
SIMATIC NET

Introduction TF-1413

Manual

- 1 Overview
 - 2 Description of the Architecture
 - 3 Configuring with COML 1413 TF
 - 4 Special Features of SIMATIC NET TF Under Windows 95 and Windows NT
 - 5 Important Information to Supplement the "TF User Interface" Manual
 - 6 Where to Obtain Help
- Glossary

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We would further point out that, for reasons of clarity, these operating instructions cannot deal with every possible problem arising from the use of this device. Should you require further information or if any special problems arise which are not sufficiently dealt with in the operating instructions, please contact your local Siemens representative.

General

This device is electrically operated. In operation, certain parts of this device carry a dangerously high voltage.

WARNING!



Failure to heed warnings may result in serious physical injury and/or material damage.

Only appropriately qualified personnel may operate this equipment or work in its vicinity. Personnel must be thoroughly familiar with all warnings and maintenance measures in accordance with these operating instructions.

Correct and safe operation of this equipment requires proper transport, storage and assembly as well as careful operator control and maintenance.

Personnel qualification requirements

Qualified personnel as referred to in the operating instructions or in the warning notes are defined as persons who are familiar with the installation, assembly, startup and operation of this product and who possess the relevant qualifications for their work, e. g.:

- Training in or authorization for connecting up, grounding or labeling circuits and devices or systems in accordance with current standards in safety technology
- Training in or authorization for the maintenance and use of suitable safety equipment in accordance with current standards in safety technology
- First Aid qualification

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Notes for the User

Documentation

The documentation for this products TF-1413/Windows 95 and TF-1413/Windows NT consists of two volumes with the following titles:

- “Introduction TF-1413” (this volume)
- The manual “TF User Interface”.
- The manual “SEND/RECEIVE User Interface”.

Conventions

The following symbol is used in the text.



This symbol highlights special features and dangers.

1 Overview

SIEMENS developed the SIMATIC NET communications for automation engineering. This is a system of high-performance **Local Area Networks** (LANs), for SIMATIC NET for Industrial Ethernet, SIMATIC NET for PROFIBUS SIMATIC NET for AS-Interface.

In the world of SIMATIC NET communication, SIMATIC NET **Technological Functions** (TF) are used for communication between control systems and computers (program-program communication) and for communication between computers. SIMATIC NET TF is compatible with MMS (**M**anufacturing **M**essage **S**pecification).

The description of the SIMATIC NET TF user interface is a separate manual and accompanies this manual.

1.1 What is TF-1413?

Function With the TF-1413/Windows 95 and TF-1413/Windows NT products, you can attach PCs and PGs to the industrial communication network Industrial Ethernet. This achieves open communication using the SIMATIC NET TF protocol.

Operating System TF-1413/Windows 95 can only be operated under Microsoft Windows 95 and TF-1413/Windows NT can only be operated under Microsoft Windows NT, Version 4.0 or higher.

TF Interface The interface to the user program implemented by TF-1413 is known as SIMATIC NET Technological Functions (TF). This has the following features:

- It is a C programming interface.
- It provides access to TF services on PCs and PGs.
- It is available as a C library and is operated with SIMATIC NET drivers and SIMATIC NET communications processors.

Adapter TF-1413 can only be operated with the network card SIMATIC NET CP 1413.



Simultaneous operation of more than one network card is possible with a suitable hardware configuration.

1.2 Using TF-1413

Environment	TF-1413 can be used in all PCs or PGs in which a CP 1413 can be operated.
PG Operation on Industrial Ethernet	<p>To operate TF-1413 on Industrial Ethernet, you can use the standard SIMATIC NET components, such as:</p> <ul style="list-style-type: none">• Transceivers,• Drop cables,• Fan-out units etc.
TF-1413	<p>TF-1413 is the basis for communication for application programs with the following tasks:</p> <ul style="list-style-type: none">• Detecting and modifying machine statuses• Keeping production statistics• Archiving process data• Visualizing processes

1.3 User Experience

User Groups

The TF-1413 product is used mainly by two user groups:

- Users of TF applications
- Programmers of TF applications
- Programmers of SR applications

Required Experience

The user group broadly labeled “Users of TF Applications” does not, of course, require the same depth of knowledge as “Programmers of TF Applications”.

The following table indicates the experience required by the user groups.

Necessary Experience	Users of TF or SR Applications	Programmers of TF or SR Applications
Familiar with PCs	yes	yes
Familiar with the SIMATIC S5 or S7 systems	yes	yes
Experience with a programming language	no	yes (C programming language an advantage)

1.4 Guide to the Documentation

For All Users

We recommend **all** users to read the following documentation:

- Introduction TF-1413 (This manual)
- The Product Information TF-1413/Windows 95 or TF-1413/Windows NT
- The Installation Instructions TF-1413/Windows 95 or TF-1413Windows NT.

For Programmers of TF Applications

We also advise programmers of TF applications to read the “TF User Interface” manual.

Programming Examples

You can select the directory paths specified with the examples to suit your system. This means that the paths contained in the documentation may differ from the actual paths on your computer.

Notes

2 Description of the Architecture

The following chapter describes the properties and functions of the TF-1413 software package.

The chapter contains the following:

- Basic information about the reference model for communication, the ISO/OSI reference model
- An overview of the various communications networks available from Siemens
- Information about SIMATI NET for Industrial Ethernet
- An overview of the SEND/RECEIVE programming interface.

