MTC200/MT-CNC
Custom Display System
17VRS

Application Manual

Indramat

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

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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.

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 3-42).
SPS functions	any number An 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 bus 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 3-46).

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' not 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 function available to the integrated editor.

Chiefly, those are functions that are employed for image file management (see Chapter 'File Menu', page 3-1), documentation (see Chapter 'Documentation', page 3-55), and filing and archiving (see Chapter 'Archiving Functions', page 3-63). In addition, there are editors for creating various user data types. The editor possesses a powerful help function.

1.4   Co-Operation 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

ℹ️ 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 an SPS program (controlling the NC handling) and a corresponding machine parameter record (processes and axes).

Bild2-1.PCX
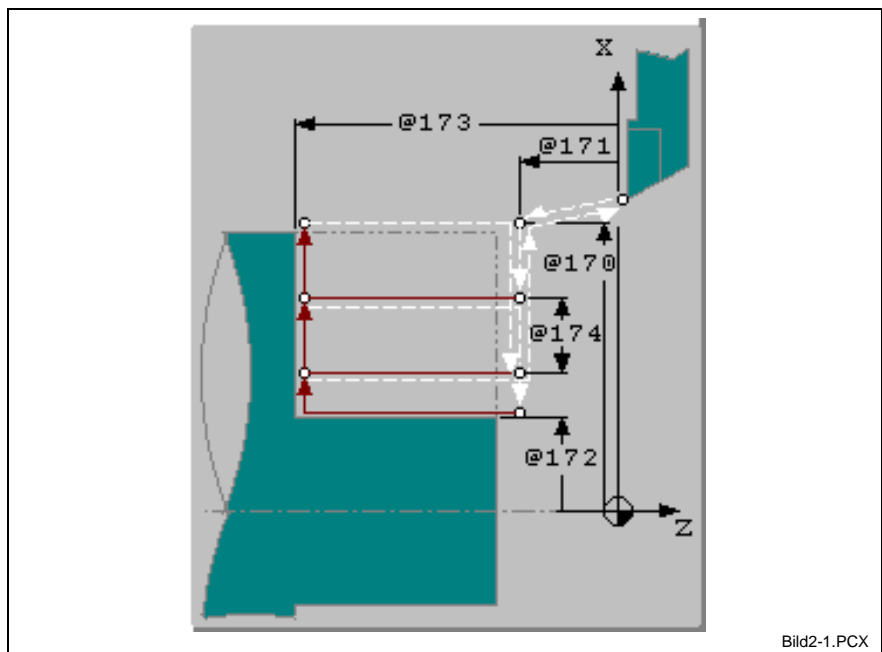
Fig. 2-1: Straight turning

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 ∅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 ∅X (@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).

Handling the Menus

The image editor is controlled via a menu. It consist 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 reach-able). This is shows by a dimmed color. That state may change dynami-cally.

If several buttons exist, one of them may, irrespective of the focusing state, be marked by arrowheads at its margins: ▶   0k   ◀. 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 <u>while the input field is blank</u>.

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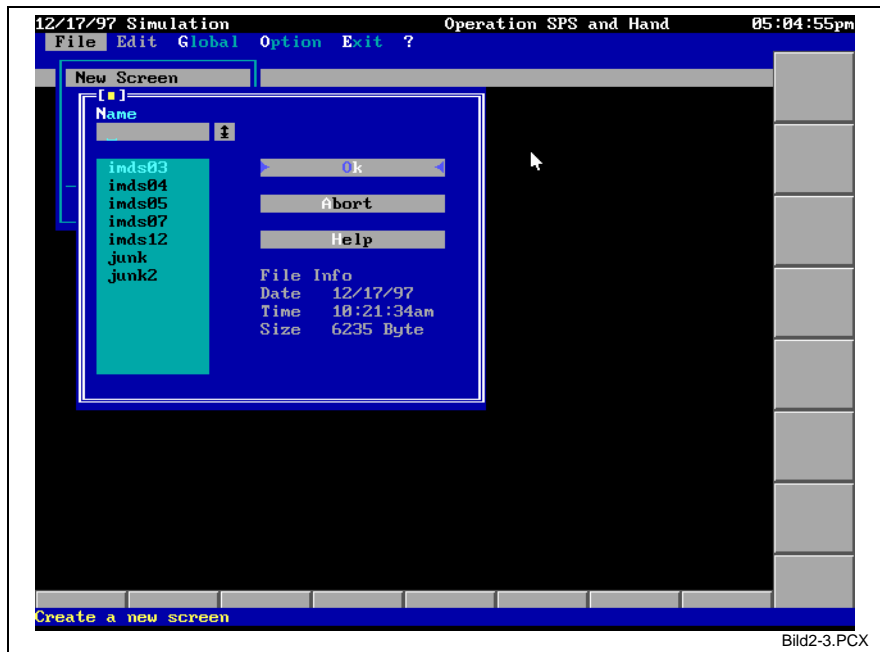
Fig. 2-3: Entering a new image file name

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.
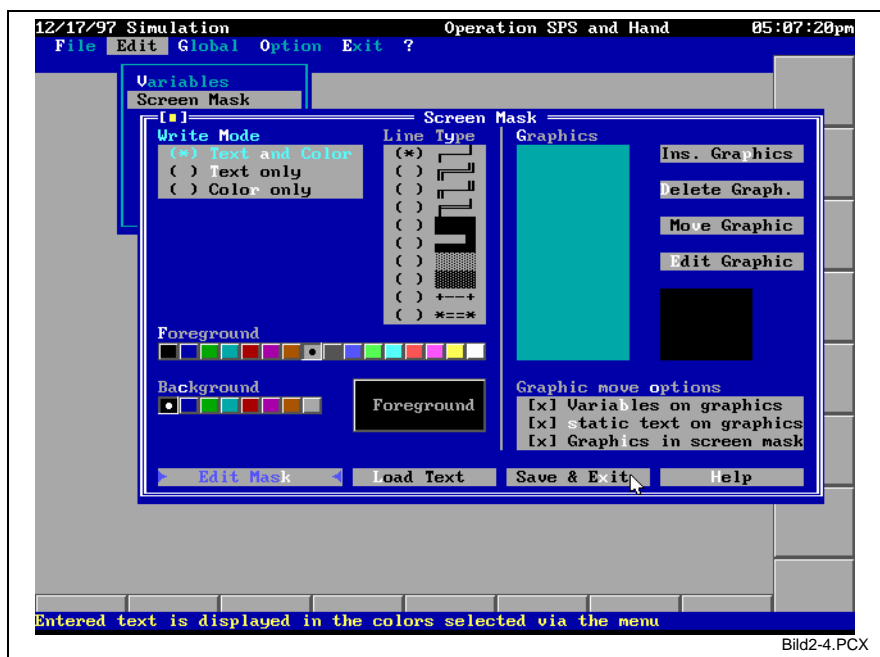

Fig. 2-4: 'Edit/Screen Mask' menu item

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 'Edit/Screen 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.
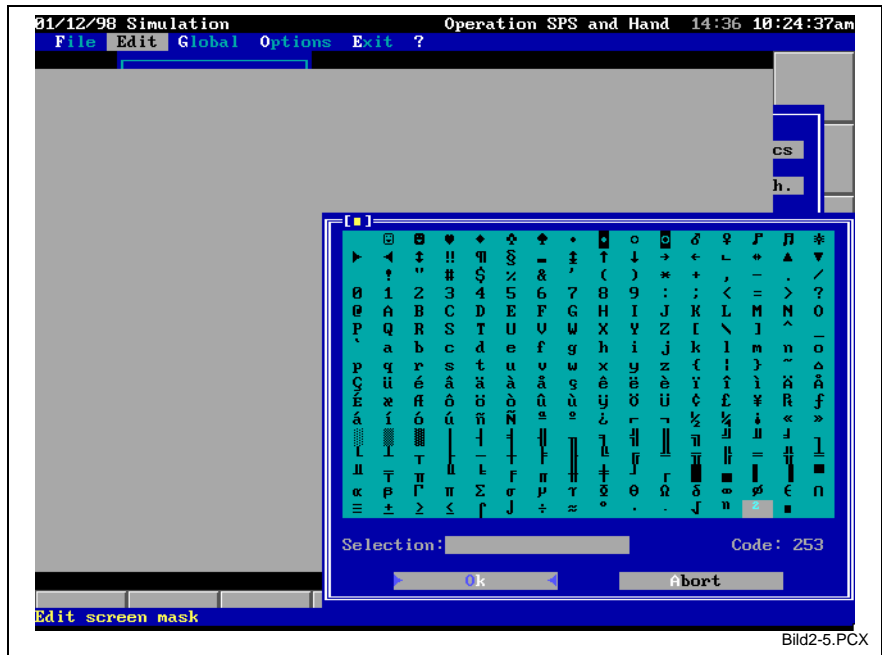
Fig. 2-5: Defining the output field of the display element

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

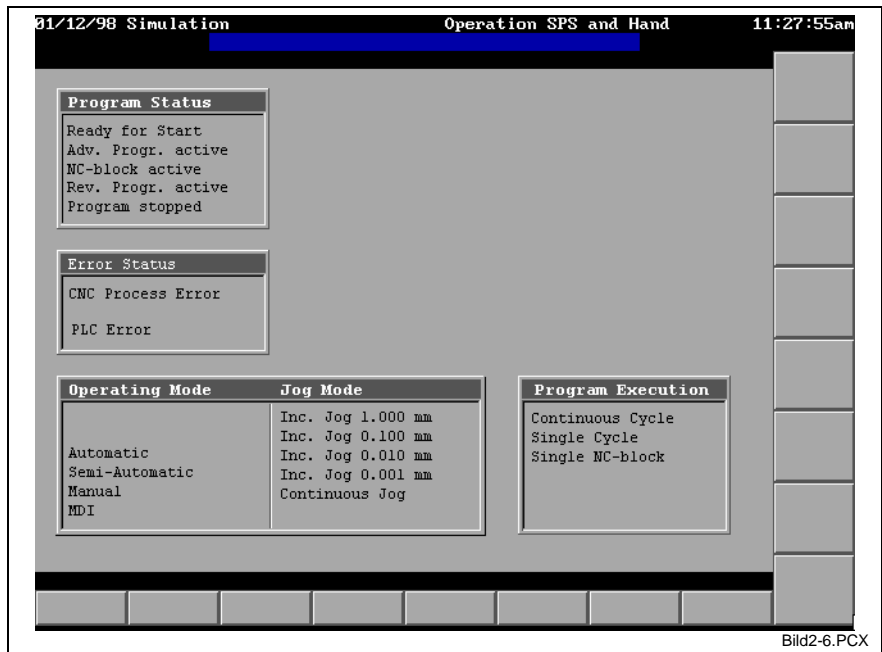Variables are the dynamic displays proper. They always consist of the interconnection of a specific display element and a control variable. Use the 'Edit/Variables' menu item to define the variables that shall be displayed in the current image (see Fig. 2-7). In a new image, variables have not yet been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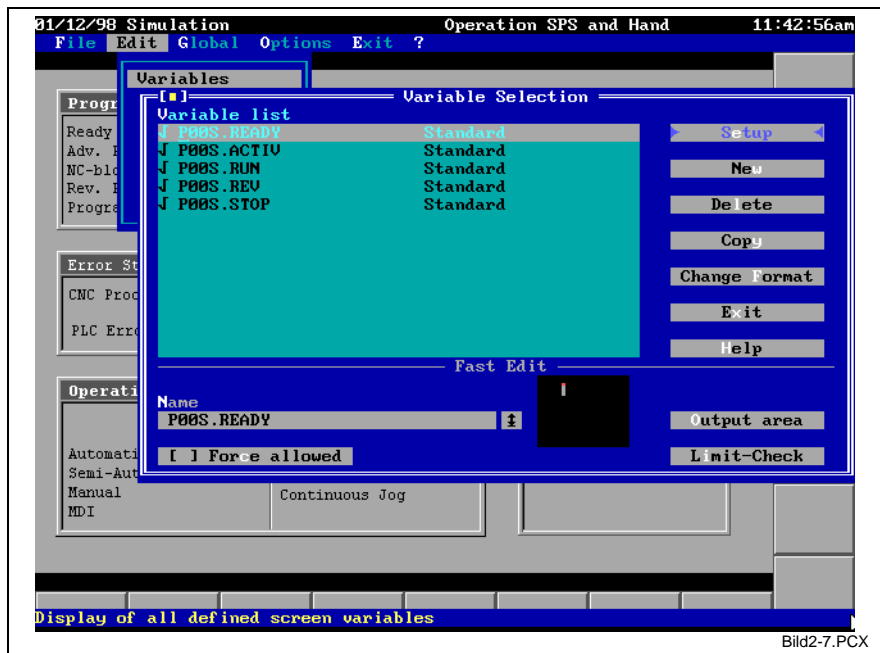
Fig. 2-7: List of all variables of the image

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: Defining the output field of the display element

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 Defining the output field of the display element).
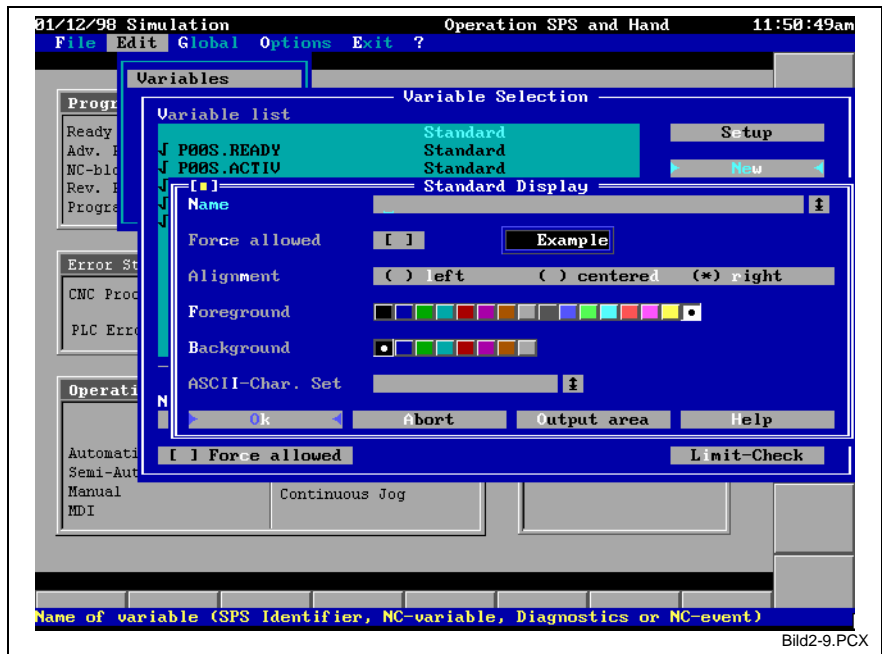

Fig. 2-9: Defining the output field of the display element

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).
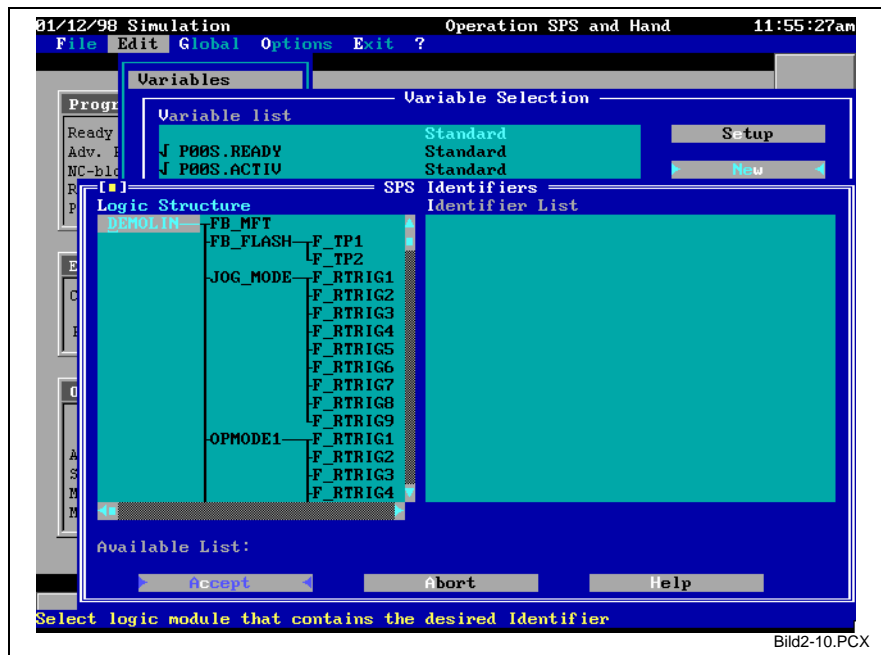
Fig. 2-10: Input assistant for SPS variables

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 Status' box.
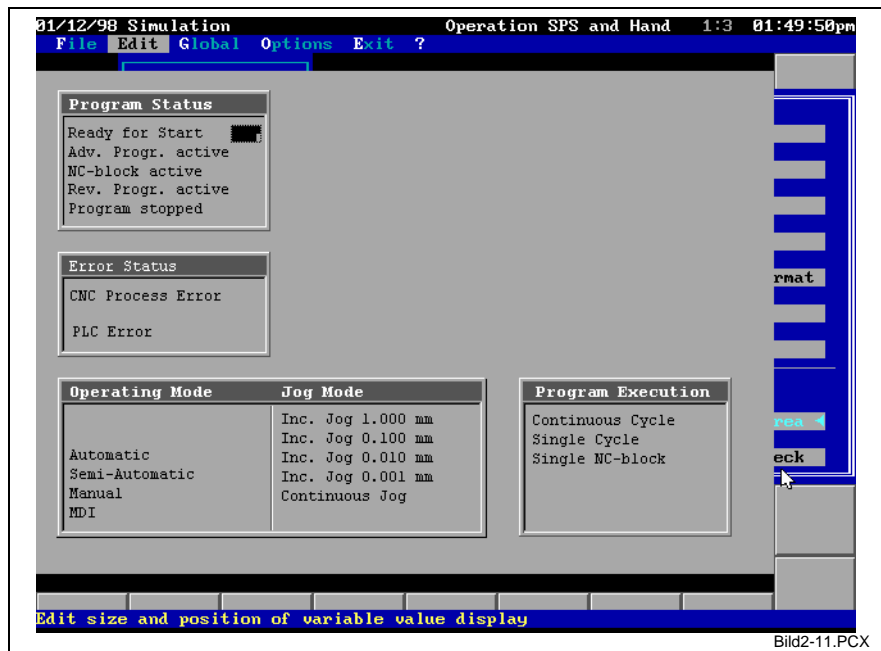

Fig. 2-11: Defining the output field of the display element

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 Status' box has been completed.
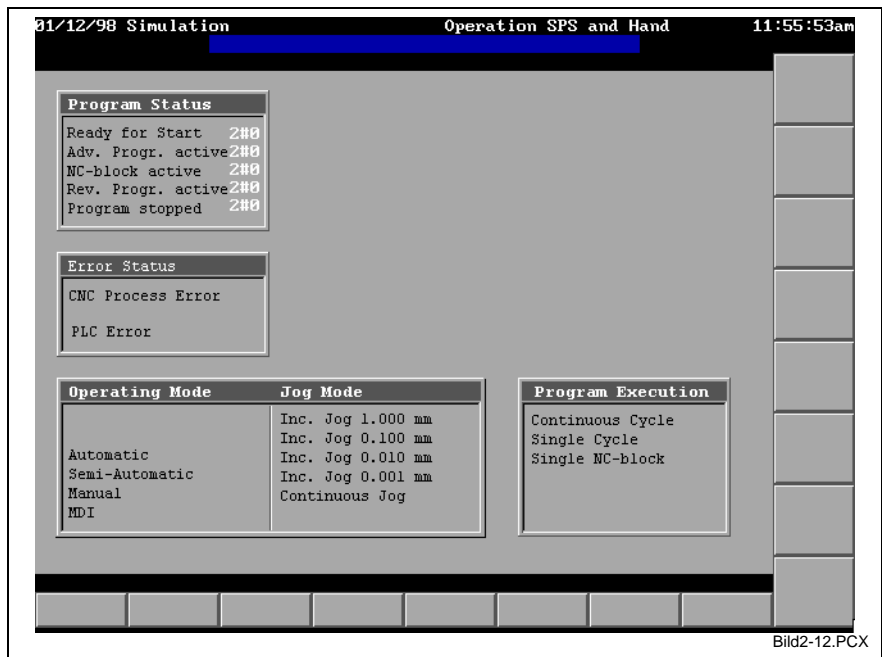
Fig. 2-12: Displaying the machine program status

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, 'No' and 'yes' can be displayed instead of '1' and '0'. Fig. 2-13 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 switch-over value defines the point at which the texts are toggled.

