

MTC200/MT-CNC
Custom Display System
18VRS
Application Manual

SYSTEM200

Title	Custom Display System 18VRS
Type of document	Application Manual
Documentation type	DOK-CONTRL-BVS*PRO*V18-AW01-EN-P
Internal filing	<ul style="list-style-type: none"> • Folder 3 / Register 4 • Drawing number 120-0400-B320-01
Purpose of the document	This document contains the configuration instructions for creating customized screens.

Configuration control

Documentation identification of previous releases	Date	Comment
109-0768-4198-00	07.96	New issue 17VRS
120-0400-B320-01	11.98	Update to 18VRS

Copyright © INDRAMAT GmbH, 1998

Copying this document, and giving it to others and the use or communication of the contents thereof without express authority are forbidden. Offenders are liable for the payment of damages. All rights are reserved in the event of the grant of a patent or the registration of a utility model or design (DIN 34-1).

Validity All rights are reserved with respect to the content of this documentation and the availability of the product.

Published by INDRAMAT GmbH • Bgm.-Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main
Telefon +49 (0)9352/40-0 • Tx 689421 • Fax +49 (0)9352/40-4885

Abt. ESM (RW)

Note This document is printed on paper bleached without chlorine.

Contents

1 Basics of the Custom Display System	1-1
1.1 Introduction	1-1
1.2 Components and Explanation of an 'Image'	1-1
1.3 Auxiliary Functions	1-2
1.4 Cooperation with the SPS Program	1-2
2 Creating an Image	2-1
2.1 Example: Turning Machine	2-1
2.2 Image Editor	2-2
Functionality of the Programming and Run Versions	2-3
Handling the Menus	2-4
Handling the Dialog Windows	2-4
Operator Input Strategy	2-5
2.3 First Image	2-6
Image Mask: The 'Invariable' Background	2-6
Defining Variables	2-9
Using Soft Keys	2-15
Machine Function Keys	2-16
SPS Keys: SPS Variable as a Soft Key	2-18
2.4 Creating Pictograms / Graphics	2-20
2.5 Further Images	2-23
Image for Turning Machine Diagnosis	2-23
Image for Monitoring the Workpiece and Selecting its Parameter Values	2-25
3 Functions of the Integrated Editor	3-1
3.1 File Menu	3-1
Create a New Image File	3-1
Load an Existing Image File	3-2
Save the Current Image File	3-3
Save the Current Image File Under a New Name	3-3
Delete an Image File	3-3
Load Image Files in Text Format	3-3
File Info	3-4
3.2 Edit Menu	3-5
Editing the Variable List	3-5
Editing the Static Image Mask	3-31
Editing Soft Keys	3-36
Editing Machine Function Keys	3-47
Editing SPS Keys	3-51

Editing the Image Banner Line.....	3-52
Editing the Image-Related Help Text.....	3-52
Defining the Cursor Start Position.....	3-53
3.3 Global Menu.....	3-53
Base Selections.....	3-53
Editing the Customized ASCII Character Sets.....	3-59
PC-ASCII Characters.....	3-61
Documentation.....	3-67
Interconnection of the Image Files.....	3-76
Archiving Functions.....	3-77
Graphics Editor.....	3-83
Scenario Editor.....	3-90
3.4 Options Menu.....	3-93
Simulation Selections.....	3-93
Editor Selections.....	3-94
PC-Schriftart.....	3-96
3.5 Help Menu.....	3-97
Menu-Related help.....	3-97
Help Overview.....	3-97
Help-Related Help.....	3-97
Changes from Version 17 to Version 18.....	3-98
Version Display.....	3-100
3.6 End Menu.....	3-100
4 Index	4-1
5 Figure	5-1

1 Basics of the Custom Display System

1.1 Introduction

The Custom Display System can be used for displaying and modifying control data. It contains an integrated editor that can be used for creating an unlimited number of customized screens (images). All created images can be interlinked as required via function keys (soft keys). This enables the user to structure the system individually.

The following data items can easily be displayed:

- SPS data: SPS variables; absolute addresses
- NC data: NC variables, events
- Axis data: Position, velocity and torque of all NC axes
- Diagnosis messages

Using different display formats increases the clarity of the image and provides the user with a swift overview of the represented control data. In addition to the conventional representation of numbers and text strings, the data may be displayed as graphics, bars or scales.

The Custom Display System offers various functions that permit NC and SPS data to be viewed and manipulated.

A password system is used that permits various operator input and security levels to be implemented that prevent an unauthorized modification of control data.

This program is available in two versions: As a programming and as a run version. The latter has limited functions. The following description refers to the programming version, since it provides full functionality. A list of the available functions is contained in the chapter 'Functionality of the Programming and Run Version', page 2-3.

1.2 Components and Explanation of an 'Image'

	An image is a self-contained unit that consists of the following components:
Image mask	is invariable; it is the background image proper.
Variable definitions	any number; these are the variable outputs.
Soft keys	are keys that are visible on the screen, and may have a specific activity assigned.
Machine function keys	are SPS inputs that are visible on the screen, and may have a specific manipulation of the SPS assigned. (see Chapter 'Editing Machine Function Keys', page 3-47).
SPS keys	any number A SPS key interconnects a binary SPS variable with an activity in the PC in the same ways as it is done using a function key.
Header line	Image banner line
Help text	may contain up to 10,000 bytes. The help text can be used, for example, for providing the operator with information about the image contents (handling, etc.).
Cursor start position	When the image is loaded, the cursor in the image is set to that position. The cursor start position is of interest if a function is used that depends on the cursor position (see Chapter 'Defining the Cursor Start Position', page 3-53).
	An image is a separate file that contains all the above-mentioned components. Any number of images (image files) may be created that may be interlinked as required (via function keys, for example).

There is an in-built editor that can be used for creating the images. In Chapter 3 you will find a detailed description of that editor.

The selections made in the images form the local configuration level.

In addition, there is a global configuration level that permits selections to be made that are common to all images. Those selections are grouped in 'base selections' and may individually be saved.

All interlinked images form a project. This free interlink has neither a 'beginning' nor an 'end'. The structure of the menu levels is within the responsibility of the creator of the images.

1.3 Auxiliary Functions

There are management and auxiliary functions available to the integrated editor.

Chiefly, these are functions that are employed for image file management (see Chapter 'File Menu', page 3-1), documentation (see Chapter 'Documentation', page 3-67), and filing and archiving (see Chapter 'Archiving Functions', page 3-77). In addition, there are editors for creating various user data types. The editor possesses a powerful help function.

1.4 Cooperation with the SPS Program

Increasingly, symbolic variables with compiler-specified addresses are, in addition to direct inputs and outputs, used on program level in the SPS programming system.

MAP file There are no absolute addresses in function blocks. In order not to restrict the usability of the SPS program variables to the absolute variables, there is a mechanism of data transfer between the SPS programming system and the Custom Display System: the MAP file.

The MAP file contains names and addresses of all variables that are used in the SPS program and its (at least declared) function blocks. Thus, the variables in function blocks may also be accessed from the Custom Display System.

To create that MAP file, the 'Create MAP file' switch in the 'Options/Compiler' menu item of the SPS programming system must be active.

When the Custom Display System is started, the MAP file is accessed and checked whether it matches the program in the SPS. If it doesn't, all SS variables in the Custom Display System are marked as unknown. Variables from other controller components (NC, axes, ...) may be displayed independently of the MAP file.

Access to the controller is not possible in off line mode. Thus, the MAP file that is to be used is unknown. In this case, a selection of all existing MAP files is offered. The MAP files are of the same name as the related SPS program.

2 Creating an Image

i A typical control application shall be used for illustrating the utilization of the display system. Step by step, we create an image. In this process we use different display formats and see, how the individual images may be linked with each other.

2.1 Example: Turning Machine

As a typical control application we use a lathe as it is employed for machining shaft ends (straight turning). Those shafts are machined in order to prepare them for the installation of bearings. The size of the corresponding bearing shall be entered via the Custom Display System before the shaft is machined. The machining cycle proper may exist as an NC cycle that requires to have certain parameter values assigned; or as an NC program that can also have parameter values assigned.

Before an image can be created in the Custom Display System, there must be a SPS program (controlling the NC handling) and a corresponding machine parameter record (processes and axes).

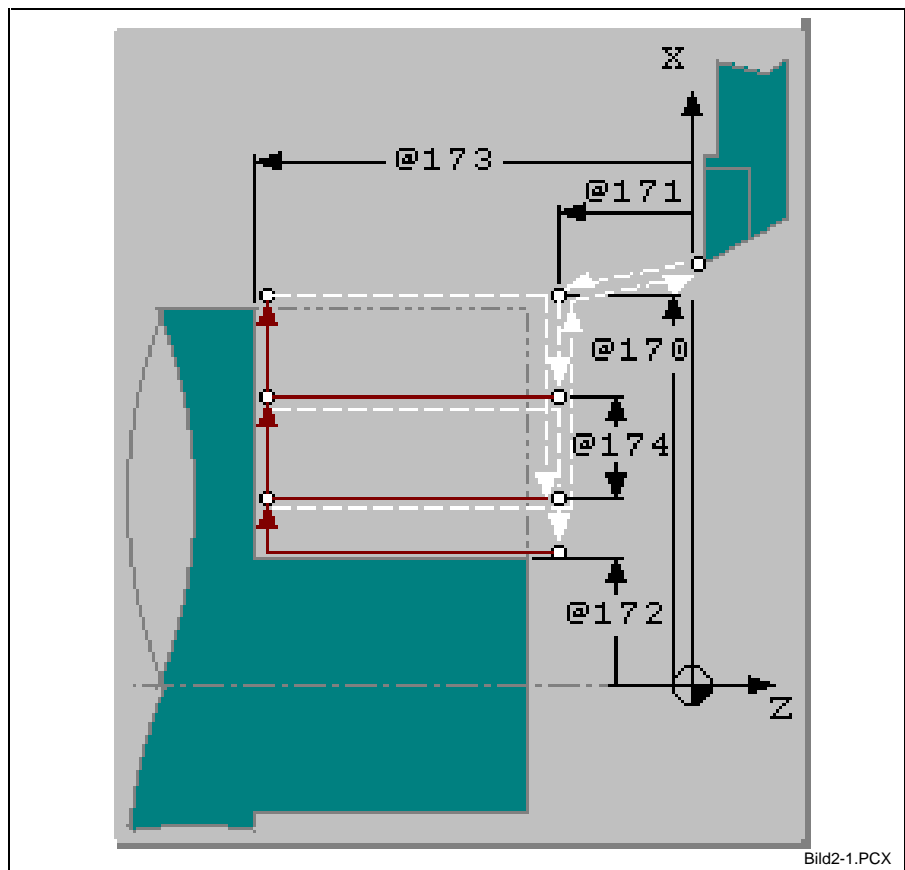


Fig. 2-1: Straight turning

Straight turning sequence

There is an unmachined shaft in the lathe's machine chuck. The size of the bearing, that shall be installed on the shaft, is entered via the Custom Display System, and the NC program is started.

At rapid traverse, the tool moves to the start point $\emptyset X$ (@170) and Z (@171). Next, it moves at rapid traverse by the depth of cut (@174) in the direction of the X axes. At a feed rate that is specified in the NC program, straight turning is performed up to the end point Z (@173), then faced by the infeed (@174), and withdrawn at rapid traverse to the start point Z (@171). That process of feeding, turning, facing, and withdrawing is repeated until the final point Z (@173) is reached. The last infeed is

adapted. The return at rapid traverse rate, first at the start point Z (@171), then at the start point ØX (@170), followed by withdrawing to the load position, terminates the NC program.

The machined shaft is manually removed from the machine chuck.

The following sections show how the Custom Display System can be used for implementing 'Monitoring' and 'Operator control' for the process described above. To maintain clarity, we develop a solution that shall be as simple as possible, but will not be complete.

2.2 Image Editor

The integrated image editor permits images to be created and modified. That process is controlled via menus; editing is done in dialogs. Chapter 3 contains a detailed description of all menu items and dialogs.

⇒ To activate the editor, press <Enter> (factory setting) or

⇒ a user-defined key or key combination (e.g. <Ctrl>+<Enter>).

A menu line is displayed on the second menu line: the editor's main menu. In addition, a brief help text about the current menu item or dialog is displayed on the bottom screen line.

Activating the editor requires the 'Edit images' access privilege (see password management of INDRAMAT GmbH).

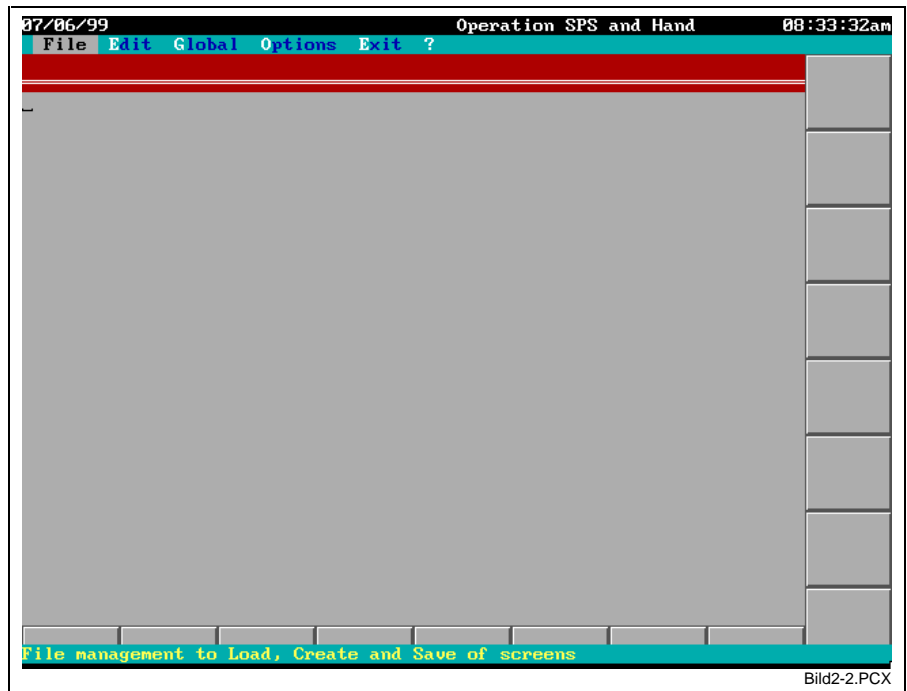


Fig. 2-2: Activating the integrated editor

A menu item that cannot be accessed is marked as inactive (dimmed representation).

Functionality of the Programming and Run Versions

Both program versions offer layered functionality. The differences are primarily in the availability of individual menu options in the Image Editor. Both versions however contain full display and machine operation functionality.

Menu option	Run version	Programming version
Create file/new image	–	√
Load file/image	√	√
Save file/image	–	√
Save as file/image	–	√
Delete file/image	–	√
Load file/text format	–	√
File/info	√	√
Edit/Variables	–	√
Edit/Image Mask	–	√
Edit/Soft Keys	–	√
Edit/Machine Function Keys	–	√
Edit/SPS Keys	–	√
Edit/Help Screen	–	√
Edit/Cursor Position	–	√
Global/Basic Settings	*)	√
Global/ASCII Characters	–	√
Global/Documentation	–	√
Global/Image Networking	√	√
Global/Archive/File Archive	–	√
Global/Archive/Project Archive	√	√
Global/Archive/Retrieve Archive	√	√
Global/Archive/Delete Archive	√	√
Global/Graphic	–	√
Option/Simulation	–	√
Option/Settings	–	√
End	√	√
Help/Menu	√	√
Help/Index	√	√
Help/Help for Help	√	√
Help/New in Version 18	–	√
Help/Version	√	√

*) In the runtime version, the menu option 'Load basic settings' is provided in place of the 'Basic settings' submenu

Handling the Menus

The image editor is controlled via a menu. It consists of:

- a main menu line, and
- various pull-down menus (submenus).

There are three different methods of controlling the main menu line and the submenus:

- ⇒ Use the cursor keys to select and the <Enter> key to open a menu, and the <Esc> key to close it. Press the <CursorRight> or the <CursorLeft> key in a menu that immediately follows the main menu line to open the neighboring menu.
- ⇒ Select the marked letter of a menu entry to open that menu. Alternatively, use the key combination <Alt>+<letter>.
- ⇒ Click the mouse button on a menu entry.
Click the right-hand mouse button to close an open menu.

Press the <F1> key (factory setting, may be customized) at any point in the menu to display an extensive help text. The help text may contain (colored) cross references to related help topics. Press the <Alt>+<F1> key combination to go back to the previous help page. Press <Alt>+<S> to look for a specific help topic. Press the <Esc> key to exit the help system.

To exit the image editor, select the 'End' menu item, or press <Esc> in the main menu. The system prompts you to save the image if the current image has been modified.

Handling the Dialog Windows

A dialog window contains a self-contained user dialog that consists of different elements that are used repeatedly:

- Input element (single-line input)
- Selection element (two-dimensional selection; always visible)
- Selection list element (one-dimensional selection that is opened upon request)
- Text editor element (free text editor)
- Text output element (single-line text display; for dynamic output, for example)
- Bar display element (moving bars; for progress indicators, for example)
- Numeric input element (number input using the cursor keys; range limitation)
- Bar input element (entering values by moving a mark on a bar)
- Check box element (selecting options with [x] and (*))
- Button element (buttons for closing the dialog, for example)


At any one time, only one of the above-mentioned individual elements can be active in the dialog window. The active element is highlighted by a different color, and is focused. Press the <Tab> key to focus the individual elements one by one in succession. Press <Shift>+<Tab> to focus backwards.

The function of each individual element is explained by a text next to it. That text contains a marked letter. Press that letter together with the <Alt> key to focus that element directly.

Each individual element may as well be focused by clicking the mouse button on it.

A display-only element cannot contain a focus. Those elements provide the user with supplementary information about the dialog window. Entering data or selecting options is not possible in a display element.

Individual elements may temporarily be disabled (i.e. they are not reachable). This is shown by a dimmed color. That state may change dynamically.

If several buttons exist, one of them may, irrespective of the focusing state, be marked by arrowheads at its margins: . This is the button that can directly be controlled by pressing the <Enter> key.

Usually, a brief help text to the focused dialog element is displayed on the bottom screen line. Press the <F1> key (factory setting) if you wish to see an extensive help text.

A dialog window can usually be closed by pressing the <Enter> key (confirming) or the <Esc> key (canceling). Using the mouse, the effect of the <Esc> key can also be reached by clicking the mouse button on the colored rectangle in the left-hand top corner of the frame, or by simply clicking the right-hand mouse button on any location.

Operator Input Strategy

Whenever names, numbers or other designations shall be entered, the system tries to provide a selection list from which existing data may be chosen.

In the 'Load file/image' menu item, for example, the list offers a list of the existing files instead of prompting the operator to enter the name of the required file. If a new name must really be entered, various supporting features can usually be expected:

- 1) Pressing the <CursorDown> button usually displays the list of the last entries. From here, you may choose an entry (press the <Enter> key) that can further be edited.
- 2) Frequently, a selection of existing similar data is available from which an entry can be selected.
- 3) For complex entries or with very large selection quantities, there is a complex input assistant available when you press the <Enter> key while the input field is blank.

For some text entries, pressing the <Alt>+<A> key combination displays all text characters that are available for that input. This permits characters to be entered that cannot be reached via the keyboard.

2.3 First Image

First, we want to create a status overview image that contains important information about the state of power activation, the program status, the selected mode, and the program sequence.

To create a new image (an image file), select the 'Create file/new image' menu item. The system asks for the name of the image file. The name may contain up to 8 characters. In our example, we want to call the first image file 'STATUS'.

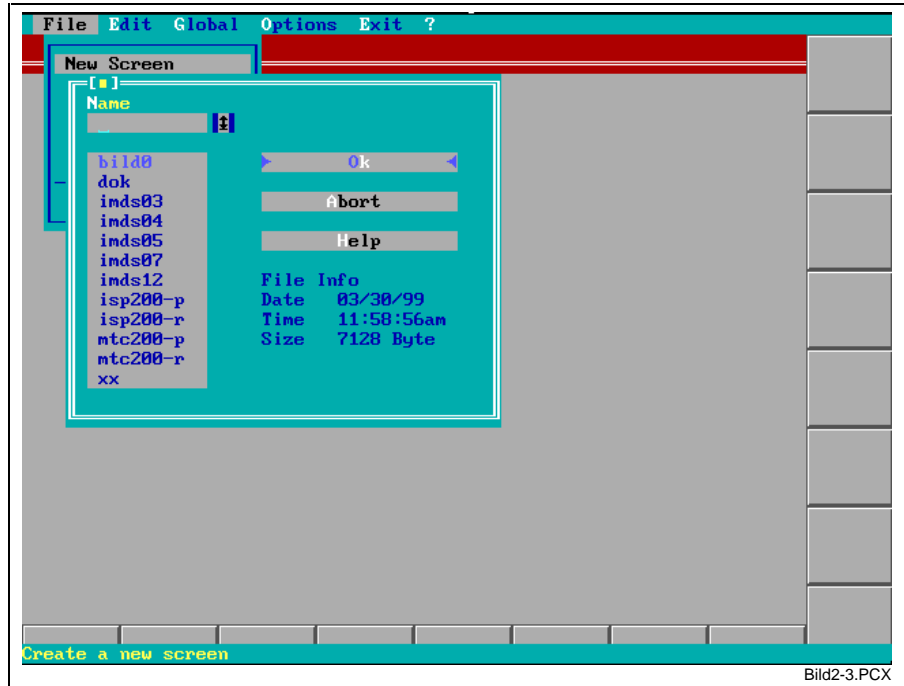


Fig. 2-3: Entering a new image file name

Note: A 'session file' is created when the Custom Display System is exited. That session file contains information about the last state of the program (such as the last configuration file and the last image file to have been employed). If that file does not exist (e.g. after the program has newly been installed), the default setting (global configuration) and the image file 'BILD0' are loaded when the Custom Display System is started. The BILD0 file is included in the standard delivery.

The 'Edit' menu item permits all components of that image to be entered or edited. We want to do this, step by step, in the following sections.

Image Mask: The 'Invariable' Background

In a new image, we first want to draw the immobile background (here referred to as 'image mask'). This includes all components that are not dependent on current controller variables (i.e. that never change).

Note: In order to keep the number of elements that must dynamically be changed in the screen at a minimum, the image should thoroughly be split into fixed and variable components. This increases the velocity at which the screen is updated.

To draw the invariable background image, select the 'Edit/image mask' menu item. A dialog window 'Image mask' appears on the screen that permits the selections to be made that are necessary for processing (see

Fig. 2-4). Select the 'Edit mask' button to bring the output area in the foreground for processing.

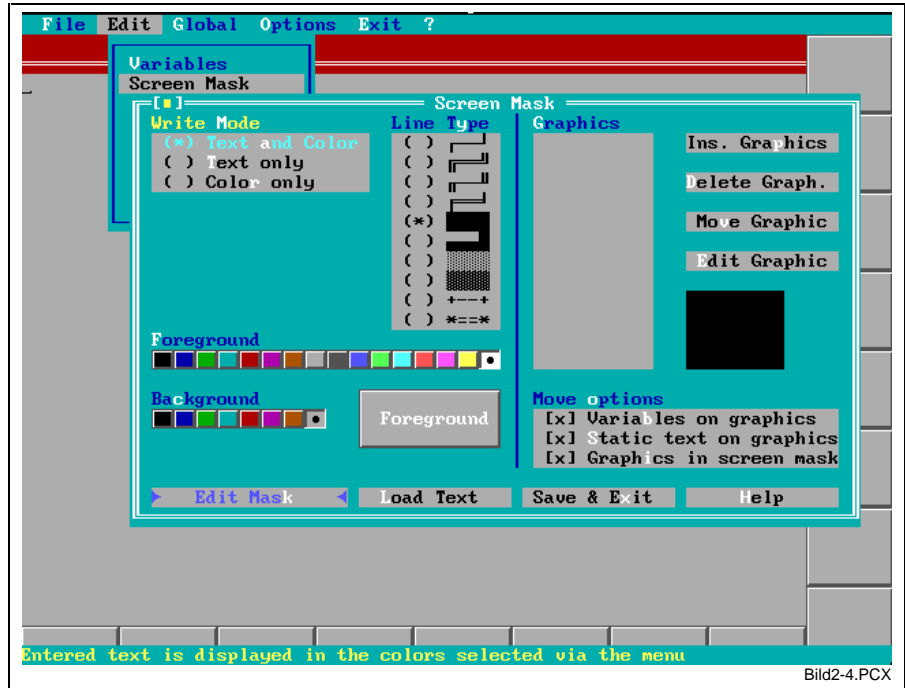


Fig. 2-4: 'Edit/image mask' menu item

Each image mask has a text grid underlaid. Graphics and colored text may be placed on this grid as required.

Creating text lines is facilitated by a key combination. Pressing the <Shift> key together with a cursor key draws a text line in the direction that is indicated by the cursor key. Corners, junctions, and crossings are added automatically. Color and line type of the drawn line can be selected from the 'Image mask' dialog window. A total of 10 different line types are available.

If you wish to employ a character that is not available via the keyboard, press the <Alt>+<A> key combination. This opens a window that contains all representable characters (see Fig. 2-5), and makes all 256 characters of the PC character set available.

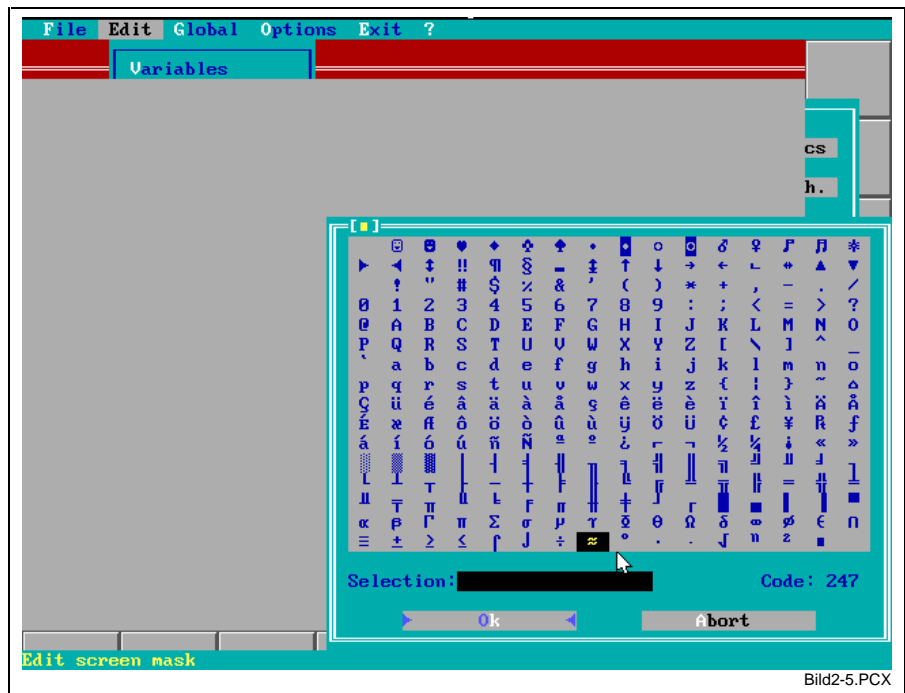


Fig. 2-5: List of all representable characters

Corrections can be made in the created image using

- the <Delete> key (clears the character under the cursor position);
- the <Backspace> key (clears the character to the left of the cursor position); or
- using the <Space> bar for overtyping.

Press <Enter> or <Esc> to exit the text editor.

Once editing, labeling, drawing lines, and changing colors have been completed, our image (example) could look like that:

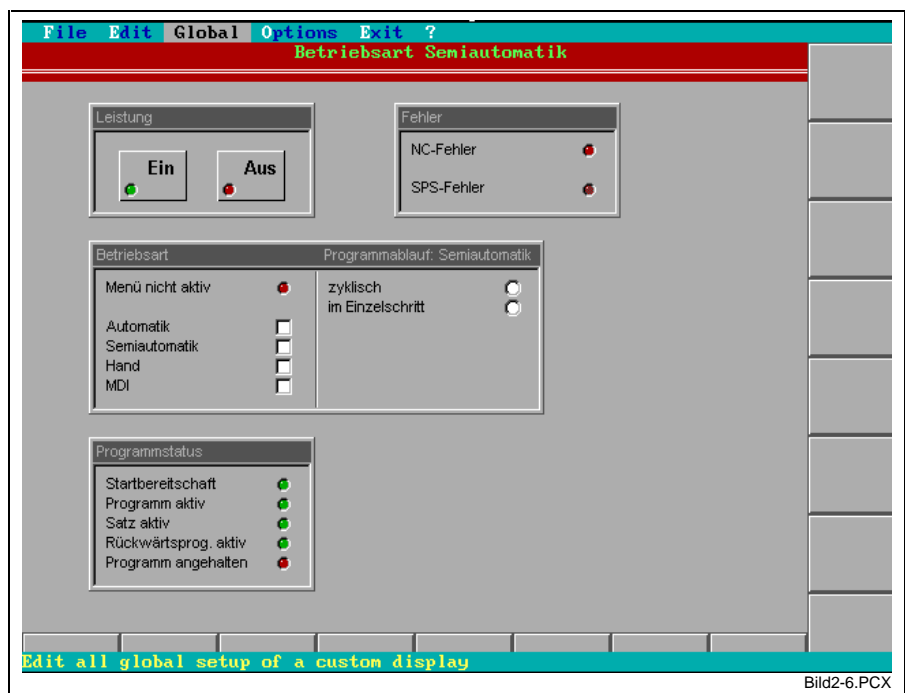


Fig. 2-6: Finished 'invariable' image

Selecting different foreground and background colors permits the invariable image to be made more attractive. Fig. 2-6 shows an attempt of creating a simple 3-D effect.

Defining Variables

Variables are the dynamic displays proper. They always consist of the interconnection of a specific display element and a control variable. Use the 'Edit/variables' menu item to define the variables that shall be displayed in the current image (see Fig. 2-7). In a new image, variables have not yet been defined. Thus, some of the buttons in the 'Variable selection' dialog window are not enabled.

In our example, we first want to fit the PROGRAM_STATUS box with current variable values. To do this, the required operator inputs will be performed below. It is assumed that a 'P00S' STRUCT variable, that represents the status of the master process, has been defined in the SPS program.

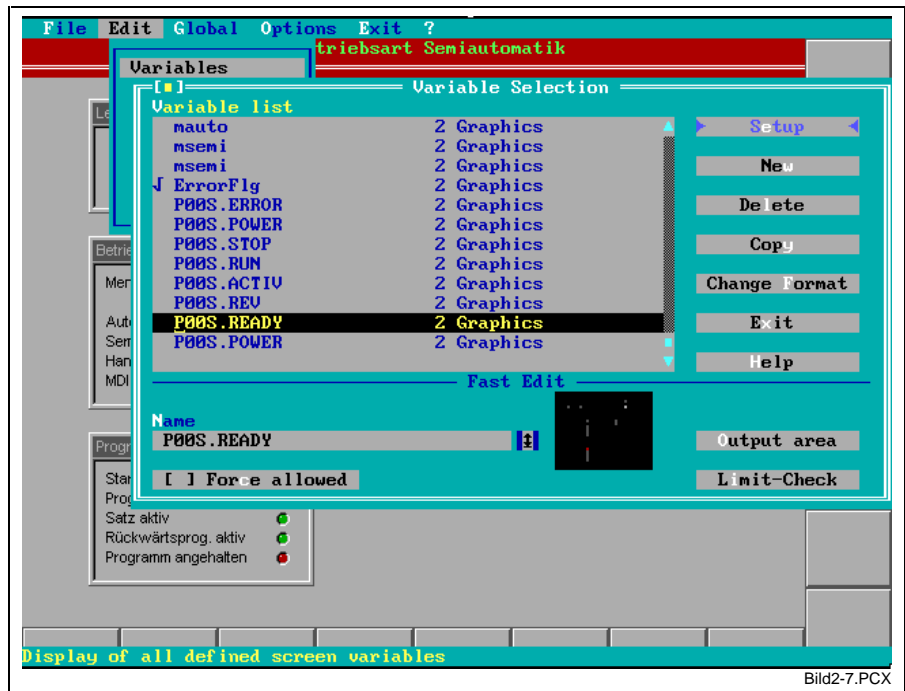


Fig. 2-7: List of all variables of the image

This window permits the variable definitions of the image to be organized. The number of variables is not limited. Some components of the variable definition may directly be processed in the lower part of the window ('Swift processing' separation line). An miniature image shows the position of the individual variables as a colored area.

The 'New' button permits a new variable to be entered in the variable list. A list of all available output elements is displayed when that button is selected. From that list select the element that shall be used for outputting the variable on the screen (see Fig 2-8).

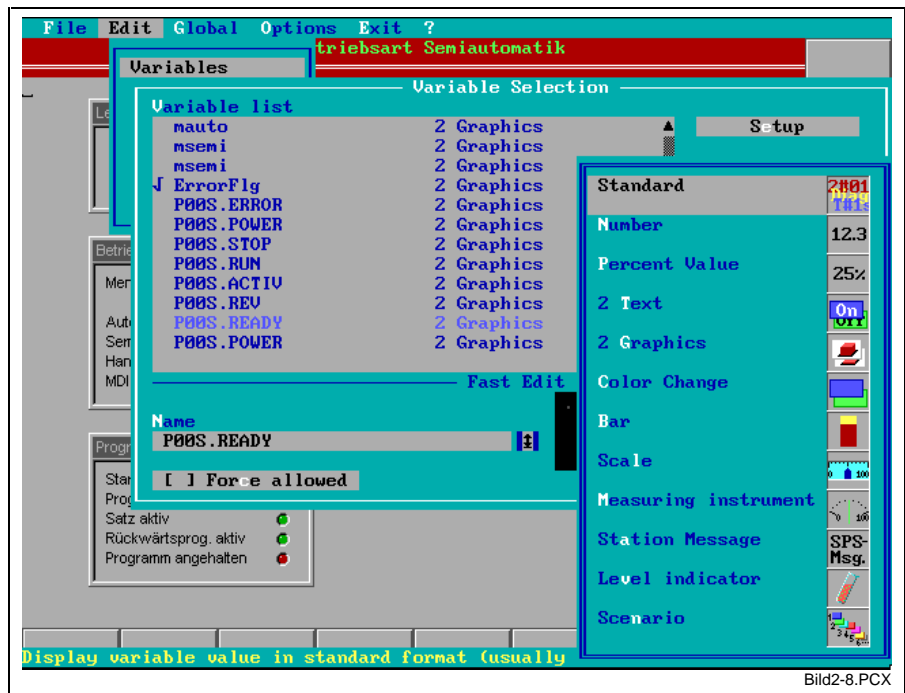


Fig. 2-8: List of all available output elements

Please refer to the Chapter ‘Display Elements’ on page 3-14 for a detailed description of the different display elements.

As a first step, we want to display the variable in its standard format (i.e. exactly as it will be represented in the SPS program, for example). Next, we open the special dialog for configuring the ‘standard’ display element (see Dialog for the display element „standard“).

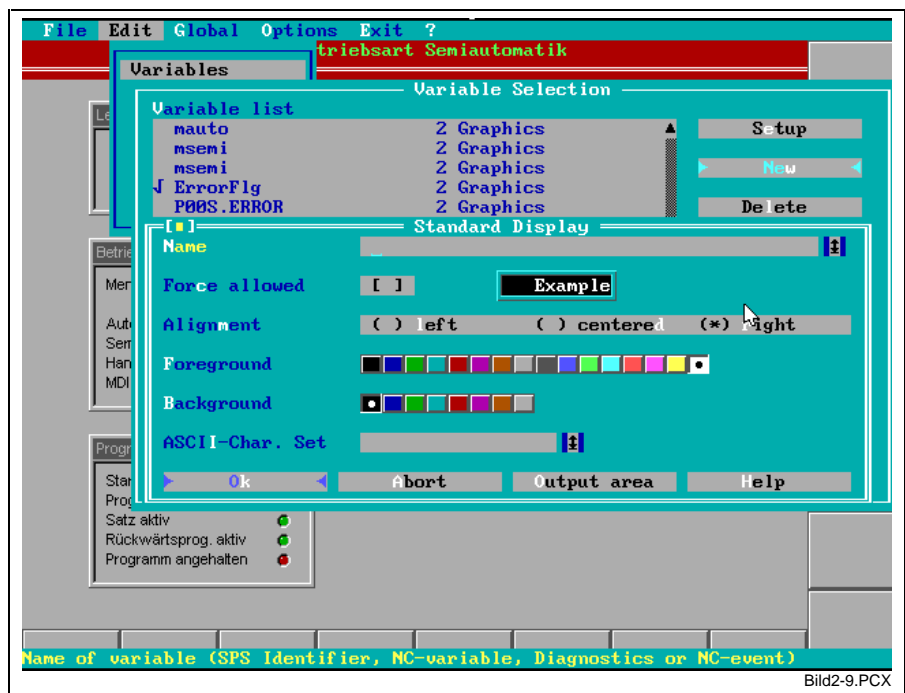


Fig. 2-9: Dialog for the display element „standard“

The name of the control variable that supplies the value of the display must be entered in the topmost line. If required (press the <Enter> key while the input field is *blank*), there is a convenient input assistant available that supplies a multi-level selection of all possible variables (see Fig. 2-10).

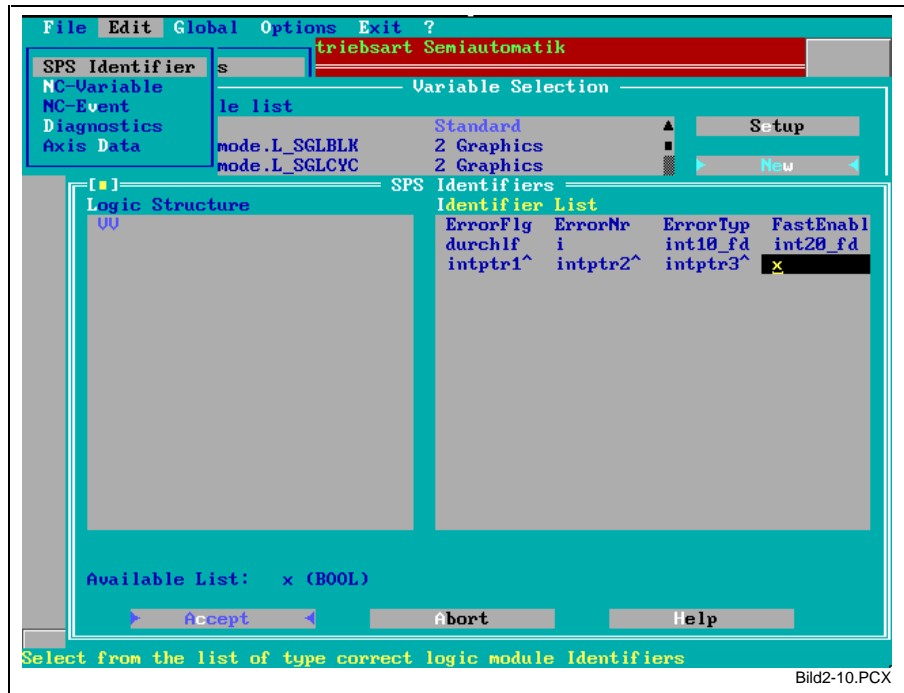


Fig. 2-10: Input assistant for SPS variables

Once the variables have been entered, the display attributes (text alignment and color selection) can be defined. Select the 'Output field' button to define the display size and the position of the variables in the output area. The output area appears in the foreground of the screen. It contains a colored area that represents the variable's display element. Use the cursor keys to move the display element to the required position. To adjust the size of the display element, either use the mouse to drag the bottom right corner (mark) or press the <Shift>+<Cursor> key combination.

In our case, the output field (display element) shall be three characters wide and one line high, and be positioned next to the word 'Ready to start' in the PROGRAM_STATE box.

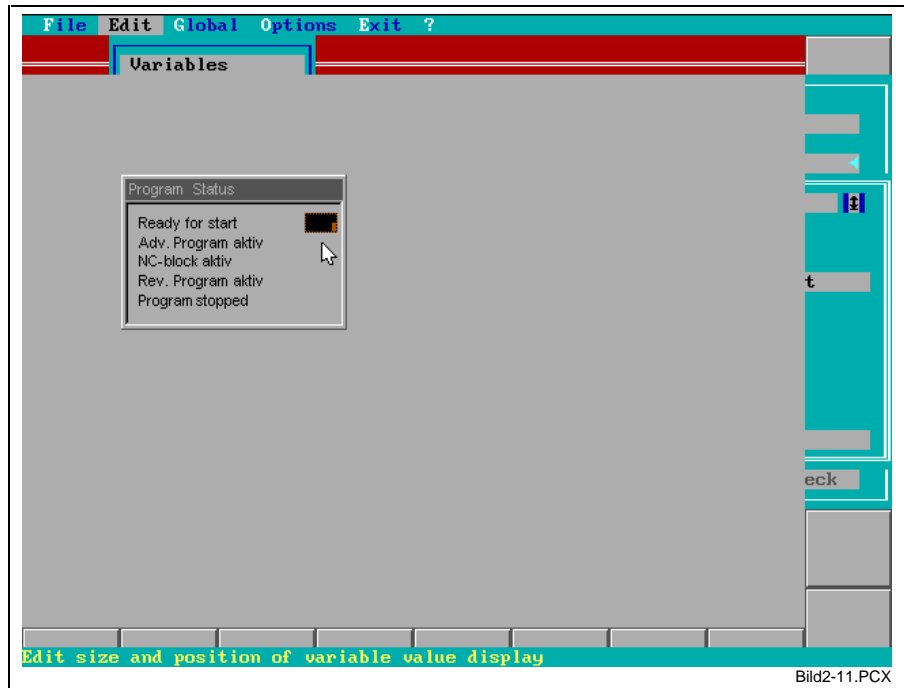


Fig. 2-11: Defining the output field of the display element

The value of the specified control variables will be displayed (as shown in Fig. 2-12) once the definition of all variables of the PROGRAM_STATE box has been completed.

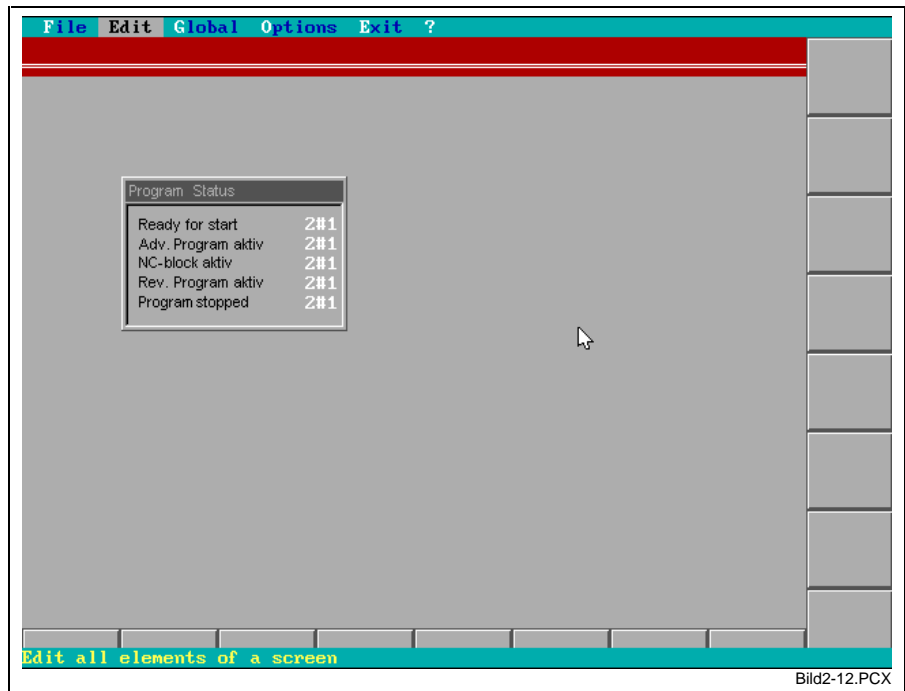


Fig. 2-12: Displaying the machine program status

Now, we have a fairly clear display of the associated variables without the machine operator being required to know the exact designation of the variables. However, the SPS-related display with preceding number base 2# is disturbing. We therefore want to show some alternatives:

- 'Number' may be selected instead of the 'standard' display element. Selecting the 'decimal' number format permits the values to be displayed without the preceding number base, i.e. as '0' or '1'.

Note: The 'Conversion' button permits the existing 'standard' display to be directly converted into 'Number'.

- The '2 texts' display element permits two alternative texts to be displayed instead of numbers. For example, 'ON' and 'OFF' can be displayed instead of '1' and '0'. The following figure shows the dialog.

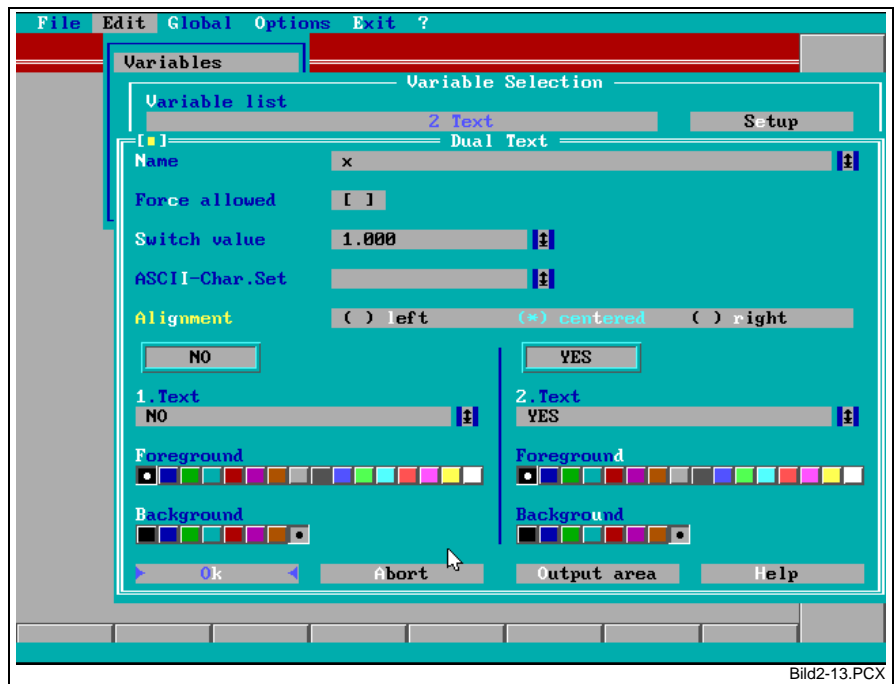


Fig. 2-13: Dialog for a '2 texts' display element

Besides being used for Boolean variables, the display element may also be used for numerical variables (e.g. INT variables). The switchover value defines the point at which the texts are toggled.

- The variable value may be displayed by 'Changing colors'. This means that the specified rectangular area changes its foreground and/or background colors when the switchover value is reached.
- Surely the most demanding method is using '2 graphics' for representing the variable value. Those graphics are, analogous to the '2 texts', toggled when the switchover value is reached. Fig. 2-14 shows the related dialog.