2.1 The ISO/OSI Reference Model

Problem-Free Interaction

As the user of powerful automation components such as host computers, programmable logic controllers, printers, data servers etc., you expect problem-free interaction between these devices and control systems so that the following features are guaranteed:

- Availability of communication systems without investing a lot of time and effort
- Communication independent of any one vendor
- Flexible modification of system structures without affecting communication
- Highest possible reliability
- The guarantee that today's devices will also be able to communicate with those of tomorrow.

Open Communication

The main requirement for open communication is a **heterogeneous network** of automation components. Devices of different vendors can communicate with each other. In contrast to this, in a **homogeneous network** only devices of one vendor can take part in communication.

The ISO/OSI Reference Model

The International Standards Organization (ISO) has defined a reference model for open system interconnection as the basis for communication between devices of different vendors.

This ISO/OSI reference model (OSI **O**pen **S**ystem **I**nterconnection) is the guideline for standardizing communication procedures. It provides a framework for standardization of communication in seven layers.

Vendors of automation components or generally of data terminal equipment not only in the industrial area have widely accepted the ISO/OSI reference model.

The Seven Layers of ISO/OSI

The ISO/OSI reference model, the basis for open communication, is divided into seven layers. The rules governing the procedures in the individual layers are known as a protocol.

The following table shows the seven layers, their names and functions.

Layer	Name	Function
7	Application layer	General application services
6	Presentation layer	Data presentation (format)
5	Session layer	Synchronization of communication
4	Transport layer	Connection establishment/termination, acknowledgments, segmentation
3	Network layer	Addressing other networks/network interconnection
2	Data link layer	Access techniques, reliable data transfer
1	Physical layer	Physical properties of the communication path

2.2 SIMATIC NET Communication Networks

The Areas of Application of SIMATIC NET

SIMATIC NET is an open, heterogeneous communication system with a variety of Local Area Networks (LANs) providing various ranges of performance for manufacturing and process automation in industry. It is based on national and international standards according to the ISO/OSI reference model.

SINEC Communication Networks

SIMATIC NET provides the following communications networks for different requirements (Figure 2.1):

- **Industrial Ethernet - a cell and management network based on IEEE 802.3.**
- PROFIBUS (Process Field Bus) - a cell and field level communication network based on DIN 19245, Parts 1, 2 and 3.
- AS-Interface (Actuator Sensor Interface) - a communication network for the actuator and sensor level.

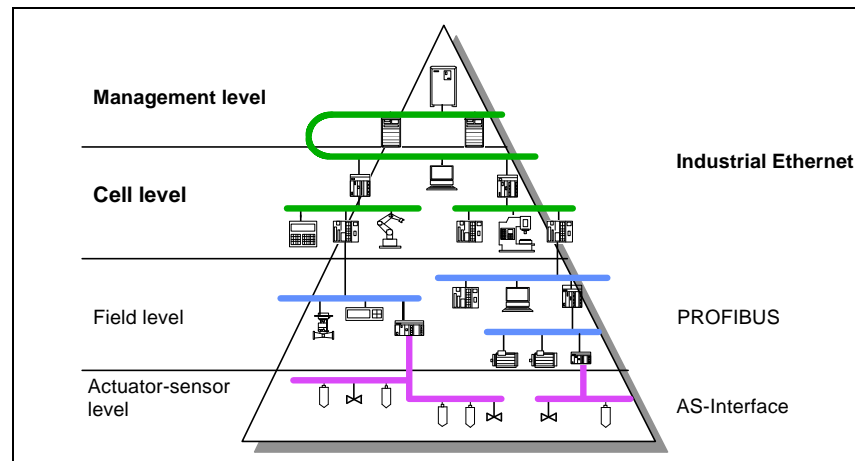


Figure 2.1 SIMATIC NET Communication Networks

2.3 SIMATIC NET for Industrial Ethernet

Area of Application of Industrial Ethernet	The cell and area network Industrial Ethernet is an industrial communication network designed for use in manufacturing and in industrial plants. It provides a wide range of network components for electrical and optical transmission of data.
Basis	The cell and area network Industrial Ethernet is based on the IEEE 802.3 (Ethernet) standard. It operates using the CSMA/CD access technique (C arrier S ense M ultiple A ccess with C ollision D etection).
Network Components	Industrial Ethernet network segments implement electrical networks using single shielded coaxial bus cables (triaxial cable).
Optical Network Components	<p>The optical network components (FO - Fiber Optic) implement optical networks using fiber optic cables.</p> <p>The advantage of optical networks is that optical network segments are immune to electrical interference and that large distances can be covered.</p>