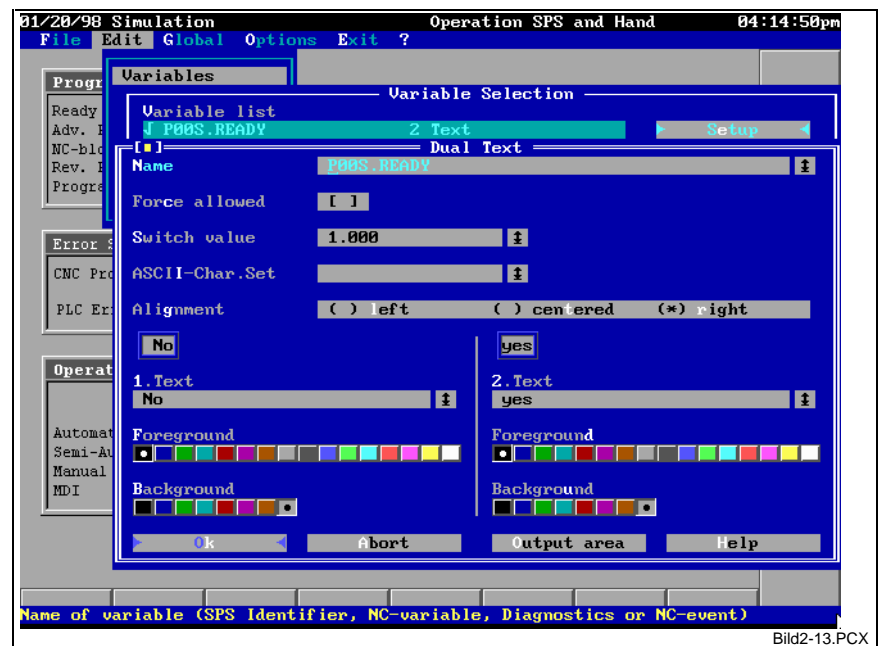- The variable value may be displayed by 'Changing colors'. This means that the specified rectangular area changes its foreground and/or back-ground colors when the switchover value is reached.

- Surely the most demanding method is using '2 graphics' for repre-senting 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.
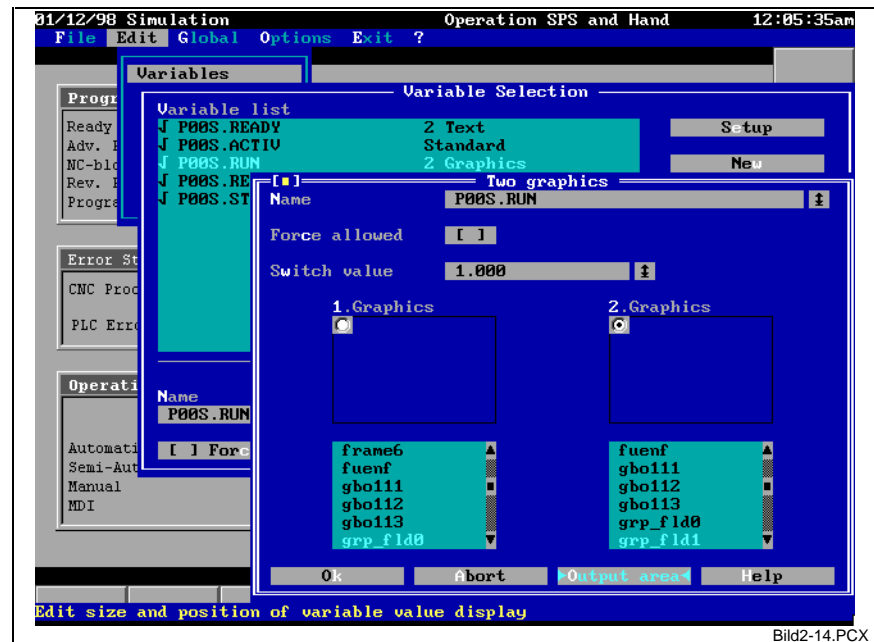
Fig. 2-14: Dialog for a '2 graphics' display element

Since graphics permit a very detailed representation, those display ele-ments open virtually unlimited possibilities of alternating variable value displays. Switches or entire plant sections may be animated, for ex-ample. 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 3-67 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 re-maining variable definitions.

Note: Variable definitions that are similar to each other can be created by simply copying them ('Copy' button in the 'Edit/variable' win-dow), 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
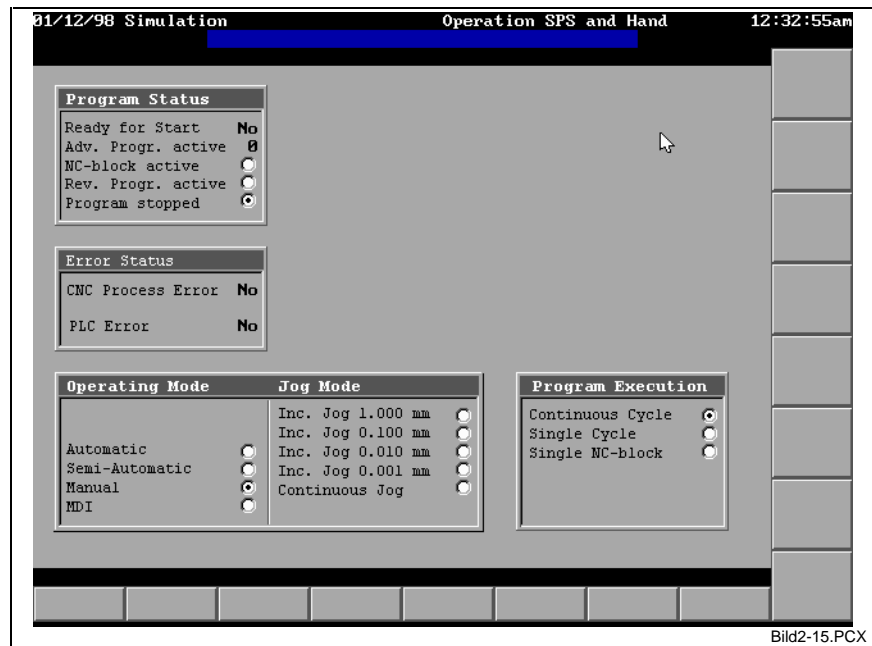
To emphasize particularly important representations, you may use heavily enlarged character sets in the output. To do this, select a character set of the appropriate size from the ASCII character set field in the display element dialog. Some character sets, that are gained from the PC-internal character sets, have usually been installed. The example in Fig. 2-15 employs the 'asc8sml' 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 2-8 show how monitoring can be implemented. This section shall now demonstrate the options of operator input.

There are tree different possibilities of operator input:

- Using PC keys: Soft keys (see page 3-32) and global keys (see page 3-49);

- using machine function keys (see page 3-42) and

- using SPS keys (see page 3-45).

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.
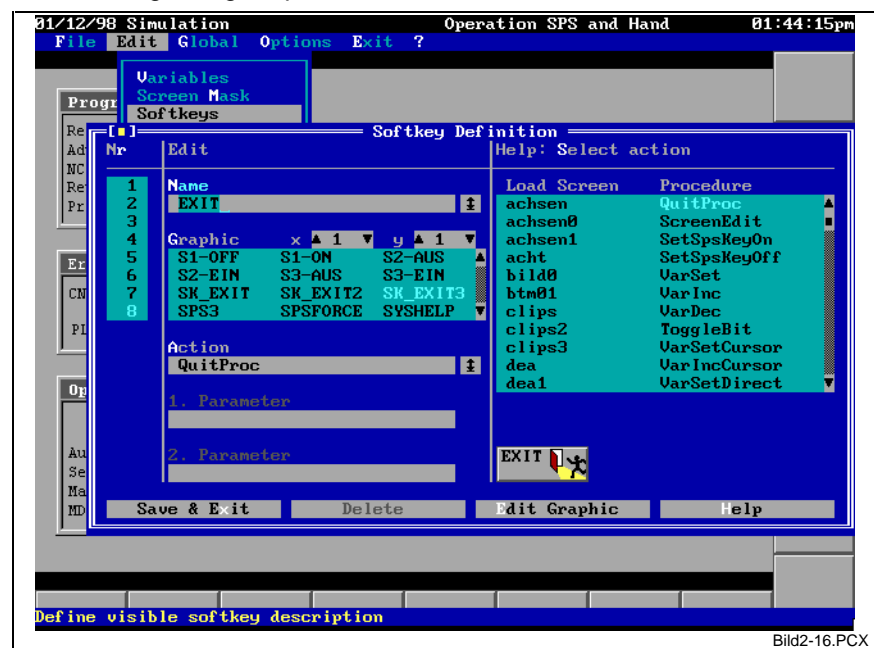
The following dialog is opened:

Fig. 2-16: Dialog for softkeys

- 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 3-32).

- 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 2-18) 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 3-32 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.
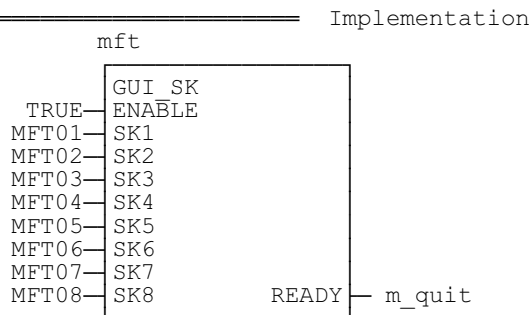
Machine Function Keys