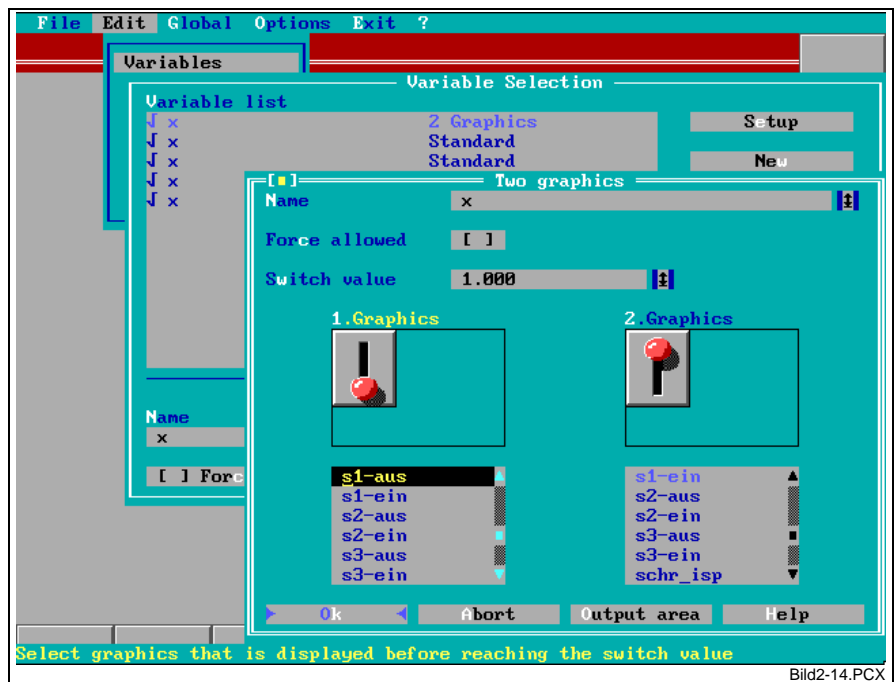


Fig. 2-14: Dialog for a '2 graphics' display element

Since graphics permit a very detailed representation, those display elements open virtually unlimited possibilities of alternating variable value

displays. Switches or entire plant sections may be animated, for example. This can make the representation very genuine.

Note: In order to be displayed at highest performance possible, graphics must exist in a specific internal format. There is a special graphics editor (see Chapter 'Graphics Editor', page 3-83 ff.), which can create that format. Some prepared graphics are included in the standard scope of delivery of the Custom Display System.

The remaining fields PERFORMANCE, MODE and PROGRAM SEQUENCE can be filled in in the same way. Fig. 2-15 shows a possible layout of the remaining variable definitions.

Note: Variable definitions that are similar to each other can be created by simply copying them ('Copy' button in the 'Edit/variable' window), assigning different control variables to them and placing the output field as required. These operator inputs can swiftly be made in the same window in the 'Swift editing' section.

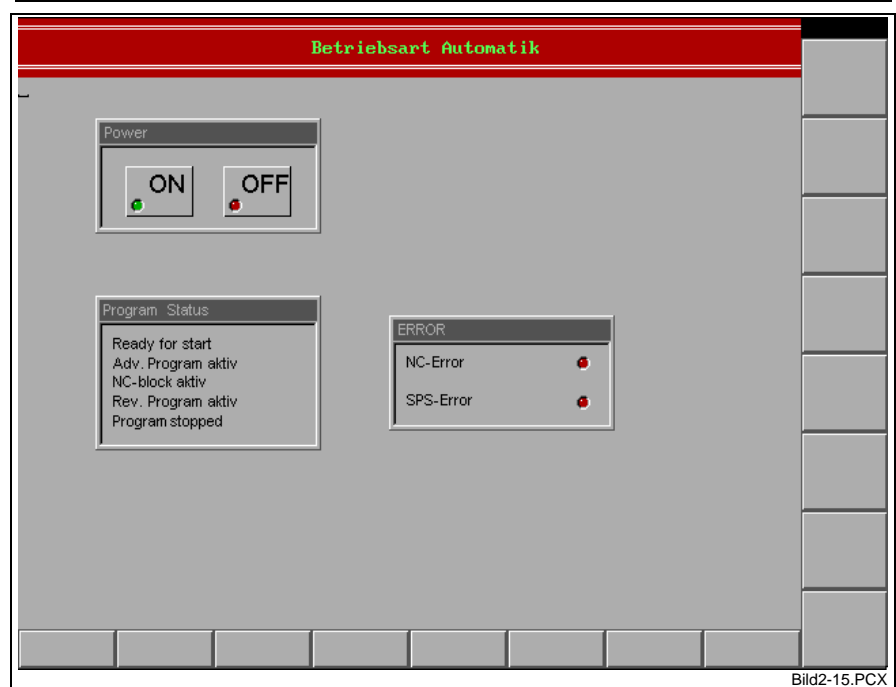


Fig. 2-15: First image of the status display of important system states, using different display elements

To emphasize particularly important representations, you may use heavily enlarged character sets in the output. To do this, select a character set of the appropriate size from the ASCII character set field in the display element dialog. Some character sets, that are gained from the PC-internal character sets, have usually been installed. The example in Fig. 2-15 employs the 'asc8sm1' character set, whose characters are four lines high and 8 columns wide (the 'asc8big' character set is twice that size).

Using Soft Keys

The Chapters 'Image Mask: The 'Invariable' Background', page 2-6 and 'Defining Variables', page 2-9 show how monitoring can be implemented. This section shall now demonstrate the options of operator input.

There are three different possibilities of operator input:

- Using PC keys: Soft keys (see page 3-36) and global keys (see page 3-55);
- using machine function keys (see page 3-47) and
- using SPS keys (see page 3-51).

Usually, distinction is not made between operator input to the plant and to the PC user interface.

Using soft keys is the easiest operator input method. To use a soft key, interconnect an existing soft key with an action, and label the key area. To do this, select the 'Edit/soft key' menu item.

The following dialog is opened:

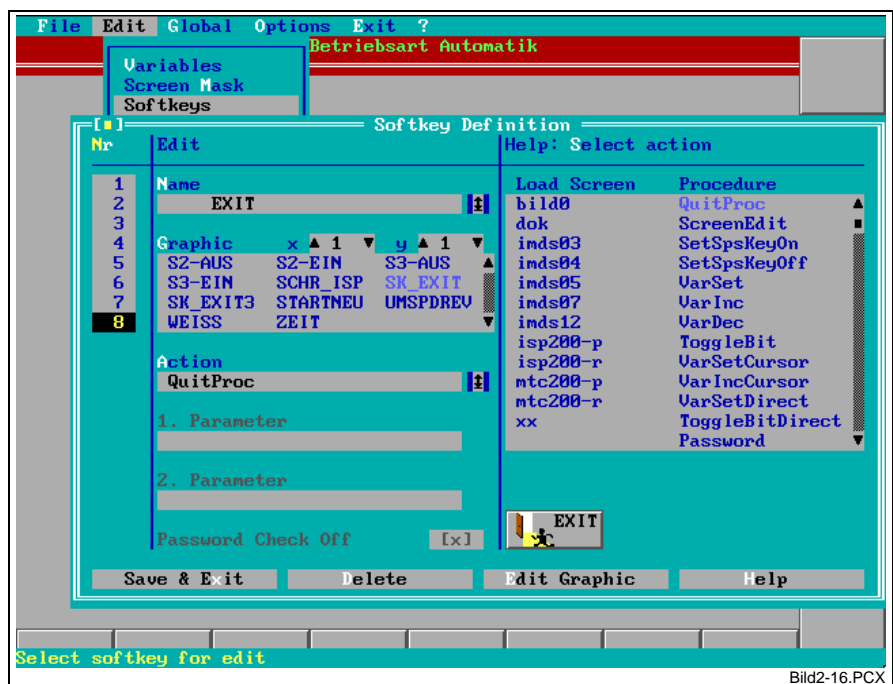


Fig. 2-16: Dialog for soft keys

- Left-hand column of the window
Select the number of the soft key that you wish to edit.
- Middle column of the window
Now you may select the features label and action. The label may consist of text and/or a graphic element that can be placed as required. The action can be specified as the name of an image that will then be loaded, or as the name of a provided procedure (see page 3-36).
- Right-hand column of the window
All existing actions are available for selection. In our example in Fig. 2-16, the soft key number 8 (at the right-hand side at the bottom of the screen) is provided with a label that consists of the text string EXIT and a previously created graphic element (the creation of graphics is described in Chapter 'Creating Pictograms / Graphics', page 2-20) that is moved to the right by 6 characters. The 'QuitProc' has been selected as the action. That action terminates the Custom Display System.

If the file name of an image is entered as the action, that image will be displayed when the related soft key is selected. This permits images to be

interconnected as required. There is no limitation on the number of existing images.

We create two further images for monitoring and controlling our turning machine. Those images shall be invoked, from the created image, via soft key 1 (image name WORKPCE) and soft key 2 (image name DIAGNOSE).

Notes: All soft keys are disabled (i.e. not accessible) during the work in the editor. This is shown by not displaying the button labels. Some procedures require additional parameters. In this case, the corresponding input fields in the dialog (see Fig. 2-16) become active. Please refer to Chapter 'Editing Soft Keys', page 3-36 for a detailed description of the parameters.

Now, we want to introduce an important group of procedures: All procedure names that begin with 'Var...' are used for manipulating control variables. The most basic one is 'VarSet'. Merely the name of the control variable and the value to which that variable shall be set is specified here. Whenever that procedure is executed, the specified variable will be set to the specified value. There is no need for the machine operator to know name or value. Merely a button with a meaningful label is offered.

There are limits to using soft keys for manipulating control variables. This means that the speed at which the variables are influenced chiefly depends on the keyboard parameters that have been selected for the PC. Thus, continuous manipulation (guaranteed in every SPS cycle) is nearly impossible.

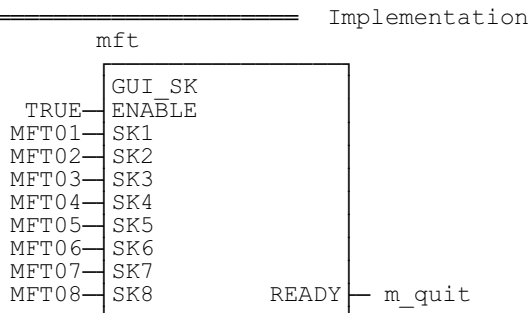
Machine Function Keys

Using machine function keys is another method of controlling the plant. That method, which permits continuous manipulation, employs real SPS inputs that are arranged as switches in the vicinity of the screen. In our example, these are the buttons at the right-hand screen margin. The principle of the machine function keys is that the SPS inputs can be synchronized with any binary SPS variable. The selected variable always assumes the value of the SPS input.

The program-related interconnection is performed via the SPS program, using a function block of the GUI_SK (with CLT via GUI_SK16) type that is to be employed once.

Below you see a typical implementation:

Identifier	AT	TYPE	Declaration	Comment
VAR_INPUT				
MFT01	%I3.1.0		:=	(*Machine function key 1*)
MFT02	%I3.1.1			(*Machine function key 2*)
MFT03	%I3.1.2			(*Machine function key 3*)
MFT04	%I3.1.3			(*Machine function key 4*)
MFT05	%I3.1.4			(*Machine function key 5*)
MFT06	%I3.1.5			(*Machine function key 6*)
MFT07	%I3.1.6			(*Machine function key 7*)
MFT08	%I3.1.7			(*Machine function key 8*)
.....				
END_VAR				
VAR				
mft		GUI_SK		(*interface module*)
.....				
END_VAR				



(*Specification of the addresses for wiring the MFT next to the display of the BTV*)
 (*with Reco inputs*)

The block shall be located immediately at the beginning of the program execution. If the program possesses an SFC structure, the block must be accommodated in a latching action in the initialization step. If the program does not possess an SFC structure, the first network in LAD/FBD/IL should be reserved for that purpose.

In our example, we want to use machine function keys for selecting the operating modes. The procedure is shown below for setting 'Automatic' mode.

Select the 'Edit/machine function key' menu item to open the dialog that is shown in Fig. 2-17. Each machine function key has three different states: Normal, depressed, and executed. For each state, the selected key can have separate labels assigned. Thus, procedures of the following sequence can be represented and controlled:

Start action – show that action is in progress – show that action has been completed

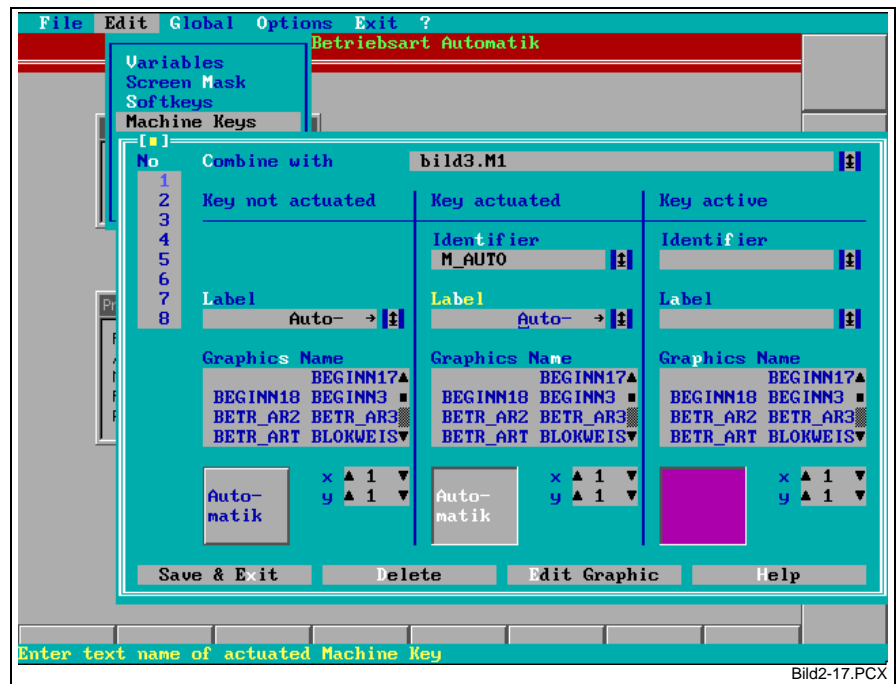


Fig. 2-17: Dialog for machine function keys

Explanation of Fig. 2-17:

- The SPS input that has been defined as machine function key 1 is interconnected with the SPS variable AUTO. This means that AUTO assumes the same value as the related SPS input.
- Unless there is a return message from another variable that represents a different state of the key, the key will be displayed as it is shown in the 'Key normal' column (graphics and text).
- If the M_AUTO variable has been set (i.e. if automatic state is active), this is shown by a depressed key ('Key depressed' state). The label contents (graphics and text) are not modified in this case, albeit that is possible.
- The third state is not used in this case (no return message → no display).

Notes: The logic that is necessary for switching modes must be implemented in the SPS program. Displaying the key states is pure status indication of Boolean variables. The key states can also be changed under the control of the SPS program if the specified return variable changes. The three states are of different priorities (highest → lowest priority): Key executed – key depressed – key normal. If several states are pending simultaneously, the state of the highest priority will be displayed.

'Semi-automatic' mode and 'Manual' mode are implemented analogously to the example shown for 'Automatic' mode.

SPS Keys: SPS Variable as a Soft Key

With a soft key, the Custom Display System responds to an event (keystroke) from the operator. With a SPS key, in contrast, the Custom Display System responds to an event in the SPS.

SPS key This is the interconnection between a Boolean SPS variable and an action in the current image. Analogous to a 'normal' soft key, a new image, or a procedure (with or without parameters) may be specified as an action. Any number of SPS keys can be entered in an image. For this purpose, select the 'Edit/SPS keys' menu item (see Fig. 2-18).

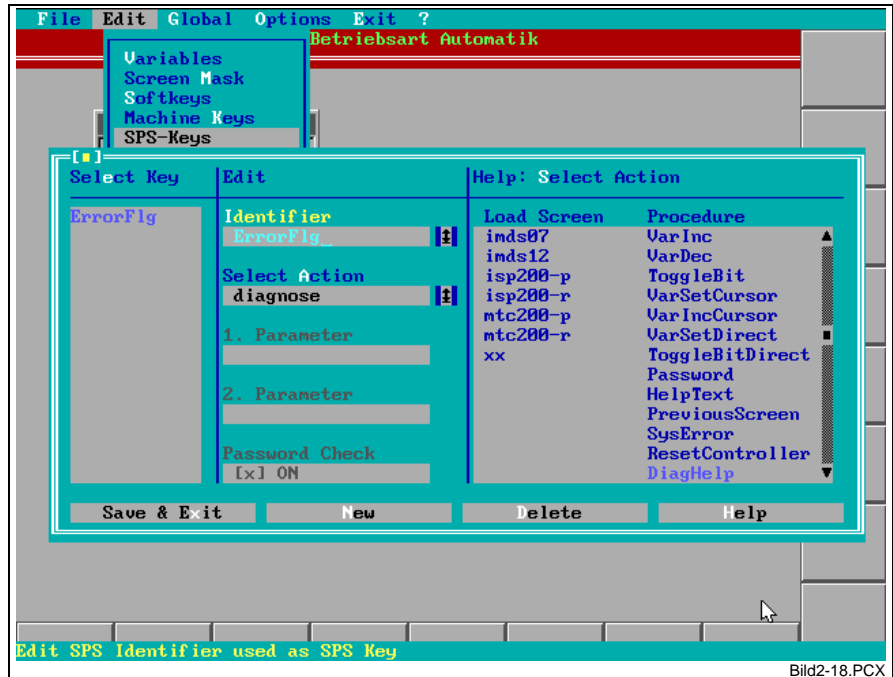


Fig. 2-18: Dialog for SPS keys

In our example, the 'Diagnose' image file shall be invoked when the 'ErrorFlg' variable is set (TRUE) in the SPS.

Notes: A SPS key is not visible. There are no buttons. All SPS keys are disabled as long as the work with the editor is in progress. The interrogation of a SPS key can specifically be disabled and enabled. This is particularly expedient if the effect (e.g. loading a different image) of a switching SPS key shall be averted. There are two procedures for this purpose: 'SetSPSKeyOn' (enable) and 'SetSPSKeyOff' (disable). If necessary, these procedures can be linked with global keys (see page 3-55). The state of the interrogation of the SPS key is displayed in the top-most screen line by 'SPS and manual control' (interrogation is enabled) or 'Manual control' (interrogation is disabled). If several SPS keys in an image switch at the same time, it must be noted that only the action of the first key will be executed. The other active (actuated) keys are ignored. The display system cyclically scans the SPS variables. It is possible that very brief SPS events (that are only present for one SPS cycle, i.e. 10 ... 150 ms, for example) are not acquired. A SPS key may be used such that the controller influences itself via the control PC deviation. this is done by interconnecting the controller with a 'Var...' action (see page 3-36) BUT: Such a modification takes longer than a setting in the SPS program itself. The communication to the PC and back to the SPS takes some time, which adds to the computing work in the PC.

2.4 Creating Pictograms / Graphics

At various points in the preceding sections we have seen the possibility of using graphic elements for displays or labels. In this section we want to show how those graphics can be created and edited.

To be able to use graphic elements in the Custom Display System, they must be available in a special format that enables them to be output on the screen at the highest speed possible. Thus, there is a graphics editor (invocation: Global/Graphics) that permits standard graphics formats to be imported and graphic elements to be edited (see Chapter 'Graphics Editor', page 3-83). Fig. 2-19 shows the graphics editor with a graphic element that is used in Fig. 2-16 Dialog for soft keys for labeling the soft key 8.

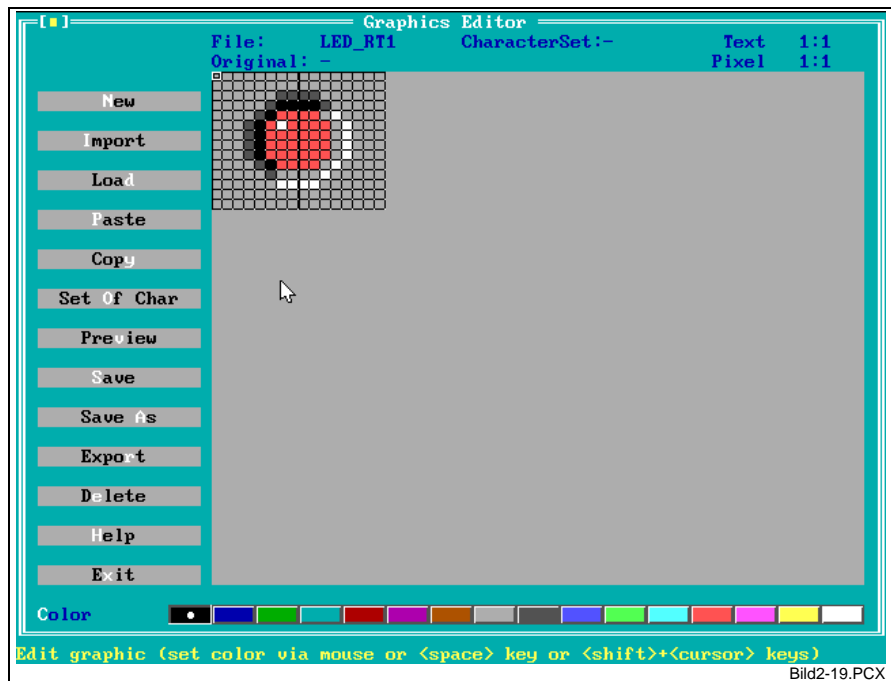


Fig. 2-19: Graphics editor with loaded graphic element for labeling a soft key

The graphics editor permits individual pixels under the cursor position to be edited (in Fig. 2-19, the cursor sits in the upper left-hand corner of the graphics). Use the space bar or click the mouse button to set individual pixels. The currently selected color is used in this procedure (color switch at the bottom margin). Use the <Shift>+Cursor key combination to draw a line in the selected color.

Creating new graphics (smaller graphics)

The following steps are necessary:

- ⇒ Selection of the color switch
Definition of the color that shall be used for filling the complete new graphics.
- ⇒ Selecting the 'New' button.
The system requests the size of the graphics to be determined. To do this, a colored area is adjusted accordingly as a substitute (see also Fig. 2-11). To modify the size, use either the <Shift>+Cursor key combination or drag the bottom right-hand edge with the mouse. The new graphic image is displayed in the editor. To facilitate allocation, the grid of the text screen is shown as a thicker line.
- ⇒ To create the graphics as required, set individual pixels of the desired color.

This procedure is well suited to create smaller graphic images and pictograms. For more complex graphic representations, however, this requires a very high effort because modifications must be made pixel by pixel. The

**Importing
(complex graphics)**

graphics editor therefore offers the possibility of importing PCX or BMP graphics and to convert them into the internal format.

This requires the following steps:

⇒ Select the 'Import' switch.

(If there is a graphic image in the editor, the system prompts you to save it). The required file can now be looked for (see Fig. 2-20).

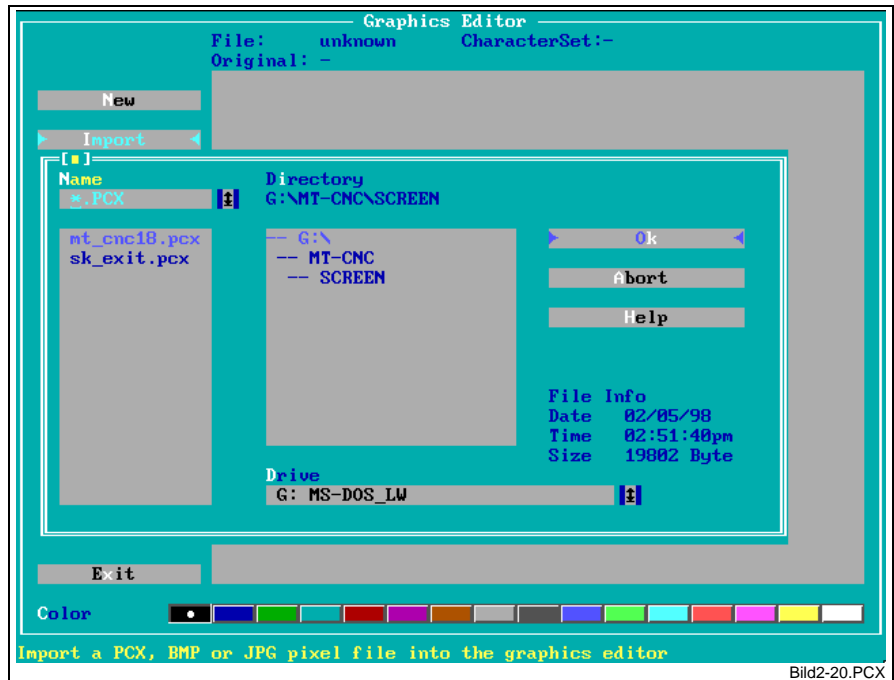


Bild2-20.PCX

Fig. 2-20: Selecting a file for graphics import

⇒ In the internal format, graphics can only represent 16 colors. Furthermore, adjusting the size may prove necessary. The necessary selections will therefore be made in a separate dialog (see Fig. 2-21). Please refer to the Chapter 'Importing Graphics', page 3-84 for a detailed description of the exact effect of the individual selections. Alternatively, use the 'Size' button to select the size of the graphic image directly as a rectangle. Any PCX or BMP may be imported, irrespective of its resolution and number of colors.

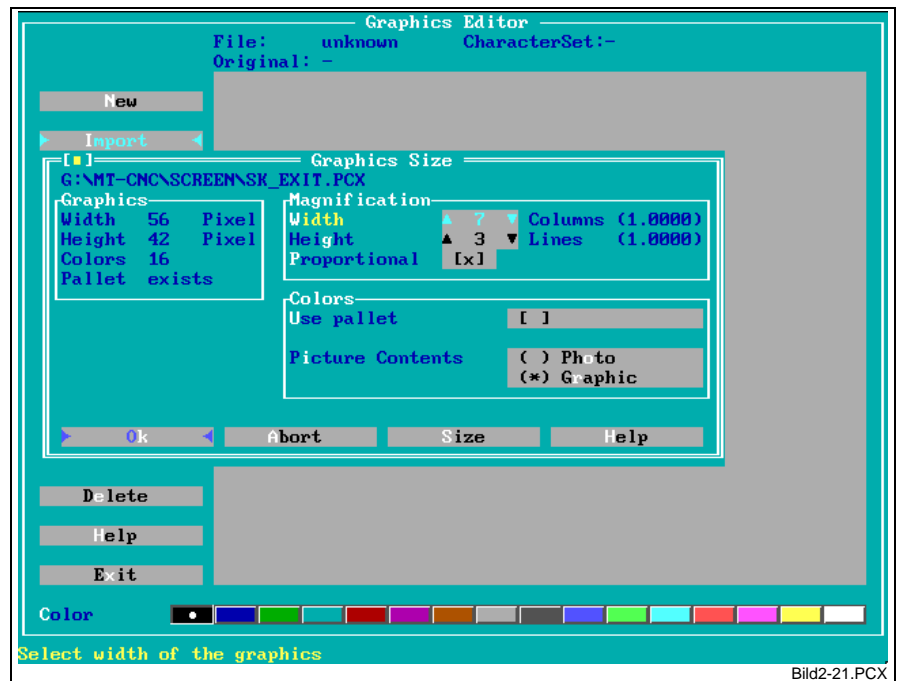


Fig. 2-21: Selections for graphics import

⇒ The graphic image is build up step by step. The speed depends on the size of the imported original graphics, its number of colors, and the performance of the PC. Once the graphic image has been imported, you may edit it as required (like one that you have created yourself). The preview function shows the modification in the correct size (see Fig. 2-22).

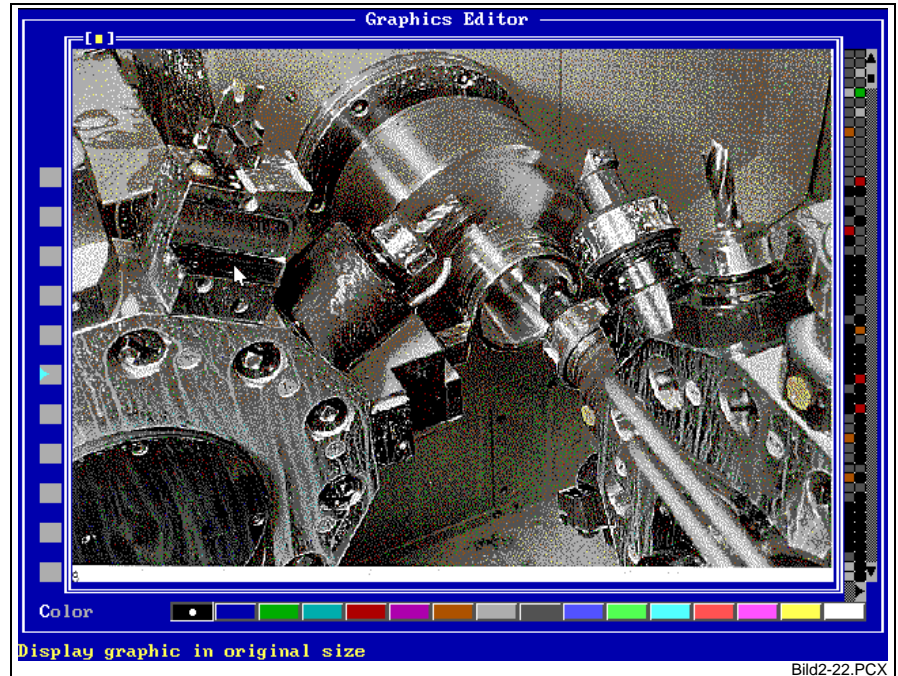


Fig. 2-22: Preview of the graphic image in the true size

2.5 Further Images

The complete handling of the turning machine requires further images to exist. In this chapter, we want to create an image for detailed diagnosis and an image for monitoring the workpiece and selecting its parameter values. In particular, we want to show new display possibilities.

Image for Turning Machine Diagnosis

We create an image with the file name DIAGNOSE. Analogous to the above-mentioned STATUS image, we position frames for output fields in the image mask (see also Chapter 'Editing the Static Image Mask', page 3-31). In order to demonstrate the use of graphic images in the image mask, we want to put more effort in it: The frames are created as graphic elements in the outfit of Windows, and are inserted in the image mask via the 'New' button in the 'Edit/image screen' dialog (see Fig. 2-22).

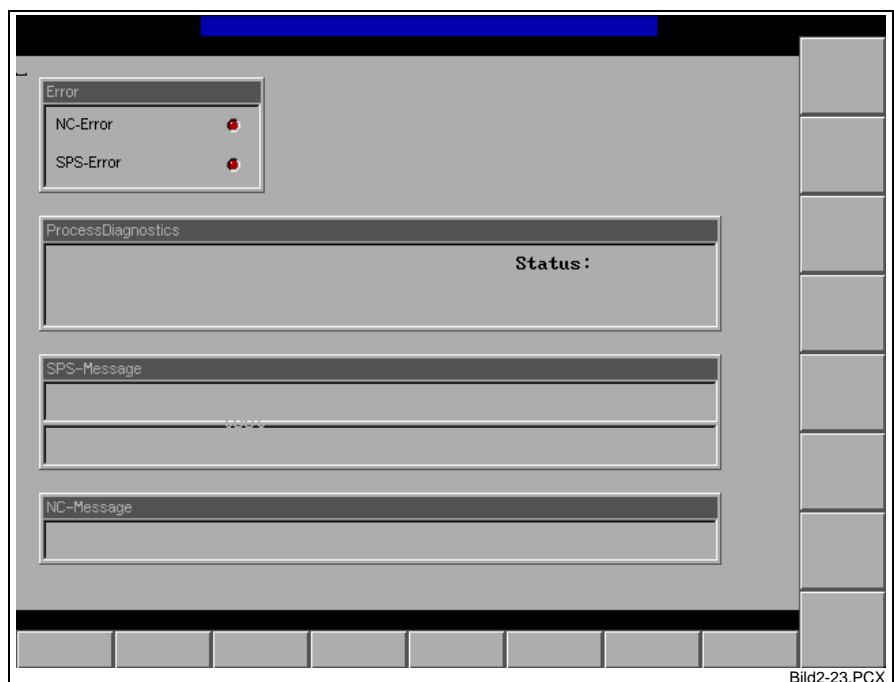


Fig. 2-23: Image mask with graphic elements and text

The graphics can either be created as a whole (as a single graphic element) or be composed of frame components. 3-D effects can easily be created with the line-draw functions in the graphics editor. Use 'Cut' and 'Paste' for multiplying identical components. A graphics file is used as a buffer in that process. The LED in the 'Error' box are drawn directly in the graphics. They represent the LEDs in their OFF state.

The text is not a part of the graphics. It is written using the 'Edit mask' function. Please note that a graphic element always replaces the background color of a text. Thus, the text only appears in the selected foreground color. If you wish to place text on graphics, you must use the invariable text grid. The lines help in planning the necessary space.

In the next step, you define the dynamic outputs. Below, the individual definitions are represented in a brief form (see Chapter 'Editing the Variable List', page 3-5):

- NC error** A '2 graphics' indicator element on the NC error line represents the SPS variable 'P00S.ERROR'. For this purpose, a graphic element is created that shows the LED in its ON state, i.e. clearly brighter. It can be obtained by cutting the smallest graphic element possible that contains the OFF LED (one or maximum two grids) from the graphics in Fig. 2-23: Image mask with graphic elements and text, and modifying it as required.

- PECULIARITY: The 1st graphic element (first, blank entry in the list) may be omitted when the '2 graphics' indicator element is defined. The OFF LED is already contained in the image mask.
- SPS warning** Likewise, the '2 graphics' indicator element is used for representing the 'ErrorFlg' variable on the SPS warning line.
- Process diagnosis** Three different pieces of information from the master process diagnosis channel are represented in the PROCESS_DIAGNOSIS box:
- First line at the left-hand side:
'%DIAG0.PROC' variable with 'standard' indicator element.
 - First line after text status:
'%DIAG0.STATUS' variable with '2 texts' indicator element and the message and error texts. The second text appears in red.
 - Second line
'%DIAG0.TEXT' variable with 'standard' indicator element across the full width of the box → diagnosis text proper from the master process.
- SPS message** Using the 'Plant message' indicator element, the 'DIAG1' and 'DIAG2' SPS variables (UINT variables that are interpreted as message numbers) are arranged, each in a line that runs across the full width, in the SPS MESSAGE box.
- NC message** Likewise, the 'Plant message' indicator element is used for indicating the '@0:10' NC variable in the NC MESSAGE box.

The soft keys are defined as follows (see also Chapter 'Editing Soft Keys', page 3-36):

- Soft key 1:
Label 'NC status',
Action 'CallProgram', 1st parameter 'DIAPG07I.EXE'
(...The INDRAMAT NC diagnosis program from the main menu item 7).
the 2nd parameter remains empty (→ no call parameters), and
- Soft key 8:
Label 'return',
Action 'PreviousScreen' (go back to the previous screen).

- Machine function keys** The machine function keys are created as follows:
- Key 1:
Interconnection with 'CLR_ERR' (input for clearing a pending error),
Normal label 'Clear Error',
Variable for depressed state 'CLR_ERR',
Depressed label 'Clear Error'.
 - Key 2:
Interconnection with 'CTRL_RST' (input that causes the NC program to be set to its initial state),
Normal label 'Control Reset',
Variable for depressed state 'CTRL_RST',
Depressed label 'Control Reset'.

With the definitions listed above, the 'Diagnosis' image looks like this:

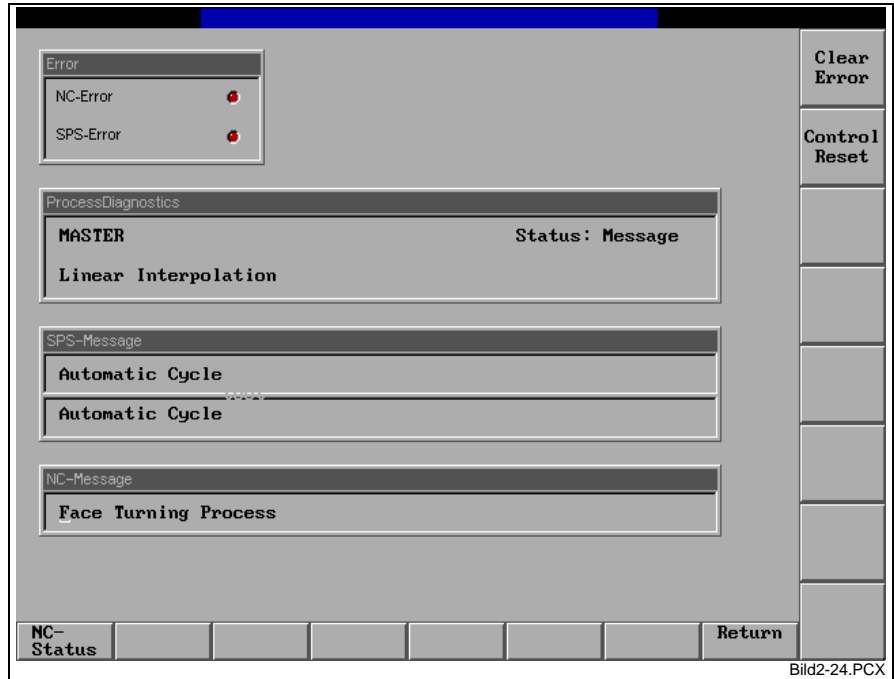


Fig. 2-24: 'Diagnosis' image with all indicators

Image for Monitoring the Workpiece and Selecting its Parameter Values

We create an image named WORKPCE. In addition to the entry of the current workpiece dimensions, the current positions of the axes that participate in the turning process shall also be placed in this image (see Fig. 2-25). We use two new indicator elements: 'Position value' and 'Bar'.

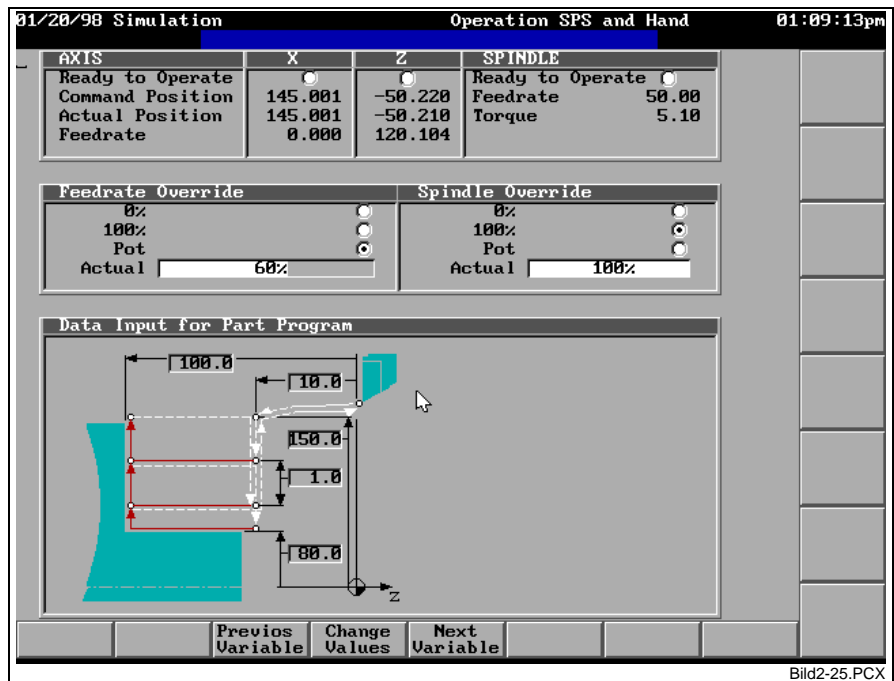


Fig. 2-25: WORKPCE image with indication of current axis positions and entry of the process-related data of a workpiece

The frames are again arranged as graphics in the image screen. The bottom frame contains a process-related diagram of the turning process with output fields for the actual dimensions. Output elements 'Number' (fixed point real) are used for entering the related NC variables @0:170 through @0:174 here (see also sequence description in Chapter 2.1, page 2-1 ff.).

The five variables have the 'Value changeable [x]' attribute assigned. This means that, using adequate procedures, the variable value can be used for manipulation (Var...). To demonstrate this, we use the VarSetDirect procedure (see Chapter 'Editing Soft Keys', page 3-36), that is assigned to soft key 4 ('Change value' label) It permits the value under the cursor position to be modified directly on the screen by entering a new value.

Notes: A variable that is selected by the cursor and marked as being changeable is shown in inverse representation.
To increase the safety of operator input, input ranges of the individual variables can be selected. This must be done with the check box 'Limit check' in the 'Edit/variables' dialog. The type-related minimum and maximum values are entered as the default values of new input elements. A limitation is particularly expedient for variable @0:174 (cutting depth), for example.

In order to be able to use the cursor for swiftly changing between the changeable variables, soft keys 3 and 5 have, respectively, the 'GotoLastForceVar' and 'GotoNextForceVar' procedures (see Chapter 'Editing Soft Keys', page 3-36) assigned. They go to the previous (left above) or next (right below) variable of the 'Value changeable [x]' property.

As a peculiarity in this image, we want to discuss the output of the current override value ('current' line in the second box). The current value is represented twice at the same position. The first output is an analog 'bar' indicator element (horizontal) within the limits 0 through 120 (see Fig. 2-26). This means that the bar is full when the override value is 120.

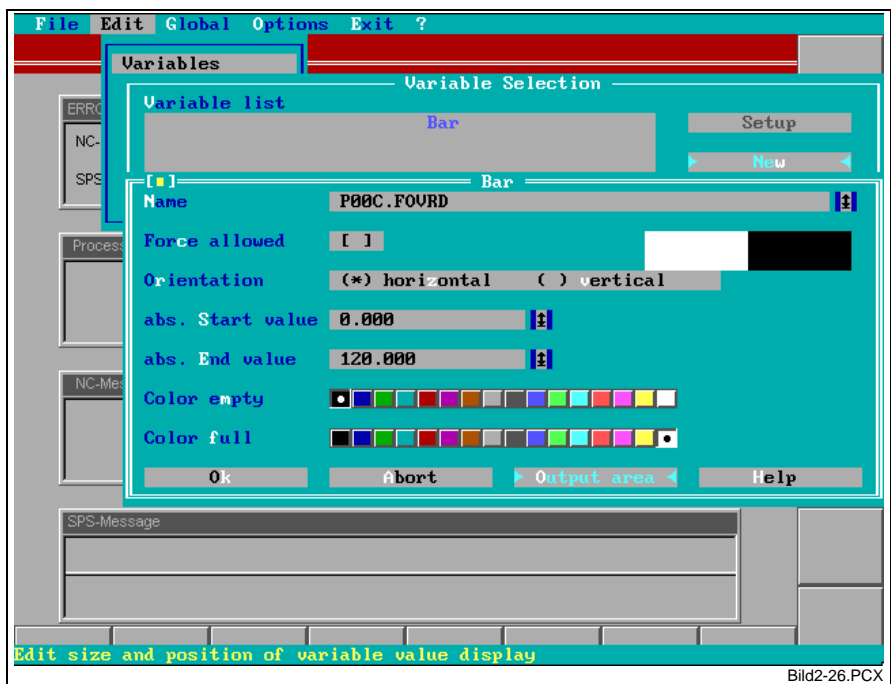


Fig. 2-26: Dialog for override indication bar indicator element

The second output is in the same output field, centered as 'Process value' indicator element in the boundaries 0 through 100. Here, a correct indication of 120% appears. The percent value is always displayed above the bar graphics; the bar is used as the background.

Note: There are further analog elements that may be used similarly to 'bar'. Those are:
'Scale',
'Measuring instrument' and
'Fill-up form' (see Chapter 'Display Elements', page 3-14).

3 Functions of the Integrated Editor

i Use the following chapter as a reference when you create your own images. There is a detailed explanation for each menu point of the integrated editor. Examples are added wherever that is necessary. Like the individual menus, the chapter has a hierarchical structure so that you should be able to quickly find the required information. To improve the transparency, there will be brief statements about call, functionality, and peculiarities for each menu item. To activate the editor you must possess the access privilege '16 - edit images'.

Call	Using the 'ScreenEdit' procedure (see Chapter 'Edit Menu', page 3-5). With new installations, that procedure is, as a global key (see Chapter 'Global Keys', page 3-55), linked with the <Enter> key.
Functionality	The integrated editor is activated. The system prompts the user to enter the correct password if the necessary access privilege has not yet been set.
Peculiarities	All soft keys (see Chapter 'Inserting Graphics in the Image Mask', page 3-35), machine function keys (see Chapter 'Editing Machine Function Keys', page 3-47), and SPS keys (see Chapter 'Editing SPS Keys', page 3-51) are disabled. This means that loading a new image or executing a specified procedure is blocked. The labels of all soft keys and machine function keys disappear from the currently loaded image. The editor can only be called if a machine function key has not been pressed. REASON: Sometimes, the links list for the machine function keys may be modified in the editor, and a previously linked variable remains permanently set if it is not changed by the SPS program. To each menu item and each dialog of the integrated editor, there is a single-line help text on the bottom line of the screen. In addition, pressing <F1> at any point displays an extensive help text. That key is selectable (see Chapter 'Editor Selections', page 3-94).

3.1 File Menu

Call	File
Functionality	Functions have been implemented that are used for organizing image files (load, save, create, copy, and delete).
Peculiarities	None

Create a New Image File

Call	Create file/new image
Functionality	An input window is opened in which the system asks for the name of a new image file. A selection of the last entries made in that window is available. To support input, a list of all existing image files is displayed. Typing the first letters of the required file name starts a quick search in that list. The selected name is automatically entered in the input line and may be edited there as required. Data and time of the last modification, and the size are displayed for each image file.
Peculiarities	Only letters and characters that may appear in the file names are permitted. The name may not be longer than eight characters. The image file is created immediately. This means that a file (that is empty to start with) with some default settings is saved. If a file of that name exists, the system warns of overwriting, and prevents it if necessary.
	Example

See Chapter 'First Image', page 2-6

Load an Existing Image File

- Call** Load file/image
- Functionality** A selection window is opened that shows all existing image files in alphabetic order. Date and time of the last modification, and the size of the file are displayed. Typing the first letters of the required file name starts a quick search in that list. The selected file is immediately loaded when the selection is entered. Accepting the selected file is also possible by double clicking the mouse button on the required entry in the selection list.
- Peculiarities** Only image files that have been created with the integrated editor are displayed.
- Old text image files may be loaded in the 'Load file/text format' menu item (see page 3-3).
- If the image file version must be adjusted upon the migration to a new program version, this is done automatically and the adapted image file is saved. The adapted image file has the creation time of the original file assigned. The files are always upward compatible. This means that a later program version will always be able to read all image files of an earlier program version.
- If there are more image files than can be shown in the selection window, the selection list can be scrolled up or down as required. There is a scroll bar at the right-hand margin of the list. The scroll box on that bar indicates the relative position within the entire list.