2.4 SEND/RECEIVE Programming Interface

SEND/RECEIVE	It is a C programming interface, which provides access to the SEND/RECEIVE services on PCs and PGs.
Compatibility	The SEND/RECEIVE programming interface of TF-1413 is a layer 4 (Transport layer) interface.
Communications with SIMATIC S5 Programmable Controllers	There is easy problem-free communication with the data handling blocks of the SIMATIC-S5 programmable controllers via the calls of the SEND/RECEIVE programming interface. The call structure and the sequence of communication with the SIMATIC S5 programmable controllers are described in detail in the "SEND/RECEIVE Programming Interface" manual.
Advantages of the SEND/RECEIVE Programming Interface	All programs equipped with the SEND/RECEIVE interface have easy access to SIMATIC-S5 programmable controllers.
Programmer Support	<p>To make it easier for programmers to familiarize themselves with the use of SEND/RECEIVE in the software packages of TF-1413, the following is provided in addition to the documentation already mentioned:</p> <ul style="list-style-type: none">• Sample programs• A call library
Sample Programs	<p>Sample programs are provided with TF-1413. They are written in the "C" programming language.</p> <p>The mode of operation of the interface can be discerned from the program context of the sample programs. Also, sections of the sample programs can be taken over in analogous contexts.</p>
Call Library	<p>Of further help is the call library for SEND/RECEIVE interface function calls, written in "C" and included in the scope of supply.</p> <p>For "C" programmers, this means:</p> <ul style="list-style-type: none">• the call library can be integrated direct into your own software• the related calls can be used direct, as described in detail in the sample programs <p>The sample programs and functions calls provide a second practical description, in addition to the explanation in the manual, of the data structures required (request block in the case of SEND/RECEIVE).</p>

3 Configuring with COML1413 TF

This chapter explains the properties and functions of the COML 1413 TF configuration tool.

COML 1413 TF is used to configure the CP 1413 SIMATIC NET communications processor for the Industrial Ethernet bus system.

Using the COML configuration software on a PC/PG, you create the database required for operating the TF protocol of the communications processor (CP 1413). The database contains all the selectable communication parameters. It is used to specify communication relations (connections).

The advantages of the configuration tool are as follows:

- When you create or install a program, you do not need to know which programs it will communicate with. The communication parameters are set by the configuration.
- Greater reliability adapted to production.

3.1 Basic Concepts

Configuring

By configuring, you specify the following:

- Communication partners
- Connections between communication partners
- Connection parameters

The data created during configuration are saved in a database.

Database

The database contains all the configured parameters and is read when the CP 1413 starts up.

The database can exist in the following formats:

- as a text database or
- as a binary data base.

Text Database

The **text** database (text DB) contains the parameters in ASCII format.

Binary Database

The **binary** database (binary DB) contains the parameters you have entered in a compact, binary format that can be loaded on the CP. This is loaded when the CP starts up.

Content of the Database

A database contains the following information:

- The station address (also known as Ethernet or MAC address) of both partners. The station address can be considered as a "house number" of the communication card.
- The TSAP (ISO Layer 4 address) of both partners. This is a subaddress on the CP that allows several programs communicating via the CP 1413 to be addressed.
- Further information about the connection, for example who establishes it.
- The application association name with which the user program communicates with a partner. As far as the application is concerned, this name stands for the communication parameters.

3.2 The Menu Bar

“File” Menu

If you select the file menu in the menu bar using the mouse, a list of options is then displayed. After selecting one of these menu options, the required function is executed.

The options available in the "File" menu are as follows:

Menu Option	Meaning
New	This menu option deletes all the configuration data in the input window. A new database can then be created.
Open DB...	This menu option opens a window so that a database can be read in. It is possible to open either a text database (*.txt) or a binary database(*.ldb) in the lower selection field. If you open a binary database, a text database is automatically generated (see Section 3.4, “Open/Save Database” Dialog).
<ul style="list-style-type: none"> • Save Text DB • Save Text DB As... 	This menu option saves the currently open database in text format. If you select "Save Text DB As...", a window is opened in which you can type in a name for the database. If you select "Save Text DB", the database is saved under its previous name.
Generate Binary DB As...	This menu option opens a window to save the database. The name you enter must have the extension ".ldb". All entries are then saved in a text file (with the extension .txt). The program also checks whether or not the configuration contains errors. If the configuration is free of errors, a loadable binary database with the extension ".ldb" is generated (see Section 3.4, “Open/Save Database” Dialog).
Print...	The current database is output to a printer to provided you with documentation. In contrast to the usual text file, the printout also has comments. Before you print, a dialog appears in which you can set the printer parameters.
Exit	Terminates the COML 1413 TF.



No umlauts (ä, ö, ü) or special characters are supported in the file and folder names.

"Help" Menu

If you select the "Help" menu in the menu bar using the mouse, a list containing the following menu options is displayed. After you select one of these menu options, the required help text is displayed.

The menu options available in the "Help" menu are as follows:

Menu Option	Meaning
Index	All the topics for which help is available are displayed.
Getting Started	This provides you with brief instructions about working with the SIMATIC NET COML 1413 TF program.
Using Help	Brief instructions about using the integrated help system are displayed.
About	<p>This menu option opens a window containing general information about the SIMATIC NET COML 1413 TF program, such as the copyright and version number.</p> <p>The integrated help system corresponds to the standard help system in windows. For further information, please refer to the windows user manual. If you press the "F1" key, you will obtain detailed information about the currently active element or field.</p>

3.3 The Main Window

Contents of the Window

The main window contains the data to be configured. Some of the information is specific to the CP (node name, station address, CP type) and some is specific to the application association.

Layout of the Main Window

The main window with the menu bar and configuration parameters is shown below.