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:

```
================================ Declaration ================================
 Identifier    AT         TYPE       :=          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
=============================== Implementation ==============================
            mft
          ┌─────────────┐
          │ GUI_SK      │
   TRUE───│ ENABLE      │
  MFT01───│ SK1         │
  MFT02───│ SK2         │
  MFT03───│ SK3         │
  MFT04───│ SK4         │
  MFT05───│ SK5         │
  MFT06───│ SK6         │
  MFT07───│ SK7         │
  MFT08───│ SK8   READY │── m_quit
          └─────────────┘
  (*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
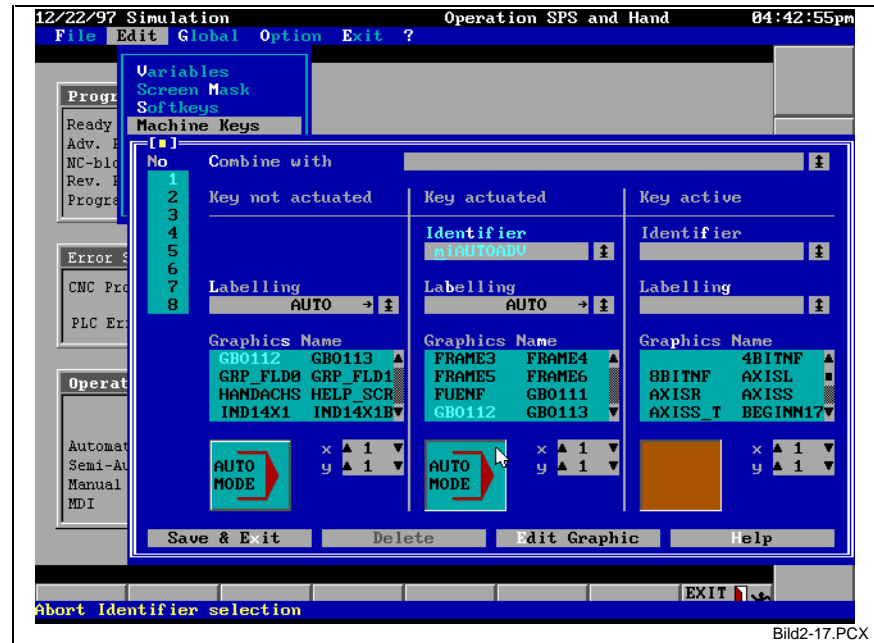

Fig. 2-17: Dialog for machine function keys

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 s 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 an 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).
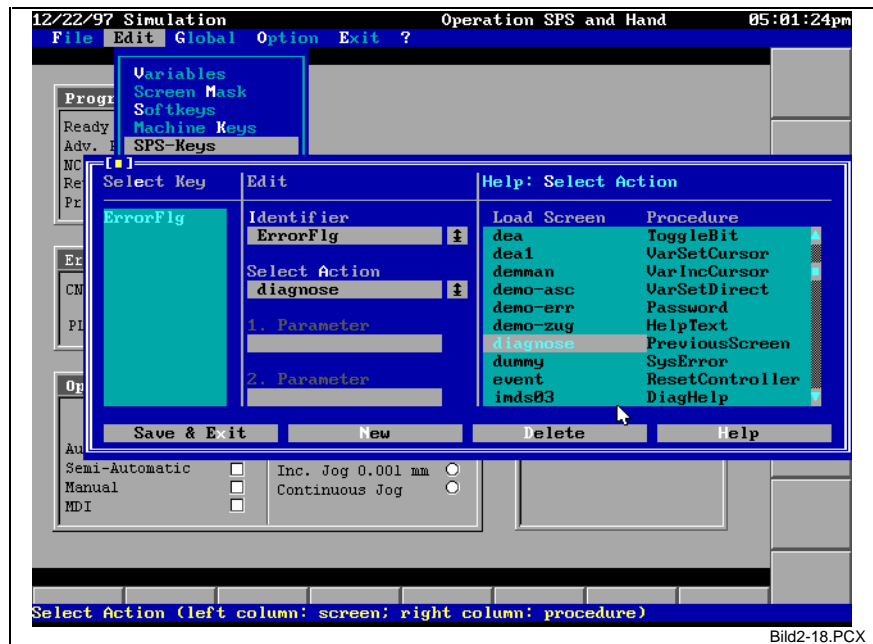

Fig. 2-18: Dialog for SPS-Keys

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

Notes: An 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 an 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 3-49). The state of the interrogation of the SPS key is displayed in the topmost 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.

An 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 3-32)

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 used 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 3-67). Fig. 2-19 shows the graphics editor with a graphic element that is used in Fig. 2-16: Dialog for softkeys for labeling the soft key 8.
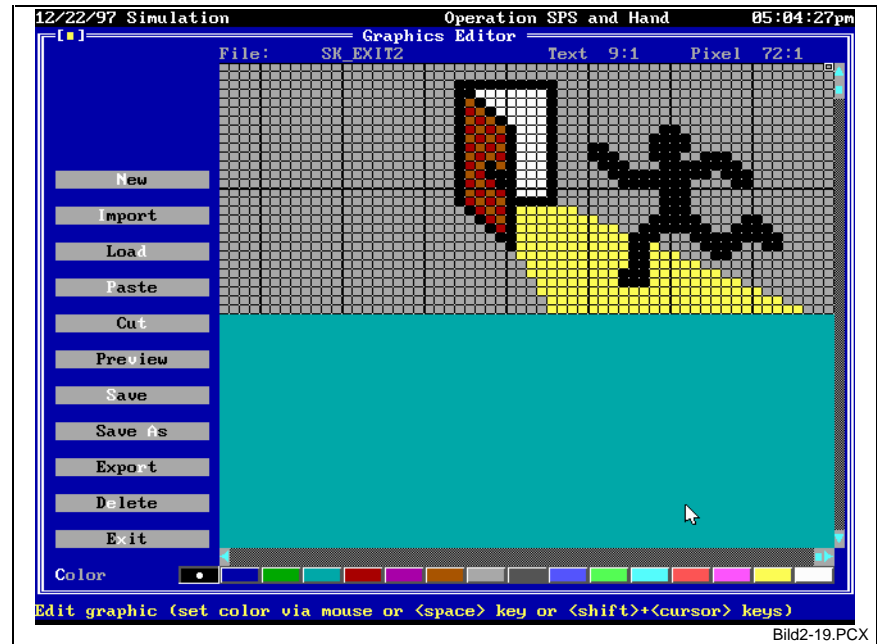

Fig. 2-19: Graphics Editor with loaded graphic element for labeling a soft key

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

Importing (complex graphics)

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).
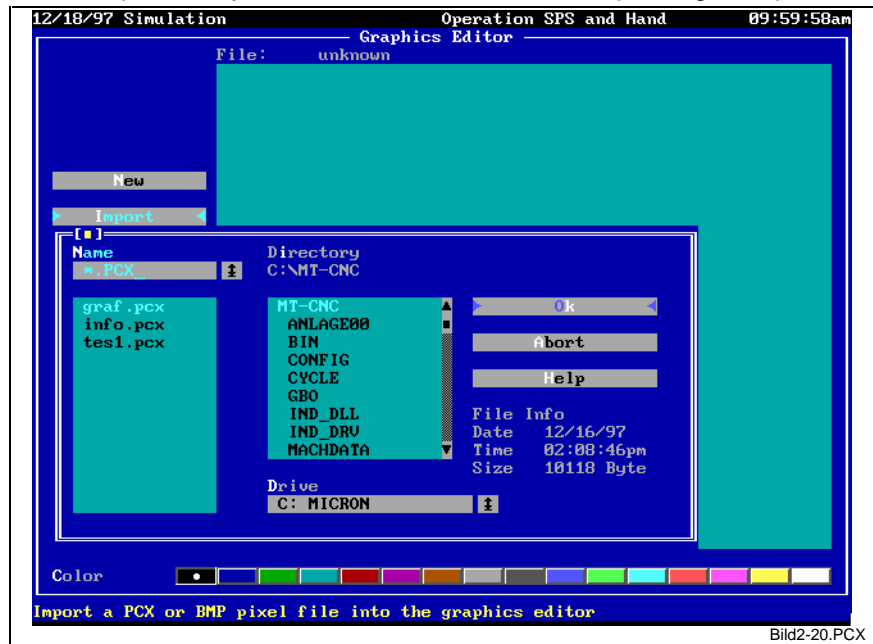

Fig. 2-20: Selecting a file for graphics import

⇒ 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 3-68 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.
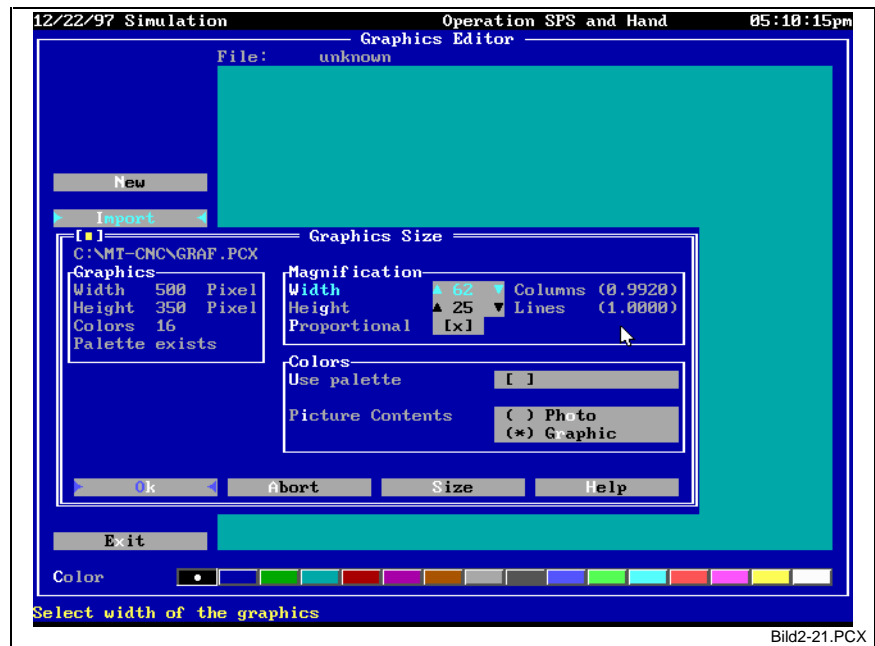
Fig. 2-21: Selections for graphics import

⇒ 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).
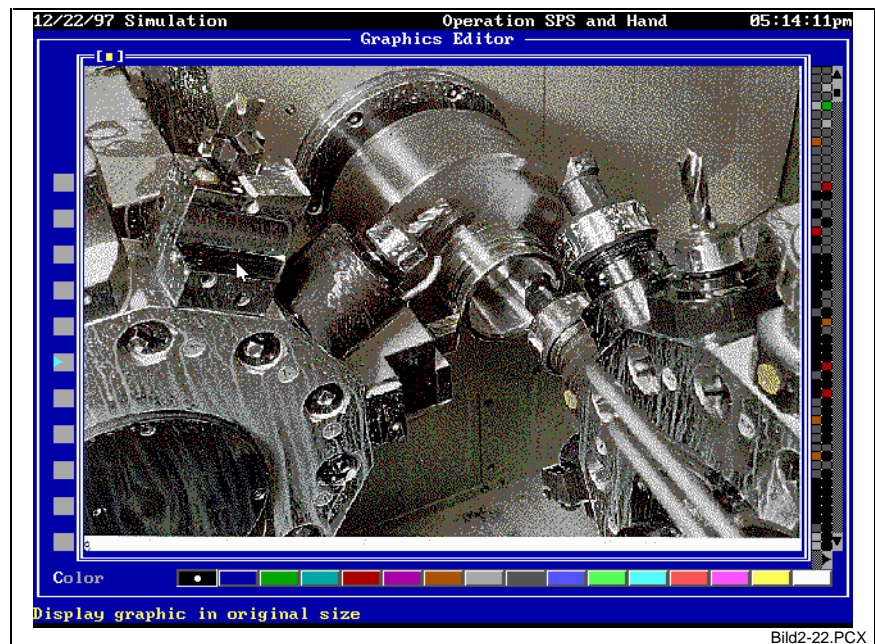

Fig. 2-22: Preview of the graphic image in the true size

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 3-27). 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 windows, and are inserted in the image mask via the 'New' button in the 'Edit/image screen' dialog (see Fig. 2-22).
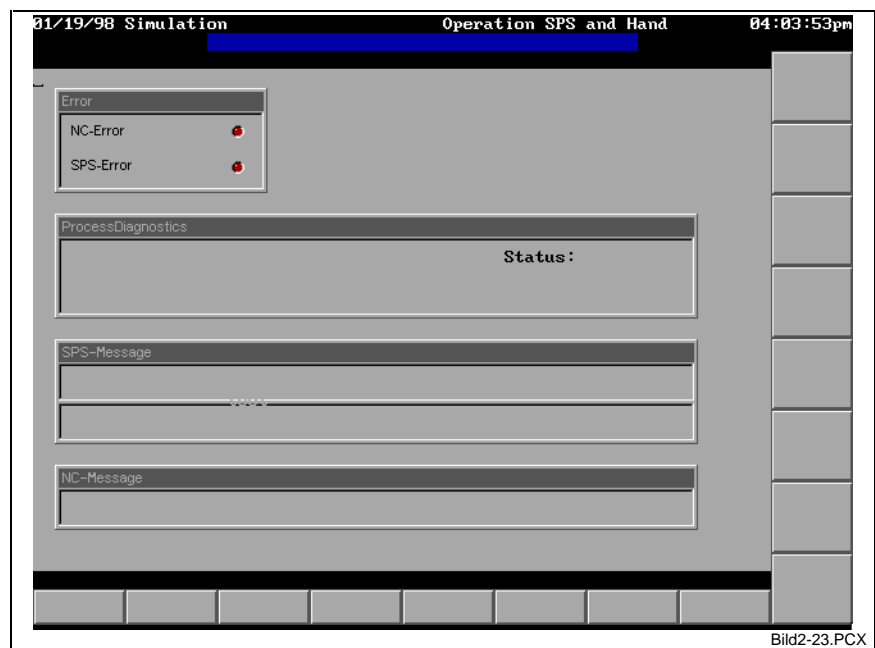

Fig. 2-23: Image mask with graphic elements and text

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 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 3-32):

−   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:

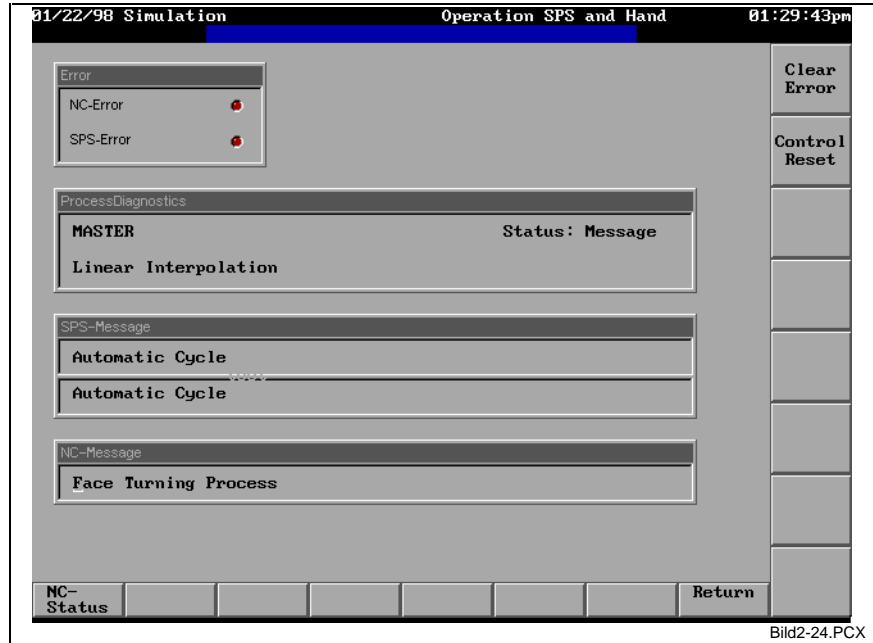Fig. 2-24: 'Diagnosis' image with all indicators

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'.
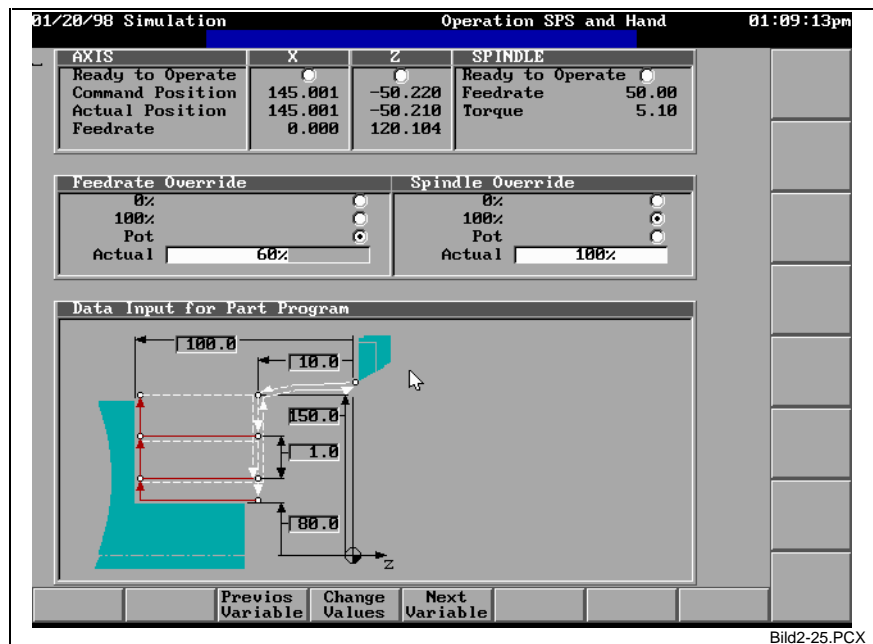

Fig. 2-25: WORKPCE image with indication of current axis positions and entry of
the process-related data of a workpiece

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 'Force allowed [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 3-32), 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 <u>and</u> 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 3-32) 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.
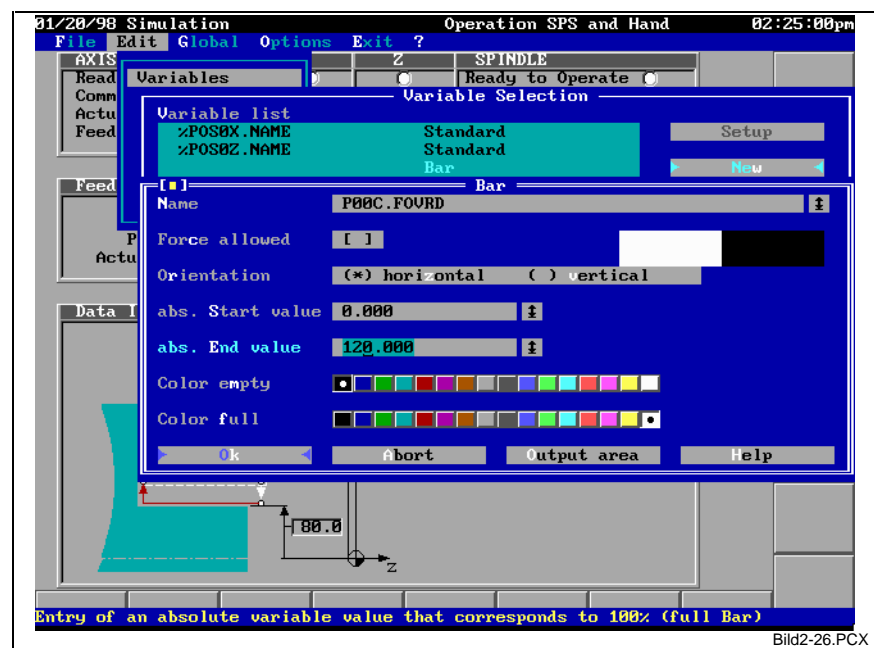

Fig. 2-26: Dialog for override indication bar indicator element

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 3-49), 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 3-31), machine function keys (see Chapter '

Editing Machine Function Keys', page 3-42), and SPS keys (see Chapter 'Editing SPS Keys', page 3-45) 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 3-73).

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 2-5

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.
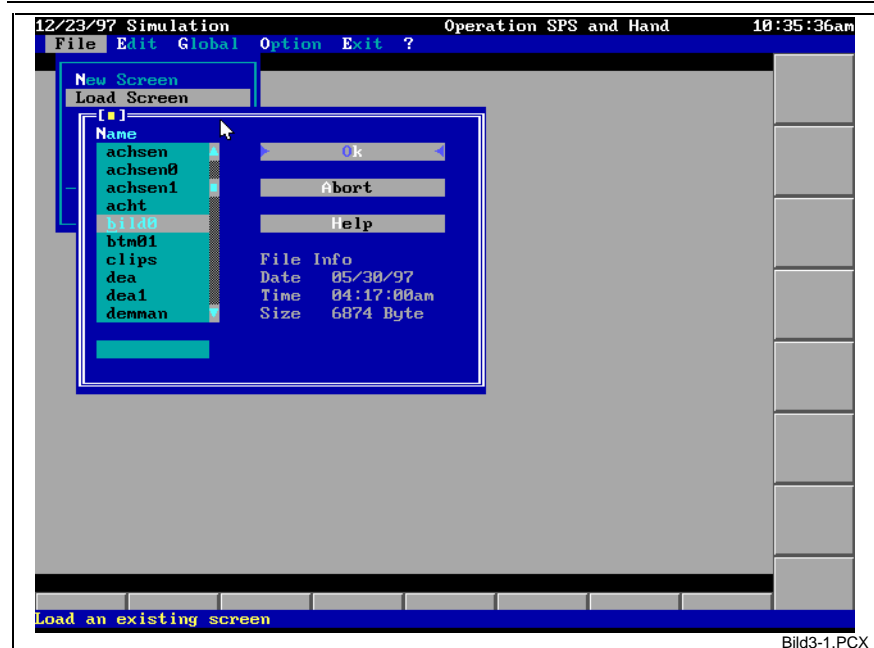
Example

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 2-5). 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 not 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 not possible.

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

Bild3-2.PCX
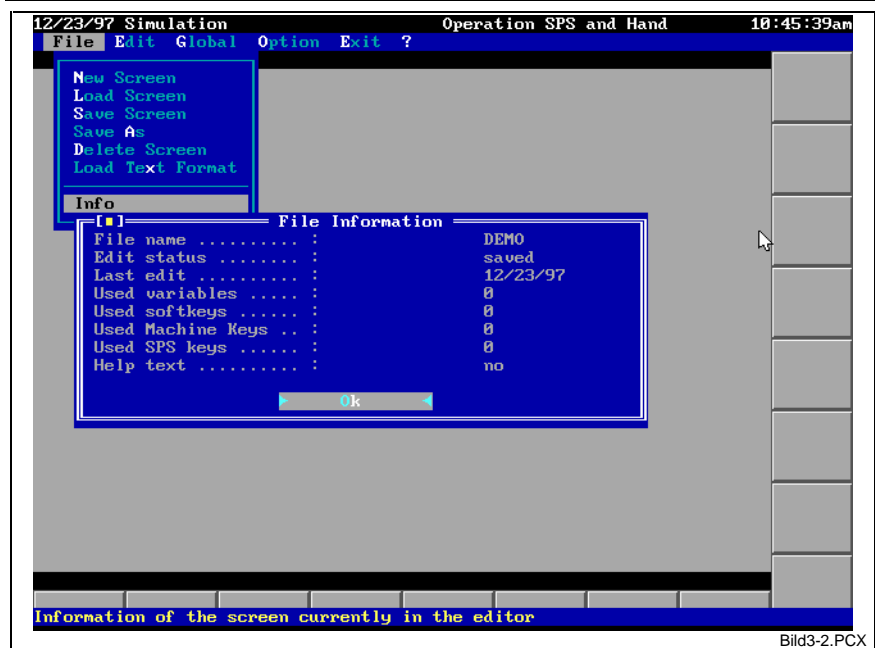
Fig. 3-2: Window with file information

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   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.

The 'Settings' switch opens a separate window that permits the selected variable definition (see also page 3-6) to be edited in detail.

There are additional functions available in the lower screen area. Those functions can be used for directly modifying some features of the variable definition.

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.

The following functions are provided for managing the variable list.

- 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   Only the following buttons are accessible if there is no variable in the loaded image:
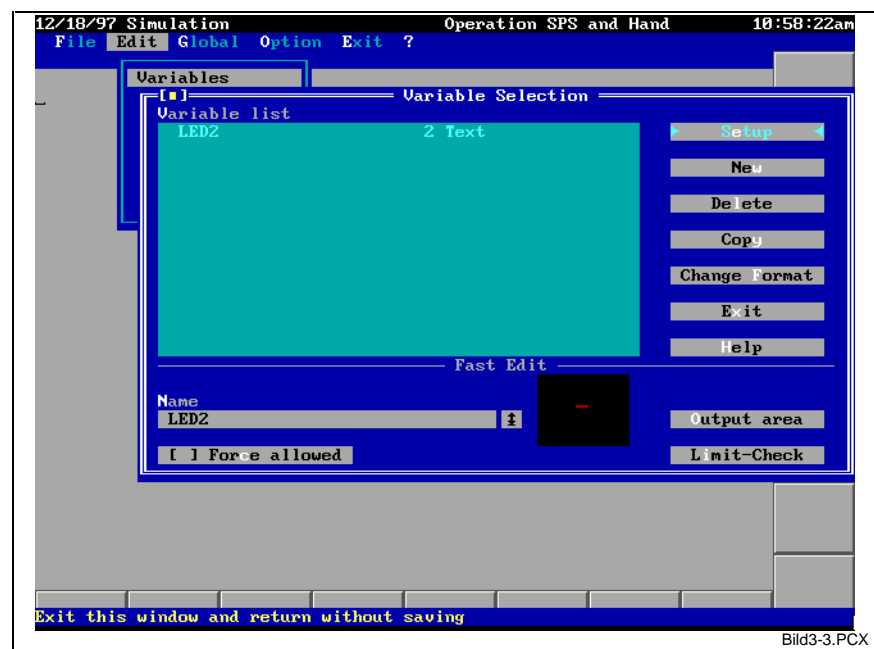
- New,
- Help, and
- Close.

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 <u>blank</u> 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.

An 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.

NC variable	**@\<process number>:\<variable number>**

An NC variable must begin with the @ character, and must always consist of process number and variable number. The process number may <u>not</u> be omitted. The two numbers are separated by a colon.

Valid range:　　　　process number　　　0..6
　　　　　　　　　　variable number　　　0..255

Event	**%EVENT\<process number>:\<event number>**

In NC programming, there is no syntax for events. The reserved '%EVENT' identifier has therefore been defined. Without a blank, it is followed by the process number, a colon, and the event number.

Valid range:　　　　Process number　　　0..6
　　　　　　　　　　Event number　　　　0..31

Diagnosis messages	**%DIAG\<process number>.STATUS|TEXT|PROC**

Diagnosis messages are required for the definition of a dynamic screen output, but have not yet been considered as variables. The reserved '%DIAG' identifier has therefore been defined. Without a blank, it is followed by the process number, a colon, and a further reserved identifier that is used for deriving the required diagnosis information:

- STATUS
  Boolean information, telling whether the message is a 'normal' message (state 0) or an error message (state 1).
- TEXT
  Brief message text (up to 54 characters) as it is contained in the diagnosis message file. A diagnosis variable of that type must be linked with a 'standard' indicator element (see page 3-14).
- PROC
  Stands for the process name (up to 40 characters). A diagnosis variable of that type must be linked with a 'standard' indicator element
  (see page 3-14).

Valid range:　　　　Process number　　　　　0..15

Axis position values	**%POS\<process number>\<axis meaning>.\<value type>[.\<reference>]**

Up to now, axis position values have not been considered as variables. The reserved '%POS' identifier has therefore been defined. Without a blank, it is followed by the process number, the axis meaning, and, separated by a period, the type of the axis information. With path-related position values, the required reference system is additionally specified, separated by a period.

Possible axis meanings:　　　　　　X,Y,Z,U,V,W,A,B,C,S1,S2 and S3

The following reserved identifiers are available as axis information type:

NAME	Specifies the current axis designation of the defined axis (up to 2 characters). For example: 'X1'. It must be linked with the 'standard' indicator elements. A display format cannot be applied (see page 3-14).
REF	Boolean information that indicates whether or not the defined axis is in its reference position (state 'ON').
COMMAND	Command position of the axis (standard format: REAL)
ACTUAL	Actual position of the axis (standard format: REAL)