Example

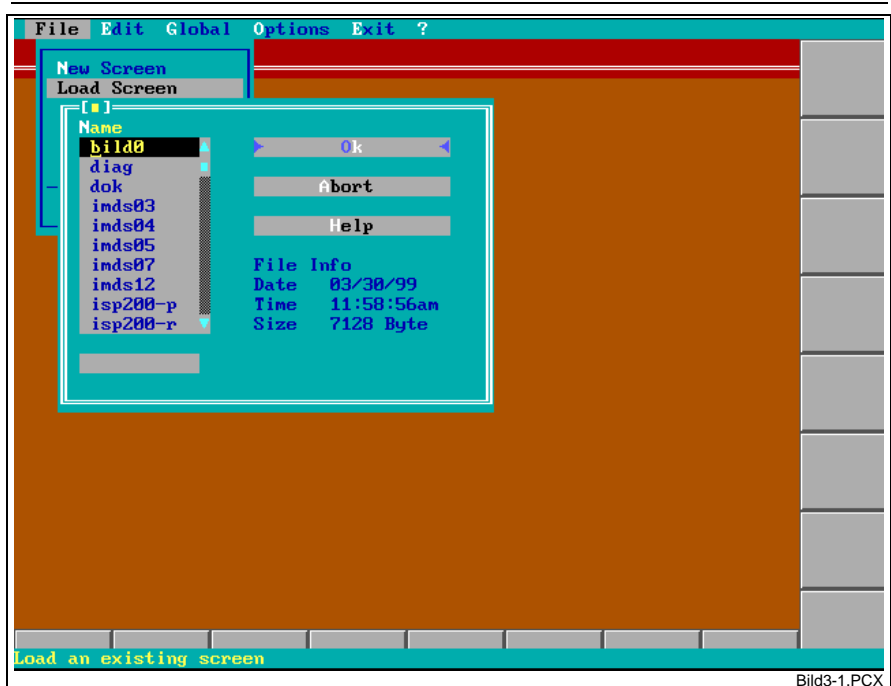


Fig. 3-1: Selection window with image files

Save the Current Image File

Call	Save file/image
Functionality	The loaded image is saved.
Peculiarities	A backup file (BAK) of the existing file will not be created. The program automatically initiates that function when you exit the integrated editor and confirm the prompt for saving the modified image.

Save the Current Image File Under a New Name

Call	Save file/image as
Functionality	The loaded image is saved under a new name. An input window is opened for this purpose, in which the system asks for the new name of the image file (see also Chapter 'First image' - 'Create a new image file', page 2-6). The current file name is shown as the default entry in the input line. A selection of the last entries made to that window is available. To support input, a list of all existing image files is displayed. Typing the first letters of the required file name starts a quick search in that list. The selected name is automatically entered in the input line and may be edited there as required. Data and time of the last modification, and the size are displayed for each image file This function may be used for copying images.
Peculiarities	A backup file (BAK) of the existing file with the same name will not be created. The last saved version of the image file with the original name will be retained.

Delete an Image File

Call	Delete file/image
Functionality	A file may be selected from the stock of all existing image files, and be deleted. A swift search through the list of the files is possible (see Chapter 'Load an Existing Image File', page 3-2).
Peculiarities	There will <u>not</u> be a safety prompt. The file of the currently loaded image may also be deleted. Any information that may be necessary for restoring the file is available in the PC memory. Saving the file again restores it.
	Example

see Fig. 3-1: Selection window with image files

Load Image Files in Text Format

Call	Load file/text format
Functionality	A selection of all image files that exist in text format is offered. The selected text file is loaded and interpreted as an image. Selection is made analogously to Chapter 'Load an Existing Image File', page 3-2.
Peculiarities	A successfully loaded text file is converted into the format of the integrated editor. However, it will not automatically be saved. The image is saved in the format of the integrated editor if the menu item 'Save file/image' is selected. Any existing image file of that name will be overwritten without confirmation being required. Saving a file in the text format is <u>not possible</u> .

Note: If an image file in the format of the integrated editor and an image file in the text format exist under the same name, the newer one of the two images is loaded when image loading is initiated as the action of a soft key. We advise against creating images in the text format. Many representation options that are available in the integrated editor cannot be implemented in that format. There can be confusion when an image, that has been created as a text file, is processed in the integrated editor, because the image will additionally be saved in the format of the integrated editor. When such an image is loaded in response to a soft key action, the newer one will be loaded.

File Info

Call	File/Info
Functionality	A window is displayed that contains important information about the currently displayed image.
Peculiarities	None
Example	

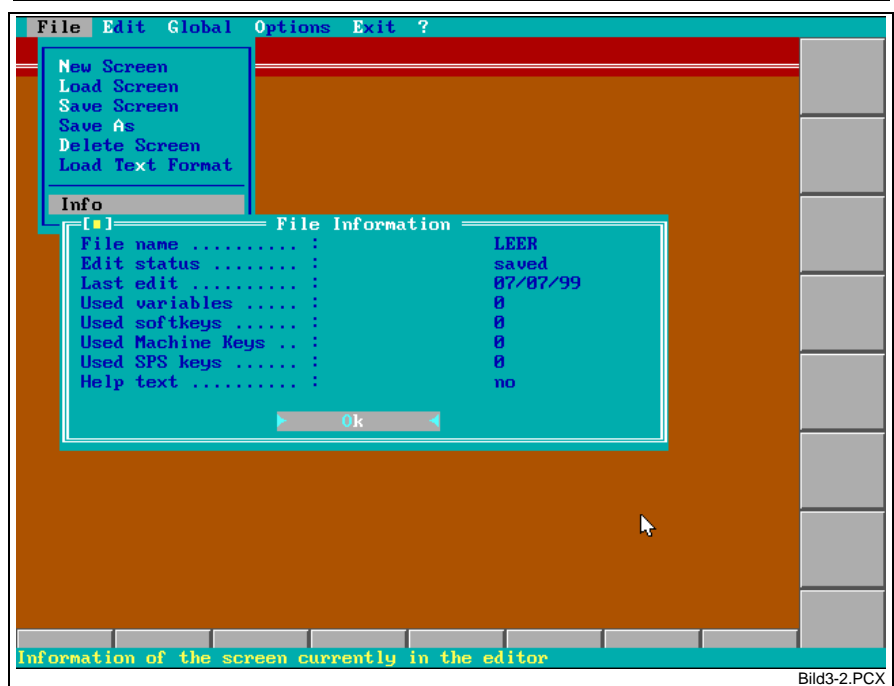


Fig. 3-2: Window with file information

3.2 Edit Menu

Call	Edit
Functionality	All components of the loaded image may be edited.
Peculiarities	None

Editing the Variable List

Call	Edit/variables
Functionality	<p>The dynamic screen outputs (i.e. the interconnections of variables and output formats) can be managed and edited. To do this, open a window (see Fig. 3-3) that contains a list of all variables that are used in the image, together with check boxes that are used for list entry management. A check at the beginning of the line shows that the variable is valid (i.e. on line display is possible). Otherwise, the display element does not appear on the screen.</p> <p>The 'Settings' switch opens a separate window that permits the selected variable definition (see also page 3-6) to be edited in detail.</p> <p>There are additional functions available in the lower screen area. Those functions can be used for directly modifying some features of the variable definition.</p> <p>A preview image shows the positions of the variables on the screen. The currently selected variables are displayed in red. All valid variables are bright; all invalid variables are dimmed. You may click the mouse button directly on the variable's represented output area in the preview image. A single click selects the related list entry, double clicking opens the required editing dialog.</p> <p>The following functions are provided for managing the variable list.</p> <ul style="list-style-type: none"> • New (or <Insert> key) creates a new variable definition at the current position; • Delete (or <Delete> key) deletes selected variable definitions; • Copy copies the selected variable definition.
Peculiarities	<p>Only the following buttons are accessible if there is no variable in the loaded image:</p> <ul style="list-style-type: none"> • New, • Help, and • Close.

Example

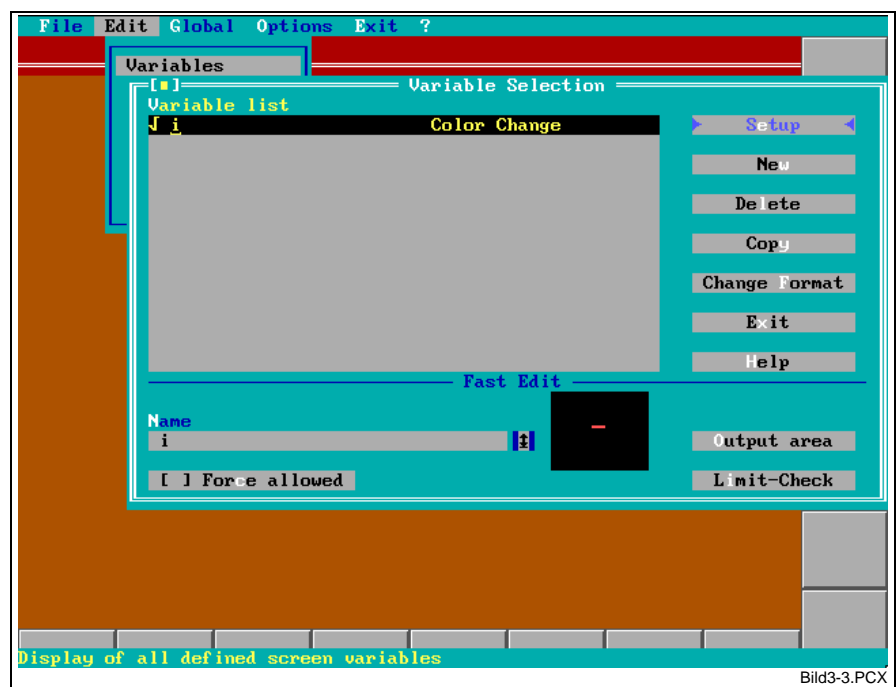


Fig. 3-3: Window for managing and editing variable definitions

Editing Variable Definitions

Call Edit/Variables/Settings

Functionality Each display element has its own dialog for selecting its properties (see Chapter 'Display Elements', page 3-14). Entering a variable name is a feature that is common to all dialogs. There are two help functions for this input:

A 'history' list contains the last entries. Press the <CursorDown> key or click the mouse button on the arrowhead symbol at the right-hand side of the input field.

An input assistant that permits a (multi-level) selection of the required variable to be made (see page 3-8). The variable may subsequently be edited manually. Press the <Enter> key with a blank input field to activate the input assistant.

The variable syntax required for further processing or manual input is explained below.

Peculiarities None

Syntax

SPS variable **{[<FB name>.]<Variable name>**

Both, absolute SPS variables (e.g. %M199.7), and symbolic SPS variables may be used. The structuring options of SPS programming permit symbolic SPS variables to exist in function blocks. The identification of such a variable requires an unambiguous qualification with all higher-level function block assignments, separated by periods (e.g. 'FB1.FB2.FB3.Name', with 'FB1' being the declaration name of the function block (extreme left in the SPS declaration), not the type name. A structure (STRUCT) is handled like a function block. The program name is known through the program in the SPS; it need not be specified here.

A SPS variable from the program does not need a qualification; it only consists of the variable name.

The names of SPS variables and function blocks are case-sensitive.

Two alternative reference systems may be used:

PROG Displaying the value in program co-ordinates (as specified in the NC program)

MACH Displaying the value in machine coordinate system

A reference system need only be specified for path-related data.

Valid range: Process number 0..6

Input Assistant for Variable Names

- Call** Press the <Enter> key in the blank field of a variable input line.
- Functionality** If the name of the variable that shall be entered is unknown, the input assistant can be used for a menu-controlled multi-level input or selection of that variable name.
- First, a selection window is displayed that offers the different variable types (see Fig. 3-4). Depending on the connected controller, different variable types are displayed.

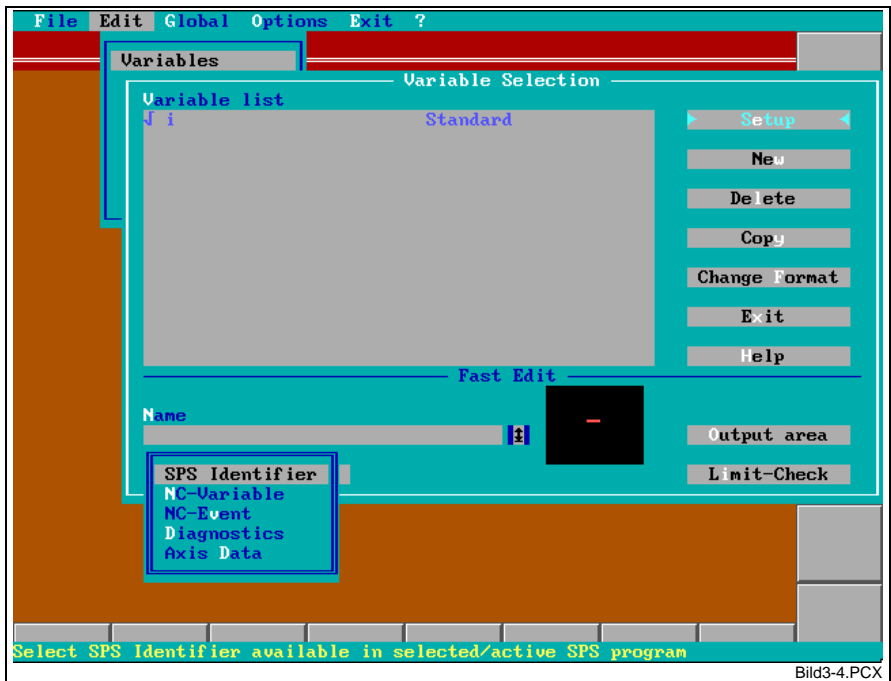


Fig. 3-4: Input assistant - selecting the variable type

Input assistant for SPS variables

Call Input assistant for variable names/SPS variable

Functionality Selecting a SPS variable from the list of all variables that are used in the SPS program and in the associated function blocks. Selection is made in two stages:

- (1) Selecting the import path, and
- (2) selecting the variables.

The preceding selection of the import path selects exactly one concrete instance (...utilization) of a function block and/or the program itself. Thus, the variable quantity is delimited and becomes clearer. Furthermore, only the names of the variables are displayed because the necessary qualification has been performed by the first selection via the import path.

The currently selected variable is displayed on a separate line of the window as it is entered in the input line for variable names. In addition, the type of the SPS variable is displayed here.

Peculiarities A structure (STRUCT) is handled like a function block. This means that the names of the structures are in the left-hand part of the window, and the structure elements are in the right-hand part.

There is no input assistant for absolute SPS variables.

There is no separate assistant for ARRAY elements. The array structure must be known to the extent that the indices can manually be entered.

Array type, and thus the array structure are shown in the selection. Only individual ARRAY elements can be displayed, not a complete ARRAY. Indices must always be constant; control variables are not permitted.

Example

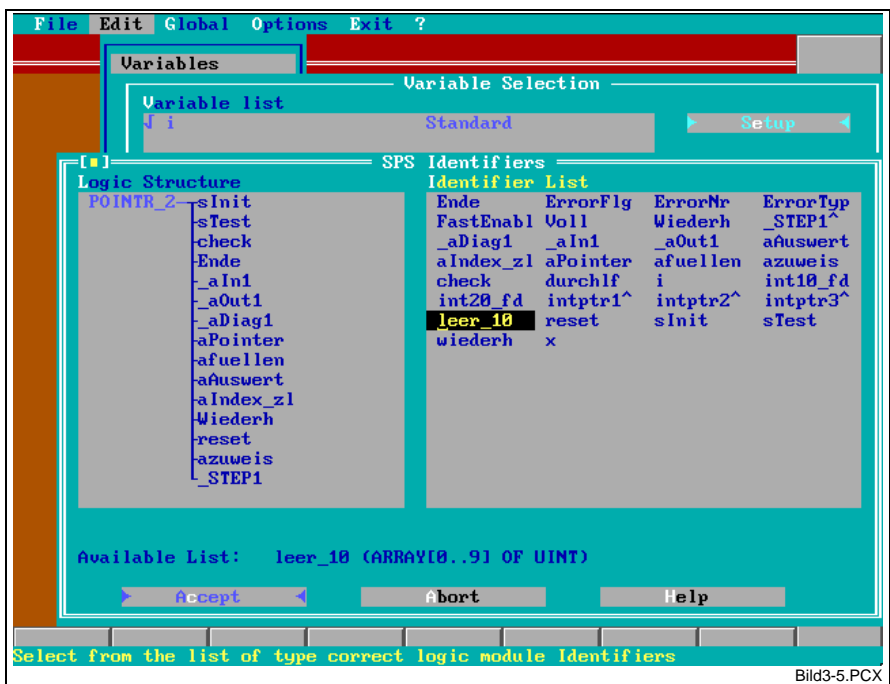


Fig. 3-5: Input assistant for SPS variables

Input assistant for NC variables

Call Input assistant for variable names/NC variable

Functionality Automatic composition of an NC variable from its components process number and variable number.

The process number may be selected from the list of all possible processes. The processes are shown by their names.

Use the <CursorDown> and <CursorUp> keys to scroll the variable numbers one by one; and the <PageDown> or <PageUp> to scroll in steps of ten.

The valid range of process number and variable number corresponds to the definitions of Chapter 'Editing Variable Definitions', page 3-6.

On a separate line, the currently selected NC variable is shown as it is accepted in the variable name input line upon confirmation. The necessary @ character is generated automatically.

Peculiarities Processes may be selected that have not (yet) been defined. Such a variable is accepted in the image, but are not (yet) displayed (→ no check in the variable list). When the process is defined later, that variable will automatically be displayed.

Example

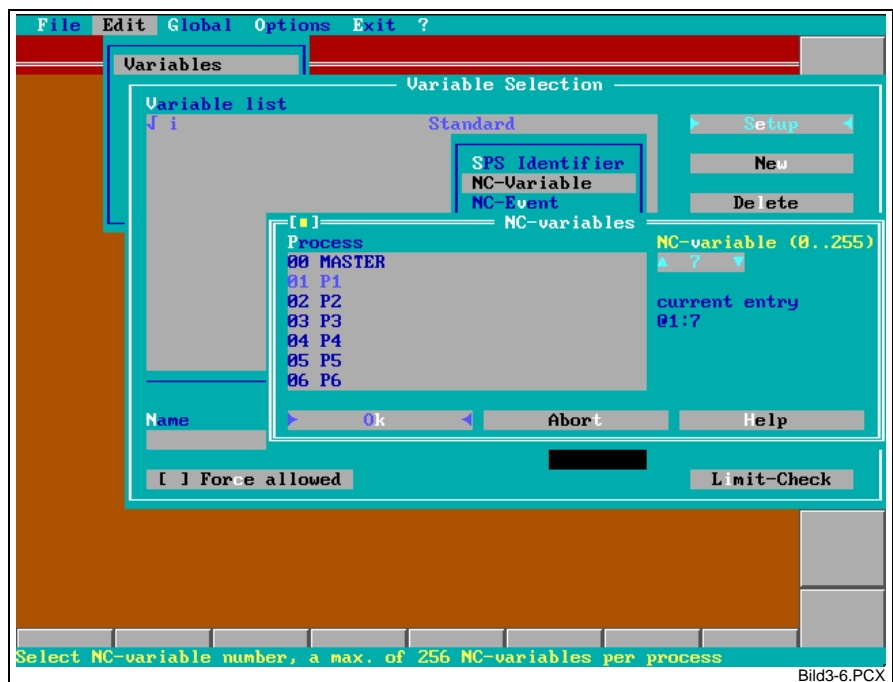


Fig. 3-6: Input assistant for NC variables

Input assistant for events

Call Input assistant for variable names/Event

Functionality Automatic composition of an event variable from its components process number and event number.

The process number may be selected from the list of all possible processes. The processes are shown by their names.

Use the <CursorDown> and <CursorUp> keys to scroll the event numbers one by one; and the <PageDown> or <PageUp> to scroll in steps of ten.

The valid range of process number and event number corresponds to the definitions of Chapter 'Editing Variable Definitions', page 3-6.

On a separate line, the currently selected event variable is shown as it is accepted in the variable name input line upon confirmation. The necessary reserved '%EVENT' identifier is generated automatically.

Peculiarities Processes may be selected that have not (yet) been defined. Such a variable is accepted in the image, but are not (yet) displayed (→ no check in the variable list). When the process is defined later, that variable will automatically be displayed.

Example

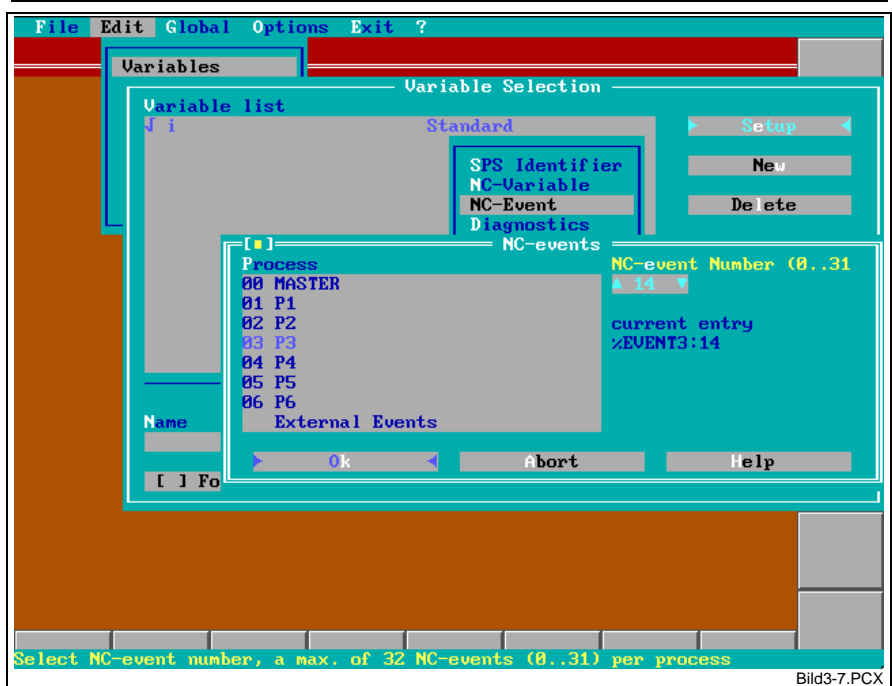


Fig. 3-7: Input assistant for events

Input assistant for diagnoses

- Call** Input assistant for variable names/Diagnosis
- Functionality** Automatic composition of a diagnosis variable from its components process or mechanism number and diagnosis information.
The process number may be selected from the list of all possible processes and mechanisms. The processes and mechanisms are shown by their names.
In a second selection, the possible diagnosis information is provided.
The valid range of process and/or mechanism number corresponds to the definitions of Chapter 3.2.
On a separate line in the window, the currently selected diagnosis variable is shown as it is accepted in the variable name input line upon confirmation. The necessary reserved '%DIAG' identifier is generated automatically.
- Peculiarities** Processes or mechanisms may be selected that have not (yet) been defined. Such a variable is accepted in the image, but are not (yet) displayed (→ no check in the variable list). When the process is defined later, that variable will automatically be displayed.

Example

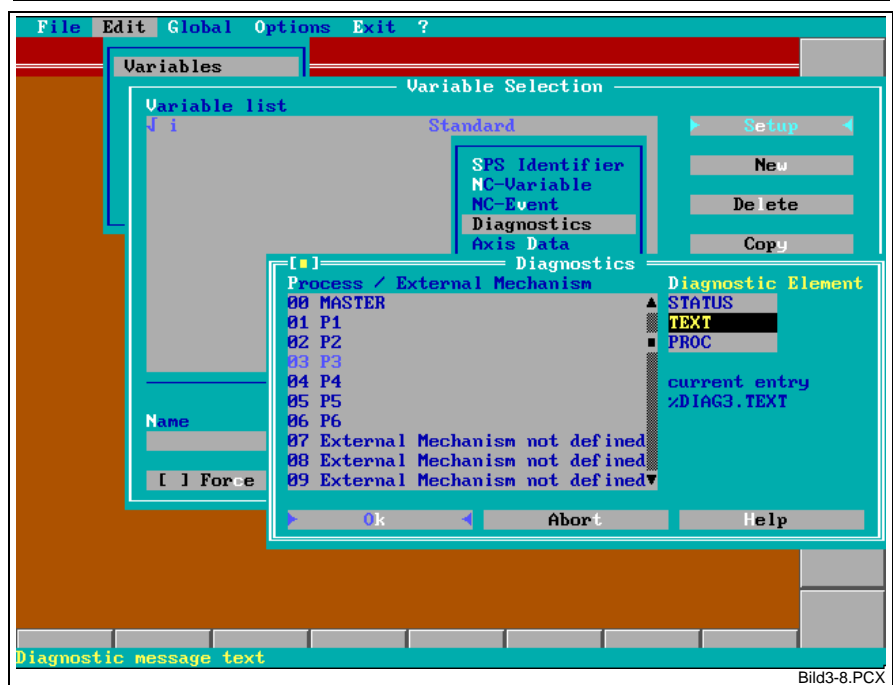


Fig. 3-8: Input assistant for diagnoses

Input assistant for axis position values

Call Input assistant for variable names/Position value

Functionality Automatic composition of a position variable from its components process number, axis meaning, axis information and, if necessary, reference system. The process number may be selected from the list of all possible processes and mechanisms. The processes are shown by their names. The axis meaning can be selected from a second list. All possible axis meanings are displayed, irrespective of whether or not those axes have currently been defined in the present process. A third list permits the axis information to be selected. With path-related values, the reference system can be determined as the fourth selection.

Peculiarities Processes or axis meanings may be selected that have not (yet) been defined. Such a variable is accepted in the image, but are not (yet) displayed (→ no check in the variable list). When the process or the axis meaning is defined later, that variable will automatically be displayed.

Example

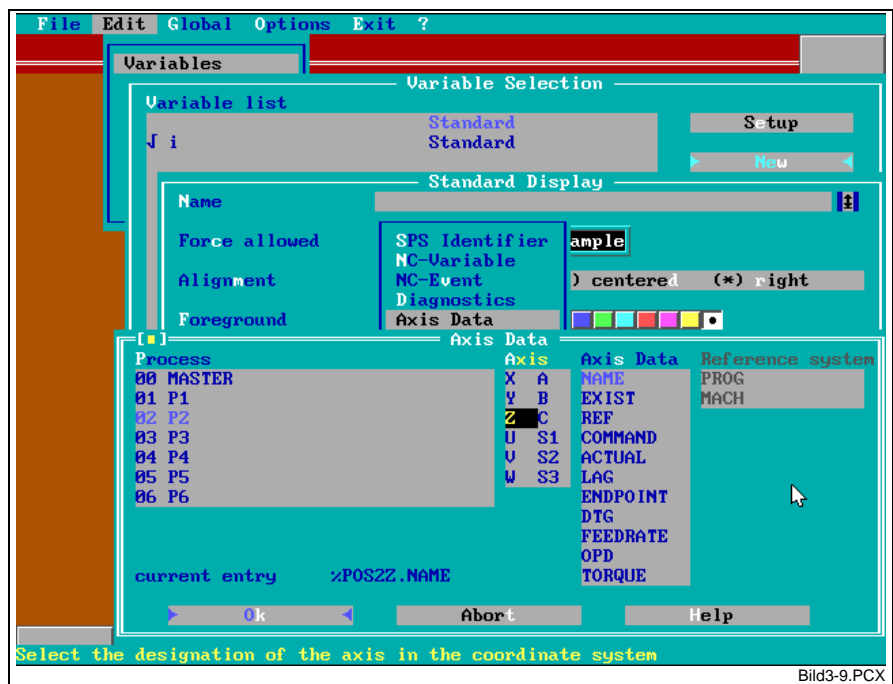


Fig. 3-9: Input assistant for axis position values

Display Elements

Call	Edit/Variables/Selections
Functionality	Depending on the type of the selected indicator element, its special dialog is opened. The individual indicator elements and the related dialogs are described below.
Peculiarities	The type of the indicator element is defined when it is created ('New' button). A compatible selection is offered for this purpose (see Fig. below).

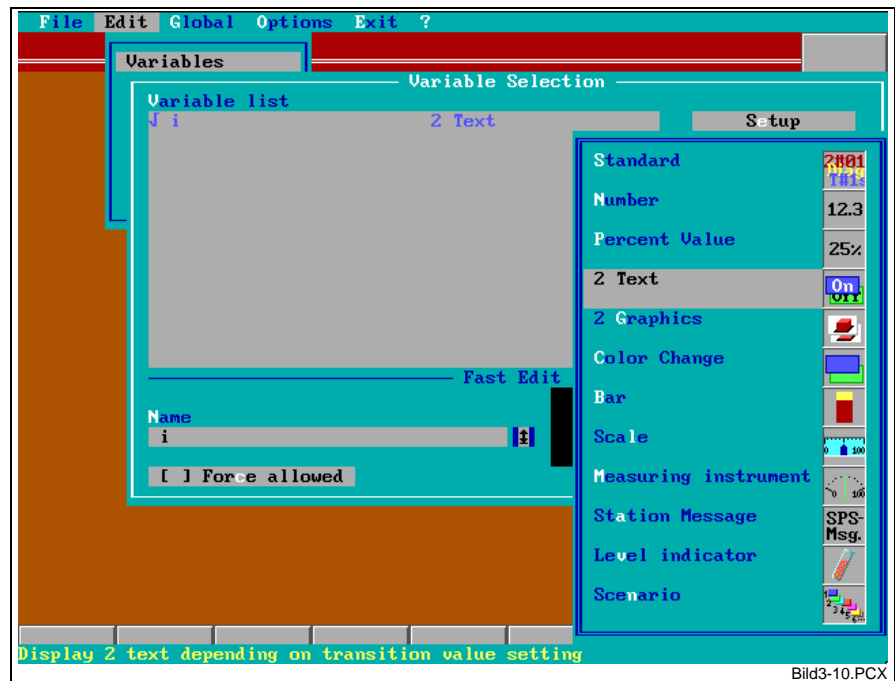


Fig. 3-10: Determining the type of the indicator element

The following indicator elements are available:

standard	<p>The variable value is displayed in its 'normal' format. Using the following examples, this means,</p> <ul style="list-style-type: none"> • a Boolean SPS variable is displayed as '2#1' • a WORD variable is displayed as '16#12AB', • an INTEGER variable is displayed as '12345', • a REAL variable (or NC variable or axis position value) is displayed as '123.456' or '1.234E56', • a diagnosis message is displayed in plain text, • A SPS string is displayed as a string, • A SPS time value (TIME) is displayed as T#5m23s, etc.
-----------------	---

This format is particularly suitable for special data that cannot be displayed in a different format.

In the default setting, REAL numbers are displayed with three fractional part digits.

The output may employ a customized ASCII character set. Output can be left-justified, centered, or right-justified.

All settings become immediately visible in the preview image (to the right of the 'Value changeable' field). This image only exemplifies the setting, it does not output the variable value.

Typical dialog

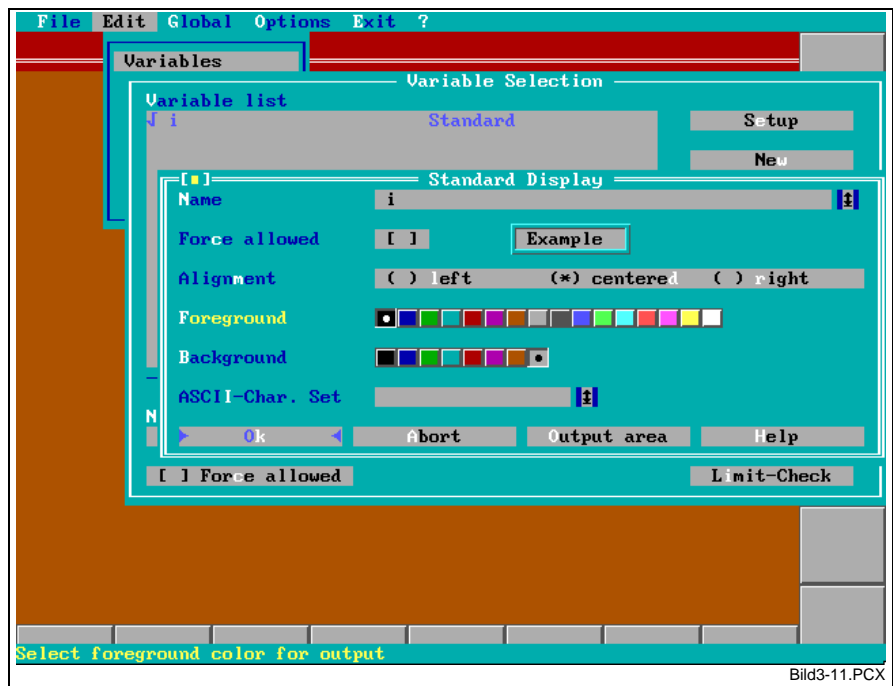


Fig. 3-11: Dialog for a 'standard' indicator element

Number The variable value is represented as an absolute number. One of the following number formats can be selected:

- decimal,
- binary,
- octal,
- hexadecimal,
- real,
- fixed point real,
- ASCII characters

The number of displayable fractional part digits can be selected for the two real representations.

All displays may employ a customized ASCII character set. Output can be left-justified, centered, or right-justified.

All settings become immediately visible in the preview image (to the right of the 'Value changeable' field). This image only exemplifies the setting, it does not output the variable value.

Typical dialog

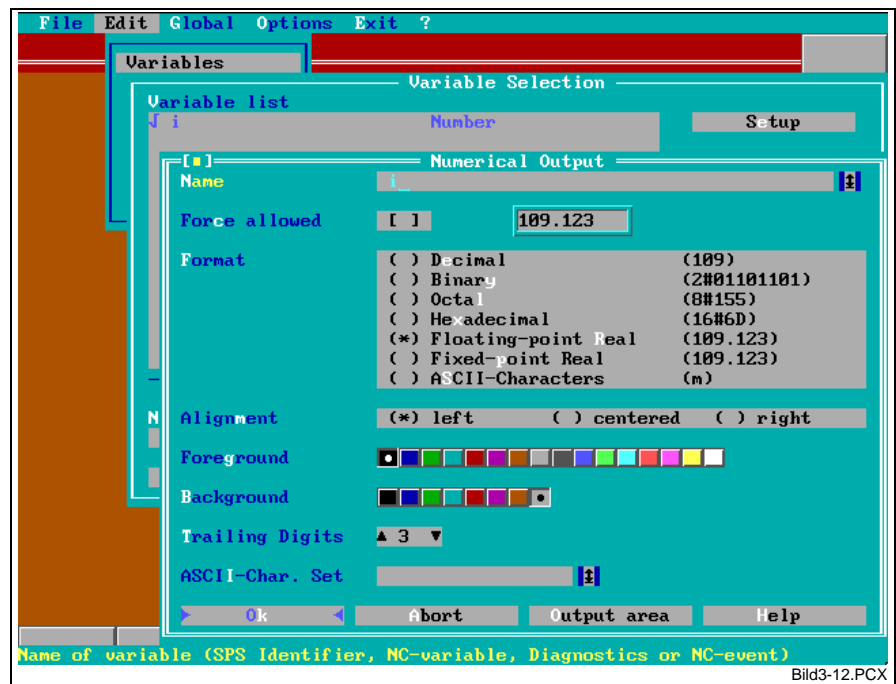


Fig. 3-12: Dialog for a 'Number' indicator element

binary

The individual number formats have the following meanings:

- Binary:

The variable value is represented in binary notation. A WORD variable, for example, looks like '2#0111001011000011'. When REAL numbers are represented it must be ensured that the bit pattern of the variable value is shown, not the bit pattern of its textual conversion. With REAL numbers, the variable value '2.0', for example, is created from a bit pattern that is subdivided into sign, mantissa, and exponent. Without knowing its structure, the variable value cannot be found. Albeit such a formatting is permitted, it does not provide any practical benefit.
- Decimal

The variable value is represented as a decimal number. A Boolean variable is shown as '0' or '1' only; numeric variables are, for example, shown as '12345' and REAL numbers without fractional part digits (always rounded) and without exponential representation.
- Octal

The variable value is represented in the octal number format (number base 8), such as '8#12345'. For REAL numbers the same facts that are mentioned under 'binary representation' apply.
- Hexadecimal

The variable value is represented in the hexadecimal number format (number base 16). For REAL numbers the same facts that are mentioned under 'binary representation' apply.
- Real

The variable value is represented as a REAL number. The number of fractional part digits can be selected (the 'fractional part digits' field becomes active). With integer variables (BOOL, BYTE, INT, ...), the selected number of fractional part digits is filled with zeros. The display format automatically changes over from floating point representation (e.g. 123.456) to exponential representation (e.g. 1.234E56). The following criteria lead to changing over from floating point representation to exponential representation:

With 0, 1, or 2 fractional part digits if

the absolute value is less than 1.0, and
 the value is not equal to 0.0, or
 the absolute value is greater than 9999999999.

With 3 fractional part digits if

the absolute value is less than 0.1, and
 the value is not equal to 0.0, or
 the absolute value is greater than 9999999999.

With 4, or more, fractional part digits if

the absolute value is less than 0.01, and
 the value is not equal to 0.0, or
 the absolute value is greater than 9999999999.

- Fixed point real

The variable value is represented as a REAL number in the floating point format. The number of fractional part digits can be selected (the 'fractional part digits' field becomes active). With integer variables (BOOL, BYTE, INT, ...), the selected number of fractional part digits is filled with zeros. This display format does not change over to exponential representation. With an insufficient number of fractional part digits, very small values are rounded and represented as 0.0.

- ASCII characters

The variable value is interpreted as an ASCII character. The value '65', for example, is represented as an 'A'. If the value exceeds the range that is valid for ASCII characters, a modulo division with 256 is performed beforehand. Thus, a value of '321' is also represented as an 'A'.

Together with using a customized ASCII character set, this number format corresponds to the 'ASCII direct' display format that existed up to version 16.

Percent value

Within selectable limits, the variable value is entered as a percent value. The absolute values for displaying 0% and 100% must be entered as limits. (The value that is related to 0% may be greater than the value that is associated with 100%. In this case, the percent value rises as the variable value falls.)

The percent value can be represented with up to three fractional part digits. A value greater than 100% (e.g. 125%) is displayed if the variable value exceeds the value that has been defined for 100%. When it falls below the 0% value, an underflow indication '---%' is displayed.

The output may employ a customized ASCII character set.

Example

A tool slide performs a linear movement. The left-hand limit stop is at the absolute position 20 (units), and the right-hand limit stop is at the absolute position 190 (units). The location of the slide shall 'relatively' be shown in that range.

Enter the value 20 (left-hand limit stop) in the field 'absolute start value', and the value 190 (right-hand limit stop) in the field 'absolute end value'. The screen shows '0%' when the variable is 20, '59%' for a variable value of 100, etc.

Example of the dialog

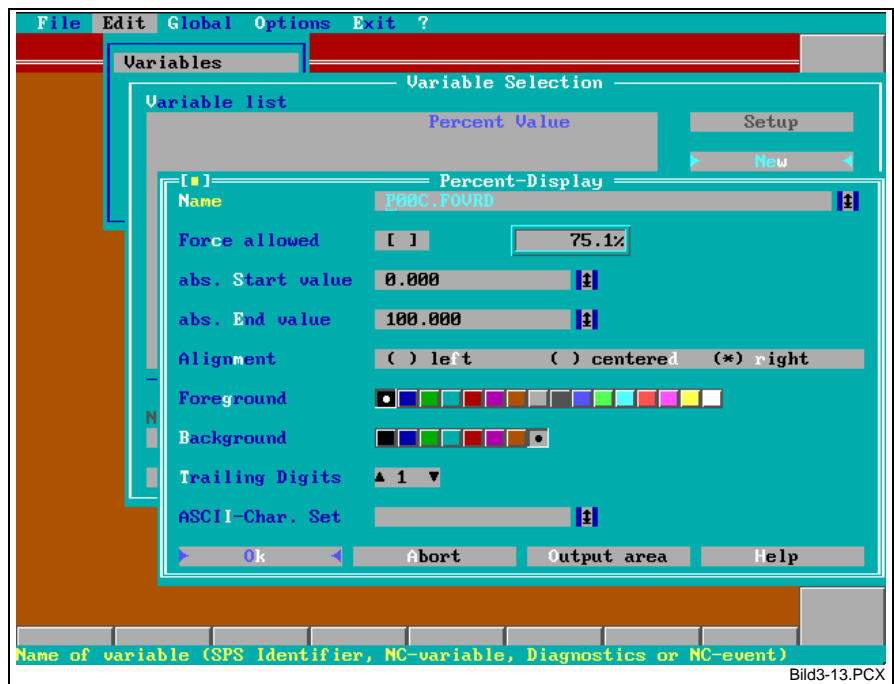


Fig. 3-13: Dialog for a 'percent value' indicator element'

2 texts Depending on the variable value, two different texts can alternately be output on the screen.

- Changeover value

The changeover value defines the point where the two alternative texts toggle. Comparing the variable value with the changeover value supplies a Boolean information that is used for controlling the display of the two alternative texts. Thus, alternative texts may be output for Boolean variables and for numeric variables.

- 1st text

The text that is output when the variable value is smaller than the changeover value is entered here. The text in the '2nd text' field is output when the variable value is equal to or greater than the changeover value. The output color of each text can separately be selected. There are separate preview lines. The text alignment can be defined.

Example of the dialog

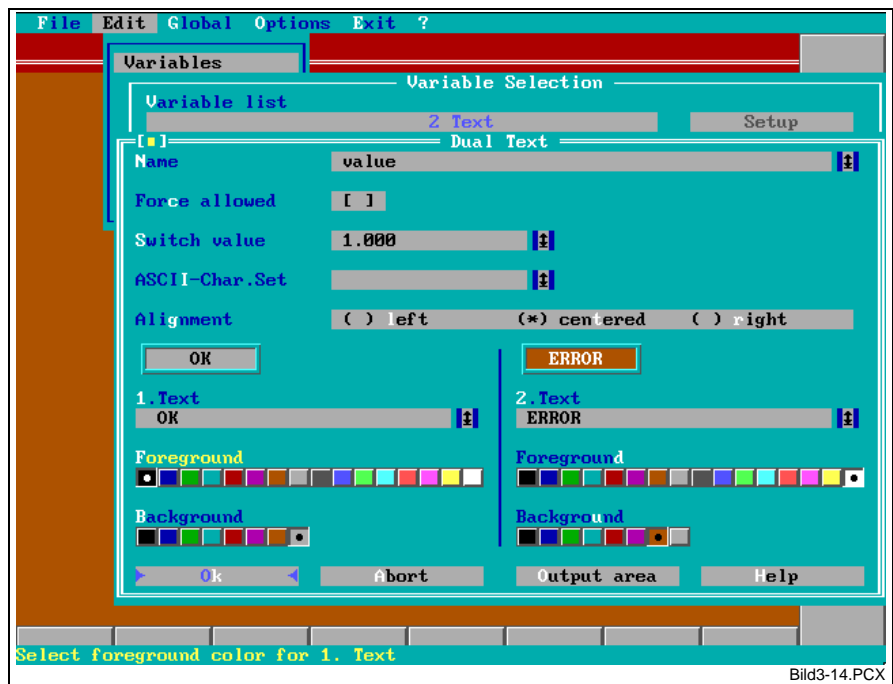


Fig. 3-14: Dialog for a '2 texts' indicator element

Using a trick, the '2 texts' indicator element permits more than two texts to be output. If one of the two texts is left completely empty (not even blanks are permitted), there will be no output on the screen for the state without text. Thus, several '2 texts' output elements may be output at the same location. This peculiarity can be used in the following typical application.

There are three flags (Boolean variables) in a SPS program that represent the plant's operating state (MANUAL, SEMI and AUTO). The ON states of the variable are mutually excluded. All three variables shall be output in the same area on the screen. Usually, those outputs would continually overwrite each other. Omitting the texts for the 'OFF' state of those variables suppresses the screen output of the two variables that are in an 'OFF' state. Only the variable that is in 'ON' state will cause the text to appear, and indicates the operating state.

In order to avoid undesired reactions, two features must be taken into account when the '2 texts' indicator element is used:

- (1) Ensure that all variables that output their texts to the same screen position mutually exclude each other. Failure to do so would display several texts on top of each other.
- (2) If only one single variable of the '2 texts' format employs a screen position, and if one of the two texts of that variable is omitted, the existing text will not be cleared even if the state of the variable has assumed the alternative value. If a text shall alternately be output and cleared, at least one blank must be entered for the text that is to be cleared.

2 graphics

Depending on the variable value, two different graphics can alternately be output on the screen.

- Changeover value
The changeover value defines the point where the two alternative graphics are toggled. Comparing the variable value with the changeover value supplies a Boolean information that is used for controlling the display of the two alternative graphics. Thus, alternative graphics may be output for Boolean variables and for numeric variables.
- 1st graphic element
The graphic element that is output when the variable value is smaller than the changeover value is selected here. The graphics in the '2nd graphic element' field are output when the variable value is equal to or greater than the changeover value.

Any graphics that have been created or imported using the internal graphics editor (see Chapter 'Graphics Editor', page 3-83) may be used here. Due to a maximum display speed, directly displaying bit map graphics is not possible.

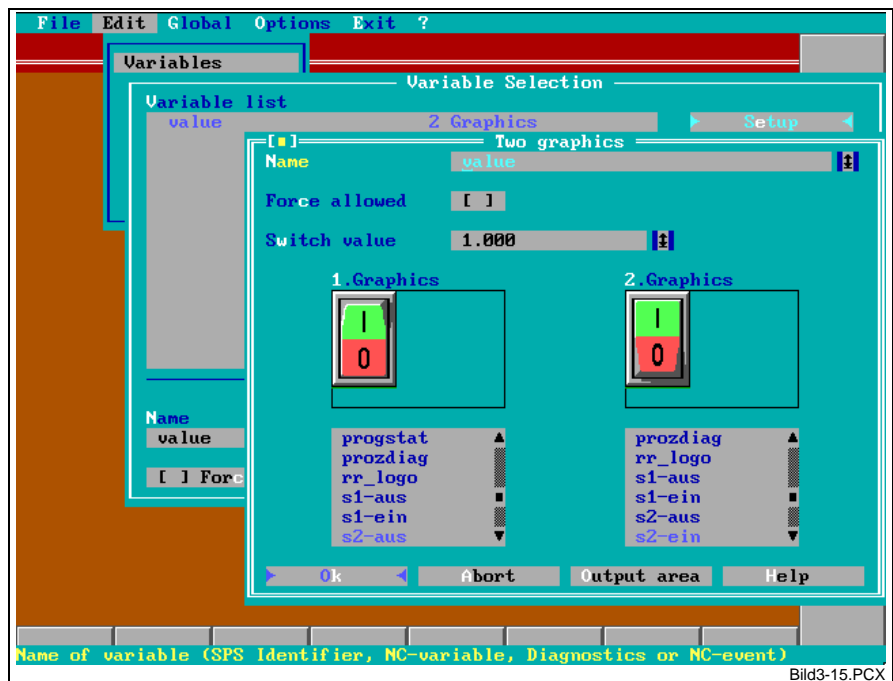


Fig. 3-15: Dialog for a '2 graphics' indicator element

Using a trick, the '2 graphics' indicator element permits more than two graphics to be output. If a graphic element is not selected for one of the two states, (first blank entry in the selection list), there will be no output on the screen for that state. Thus, several '2 graphics' indicator elements may be output at the same location. This peculiarity can be used in the following typical application.

There are three flags (Boolean variables) in a SPS program that represent the plant's operating state (MANUAL, SEMI and AUTO). Those three states of the plant shall be displayed by three symbols (graphics). The ON states of the variable are mutually excluded. All three variables shall be output in the same area on the screen. Usually, those outputs would continually overwrite each other. Omitting the graphics for the 'OFF' state of those variables suppresses the screen output of the two variables that are in an 'OFF' state. Only the variable that is in 'ON' state will cause the graphic element to appear, and indicates the operating state.