SINEC COML 1413 TF -H1.TXT

File Help

Node name: node 1 Station address: 08.00.06.01.00.00 CP type: CP 1413 TF

Application association list

appl1

Delete

Edit application association selected on left

Name: appl1

Remote Addr: 08.00.06.01.00.01

Local TSAP: tsap1 hex: 74.73.61.70.31

Remote TSAP: tsap2 hex: 74.73.61.70.32

Server-ID: server

Connection establ. Connection type PDU size:

active static 2000

passive dynamic IPDU size:

512

Insert Replace Cancel

Elements of the Main Window

The following table shows the elements of the main window and indicates where you can find more detailed information.

Element in the Main Window	Group	Described in
Menu bar	-	Later in this section
<ul style="list-style-type: none"> • Node name • Station address • CP type 	Parameters Specific to the CP	in Section 3.3.1
Application association list	-	Later in this section
Parameters for the application association ("edit application associations selected on left").	Application Associations and Their Parameters	in Section 3.3.2
<ul style="list-style-type: none"> • Delete • Include • Change • Abort 	Command Buttons	in Section 3.3.3

Menu bar

The menu bar contains menu options for handling files and for calling the integrated help system.

Integrated Help

When you work with COML 1413 TF, you can obtain help for every parameter by selecting it with the cursor and then pressing the "F1" key.

"Application Association List"

The list on the left of the window contains the application associations that you can select for editing.

You can edit the parameters of the selected application association in the right-hand half of the window ("edit application association selected on left").

3.3.1 Parameters Specific to the CP

Node Name The node name is used simply for user documentation and has no effect on the configuration. You can use up to 40 characters to identify a station.

Stations Address The station address is the MAC (Ethernet) address of this station. The station address must be specified. Type in six pairs of hexadecimal numbers separated by a period (.) or blank ().

Example: 08.00.06.01.00.01



The first pair of numbers (in the example 08) must be even. Otherwise the address is a multicast address that is normally assigned to a group of nodes as an additional common address.

CP Type This entry specifies the type of communications processor. This product only supports the CP 1413.

3.3.2 Application Associations and Their Parameters

Definition of an Application Association

An application association describes the ISO layer 7 connection between two partners. It is identified uniquely by its name.

Overview

The application associations are displayed in a list box on the left of the screen and their parameters are displayed in a dialog box on the right of the screen.

- Left: ("application association list") contains the application associations that you can select for editing.
- Right: ("edit application association selected on left") contains the parameters of the application association selected in the list box.

Operation

If the application association list contains entries, you can display the parameters for each entry on the right-hand side by positioning the cursor on the required application association. You can select an application association either with the mouse or by using the cursor up/down keys providing the list is selected.

Using the command buttons "Delete", "Include", "Change" and "Abort" you can edit application associations. The actual editing involves changing the parameters in the right-hand side of the window.



Once you have edited a parameter belonging to an application association in the right-hand dialog box, you can no longer exit the right-hand dialog box until you have acknowledged the changes with the command buttons "Include", "Change" or "Abort". This mechanism prevents you from making accidental changes.

Name

The user program uses this name to access communication channels. This name must be specified and can have up to a maximum of 16 characters.

An application association name must only be used on a station once. All application association names are listed in the application association list.

Remote Address The remote address is the station address (MAC or Ethernet address) of the partner station. You enter six hexadecimal pairs of numbers, each pair separated by a period (.) or blank ().

Example: 08.00.09.01.00.01



A remote address must be specified if the station establishes the connection to the partner, refer to the integrated help.

Local TSAP

TSAP stands for **T**ransport **S**ervice **A**ccess **P**oint (TSAP-ID); the TSAP is the layer 4 address. The TSAP configured for a station and its partner must cross match (remote TSAP on station A = local TSAP on station B).

You can enter any characters for the TSAP. If you use non-printable ANSI characters or special characters, you should make your entry in hexadecimal format (the field to the right of the TSAP field). The TSAP can be a maximum of 8 characters long.

- A TSAP must be specified if this station establishes the connection to the partner. Otherwise, the remote TSAP (if this is not known) can be specified during operation. In this case, do not specify a remote address. The connection is unspecified.
- The display is in the ANSI format usual in windows and is not identical to the ASCII representation (for example differences with umlauts).



When you configure with COM143 and COM1430, the TSAP is padded out with blanks up to the configured length. These blanks must also be entered when working with COM1413 TF.

“Local TSAP” = “remote TSAP” of the partner station

Remote TSAP

The TSAP in the partner station is governed by the same rules as the TSAP on the local station (refer to the description "local TSAP").

“Remote TSAP” = “local TSAP” of the partner station

Server ID

The server identifier is used to group several application associations together to form one logical server. This means that a program operating as a server does not need to know the application associations that are connected to it. Instead of this, the server ID is used.

This entry is optional. You can use names with up to 6 characters.

Connection Establishment

The mode for the connection establishment. The connection establishment describes who establishes the connection. One of the two partners establishes the connection, in other words one of the partners is active.

The following selections are possible:

Connection Establishment	Description
Active	This station establishes a connection (partner waits for connection establishment).
Passive	This station waits for connection establishment (the partner initiates the connection).

For information about partly specified passive stations, call the integrated help with F1.

Connection Type

The connection type specifies when a connection is established and terminated.

Connection Type	Description
Static	A static connection is established after the units start up and is maintained constantly (even when there is no data exchange currently taking place).
Dynamic	A dynamic connection is established when it is required for data exchange and is then terminated again.