LAG	Position lag of the axis (standard format: REAL)
ENDPOINT	End value of the axis movement (standard format: REAL)
DTG	Residual path of the axis movement (standard format: REAL)
FEEDRATE	Velocity of the axis movement (standard format: REAL)
OPD	Optimum zero point distance of the axis (standard format: REAL)
TORQUE	Axis torque (standard format: REAL)

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 co-ordinate 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 <u>blank</u> 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.
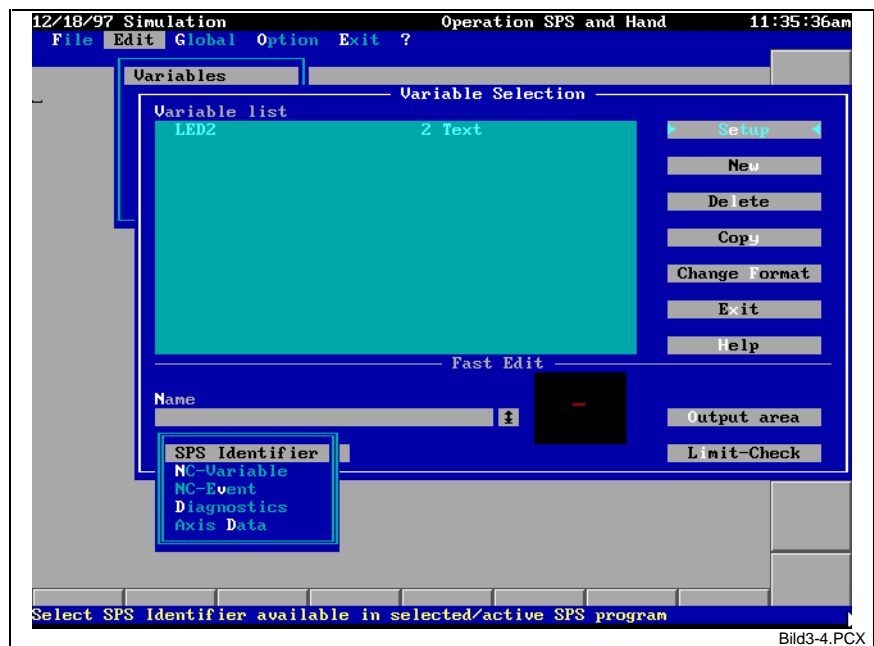

Fig. 3-4: Input assistant - selecting the variable type

**Input assistant for
SPS variables**

Call   Input assistant for variable names/SPS Variable

Functionality Selecting an 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 qualifica-
tion 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. Indi-
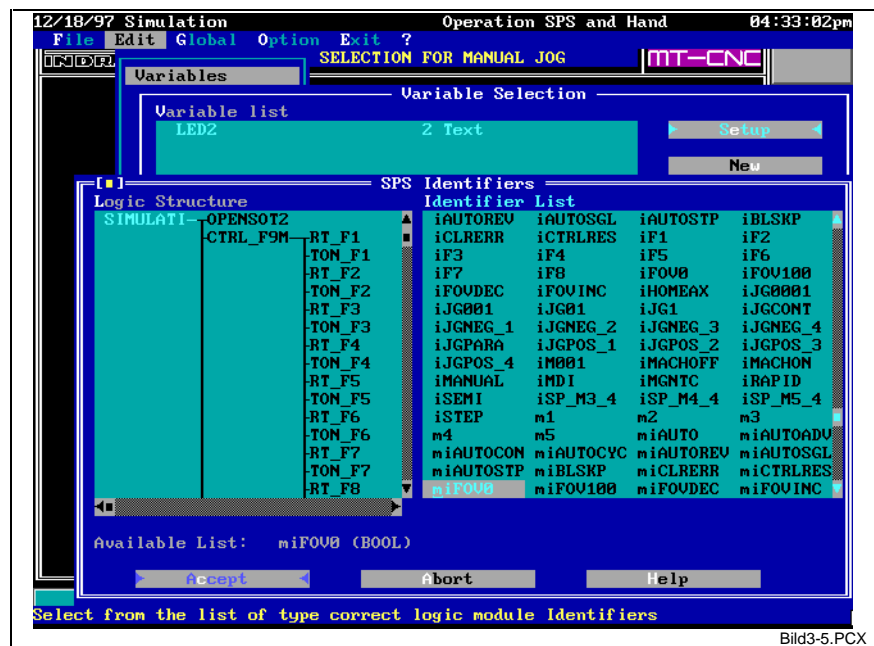ces must always be constant; control variables are not permitted.

Example

Fig. 3-5: Input assistant for SPS variables

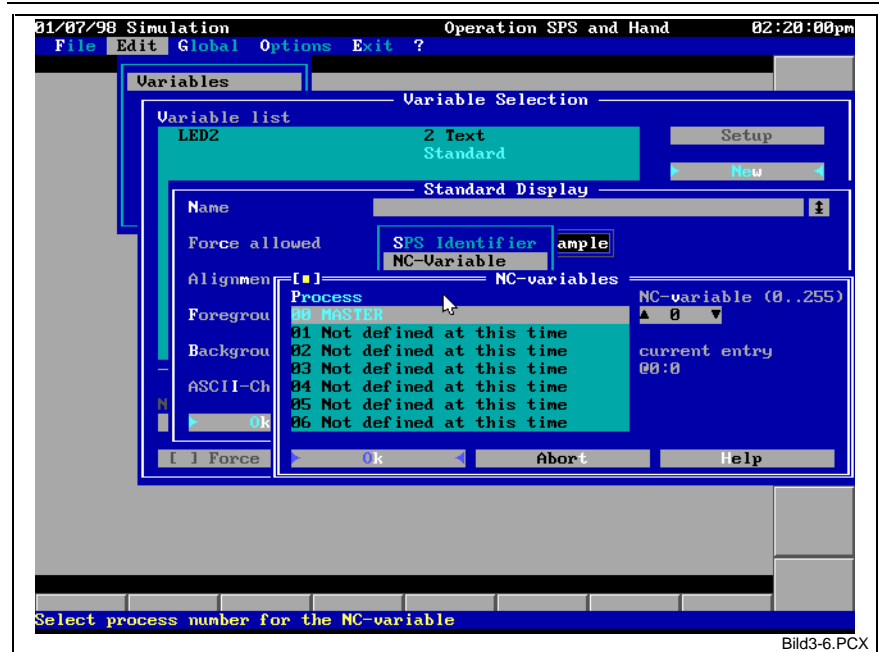|	
Input assistant for NC variables	
Call	Input assistant for variable names/NC-Variable
Functionality	Automatic composition of an NC variable from its components process number and variable number. The process number may be selected from the list of all possible processes. The processes are shown by 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 ($\rightarrow$ no check in the variable list). When the process is defined later, that variable will automatically be displayed.
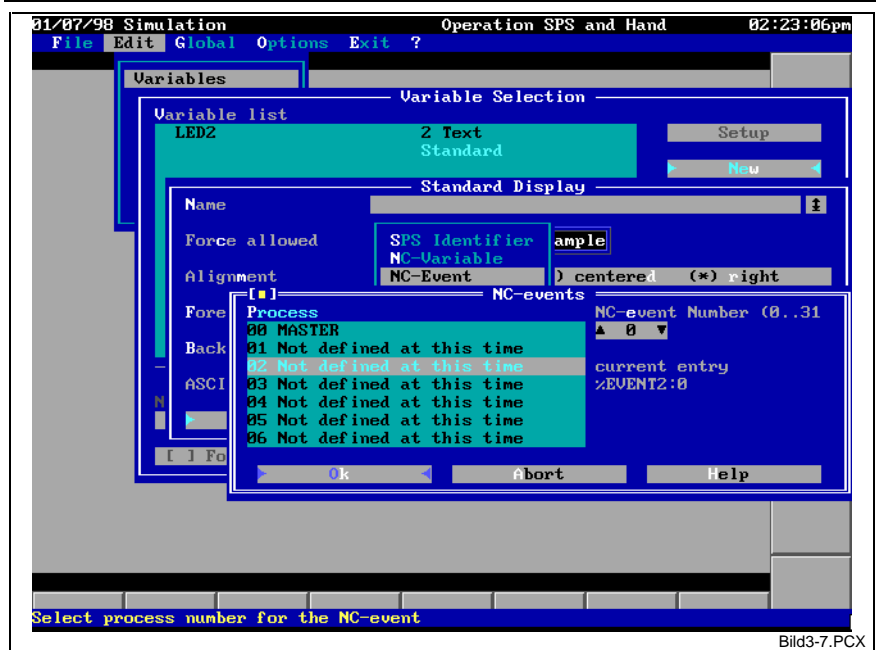
Example

Fig. 3-7: Input assistant for NC-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 ($\rightarrow$ no check in the variable list). When the process is defined later, that variable will automatically be displayed.
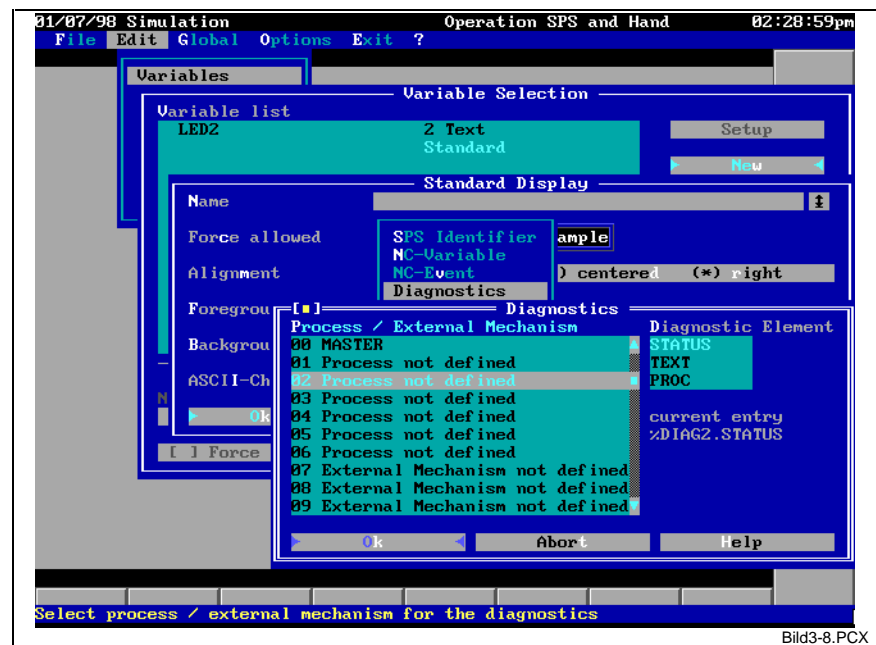
Example

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.
The valid range of the process number corresponds to the definitions of Chapter 'Editing Variable Definitions', page 3-6.
On a separate line in the window, the currently selected position variable is shown as it is accepted in the variable name input line upon confirmation. The necessary reserved '%POS' identifier is generated automatically.

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 ($\rightarrow$ no check in the variable list). When the process o the axis meaning is defined later, that variable will automatically be displayed.
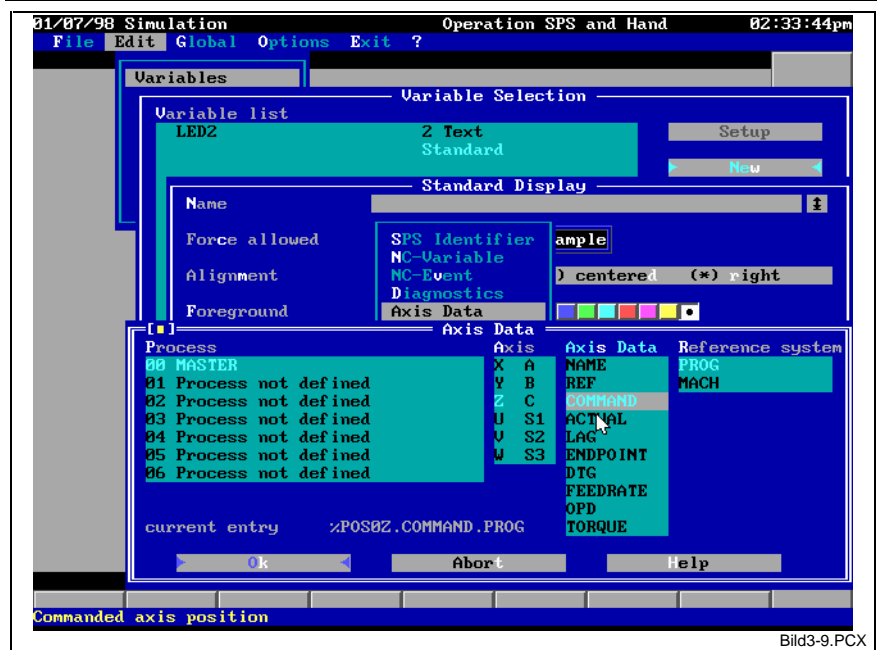
Example

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).
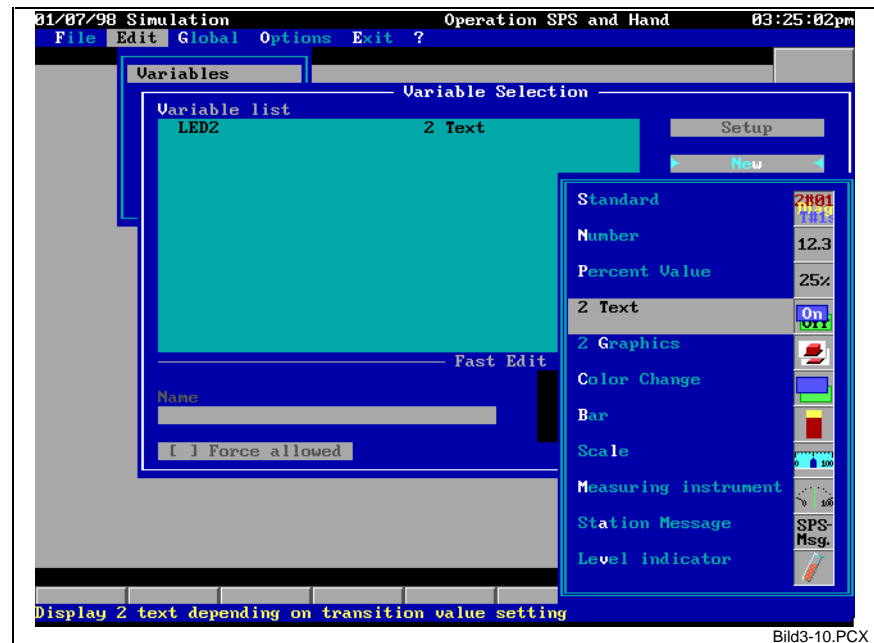

Fig. 3-10: Determining the type of the indicator element

The following indicator elements are available:

standard   The variable value is displayed in its 'normal' format. Using the following examples, this means,

- 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,
- an SPS string is displayed as a string,
- an 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 setting 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.
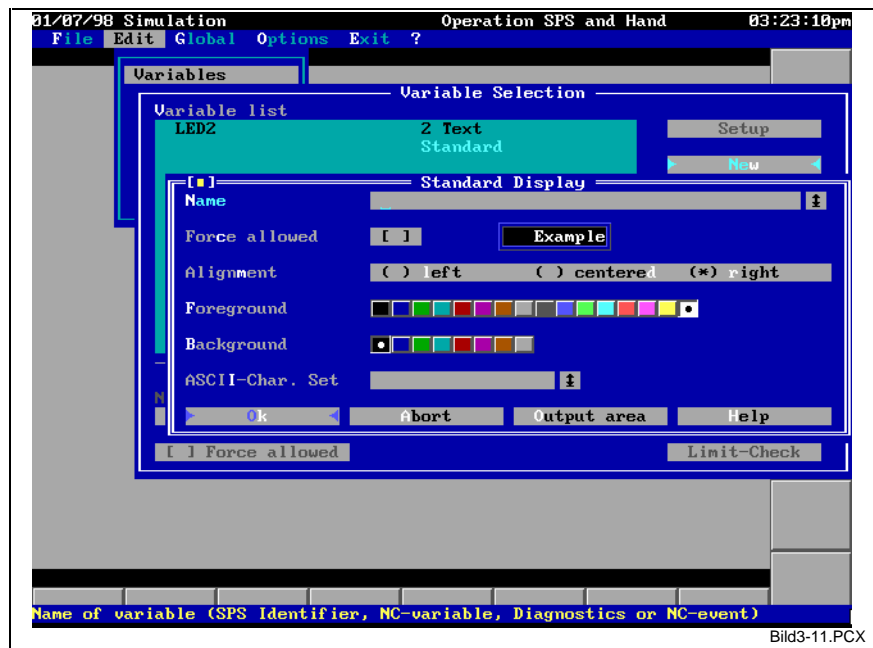
Typical dialog

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 setting 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.
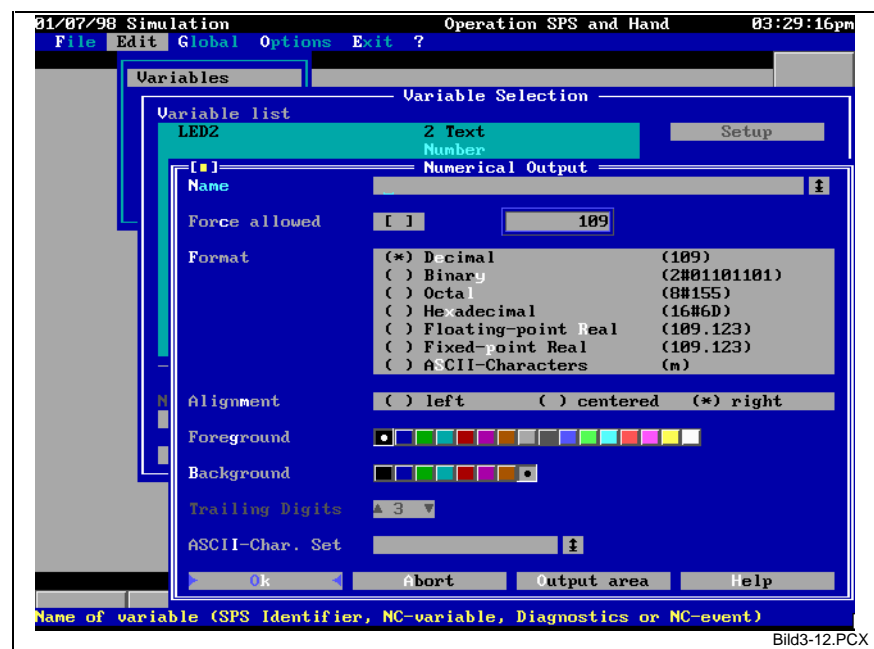
Typical dialog

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 trailing digits can be selected (the 'trailing digits' field becomes active). With integer variables (BOOL, BYTE, INT, ...), the selected number of trailing 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 <u>not</u> 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.

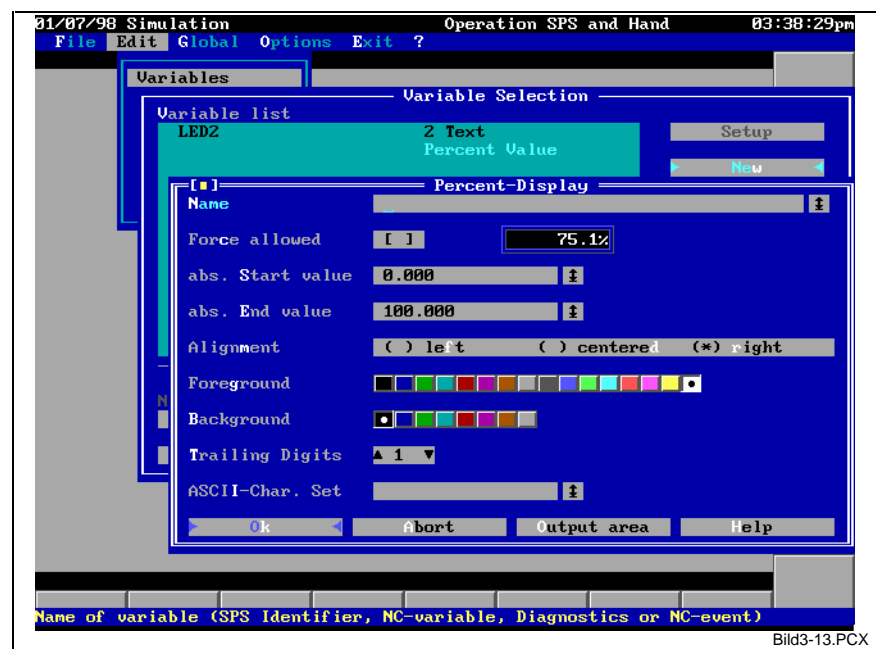*Indramat*

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.

- 1. Text

  The text that is output when the variable value is smaller than the changeover value is entered here. The text in the '2. 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.
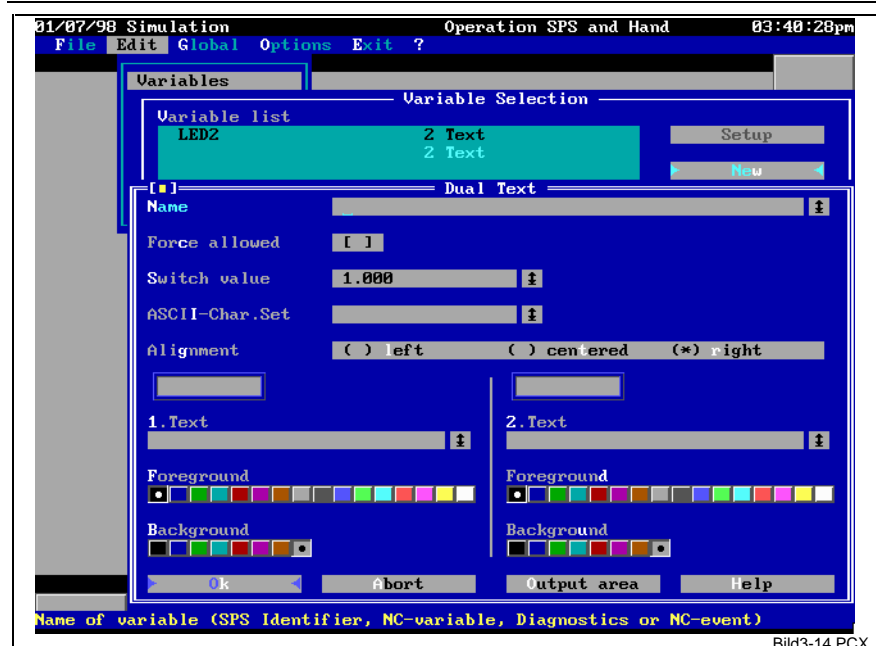
Example   of the dialog

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 an 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.

- 1. Graphics

  The graphic element that is output when the variable value is smaller than the changeover value is selected here. The graphics in the '2. Graphics' 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 3-67) may be used here. Due to a maximum display speed, directly displaying bit map graphics is not possible.
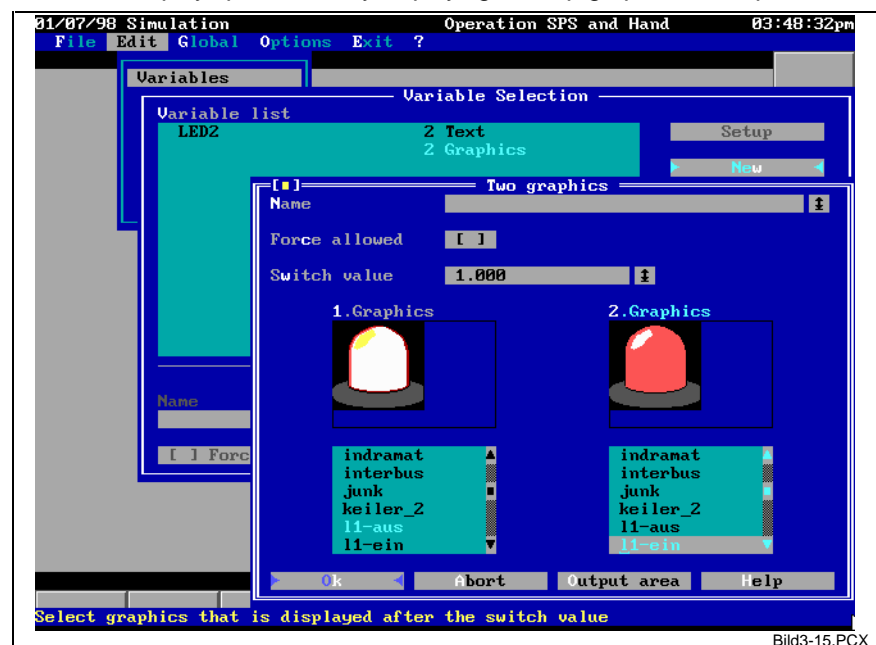

Fig. 3-15: Dialog for a 'Two graphics' indicator element

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 an 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 3-27). 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.
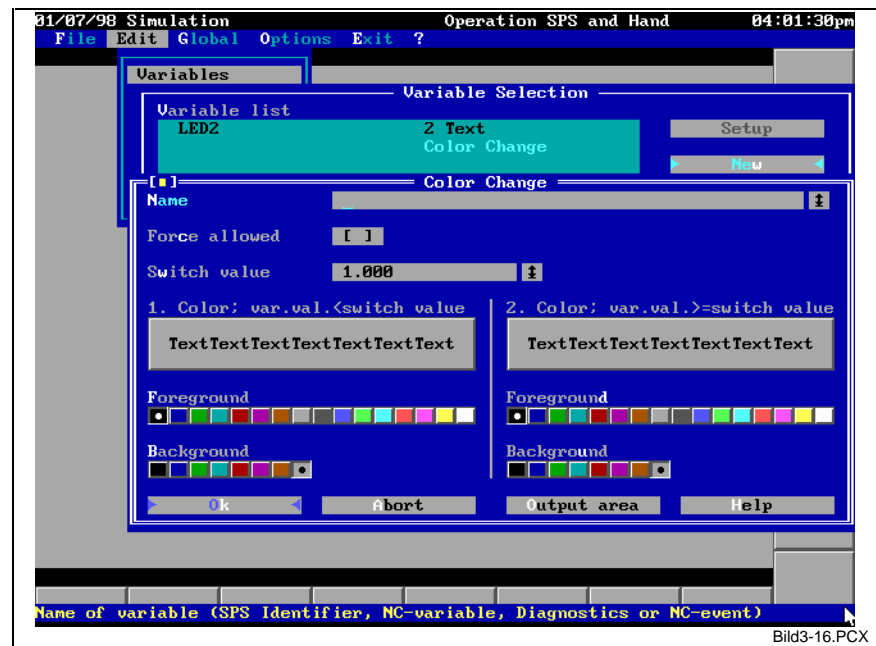
Example   of the dialog

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.

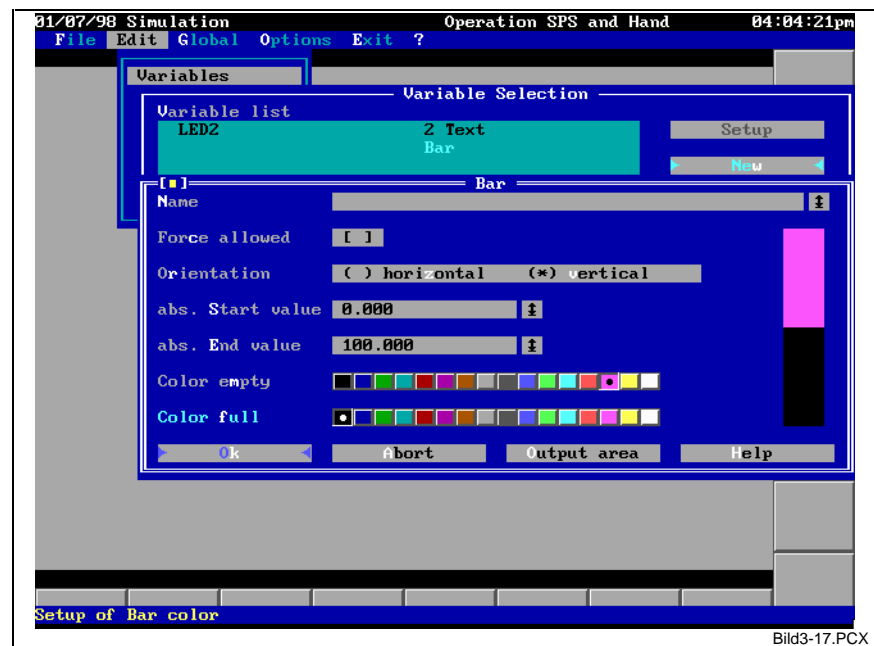Example   of the dialog

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.
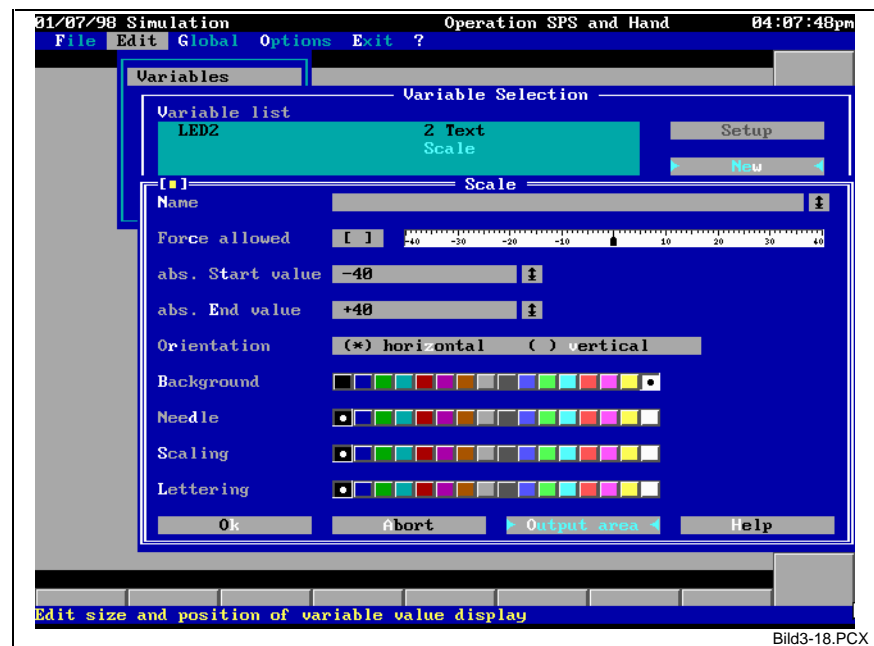
Example   of the dialog

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.

Notes: A full circle is considered as having 360°. GONs (440 GON = full circle) are not taken into account.

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.

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.
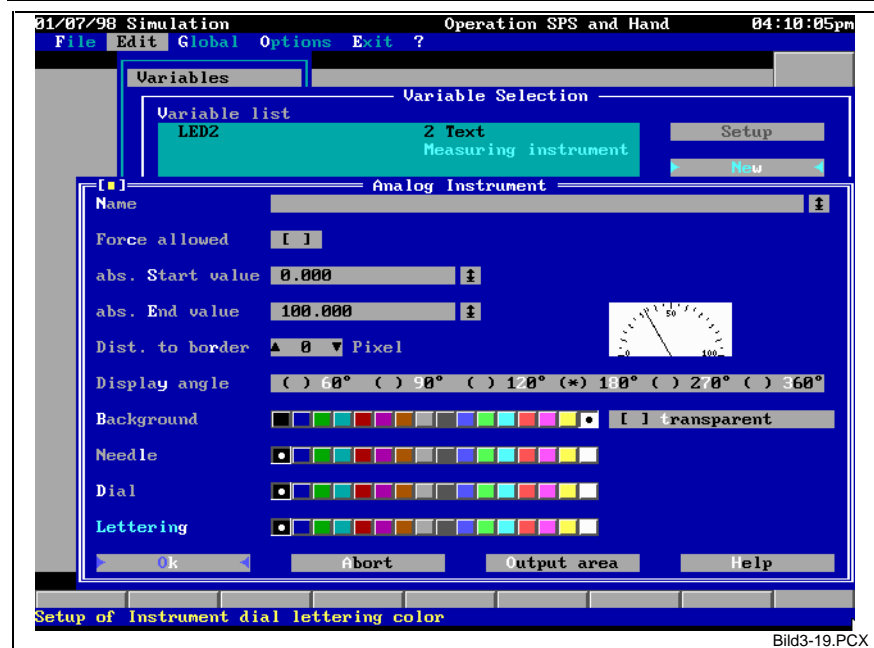
Example   of the dialog

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 'PlcHelp' and 'PlcHelpCursor' (see Chapter 'Editing Soft Keys', page 3-32).

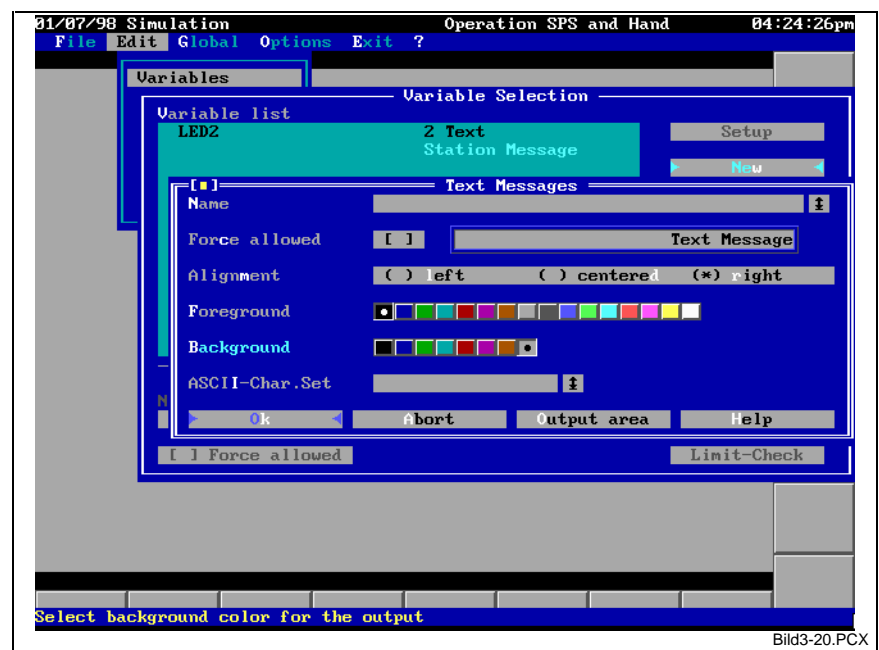Example   of the dialog

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 graphic elements may be left blank (first blank entry of the graphics list). Only one graphic element will be faded in or out pixel by 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.

Indramat

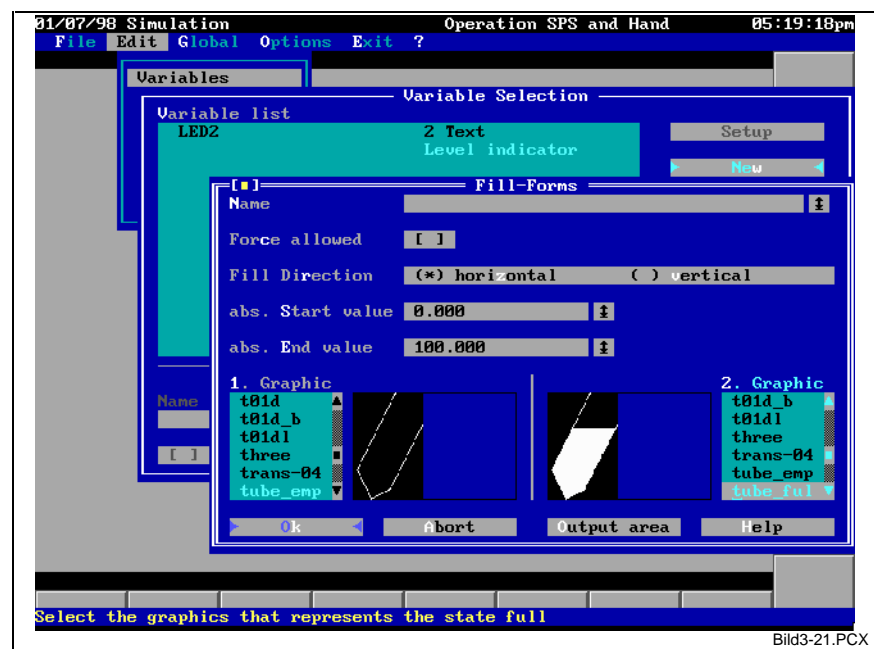Example   of the dialog

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

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 3-32). 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 3-26).

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 3-32), and has not been defined as an indicator will not be limit-checked.
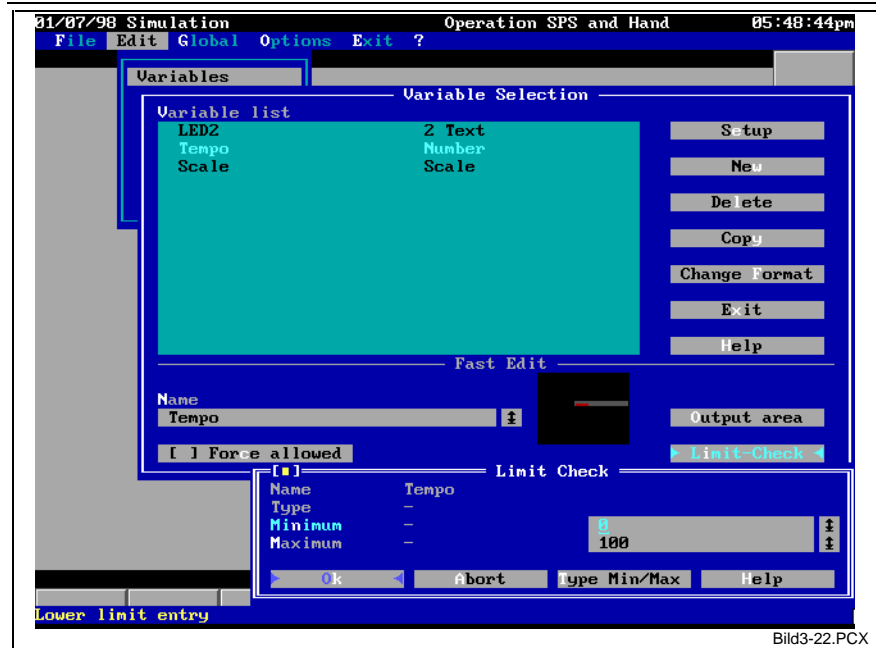Selecting the [Typ Min/Max] button enters the specified limits of the variable type.

Example

Fig. 3-22: 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
- 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.

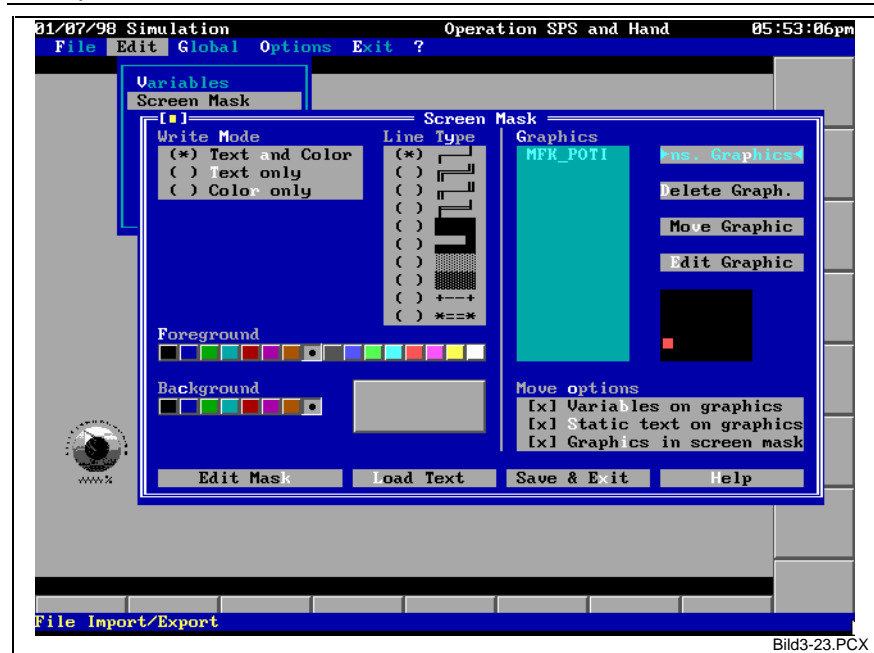**Peculiarities**   None

Example

Fig. 3-23: 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 3-29). 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 3-29) 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 3-29). 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 3-51.

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 3-28).

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 overtype mode (the character under the cursor position will be overtyped). The following commands are possible:

- <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 3-28).
  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. 3-24). 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.
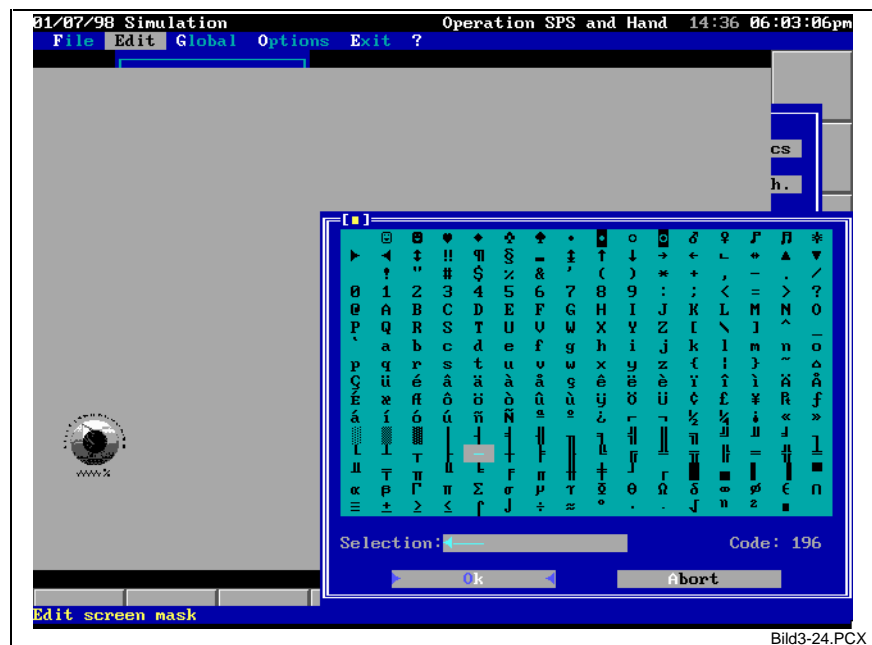
Fig. 3-24: Selecting characters from the ASCII table

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 3-32) 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 3-47). The text to the right will <u>not</u> 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 3-47). The text to the right will <u>not</u> be moved to the left.

- <Enter> or <Esc>
  Writing in the image mask is terminated, and the setting window (see Fig. 3-23) re-appears. The modifications will be accepted in either case, even when you select <Esc>. Discarding the modifications is <u>not</u> 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 3-67) 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.
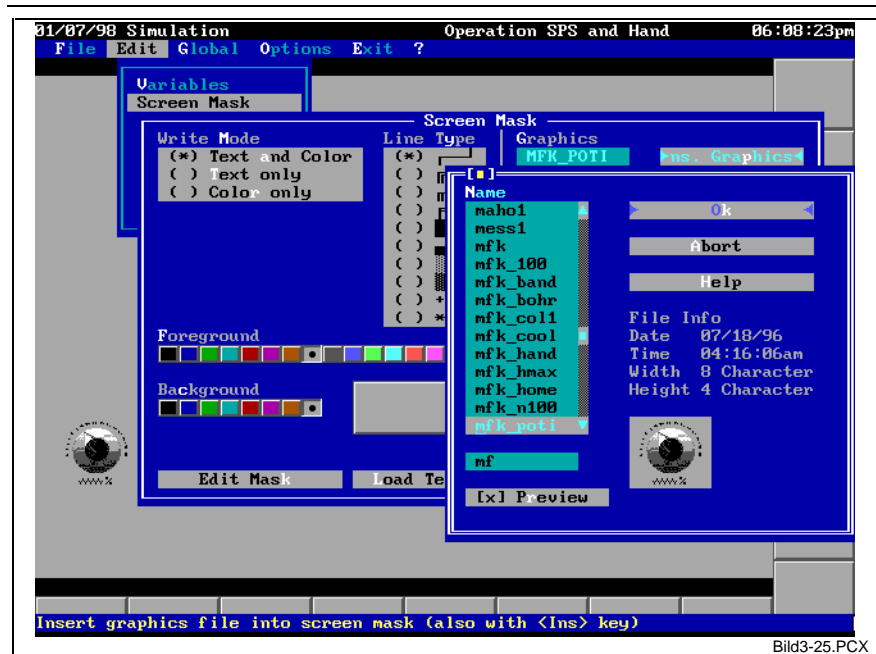