This permits simple animation to be created. To do this, a number of (e.g. Boolean) flags are declared in the SPS that represent the individual states of the sequence that shall be animated. For example: The flags z1 through z20 are created for a sequence of 20 states. The SPS program must now ensure that the bits are set (one by one) according to the sequence. Next, 20 graphics are created that show the individual phases of the sequence. Those graphics must then be linked as '2 graphics' indicator elements with the variables z1 through z20. Only the 2nd graphic elements are used here, the 1st graphic elements remain blank.

Note: Displaying graphics dynamically requires a large amount of data and computing time. Restricting the dynamic display to the graphic components that change is therefore expedient for swift displays. Invariable parts of the graphics should be placed into the image mask (see Chapter 'Editing the Static Image Mask', page 3-31). They will only be loaded once when the image is loaded, and displayed. If, for example, a single indicator lamp of a large control panel shall be altered, the graphics that contain the control panel should be in the image mask, and only a small graphic element should be altered with the '2 graphics' indicator element.

Graphics are only stored as a reference (name of the graphics file). The graphics themselves are not copied into the indicator element. The graphics can no longer be displayed if the graphics file is deleted. An error message is output when an attempt is made to load the graphics file.

Changing colors

Depending on the variable value, a rectangular screen area of any size alternately displays two different colors.

The contents (image mask) of the designated screen section is represented in two different colors (foreground and background). The screen contents do not change.

- Changeover value

The changeover value defines the point where the two alternative colors are toggled. This means: The color before the changeover value (foreground and background) is used for coloring the specified range if the variable value is smaller than the changeover value. The color after the changeover value is used for coloring the specified range if the variable value is equal to or greater than the changeover value

Notes: Empty screen areas (filled with blanks) can only be set with the background color. The foreground color is only visible with text characters. If you want the foreground color to appear for empty areas, you must fill the whole area with massive ASCII characters (code 219). Only the foreground color can be used here.

There may be unwanted effects if there are other indicator elements in the area that is changed using '2 colors'. The dynamic displays on the screen are only updated when their values changes. Thus, the indicator elements that are located in the affected screen area will be included in the change when the colors change. If, however, the value of such an element changes, the associated output field will newly be output in its selected colors.

Example of the dialog

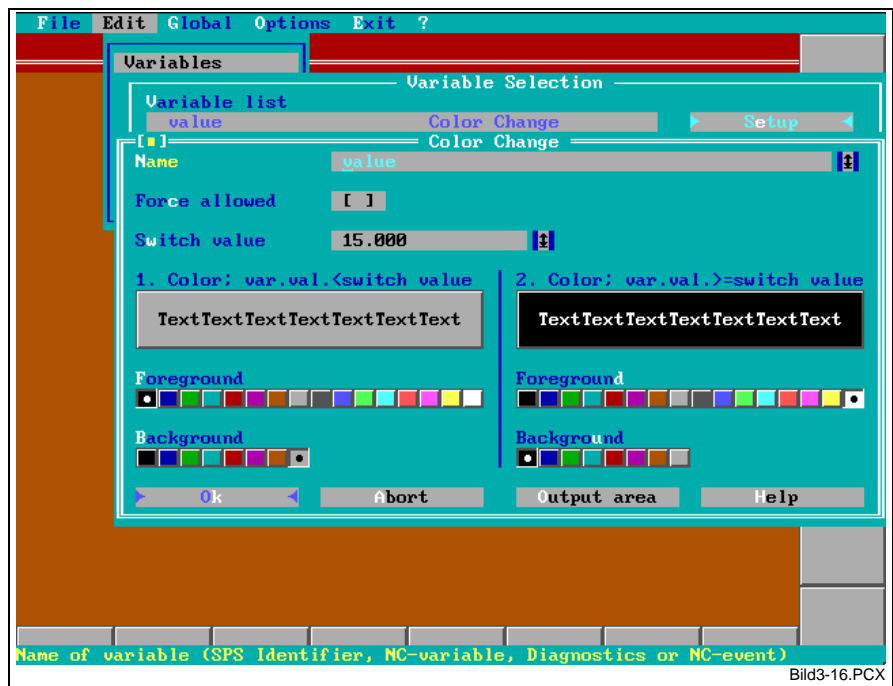


Fig. 3-16: Dialog for a 'changing colors' indicator element

Bars The variable value is output as a horizontal or vertical bar of a selectable indicating range. Absolute values must be specified for the start value (displays an empty bar) and the end value (displays a full bar). The bar is 'empty' when the variable has reached the absolute start value. It is 'full' when the variable has reached the absolute end value. Values above or below the indicating range are not indicated. The result of the selection immediately becomes visible as a preview. If the space in the window proves insufficient, that preview may be reduced in size.

Example of the dialog

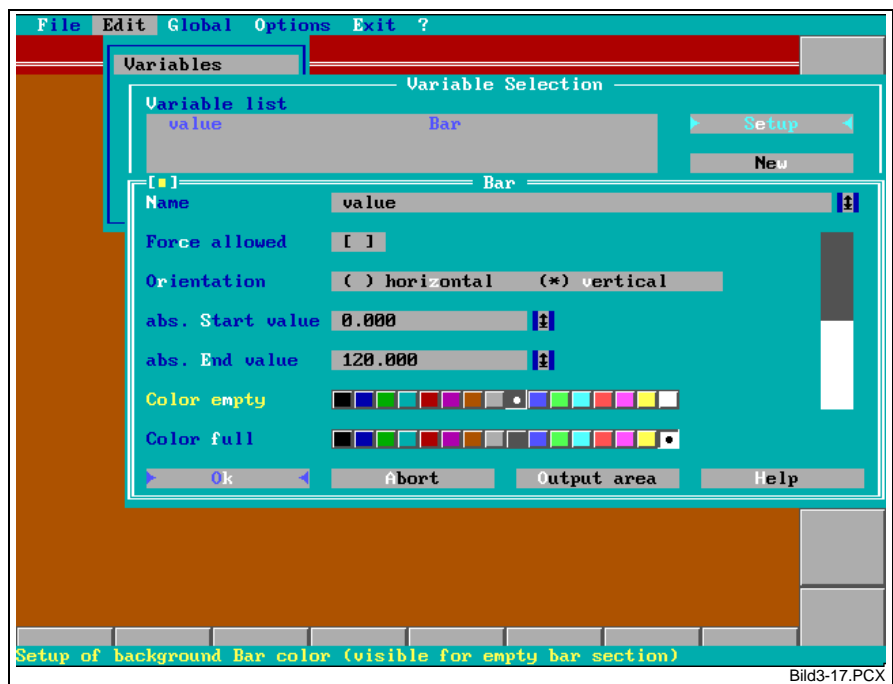


Fig. 3-17: Dialog for a 'Bars' indicator element

Scale The variable value is output as a horizontal or vertical scale with position indicator and labeled scale. The scale has a selectable indicating range.

Absolute values must be specified for the left-hand (lower) end of the scale (absolute start value) and the right-hand (upper) end of the scale (absolute end value).

Four different colors may be selected for the scale:

- Background
Color of the scale's background area.
- Pointer
Color of the scale pointer. The pointer is always five pixels wide, and features an arrowhead at its upper/right-hand end.
- Scale
Color of the scale graduation in 10er, 5er and, if applicable, unit marks. A 10er mark is always 4 pixels long; a 5er mark is 3 pixels long, and a unit mark is 2 pixels long. If the color selected for the scale is the same as the background color, the scale will be invisible.
- Label
Color of the automatic scale annotation with absolute numbers. Currently, annotation always employs figures that are 5 pixels high and 3 pixels wide. If the color selected for the annotation is the same as the background color, the label will be invisible.

All selections will immediately become visible in a preview (to the right of the 'value changeable' field). The preview will proportionally be reduced if the output field that is selected for the scale is larger than the space that is available for the preview.

A scale is always represented with a border that produces a three-dimensional appearance. The border is exactly one pixel wide; it is dark gray at the top and at the left-hand side, and white at the bottom and the right-hand side. This gives the impression of an indicator with a slightly recessed surface. The border cannot be modified.

Example of the dialog

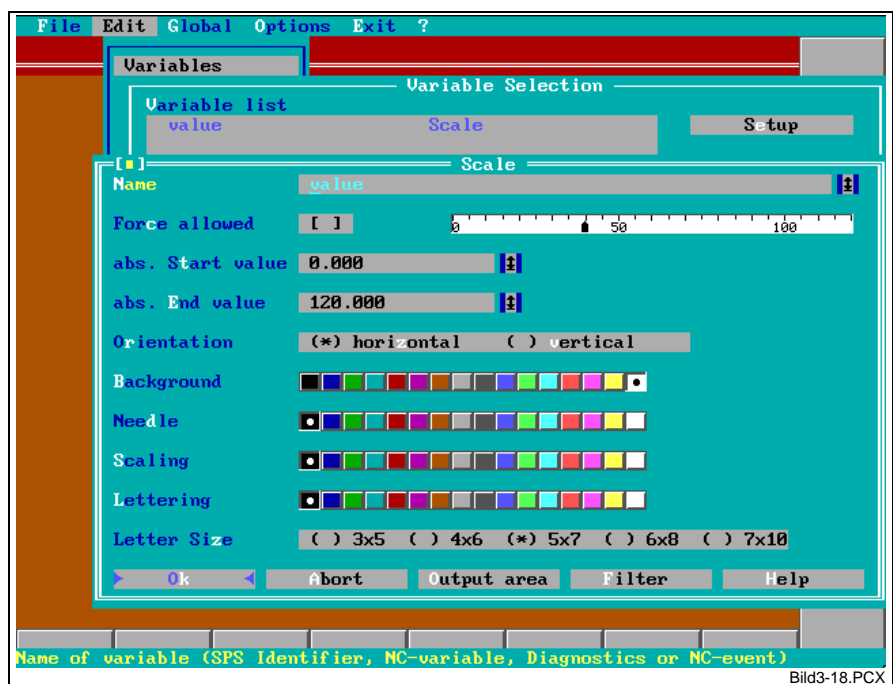


Fig. 3-18: Dialog for a 'Scale' indicator element

Measuring instrument

The variable value is represented as a pointer instrument. The displayable range of the measuring instrument can be selected. Absolute values must be specified for the left-hand limit stop (absolute start value) and the right-hand limit stop (absolute end value). Six different representation forms of the measuring instrument may be selected:

- 60°

The measuring instrument features an opening angle of 60°. The indication is symmetrical (i.e. it begins at -30° and ends at +30°).

Peculiarity: The pointer origin (pivot) may lie outside the output field.

- 90°
The measuring instrument features an opening angle of 90°. The indication is not symmetrical (i.e. it begins at 0° and ends at +90°). The display range describes a quarter circle.
- 120°
The measuring instrument features an opening angle of 120°. The indication is symmetrical (i.e. it begins at -60° and ends at +60°).
- 180°
The measuring instrument features an opening angle of 180°. The indication is symmetrical (i.e. it begins at -90° and ends at +90°). The display range describes a semi-circle.
- 270°
The measuring instrument features an opening angle of 270°. The indication is symmetrical (i.e. it begins at -135° and ends at +135°). The display range describes a 3/4-circle. This representation is particularly suitable for representing potentiometers that are used on the BTM-3 control panel, for example.
- 360°
The measuring instrument describes a full circle. The indication starts at 0° and continues clockwise until it has reached the origin again. Start and end point are at the top.

Note: A full circle is considered as having 360°. GONs (440 GON = full circle) are not taken into account. 0° is assumed to be at the top. The angle runs clockwise.

The measuring instrument can be represented in four different selectable colors:

- Background
Color of the measuring instrument's background. The previous screen background may be used instead of a monochrome background (transparent [x]). Thus, the measuring instrument becomes transparent.
- Pointer
Color of the pointer. The pointer is always 1 pixel wide.
- Scale
Color of the indicator range graduation in 10er, 5er and, if applicable, unit marks. A 10er mark is always 5 pixels long; a 5er mark is 3 pixels long, and a unit mark is 1 pixel long. If the color selected for the scale is the same as the background color, the scale will be invisible.
- Label
Color of the measuring instrument's automatic scale annotation with absolute numbers. Currently, annotation always employs figures that are 5 pixels high and 3 pixels wide. If the color selected for the annotation is the same as the background color, the label will be invisible.

There are 5 options for selecting the size of the scale lettering on the measuring instrument.

A filter may be used for displaying the variable value, i.e., before displaying, the current value is converted as a measuring instrument indicator (see Chapter 'Editing Soft Keys', page 3-36). This allows meaningful value ranges for labeling to be created.

All selections will immediately become visible in a preview (to the right of the 'value changeable' field). The preview will proportionally be reduced if the output field that is selected for the measuring instrument is larger than the space that is available for the preview.

Example of the dialog

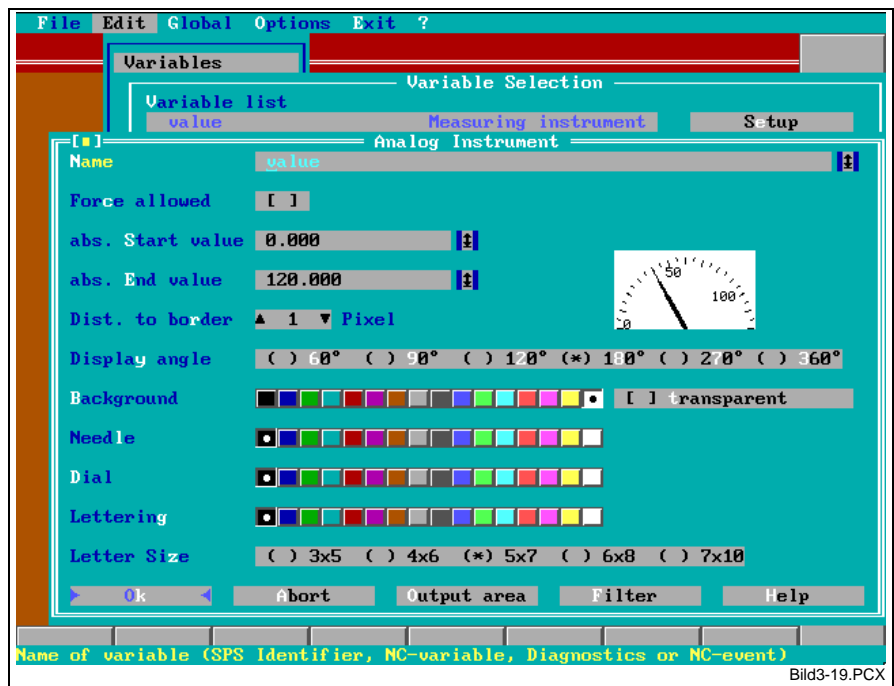


Fig. 3-19: Dialog for a '_Measuring instrument' indicator element

Plant message

The value of the variable is interpreted as the number of a plant message. The related message text (up to 54 characters) is displayed on the screen. This indicator element permits a separate message system to be set up in the SPS.

The variable should be of an integer numeric format (INT, WORD,...). The SPS message texts can be created and edited in the MT-CNC main menu item 'NC status and diagnoses'. Each SPS message text can have a 14-line comment assigned that can be represented using the specifically provided procedures 'SPSHelp' and 'SPSHelpCursor' (see Chapter 'Editing Soft Keys', page 3-36).

Example of the dialog

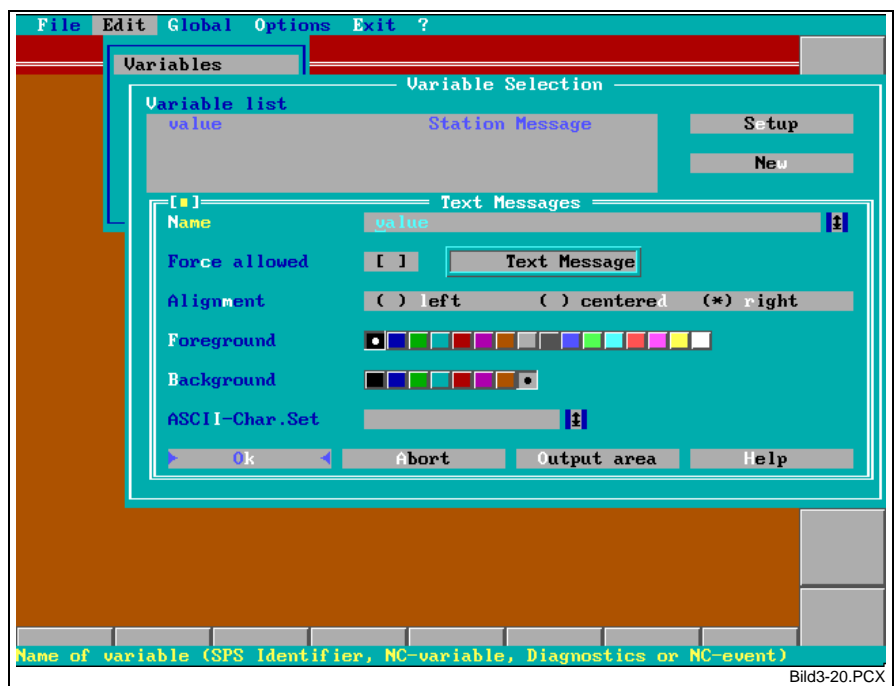


Fig. 3-20: Dialog for a 'Plant message' indicator element

Fill-up form The variable value is shown as the fill level of any process-related form. The internal principle shall be discussed here for a better understanding:

Two graphic elements are placed on top of each other. One graphic element represents the empty state, the other one the full state. Depending on the value of the variable, the empty-state graphic element is more or less covered by the full-state graphic element, thus simulating a continuous filling. Strictly speaking, this is a mix of the indicator elements 'bars' and '2 graphics'

The separating line between the two graphic elements can be horizontal (horizontal filling direction) or vertical (vertical filling direction).

The range of the indication can be defined by specifying absolute start and end values.

Tip: One of the two graphics may also be left empty (first empty entry in the graphics list). Thereby only one graphic is shown/hidden pixel-for-pixel.

Note: The form will always be filled linearly, not proportionally to the surface. Consequently, the indication becomes less accurate as the edges of the contour become less parallel.

The 'fill-up form' indicator element is particularly suitable for creating filled bars. In contrast to earlier versions, the presently used bar elements no longer feature a filling pattern.

Example of the dialog

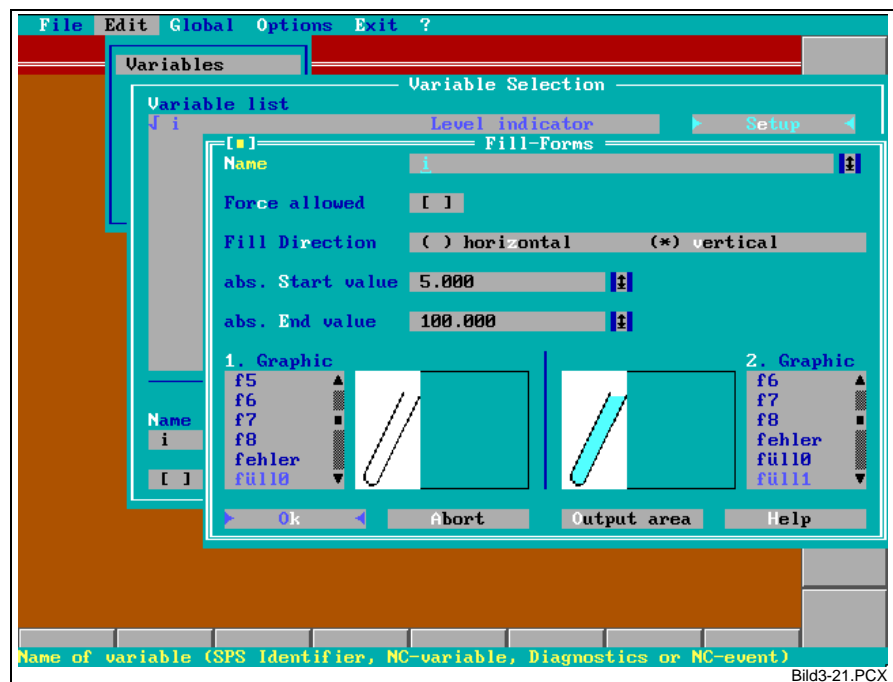


Fig. 3-21: Dialog for a 'Fill-up form' indicator element

Scenario The variable value is represented as a sequence of 256 graphics which may be placed at any desired location on the screen. Each graphic is assigned a whole-number value between 0 and 255. This permits easy representation of complex processes, such as moving a gantry loader. To be able to create, edit and administer scenarios, a new tool, Scenario Editor, has been added to the Global menu (see Chapter 'Scenario Editor', page 3-90).

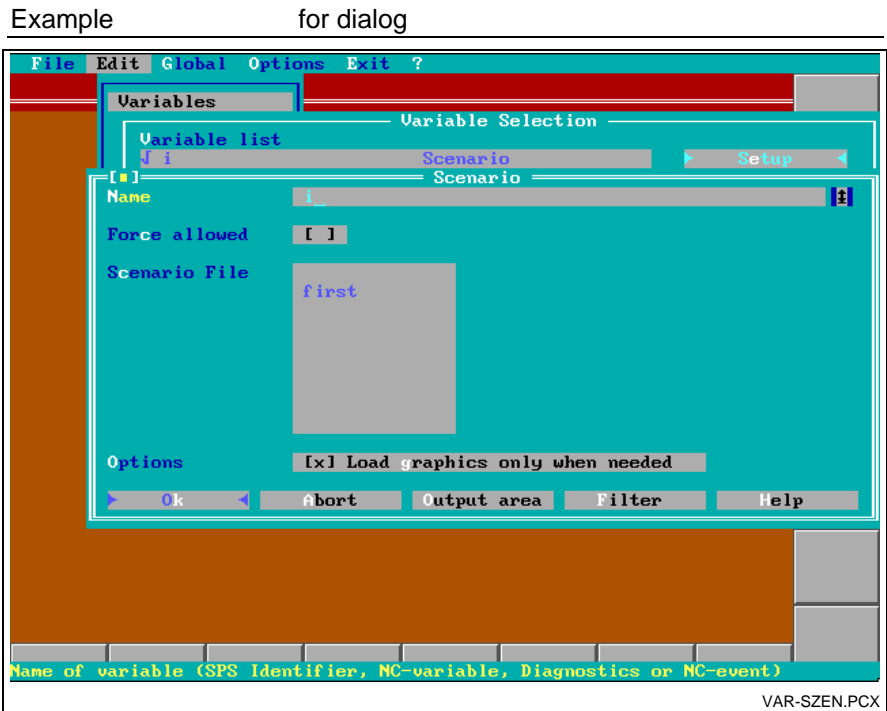


Fig. 3-22: Dialog for a display element 'Scenario'

Notes:

- (1) The 'Load graphics only as needed' option determines whether the graphics displayed by the scenario are loaded as soon as the display element is created (generally when loading the image) or only when you want the scenario to display then. This option has a significant effect on memory and runtime for displaying.

If this option is turned off, all graphics which the scenario needs are loaded and held in memory as soon as the display element is created. This means among other things that a noticeable wait time results when loading the image until all the graphics are loaded. In addition, much of the available memory may be taken up. The result can be that there is then no memory available for additional display elements.

Caution when using many large graphics !!!

On the other hand, this setting has the advantage that the scenario graphics can be immediately displayed with no jerking.

If the option is turned on, none of the graphics which may be needed are loaded when the scenario is loaded. This means the display element only needs minimal time to come up (e.g., when loading the graphic). To display a scenario graphic, it must be loaded prior. Depending on the size of the graphic and the speed of the computer, this process may involve a short wait time. Once a graphic is loaded, it is not discarded. This means that no load process is required to display it again. The graphic is now displayed without jerking.

This option can therefore be used to choose between fast image loading and immediate jerk-free representation of the scenario. The difference becomes even more apparent the larger the individual scenario graphics are and the more different graphics are used in the scenario.

- (2) The scenario is always displayed relative in the selected output field. If the output range is made smaller than the size of the scenario itself, any graphics which lie outside will be displayed either partially or not at all.

Filter-Function

- Opening** Edit/Variables/Scale/Filter
or
Edit/Variables/Measuring Instrument/Filter
or
Edit/Variables/Scenario/Filter
- Functionality** For some display elements, the current value from the controller can be processed using a filter function. A linear filter is currently available.
- The dialogs for the affected display elements have a corresponding 'Filter' switch which opens the dialog for the linear filter.

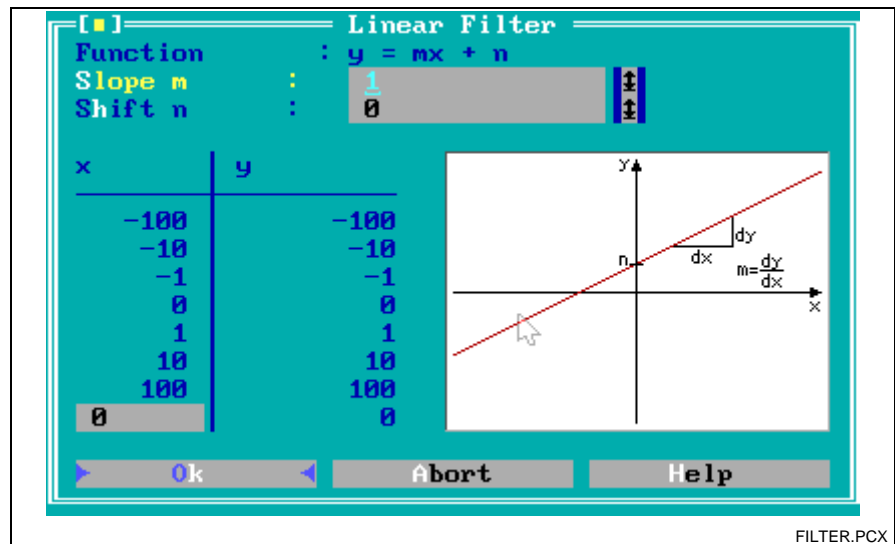


Fig. 3-23: Dialog for entering a linear filter

A linear equation is described as $y = mx + n$, whereby 'm' is a rise and 'n' is a (constant) shift. The original value from the controller is inserted for 'x', and the calculated function value 'y' is displayed. To display the value unchanged, a rise of 1.0 and a shift of 0.0 must be selected.

The graphic in the right half of the dialog window (here shown as a gray field) shows an example for a linear equation. This is only an aid to understanding, and is not calculated from the entered parameters. The table in the left half does however contain some demonstrative y-values, which are calculated using the entered parameters. The bottom line in the table allows your own value to be tested.

Examples: for linear equations

- (1) The value in the controller is in 'inch' resolution, but you want to represent the display scaling (scale or measuring instrument) in mm.
The conversion factor from 'inch' to 'mm' must be applied as rise 'm'. One inch corresponds to 25.4 mm (1 mm is 0.03939 inches).
Since we are not shifting the null, the 'n' shift remains 0.0.
- (2) The absolute position of a tool carriage is filed with an INT variable (range -32766 to +32767). Full left is therefore at the absolute travel position -225 (units), and full right at 427 (units). The carriage position shall be displayed using a scale with a display range of -100 to +100.

Rise 'm' is calculated as follows:

$$m = \frac{dy}{dx} = \frac{100 - (-100)}{427 - (-225)} = \frac{200}{652} = \underline{0.30675}$$

dy Difference of the y-values

dx Difference of the x-values.

To determine the 'n' shift, the linear equation is converted to 'n' and a known value pair inserted. This may be for example the full right position:

$$y = 100 \text{ and } x = 427.$$

$$n = y - mx = 100 - 0.30675 \times 427 = \underline{-30.9816}$$

- (3) You want to represent a position value as a scenario with 40 single images. But the absolute position value only changes between 3.5622 and 4.9318 in the corresponding range. And the desired function value must lie between 0 and 39.

Analogous to Example (2) the parameters are calculated as follows:

$$m = \frac{dy}{dx} = \frac{39 - 0}{4.9318 - 3.5622} = \frac{39}{1.3696} = \underline{28.4755}$$

$$n = y - mx = 39 - 28.4755 \times 4.9318 = \underline{-101.4353}$$

Peculiarities None

Modifying Variable Values

Call Edit/Variables/Value changeable
or

Edit/Variables/<Dialog of the indicator elements>/Value changeable

Functionality The variable value is marked as being changeable. This means that, using suitable procedures, the operator may change the value of the variable (see Chapter 'Editing Soft Keys', page 3-36). A changeable variable is highlighted when the cursor is moved across its output area.

Peculiarities If a variable has repeatedly been defined in an image (using different indicator elements, for example), the changeability can be defined separately for each occurrence. A valid range can be specified for the changes that defines the limits in which the value may be modified (see Chapter 'Limit Check)', page 3-30).

Limit Check)

Call Edit/Variables/Limit check

Functionality The valid range in which the variable value may be modified can be delimited. Whenever the variable shall be modified, the system checks for those limits. There will be an error message if the new value is outside the specified range.

Peculiarities When a variable is defined that in not (yet) known, specifying the value ranges is possible. However, the maximum value range of the variable cannot be displayed because it is unknown.

The value range is only delimited if a variable is concerned that has been defined as an indicator. A variable that is directly influenced by a soft key (see Chapter 'Editing Soft Keys', page 3-36), and has not been defined as an indicator will not be limit-checked.

Selecting the [Typ Min/Max] button enters the specified limits of the variable type.

Example

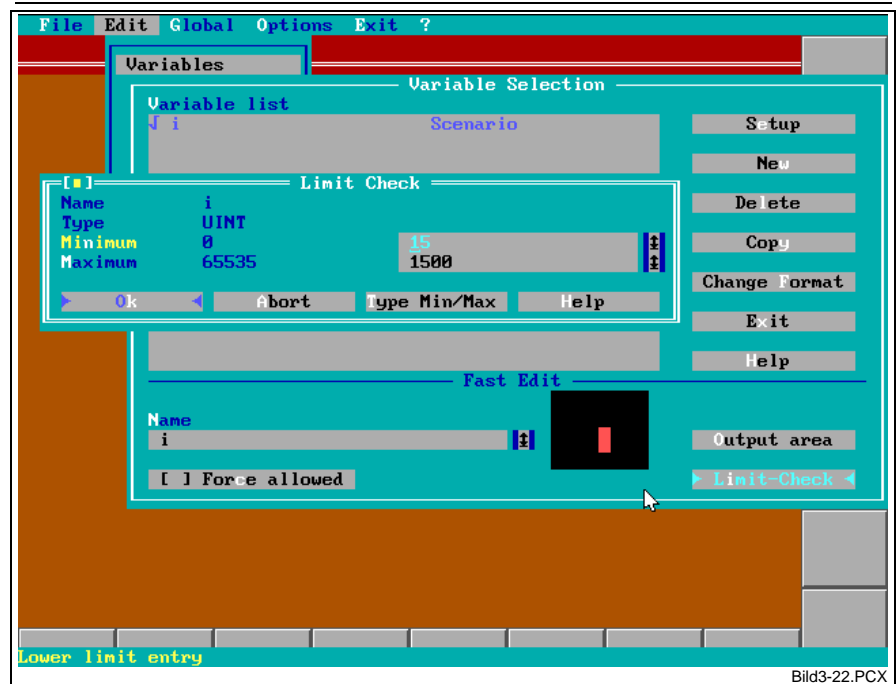


Fig. 3-24: Entering the range limits for value changes

Editing the Static Image Mask

Call Edit/Image mask

Functionality The static image component can be edited. Graphics and any texts or lines made of text characters can be arranged and/or edited in the image mask. The texts and graphics that are placed here are not dependent on variable values.

The window is optically (vertical line) and functionally split in two parts:

- left-hand part: Selections for placing text, and color
- right-hand part: graphics management.

The [Edit mask] button permits text to be created and edited in the image mask. The [Load text] button enables ASCII files to be imported. Their contents are arranged as text in the image mask.

When text is entered, lines can easily be drawn with the <Shift> key and the cursor keys. A line type may be defined beforehand.

In the image mask, graphics are always stored as references. This means that only the name of the graphics file and its co-ordinates are retained in the image mask. The [New], [Clear], and [Place] buttons can be used for editing the list of the displayed graphics. The [Graphics editor] button provides direct access to the graphics editor, and automatically loads the currently selected graphics.

The graphic elements are put on top of each other in the sequence in which they are contained in the list. The first graphic element in the list is output as the bottom one, the last graphic element as the top one. When a graphic element is moved within the image mask, all variables that lie on top of it may be moved too. There are moving options that can be used for adjustment.

Note: If variable value shall be represented as animated graphics, the moved part of the graphics should be kept as little as possible, thus achieving the highest display speed possible. This requires the complete graphics to be arranged in the image mask. Using the graphics editor, the part of the graphics that shall be shown moving is cut from the graphics and lined with the required variable in a '2 graphics' indicator element. The graphic element of one state may even be left out if it does not change with respect to the graphics in the image mask.

Peculiarities None

Example

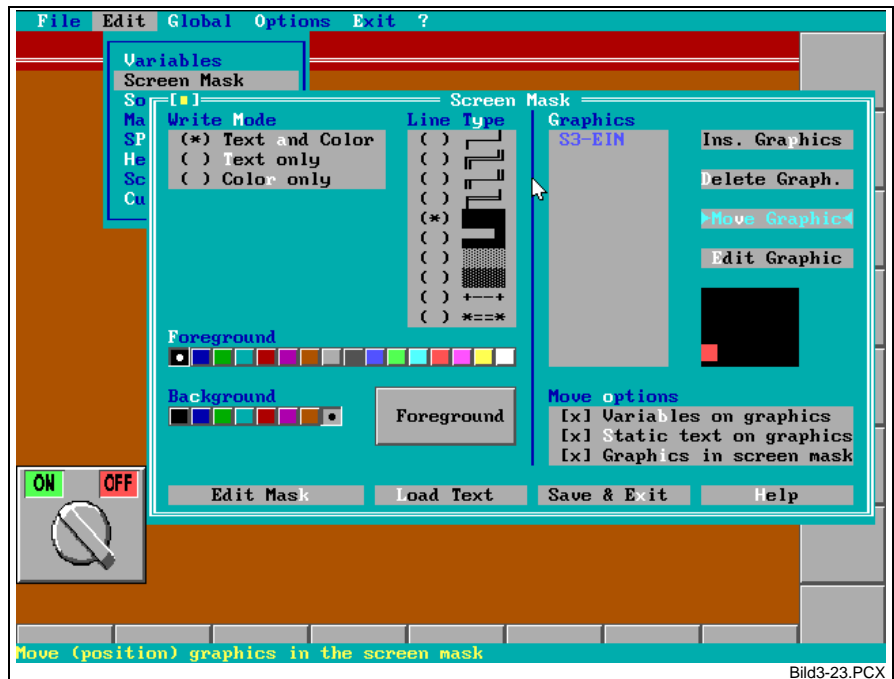


Fig. 3-25: Window for image mask editing

Selecting the Write Mode

Call Edit/Image mask/Write mode

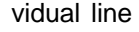
Functionality The write mode that is employed for writing in the image mask can be selected:

The following modes are possible:

- Text and color
Each character that is entered in the image mask is displayed in the selected colors (see page 3-33). this is the 'normal' write mode.
- Text only
Each character that is entered in the image mask is displayed in the color that exists at the write position (i.e. only the textual contents of the image mask are changed). The previously used colors remain unchanged. The color selections made for writing (see page 3-33) are not taken into consideration.
- Color only
Only the color can be modified in the image mask, not the textual contents. Press the <Space> bar to display the selected color at the cursor position (see page 3-33). The image mask's textual contents at that point will not be modified.

Peculiarities None

Selecting a Line Type for Writing in the Image Mask

Call	Edit/Image mask/Line type
Functionality	The line type is selected that shall be produced in the function that is used in the image mask for swiftly drawing a line. A short sample of the individual line type is offered (e.g. ). Using the combination of <Shift> and cursor keys permit a line of the selected type to be drawn in the image mask. Creating customized line types is explained in Chapter 'Modifying the Line Types', page 3-57.
Peculiarities	None

Selecting the Colors for Writing in the Image Mask

Call	Edit/Image mask/Foreground Background
Functionality	The foreground color and the background color that are used for writing to the image mask can be selected. The selected colors are shown as an example.
Peculiarities	Using the selected colors may not be possible if they are not compatible with the selected write mode (see Chapter 'Selecting the Write Mode', page 3-32).

Loading an External Text as an Image Mask

Call	Edit/Image mask/Load text
Functionality	Any ASCII file may be loaded. That file is interpreted as an image mask. If necessary, an image mask can be created on an external word processing system, and be read into the system.
Peculiarities	The previously used image mask is completely discarded. A 'hard' line delimiter (CR/LF) is expected for the recognition of individual lines. The text is always inserted such that it begins in the left-hand top corner of the image mask. If the entered text is wider and/or longer than the image mask, it will be truncated at the edge of the image mask. The user must ensure that a readable ASCII file is loaded. Apart from not being able to read it, loading an illegible file (e.g. a program) may lead to serious problems in the program.

Writing in the Image Mask

Call	Edit/Image mask/Edit mask
Functionality	Taking the above-mentioned settings into consideration, writing to the image mask is possible. All menus disappear and a block cursor becomes visible. Writing in the image mask is done in otype mode (the character under the cursor position will be otyped). The following commands are possible: <ul style="list-style-type: none"> • <CursorLeft>, <CursorRight>, <CursorUp> and <CursorDown>, The cursor moves on the screen by one character in the specified direction. • <Home>, <End>, <PageDown> and <PageUp> The cursor moves to the left, right, top and bottom end of the screen mask. • <Shift>+Cursor keys Drawing lines of the selected line type (see Chapter 'Selecting a Line Type for Writing in the Image Mask', page 3-33). Corners, junctions, and crossings are generated automatically. Keep the <Shift> key depressed while you are drawing a line. • <Alt>+<A> A window opens that offers all available ASCII characters of the PC character set for selection (see Fig. 3-26). This permits characters to be displayed on the screen that cannot be attained via the keyboard. Using

the space bar permits a character string of several ASCII characters to be assembled that is entered at the current cursor position.

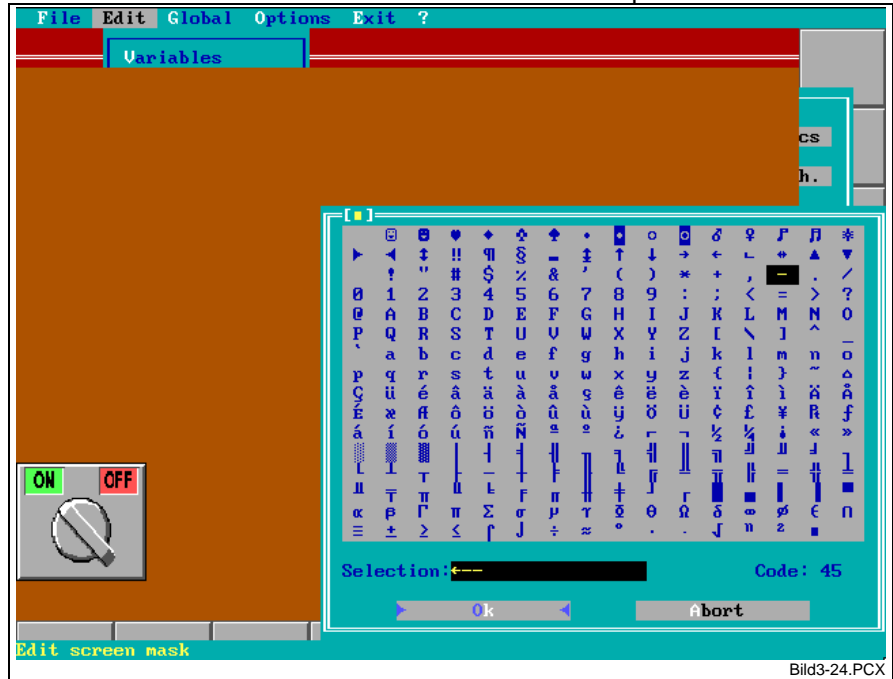


Fig. 3-26: Selecting characters from the ASCII table

Note: The <PrintScreen> key should not be used for producing a screen shot when characters are used from the first two lines of the selection window (codes 0 through 31). The image contains characters that are interpreted by the printer as control characters. Use the 'PrintScreen' procedure (see Chapter 'Editing Soft Keys', page 3-36) instead if you wish to produce a hard copy of the screen contents. All 'risky' characters will then be replaced.

- <Delete>
The character under the cursor position is cleared. A gap appears at that point that is filled with the image mask's base color (see Chapter 'Defining Colors', page 3-54). The text to the right will not be moved to the left.
- <Backspace>
The character to the left of the cursor position is cleared and the cursor moves to the left by one position. A gap appears at that point that is filled with the image mask's base color (see Chapter 'Defining Colors', page 3-54). The text to the right will not be moved to the left.
- <Enter> or <Esc>
Writing in the image mask is terminated, and the setting window (see Fig. 3-25) re-appears. The modifications will be accepted in either case, even when you select <Esc>. Discarding the modifications is not possible.
- Any other alpha or numeric key
Except for the function keys, all other keys may be used for writing on the screen.

Peculiarities None

Inserting Graphics in the Image Mask

- Call** Edit/Image mask/New or <Insert> key
- Functionality** Graphics may be included in the image mask. To do this, all existing graphics are offered in a selection window (see Fig. 3-25). Optionally, a preview of the graphics may be displayed. The required graphics are loaded when the <Enter> key or the OK button is pressed, and must be placed on the screen. Use the cursor keys to place the graphics, and press the <Enter> key to confirm the placing. To abort the integration of the graphics into the image mask, press the <Esc> key when you select the graphics file or place the graphics. The graphics are always entered at the cursor position in the list. This is significant because display takes the sequence of the list into account. The first graphic element in the list is output at the bottom, and the last one at the top. This permits overlapping graphics to be implemented if this is required. The size of the graphics cannot be influenced.
- Peculiarities** Graphics are always entered in the image mask as a reference (name of the graphics file). Thus, they are not stored again in full in the image mask. When a graphics file is cleared or renamed, it can no longer be displayed in the image mask. An error message is output if an attempt is made to call such a file. Graphics in the image mask are always loaded when the image is loaded. There are no updates in between. Modifying graphics that are currently located in the image mask in the editor (see Chapter 'Graphics Editor', page 3-83) will only come into effect when the image and, consequently, the graphics are loaded again.

Tip: Call the menu item Global/New settings and exit it to cause the image to be reloaded swiftly.

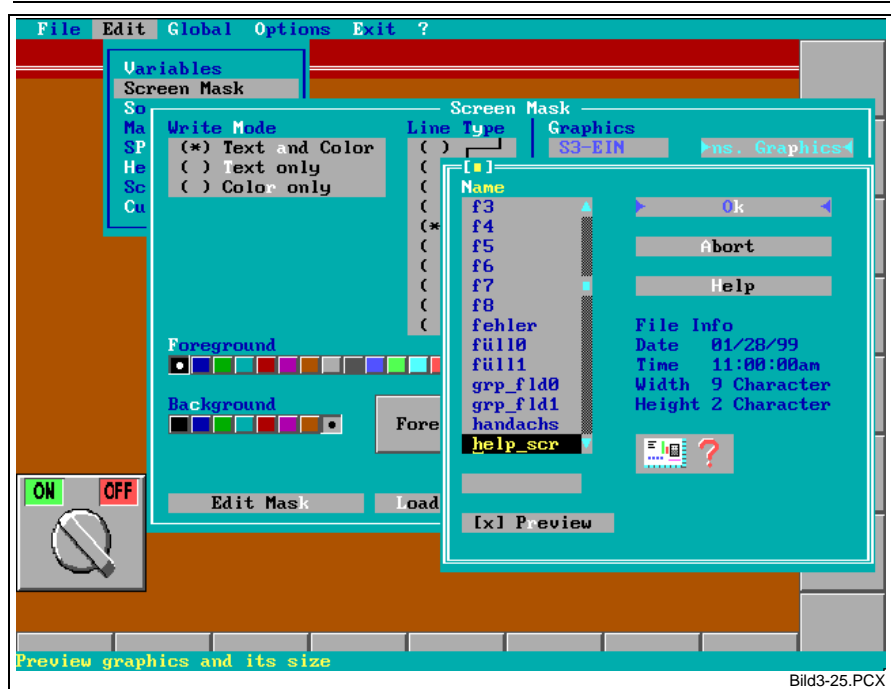


Fig. 3-27: Selecting a graphic element for integration into the image mask

Clearing Graphics from the Image Mask

Call	Edit/Image mask/Clear or <Delete> key
Functionality	The selected graphic element is deleted from the list without any further query. All subsequent entries are moved up.

Moving Graphics in the Image Mask

Call	Edit/Image mask/Placing
Functionality	<p>The graphic element that has been selected from the list can be moved within the image mask. Its position in the list and, consequently, its display order remain unchanged.</p> <p>Moving is done in a colored rectangular area whose size corresponds to the size of the graphic element. Use the cursor keys or the mouse to move that rectangle within the image mask. Press the <Enter> key or double click the mouse button to accept the modification. Press the <Esc> key to abort the procedure.</p> <p>The size of the graphic element cannot be influenced.</p>
Peculiarities	<p>As an option, other image components may automatically be moved as well when graphics are moved within the image mask:</p> <ul style="list-style-type: none"> • any variable whose output area is fully inside the graphic element; • the text contents of the image mask(text and color) at the place of the graphic element; • further graphics of the screen mask that are fully inside the graphic element. <p>Use the move options to perform the necessary selections.</p> <p>'Variables on graphics', in particular, saves subsequent corrections of the variable that animates the graphics. If, for example, 20 animated switches and indicators (variables) have been accommodated on a control panel (graphics in the image mask), those elements can automatically be included in the movement when the control panel is moved inside the image mask.</p>

Editing Soft Keys

Call	Edit/Soft keys
Functionality	<p>The soft keys of the currently opened window can be edited. To do this, open a window in which the soft key features (annotation, action, and parameters) can be modified (see Fig. 3-26). The label on the button of the currently processed soft key can be shown in a preview.</p> <p>A text may be entered and/or a graphic element selected may be as annotation. The position of the graphic element on the button is selectable. The text is always displayed visibly on top of the graphic element. The graphic element is stored as a reference to the graphics file; not as the contents of the graphics. When the graphics file is deleted, the image can no longer be displayed when it is loaded (and, consequently, an attempt is made to load the graphics file). An error message is not output. However, the reference is retained.</p> <p>Either the name of the image file that is loaded when the soft key is selected, or the name of a given procedure that is executed when the soft key is selected can be specified as the action. There is a selection of all possible actions available in the right-hand part of the window that permits the action to be entered:</p> <ul style="list-style-type: none"> • The left-hand column contains all existing image files. • The right-hand column contains all specified procedures (see below). <p>During scrolling, a brief help text, that is related to those procedures, is output on the help line at the bottom screen margin.</p> <p>Some procedures require one or two parameters (such as variable names or values). The parameter input fields become active according to the selected procedure. There are procedure-related input assistants for the parameter input fields that can be activated by pressing the <Enter> key on a <u>blank</u> input field.</p>

Exception: There is no input assistant for entering a numeric value.