PDU Size

Maximum size of the data buffer transferred by the application to the CP. Select one of the following PDU sizes (in bytes).

500, 1000, 2000, 4000, 8000.

The data buffers are distributed depending on the highest value selected for an application association on the CP.

If, for example, no PDU sizes of 8000 or 4000 bytes are selected, the available space is used for additional 2000, 1000 and 500 byte buffers.

Recommended values are 1000 or 2000 bytes.

The PDU sizes configured for the application associations are also available for layer 4 connections (transport connections) that are not configured. If no application association is configured or only those with a PDU size of 500 bytes, then PDUs with a size of 1000 bytes are available for the layer 4 connections.



When you select the PDU size, please remember that every job is performed using the selected PDU size. If you select a PDU size of 4000 bytes for an application association, 4000 bytes will be transferred regardless of the actual length of the user data. It is generally therefore not advisable to select 8000 byte buffers.

The TF protocol does not allow use of frames containing more than 4000 bytes.

TPDU Size

Size of the transport PDU (data frames on the local network) in bytes. Possible values are 512 and 1024 bytes. 512 bytes is strongly advised since if there are several application associations with 1024 bytes there may not be enough transmit buffers available. The TPDU size has nothing to do with the size of the user buffer. These can be larger since the CP can automatically distribute a user buffer over several TPDU's.

3.3.3 Command Buttons

- “Delete”** Before you can delete an application association, it must first be selected in the "List of Application Associations". When you then activate the "Delete" button, the application association is deleted.
- “Include”** The values that can be entered or selected in the right-hand dialog box are adopted in the form of a new application association. This is then included along with its name in the application association list.
- “Change”** The values entered or selected in the right-hand dialog box are adopted. The application association selected in the "List of Application Associations" is replaced by the new application association and the modified parameters become valid.
- “Abort”** Changes to the values in the right-hand dialog box are discarded.

3.4 “Open/Save Database” Dialog

Opening or Saving a Database

To open or save a database, select the corresponding option in the file menu. The dialogs that then appear have the typical Windows layout (Figure 3-1).

The layout of the dialog for saving a database is analogous to that of the "Open Database" dialog.

“Open Database” Dialog

The following figure shows the "Open Database" dialog.

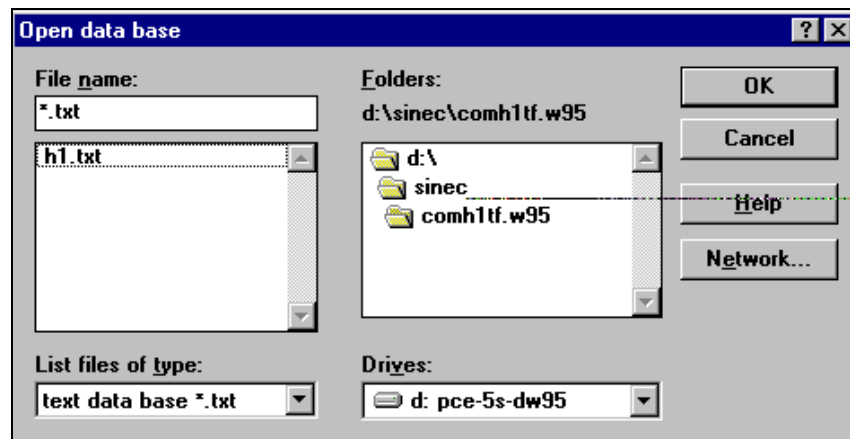


Figure 3-1 Dialog for Opening a File

Fields in the “Open Database” Dialog

Entries must be made in the following fields in the "Open Database" dialog:

Fields	Description
File Name	You can select or enter the file name for the database. If you type in the entry manually, the extension must be “.txt” or “.ldb”.
List Files of Type	You can select the following data types: <ul style="list-style-type: none"> • *.txt for text databases • *.ldb for binary databases
Directories	Select the required directory
Drives	Select the required drive

3.5 Print Dialog

Printing Documentation

To create documentation, select the "Print..." menu option in the "File" menu. The results of your current editing session are then printed out on the printer.

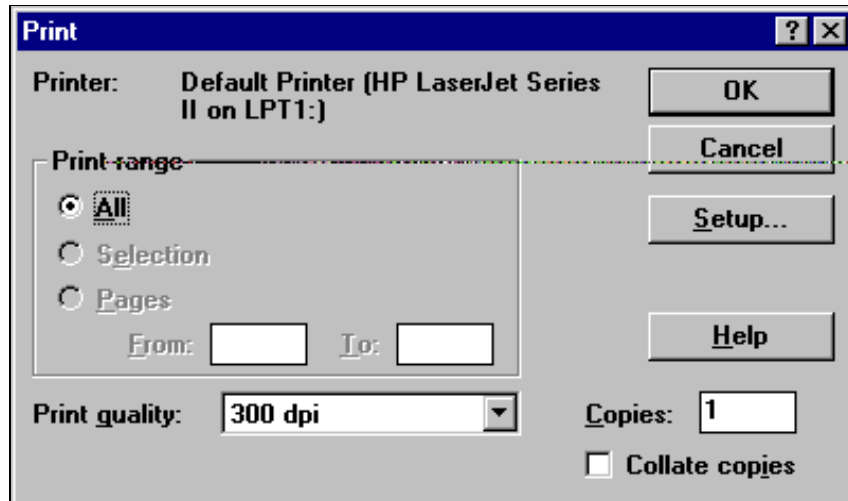


Figure 3.2 Dialog for Setting the Print Parameters

Fields of the Print Dialog

The print dialog contains the following fields:

Field	Meaning
Printer	To select a suitable printer and to set the print parameters.
Page Range	To select the range of pages. Only the "All" option is supported.
Copies	Number of copies to be printed out (standard = 1).