Fig. 3-25: Selecting a graphic element for integration into the image mask

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   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.

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.

The size of the graphic element cannot be influenced.

Peculiarities   As an option, other image components may automatically be moved as well when graphics are moved within the image mask:

- 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.

Use the move options to perform the necessary selections.

'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.

Editing Soft Keys

Call   Edit/Softkeys

Functionality   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.

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.

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:

- The left-hand column contains all existing image files.
- The right-hand column contains all specified procedures (see below).

During scrolling, a brief help text, that is related to those procedures, is output on the help line at the bottom screen margin.

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.

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

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.
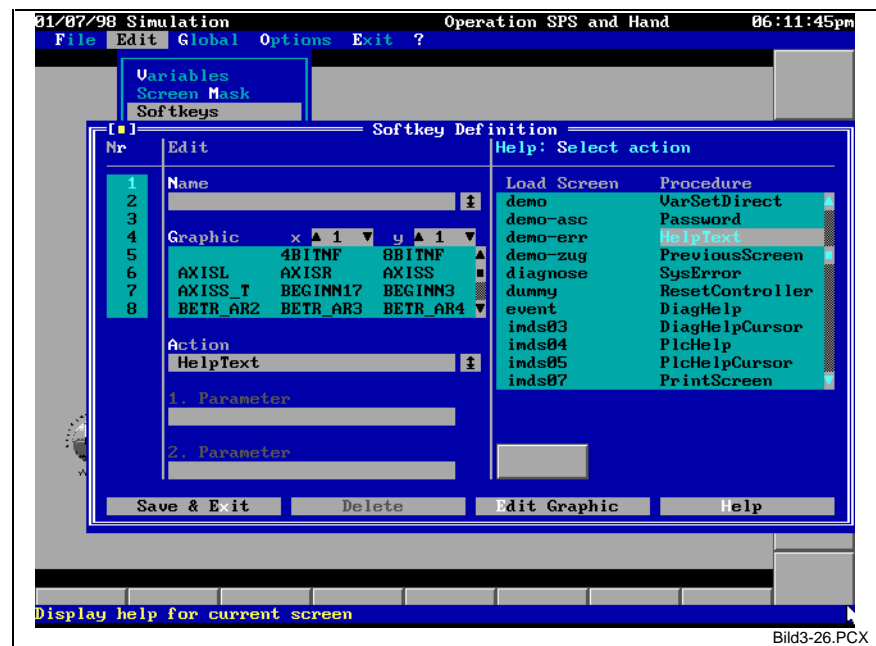
Fig. 3-26: Window for editing softkey definitions

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 3-49). The Custom Display System cannot be exited if this has not been done.

No parameters.

ScreenEdit   The in-built 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 3-49). 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 When the soft key is selected, a specific variable (1st parameter) is increased by a specific value 82nd parameter). SPS variables (except Boolean variables) and NC variables 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.

The execution of the procedure is also denied if the increased value would be outside the defined value range (see Chapter 'Limit Check', page 3-26). 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 3-26). 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 3-26). An error message is output in this case.
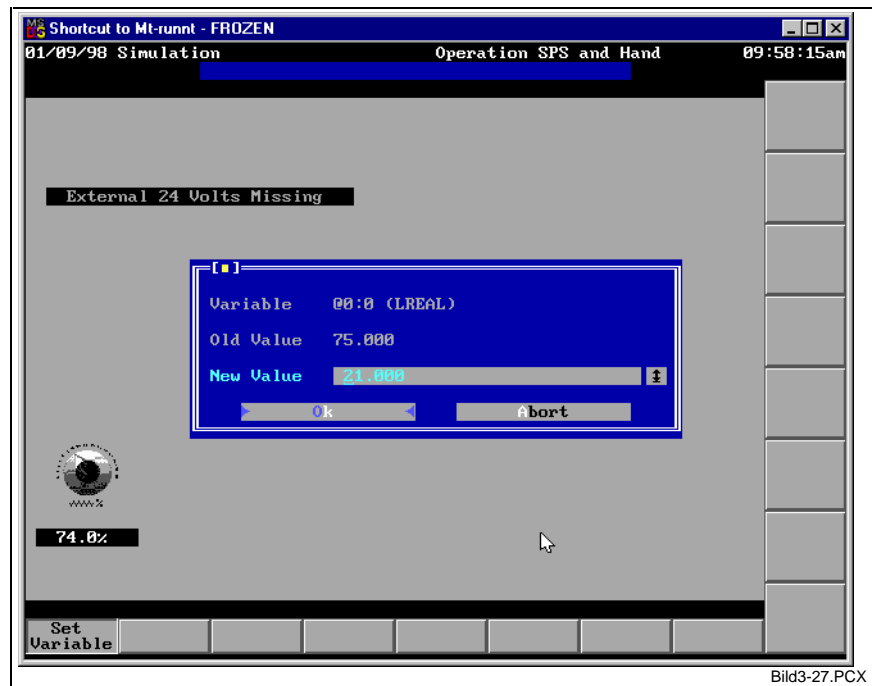
No parameters.

Fig. 3-27: Entering a new value of a changeable variable

VarIncCursor   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.
No parameters

VarSetDirect   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.
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 (limit check). An error message is output in this case.
No parameters

PassWord   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 3-49), and linked with the <Alt>+<K> key combination, for example.
No parameters

HelpText   The help text is displayed that is related to that image (see Chapter 'Editing the Image-Related Help Text', page 3-46).
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.
No parameters

PreviousScreen   In the process of loading new images as a result of a soft key action, the latest 100 load processes are retained in a stack (FIFO). This procedure permits the stack to be processed step by step backwards. This means that the last 100 images can be loaded again in the reverse sequence. The stack 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 stack is empty.

The stack 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).

In order to be available in all images, this procedure should expediently be allocated to a global key (s. page 3-49).

No parameters

SysError   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.

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.

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

Bild3-28.PCX
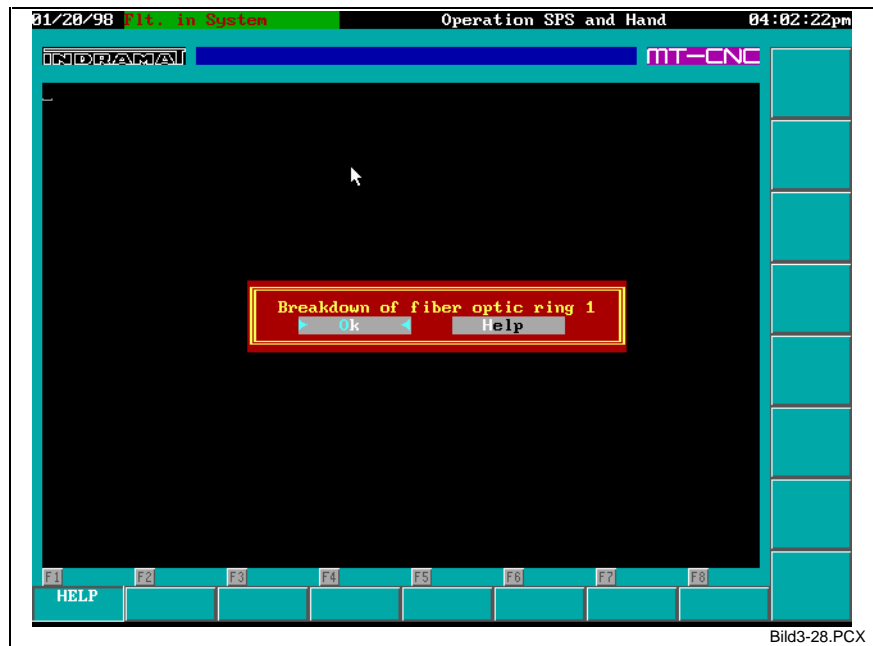
Fig. 3-28: Example of displaying system-error-related help

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 <u>active</u> 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.
No parameters

PlcHelp
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.
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.

PlcHelpCursor
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.
No parameters

PrintScreen   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 3-55), 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.

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).

No parameters

CallProgram   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.

A DOS input environment can be activated by invoking the corresponding shell (e.g. 'C:\COMMAND.COM'). Enter 'EXIT' to return. To call the batch files (extension .BAT) and the DOS commands (e.g. 'DIR' or 'COPY'), the installed shell is invoked (1st parameter) and '/c[drive:][path]<BatchName>' is specified as the argument (2nd parameter) (see example Fig. 3-29). Important: No blank is allowed between the switch '/c' and the name of the batch file and/or the DOS command.

Parameters:

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. 3-29: Example of using the CallProgram procedure for batch files

Indramat

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 3-49) 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	The cursor is moved to the left by one column. 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 <CursorLeft> as a global key. If necessary, that setting may be modified or even cleared. No parameters
GoRight	The cursor is moved to the right by one column. 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 <CursorRight> as a global key. If necessary, that setting may be modified or even cleared. No parameters
GotoTop	The cursor goes directly to the top screen margin. There is an audible signal if it is already there. No parameters

GotoBottom	The cursor goes directly to the bottom screen margin. There is an audible signal if it is already there. No parameters
GotoHome	The cursor goes directly to the top screen margin. There is an audible signal if it is already there. No parameters
GotoEnd	The cursor goes directly to the right-hand screen margin. There is an audible signal if it is already there. No parameters
GotoCursor	The cursor goes to the specified screen position (1st parameter). The position is specified in the X:Y format. Parameter: 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.
GotoUpForceVar	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. No parameters
GotoDownForceVar	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. No parameters
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   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.

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.

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.

Each machine function key knows three different states:

- not depressed,
- depressed, and
- executed.

Each state is represented by a different label.

To configure the machine function keys of an image, the following dialog is opened:

Bild3-30.PCX
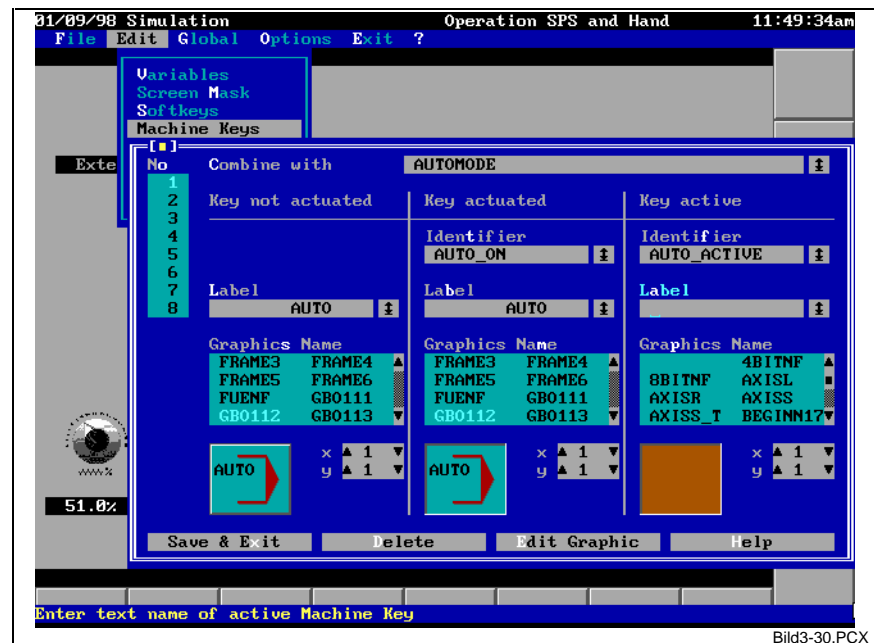
Fig. 3-30: Window used for editing machine function keys

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. Only 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. Only Boolean variables may be selected.

Note: The 'Key executed' state will be displayed rather than the 'Key depressed' state, if both are present at the same time,

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   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.
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 executed / variable   Name of the Boolean SPS 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.
With an empty input field, a selection of all available SPS variables is offered. Only Boolean variables may be selected.

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).

Key executed / annotation   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.

Key executed / graphic name   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.

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.

Delete   The settings of the selected machine function key are deleted <u>without any further inquiry</u>.