Some actions require certain password privilege in order to be carried out. This is required for example when changing variables in the control ('Modify variables' key). If there is no corresponding authorization before carrying out the action, an attempt is made to obtain this by prompting for a new password. Specific exceptions can be made here using the 'Password-Check active' switch. The switch becomes active for the following actions:

- VarSet,
- VarInc,
- VarDec,
- ToggleBit und
- LoadArchive

With the exception of LoadArchive, these are all actions which require no further input from the user, since all necessary settings are already specified in the parameters for the action.



CAUTION

All actions which result in changes to the system or user interface can normally be executed only with the appropriate user privileges (password prompt).

⇒ Turning off password prompt may jeopardize the safety of the system or the stability of the user interface.

Peculiarities

The selection of existing images only contains images that have been created using the image editor. Albeit 'old' text images may be entered manually as an action (and will be executed), they are not contained in the selection. If an image exists under the same name in the format of the image editor and in the 'old' text format, the later version will be loaded (this may be the text image). When an image, that has been loaded as a text file, is stored (see Chapters 'Save the Current Image File', page 3-3 and 'Save the Current Image File Under a New Name', page 3-3), a file in the image editor format is always created. Any existing file of the same name will be overwritten without any warning.

If an image and one of the given procedures share the same name, it is always the procedure that will be executed.

The action names are not case-sensitive.

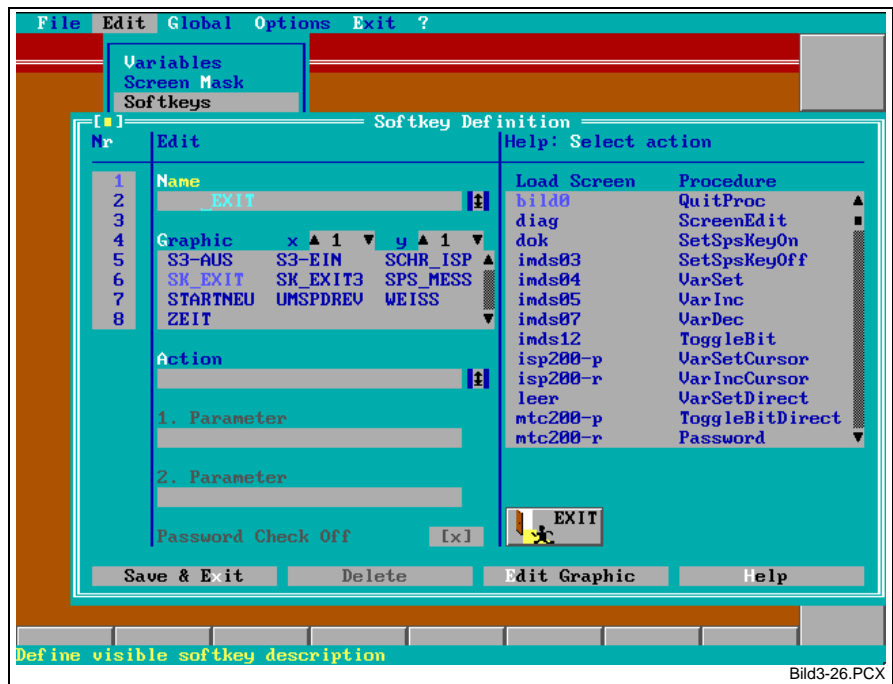


Fig. 3-28: Window for editing soft key definitions

The following procedures are available:

QuitProc

The Custom Display System is terminated and the system returns to the calling program (usually the MT-CNC main menu). The system remembers the last image to have been loaded, and immediately loads it when the Custom Display System is called again.

Note: At least one utilization of the 'QuitProc' procedure must have been entered as a global key (see page 3-55). The Custom Display System cannot be exited if this has not been done.

No parameters.

ScreenEdit

The built-in image editor is activated. The user may be prompted to enter the necessary password for the privilege of editing images. Soft key handling and machine function keys are disabled, and the key annotation disappears. The image editor can only be activated when a machine function key is not pressed. (Reason: The interconnection list of the machine function keys may be modified in the editor; and the linked variable or an active machine function key could remain set.)

Note: At least one utilization of the 'ScreenEdit' procedure must have been entered as a global key (see page 3-55). The image editor could never again be activated if this has not been done.

No parameters.

SetSPSKeyOn

The interrogation of the SPS keys is enabled. The indicator on the top-most screen line changes to 'SPS control and manual'. The interrogation of the SPS keys can be disabled with the 'SetSPSKeyOff' procedure.

No parameters.

SetSPSKeyOff

The interrogation of the SPS keys is disabled. The indicator on the top-most screen line changes to 'Manual control'. The interrogation of the SPS keys can be disabled with the 'SetSPSKeyOn' procedure.

That procedure is expedient if SPS keys have been defined that (in the case of an error, for example) load another image that shall be suppressed because operator inputs remain to be done in the current image.

The state of the interrogation of the SPS keys is not retained when the Custom Display System is terminated. The interrogation of the SPS keys is always enabled when the Custom Display System is loaded again.

- No parameters.
- VarSet** A specific variable (1st parameter) is set to a specific value (2nd parameter) when the allocated soft key is selected. Thus, SPS variables, NC variables and events may be modified.
The user must possess a 'Modify variables' password privilege. The system prompts the user to enter a password if that password privilege has not been set. The execution of the procedure is denied if the privilege can still not be set.
There are valid value range limits if the variable that is to be influenced is contained in the variable definition of the image. When the soft key is selected, a check for the valid value range will be performed. The execution of the procedure is aborted and an error message is issued if the new variable value is outside the selected value range of the variable.
Parameters:
1. Name of the variable that shall be modified. The existence of the variable will not be checked during input. An input assistant is opened when the input field is blank. If the variable is unknown, an error message is output in response to an attempt to execute the procedure (selecting the soft key).
2. Value to which the variable shall be set. When the value is entered, it will not be checked for being inside the valid value range of the variable (a value of 199, for example, is too great for a Boolean variable) or for being suitable (the value 'A', for example, is not suitable for setting a BYTE variable). If the value is not valid, an error message is output when an attempt is made to execute the procedure.
- VarInc** Actuating soft keys increases a certain variable (1st parameter) by a certain value (2nd parameter). It is possible to change SPS variables (except for boolean WORD, BYTE, and INC or DEC) and NC variables.
The user must possess a 'Modify variables' password privilege. The system prompts the user to enter a password if that password privilege has not been set. The execution of the procedure is denied if the privilege can still not be set.
The execution of the procedure is also denied if the increased value would be outside the defined value range (see Chapter 'Limit Check', page 3-30). An error message is output in this case.
Parameters:
1. Name of the variable that shall be increased. The existence of the variable will not be checked during input. An input assistant is opened when the input field is blank. If the variable is unknown, an error message is output in response to an attempt to execute the procedure (selecting the soft key).
2. Value by which the variable shall be increased. When the value is entered, it will not be checked for being inside the valid value range of the variable or for being suitable. If the value is not valid, an error message is output when an attempt is made to execute the procedure.
- VarDec** Apart from the fact that the variable is decreased by the specified value, this procedure works like 'VarInc'.
- ToggleBit** The state of a given Boolean SPS variable or of an event is changed. This means that the variable assumes its alternate state ('ON' becomes 'OFF', and vice versa).
The user must possess a 'Modify variables' password privilege. The system prompts the user to enter a password if that password privilege has not been set. The execution of the procedure is denied if the privilege can still not be set.
The execution of the procedure is also denied if the alternate value is not valid, i.e. outside the defined range (see Chapter 'Limit Check', page 3-30). An error message is output in this case.
Parameter:

Name of the SPS variable or the event. The existence of the variable will not be checked during input. An input assistant is opened when the input field is blank. If the variable is unknown, an error message is output in response to an attempt to execute the procedure (selecting the soft key).

VarSetCursor

Any variable can be set to any value. This procedure works with SPS variables, NC variables, or events. All variables can be used that are displayed in any format and that may be modified. The 'Value changeable' check box must be activated for this purpose.

A changeable variable is highlighted when the cursor is moved across its output area.

When the 'VarSetCursor' procedure is activated (when the soft key is pressed), that variable immediately appears in the window and can be used for entering a new value (see Fig. 3-27). Unless the cursor sits on the output field of a changeable variable, a list of all changeable variables of that image is offered.

Note: There are some procedures that permit a particularly swift change between the changeable variables of the image. In the default configuration, pressing the <Tab> key changes from the top left to the bottom right position, and pressing the <Shift>+<Tab> key combination changes from the bottom right to the top left position. Finding a changeable variable thus becomes much easier. If the cursor sits on such a variable when 'VarSetCursor' is called, that variable will immediately be entered in the value input window. Those keys are defined as 'global keys' and may be modified as required.

Executing that procedure requires the 'Modify variables' password privilege to be set. The system prompts the user to enter a password if that password privilege has not been set. The execution of the procedure is denied if the privilege can still not be set.

The execution of the procedure is also denied if the new value would be outside the defined range (see Chapter 'Limit Check', page 3-30). An error message is output in this case.

No parameters.

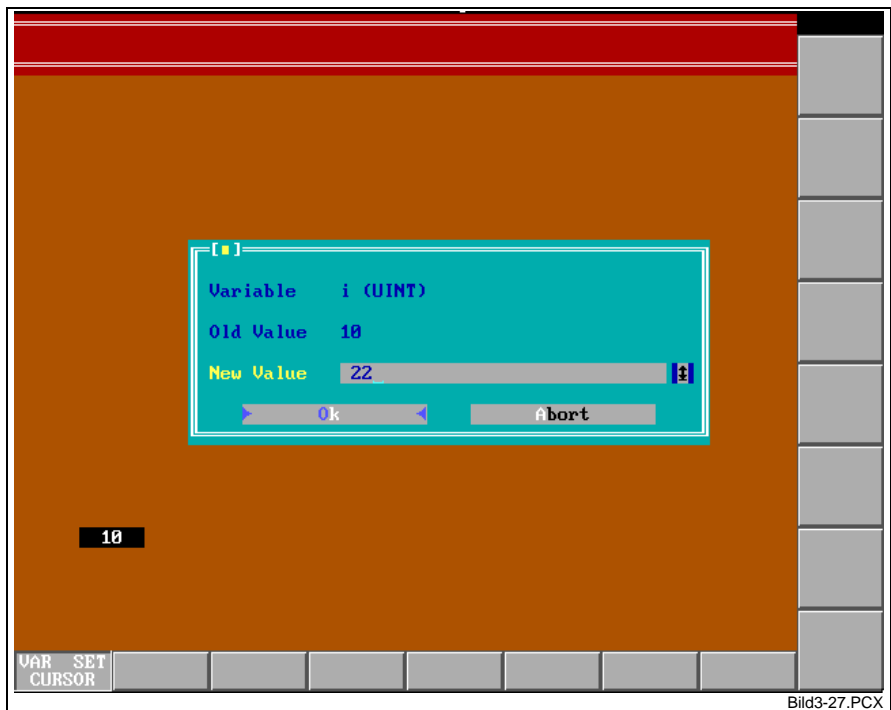


Fig. 3-29: Entering a new value of a changeable variable

VarIncCursor	<p>Any variable can be increased by any value. With a negative increment, the variable is decreased. The rest of the functionality corresponds to the functionality of the 'VarSetCursor' procedure.</p> <p>No parameters</p>
VarSetDirect	<p>A variable that is marked with the 'Value changeable' property can be modified directly in the screen. Independently of the selected display element, the variable value is displayed as an absolute number that can be modified. The new value is accepted in the controller when the <Enter> key is pressed. Pressing the <Esc> key aborts the value modification.</p> <p>Executing that procedure requires the 'Modify variables' password privilege to be set. The system prompts the user to enter a password if that password privilege has not been set. The execution of the procedure is denied if the privilege can still not be set.</p> <p>The execution of the procedure is also denied if the new value would be outside the defined range (limit check). An error message is output in this case.</p> <p>No parameters</p>
ToggleBitDirect	<p>A boolean variable marked with the property 'Value modifiable' can be changed directly in the screen if the cursor is located over it (reverse highlighting). Each time the procedure is executed the corresponding alternative value is set.</p> <p>Executing that procedure requires the 'Modify variables' password privilege to be set. The system prompts the user to enter a password if that password privilege has not been set. The execution of the procedure is denied if the privilege can still not be set.</p>
PassWord	<p>This procedure forces the password input window to be invoked. To achieve conformity with the other MT-CNC menu items, the procedure may be implemented as a global key (see page 3-55), and linked with the <Alt>+<K> key combination, for example.</p> <p>No parameters</p>
HelpText	<p>The help text is displayed that is related to that image (see Chapter 'Editing the Image-Related Help Text', page 3-52).</p> <p>Use the <CursorUp>, <CursorDown>, <PageUp>, <PageDown>, <Home> and <End> keys to scroll the help text. The window in which the help text is displayed may be moved and/or reduced in size.</p> <p>No parameters</p>
PreviousScreen	<p>In the process of loading new images as a result of a soft key action, the latest 100 load processes are retained in an archive (FIFO). This procedure permits the archive to be processed step by step backwards. This means that the last 100 images can be loaded again in the reverse sequence. The archive content is retained when the Custom Display System is exited, and will immediately be available when the program is invoked the next time. An error message will be issued if the archive is empty.</p> <p>The archive does not contain the images that have been loaded via the 'Load file/image' menu item (see Chapter 'Load an Existing Image File', page 3-2).</p> <p>In order to be available in all images, this procedure should expediently be allocated to a global key (s. page 3-55).</p> <p>No parameters</p>
SysError	<p>This procedure permits the current system error message (brief text) to be displayed if a system error is pending in the SPS. If there is an additional text (... a help) to that message, displaying that help text is offered.</p> <hr/> <p>Note: If the system error changes while the system error message or the related help is being displayed, this change will not be noticed. A new system error will only be displayed when the procedure is invoked again.</p> <hr/>

If there is no system error pending in the SPS, a corresponding message will be output when this procedure is executed.

Fig. 3-28 shows a typical help display for a pending system error.

No parameters

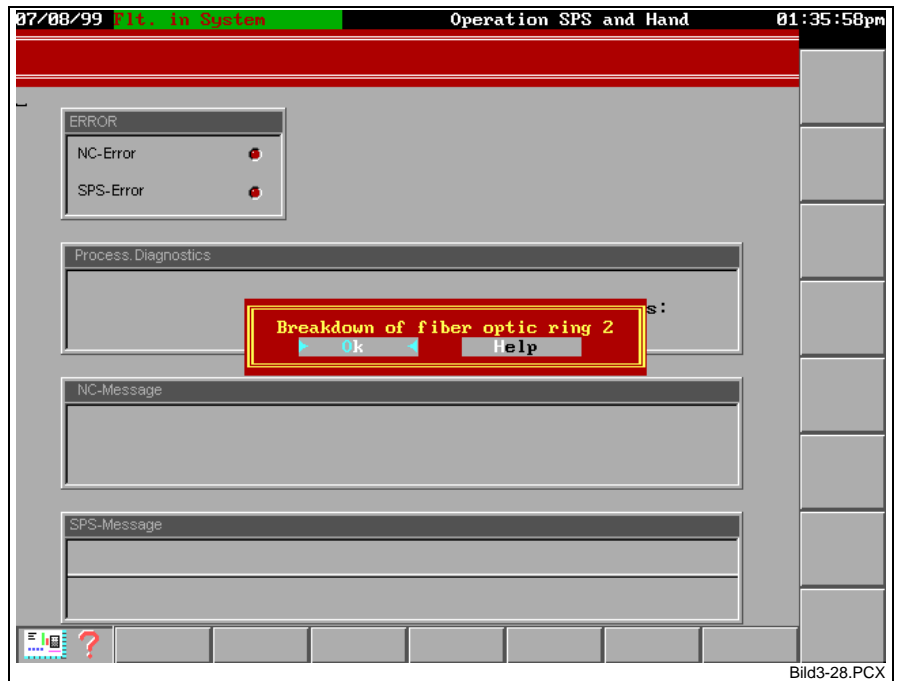


Fig. 3-30: Example of displaying system-error-related help

ResetController

Resetting the INDRAMAT controller.

A malfunction in the SPS program or in an I/O unit may require the controller to be reset in order to repeat certain information steps. This is done by the 'ResetController' procedure. It requires the 'System reset' password privilege to be set. The system prompts the user to enter a password if that password privilege has not been set. The execution of the procedure is denied if the privilege can still not be set.

Notes: Resetting the controller may take several seconds. A reaction in the PC is not possible during that time.
 There may be situations (particularly severe problems in the controller) where this procedure cannot be used as a remedial action (for example, if communication with the controller is not possible). The controller must be switched off in this case.

No parameters

DiagHelp

This procedure displays the additional text (... a help) to the current diagnosis message of a particular process or mechanism (parameter). The help window looks similar to the representation in Fig. 3-28.

An error message is output if the specified process is not active.

Parameter:

Number of the process or mechanism for which help shall be displayed.

When the number is entered, the system does not verify whether the process number is inside the valid range (0...31) and whether the selected process is active.

DiagHelpCursor

This procedure displays the additional text (help) to any process or mechanism. A list of all active processes is offered for selection. The procedure of using the selected process for displaying the help text is the same as for 'DiagHelp'. If the cursor sits on the output field of a 'diagnosis variable' on the screen (see page 3-5), or if there is only one single active process, the help to that process will be displayed immediately, and without selection.

SPSHelp	<p>No parameters</p> <p>This procedure displays the additional text (help) to the plant message (see Chapter 'Display Elements', page 3-14) of a specific variable (parameter). This means that the variable value is interpreted as a message number, and the help that is related to that message number is displayed. The help window looks similar to the representation in Fig. 3-28. An error message is output if the specified variable does not exist.</p> <p>Parameter: Variable, whose value is interpreted as a message number and whose help text shall be displayed. Upon input, the system will not check whether the variable exists.</p>
SPSHelpCursor	<p>This function displays the additional text (help) to the value of any variable of the 'plant message' format (see Chapter 'Display Elements', page 3-14). An error message is output if there is no variable of that format or if there is no help to the message number (= variable value). If several variables have been defined in that format in the image, a selection of those variables is offered. The related help is offered immediately and without selection if the cursor already sits on the output field of such a variable. The window that contains the help to the SPS message looks similar to the representation in Fig. 3-28.</p> <p>No parameters</p>
PrintScreen	<p>This procedure prints a hard copy of the screen contents with all current values. According to the selected print options (see Chapter 'Print options', page 3-68), the screen contents will either be 'printed' to a file or directly be sent to the selected printer. Depending on the printer, there may be brief interruptions of the screen updates during the printout. The print progress is not output because it is usually completed inside a few seconds.</p> <hr/> <p>Restriction: The printer interface is only suitable for text representation. All graphic elements are therefore suppressed (i.e. not printed). Use the 'SavePcx' procedure if you need a graphical hard copy of the screen contents. That procedure saves the current screen contents in the PCX format in a freely selectable file. Using suitable printer drivers, that file can later be printed (preferably under Windows).</p> <hr/> <p>No parameters</p>
CallProgram	<p>Any external program may be invoked (1st parameter). Components of the INDRAMAT desktop, for example, can be invoked directly from the Custom Display System. Third-party programs may also be invoked (e.g. a word processing program or a file manager). Command pointer arguments (2nd parameter) can be transferred to the programs. Starting a DOS input environment can be done by invoking the corresponding shell, e.g., 'C:\COMMAND.COM' (for DOS and Win95) or 'C:\WINNT\SYSTEM32\COMMAND.COM' (for NT). Then the batch files (batch processing files with '.BAT' extension) and the DOS commands (e.g., 'DIR' or 'COPY') are invoked, by invoking the installed shell (1st parameter) and given as argument (2nd parameter) 'c[drive:][path]<BatchName>' (see Fig. 3-13). It is important that <u>no blanks</u> are left between switch '/c' and the name of the batch file or DOS command.</p> <p>Parameters:</p> <ol style="list-style-type: none"> 1. Name of the program that shall be invoked. When the input field is empty, a free selection of drive, directory and file is offered. An error message is output if the file cannot be found when the soft key is pressed (the function shall be executed).

2. Command line arguments for the program invocation. There is no input assistant. The field may be left blank if necessary.

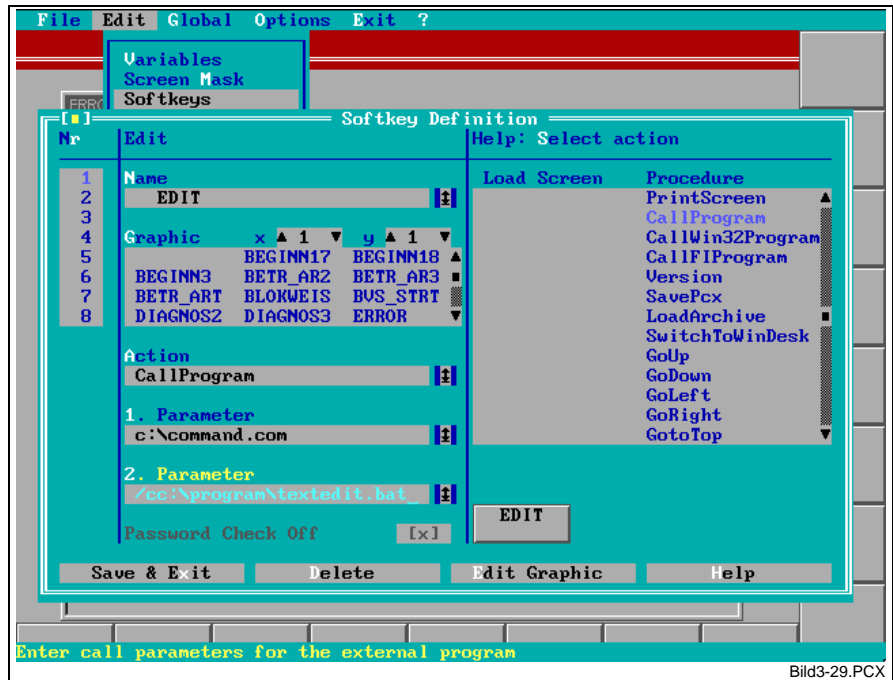


Fig. 3-31: Example of using the CallProgram procedure for batch files

- Version** A window is opened that shows the version numbers of some components of the MT-CNC user interface and of the Custom Display System. To achieve conformity with the other MT-CNC menu items, the procedure should be implemented as a global key (see page 3-55) and linked with the <Alt>+<V> key combination.
No parameters
- SavePcx** A graphical hard copy of the screen contents with all current values is created. The hard copy may be saved in the PCX format in a freely selectable file.
Important detail: The hard copy is produced when the action is performed (when the soft key is selected), not after the file has been selected. Up to then, the hard copy is retained in the PC memory
- LoadArchive** The internal editor is not needed for loading a file. Thus, an update can also be taken on by a machine operator who is not authorized for invoking the editor. The required dialog is the same as the one in the editor. The archive can only be transferred as a whole, not selectively.
All such modifications take immediate effect. This means that the base selections and the current image are newly loaded.
No parameters
- GoUp** The cursor is moved up by one line. There is an audible signal when it reaches the upper margin. A changeable indicator element is displayed in its inverted color when the cursor is moved across it. The same applies to all graphical indicator elements.
In the default setting, that procedure is linked with <CursorUp> as a global key. If necessary, that setting may be modified or even cleared.
No parameters
- GoDown** The cursor is moved down by one line. There is an audible signal when it reaches the lower margin.
A changeable indicator element is displayed in its inverted color when the cursor is moved across it. The same applies to all graphical indicator elements.
In the default setting, that procedure is linked with <CursorDown> as a global key. If necessary, that setting may be modified or even cleared.

	No parameters
GoLeft	<p>The cursor is moved to the left by one column. There is an audible signal if it is already there.</p> <p>A changeable indicator element is displayed in its inverted color when the cursor is moved across it. The same applies to all graphical indicator elements.</p> <p>In the default setting, that procedure is linked with <CursorLeft> as a global key. If necessary, that setting may be modified or even cleared.</p> <p>No parameters</p>
GoRight	<p>The cursor is moved to the right by one column. There is an audible signal if it is already there.</p> <p>A changeable indicator element is displayed in its inverted color when the cursor is moved across it. The same applies to all graphical indicator elements.</p> <p>In the default setting, that procedure is linked with <CursorRight> as a global key. If necessary, that setting may be modified or even cleared.</p> <p>No parameters</p>
GotoTop	<p>The cursor goes directly to the top screen margin. There is an audible signal if it is already there.</p> <p>No parameters</p>
GotoBottom	<p>The cursor goes directly to the bottom screen margin. There is an audible signal if it is already there.</p> <p>No parameters</p>
GotoHome	<p>The cursor is moved to the left by one column. There is an audible signal if it is already there.</p> <p>No parameters</p>
GotoEnd	<p>The cursor goes directly to the right-hand screen margin. There is an audible signal if it is already there.</p> <p>No parameters</p>
GotoCursor	<p>The cursor goes to the specified screen position (1st parameter). The position is specified in the X:Y format.</p> <p>Parameter:</p> <p>The required position is specified in the format X:Y. If the <Enter> key is pressed with an empty input field, the position can automatically be generated by moving the cursor to the required position.</p>
GotoUpForceVar	<p>The cursor is moved upwards until a line is encountered that contains the lower end of a changeable variable ('Value changeable' check box is selected). If the line contains more than one changeable variable, the cursor goes to the one that is in the same column as the cursor, or to the right of that column. There is an audible signal if no further variable can be found further up, and the cursor remains at its last position.</p> <p>No parameters</p>
GotoDownForceVar	<p>The cursor is moved down until a line is encountered that contains the beginning of a changeable variable ('Value changeable' check box is selected). If the line contains more than one changeable variable, the cursor goes to the one that is in the same column as the cursor, or to the right of that column. There is an audible signal if no further variable can be found further down, and the cursor remains at its last position.</p> <p>No parameters</p>

GotoLeftForceVar	The cursor is moved to the left until a column is encountered that contains the right-hand end of a changeable variable ('Value changeable' check box is selected). If the column contains more than one changeable variable, the cursor goes to the one that is on the same line as the cursor, or below that line. There is an audible signal if no further variable can be found further to the left, and the cursor remains at its last position. No parameters
GotoRightForceVar	The cursor is moved to the right until a column is encountered that contains the left-hand edge of a changeable variable ('Value changeable' check box is selected). If the column contains more than one changeable variable, the cursor goes to the one that is on the same line as the cursor, or below that line. There is an audible signal if no further variable can be found further to the right, and the cursor remains at its last position. No parameters
GotoNextForceVar	The cursor is moved to the right until a column is encountered that contains the left-hand top edge of a changeable variable ('Value changeable' check box is selected). If such a variable cannot be found on the current line, the search is continued on the line below from left to right. If such a variable cannot be found by the end of the page, the search is continued on the topmost line. No parameters
GotoLastForceVar	The cursor is moved to the left until a column is encountered that contains the right-hand bottom edge of a changeable variable ('Value changeable' check box is selected). If such a variable cannot be found on the current line, the search is continued on the line above from right to left. If such a variable cannot be found by the top of the page, the search is continued at the right-hand side of the bottom line. No parameters

Editing Machine Function Keys

Call	Edit/Machine function keys
Functionality	<p>Machine function keys are SPS inputs whose keys are directly arranged in the PC's control panel. With the MTC200, these are the 8 vertically arranged keys to the right of the screen; with the CLT, these are the 16 keys beneath the screen. Controlling the machine function keys requires the GUI_SK or GUI_SK16 (with CLT) function block to be declared and interconnected in the SPS program.</p> <p>Via the PC, those SPS inputs can be interconnected with other SPS variables. This means that the interconnected variable and the machine function key have the same value assigned. This permits undisturbed machine control from the PC. In each SPS cycle, the interconnected SPS variable is set accordingly. Machine function key are therefore particularly suitable for continuous axis jogging, for example.</p> <p>In conjunction with the button area of the machine function key that is visible on the screen, two further SPS variables may additionally be specified.</p> <p>Each machine function key knows three different states:</p> <ul style="list-style-type: none"> • not depressed, • depressed, and • executed. <p>Each state is represented by a different label.</p> <p>To configure the machine function keys of an image, the following dialog is opened:</p>

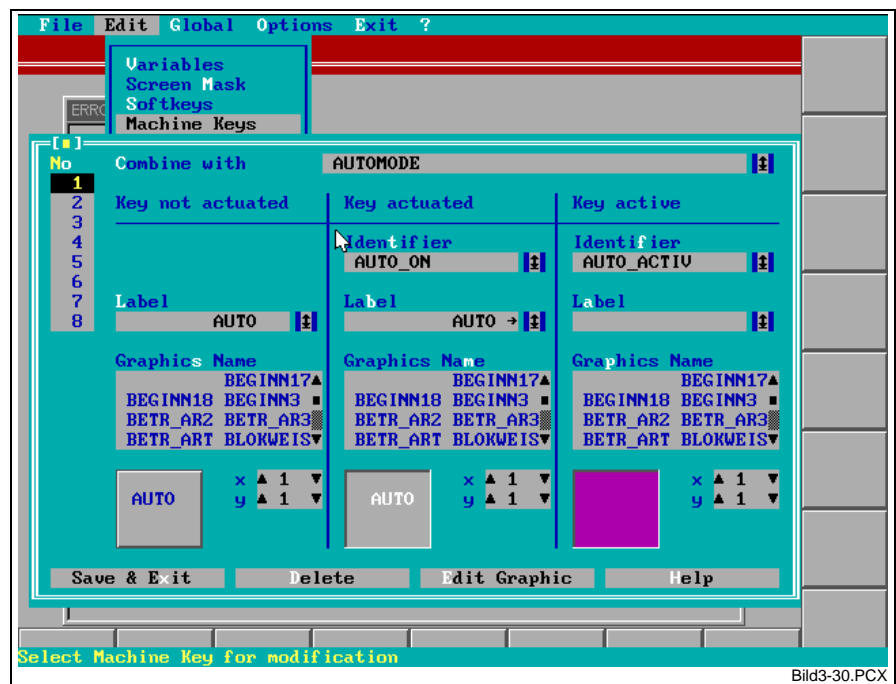


Fig. 3-32: Window used for editing machine function keys

Meaning of the input lines

No.	Selection of the machine function key for editing.
Interconnection with	Name of the Boolean SPS variable that shall be interconnected with the machine function key. This is the variable in the SPS that is set to the state of the machine function key (the interconnected SPS variable is set when the machine function key is pressed). Pressing the <Enter> key on a blank input field displays a selection of all available SPS variables. <u>Only</u> Boolean variables can be selected.
'Normal' key / annotation	Annotation text of the machine function key that is displayed in the 'not depressed' state. A text of more than one line will not automatically be wrapped. Wrapping must be done by purposefully entering blank lines. To support formatting, the current formats of the individual states are shown in a preview.
'Normal' key / graphic name	A graphic element can additionally be selected for the label. Typing the first letters starts a quick search for the required graphic element. The currently selected graphic element is immediately displayed in the preview. If necessary, the graphic element may be moved on the button area. The x and the y direction can separately be selected. the top left corner is identified by 1-1. Graphics are always in the background of the button. This means that text is always displayed in the selected foreground colors on top of the graphics.
Key depressed / variable	Name of the Boolean SPS variable that shows the 'Key depressed' state on the screen. The button of the machine function key is displayed in a depressed state and shows the annotation that has been specified for that state. With an empty input field, a selection of all available SPS variables is offered. <u>Only</u> Boolean variables may be selected.
<hr/>	
Note:	The 'Key executed' state will be displayed rather than the 'Key depressed' state, if both are present at the same time,
<hr/>	
Key depressed / annotation	Annotation text of the machine function key that is displayed in the 'depressed' state. A text of more than one line will not automatically be wrapped. Wrapping must be done by purposefully entering blank lines. To support formatting, the current formats of the individual states are shown in a preview.

Key depressed / graphic name	<p>A graphic element can additionally be selected for the label of the 'Key depressed' state. Typing the first letters starts a quick search for the required graphic element. The currently selected graphic element is immediately displayed in the preview. If necessary, the graphic element may be moved on the button area. The x and the y direction can separately be selected. the top left corner is identified by 1-1.</p> <p>Graphics are always in the background of the button. This means that text is always displayed in the selected foreground colors on top of the graphics.</p>
Key executed / variable	<p>Name of the Boolean variable that shows the 'Key executed' state on the screen. The button of the machine function key is displayed in a depressed state and shows the annotation that has been specified for that state.</p> <p>With an empty input field, a selection of all available SPS variables is offered. <u>Only</u> Boolean variables may be selected.</p> <hr/> <p>Note: Of all three states, this state is of the highest priority. It is always displayed if it exists (i.e. if the specified variable is TRUE).</p> <hr/>
Key executed / annotation	<p>Annotation text of the machine function key that is displayed in the 'executed' state. A text of more than one line will not automatically be wrapped. Wrapping must be done by purposefully entering blank lines. To support formatting, the current formats of the individual states are shown in a preview.</p>
Key executed / graphic name	<p>A graphic element can additionally be selected for the label of the 'Key executed' state. Typing the first letters starts a quick search for the required graphic element. The currently selected graphic element is immediately displayed in the preview. If necessary, the graphic element may be moved on the button area. The x and the y direction can separately be selected. the top left corner is identified by 1-1.</p> <p>Graphics are always in the background of the button. This means that text is always displayed in the selected foreground colors on top of the graphics.</p>
Delete	<p>The settings of the selected machine function key are deleted <u>without any further inquiry</u>.</p>
Peculiarities	<p>The menu item is disabled (cannot be selected) if machine function keys have not been defined for a specific application (plant or machine) (see page 3-55).</p> <p>In contrast to soft keys, machine function keys <u>cannot</u> be used for loading images or executing procedures.</p> <p>The GUI_SK or GUI_SK16 function block must be used in the SPS program, and be interconnected with the SPS inputs that are used as machine function keys. To ensure undisturbed execution of the function, there must not be more than one single utilization of the function block in the SPS program. The function block should be invoked in one of the upper steps/networks.</p> <p>All selections that have been made for a machine function key are only accepted when the window is closed or when a different machine function key is selected. Modifications (including deletion) may be canceled at this point in time.</p> <p>Example</p> <hr/> <p>A machine function key shall be used for closing a guard door. The SPS program contains a logic with latching function that keeps the corresponding drive activated until a limit switch in the guard door responds.</p> <p>The following variables exist in the SPS program:</p> <ul style="list-style-type: none"> • Schutz_Zu Start signal to close guard door A. • Schutz_An Latching flag that keeps the motor active after the start signal has been issued until a limit switch in the guard door responds. • Schutz_ok Limit switch that indicates that the guard door is closed..

We assume that the guard door is open and not yet moving.
 A suitable graphic element is output as the label on the button.
 When the machine function key is selected, the interconnection causes the 'Schutz_Zu' variable to become active. This activates the latching function in the SPS program, and the guard door is closed. Interpreting the 'Schutz_An' variable causes this situation to be shown on the screen by a depressed button and a graphic element that shows the moving door. This means that it becomes obvious that pressing the button has caused a reaction in the plant.
 When the 'Schutz_ok' limit switch responds, the latching function in the SPS is canceled and the guard door drive motor switched off. Interpreting the state of the 'Schutz_ok' variable causes the matching graphics or a text in a different color to be output in the depressed button area.

Notes: Since the complete sequence has been programmed in the SPS and the changes in the button surfaces only represent a status indicator of the corresponding SPS variables, the indications on the screen are also output as described above when the process is initiated by the SPS program or by other external events.
 If several states of a machine function key are active at the same time, the following descending order of priority applies: Executed, depressed, not depressed.

Editing SPS Keys

Call	Edit/SPS keys
Functionality	The list of SPS keys of the loaded image can be edited. A SPS key is the interconnection of a Boolean variable with an action in the Custom Display System. The corresponding action is executed if the SPS variable is logic 1 (TRUE). Like for soft keys, possible actions may be images or predefined procedures (see Chapter 'Editing Soft Keys', page 3-36. The parameter input fields can be activated according to the selected procedure. Fig. 3-31 shows the input window for SPS keys.
Peculiarities	Only the 'New' and 'Close' buttons can be reached if the currently loaded image does not yet contain a SPS key The interrogation of the SPS keys (i.e. the interrogation of the values of the specified Boolean variable) can be disabled with the 'SetSPSKeyOff' action, and be enabled with the 'SetSPSKeyOn' action (see page 3-36).
	Note: Only the action of the <u>first active</u> SPS key will be executed if several SPS keys are active at the same time. All the other active SPS keys will not be considered.

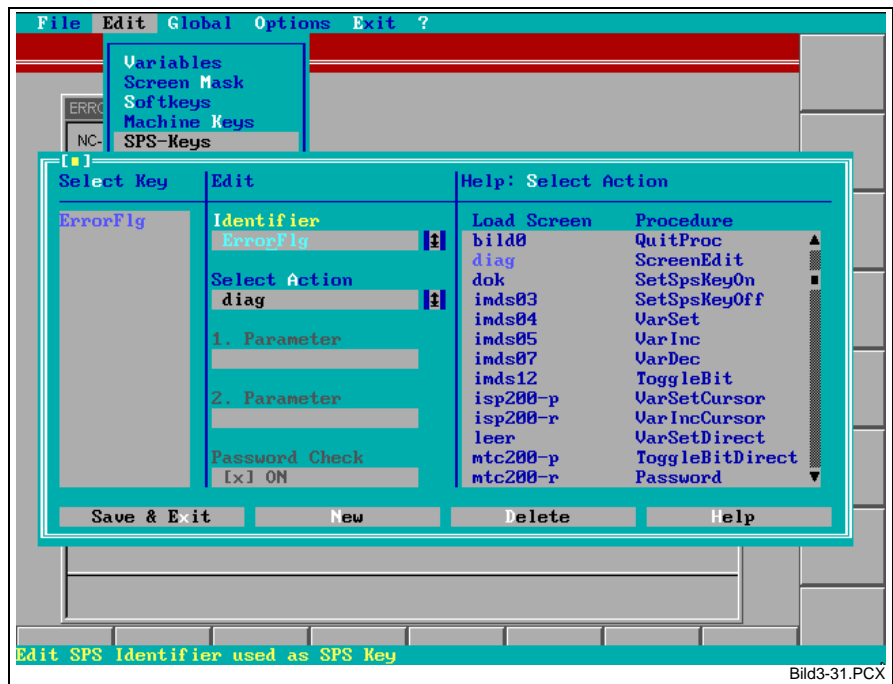


Fig. 3-33: Window used for editing SPS keys

Editing the Image Banner Line

- Call** Edit/Banner line
- Functionality** The contents of the image's banner line can be entered or modified.
- Peculiarities** The banner line content is automatically output in the center of the field provided (see Chapter 'Banner Line', page 3-57).

Editing the Image-Related Help Text

- Call** Edit/Help screen
- Functionality** The image-related help screen can be edited. There is a text editor that supports all the usual editing functions. The continuous text is not automatically wrapped. This means that writing beyond the end of the line is denied.
The help text may contain a maximum of 10,000 characters.
If necessary, text may be imported from a file. This permits a more convenient word processing system to be employed for creating texts, or the same help texts to be used in different images. The file that is to be loaded shall be an ASCII file with 'hard' line delimiters. The length of the lines must not exceed the width of the help screen 864 useable columns). Longer lines will be truncated to the maximum width (68 columns) possible when they are loaded.
- Peculiarities** The previous content of the text editor is discarded when text is imported from a file. If the text that shall be loaded exceeds (is wider and/or longer) the maximum size of the help screen (68 columns and/or a total of 10,000 characters), it will be truncated at the limits.
The user must ensure that a readable ASCII file is loaded. Apart from not being able to read it, loading an illegible file (e.g. a program) may lead to serious problems in the program.

Defining the Cursor Start Position

Call	Edit/Cursor position
Functionality	<p>The cursor position can be defined when the image is loaded. This preselection is expedient if predefined procedures (see Chapter 'Editing Soft Keys', page 3-36) are used that employ the cursor position for selecting changeable variables. The cursor can immediately be positioned on such a variable.</p> <p>All menu windows disappear from the screen when this menu item is selected. A block cursor appears that can be used to the required position on the screen. Pressing the <Enter> key accepts the selected position as the cursor start position; pressing the <Esc> key cancels the selection. When a new image is created, the cursor start position is in the top left corner of the output area.</p>
Peculiarities	None

3.3 Global Menu

Call	Global
Functionality	<p>Settings that are not tied to a specific image may be edited. This are chiefly settings that concern the Custom Display System, and are valid in all images (globally). Furthermore, some functions are offered that are used for management and documentation and, consequently, are also globally available.</p>
Peculiarities	None

Base Selections

Call	Global/Base selections
Functionality	<p>The appearance of the Custom Display System can be modified. Arrangement, number and color of the soft keys, for example, may be changed.</p>
Peculiarities	<p>All settings of that menu item are saved in a configuration file. Any number of configuration files is possible; the files are loaded as required. Thus, the appearance of the Custom Display System can easily be modified.</p> <p>Some global settings may cause fundamental changes of the screen. Status indications of the image are therefore not possible as long as this menu item is active. The image is cleared from the memory and loaded after the menu item has been exited. If the image has previously been modified in the in-built editor, the system prompts the user to save it before it is cleared.</p>

Defining Colors

- Call** Global/Base selections/Colors
- Functionality** The colors of different windows, menus and buttons can be modified. The colors are grouped. A sample field shows the selected color combination.
- Peculiarities** The colors of the image mask of an image (see Chapter 'Editing the Static Image Mask', page 3-31) are a part of the image and cannot globally be modified. The colors that were originally selected in the image mask are retained. The selected colors of the image mask are only used as initial colors when a new image is created. The colors of keys (soft keys and machine function keys) are only valid for textual key labels. The color selections will not be considered if graphics are used for annotation.

Example

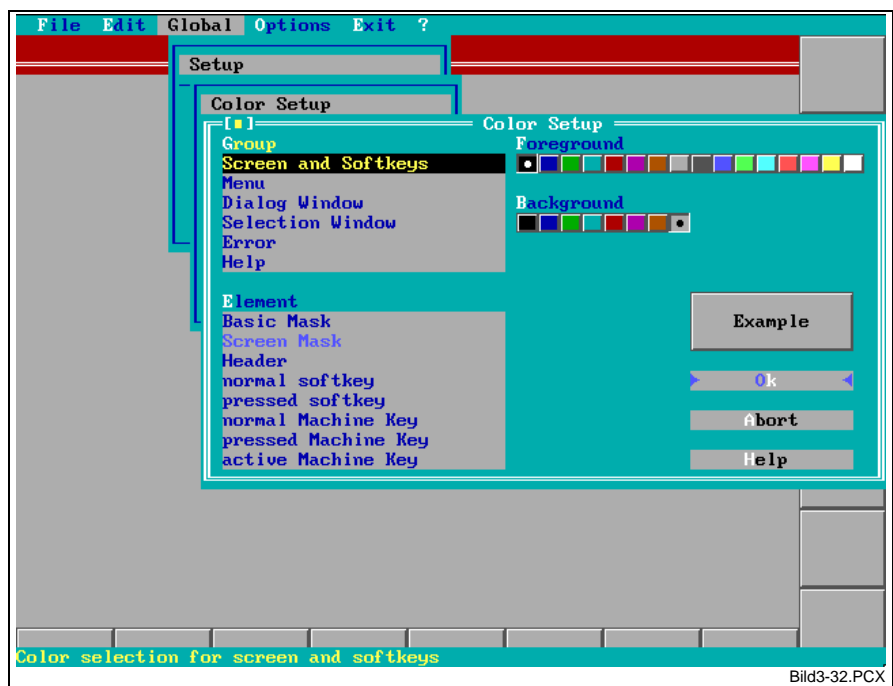


Fig. 3-34: Selecting colors

Defining the Soft Keys

- Call** Global/Base selections/Soft key
- Functionality** Any soft key may globally be configured. The size of the soft key and the location at which it appears on the screen can be defined. Furthermore, the PC key (any available key or key combination) that is used for activating the soft key can be determined. A maximum of 20 soft keys can be configured. All previously defined soft keys are displayed in a preview; the selected soft key is highlighted.
- Peculiarities** When a new soft key is created or deleted it must be ensured that the soft key selection list is without a gap when it is exited. If, for example, a total of 10 soft keys have been defined, these must be the soft keys 1 through 10. The numbers used in that window are used for selection when the soft keys are edited (see page 3-36). A PC key that has already been interconnected with a global key (see page 3-55) can not be interconnected with a soft key.

Example

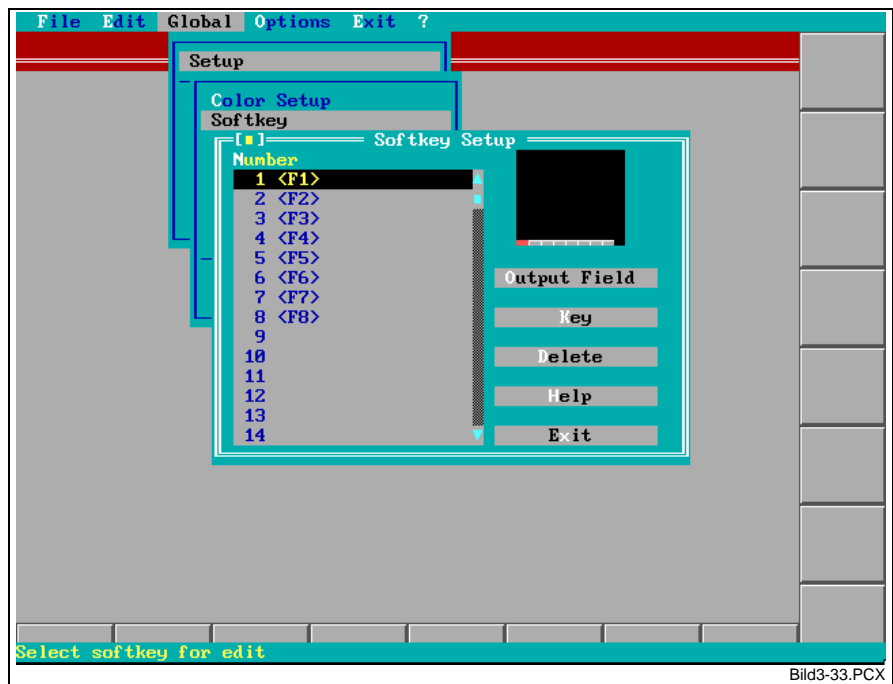


Fig. 3-35: Configuring soft keys

Global Keys

Call Global/Base selections/Global keys

Functionality Global keys are hidden soft keys that are valid in all images. A maximum of 40 global keys can be defined in this menu item. Similar to a soft key, a global key consists of the interconnection between a PC key and an action (with or without parameters). (See page 3-55.)

Peculiarities Some actions need parameters. There is an input assistant available when the <Enter> key is pressed while the input field is blank (see page 3-36). A PC key that has already been interconnected with a soft key (see page 3-54) cannot be interconnected with a global key.