A document is created containing all the configured parameters and comments. The comments describe the meaning of the parameters and all start with the (#) character.

Compatibility Between the Text Database and Documentation

A documentation file can be read in as a text database. A text database can also be used for documentation (without comments).

4 Special Features of SIMATICNET TF Under Windows 95 and Windows NT

This chapter explains the special features of SIMATIC NET TF under Windows 95 and Windows NT.


The SIMATIC NET TF user interface is provided in the form of a DLL. You use the functions of the TF user interface to create and process the TF PDUs and for service-oriented execution of the jobs and acknowledgments.

The services of the TF user interface can be grouped as follows:

- Administrative services - necessary for initializing the TF applications
- Open services - can be mapped on MAP 3.0 MMS (ISO 9506).

The SIMATIC NET TF user interface is described in the accompanying manual.

4.1 General

TF-DLL	The TF library is supplied as a 32 bit code (DLL) and is installed in the folder \Sinec\tf.w95\lib resp. \Sinec\tf1413.nt\nt\lib and in the system folder of Windows 95. Section 4.5 contains instructions for generating your programs.
Configuration File STF_CONF.DAT	<p>Using the configuration file STF_CONF.DAT, you can adapt the SIMATIC NET TF library to your needs. The configuration file must be in the working directory since this is read when the SIMATIC NET TF library (TF_INIT) is initialized.</p> <p>Based on the set parameters, the SIMATIC NET TF library requests dynamic memory. If this file does not exist, the default parameters as listed in the example of the configuration file in \Sinec\tf.w95\sample\STF_CONF.DAT resp. \Sinec\tf1413.nt\nt\sample\STF_CONF.DAT) are used.</p>
Module Name	With TF applications, the module with the name "CP_H1_1:" is addressed (default). This name is specified in the STF_CONF.DAT file.
Header Files	<p>File location</p> <p>The header files are in the folder \Sinec\tf.w95\include resp. \Sinec\tf1413.nt\nt\include.</p> <p>STF_NEW.H</p> <p>The header file STF_NEW.H is the standard TF header file required by all TF applications. This header file contains information and definitions about the SINEC technological functions.</p> <p>To activate the C prototypes check, please add the following lines to your program:</p> <pre>#define TF_PROTO #include "stf_new.h"</pre>
Byte Alignment - Padding Bytes	<p>The default compiler settings mean that structured variables are saved with padding bytes between the components.</p> <p> The TF library, however, assumes a byte aligned format without padding bytes in the variables. All the variable structures used by the TF library must therefore be parenthesized with #pragma pack(1) and #pragma pack().</p>

Restricted Length for Messages With all TF calls, the message must **not exceed a total length of 4000 bytes.**

Defines - tf_service With the tf_receive call, the element tf_service is returned as part of the pb_recv structure. The values that are returned are defined as defines in STF_NEW.H.

The names WRITE and READ were intended for the variable services. These macro names may, however, overlap with other header files such as in WINDOWS.H. For this reason, the tf_service definitions for the variable services are VAR_READ and VAR_WRITE.

4.2 Synchronous Function Calls

Synchronous Call The SIMATIC NET TF user interface provides synchronous and asynchronous calls. A synchronous call means that the call is only returned to the caller on completion of the job.

Mode In most SIMATIC NET TF functions, the mode is controlled by the **mode** parameter.

“mode” Parameter	Meaning
CONF_SYNC	Synchronous mode
CONF_ASYNC	Asynchronous mode

Warnings Make sure that you remember the following warnings regarding calls:



While a synchronous job is active, all indications (IND_CONF and IND_UNCONF events) are acknowledged negatively until the job confirmation arrives and the job is completed.



As a result, synchronous and asynchronous calls must not be mixed. If the client/server function is required at the same time in program, only the asynchronous mode should be used.

4.3 Asynchronous Modes

Asynchronous Call The SIMATIC NET TF user interface provides asynchronous and synchronous calls. With asynchronous calls, the application can decide when it wants to receive the acknowledgment of an initiated job and process it.

Waiting for Termination The SIMATIC NET TF library provides three ways in which it is possible to wait for the termination of asynchronous SIMATIC NET TF function calls:

- Single wait
- Polling
- Waiting in a central loop - GetMessage().



If the send credit is ignored, calls with errors can be rejected!

With all asynchronous function calls of the TF library, the user variables to be read or written with TF and their object descriptions and job parameter field must be declared as global variables.

Single Wait The simplest method for a process to wait for an asynchronous event is to use the SIMATIC NET TF call `tf_receive`. With the `tf_receive` call, the user process is blocked until an event occurs or until there is a timeout. These functions are described in detail in the accompanying volume "TF User Interface".

Polling If `wait_timeout = 0` is set for a `tf_receive` call, it is possible to check whether a message has arrived. The call is returned immediately. If a message was there, the value of `NUM_MESS` is greater than 0, otherwise it is 0.