Peculiarities   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 3-49.

In contrast to soft keys, machine function keys <u>cannot</u> be used for loading images or executing procedures.

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 first steps/networks.

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.

Example

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.

The following variables exist in the SPS program:

- safe_closes   Start signal to close guard door A.
- safe_on   Latching flag that keeps the motor active after the start signal has been issued until a limit switch in the guard door responds.
- safe_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 'safe_closed' variable to become active. This activates the latching function in the SPS program, and the guard door is closed. Interpreting the 'safe_on' 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 'safe_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 'safe_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. An SPS key is the interconnection of a Boolean SPS 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 3-32. 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 an SPS key

The interrogation of the SPS keys (i.e. the interrogation of the values of the specified Boolean SPS variable) can be disabled with the 'SetSpsKeyOff' action, and be enabled with the 'SetSpsKeyOn' action (see page 3-32).

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.
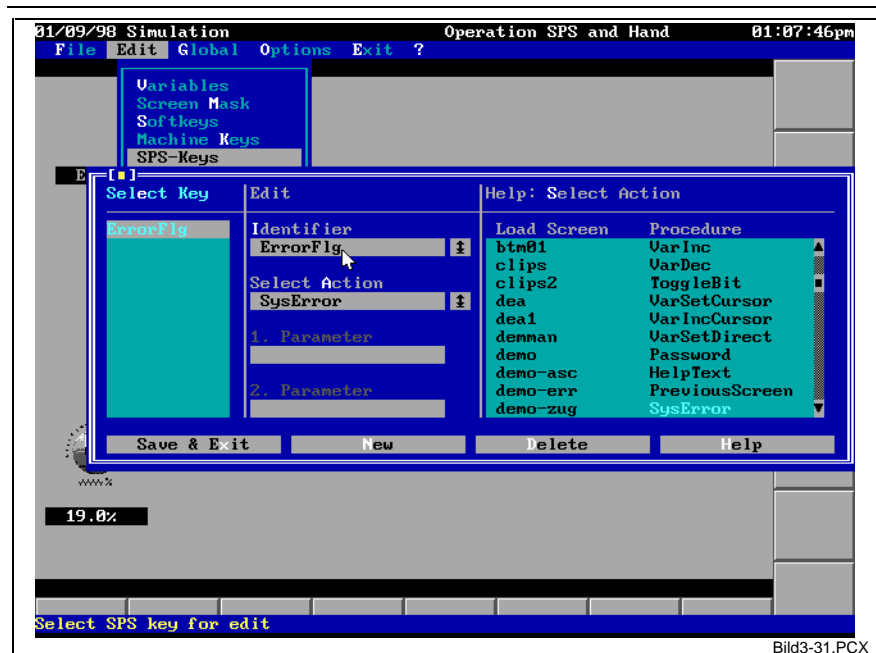
Fig. 3-31: Window used for editing SPS-Keys

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 3-51).

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	The cursor position can be defined when the image is loaded. This preselection is expedient if predefined procedures (see Chapter 'Editing Soft Keys', page 3-32) are used that employ the cursor position for selecting changeable variables. The cursor can immediately be positioned on such a variable. 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.
Peculiarities	None

3.3   Global Menu

Call	Global
Functionality	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.
Peculiarities	None

Setup

Call　　　　Global/Setup

Functionality　　The appearance of the Custom Display System can be modified. Arrangement, number and color of the soft keys, for example, may be changed.

Peculiarities　　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.
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.

Defining Colors

Call　　　　Global/Setup/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 3-27) 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
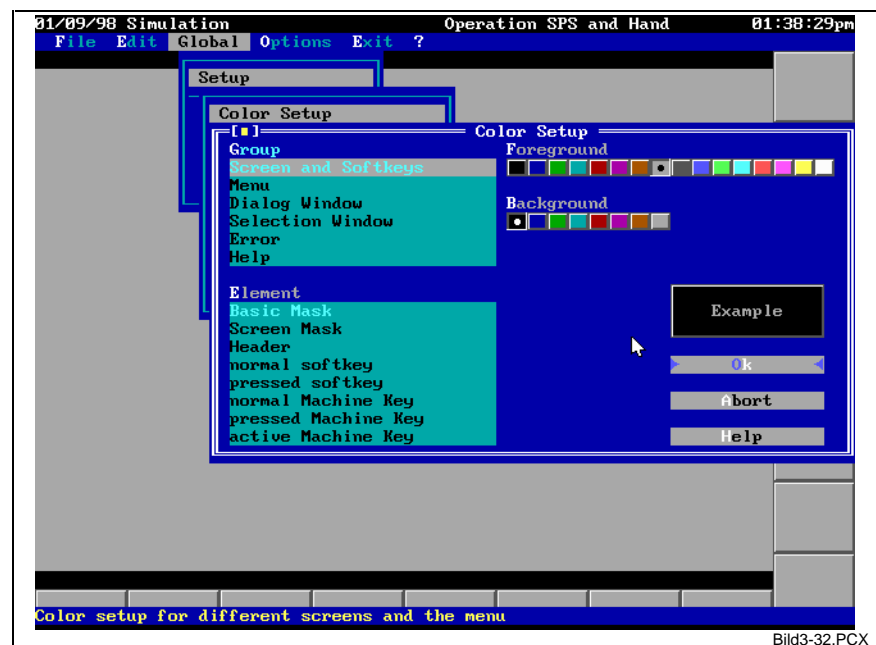
Fig. 3-32: Selecting colors

Defining the Soft Keys

Call   Global/Setup/Softkey

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 3-32).
A PC key that has already been interconnected with a global key (see page 3-49) can not be interconnected with a soft key.

Example
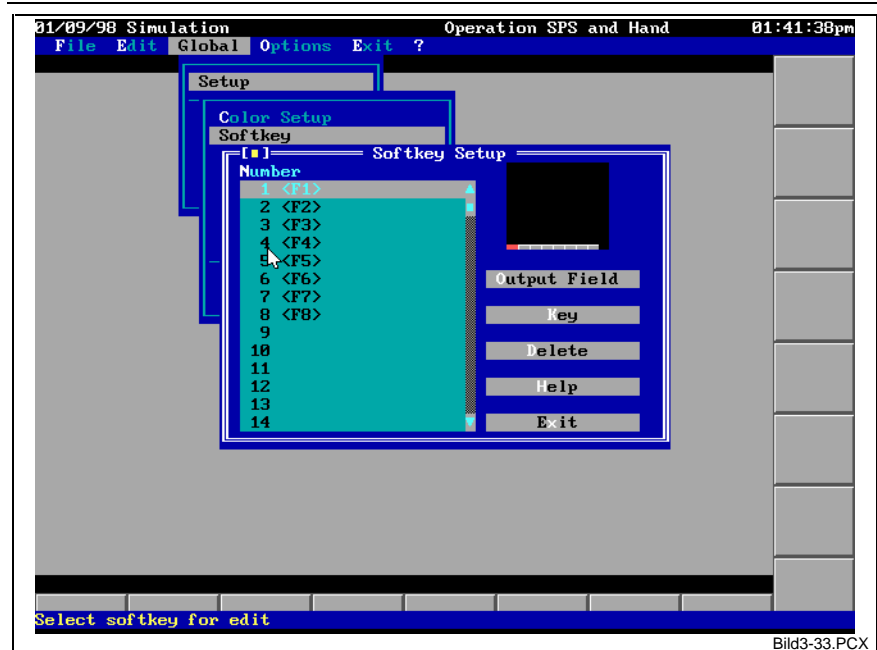
Fig. 3-33: Configuring Softkeys

Global Keys

Call   Global/Setup/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).

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 3-32).
A PC key that has already been interconnected with a soft key (see page 3-48) cannot be interconnected with a global key.

Example
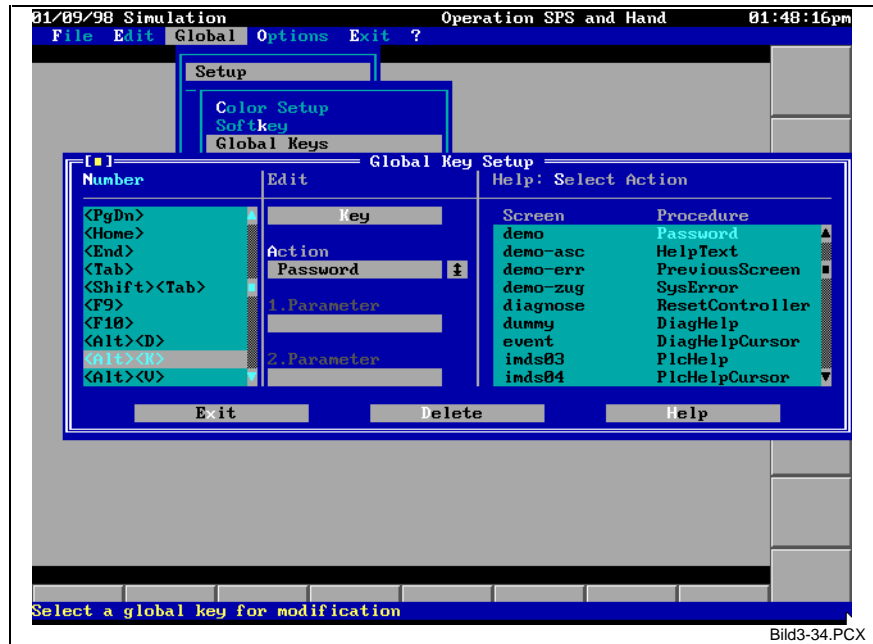
Fig. 3-34: Configuring Global Keys

Machine Function Keys

Call   Global/Setup/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 3-42).

> ⚠ **CAUTION**
>
> 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.
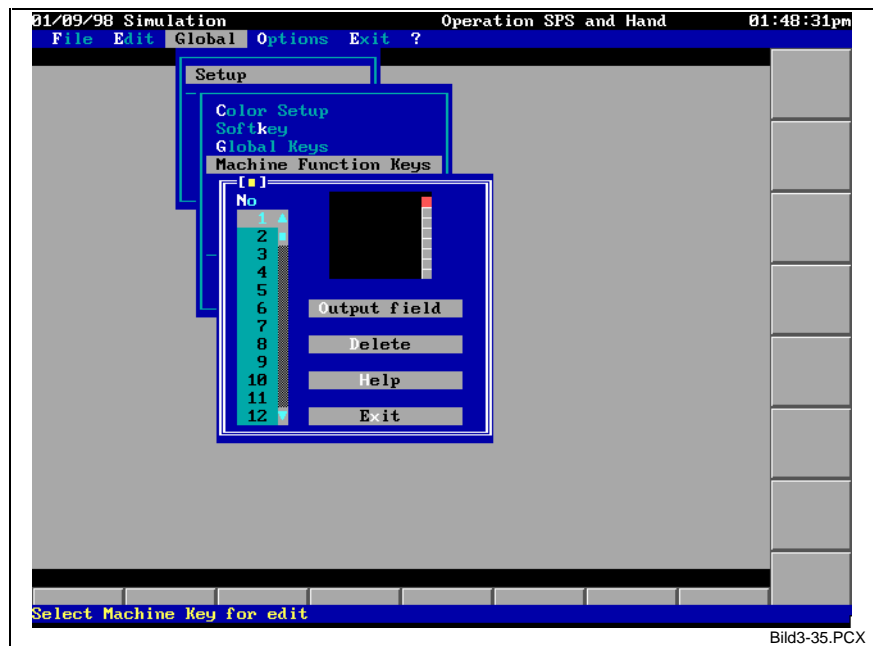
Fig. 3-35: Configuring machine function keys

Base Mask – Outer Border

Call   Global/Setup/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 3-27 ff). The difference is in the facts that

- 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/Setup/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/Setup/Banner Line

Functionality   Position and width of the single-line banner line are defined here.

Peculiarities   The banner line area is always one line.

Is 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/Setup/Line Characters

Functionality   All 10 available line types (swift line drawing using the <Shift>+Cursor-keys, see pages 3-28 ff and 3-29 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. 3-36. 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 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 characters 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.
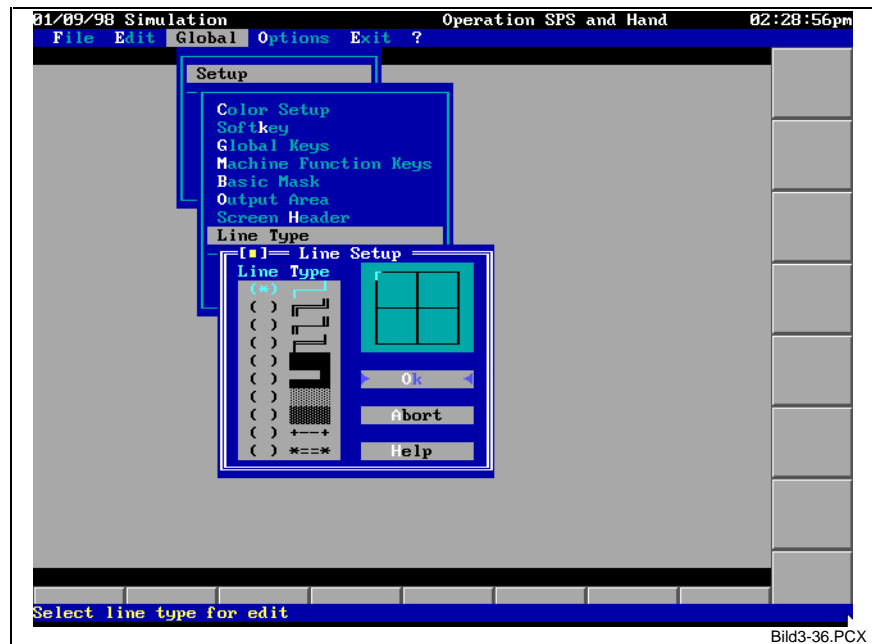
Fig. 3-36: Modifying line types

Loading a Complete Base Selection

Call   Global/Setup/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 3-52).

Peculiarities   None

Saving a Complete Base Selection

Call   Global/Setup/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. 3-37: 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 the 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. 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. 3-37).

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 3-55).

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 without any further inquiry.

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 3-55) can restore the file.

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. 3-38).
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 3-32)

Indramat
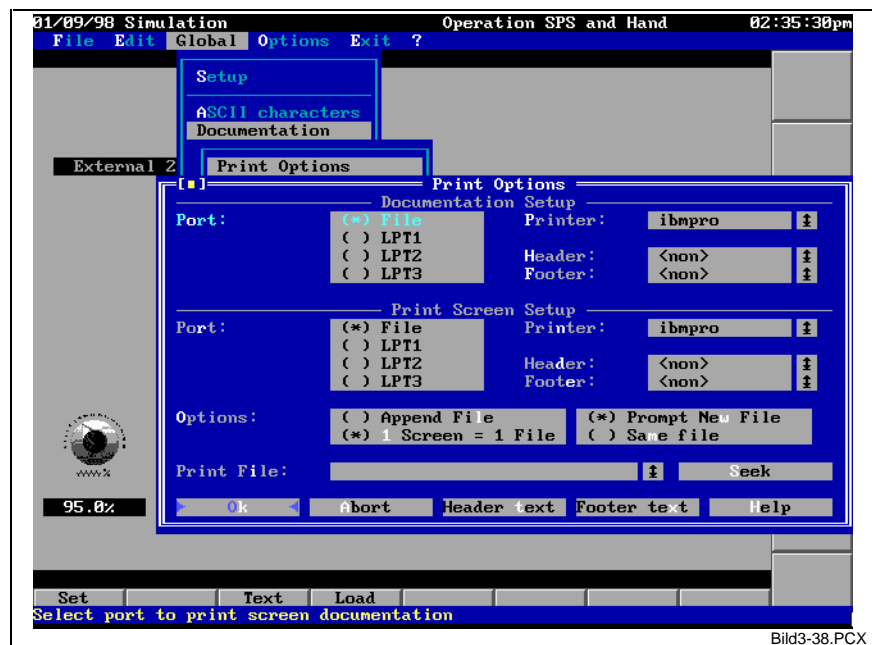
Fig. 3-38: Window for selecting print options

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

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.

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 3-58).

Footer text	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. 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 3-58).
Options/Extend file or 1 screen = 1 file	This selection is valid for the 'PrintScreen' procedure (see Chapter 'Editing Soft Keys', page 3-32). 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.
Options/Ask new file or same file	This selection is valid for the 'PrintScreen' procedure (see Chapter 'Editing Soft Keys', page 3-32). 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. 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.
Print file	This selection is valid for the 'PrintScreen' procedure (see Chapter 'Editing Soft Keys', page 3-32). 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. The selections made in the print file remain without effect if the options '! 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.
Header/footer texts	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 3-58).
Peculiarities	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.

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. 3-39). Such a text may contain a maximum of 6 lines and 255 columns. The <Shift>+<Cursor> key combination can be used for drawing lines.
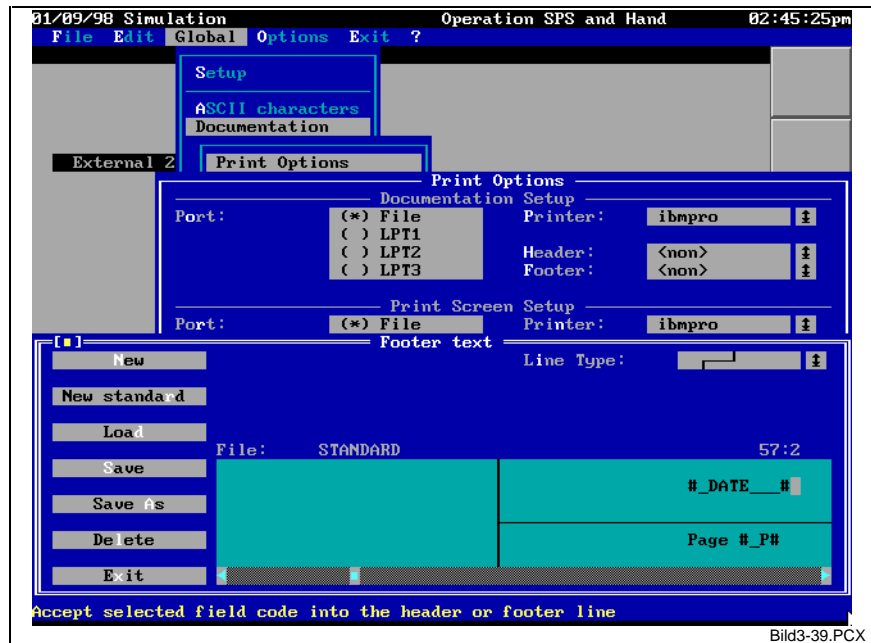
Fig. 3-39: Editor for header and footer texts

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 overtype 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.

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

CAUTION

There is an input assistant for entering the cross commands. Pressing the '#' character opens a selection window (see Fig. 3-40) 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.
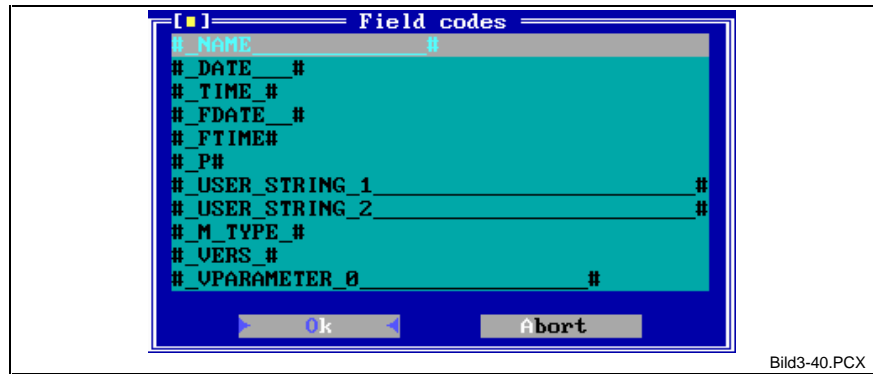
Fig. 3-40: Selecting cross commands

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 3-60) 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 3-61) 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', page 3-55). 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

 %POSOXNAME, 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,
 %POSOXNAME, 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

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


     SPS-Keys

 P00S.ERROR, Action=SysError, Parameter=()


     Machine Keys

 1:free
 2:free
 3:free
 4:free
 5:free
 6:free
 7:free
```