Example

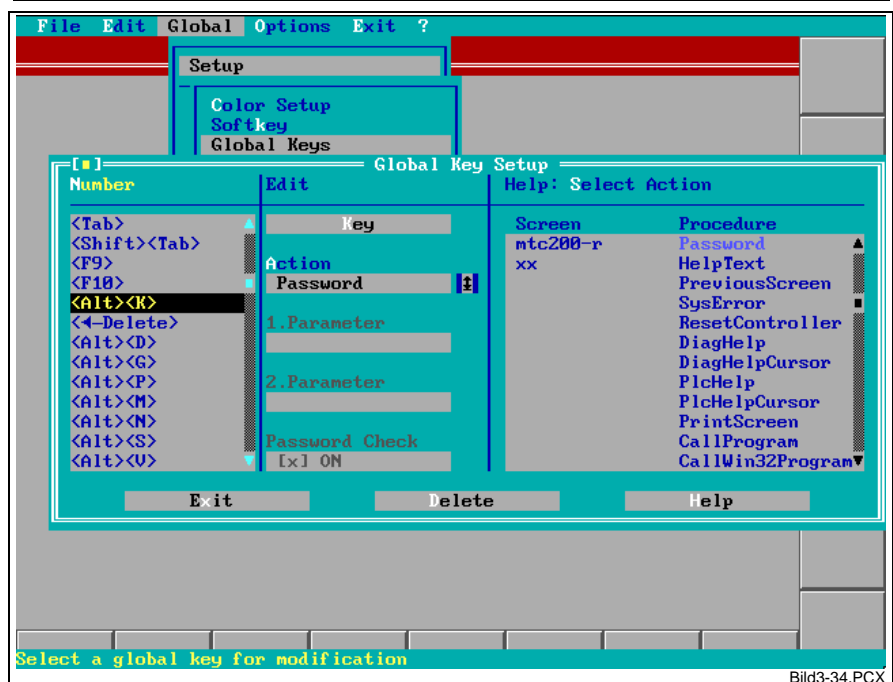


Fig. 3-36: Configuring global keys

Machine Function Keys

Call	Global/Base selections/Machine function keys
Functionality	Size and arrangement of the button area of all machine function keys can be selected on the screen. To do this, an input window (see Fig. 3-35) is opened that permits all necessary components of a machine function key to be configured. A maximum of 16 machine function keys can be configured.
Peculiarities	The numbers employed in this window are used for selection when the machine function keys are edited (see page 3-47).



If less machine function keys are configured than are used in existing images, the local information of the machine function keys that no longer exist will be lost when the image is saved. Saving may be performed automatically during address adjustment, for example.

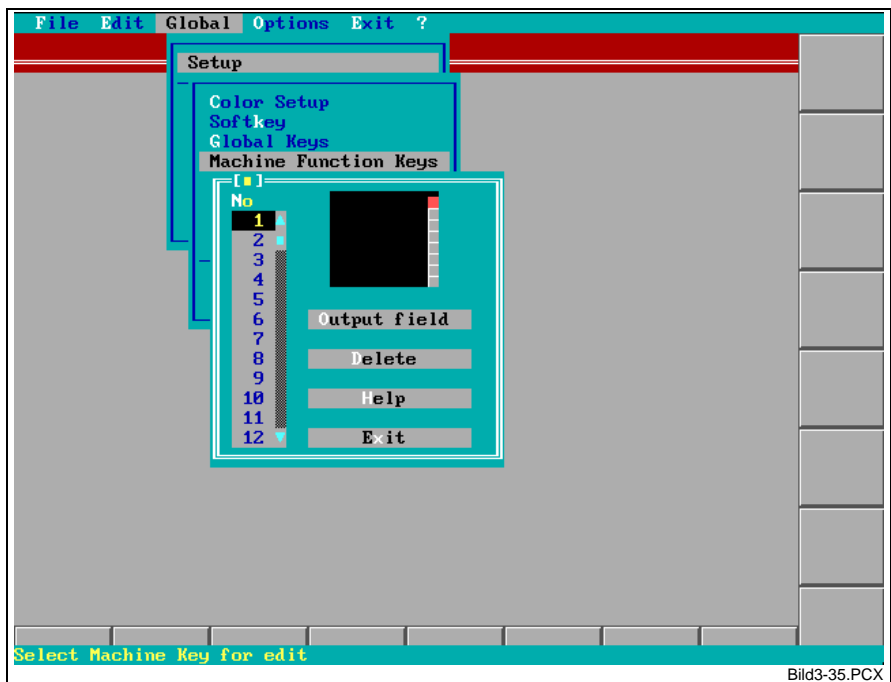


Fig. 3-37: Configuring machine function keys

Base Mask – Outer Border

Call	Global/Base selections/Base mask
Functionality	The base mask that is shown in all images can be edited. The colored texts and graphics may be placed as required. This menu item works like editing the image mask of an image (see Chapter 'Editing the Static Image Mask', page 3-31 ff). The difference is in the facts that <ul style="list-style-type: none"> • the base mask is always visible; i.e. it is not tied to a specific image; and • the entire screen minus the topmost screen line is available for editing. In the previously used typical images, the tree-line header (enclosed in double lines) is a part of the base mask. A company logo could be placed here, for example.
Peculiarities	Some areas of the base menu are hidden and never appear on the screen. They are covered by the button areas of the soft keys or machine function keys, or the output areas of the images.

Output Area – Space for Image Output

Call	Global/Base selections/Output area
Functionality	The screen area is defined in which all image outputs (image mask and variables) are placed. This area is always a rectangular space.
Peculiarities	Position counting in the screen output area (for the positioning of the variables) always begins with 1:1 in the left-hand top corner. The variables always have relative positions in the output area and are therefore always displayed with the same distance from the left-hand top corner of the output area. If the output area is defined such that it is hidden by button areas of soft keys or machine function keys, the outputs that may be positioned there will be hidden by the button areas and consequently not be visible.



CAUTION

If the output area is reduced in size, the image masks of the images will be adjusted accordingly. Image mask contents, that are now outside of the output area will be lost when the image is saved. Saving may be performed automatically during address adjustment, for example.

Banner Line

Call	Global/Base selections/Banner line
Functionality	Position and width of the single-line banner line are defined here.
Peculiarities	The banner line area is always one line. It must be ensured that there is no overlapping of the button areas of the soft keys and machine function keys, the output area, and the banner line area.

Modifying the Line Types

Call	Global/Base selections/Line characters
Functionality	All 10 available line types (swift line drawing using the <Shift>+Cursor-keys, see pages 3-33 ff. and 3-33 ff.) can be edited. An editing window is available that contains a frame and a cross which are drawn in the characters of the selected line type (see Fig. 3-36). This representation contains all characters of the line type. The cursor keys can be used for selecting and modifying the individual line characters. Identical characters are jointly marked and modified (the vertical lines in the example of Fig. 3-38). The characters can be entered either directly via the keyboard or via a selection window that contains all ASCII characters of the PC (using the <Alt>+<A>, <Space> key combination or double clicking the mouse button; see Fig. 3-24).
Peculiarities	Within one line type, distinction is not made between different characters in the same direction. This means that there is only one common character for a vertical line, not a character for the left-hand margin, another one for the window cross, and a third one for the right-hand margin. The same applies to horizontal lines.

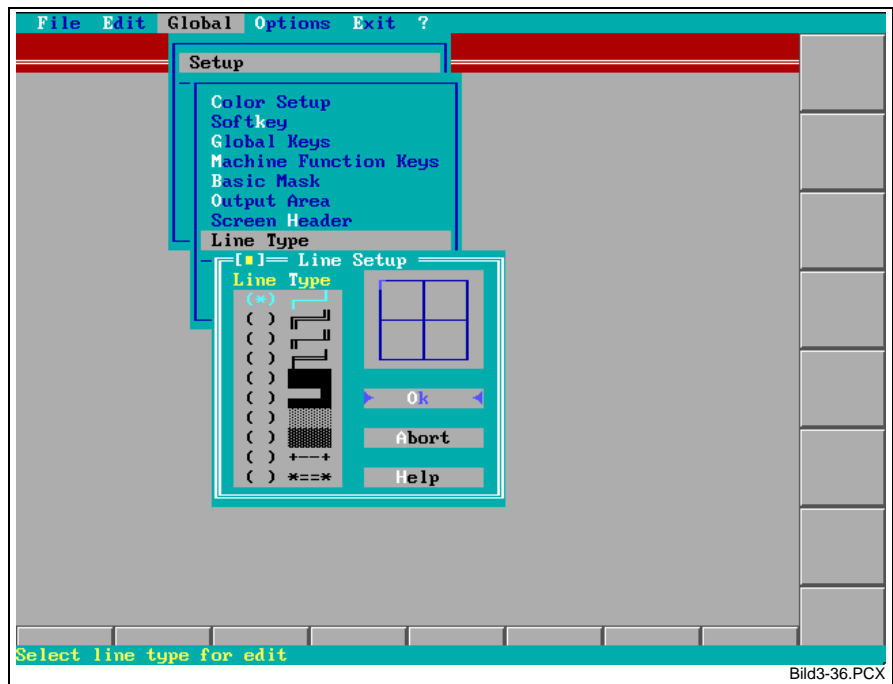


Fig. 3-38: Modifying line types

Loading a Complete Base Selection

Call Global/Base selections/Load

Functionality A file can be loaded that contains all base selections (configuration file). A selection window is offered, that contains all available configuration files (comparable with Fig. 3-1). All selections of the loaded file are immediately effective. If the current base selection is modified and has not been saved, the system prompts the operator to save the current base selection first (see Chapter 'Saving a Complete Base Selection', page 3-58).

Peculiarities None

Saving a Complete Base Selection

Call Global/Base selections/Save

Functionality The current base selections can be saved. An input window is opened that asks for the new name of the configuration file. The input line contains the current name of the configuration file. A selection of the last inputs made in that window is available. To support input, the list of all existing configuration files is offered. Typing the first letters of the file name starts a quick search for the required element. The selected file is immediately entered in the input line where it can be edited. For each configuration file, date and time of the last modification and the size are displayed. This function is also suitable for copying base selections (= configuration files).

Peculiarities Any existing configuration file of the same name will be overwritten without any further inquiry.

Editing the Customized ASCII Character Sets

Call	Global/ ASCII characters
Functionality	All functions are implemented that are used for editing and managing customized ASCII character sets (see also Chapter 'Display Elements', page 3-14, Fig. 3-10). Besides 'normal' ASCII characters, small images can be created that can be played back as a sequence of images.
Peculiarities	If an ASCII character set is being processed that has not yet been saved, the system prompts the user to save it when the menu is exited. Only one ASCII character set can be edited at any one time. Depending on a character set being loaded, some functions cannot be reached (button is inactive).

Example

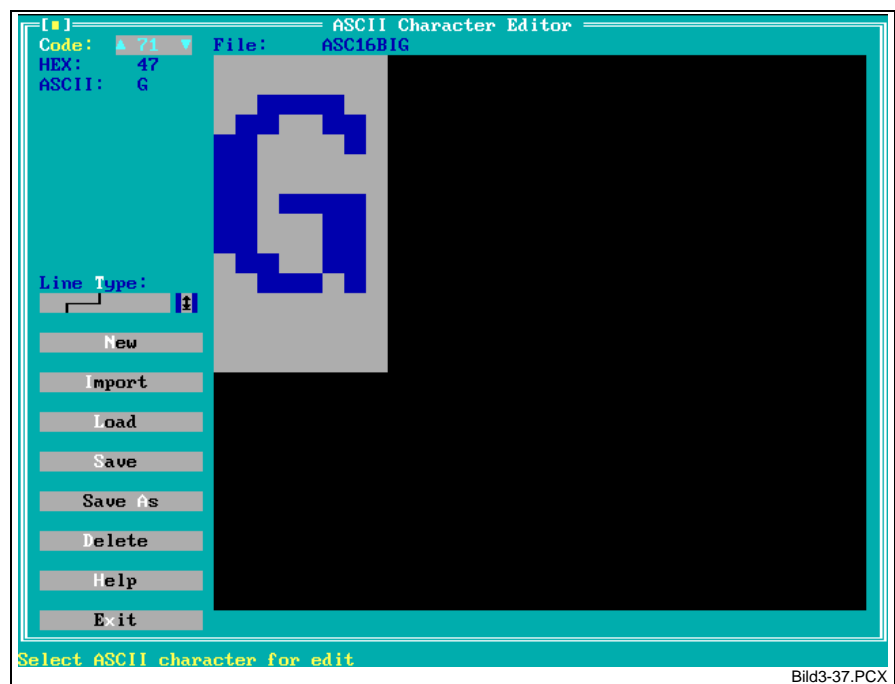


Fig. 3-39: Editor used for editing customized ASCII character sets

New ASCII Character Set: Defining the Dimension

Call	Global/ ASCII characters/New
Functionality	A new ASCII character set can be created. First, the size of an ASCII character must be selected. This size is valid for all characters of the character set. The appearing preview windows can be used for sizing the characters. Use the <Shift>+<Cursor> keys or click the mouse button at the right-hand bottom corner to adjust the size as required.
Peculiarities	The size of an ASCII character cannot be changed once it has been defined.

Editing an ASCII Character

Call	Global/ ASCII character /<Editor area>
Functionality	All 256 characters of the currently loaded or newly created customized ASCII character set can be edited. To select a specific character, select the corresponding ASCII code. To facilitate allocation, the code is also represented as a hexadecimal number and as an ASCII character. To edit a character, all 256 characters of the PC character sets are available. Using the <Alt>+<A> key combination permits characters to be employed that cannot be reached via the keyboard. Use the <Shift>+<Cursor> keys to draw lines of the selected line type. The <Alt>+<Cursor> keys permit the entire screen contents to be scrolled such that the parts of the ASCII character that disappear at one side of the window reappear at the opposite side. This permits image sequences to be created easily.
Peculiarities	Previously written text characters can be overtyped with the <Space> bar.

Importing a Character Content

Call	Global/ASCII character/Import
Functionality	For the currently selected ASCII character (selection via code number in the top left corner of the window), the contents may be loaded from a file. This should possibly be an ASCII file with 'hard' line delimiters. This function permits large ASCII characters to be created in an external text editor. This function can expediently also be used for several ASCII characters of nearly the same contents. The same contents can be loaded in several characters, and be modified.
Peculiarities	The previous content of the ASCII character is completely discarded. A 'hard' line delimiter (CR/LF) is expected for discriminating individual lines. If the text that shall be read is wider and/or longer than the ASCII character, it will be truncated at the limits of the ASCII character. The user must ensure that a readable ASCII file is loaded. Apart from not being able to read it, loading an illegible file (e.g. a program) may lead to serious problems in the program.

Loading an Existing ASCII Character Set

Call	Global/ASCII character/Load
Functionality	A list of all existing ASCII character sets is offered (see also Fig. 3-1). A character set may be selected from that list. The name of the character set (i.e. the name of the file) is displayed above the editor area (see Fig. 3-39).
Peculiarities	None

Saving an ASCII Character Set

Call	Global/ASCII character/Save
Functionality	The currently edited ASCII character set is saved. If a name is not yet known (with a newly created ASCII character set), the functionality of the 'Save as' switch is performed instead (see Chapter 'Saving an ASCII Character Set Under a New Name', page 3-61).
Peculiarities	This function is automatically invoked with an additional inquiry, when an attempt is made of exiting the ASCII character editor without having saved the currently processed character set.

Saving an ASCII Character Set Under a New Name

Call	Global/ASCII character/Save as
Functionality	The currently edited ASCII character set is saved under a new name. To do this, a window is opened that permits the new name to be entered. Furthermore, all existing ASCII character sets are offered for selection. This function is suitable for copying ASCII character sets.
Peculiarities	None

Deleting an ASCII Character Set

Call	Global/ASCII character/Delete
Functionality	A character set can be selected from the list of all existing and saved ASCII character sets. The selected character set will be deleted <u>without any further inquiry</u> .
Peculiarities	Only the file of the character set is cleared, not the currently loaded information of that character set. When the file of the currently loaded character set is deleted, saving the file again (see Chapter 'Saving an ASCII Character Set', page 3-60) can restore the file.

PC-ASCII Characters

Call	Global/PC-ASCII Characters
Functionality	In this menu option you can modify the character set used for displaying normal text. Multiple files with such character sets may be created and administered. These modifications may serve both for creating special text characters (e.g., switch symbols or indicator lights) and for modifying the appearance of the font (see also 'Creating your own characters'). The following dialog is opened:

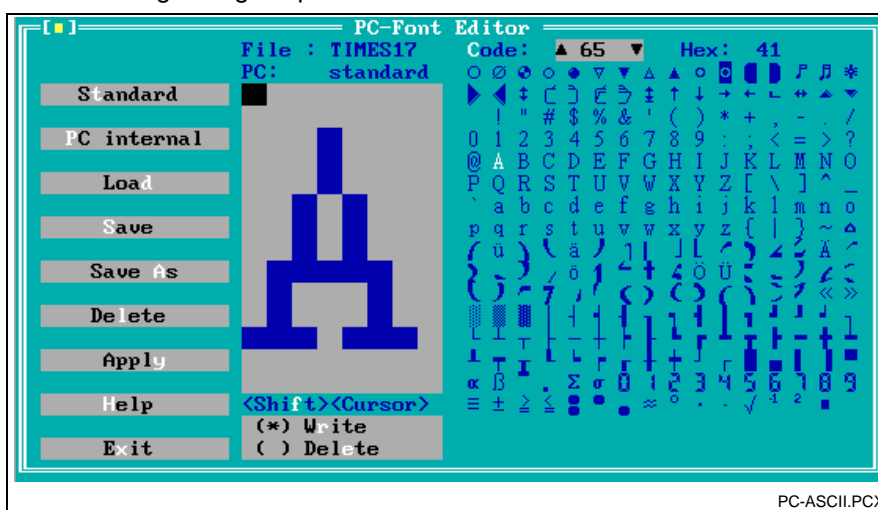


Fig. 3-40: Window for editing and managing PC characters

The switches on the left side enable you to manage multiple PC-ASCII character sets (PC fonts). The editor field in the middle (where the letter 'A' is located) allows you to modify each individual character in the PC character set. The desired character is selected either by setting the corresponding code number, by using the <PageUp> or <PageDown> key in the editor field, or by clicking with the mouse on the character in the preview table in the right half of the window. All changes are immediately visible in the preview.

Basically three different types of PC character sets are distinguished:

- **INDRAMAT-Standard character set**
This is automatically installed and is normally always loaded ('Standard' switch). It does not however take any language-dependent peculiarities into account. It is always a German character set.
- **Internal PC character set**
Every PC contains character sets with various heights and in various languages. The corresponding character set can be loaded in the current country setting and appropriate height ('PC internal' switch).

Note: With some PCs it can happen that no suitable character set is found. In this case, unreadable characters are displayed in the preview (right half of window).

- **User-PC character sets**
As many copies as desired can be made from the two just-mentioned character sets and saved under a name of your choosing. These are then the user-PC character sets. They may be modified whenever desired.

Peculiarities Although it is possible to modify the order of the ASCII characters, you are strongly advised against putting a 'Z' in place of an 'A' etc., since the menu or dialog will no longer be recognizable.

A 'PC-Font' dialog is also available in the 'Options' menu for selecting a PC font.

Creating your own characters The ability to manipulate the font for all text outputs open new display possibilities. The following examples are designed to give you some ideas for creating your own text characters (see also Fig. 3.40).

Notes:

- (1) A text character is always 14 pixels high and 8 pixels wide. This size cannot be modified.
- (2) Graphic symbols as text characters offer a number of advantages compared with graphics:
 - A graphic the size of a text character uses 56 bytes of memory, a text character only 2 bytes (1 byte for the character itself, 1 byte for the color information).
 - Text is output significantly faster than graphics. This is due not only to the smaller data size, but also to the fact that text output is well supported by the graphics card hardware.
 - Texts can be displayed over graphics, but graphics on graphics is only possible in the full grid.
Disadvantage: Limited to 2 colors. (foreground and background).
- (3) Give some thought to which characters are 'unnecessary' and can be modified. In some cases individual symbols are used as marked on a bar or a special characters on the window frame. Nor is it advisable to change the ■ character (code 219), since the representation of the enlarged pixel also changes in the editor.
- (4) Self-designed characters should be designed so that sufficient space remains between it and the adjacent characters on the screen, allowing a screen filled with text to still be legible. For example, leave one pixel free along the right edge, since the next character always follows directly on the screen. Note also that when using these self-created characters as labeling for buttons (e.g., soft keys), you need to leave space for the 3-D border. This is provided for with the PC font used previously.
- (5) Screen dumps using the 'PrintScreen' function will not reproduce self-created characters. Instead, the original text characters appear. Reason: Only the code numbers for the individual characters are sent to the printer. The printer then outputs the character for each code

stored in its character set. The 'SavePcx' (PCX-screen dump) function does however include all created characters.

Example 1: LCD design characters

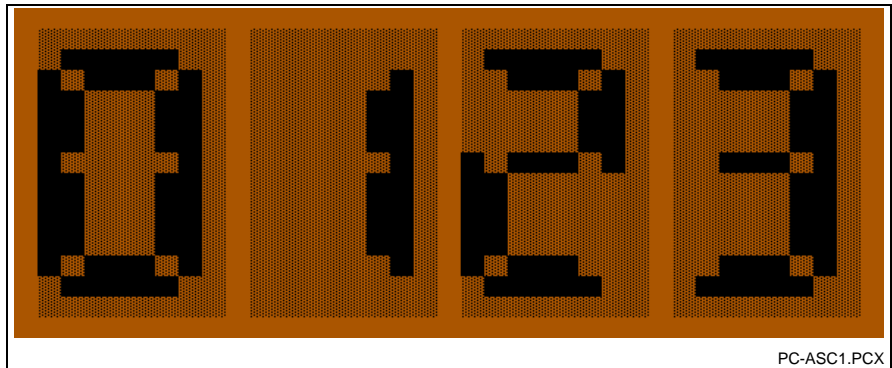


Fig. 3-41: Examples of LCD design digits

These characters can be entered instead of the previous digits. Bear in mind that these characters then stand out very clearly from the running text, which does not contribute to legibility. It is therefore advisable to place these digits on unused text characters, such as 230 to 239. To then use these digits for displaying numbers, you must use the ASCII editor to create a user-ASCII character set which does the 'redirection'.

A new ASCII character set has to be created with an edge length of 1:1, and the characters from 230 to 239 must be entered for codes 48 to 57 (the 'true' digits 0 to 9). This is easy to accomplish using the <Alt>+<A> table. The ASCII character set, for example, is saved as 'LCD_1x1'. To output numbers in LCD design, select this ASCII character set.

Example 2: Double-size digits

It is often desirable to emphasize number optically by making them larger. This would make sense for example with position displays. The following suggestion shows a way to do this. The idea is to configure several text characters so that together they result in a large digit.

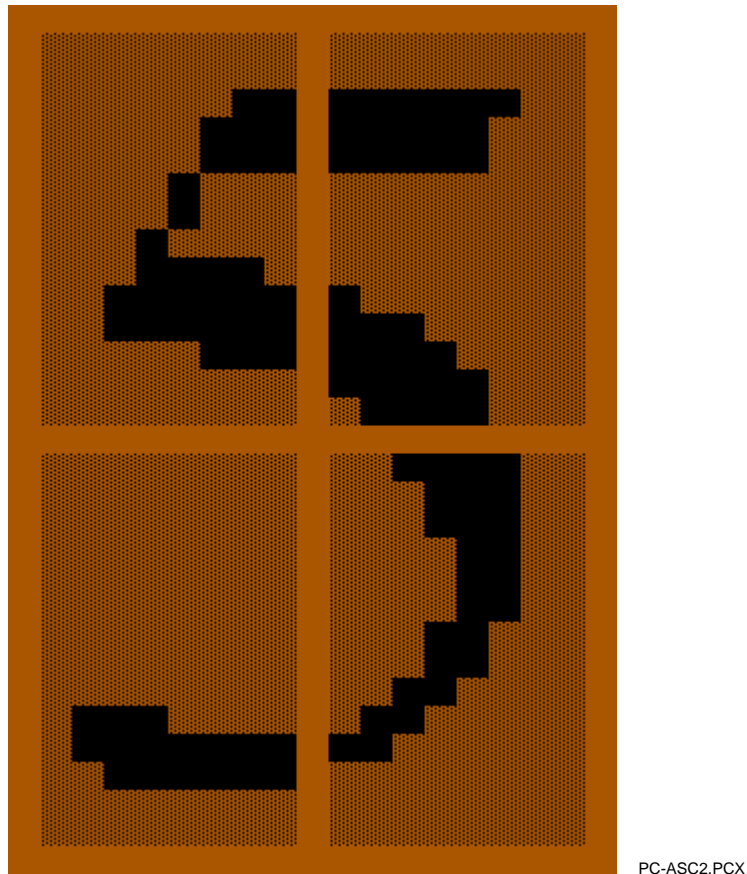


Fig. 3-42: Example for double-size digits

A total of 40 characters are needed for all the digits. If you also require a decimal point and sign, additional characters have to be 'sacrificed'.

Analogous to Example 1, a user-ASCII character set with an edge length of 2:2 is created. Codes 48 to 57 (the 'true' digits 0 to 9) are filled with the newly created digit parts - preferably using <Alt>+<A>. The user-ASCII character set is saved, for example as 'Digi_2x2'. When used to output numbers, the large digits are displayed.

Notes:

- (1) It is possible to create even larger characters, but the amount of characters required rises drastically. For digits with 3x3 character size, as many as 90 'unnecessary' characters will be used.
 - (2) When constructing new characters which are distributed over multiple text characters, it helps to first draw the character on graph paper (1 character is 14 pixels high by 8 pixels wide).
-

Example 3: Self-designed fonts

The internal PC font typically used has taken on a rather stodgy appearance. Now it is possible to alter it according to personal taste or corporate strategy. The following letters are based on the 'Times' font. Note however that in contrast to the true 'Times' font, here each character must have the same width, which in the case of 'W' for example calls for a little imagination.

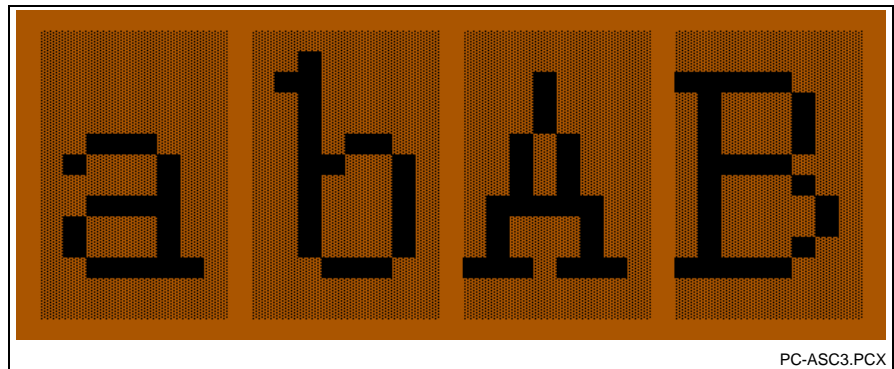


Fig. 3-43: Example of self-designed letters

As opposed to the two previous examples, here the 'correct' characters are affected. No 'redirection' is required via the user-ASCII character set. All dialogs, menus, helps, etc. are then output using this font.

Example 4: Self-designed special characters and graphic symbols

When representing technical processes, characters are often needed which are not normally made available by the PC character set. Previously, for example, it was not possible to represent the unit for rotational speed (rpm's) with a superscript -1. The first example character shows a way this can be represented. Since Version 18 and higher allows directory selection (e.g., for importing graphics) with all subdirectories also shown, it is an easy matter to label all previously opened directories as such. A maximum of two characters are provided which can be determined under Option/Settings. The following example shows an opened folder represented by two characters. Likewise, a closed folder also would need to be created.

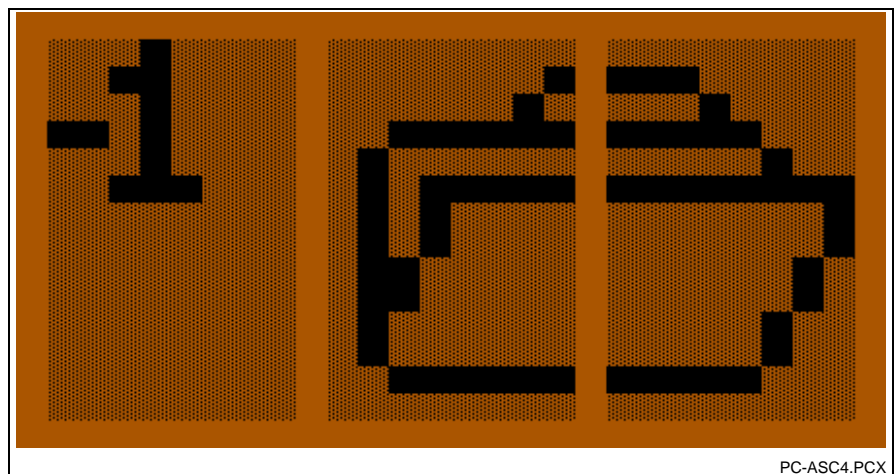


Fig. 3-44: Example for self-designed symbolic representations

Editing PC-ASCII characters

- Call** Global/PC-ASCII-Character/<Editorfeld>
- Functionality** The selected character from the loaded PC font can be edited pixel-by-pixel. The character is represented 16x enlarged (1 pixel corresponds to ■). The following editing functions are available:
- The <Space> key changes the state of the selected pixel, i.e., a previously set pixel is deleted and vice-versa. The cursor is not relocated.
 - Double-clicking a pixel with the mouse has the same effect as the <Space> key.

- The combination <Shift>+<Cursor> allows lines to be drawn or deleted. The response is determined by the setting 'Write' or 'Delete' in the switch field <Shift>+<Cursor>.
- The key combination <Alt>+<Cursor> shifts the contents of a character by one pixel in the selected direction (line wrap).
- The selected character can be completely deleted by pressing <Alt>+<Delete>, and completely filled by pressing <Alt>+<Insert>.

Each change is immediately displayed in the preview to the right next to the editor field.

The <PageUp> and <PageDown> keys skip to the character with the next higher or next lower code. In addition, you can use the mouse to directly select the desired character in the preview in the right half of the window.

Loading a user-PC character set

Call	Global/PC-ASCII-Character/Load
Functionality	You can load an existing file with a user-PC character set. For this a selection window with all currently available and suitable files is provided. A fast search can be done by entering the first letters of the desired file name in the list.
Peculiarities	None

Loading the INDRAMAT Standard PC Character Set

Call	Global/PC-ASCII-Character/Standard
Functionality	Loads the standard font included with the unit. This corresponds to the PC-internal German character set.

Why is this standard font necessary? Why isn't the internal PC character set used?

Answer:

With some PCs it can happen that the internal character set is incomplete or even completely damaged. This is justified by the fact that character sets are normally stored in three various sizes in the PC (8 pixels, 14 pixels and 16 pixels high). The 14 size is always used for representing texts in the Display System. For reasons of economy, however, some BIOS versions do not include this character set since it is not used for displaying in DOS text mode (→ there a character is 16 pixels high). But this cannot always be recognized and therefore leads to illegible displays. To allow text display, the unit is shipped with a file which contains a (German) standard character set.

Peculiarities	None
----------------------	------

Loading the Internal PC Character Set

Call	Global/PC-ASCII-Character/PC internal
Functionality	Loads the character set stored in the PC ROM. This takes country-specific peculiarities into account.

Note: With some PCs it can happen that the internal character set is incomplete or even completely deformed. This is justified by the fact that character sets are normally stored in three various sizes in the PC (8 pixels, 14 pixels and 16 pixels high). The 14 size is always used for representing texts in the Display System. For reasons of economy, however, some BIOS versions do not include this character set since it is not used for displaying in DOS text mode (→ there a character is 16 pixels high). But this cannot always be recognized and therefore leads to illegible displays. To allow text display, the unit is shipped with a file which contains a (German) standard character set.

If the internal character set of the PC is damaged, the following course of action is recommended to obtain a PC character set:

⇒ Create the desired character set on a PC which has a correspondingly functional BIOS. Save the character set there as a user file by using 'Save as', so that it can be transported to your own PC using file move (see 3.3).

⇒ Load the standard character set included with the unit and save it under its own name as a user file. Use Editor to manually change the characters which need to be modified.

⇒ Replace the BIOS. This can generally be done by swapping out an EPROM. Since this approach is rather complicated and requires appropriate technical background, it is recommended only with reservations.

Peculiarities None

Saving a PC Character Set

Call Global/PC-ASCII-Character/Save

Functionality Saves the currently loaded PC character set. If no file name is known, the 'Save As' function of the switch is executed instead.

By saving it, the standard PC character set as well as the PC-internal character set can be changed into the user-PC character set.

Peculiarities None

Saving a PC Character Set under a New Name

Call Global/PC-ASCII-Zeichen/Save As

Functionality Saves the currently loaded PC character set as a file. You are prompted to enter a file name. The file name is displayed in the editor field in the 'File:' line (see Fig. 3-40, page 3-61).

This function is useful for copying PC character set files.

By saving it, the standard PC character set as well as the PC-internal character set can be changed into the user-PC character set.

Peculiarities None

Applying the PC Character Set

Call Global/PC-ASCII-Character/Apply

Functionality Applies the currently loaded PC character set for displaying all texts. The changes immediately become active.

The name of the PC character currently used for display is shown in the editor field in the 'PC:' line.

This application of a PC character set corresponds to the selection under 'Option/PC Font' (see 3.4, page 3-96).

Peculiarities The switch is only active if the PC character set has not been modified since the last save.

Documentation

Call Global/Documentation

Functionality Various functions for documenting (printing) individual images or all images of the entire project, and various print settings are offered.

Peculiarities None

Print options

Call Global/Documentation/Print options

Functionality Selections for the individual print options can be made here. An input window is opened (see Fig. 3-45).

The window consists of two areas:

- Upper part: Selections for documenting the images
- Lower part: Selections for producing hard copies of the screen using the 'PrintScreen' procedure (see also Chapter Editing Soft Keys', page 3-36)

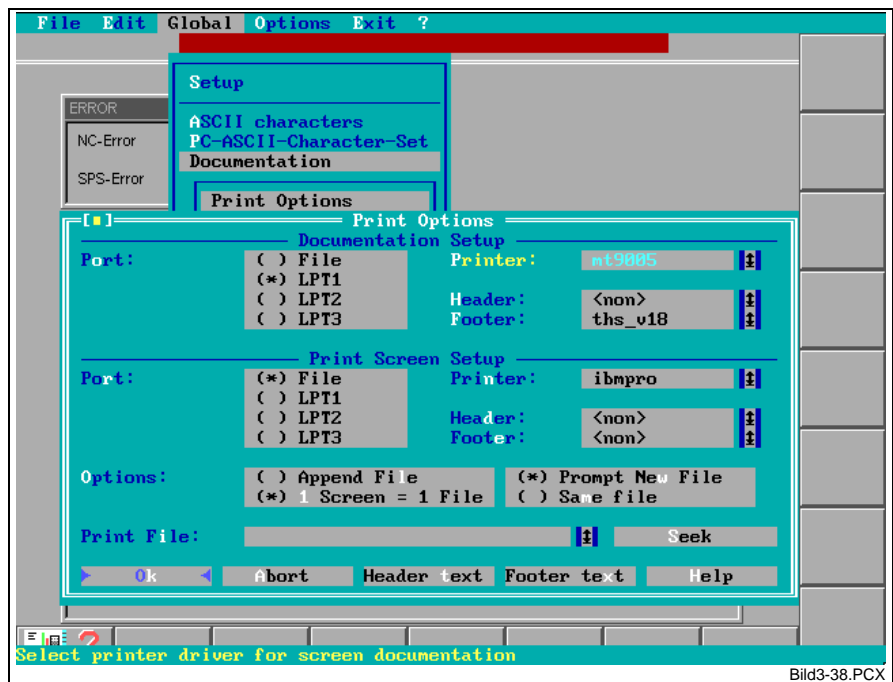


Fig. 3-45: Window for selecting print options

Meaning of the input and selection fields

Interface

The printout can be directed either to the selected printer (printer on LPT1 through LPT3) or be saved in a file. The selection can be made here. If the 'File' interface is selected for the screen shot, the 'Options' and 'Print file' fields become active, too.

Notes:

- (1) When the printout is directed to a file, print control characters that would be sent to the printer will also be written to the file. Depending on the selected printer, this may impede the readability, but it permits the print file to be sent directly to the corresponding printer when this is required. With the standard printer, this can be done with the DOS command 'copy <printfile> prn'.
- (2) Note (1) shows that a compatible printer must also be selected when the printout goes to a file, because the printer-related control characters are entered in that file.
- (3) The print files may optionally be created on a diskette. This permits printing even if there is no printer connected to the computer.
- (4) To be able to print from a Windows environment directly to a connected printer, two conditions must be satisfied:
 - (a) The printer must be assigned to a logic interface LPT1, LPT2 or LPT3.
 - (b) The printer must be compatible with one of the installed INDRAMAT printer drivers. Use an IBM printer ('ibm' in the driver name) or an EPSON printer ('eps' in the name) if you are not sure. Most Windows printer drivers are compatible with that.

Printer

Selecting this field displays a list of all printer drivers that are provided by the MT-CNC installation program.

Header text	<p>All existing header text files are displayed for selection. The selected header text is used for printing. The first entry in the list is always <none>. A header text is not printed if <none> is selected.</p> <p>A header text can be up to 6 lines long. It is automatically printed at the beginning of each new page. A header text may contain cross commands (see also Chapter 'Header and Footer Texts for the Documentation', page 3-71).</p>
Footer text	<p>All existing footer text files are displayed for selection. The selected footer text is used for printing. The first entry in the list is always <none>. A footer text is not printed if <none> is selected.</p> <p>A footer text can be up to 6 lines long. It is automatically printed at the end of each page. A footer text may contain cross commands (see also page 3-71).</p>
Options/Extend file or 1 screen = 1 file	<p>This selection is valid for the 'PrintScreen' procedure (see Chapter 'Editing Soft Keys', page 3-36). If the selected interface is 'File', the user can define whether the screen shots that have been produced with the 'PrintScreen' procedure are appended to the existing print file. In this case, 'Extend file' must be selected. If '1 image = 1 file' is selected instead, a separate print file is created for each screen shot. In this case, the right-hand part of the options will become active, too.</p>
Options/Ask new file or same file	<p>This selection is valid for the 'PrintScreen' procedure (see Chapter 'Editing Soft Keys', page 3-36). If the selected interface is 'File', and the option '1 screen = 1 file' has been selected, the user can define whether a new file with a separate name shall be produced for each screen shot or whether the screen shot shall always be written to the same file. In the second case, only the last screen shot will be retained because the previous one will be overwritten.</p> <p>If 'Ask new file' has been selected, the system <u>first</u> produces the screen shot, <u>then</u> asks for the name of the file. Thus it can be ensured that the state is documented that existed when 'PrintScreen' was selected.</p>
Print file	<p>This selection is valid for the 'PrintScreen' procedure (see Chapter 'Editing Soft Keys', page 3-36). If the selected interface is 'File', drive, directory and name of the print file can be defined. The 'Search' button provides support in that process. It permits the print file to be selected/entered on the basis of actually existing drives and directories.</p> <p>The selections made in the print file remain without effect if the options '1 screen = 1 file' and 'Ask new file' have been selected. In this case, the system asks for the print file immediately during the printing process.</p>
Header/footer texts	<p>Header text files and/or footer text files can be edited and managed in a separate editor (see Chapter 'Header and Footer Texts for the Documentation', page 3-71).</p>
Peculiarities	<p>The selections made in that option window are stored in a separate print selection file. Thus, it will be available when the Custom Display System is activated again. If options have been modified when the <Esc> key is pressed for exiting the window, the system will ask if you want to save the changes.</p>

Header and Footer Texts for the Documentation

Call Global/Documentation/Print options/Header texts|Footer texts

Functionality The text that is printed at the beginning and at the end of each page can be edited in a separate editor (see Fig. 3-46). Such a text may contain a maximum of 6 lines and 255 columns. The <Shift>+<Cursor> key combination can be used for drawing lines.

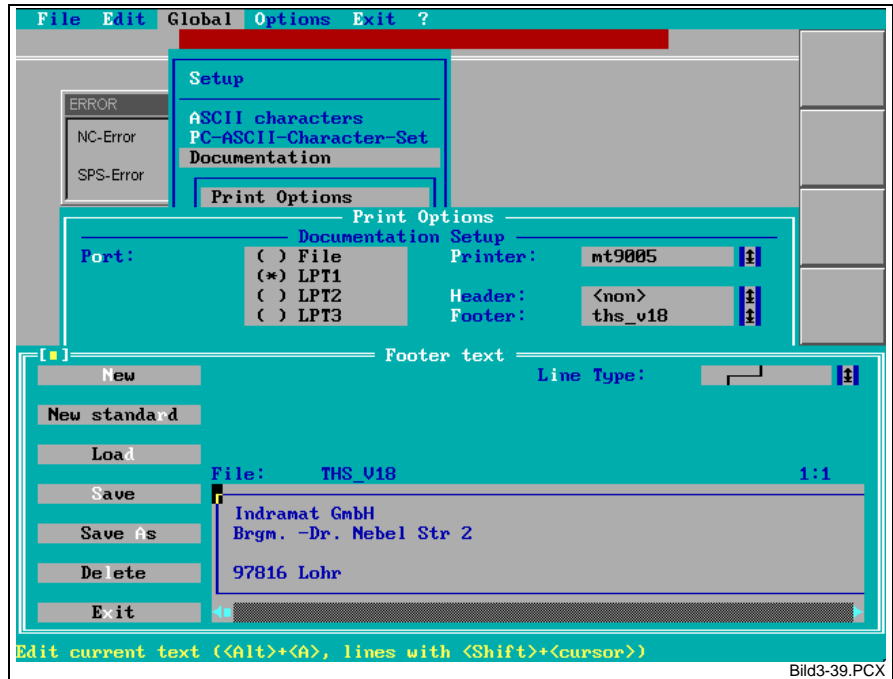


Fig. 3-46: Editor for header and footer texts

To edit the texts, there is an editor that supports all the usual editor functions. Continuous text is not automatically wrapped at the end of the line (i.e. writing beyond the end of the line is not possible). Only overwrite mode is possible.

The employed print routines support some 'cross commands'. These are text marks that are replaced with the corresponding information of the same length when the document is printed.



CAUTION

The cross commands must be of exactly the specified length and the specified syntax. Otherwise they cannot be recognized and replaced during the printout.

There is an input assistant for entering the cross commands. Pressing the '#' character opens a selection window (see Fig. 3-47) that contains all cross commands. A brief help text to each cross command is offered on the bottom line. When a cross command is selected, it is entered in the text and the cursor moves to the end of the cross command.

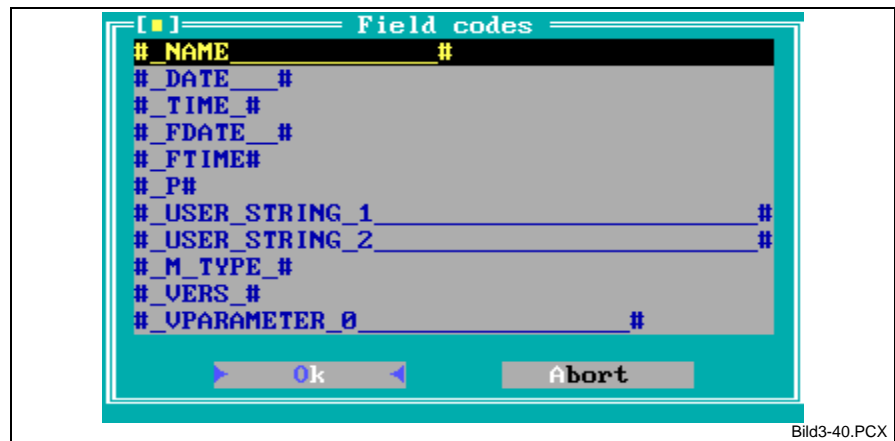


Fig. 3-47: Selecting cross commands

Meaning of the cross commands

NAME _____

Here, the name of the image file (documentation of the current image file - see Chapter 'Documentation of the Current Image File', page 3-74) or the name of the print file (documentation of all image files of the whole project - see Chapter 'Documentation of all Image Files of the Project', page 3-76) is inserted.

Documentation of the Current Image File', page 3-74) or the name of the print file (documentation of all image files of the whole project - see Chapter 'Documentation of all Image Files of the Project', page 3-76) is inserted.

DATE ___

Here, the current date (i.e. the date when the documentation is started) is inserted.

TIME _

Here, the current time (i.e. the time when the documentation is started) is inserted.

FDATE ___

Here, the date of the last modification of the documented file (i.e. the date of the image file) is inserted.

FTIME#

Here, the time of the last modification of the documented file (i.e. the time of the image file) is inserted.

P#

Here, the current page number will be printed.

USER_STRING_1 _____

Here, the first line of the license proof will be printed. The license proof is the text that must be entered when the software is installed. This should be the name of the company or the name of the plant.

USER_STRING_2 _____

Here, the second line of the license proof will be printed. A

#_M_TYPE_#

Here, the type of the employed controller (e.g. 'MT-CNC' or 'CLT') will be printed.

#_VERS_#

Here, the current version of the user interface will be printed.

#_VPARAMETER_0_____#

Here, the current plant number and the associated plant name will be printed.

Peculiarities The 'New standard' check box creates a header and/or footer text that complies with the INDRAMAT recommendations for such texts. First the system inquires how wide the created text shall be. This value chiefly depends on the employed printer driver.
If necessary, a cross command may repeatedly be used in a text.

Documentation of the Current Image File

Call Global/Documentation/Print single image

Functionality The contents of the currently loaded image file are printed. All components of the image that may also be entered and modified in the 'Edit' menu item (see Chapter 'Editing the Variable List', page 3-5) are listed in the documentation. The individual image components are highlighted by a double-underlined headline.

Fig. 3-41 shows an excerpt from the documentation of an image file. The system asks for the name of the print file if the printout is directed to a file (see Chapter 'Print options'). The name of the currently loaded image file is offered as the default selection.

Peculiarities If machine function keys have not been defined, this section does not exist in the documentation.
The image mask is printed without color information.

```

Variables
iiiiiiii
%POSX.NAME, type=unknown, Modify NOT allowed, format=Standard, ASCII-Set='',
Output area: x=31, y=14, Width=10, Depth=1,
Color=White on Black,
Minimum=0.000, Maximum=0.000,
%POSZ.NAME, type=unknown, Modify NOT allowed, format=Standard, ASCII-Set='',
Output area: x=31, y=14, Width=10, Depth=1,
Color=White on Black,
Minimum=0.000, Maximum=0.000,

Softkeys
iiiiiiii
1:free
2:free
3:Text='Previos Variable', Graphic file=, Action=
4:Text=' Change Values', Graphic file=, Action=
5:Text=' Next Variable', Graphic file=, Action=
6:free
7:free
8:free

SPS-Keys
iiiiiiii
P00S.ERROR, Action=SysError, Parameter=()

Machine Keys
iiiiiiiiiiii
1:free
2:free
3:free
4:free
5:free
6:free
7:free
    
```

Bild3-41.PCX

Fig. 3-48: Typical image file documentation

Documentation of all Image Files of the Project

Call	Global/Documentation/Print project
Functionality	All components of all image files of the project are printed. The image components are printed in the same way as the single images (see Chapter 'Documentation of the Current Image File', page 3-74). All image files that belong to the project are printed consecutively. At the beginning of the documentation, a table is printed that lists all image files that belong to the project. That table also shows the interconnection of all images (see Chapter 'Documentation of all Image Files of the Project', page 3-76).
Peculiarities	The routine that determines all images that belong to the project always starts the analysis in the currently loaded image and looks along a network structure for all files that are interconnected directly and indirectly with that currently loaded image file. A currently loaded 'test image' that may not contain any soft keys should not be used for starting the documentation of all images of a project. All image files are acquired, too, that can be invoked via global keys (see Chapter 'Global Keys', page 3-55). When the printout is directed to a file (see Chapter 'Print options', page 3-68), the system asks for the name of the print file when documentation is started. While printing is in progress, the current print status is displayed in a separate window. Printing can be interrupted and/or aborted.