Waiting in the Central Loop GetMessage() When a message is received, a `WM_SINEC` message is sent to the TF user program. This can then fetch the message with a `TF_receive` with `wait_timeout = 0` in its `WndProc` routine. For more detailed information, refer to the following section "Special Features for Windows 95 and Windows NT".

4.4 Special Features for Windows 95 and Windows NT

WndProc

Windows programs differ from DOS programs among other things because they branch to a WndProc. At a central point, Windows programs wait for Windows messages that are then processed according to a WndProc procedure. It may occur that during the processing of the WndProc, control is transferred to Windows and that WndProc is called again.

set_window_handle

In a Windows program, you must call the routine `set_window_handle` with a window handle after `stf_init()` so that the driver of the CP 1413 knows where to send its messages. If an asynchronous command is issued, when the message is received, a `WM_SINEC` message is sent to Windows. In the corresponding Windows procedure, it can then be processed by calling `tf_receive` with timeout 0.

Call format of `set_window_handle`:

```
set_window_handle (HWND hWnd);
```

Example

Example of a typical Windows application:

```
WndProc (hWnd, )
{
    switch (msg)
    {
        case .... /* init -code */:
            stf_init ( );
            set_window_handle (hWnd);
            break;
        case ... /* Trigger the SIMATIC NET
                    TF-function */:
            tf_xxx ( ,ASYNC, );
            :
            :
            break;
        case WM_SINEC:
            tf_receive ( 0,1, , );
            break;
    }
}
```

You will find further sample programs for Windows in the folder:

`\Sinec\tf.w95\sample resp.`

`\Sinec\tf1413.nt\nt\sample..`

**set_window_
handle_msg**

Set_window_handle_msg is the alternative function to set_window_handle().

This functions allows the application to be informed of the arrival of data by the driver using a self-defined message (msg_id).

Call format of set_window_handle_msg:

```
set_window_handle_msg (HWND hWnd,  
                      unsigned int msg_id);
```

4.5 Compiling and Linking for Windows 95

Compiler The Microsoft Visual C++ Compiler 2.2 is supported.

Library The SIMATIC NET -TF library under Windows 95 is
 \Sinec\tf.w95\lib\tf32.dll, resp. under Windows NT
 \Sinec\tf1413.nt\nt\lib\tf32.dll.
 This is a dynamic link library (DLL).

 You must link the import library
 \Sinec\tf.w95\lib\tflib.lib resp.
 \Sinec\tf1413.nt\nt\lib\tflib.lib
 to your user program. For the exact link instructions, refer to the
 description of the compiler you are using.

Example The sample programs with a make file are in the folder
 \Sinec\tf.w95\sample resp. \Sinec\tf1413.nt\nt\sample .
 These contain the most common TF calls and illustrate how to handle
 the TF user interface.

 For more detailed information about using the samples, refer to the
 headers of the files and the README.TXT file.

4.6 Error Codes of the Driver on the Program Interface

Result Value With ERRNO (type: unsigned short), the driver transfers an error code to the calling program. If the value 0x9500 is entered in the high word in the result value of the SIMATIC NET TF functions, this means that the low word contains a driver error code.

Error Codes The driver can transfer the following error codes:

Error Code	Meaning
0x0000	No error, successful
0x00ca	The resources in the driver are exhausted
0x00cb	Error configuring the driver
0x00cd	Invalid call
0x00ce	Parameter error
0x00d1	The module is not responding
0x00d2	Lack of memory
0x00d7	There is currently no message for this process
0x00d8	The length of the buffer transferred to the driver is too short
0x00db	The job sent to the driver could not be executed in the required time
0x00dd	Invalid job
0x00ea	No license exists for this function
0x00f5	Invalid subsystem
0x0118	Length of the buffer transferred to the driver is too long
0x0119	Length of the buffer transferred to the driver is too short
0x012c	Wrong channel type
0x012d	Negative acknowledgment for identify
0x012f	No time stamp found
0x0131	Invalid host driver job
0x0132	Invalid handle
0x0133	Job only allowed for the CP 5412 (A2)
0x0134	CP blocking access
0x0135	Length of the buffer transferred to the driver is too short

Notes

5 Important Information to Supplement the “TF User Interface” Manual

This chapter contains information that is intended to supplement the "TF User Interface" manual.

5.1 Additional Information

Introduction	Please note the following information that is in addition to the sections in the "TF User Interface" manual.
Variable Services	With the variable services <code>tf_read()</code> and <code>tf_write()</code> , only one type of variable can be used in a call according to the variable specification. If a call contains, for example, a named variable (NAME) and a numeric variable (NUM_ADDR), the function will not be executed correctly.
TF User Interface Section 16.2.4	In the TF User Interface manual, Section 16.2.4, the last component of the <code>PI_ADD_INF</code> component is as follows: <code>CHAR (*dom_use) [TF_MAX_DOM_PI] [TF_MAXNAMLEN_DOM];</code>
Acknowledgments of the TF Interface	<p>Acknowledgments sent by the TF interface, such as <code>rsp_msg_exch</code>, are not acknowledged by the module.</p> <p>If the user specified incorrect values for these acknowledgments that cannot be checked by the <code>TF_library</code>, the function <code>TF_OK</code> is returned as the return value although the CP 1413 discards this acknowledgment as being incorrect. For this reason, make sure that for example <code>obj_adr</code> is correctly set for <code>rsp_msg_exch</code>.</p>