Fig. 3-41: 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 3-60). 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 3-61).
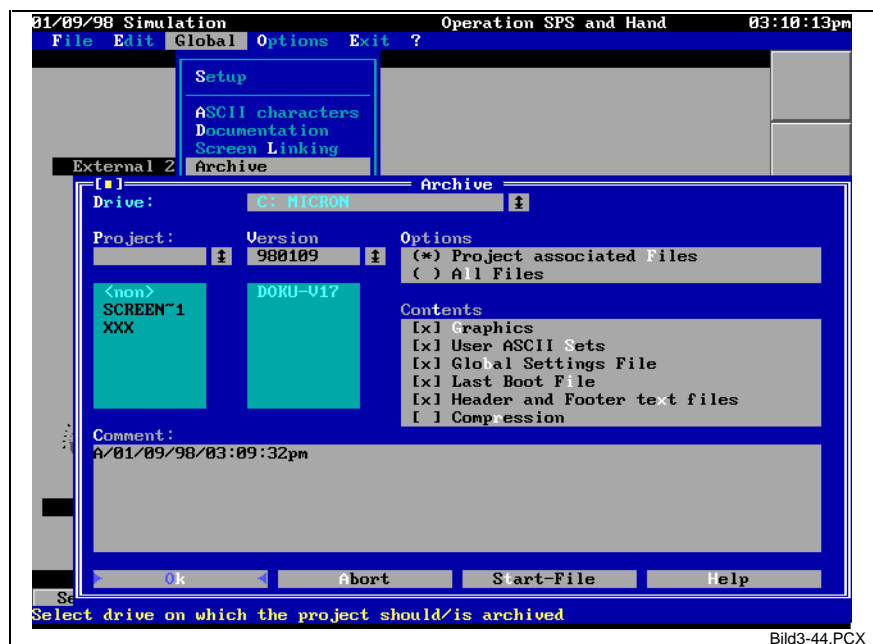
Peculiarities   The routine that determines all images that belong to the project always starts the analysis in the currently loaded image and looks along a network structure for all files that are interconnected directly and indirectly with that currently loaded image file. A currently loaded 'test 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 3-49).