Interconnection of the Image Files

Call	Global/Image interconnection
Functionality	<p>A table is set up that contains all files that belong to the project (see Fig. 3-49). All links between the individual image files and to graphics and ASCII character set files are listed here.</p> <p>The <i>vertical axis</i> of the table (left-hand column) contains all 'callers' (i.e. all objects that are able to load a file or execute a procedure). Distinction is made between:</p> <ul style="list-style-type: none"> • image files that can 'call' via soft key or SPS key (above the separating line), and • global keys (beneath the separating line) <p>The <i>horizontal axis</i> of the table (top line) contains all 'called' (i.e. all objects that can be called). Distinction is made between:</p> <ul style="list-style-type: none"> • image files that can be loaded, • specified procedures, • graphics files, and • ASCII character set files (separated from each other by a vertical separation line). <p>A call may have different triggers. This is marked by different characters on the crossings between 'caller' and 'called'. The following characters are possible on the crossings:</p> <ul style="list-style-type: none"> • SK Called by a soft key (images, procedures, and graphics), • SPS Called by a SPS key (images and procedures) • MFT Called by a machine function key (graphics only) • Msk Used in the image mask (graphics only) • Var Called by variable output (graphics and ASCII character sets) • x Called by global keys <p>The cursor keys permit scrolling in any direction if the table exceeds the size of the screen. The axes of the table always remain visible.</p>

Called	Caller	CallProg	DiagHelp	DiagHelp Cursor	GoDown	GoLeft	GoRight
DIAG	DIAG	ram	-	-	-	-	-
<Alt><X>	-	-	-	-	-	-	-
<←>	-	-	-	-	-	-	-
<↑>	-	-	-	-	-	-	-
<↓>	-	-	-	-	x	-	-
<←>	-	-	-	-	-	x	-
<→>	-	-	-	-	-	-	x
<PgUp>	-	-	-	-	-	-	-
<PgDn>	-	-	-	-	-	-	-
<Home>	-	-	-	-	-	-	-
<End>	-	-	-	-	-	-	-
<Tab>	-	-	-	-	-	-	-
<Shift><Tab>	-	-	-	-	-	-	-
<F9>	-	-	-	-	-	-	-
<F10>	-	-	-	-	-	-	-
<Alt><K>	-	-	-	-	-	-	-
<←-Delete>	-	-	-	-	-	-	-
<Alt><D>	-	-	-	-	-	-	-
<Alt><G>	-	-	-	x	-	-	-
<Alt><P>	-	-	-	-	-	-	-
<Alt><M>	-	-	x	-	-	-	-
<Alt><N>	-	x	-	-	-	-	-
<Alt><S>	-	x	-	-	-	-	-

Global Key '<Down>' calls Procedure 'GoDown'

Exit Help

Display all links between screens, procedures, graphics and global keys

Bild3-42.PCX

Fig. 3-49: Example of image interconnection

For better orientation, the crossing currently selected by the cursor is shown in plain text beneath the table.

To quickly find all entries within a line, use the key combination <Alt>+<CursorLeft> and <Alt>+<CursorRight> to jump left or right directly to the next crossing.

Peculiarities

The routine that determines all images that belong to the project always starts the analysis in the currently loaded image and looks along a network structure for all files that are interconnected directly and indirectly with that currently loaded image file. A currently loaded 'test image' that may not contain any soft keys should not be used for starting the documentation of all images of a project. The images may be interconnected in any structure. Displaying a 'neat' menu or tree structure is therefore not possible. The table cannot contain any calls from an image that are performed via the 'PreviousScreen' procedure.

Archiving Functions

Call Global/Archiving

Functionality

Functions are provided that are used for storing and archiving individual image files, or all files of the entire project. The following archiving function are available:

- archiving,
- fetching from the archive
- clearing the archive

An archive may, but need not be allocated to a project. All projects that have been created by a SPS archive are offered in the archive. Any number of archives (versions) may be created in a project. If archiving is performed on diskettes, an archive may need several diskettes. Changing diskettes is supported.

Peculiarities

Distinction is made between archiving interconnected files (project archive) and archiving loose files (i.e. without taking interconnections into consideration - file archive). For fetching and clearing archives, the same functionality exists for project archives and for file archives.

Archiving One or More Files

Call	Global/Archive/Archiving/File archive
Functionality	<p>One file or several files of the Custom Display System may be archived. Interconnections of image files are never taken into consideration. The selection is made by highlighting (<Space> bar or double clicking the mouse button) the corresponding files in the list of all files of the Custom Display System (see Fig. 3-50). The currently loaded image is automatically highlighted. Each marked line is identified by a check. In marking, the cursor automatically moves down by one line. This enables a large number of files to be marked quickly.</p> <p>The number of the currently marked entries is shown beneath the selector field of all files. Marking previously marked entries unmarks them.</p> <p>The 'Compress' check box permits the archive to be packed. This takes more time, but the resulting archive is drastically reduced in size. A reduction rate down to 10% for a graphics file is realistic. This option should always be used when archiving is performed onto diskettes. This increases the possibility that the complete archive fits onto one diskette. The additionally required time is compensated by the significantly reduced data quantity that must be saved on the diskette.</p> <p>The 'automatic reference' check box causes all graphics files and files with ASCII character sets, that are used by an image (for variables, in the image mask, as a label on the buttons, ...) to be marked automatically. This option is particularly suitable for archiving a single image together with all its employed files.</p>

Notes: An employed file is searched for when an image file is marked (0-1 edge). This means that setting the check box afterwards does not highlight the employed file. Unmarking an image file does not clear the marks of employed files because those files may also be employed by other image files.

Employed image files are not marked. You must use the project archive for this purpose.

For archiving purposes, drive, project (name of the subdirectory), and version (name of the archive file) can be selected and/or entered. Provided that the necessary access privilege is available, archiving on a network drive is possible, too.

Each archive may be provided with a comment of up to 4000 characters. The comment is always initialized with the name of the user, and the current date and time.

A so called 'start file' can be applied to each archive. This file contains information about certain actions to be automatically executed when retrieving an archive. A separate dialog exists to determine the contents of the 'start file'.

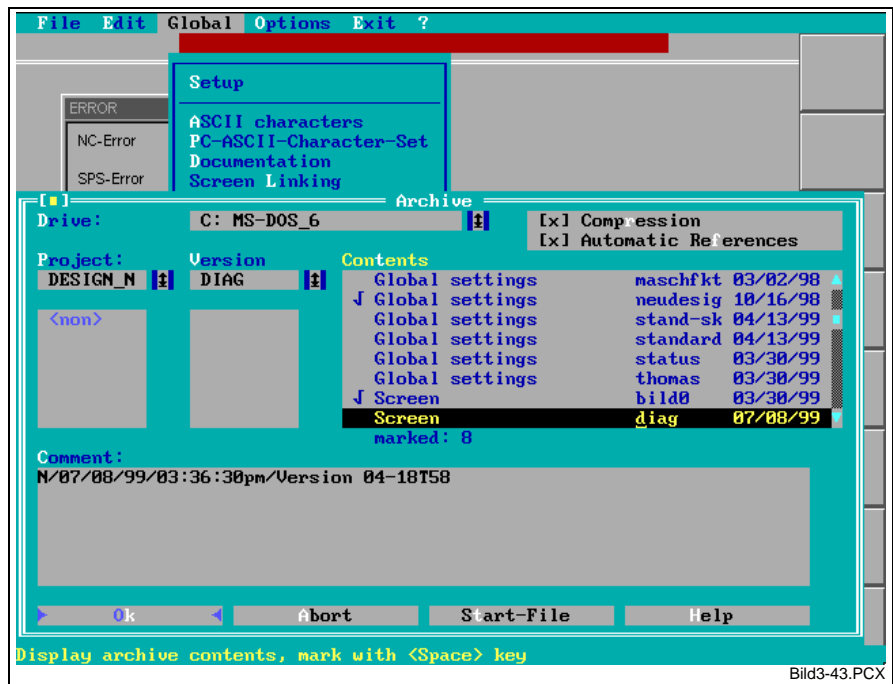


Fig. 3-50: File archive

Peculiarities The progress of the archiving process is shown in a status window.

Archiving a Project

Call Global/Archive/Archiving/Project archive

Functionality The project archive knows two modes:

1. Archiving all image files that belong to the project (interconnected archiving), and
2. Archiving all existing files of the Custom Display System; including the ones that do not belong to the current project (loose archive).

All graphics and ASCII files that are employed by the image files may optionally be included in the archiving process. All configuration files and/or the currently used configuration file (see Chapter 'Base Selections', page 3-53) may also be archived.

Optionally, the archive can be compressed. Archiving takes longer, but requires much less space. For archives on diskette, in particular, this selection is strongly recommended.

For archiving purposes, drive, project, and version (name of the archive) can be selected and/or entered. Provided that the necessary access privilege is available, archiving on a network drive is possible, too.

The current date is suggested as version (expedient for daily backups). Each archive may be provided with a comment of up to 4000 characters. The comment is always initialized with the name of the user, and the current date and time.

A so called 'start file' can be applied to each archive. This file contains information about certain actions to be automatically executed when retrieving an archive. A separate dialog exists to determine the contents of the 'start file'.

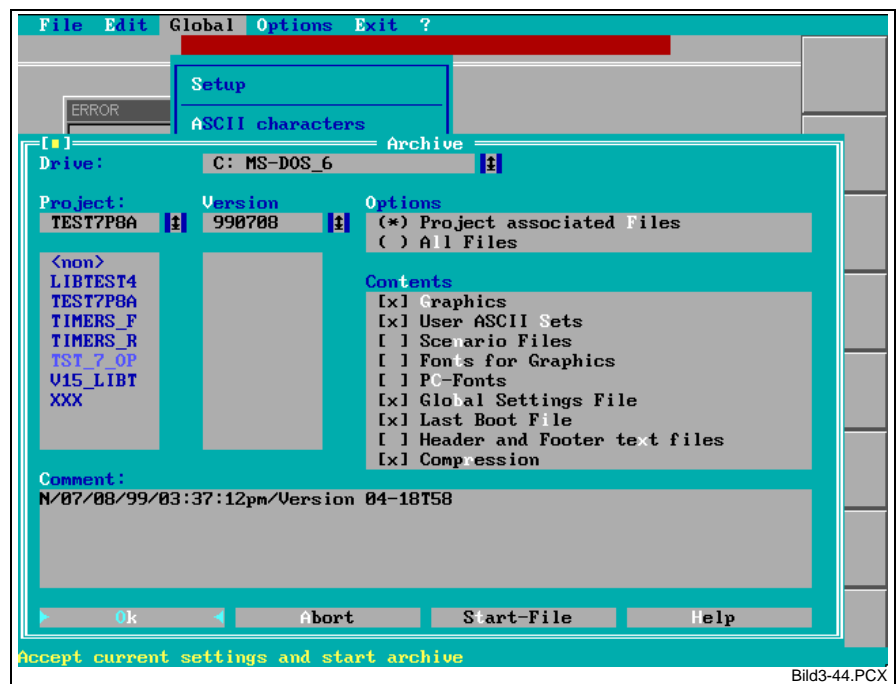


Fig. 3-51: Project archive

Peculiarities The routine that determines all images that belong to the project always starts the analysis in the currently loaded image and looks along a network structure for all files that are interconnected directly and indirectly with that currently loaded image file (see Chapter 'Interconnection of the Image Files', page 3-76). A currently loaded 'test image' that may not contain any soft keys should not be used for starting the documentation of all images of a project. The progress of the archiving process is shown in a status window.

Retrieving an Archive

Call Global/Archive/Fetching archive

Functionality Individual or all files can be retrieved from an archive. All files that are to be retrieved must be marked (see Fig. 3-52). This can be done either directly in the list of contents using the <Space> bar or double clicking the mouse button, or automatically via the buttons 'Mark all' and/or 'Compare'. The 'Compare' button compares the files in the archive with the ones in the PC and marks all files that are only contained in the archive and/or are newer in the archive. The comment can only be viewed; it cannot be modified.

Peculiarities The progress of the archive retrieving process is shown in a status window. The system warns of overwriting existing files.

If a start file is detected within the archive, it is prompted whether it is to be applied. If [Yes] is answered at this point, the information contained is accepted, i.e. the indicated file including basic settings and the defined screen file is loaded.

Example

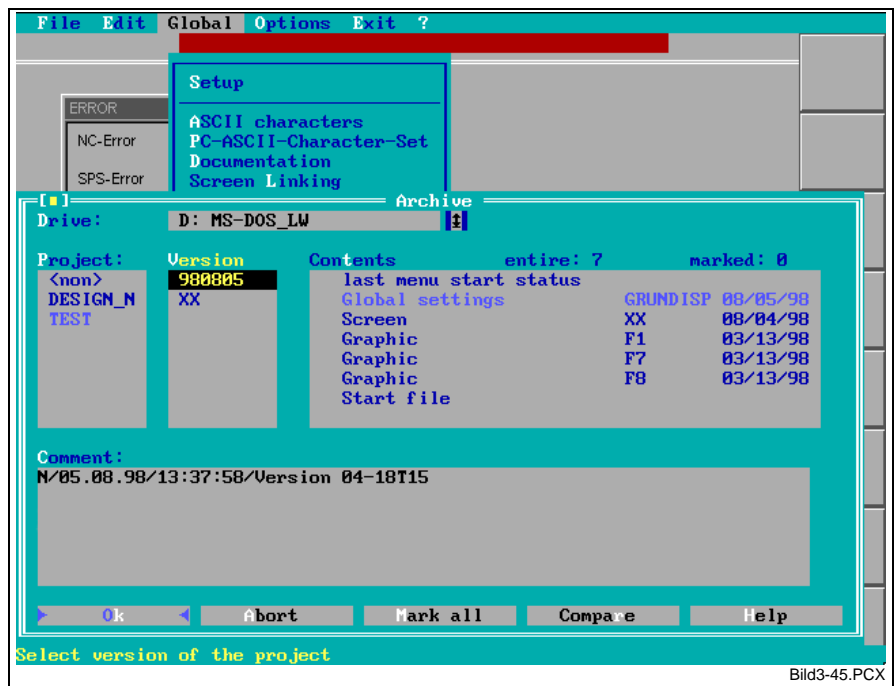


Fig. 3-52: Retrieving an archive

Clearing an Archive

- Call** Global/Archive/Clear archive
- Functionality** Any archive may be cleared. To select the archive, a window is opened that permits the archive contents to be viewed (see also Fig. 3-52). There is a safety request before the archive is cleared.
- Peculiarities** Removing individual files from an archive is not possible.

Example

see Fig. 3-45

Start File

- Call** Global/Archive/Archive/File Archive/Start file
or
Global/Archive/Archive/Project archive/Start file
- Functionality** The Start file contains instructions for automatic actions when retrieving the archive. This is especially useful when creating updates for run versions of the Display System. No further actions need to be executed manually, since they are automatically carried out when the archive is retrieved.
The following actions can be included:
 - Name of the file to load with basic settings (configuration file) and
 - Name of the image to load.
 The following dialog is prepared:

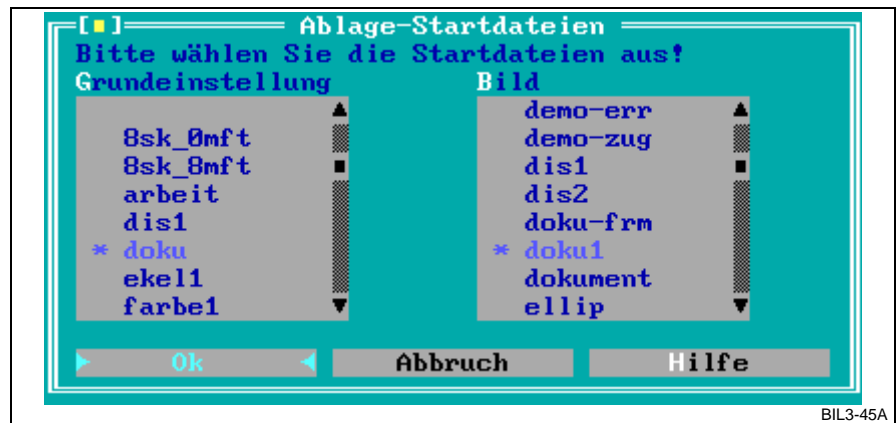


Fig. 3-53: Archive start files

In the list at left select the file including basic settings, and in the list at right the image file. Both lists have a blank first entry. Selecting this one means no corresponding automatic loading takes place.

In both lists, the file marked with an asterisk is the currently active one.

If an image or configuration file which is not marked in the archive selection is selected when creating a file archive, in other words is not intended for the archive, marking is prompted.



Fig. 3-54: Marking the selected file

If nothing is marked, an archive could result whose start file points to files which do not exist in the destination computer.

When retrieving the archive, a distinction is made whether this shall be done from the menu or using the 'LoadArchive' procedure (see 'Editing Soft Keys, page 3-36'). In the first instance, when a start file is located in the retrieved archive, you are asked whether this one is to be used. This question is not asked in the 'LoadArchive' procedure, rather the contents of the start file is always executed.

Notes:

- (1) The start file is not available as a file. It is rather simply a means of transport for the information pertaining to automatic loading. After the archive is retrieved and the start file run, this information is no longer present.
- (2) Only files which exist in the 'creator PC' can be placed in the start file.
- (3) In spite of prompting, there is still the possibility of creating inconsistent start files by selecting files for automatic loading which are neither in the archive nor in the destination computer. Here you must exercise additional caution when archiving!

Peculiarities

The 'Start File' switch is only available in the programming version.

Graphics Editor

Call Global/Graphics

Functionality An editor is provided that permits graphics files to be managed, edited, and imported.

Graphics that can be used in the Custom Display System must be in an internal access-optimized format. Existing pixel graphics (e.g. PCX or BMP files) cannot directly be displayed.

Peculiarities The Custom Display System only distinguishes 16 colors. Thus, only 16-color graphics can be displayed. Due to the mixed representation of text and graphics, palette information for indication cannot be supported. The system always employs the 16 DOS standard colors.

Example

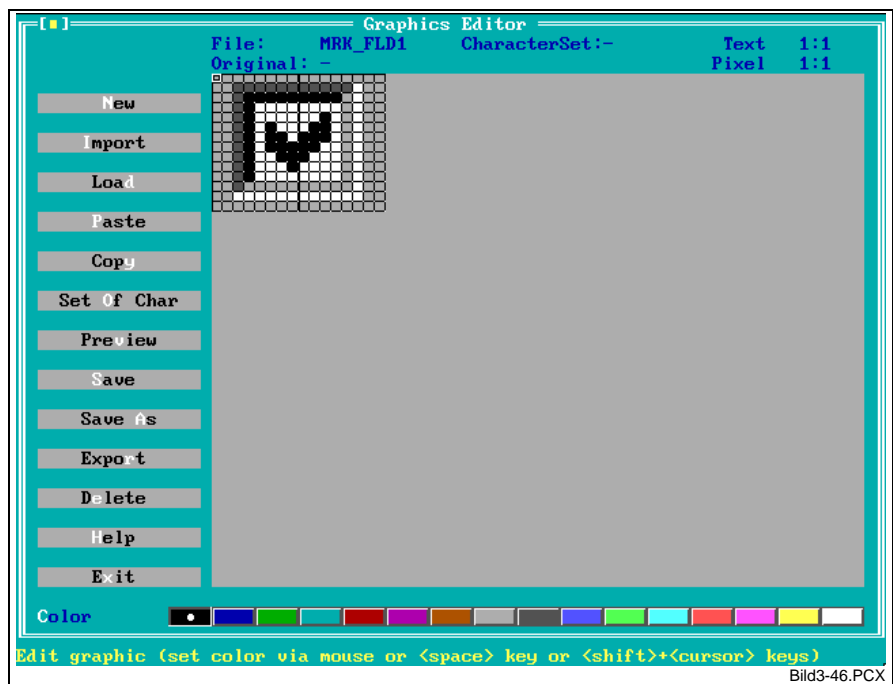


Fig. 3-55: Graphics editor with loaded graphics

Creating New Graphics

Call Global/Graphics/New

Functionality New graphics can be created. First, the size of the graphics must be defined. To do this, a sizing area appears on a cleared background. Using the <Shift>+<Cursor> keys or dragging the right bottom corner with the mouse permits the size of that area to be modified. Sizing is only possible within the text grid dimensions. Thus, the smallest graphic element that can be created is 8 pixels wide and 14 pixels high. A graphic element cannot be larger than the output area (see Chapter 'Output Area – Space for Image Output', page 3-57). The actual size of the area is displayed on the topmost screen line, at the left-hand side next to the time, as height:width in the text grid.

The sizing area can be positioned anywhere on the screen.

When the <Enter> key is pressed to accept the size selections, a graphic element is created in the edit field of the graphics editor, and filled with the currently selected color. If you wish to create a graphic element in a specific color, that color must be selected before the graphic element is created.

Peculiarities If the editor already contains a graphic element, it will be cleared from the editor. If the graphic element has not yet been stored, the system will prompt you to do it now.

Editing Graphics

Call	Global/Graphics/<Editor field>
Functionality	<p>The editor is mainly used for creating or modifying small graphic elements (e.g. button areas). An external graphics editor should be used for creating complex graphics.</p> <p>The currently loaded or newly created graphic element can be edited on a pixel basis. A cursor appears in the editor field (special frame of a pixel in Fig. 3-55, top left). This cursor can be moved with any command. If the size of the graphics exceeds the size of the editor field, bars appear at the right-hand and bottom margin that show the relative position of the cursor within the graphics. The current cursor position in text and pixel coordinates is displayed at the right-hand side, above the editor field.</p> <p>There are three different methods of drawing a pixel in the currently selected color:</p> <ol style="list-style-type: none"> (1) Press the <Space> key at the current cursor position. (2) Click the left-hand mouse button on a pixel. When you hold the mouse button down, pixels will be created along the mouse track as you move the mouse along. (3) Use the <Shift>+<Cursor> keys for drawing a line. <p>All pixel/character actions refer to the currently selected color. The drawing color can be selected via the color selector switch beneath the editor field.</p> <p>There are no functions for deleting a pixel. Unwanted pixels can be 'cleared' by overtyping them in the required color. The <Alt>+<Backspace> key combination cancels all pixel modifications.</p> <p>Pressing the <Alt>+<Cursor> key combination scrolls the graphics by one pixel in the specified direction. Pixels that drop out at one side are inserted at the other side.</p> <p>The text grid in the editor field is marked by highlighted lines (see Fig. 3-55). This permits specific output fields to be created that can be used for variable output.</p> <p>The preview function (see Chapter 'Graphics Preview', page 3-89), enables the real appearance of the graphics to be verified in its original size.</p>
Peculiarities	<p>This graphics editor is just a pixel editor. There are no functions that can be used for creating complex objects, such as lines, circles or rectangles. There are no complex color functions (such as filling an area) available. The pixel size cannot be modified. This means that the size of the editor field cannot be modified.</p>

Importing Graphics

Call	Global/Graphics/Import
Functionality	<p>To be able to employ graphics in the Custom Display System, they must be available in an internal access-optimized format. Existing pixel graphics cannot directly be displayed. The import function permits those graphics to be imported (i.e. to be translated into the internal format) so that they can be used.</p> <p>There are import filters for graphics in PCX and BMP format.</p> <p>When graphics are imported, their size in the Custom Display System is defined. The size can be adjusted according to the requirements in the status display (see Fig. 3-56). Different scaling factors can be used for width and height ('proportional' option must be OFF). The size specifications are grid dimensions. Dimensions that correspond to the original size are defined as the initial values. If the original is larger than the maximum possible graphics size in the Custom Display System (maximum output area see Chapter 'Output Area – Space for Image Output', page 3-57), the dimensions are reduced proportionally. The 'Size' check box in Fig. 3-56 permits the size to be defined with a sizing area that shows the exact size of the graphics.</p>

Graphics in the Custom Display System can only be displayed in 16 different colors. The color depth of graphics that use more than 16 colors must therefore be reduced accordingly. This can be done with the 'Use palette' and 'Image type' options:

- 'Use palette' button

During import, the user can decide whether or not the color palette, that usually accompanies all graphics, shall be taken into consideration.

Activating that option is usually very expedient because it is the only way that the colors used in the graphics can be recognized. The only exception are graphics that have already been reduced to 16 colors with MS Windows programs, and using a Windows standard palette. Here, de-activating that option may yield better results because MS Windows employs a standard palette that is similar but not identical to the one used in MS-DOS. Some colors cannot be correctly recognized during adjustment. Frequently, dark gray, for example, is recognized as light gray. De-activating the option restores the correct colors.

Note: Up to version 16, a palette was never used.

- 'Image type' button

The Custom Display System only permits graphics of 16 colors to be displayed. Imported graphics often possess 256 or even 16 million colors. That number must therefore suitably be reduced. Different reduction principles can be used. Either, merely the matching color out of the 16 DOS colors is determined (principle: 'most similar color'), or the colors are allocated according to the 'error distribution' principle.

The 'Photo' selection should be used when photo-realistic images are imported. Here, the 'error distribution' principle is used. This provides a representation of graduated color transitions that is as realistic as possible.

The 'Graphics' selection is suitable for importing schematic representations. Here, the 'most similar color' principle is employed. Colored areas are represented as such.

Note: Up to version 16, the 'Graphics' selection was always used.

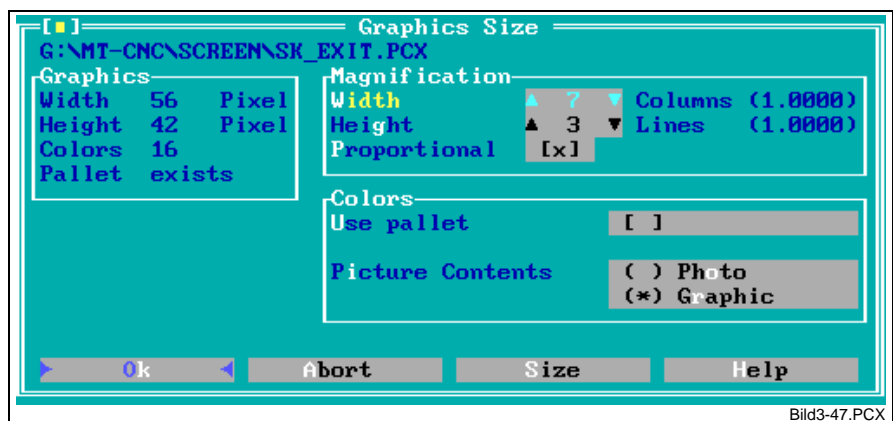


Fig. 3-56: Import selections for graphics

Once a graphic has been successfully imported, as a reminder the name of the source file is displayed in the Editor field in the line 'Original:<Source File>' (see also Fig. 3-53, page 3-82).

Peculiarities	<p>Note: If 'Photo' has been selected for an import, colors and graduated color transitions will be represented by several pixels. Consequently, the resolution of the graphics is reduced so that individual pixels will be more evident when the screen is looked at closely.</p> <p>To adjust the size to the Custom Display System, lines and/or columns are omitted (when the size is reduced) or multiplied (when the size is increased). Very thin lines in the original may disappear when the size is reduced. In this case, the original graphics should be created in approximately the required size. Remember: 1 text grid is 8 pixels wide and 14 pixels high.</p> <p>There are external color reduction algorithms, known as 'Dithering', that employ the 16 standard colors to combine non-representable colors such that regular structures are produced. They contain the risk that regularly each second, fourth, etc. line is removed when the size is adjusted. Thus, an orange area of the original turns out to be red or yellow only, or there are beats that cause red and yellow sections of the same size to appear. This can be prevented by using a different color reduction algorithm (direct import of the original graphics, or using the integrated reduction algorithms) or by selecting an enlarging factor that is not quite a multiple of the original size. To support that procedure, the enlarging factor is shown in the import window.</p> <p>Once graphics have been imported, their size cannot be changed. If original graphics shall be used in different sizes, they must repeatedly be imported in the required sizes.</p>
----------------------	--

Exporting a Graphics File

Call	Global/Graphics/Export
Functionality	The graphics in the editor can be exported as a PCX file. The result is always a compressed PCX file with 16 colors and palette. Drive, directory and file name can be defined as required.
Peculiarities	<p>The import filter should be set to the following values if those graphics are to be imported again:</p> <ul style="list-style-type: none"> • Use palette: OFF • Image type: Graphics.

Loading Existing Graphics

Call	Global/Graphics/Load
Functionality	A graphics component can be selected from the list of all graphics that exist in the internal format. The selected graphic component is loaded into the editor. The selection is supported by a (reduced) preview image (see Fig. 3-27).
Peculiarities	If the editor already contains a graphic element, it will be cleared from the editor. If the graphic element has not yet been stored, the system will prompt you to do it now.

Inserting Existing Graphics Into the Loaded Graphics

- Call** Global/Graphics/Insert
- Functionality** A graphic element that exists as a graphics file can be inserted at any point into the graphics in the editor. That function is suitable for swiftly copying repeatedly used elements. Only one LED must really be created in the example of Fig. 3-55. Later it can be inserted at the other points.
- Peculiarities** Inserting is only possible in the text grid. The 'insert' button will only be active if there are graphics in the editor.

Saving a Part of the Loaded Graphics

- Call** Global/Graphics/Cut
- Functionality** A part (section) of the graphics in the editor may be saved as a separate graphics file. In conjunction with inserting graphics (see Chapter 'Graphics Editor', page 3-83), this function is suitable for copying repeatedly used elements within the graphics. This function can also be used for copying small sections from large graphics, editing those segments, and outputting them as variable value in the '2 graphics' format (see Chapter 'Display Elements', page 3-14). This method can be used for animating all LEDs in the example of Fig. 3-55. Thus, the variable part of the graphics remains very small, yielding a noticeable increase in the speed of the dynamic output.
- Peculiarities** Cutting is only possible in the text grid. The 'Section' button is only active when the graphics editor contains a graphic element.

Graphic Character Set

- Call** Global/Graphic/Character Set
- Functionality** Text can be written directly in Graphics Editor. Various character sets may be used. These are selected using the 'Character Set' switch. In addition to information about the font height and width, the selection window also shows a preview of several letters. The character sets are created from TrueType character sets. The character set file contains the original name of the font which is being displayed in the preview.

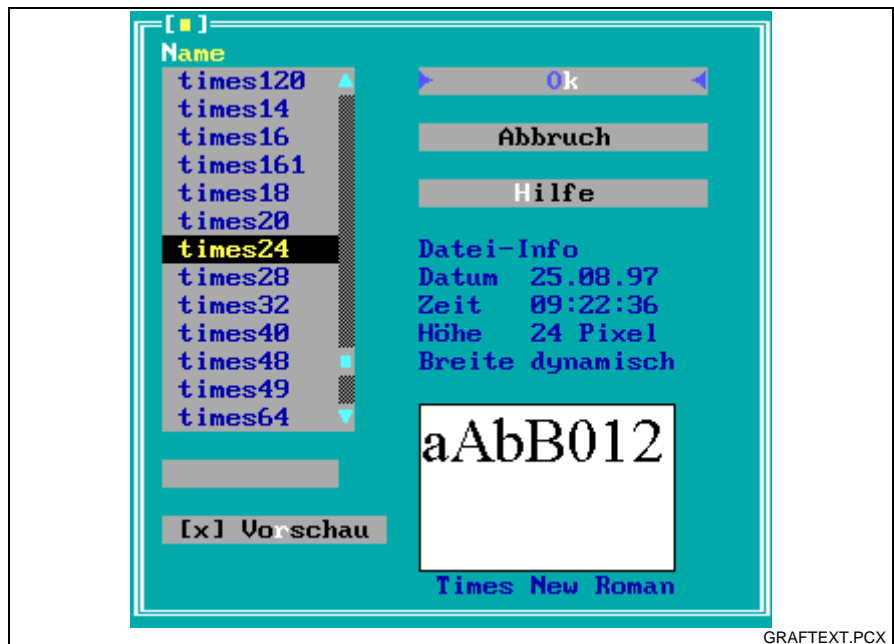


Fig. 3-57: Selecting a graphic character set

To write in the graphic, the cursor must be positioned at the lower left corner of the beginning of the text. Then you may simply begin writing. The text is output in the currently set color.

Notes:

- (1) Each written character is immediately entered into the graphic as a pixel quantity. The meaning as a letter is not retained. This means it is not possible to later output a text in font 'A' as text in font 'B'. Nor can the text be deleted by backspacing.
- (2) Since the <Space> key is already reserved for setting an individual pixel, space between must be created by advancing the cursor itself.
- (3) The original fonts from which the character sets were derived may not contain all the text characters available under MS-DOS. As a rule, however, all the characters available on the keyboard are included.
- (4) The command for undoing changes (<Alt>+<Backspace>) affects each pixel in the text character individually, not the entire character at once.
- (5) Included in this version are several files with various font types and sizes.
- (6) The character set files contain just one size of a font. It is not possible to modify the font size after the fact. The character set file would have to be recreated in the desired size instead.
- (7) When writing, the cursor is always located on the baseline, i.e., at the lower edge of most letters. Depending on the font, some characters may show some differences and extend below the baseline. This is quite typical of the letters 'g' and 'j'. Bear this in mind when writing at the lower edge of the graphic.
For highly inclined or decorative fonts, some characters may also extend to the left beyond the cursor position. This may occur for example with fonts which produce a connected, handwriting-like lettering.

Peculiarities

Only one graphic character set can be loaded. The name of the currently loaded set is displayed in the editor field. (see Fig. 3-55).

Graphics Preview

- Call** Global/Graphics/Preview
 - Functionality** The graphics in the editor are displayed in their real size.
 - Peculiarities** The 'Preview' button is active if there are graphics in the editor.
- Example

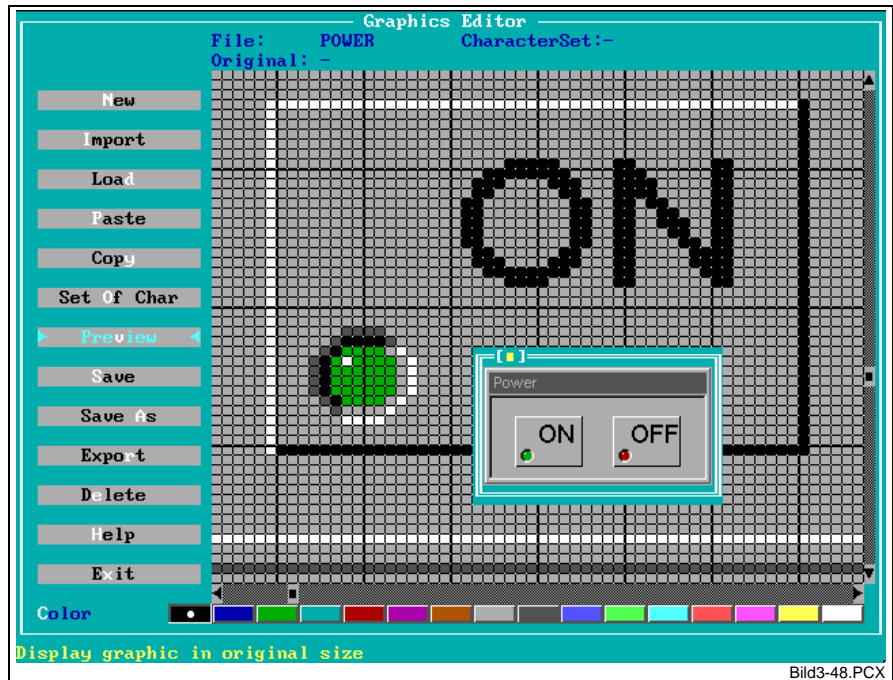


Fig. 3-58: Preview function of the graphics editor

Saving the Loaded Graphics

- Call** Global/Graphics/Save
- Functionality** The graphics in the editor are saved. If a file name is not known yet, the 'Save as' function (see Chapter 'Saving the Loaded Graphics Under a New Name', page 3-89) is performed instead. The name of the graphics file is displayed at the left-hand side, above the editor field.
- Peculiarities** The 'Save' button is active when the editor contains graphics.

Saving the Loaded Graphics Under a New Name

- Call** Global/Graphics/Save as
- Functionality** The graphics in the editor are saved under a new name. The function can be used for copying graphics files. The name of the graphics file is displayed at the left-hand side, above the editor field.
- Peculiarities** The 'Save' button is active when the editor contains graphics.

Deleting an Existing Graphics File

- Call** Global/Graphics/Delete
- Functionality** A file can be deleted from the list of existing graphics files. A selector window with a preview display is opened for that purpose (see Fig. 3-27). There will be a safety prompt before the graphics file is deleted.
- Peculiarities** The file of the graphic element that is currently loaded in the editor may also be deleted. This file can be restored by saving it again.

Scenario Editor

- Call** Global/Scenario
- Functionality** Provides an editor for creating, editing and managing scenarios.
- Definition** A scenario is an assignment list consisting of 256 equal entries, each of which contains a graphic name and relative X-Y coordinates of the upper left edge for the output. The result is a sequence of maximum 256 graphics. Each variable value from 0 to 255 is assigned an entry (graphic and its position) for the scenario. The graphics can be placed at any position on the screen. Exactly one graphic per scene can be displayed at a time.
- The individual graphics in a scenario are always displayed over any other display elements, and may cover them.
- A scenario does not have its own background. Whichever screen contents is currently active is used as the background.
- Scenarios can be used to conveniently represent complex processes, such as all the various positions and the motion of a gantry loader. Various graphics of different sizes are displayed at different locations on the screen. You may also use a scenario to show multiple graphics of the same size in the same position. By using successive graphics in this way, film-like sequences can be generated.

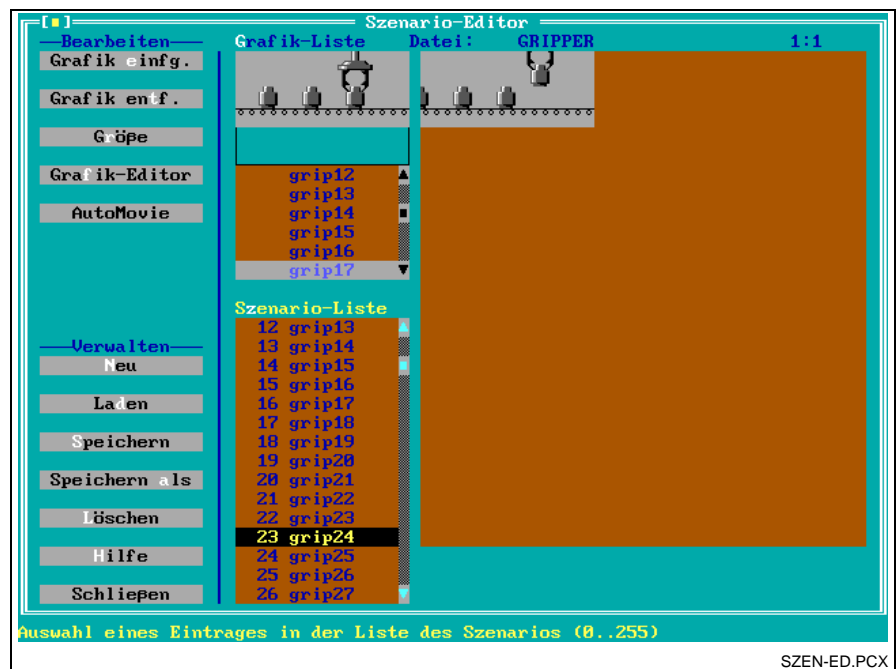


Fig. 3-59: Scenario Editor

A central component of the Scenario Editor is the scenario list. This holds the correspondencies between the sequential numbers (0 to 255) and their associated graphic. The relative X-Y position of the currently selected graphic within the scenario is displayed at the top right of the editor field. Within the editor field itself you may change the position of the graphic. In the present example of Fig. 3-57 all the graphics are shown the same size and completely fill the scenario. If the graphics are smaller than the scenario and not all in the same position, all except for the one currently marked in the list are grayed out (see Fig. 3-58). If the editor field is activated, the marked graphic is also surrounded by a dotted line as an indication that it is active and may be moved.

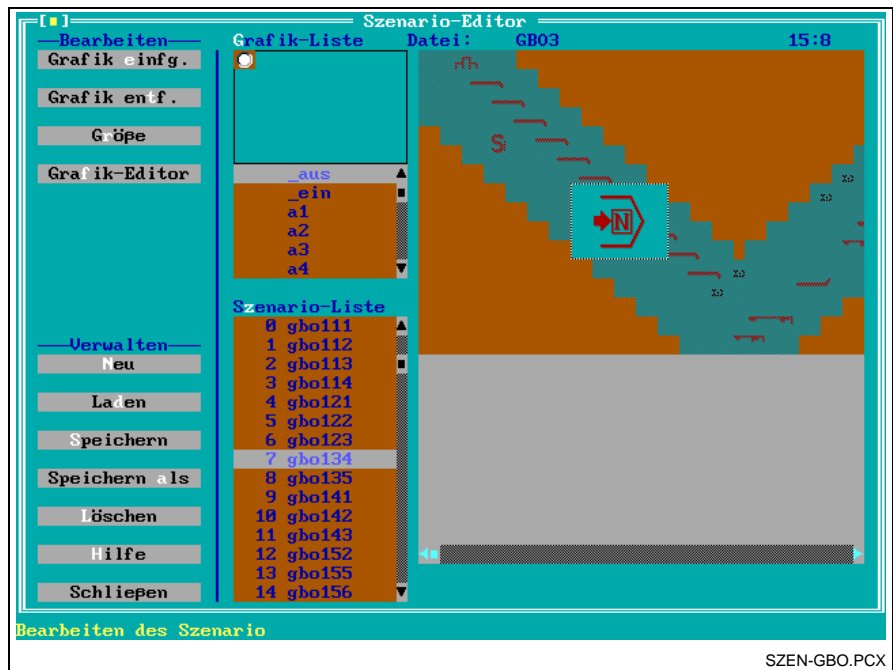


Fig. 3-60: Scenario Editor with differently arranged graphics

Creating a new scenario

To create a new scenario, the following steps must be carried out:

- (1) 'New' switch → Sets the size of the scenario, but can be changed later.

Editing a scenario

- (2) Select entry in the scenario list.
- (3) Select the graphic from the list and use <Space> or the 'Insert graphic' key (or <Insert> key) to place it in the editor area.
- (4) The graphic shown with a dotted border in the editor area, where it can be moved to the desired position.
- (5) Repeat points (2) to (4) as often as needed until all the desired graphics are placed into the scenario.

Deleting a graphic

- (6) Use the <Delete> key or 'Delete graphic' switch to remove the graphic selected in the scenario list from the scenario.

Running the Graphics Editor

To quickly modify a graphic without exiting the Scenario Editor, use the 'Graphics Editor' switch. In the Graphics Editor the graphic marked in the scenario list is automatically loaded. The Graphics Editor can also be opened by pressing the <Space> bar after selecting an entry in the scenario list.

Changing the size of a scenario

The 'Size' switch enables you to make changes in the size of an already loaded scenario. Afterwards a check is made to see whether the individual graphics still fit within the new area. If this is not the case, the positions of the upper left corners are adjusted up and to the left so that there is just a line or column visible. The following message is displayed to alert you of this change:

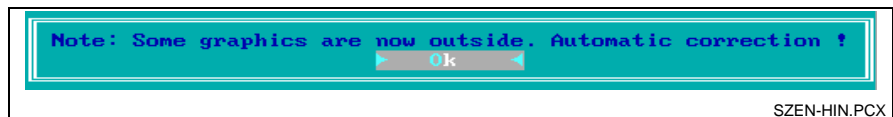


Fig. 3-61: Alert for corrected graphics positions

Film sequences with scenarios

The following sequence of graphics shows how scenarios can be used to generate 'moving pictures'. A variable must be written in the controller so that it controls the individual images of the motion sequence analogous to the actual sequence.

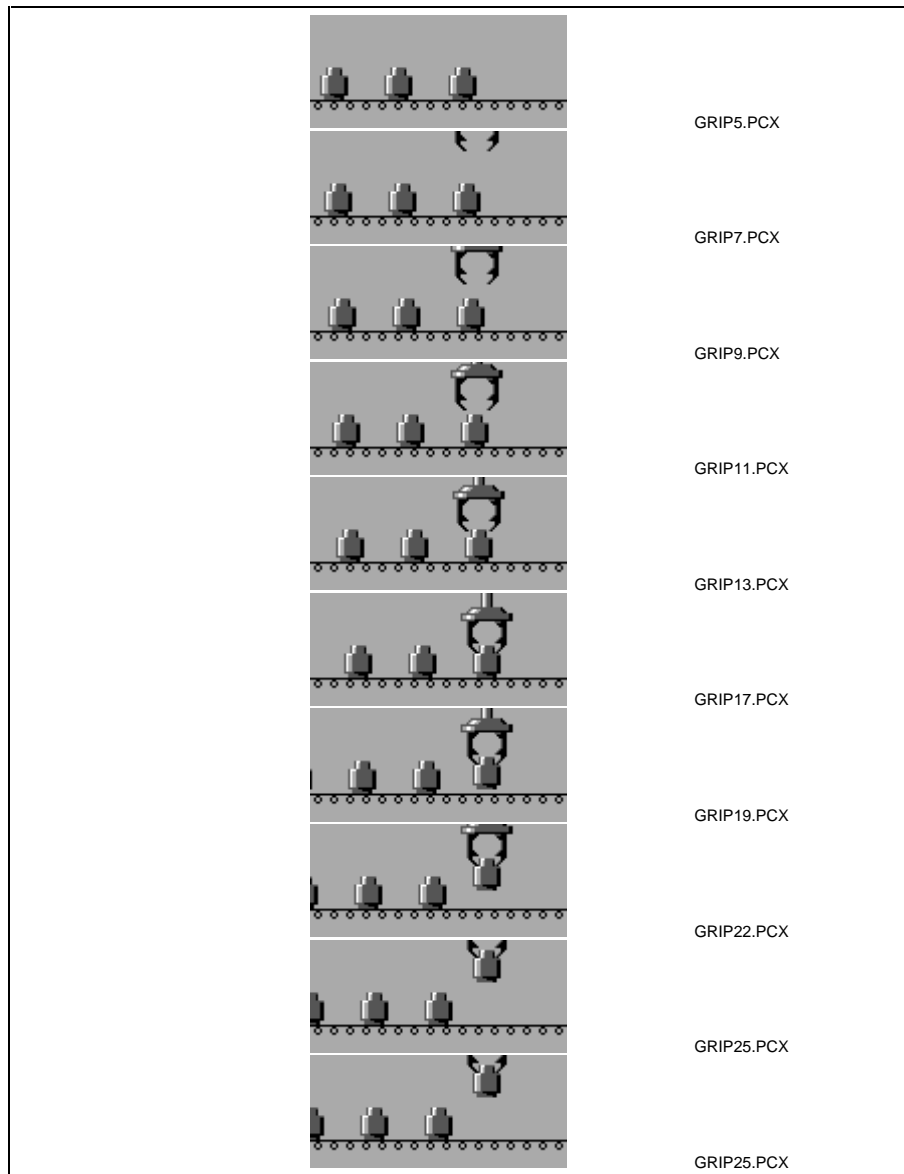


Fig. 3-62: Gripper sequence - Fig. 1 - 10

The film sequences will look even more realistic if 'actual' films are used as the model (e.g., AVI or MOV files). This does however require some manual work, since these films cannot be directly imported. The required steps are:

- ⇒ Break the film down into individual images (e.g., use player in single frame mode, use clipboard, save as graphic file in any graphics program),
- ⇒ Import individual graphics files to the Graphics Editor and save as internal graphic,
- ⇒ Assign individual graphics to a scenario.
- ⇒ The SPS program must contain a variable which accepts values on demand which correspond to the individual images in a scenario. A sequence of approx. 5 images per second has proven to be an acceptable rate. The SPS variable must take the next value every 200 ms.

