "job complete without err"
                  :AN  F   55.0
                  :=   F   55.1    edge flag "data transfer
                  :                completed"
                  :A   F   57.2
                  :=   F   55.0
                  :
                  :A   F   55.1    edge flag "data transfer
                  :                completed"
                  :AN  F   54.0    no pafe by send
                  :R   F   45.7    reset "call-send-bit"
                  :
                  :BE
```

Description

The FB40 "SEND_SDA" cyclically calls the function block FB120 "SEND" to transfer data.

In this example the FB120 "SEND" transfers 2 bytes of user data to the configured communication partner.

Depending on the data transfer and the value of the parameter "PAFE" the Send bit is reset and the function block FB40 is terminated.

Parameters

The table gives an overview of the parameters of FB120 "SEND".

Table 4-6

Parameter	Description
SSNR	Interface number of the CP5431.
A-NR	Job number which identifies the S/R connection of the CP5431.
ANZW	Job status.
QTYP	ID for the send buffer type.
DBNR	Number of the data block (DB).
QANF	Offset in the send buffer.
QLAE	Length of the area to be transferred.
PAFE	Error display of the block.