6 Where to Obtain Help

The following chapter lists people to contact about SIMATIC NET, as follows:

- Who to contact with technical questions
- Who to contact about SIMATIC NET training courses

6.1 Help with Technical Questions

- Documentation** You will find information about topics related to using this software in the following sources:
- In the relevant printed documentation
 - In the help system integrated in the software (F1 key)
 - In text files on the diskette(s) supplied
- Who to Contact** If you have technical questions about using the software and your problem is not dealt with in the documentation or in the integrated help system, please contact your Siemens representative or dealer.
- The addresses are listed in the following:
- in our Catalog IK 10
 - in CompuServe (go autforum > library area SIMATIC NET)
 - on the Internet (<http://www.aut.siemens.de>)
- Common Questions** Our customer support on the Internet provides useful information and answers to common questions. Under FAQ (Frequently Asked Questions), you will find a variety of information about our entire range of products.
- The address of the AUT homepage in the worldwide web of Internet is:
- <http://www.aut.siemens.de/net>
- Hotline** If you have problems, you can also contact our hotline:
- Telephone: 0911 - 895 - 7000
(from abroad +49 - 911 - 895 - 7000)
 - Telefax: 0911 - 895 - 7001
(from abroad +49 - 911 - 895 - 7001)
 - E-Mail: simatic.support@nbgm.siemens.de
 - Mailbox (BBS, analog/ISDN, 8N1):
0911 - 895 - 7100
(vom Ausland +49 - 911 - 895 - 7100)

6.2 Contacts for SIMATIC NET Training

- Course Enrollment** Siemens AG
Trainings-Center für Automatisierungstechnik
AUT 959 Kursbüro
Östliche Rheinbrückenstraße 50
76181 Karlsruhe
- Telephone 0721 - 595 - 2917
from abroad +49 - 721 - 595 - 2917
 - Fax 0721 - 595 - 6987
from abroad +49 - 721 - 595 - 6987

Notes

Glossary

AS-I	Actuator-Sensor Interface - a cable for direct connection of simple binary sensors and actuators (transmission of small amounts of information - previously: SINEC S1).
ASCII	American Standard Code of Information Interchange - standardized 7-bit character code for data transmission and processing in programs (DIN 66003). With the extended ASCII code (8-bit code) 256 characters can be represented.
COML	Configuration Management Local - Configuration software for SINEC communications processors.
CSMA/CD	Carrier Sense Multiple Access/Collision Detection - access technique for bus systems complying with IEEE 802.3 (Ethernet).
CP	Communications Processor - module for installation in computers or programmable logic controllers.
DB	Database - the local database describes the communication network from the point of view of the local system. The database is accessed by system routines when the connection is established.
DPRAM	Dual-Port Random Access Memory - allows simultaneous access by two devices (CP and CPU) to one memory chip (RAM).
Driver	Software required for the data transfer between applications and the -> CP.
ESD Guidelines	Electrostatically sensitive devices - guidelines for handling electrostatically sensitive devices.
FO	Fiber Optic
IEEE	Institute of Electrical and Electronics Engineers
Industrial Ethernet	Cell network complying with the international standard IEEE 802.3 (Ethernet) designed for use in an industrial environment (previously SINEC H1).
IRQ	Interrupt Request
ISA	Industrial System Architecture - PC bus standard; ISA Bus - expansion bus for XT and AT computers.
ISO	International Standards Organization - international organization based in Geneva responsible for creating general standards particularly in the field of data transmission.
LAN	Local Area Network for direct connection of computers.

MAC	Media Access Control - techniques for controlling access by a station to a common transmission medium.
MAC Address	Address to distinguish different stations on a commonly used transmission medium.
MMS	Manufacturing Message Specification - user interface of MAP.
Multicast Address	The multicast address is an address for a particular group of stations.
Network	A network consists of one or more interconnected subnets with any number of stations. Several networks can exist side by side. There is a common node table for every subnet.
PC	Personal Computer
PG	Programming device - a programming device of the SIMATIC product range produced by Siemens AG; used for programming and configuration and for maintenance and service.
PDU	Protocol Data Unit - user data plus control information belonging to a layer of the ISO 7-layer model.
PROFIBUS	Process Field Bus - a field bus complying with DIN 19245 (previously SINEC L2).
Protocol	A set of rules governing data transmission. Using these rules, both the formats of the messages and the data flow during transmission can be specified.
S7 PLC	Abbreviation for a programmable logic controller of the SIMATIC product range produced by Siemens AG.
Services	Services provided by a communication protocol.
SIMATIC NET	New name of the SINEC range of products.
SIMATIC NET Industrial Ethernet	SINEC bus system for industrial applications based on Ethernet.
SIMATIC NET PROFIBUS	SINEC bus system for industrial applications based on PROFIBUS.
SR Interface	SEND/RECEIVE programming interface, also known as the PC -E-S5 programming interface.
System	All the electrical equipment within a system. A system includes, among other things, programmable logic controllers, devices for operation and monitoring, bus systems, field devices, actuators, supply lines.
TF	Technological Functions - MMS-compatible user services in SINEC.
TPDU	Transport Protocol Data Unit - presentation of a message from the transport system (layer 4) of the sender to the transport system of the receiver (layer 4).