- Peculiarities**
- (1) The graphics (their contents) are not saved within a scenario. Only the names of the graphics files are stored. If you rename or delete such a graphic file, the scenario will no longer be able to display it.
 - (2) Scenarios can quickly use up all the available memory. At the memory limit you may experience noticeable reductions in display speed, since operating system-dependent swap mechanisms can have the effect of displacing both the data as well as the program memory. Scenarios can quickly reach your memory limit, since the process permits a large number of graphics to be used.
 Example calculation:
 A graphic the size of 1x1 text raster uses 56 bytes of memory (8x14 pixels x 4 bits for color). A graphic the size of 15x40 rasters (corresponds to approx. 1/4 screen) already uses 33600 bytes. If you use 100 (different!) graphics this size in a scenario, a total of 3.2MB of memory will be consumed.
 If the amount of available memory can be determined at startup of whichever Display System program is in use (e.g., under all Windows versions), make sure enough memory is allocated. The program itself requires an additional 1.5MB or so of memory.
 - (3) In connection with scenarios, the internal management of graphics was revised. If a graphic is needed more than once in an image, previously it was loaded and reloaded as required. There is not an additional administration level which requires the same graphic to be loaded only once. This saves both processing time (for loading) and memory. If a scenario for example consists of 256 different positions of the same graphic, it will still be loaded just once.

3.4 Options Menu

- Call** Option
- Functionality** this menu item contains the selections for the editor.
- Peculiarities**

Simulation Selections

- Call** Option/Simulation
- Functionality** The simulation speed and the on line display during the work in the editor can both be influenced.
 De-activating the on line display during the work in the editor proves expedient if continuous communication and display refreshing delays the handling of the editor. Communication and, consequently, updating the output on the screen are suspended while the work with the editor is in progress. The displays are frozen in their last position.
 Simulation means the continuous variation of the values in off line mode. Thus, changes of the display can be tested without a controller being connected. The resulting continual swift changes of the values on the screen may cause a disturbing flickering. The simulation behavior can therefore be influenced in this dialog by selecting the speed at which the values change. The following selections are used:
 swift → Values change at maximum speed (depends on PC and data quantity)
 medium → Approximately 0.22 seconds elapse between two value changes
 slow → Approximately 1 second elapses between two value changes
 OFF → The values do not change. Using the bar, the invariable value can be set in unit steps. This permits easy testing of indicator elements in off line mode.

Note: Simulation does not necessarily use the full range of the variable values. For SPS variables it is assumed that the memory contents change byte-by-byte. While a Boolean variable only considers one bit, an INT variable considers two consecutive bytes. Since the high byte and the low byte are both modified, the value changes as 0-257-514-771-1028 ... rather than in unit steps. The resulting values of REAL variables are not practical because the memory is filled byte by byte, too, without taking mantissa or exponent into account. For NC variables and axis position values, a range from -128 through +127 is assumed and employed.

Peculiarities See Fig. 3-49.

Example

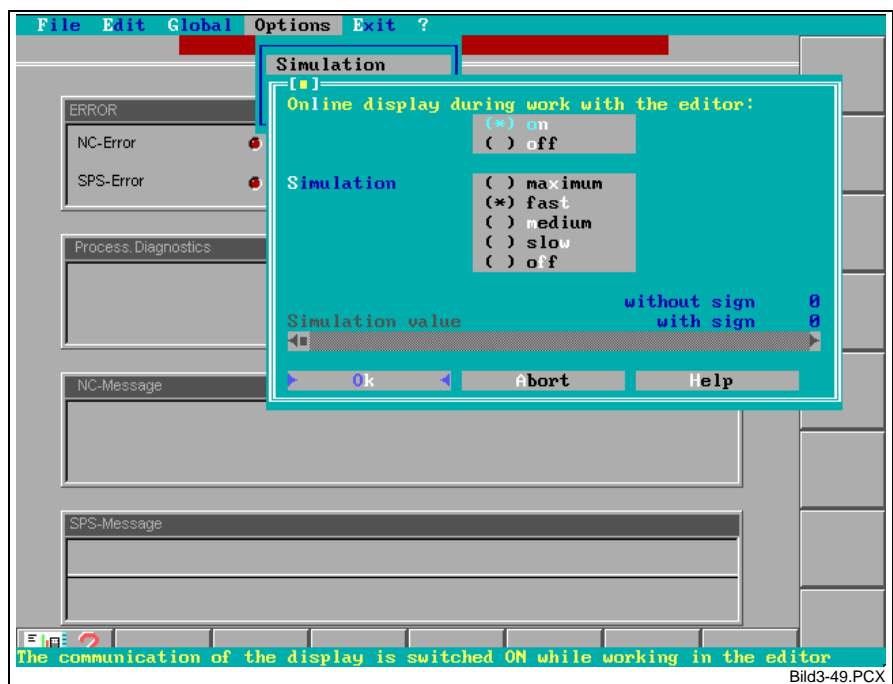


Fig. 3-63: Selections for simulation

Editor Selections

Call	Option/Selection
Functionality	<p>This menu option contains settings for working with the Editor:</p> <ul style="list-style-type: none"> • In standard configuration, <F1> opens Editor Help. In systems with a permanently assigned Help key, that may be another. This window permits the necessary configuring. • The 'Acoustic sounds' switch allows you to turn off any tones which might be generated with error messages or when activating soft keys. • Use of the mouse is controlled by the 'Use mouse' switch. A distinction is <u>not</u> made between use in Editor and for machine operation. • The 'Invert modifiable elements' switch controls the behavior of display elements which are marked as modifiable when the cursor is placed over them. If the switch is selected [x], the display elements are displayed inverted. If the switch is not set [], there is no change in the depiction. • When selecting directories (especially for the various import and export functions), it is possible to show all previously opened directories as open and all subdirectories as still closed. A maximum of 2 characters each can be specified for this display. This feature is

particularly useful in the context of defining your own text characters (see Example 4 in Section 3.3, page 3-61), and allows meaningful symbols to be displayed.

Peculiarities

Note: The new selections take an immediate effect. The original selections are re-activated if the window is exited with [Abort] (<Esc> key).

Example

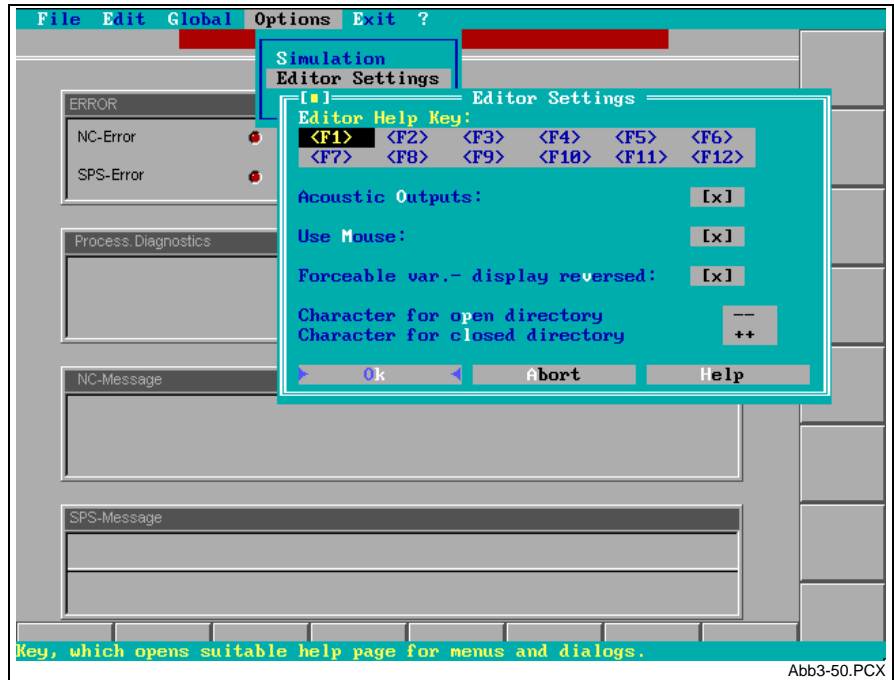


Fig. 3-64: Editor selections

PC Font

- Call** Option/PC-Font
- Functionality** You can specify the font used to display all texts. There are basically three various font types:
- standard: The font which is loaded during installation. See also Section 0, page 3-66.
 - PC internal: The font permanently installed in the PC. This font takes country-specific peculiarities into account. See also Section 3.3, page 3-66.
 - user: A font created or modified by the user. A PC-ASCII Editor is provided for this purpose.

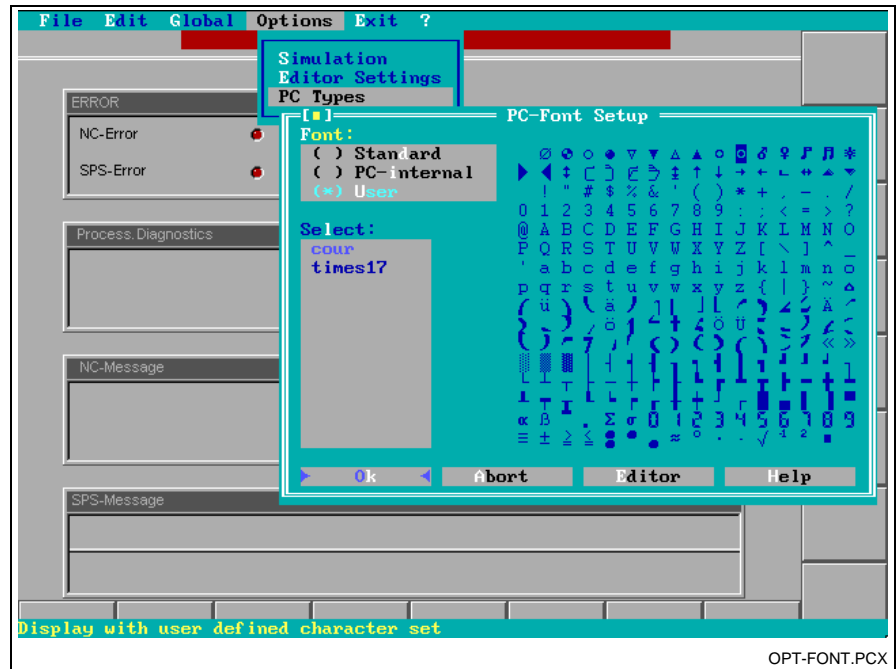


Fig. 3-65: Selecting the PC font

Based on the selection, the full character set for the associated font is displayed in the right section.

When needed, a line in the selection list of the PC-ASCII Character Set Editor can be directly called by activating the [Editor] switch or pressing the <Space> bar (or double-clicking the mouse) (see section 3.3, page 3-61 ff.) direkt gerufen werden.

- Peculiarities** The settings are accepted as soon as you click the [Ok] switch, and will be automatically activated the next time you start the Display System.

3.5 Help Menu

Call	?
Functionality	A menu is opened that contains various help functions.
Peculiarities	None

Menu-Related help

Call	?/Menu
Functionality	The help system is started. The start page is an overview of the menu functions.
Peculiarities	None

Help Overview

Call	?/Index
Functionality	The help system is started. The start page is an overview of the help contents.
Peculiarities	None

Help-Related Help

Call	?/Help to help
Functionality	The help system is started. The start page is an explanation of handling the help function.
Using the keys	
<F1>	Help related to the menu item under the cursor position, or, in the window of a dialog, to the current dialog and/or the currently focused selection in the dialog.
<Enter>	Zooming into selected entries (cross references), invoking further help to the next search word.
<Alt>+<S>	Looking for a character string in the search words.
<Ctrl>+<L>	Continuing the search.
<Alt>+<F1>	Going back by one help window in the batch.
<Esc>	Exiting the help function.
Peculiarities	None

Changes from Version 17 to Version 18

Call	?/What is new in Version 18
Functionality	<p>Starts the Help system. Start page is an overview with the most important changes in this version of the Custom Display System, which are also listed below. These have mainly to do with expanding the graphics functionality:</p> <ul style="list-style-type: none"> • The display element scenario is new. This is a sequence of max. 256 graphics which can be placed at any desired location on the screen. Each graphic is associated with a whole-number variable value between 0 and 255. This feature makes it easy to represent complex processes such as the movement of a gantry loader. To create, edit and manage scenarios, a new tool has been created in the 'Global' menu with the scenario editor. • Along with introduction of the scenario, internal management of graphics has been revised: previously, if a graphic was needed more than once in an image, it had to be reloaded each time. Now there is an additional administration level which allows the same graphic to be loaded just once. This saves processing time (for the loading) as well as memory. If a scenario consists for example of 256 positions for the same graphic, the latter will be loaded just one time. • You can now import JPEG files into the Graphics Editor. Files in this format have either 'JPG' or 'JPE' extensions. This format uses very complex compression techniques to allow creation of high resolution graphics (16 million colors) having a relatively small file size. Compared with the BMP or PCX format, reductions down to 5 or 10% are possible! For this reason, the JPEG format is often used for sending graphics, such as over the Internet. Today JPEG has become one of the most frequently used graphics formats. • You can now write text directly in the Graphics Editor, using various character sets. These are selected using the new 'Character Set' switch. The selection window shows information about the character height as well as a preview of sample letters. The character sets are based on TrueType character sets. For this reason the original name of the font is displayed. To write, you must place the cursor on the lower left corner of the type. Then you can begin writing. Several files with various font types and sizes are supplied with this version. • In Graphics Editor, the name of the just loaded graphics file is no longer displayed above the graphic, rather the name of the just used character set and, in case of an imported, external graphic, the original name of this graphic. • The PC font which is used for displaying all texts (including this Help section) can be specifically modified. Supporting this is a new menu option 'PC-ASCII-Character' in the Global menu, which enables you to manage and manipulate any number of such character sets. Selection is done in the new menu option 'Option/PC-Font'. • You can now change the size of the labeling for the 'measuring instrument' and 'scale' display elements. Five different type sizes are available. The dialogs for these two display elements contain an additional selection for this. • The instrument indicator is no longer simply a thin line, but rather widens gradually towards the center for a more realistic appearance. • The setting for the simulation speed in the 'Option/Simulation' menu now contains the additional step 'maximum'. The 'fast' step is now somewhat slower. This is especially useful for very fast computers, since the previous 'fast' setting (now 'maximum') resulted in an

extremely fast flickering which was unrecognizable. The 'fast' step now changes every 0.11 seconds.

- Display of the interconnections between all the files in a project has been expanded:
 - Scenarios are also displayed as the 'caller' or 'called'.
 - For improved orientation, the intersection currently selected by the cursor is also called out in plain English below the table.
 - To quickly locate all called files within a line, you can use the key combination <Alt>+<CursorLeft> and <Alt>+<CursorRight> to jump left or right directly to the next entry.
- The 'measuring instrument', 'scale' and 'scenario' display elements allow for specifying a filter function for the display value. Currently a linear filter (linear equation) is available. The display value is converted based on the filter function before it is displayed.
- For some actions (e.g., in conjunction with soft keys), you can specify whether password authorization is required to execute them. This is useful for example when directly setting variables, or when initiating similar actions using a SPS key, which is invisible to the user.
- For axes, an additional data type %POS*.EXIST has been introduced. This refers to Boolean information as to whether the axis is still in the indicated process. This allows you to respond when the axis is assigned a different process.
- So-called external events are supported. There are 32 events which are not assigned to any process. Instead of the process number, the letter 'X' is used.

Peculiarities None

Version Display

- Call** ?/Version
- Functionality** Displays the version of the INDRAMAT desktop and of the Custom Display System.
- Peculiarities** This function is also available as a procedure. It may be interconnected as a global key with the <Alt>+<V> PC keys, for example. (In other INDRAMAT menu items, <Alt>+<V> is also used for displaying the version).
- Example

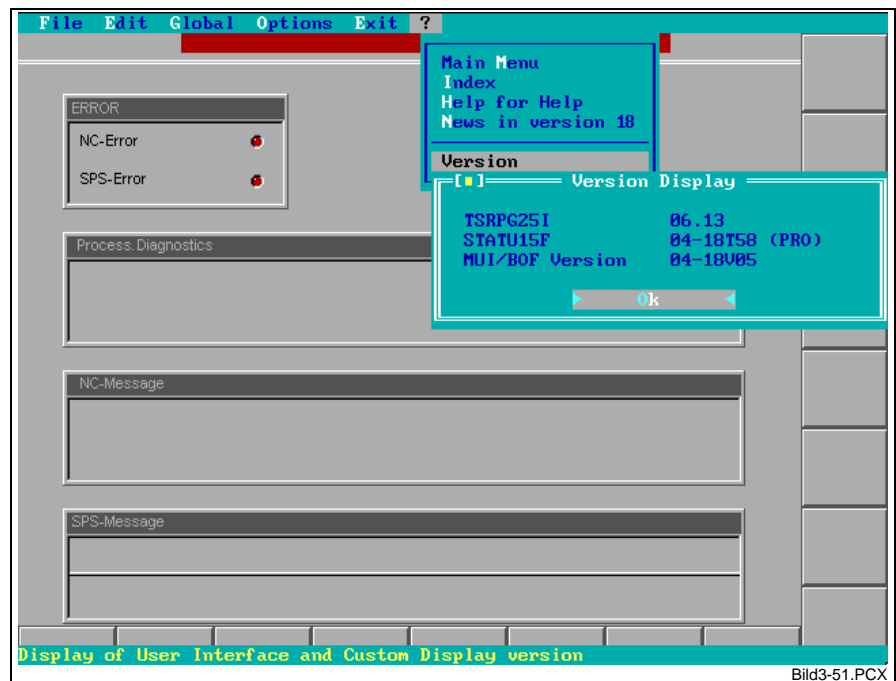


Fig. 3-66: Version display

The enable state is displayed in parentheses in the second line. 'PRO' stands for the programming version (full version), and 'RUN' for the limited Run version.

3.6 End Menu

- Call** End
- Functionality** The integrated editor is exited. If the currently loaded image file has been modified, saving that image file is offered. All modifications will be lost if another image is loaded without saving the previous one. This permits test modifications to be performed in the image that will not be saved.
- Peculiarities** Selecting the <Esc> key on the main menu line also exits the integrated editor.

4 Index

A

- Archive functions
 - Start file 3-75
- Archiving functions
 - Archiving a project 3-73
 - Archiving one or more files 3-72
 - Clearing an archive 3-75
 - Fetching an archive 3-74
- Archiving functions 3-71
- ASCII table 3-33
- Auxiliary functions 1-2

B

- Banner line 1-1
- Base selections 3-50
 - Banner line 3-54
 - Base mask – outer border 3-53
 - Defining colors 3-51
 - Defining the soft keys 3-51
 - Global keys 3-52
 - Loading a complete base selection 3-55
 - Machine function keys 3-53
 - Modifying the line types 3-54
 - Output area – space for image output 3-54
 - Saving a complete base selection 3-55

C

- Changes from Version 17 to Version 18 3-92
- Create a new image file 3-1
- Creating an image 2-1
- Creating pictograms / graphics 2-20
 - Creating new graphics (smaller graphics) 2-20
 - Importing (complex graphics) 2-21
- Cursor start position 1-1

D

- Defining the cursor start position 3-50
- Delete an image file 3-3
- Documentation 3-64
 - Documentation of all image files of the project 3-70
 - Documentation of the current image file 3-69
 - Header and footer texts for documentation
 - Cross commands 3-68

Header and footer texts for the documentation 3-67

Cross commands

Current page number 3-68

Current plant number - plant name 3-69

Current time 3-68

Current version 3-69

Date 3-68

Date of the last modification 3-68

License proof - first line 3-68

License proof - second line 3-68

Name 3-68

Time of the last modification 3-68

Type of the employed controller 3-69

Print options 3-64

Footer text 3-66

Header text 3-66

Header/footer texts 3-66

Interface 3-65

Options/Ask new file or same file 3-66

Options/Extend file or 1 screen = 1 file 3-66

Print file 3-66

Printer 3-65

E

Edit menu 3-5

Editing machine function keys 3-45

Input line 3-46

'Normal' key / annotation 3-46

'Normal' key/Graphic name 3-46

Delete 3-47

Interconnection with 3-46

Key depressed / variable 3-46

Key depressed/ Annotation 3-46

Key depressed/Graphic name 3-47

Key executed/ Annotation 3-47

Key executed/Graphic name 3-47

Key executed/variable 3-47

Editing Soft Keys 3-35

CallProgram 3-42

DiagHelp 3-41

DiagHelpCursor 3-41

GoDown 3-43

GoLeft 3-44

GotoBottom 3-44

GotoCursor 3-44

GotoDownForceVar 3-44

GotoEnd 3-44

- GotoLastForceVar 3-45
- GotoLeftForceVar 3-45
- GotoNextForceVar 3-45
- GotoRightForceVar 3-45
- GotoTop 3-44
- GotoUpForceVar 3-44
- GoUp 3-43
- HelpText 3-40
- PassWord 3-40
- PreviousScreen 3-40
- PrintScreen 3-42
- QuitProc 3-37
- ResetController 3-41
- SavePcx 3-43
- ScreenEdit 3-37
- SetSPSKeyOff 3-37
- SetSPSKeyOn 3-37
- SPSHelp 3-42
- SPSHelpCursor 3-42
- SysError 3-40
- ToggleBit 3-38
- VarDec 3-38
- VarInc 3-38
- VarIncCursor 3-40
- VarSet 3-38
- VarSetCursor 3-39
- VarSetDirect 3-40
- Version 3-43
- Editing SPS keys 3-48
- Editing the customized ASCII character sets 3-56
 - Deleting an ASCII character set 3-58
 - Editing an ASCII character 3-57
 - Importing a character content 3-57
 - Loading an existing ASCII character set 3-57
 - New ASCII character set - defining the dimension 3-56
 - Saving an ASCII character set 3-57
 - Saving an ASCII character set under a new name 3-58
- Editing the image banner line 3-49
- Editing the image-related help text 3-49
- Editing the static image mask 3-30
 - Clearing graphics from the image mask 3-35
 - Inserting graphics in the image mask 3-34
 - Loading an external text as an image mask 3-32
 - Moving Graphics in the Image Mask 3-35
 - Selecting a line type for writing in the image mask 3-32
 - Selecting the colors for writing in the image mask 3-32
 - Selecting the write mode 3-31

- Writing in the image mask 3-32
- Editing the variable list 3-5
 - Display element
 - Scenario 3-26
 - Display elements 3-14
 - Editing variable definitions 3-6
 - Diagnosis messages 3-7
 - NC variable 3-7
 - SPS variable 3-6
 - Filter function 3-28
 - Indicator element
 - 2 graphics 3-19
 - 2 texts 3-18
 - Bars 3-22
 - binary 3-16
 - Changing colors 3-21
 - Fill-up form 3-26
 - Measuring instrument 3-23
 - Number 3-15
 - Percent value 3-17
 - Plant messages 3-25
 - Scale 3-22
 - standard 3-14
 - Input assistant for variable names 3-8
 - Input assistant for variable number 3-11
 - Axis position values 3-13
 - Diagnoses 3-12
 - SPS variables 3-9
 - Limit check 3-29
 - Modifying variable values 3-29
- Editor selections 3-88
- Editor settings
 - acoustic sounds 3-88
 - directories 3-88
 - Editor Help 3-88
 - Invert modifiable elements 3-88
 - mouse 3-88
- End menu 3-94

- F
- File info 3-4
- File menu 3-1
- First image 2-6
 - Defining variables 2-9
 - Image mask - the 'invariable' background 2-6
 - Machine function keys 2-16
 - SPS keys - SPS variable as a soft key 2-19

- SPS key 2-19
- Using soft keys 2-15
- Functions of the integrated editor 3-1

G

- Global configuration level 1-2
- Global menu 3-50
- Graphical Editor
 - Graphic character set 3-81
- Graphics editor 3-77
 - Creating new graphics 3-77
 - Deleting an existing graphics file 3-83
 - Editing graphics 3-78
 - Exporting a graphics file 3-80
 - Graphics preview 3-83
 - Importing Graphics 3-78
 - 'Image type' button 3-79
 - 'Use palette' button 3-79
 - Color reduction algorithms 3-80
 - Dithering 3-80
 - MS-DOS standard palette 3-79
 - Windows standard palette 3-79
- Inserting existing graphics into the loaded graphics 3-81
- Loading existing Graphics 3-80
- Saving a part of the loaded graphics 3-81
- Saving the Loaded Graphics 3-83
- Saving the loaded graphics under a new name 3-83

H

- Help menu 3-91
- Help overview 3-91
- Help text 1-1
- Help-related help 3-91

I

- Image 1-1
- Image editor 2-2
 - Functionality of the Programming and Run Version 2-3
 - Handling the dialog windows 2-4
 - Handling the menus 2-4
- Image for Monitoring the Workpiece and Selecting its Parameter Values 2-25
- Image for turning machine diagnosis 2-23
 - Machine function key 2-24
 - NC error 2-23
 - NC message 2-24
 - Process diagnosis 2-24

- SPS message 2-24
- SPS warning 2-24
- Image mask 1-1
- Interconnection of the image files 3-70

L

- Load an existing image file 3-2
- Load image files in text format 3-3
- Local configuration level 1-2

M

- Machine function keys 1-1
- MAP file 1-2
- Menu-related help 3-91

O

- Operator input strategy 2-5
- Options menu 3-87

P

- PC font 3-90
 - PC Internal 3-90
 - standard 3-90
 - user 3-90
- PC-ASCII characters 3-58
- PC-ASCII-characters
 - Digits in LCD design 3-60
 - Double sized digits 3-60
 - Editing PC-ASCII-characters 3-62
 - Loading an user PC character set 3-63
 - Loading the INDRAMAT standard PC character set 3-63
 - Loading the internal PC character set 3-63
 - own characters 3-59
 - Own special characters and graphical symbols 3-62
- PC-character sets 3-59
 - INDRAMAT standard character set 3-59
 - internal character set 3-59
 - User PC character set 3-59
- Saving a PC character set 3-64
- Saving the PC character set with a new name 3-64
- Self-designed fonts 3-61
- Using PC character set 3-64

Procedures

- LoadArchive 3-36
- PrintScreen 3-59
- SavePcx 3-60

- ToggleBit 3-36
- ToggleBitDirect 3-40
- VarDec 3-36
- VarInc 3-36
- VarSet 3-36

S

- Save the current image file 3-3
- Save the current image file under a new name 3-3
- Scenario 3-84
- Scenario Editor 3-84
 - Calling the graphics editor 3-85
 - Creating a new scenario 3-85
 - Deleting a graphic 3-85
 - Editing a scenario 3-85
 - Editing the size of a scenario 3-85
 - Film sequence with scenarios 3-86
- Simulation selections 3-87
 - Selecting the speed of the value changes 3-87
- Soft keys 1-1
- SPS functions 1-1
- SPS programming system 1-2
- Straight turning sequence 2-1

V

- Variable definitions 1-1
- Version display 3-94

5 Figure

Fig. 2-1: Straight turning	2-1
Fig. 2-2: Activating the integrated editor	2-2
Fig. 2-3: Entering a new image file name	2-6
Fig. 2-4: 'Edit/image mask' menu item	2-7
Fig. 2-5: List of all representable characters	2-8
Fig. 2-6: Finished 'invariable' image	2-8
Fig. 2-7: List of all variables of the image	2-9
Fig. 2-8: List of all available output elements	2-10
Fig. 2-9: Dialog for the display element „standard“	2-10
Fig. 2-10: Input assistant for SPS variables	2-11
Fig. 2-11: Defining the output field of the display element	2-11
Fig. 2-12: Displaying the machine program status	2-12
Fig. 2-13: Dialog for a '2 texts' display element	2-13
Fig. 2-14: Dialog for a '2 graphics' display element	2-13
Fig. 2-15: First image of the status display of important system states, using different display elements	2-14
Fig. 2-16: Dialog for soft keys	2-15
Fig. 2-17: Dialog for machine function keys	2-18
Fig. 2-18: Dialog for SPS keys	2-19
Fig. 2-19: Graphics editor with loaded graphic element for labeling a soft key	2-20
Fig. 2-20: Selecting a file for graphics import	2-21
Fig. 2-21: Selections for graphics import	2-22
Fig. 2-22: Preview of the graphic image in the true size	2-22
Fig. 2-23: Image mask with graphic elements and text	2-23
Fig. 2-24: 'Diagnosis' image with all indicators	2-25
Fig. 2-25: WORKPCE image with indication of current axis positions and entry of the process-related data of a workpiece	2-25
Fig. 2-26: Dialog for override indication bar indicator element	2-26
Fig. 3-1: Selection window with image files	3-2
Fig. 3-2: Window with file information	3-4
Fig. 3-3: Window for managing and editing variable definitions	3-6
Fig. 3-4: Input assistant - selecting the variable type	3-8
Fig. 3-5: Input assistant for SPS variables	3-9
Fig. 3-6: Input assistant for NC variables	3-10
Fig. 3-7: Input assistant for events	3-11
Fig. 3-8: Input assistant for diagnoses	3-12
Fig. 3-9: Input assistant for axis position values	3-13
Fig. 3-10: Determining the type of the indicator element	3-14
Fig. 3-11: Dialog for a 'standard' indicator element	3-15
Fig. 3-12: Dialog for a 'Number' indicator element	3-16
Fig. 3-13: Dialog for a 'percent value' indicator element	3-18
Fig. 3-14: Dialog for a '2 texts' indicator element	3-19
Fig. 3-15: Dialog for a '2 graphics' indicator element	3-20
Fig. 3-16: Dialog for a 'changing colors' indicator element	3-22
Fig. 3-17: Dialog for a 'Bars' indicator element	3-22
Fig. 3-18: Dialog for a 'Scale' indicator element	3-23
Fig. 3-19: Dialog for a '_Measuring instrument' indicator element	3-25
Fig. 3-20: Dialog for a 'Plant message' indicator element	3-26
Fig. 3-21: Dialog for a 'Fill-up form' indicator element	3-27
Fig. 3-22: Dialog for a display element 'Scenario'	3-27
Fig. 3-23: Dialog for entering a linear filter	3-28
Fig. 3-24: Entering the range limits for value changes	3-31
Fig. 3-25: Window for image mask editing	3-32
Fig. 3-26: Selecting characters from the ASCII table	3-34
Fig. 3-27: Selecting a graphic element for integration into the image mask	3-35
Fig. 3-28: Window for editing soft key definitions	3-38
Fig. 3-29: Entering a new value of a changeable variable	3-41
Fig. 3-30: Example of displaying system-error-related help	3-42

Fig. 3-31: Example of using the CallProgram procedure for batch files	3-45
Fig. 3-32: Window used for editing machine function keys	3-48
Fig. 3-33: Window used for editing SPS keys	3-52
Fig. 3-34: Selecting colors	3-54
Fig. 3-35: Configuring soft keys	3-55
Fig. 3-36: Configuring global keys	3-55
Fig. 3-37: Configuring machine function keys	3-56
Fig. 3-38: Modifying line types	3-58
Fig. 3-39: Editor used for editing customized ASCII character sets	3-59
Fig. 3-40: Window for editing and managing PC characters	3-61
Fig. 3-41: Examples of LCD design digits	3-63
Fig. 3-42: Example for double-size digits	3-64
Fig. 3-43: Example of self-designed letters	3-65
Fig. 3-44: Example for self-designed symbolic representations	3-65
Fig. 3-45: Window for selecting print options	3-68
Fig. 3-46: Editor for header and footer texts	3-71
Fig. 3-47: Selecting cross commands	3-72
Fig. 3-48: Typical image file documentation	3-75
Fig. 3-49: Example of image interconnection	3-77
Fig. 3-50: File archive	3-79
Fig. 3-51: Project archive	3-80
Fig. 3-52: Retrieving an archive	3-81
Fig. 3-53: Archive start files	3-82
Fig. 3-54: Marking the selected file	3-82
Fig. 3-55: Graphics editor with loaded graphics	3-83
Fig. 3-56: Import selections for graphics	3-85
Fig. 3-57: Selecting a graphic character set	3-88
Fig. 3-58: Preview function of the graphics editor	3-89
Fig. 3-59: Scenario Editor	3-90
Fig. 3-60: Scenario Editor with differently arranged graphics	3-91
Fig. 3-61: Alert for corrected graphics positions	3-91
Fig. 3-62: Gripper sequence - Fig. 1 - 10	3-92
Fig. 3-63: Selections for simulation	3-94
Fig. 3-64: Editor selections	3-95
Fig. 3-65: Selecting the PC font	3-96
Fig. 3-66: Version display	3-100

Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland - Germany

Vertriebsgebiet Mitte Germany Centre <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service	Vertriebsgebiet Ost Germany East <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service	Vertriebsgebiet West Germany West <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service	Vertriebsgebiet Nord Germany North <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service
INDRAMAT GmbH Bgm.-Dr.-Nebel-Str. 2 D - 97816 Lohr am Main Telefon: +49 (0)9352/40-0 Telefax: +49 (0)9352/40-4885	INDRAMAT GmbH Beckerstraße 31 D - 09120 Chemnitz Telefon: +49 (0)371/35 55-0 Telefax: +49 (0)371/35 55-333	INDRAMAT GmbH Harkortstraße 25 D - 40849 Ratingen Telefon: +49 (0)2102/43 18-0 Telefax: +49 (0)2102/41 315	INDRAMAT GmbH Kieler Straße 212 D - 22525 Hamburg Telefon: +49 (0)40/85 31 57-0 Telefax: +49 (0)40/85 31 57-15
Vertriebsgebiet Süd Germany South <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service	Gebiet Südwest Germany South-West <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service		INDRAMAT Service-Hotline INDRAMAT GmbH Telefon: (+49)-0172/660 04 06 -oder- Telefon: (+49)-0171/333 88 26
INDRAMAT GmbH Ridlerstraße 75 D-80339 München Telefon: +49 (0)89/540138-30 Telefax: +49 (0)89/540138-10	INDRAMAT GmbH Böblinger Straße 25 D-71229 Leonberg Telefon: +49 (0)7152/9 72-6 Telefax: +49 (0)7152/9 72-727		

Kundenbetreuungsstellen in Deutschland - Service agencies in Germany

Europa - Europe

<p>Austria <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth Ges.m.b.H. Geschäftsbereich INDRAMAT Hägelingasse 3 A - 1140 Wien Telefon: +43 (0)1/9852540-400 Telefax: +43 (0)1/9852540-93</p>	<p>Austria <input type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth G.m.b.H. Geschäftsbereich INDRAMAT Industriepark 18 A - 4061 Pasching Telefon: +43 (0)7221/605-0 Telefax: +43 (0)7221/605-21</p>	<p>Belgium <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth N.V.-S.A. Geschäftsbereich INDRAMAT Industrielaan 8 B-1740 Ternat Telefon: +32 (0)2/5823180 Telefax: +32 (0)2/5824310</p>	<p>Denmark <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>BEC AS Zinkvej 6 DK-8900 Randers Telefon: +45 (0)87/11 90 60 Telefax: +45 (0)87/11 90 61</p>
<p>England <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth Ltd. INDRAMAT Division 4 Esland Place, Love Lane GB - Cirencester, Glos GL7 1YG Telefon: +44 (0)1285/658671 Telefax: +44 (0)1285/654991</p>	<p>Finland <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Rexroth Mecman OY Ansatie 6 SF-017 40 Vantaa Telefon: +358 (0)9/84 91 11 Telefax: +358 (0)9/84 91 13 60</p>	<p>France <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth Sigma S.A. Division INDRAMAT Parc des Barbanniers 4, Place du Village F-92632 Gennevilliers Cedex Telefon: +33 (0)141 47 54 30 Telefax: +33 (0)147 94 69 41</p>	<p>France <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Rexroth - Sigma S.A. Division INDRAMAT 270, Avenue de Lardenne F - 31100 Toulouse Telefon: +33 (0)5 61 49 95 19 Telefax: +33 (0)5 61 31 00 41</p>
<p>Italy <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth S.p.A. Divisione INDRAMAT Via G. Di Vittoria, 1 I - 20063 Cernusco S/N.MI Telefon: +39 (0)2/92 36 52 70 Telefax: +39 (0)2/92 36 55 12</p>	<p>Italy <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth S.p.A. Divisione INDRAMAT Via Borgomanero, 11 I - 10145 Torino Telefon: +39 (0)11/7 71 22 30 Telefax: +39 (0)11/7 71 01 90</p>	<p>Italy <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth S.p.A. Divisione INDRAMAT Via del Progresso, 16 (Zona Ind.) I - 35020 Padova Telefon: +39 (0)49/8 70 13 70 Telefax: +39 (0)49/8 70 13 77</p>	<p>Italy <input type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth S.p.A. Divisione INDRAMAT Via de Nicola, 12 I - 80053 Castellammare di Stabia NA Telefon: +39 (0)81/8 72 30 37 Telefax: +39 (0)81/8 72 30 18</p>
<p>Italy <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth S.p.A. Divisione INDRAMAT Viale Oriani, 38/A I - 40137 Bologna Telefon: +39 (0)51/34 14 14 Telefax: +39 (0)51/34 14 22</p>	<p>Netherlands <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Hydraudyne Hydrauliek B.V. Kruisbroeksestraat 1 P.O. Box 32 NL - 5281 RV Boxtel Telefon: +31 (0)411/65 19 51 Telefax: +31 (0)411/65 14 83</p>	<p>Netherlands <input type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Hydrocare B.V. Kruisbroeksestraat 1 P.O. Box 32 NL - 5281 RV Boxtel Telefon: +31 (0)411/65 19 51 Telefax: +31 (0)411/67 78 14</p>	<p>Spain <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth S.A. Division INDRAMAT Centro Industrial Santiga Obradors s/n E-08130 Santa Perpetua de Mogoda Barcelona Telefon: +34 937 47 94 00 Telefax: +34 937 47 94 01</p>
<p>Spain <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Goimendi S.A. División Indramat Jolastokieta (Herrera) Apartado 11 37 E - 20017 San Sebastian Telefon: +34 9 43/40 01 63 Telefax: +34 9 43/39 17 99</p>	<p>Sweden <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Rexroth Mecman Svenska AB INDRAMAT Division Varuvägen 7 S - 125 81 Stockholm Telefon: +46 (0)8/727 92 00 Telefax: +46 (0)8/64 73 277</p>	<p>Switzerland - West <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth SA Département INDRAMAT Chemin de l'Ecole 6 CH-1036 Sullens Telefon: +41 (0)21/731 43 77 Telefax: +41 (0)21/731 46 78</p>	<p>Switzerland - East <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth AG Geschäftsbereich INDRAMAT Gewerbstraße 3 CH-8500 Frauenfeld Telefon: +41 (0)52/720 21 00 Telefax: +41 (0)52/720 21 11</p>
<p>Russia <input type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Tschudnenko E.B. Arsenia 22 RUS - 153000 Ivanovo Rußland Telefon: +7 093/223 96 33 oder/for +7 093/223 95 48 Telefax: +7 093/223 46 01</p>	<p>Slowenia <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>DOMEL Elektromotorji in gospodinjnski aparati d. d. Otoki 21 SLO - 64 228 Zelezniki Telefon: +386 64/61 73 32 Telefax: +386 64/64 71 50</p>	<p>Turkey <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth Hidropar A..S. Fevzi Cakmak Cad No. 3 TR - 34630 Sefaköy Istanbul Telefon: +90 212/541 60 70 Telefax: +90 212/599 34 07</p>	

Europäische Kundenbetreuungsstellen (ohne Deutschland)
European Service agencies (without Germany)

Außerhalb Europa - outside Europe

<p>Argentina <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth S.A.I.C. Division INDRAMAT Acassusso 48 41/7 RA - 1605 Munro (Buenos Aires) Telefon: +54 (0)1/756 01 40 +54 (0)1/756 01 36</p>	<p>Argentina <input type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>NAKASE Asesoramiento Tecnico Calle 49, No. 5764-66 RA - 1653 Villa Balester Provincia de Buenos Aires Telefon: +54 (0) 1/768 24 13 Telefax: +54 (0) 1/768 36 43</p>	<p>Australia <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>AIMS - Australian Industrial Machinery Services Pty. Ltd. Unit 3/45 Horne ST Campbellfield 3061 AUS - Melbourne, VIC Telefon: +61 (0)3/93 59 02 28 Telefax: +61 (0)3/93 59 02 66</p>	<p>Brazil <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth Automação Ltda. Divisão INDRAMAT Rua Georg Rexroth, 609 Vila Padre Anchieta BR - 09951-270 Diadema-SP [Caixa Postal 377] [BR-09901-970 Diadema-SP] Telefon: +55 (0)11/745 90 60 +55 (0)11/745 90 70 Telefax: +55 (0)11/745 90 50</p>
<p>Canada <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Basic Technologies Corporation Burlington Division 3426 Mainway Drive Burlington, Ontario Canada L7M 1A8 Telefon: +1 905/335 55 11 Telefax: +1 905/335-41 84</p>	<p>China <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth (China) Ltd. Shanghai Office - Room 206 Shanghai Internat. Trade Centre 2200 Yanan Xi Lu PRC - Shanghai 200335 Telefon: +86 21/62 75 53 33 Telefax: +86 21/62 75 56 66</p>	<p>China <input type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth (China) Ltd. Shanghai Parts & Service Center 199 Wu Cao Road, Hua Cao Minhang District PRC - Shanghai 201 103 Telefon: +86 21/62 20 00 58 Telefax: +86 21/62 20 00 68</p>	<p>China <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth (China) Ltd. 15/F China World Trade Center 1, Jianguomenwai Avenue PRC - Beijing 100004 Telefon: +86 10/65 05 03 80 Telefax: +86 10/65 05 03 79</p>
<p>China <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth (China) Ltd. A-5F., 123 Lian Shan Street Sha He Kou District PRC - Dalian 116 023 Telefon: +86 411/46 78 930 Telefax: +86 411/46 78 932</p>	<p>Hongkong <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Rexroth (China) Ltd. 19 Cheung Shun Street 1st Floor, Cheung Sha Wan, Kowloon, Hongkong Telefon: +852 27/41 13 51/-54 oder/or +852 27/41 14 30 Telefax: +852 27/86 07 33</p>	<p>India <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth (India) Ltd. INDRAMAT Division Plot. 96, Phase III Peenya Industrial Area IND - Bangalore - 560058 Telefon: +91 (0)80/8 39 21 01 Telefax: +91 (0)80/8 39 43 45</p>	<p>India <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth (India) Ltd. INDRAMAT Division Plot. A-58, TTC Industrial Area Thane Turbhe Midc Road Mahape Village IND - Navi Mumbai - 400 701 Telefon: +91 (0)22/7 61 46 22 Telefax: +91 (0)22/7 68 15 31</p>
<p>Indonesia <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>PT. Rexroth Wijayakusuma Jl. Raya Bekasi Km 21 Pulogadung RI - Jakarta Timur 13920 Telefon: +62 21/4 61 04 87 +62 21/4 61 04 88 Telefax: +62 21/4 60 01 52</p>	<p>Japan <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Rexroth Automation Co., Ltd. INDRAMAT Division 1F, I.R. Building Nakamachidai 4-26-44 Tsuzuki-ku, Yokohama-shi J - Kanagawa-ken 224-004 Telefon: +81 459/42-72 10 Telefax: +81 459/42-03 41</p>	<p>Korea <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Mannesmann Rexroth-Seki Co Ltd. 1500-12 Da-Dae-Dong ROK - Saha-Ku, Pusan, 604-050 Telefon: +82 (0)51/2 60 06 18 Telefax: +82 (0)51/2 60 06 19</p>	<p>Korea <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Seo Chang Corporation Ltd. Room 903, Jail Building 44-35 Yeouido-Dong Yeoungdeungpo-Ku C.P.O.Box 97 56 ROK - Seoul Telefon: +82 (0)2/7 80 82 08 +82 (0)2/7 80 82 09 Telefax: +82 (0)2/7 84 54 08</p>
<p>Mexico <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Motorización y Diseño de Controles SA de CV Ant. Camino a Sta. Monica No. 7 San Lucas Tepetlaco MEX - 54060 Tlalnepantla Telefon: +52 53/97 86 44 Telefax: +52 53/98 98 88</p>	<p>New Zealand <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>Engineering Computer Services Ltd. P. O. box 20 204 Te Rapa NZ - Hamilton Telefon: +64 (0)7/8 49 22 11 Telefax: +64 (0)7/8 49 22 20</p>	<p>South Africa <input checked="" type="checkbox"/> V/S <input checked="" type="checkbox"/> Service</p> <p>HYTEC Automation (Pty) Ltd. 28 Banfield Road, Industria North RSA - Maraisburg 1700 Telefon: +27 (0)11/673 20 80 Telefax: +27 (0)11/673 72 69</p>	<p>Taiwan <input checked="" type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Rexroth Uchida Co., Ltd. No.1, Tsu Chiang Street Tu Cheng Ind. Estate Taipei Hsien, Taiwan, R.O.C. Telefon: +886 2/2 68 13 47 Telefax: +886 2/2 68 53 88</p>

Kundenbetreuungsstellen außerhalb Europa - Service agencies outside Europe

Außerhalb Europa / USA - outside Europe / USA

<p>USA <input type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth Corporation INDRAMAT Division 5150 Prairie Stone Parkway USA - Hoffman Estates, IL 60192-3707</p> <p>Telefon: +1 847/6 45 36 00 Telefax: +1 857/6 45 62 01</p>	<p>USA <input type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth Corporation INDRAMAT Division Central Region Technical Center USA - Auburn Hills, MI 48326</p> <p>Telefon: +1 248/3 93 33 30 Telefax: +1 248/3 93 29 06</p>	<p>USA <input type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth Corporation INDRAMAT Division Southeastern Technical Center 3625 Swiftwater Park Drive USA - Suwanee Georgia 30174</p> <p>Telefon: +1 770/9 32 32 00 +1 770/9 32 19 03</p>	<p>USA <input type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth Corporation INDRAMAT Division Northeastern Technical Center 99 Rainbow Road USA - East Granby, Connecticut 06026</p> <p>Telefon: +1 860/8 44 83 77 +1 860/8 44 85 95</p>
<p>USA <input type="checkbox"/> V/S <input type="checkbox"/> Service</p> <p>Mannesmann Rexroth Corporation INDRAMAT Division Charlotte Regional Sales Office 14001 South Lakes Drive USA - Charlotte, North Carolina 28273</p> <p>Telefon: +1 704/5 83 97 62 +1 704/5 83 14 86</p>	<p>Kundenbetreuungsstellen außerhalb Europa / USA Service agencies outside Europe / USA</p>		

Notes

279663

Printed in Germany