When the printout is directed to a file (see Chapter 'Print options', page 3-55), 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   A table is set up that contains all files that belong to the project (see Fig. 3-42). All links between the individual image files and to graphics and ASCII character set files are listed here.

The *vertical axis* 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:

- image files that can 'call' via soft key or SPS key (above the separating line), and
- global keys (beneath the separating line)

The *horizontal axis* of the table (top line) contains all 'called' (i.e. all objects that can be called). Distinction is made between:

- image files that can be loaded,
- specified procedures,
- graphics files, and
- ASCII character set files
  (separated from each other by a vertical separation line).

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:

- SK   Called by a soft key
               (images, procedures, and graphics),
- SPS   Called by an 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

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.

Fig. 3-42: Example of image interconnection

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 an 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   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. 3-43). 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.

The number of the currently marked entries is shown beneath the selector field of all files. Marking previously marked entries unmarks them.

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.

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.

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 used 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 seperate dialogue exists to determine the contents of the 'start file'.
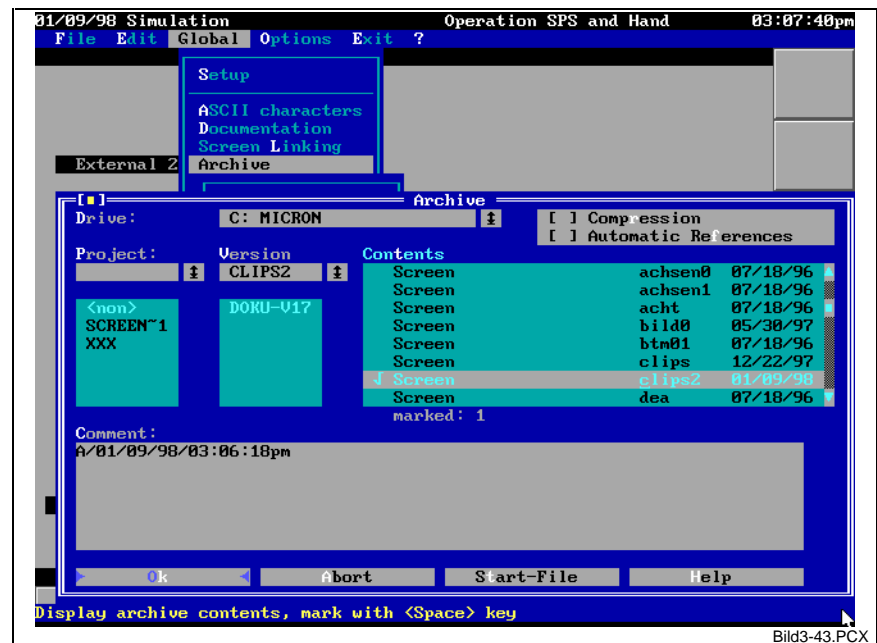
Fig. 3-43: File archive

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 '**Fehler! Verweisquelle konnte nicht gefunden werden.**', page **Fehler! Textmarke nicht definiert.**) 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 seperate dialogue exists to determine the contents of the 'start file'.

Fig. 3-44: 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 3-62). 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. 3-45). 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
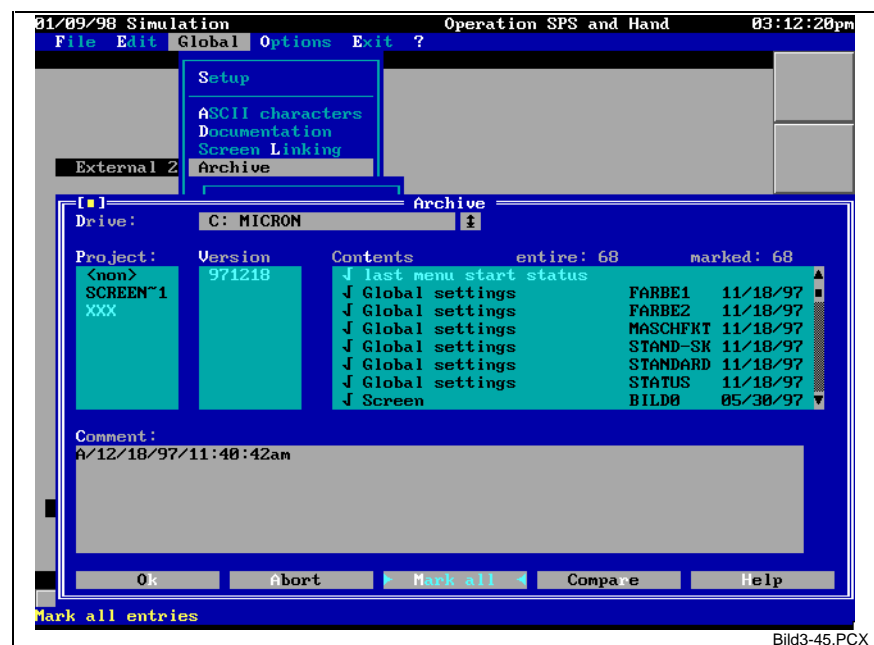
Fig. 3-45: Retrieving an archive

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. 3-45). 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(s)\File Archive\Start File

or

Global\Archive\Archive File(s)\Project Archive\Start File

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
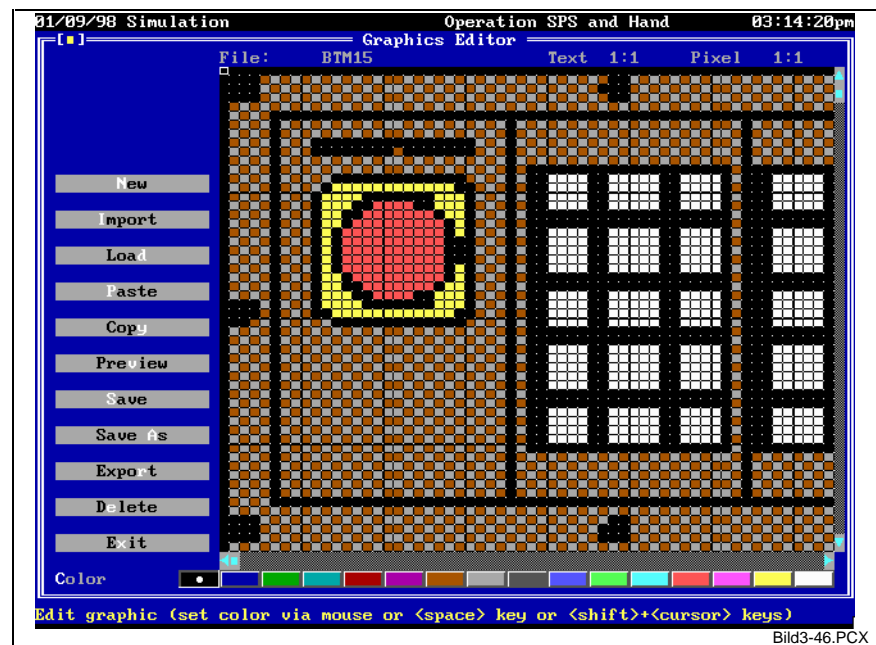
Fig. 3-46: Graphics editor with loaded graphics

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 3-51). 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 editor 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 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.

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. 3-46, 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 co-ordinates is displayed at the right-hand side, above the editor field.

There are three different methods of drawing a pixel in the currently selected color:

(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.

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.

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.

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.

The text grid in the editor field is marked by highlighted lines (see Fig. 3-46). This permits specific output fields to be created that can be used for variable output.

The preview function (see Chapter 'Graphics Preview', page 3-71), enables the real appearance of the graphics to be verified in its original size.

Peculiarities 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.

Importing Graphics

Call Global/Graphics/Import

Functionality 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.

There are import filters for graphics in PCX and BMP format.

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. 3-47). 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 3-51), the dimensions are reduced proportionally. The 'Size' check box in Fig. 3-47 permits the size to be defined with a sizing area that shows the exact size of the graphics.

Graphics in the Custom Display System can only 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 pallet' 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 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 correctly be recognized during adjustment. Frequently, dark gray, for example, is recognized as light gray. De-activating the option brings back 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.
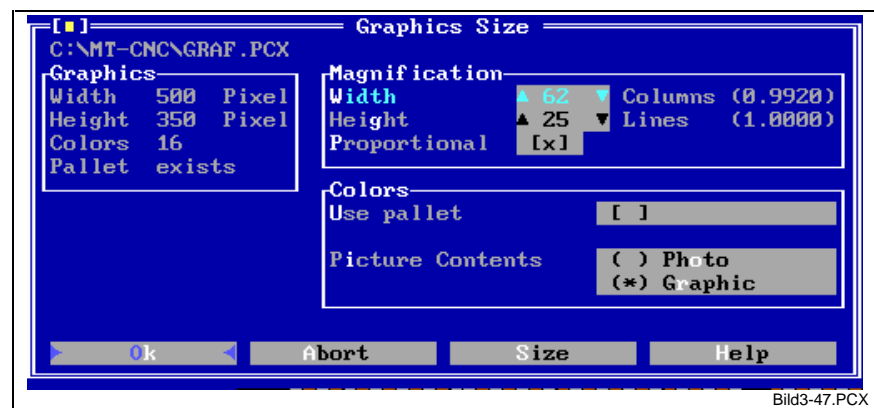
Fig. 3-47: Import selections for graphics

Indramat

<table>
<tr><td>**Peculiarities**</td><td>Note:</td><td>Has 'Photo' 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.</td></tr>
<tr><td></td><td></td><td>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.</td></tr>
<tr><td></td><td></td><td>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.</td></tr>
<tr><td></td><td></td><td>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.</td></tr>
</table>

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 The import filter should be set to the following values if those graphics are to be imported again:
- 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. 3-25).

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. 3-46. 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 3-67), 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. 3-46. 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.

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
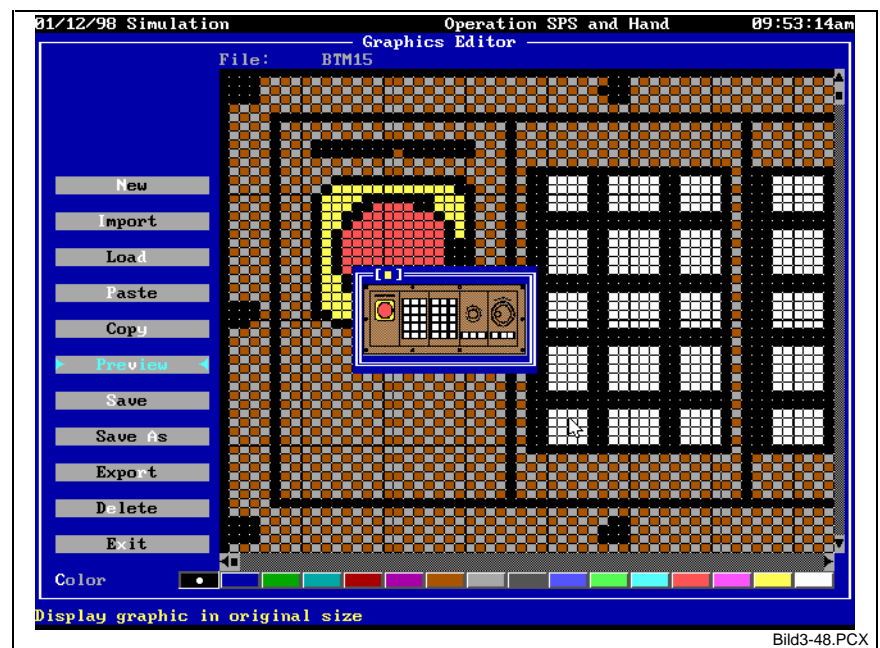
Fig. 3-48: Preview function of the graphics editor

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 3-72) 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. 3-25). 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.

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 continuos 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	$\rightarrow$	Values change at maximum speed (depends on PC and data quantity)
medium	$\rightarrow$	Approximately 0.22 seconds elapse between two value changes
slow	$\rightarrow$	Approximately 1 second elapses between two value changes
OFF	$\rightarrow$	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
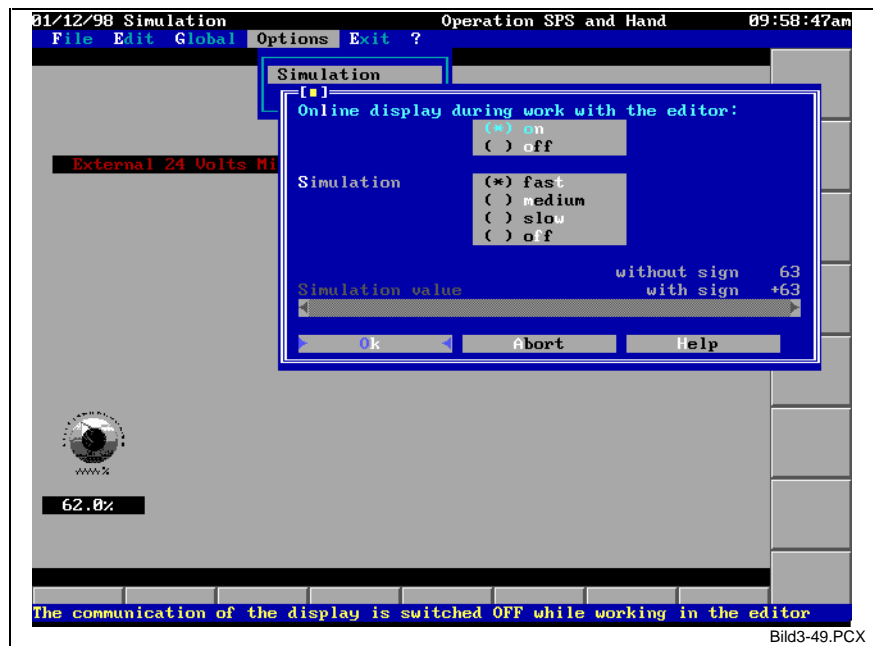
Fig. 3-49: Selections for simulation

Editor Selections

Call　　Option/Selection

Functionality　　This menu item contains selections for working with the editor.

In the default setting, selecting the <F1> key displays the editor-related help. A different key may be used if the plant features a help key with a fixed label. This windows permits the necessary adjustments to be made.

The 'Audible output' button permits all sound outputs to be switched off (e.g. upon error messages, or when a soft key is pressed).

The 'Use mouse' button controls the utilization of the mouse. Distinction is not made between using the mouse in the editor and using it for machine handling.

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
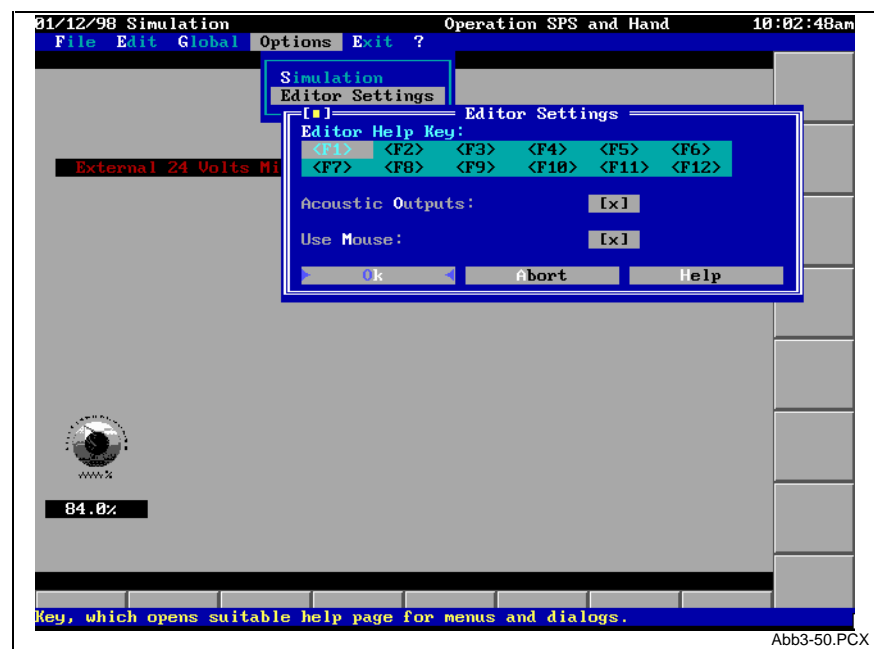
Fig. 3-50: Editor selections

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 16 to Version 17

Call	?/What is new in version 17
Functionality	The help system is started. The start page is an overview that contains the major changes in that version of the Custom Display System, that are listed below:

This version of the Custom Display System has experienced various changes and extensions that chiefly make the program 'round'. They show in many small details that make handling easier and give the resulting interface a smarter appearance.

The following is a list of the major changes:

- The image editor possesses a complete integrated help system (this window). This help, that is available to all menu items and all dialogs, is activated by selecting the <F1> key or the corresponding help switches. The help to a topic may be several pages long, and may contain cross references to related topics. Selecting <Alt>+<F1> returns you to previously displayed help pages.

- Axis position values can now be displayed in program and in machine co-ordinates. The syntax has been enhanced accordingly. The PROG and MACH keywords define the reference system. The input assistant for axis position values has been enhanced.

- ARRAY elements from the SPS program may now be used as variables. However, only elementary data is displayed. This means that only individual ARRAY elements are displayed, never a complete ARRAY. Constants must be used for indexing an ARRAY; control variables are not supported.

- Soft keys and machine function keys can now be labeled with text and with graphic elements at the same time. The graphic element can be placed anywhere on the button area. The input assistants have been enhanced such that a preview of the label is always displayed.

- The previous display elements bars and scale are now graphic elements. Besides a nicer appearance they feature a much finer resolution. Filling patterns for bars are no longer supported.

- There is a new indicator element, the measuring instrument. It works like a scale, but has a different appearance.

- The fill-up form is another new indicator element. It permits any process-related forms to be filled. this is achieved by a simple yet efficient trick. Two graphic elements are placed on top of each other. One represents the empty state, while the second one represents the full state. The value-related boundary between the two graphic elements represents the filling level . A fill-up form is a mixture of a bar and graphics.

- The editing window for variables, that has jointly be used for all display formats, no longer exists. Instead, there is a separate dialog for each indicator element. Those dialogs are much better adapted to the features of the individual elements. The operator guidance in the dialogs has significantly been improved. There is a continuous result preview ('Look & Feel').

- Some of the previously used display formats are combined in new indicator elements. All absolute number outputs (binary, decimal, ...) have been united in a 'number display' indicator element. Likewise, different directions of scales and bars have been split up. There is now a total of eleven different indicator elements. These are
  - standard display
  - numeric display
  - percent valued display

- 2 texts
- 2 colors
- changing colors
- bar indicator
- scale indicator
- measuring instrument
- plant message, and
- fill-up form

- Creating a new indicator element (Edit/Variables/New) now requests the required indicator element to be selected. The indicator element will then immediately be filled with sensible start values that must merely be adjusted to the requirements.

- There is no more limitation of the number of graphics in the image mask (background) and of the number of variables. Only the available memory in the computer delimits the number.

- Graphic elements in then image mask (background) are now output on the screen in the specified sequence on top of each other. This means that the first graphic element is at the bottom and the last one at the top. New graphic elements are inserted in the graphics list at the current cursor position.

- Options in the image mask dialog enable all variables and/or text elements that are located on the output area of background graphics to be moved together with those graphics. This eliminates the cumbersome process of subsequently moving the individual indicator elements that animate the graphics.

- All color selections are now implemented with the color switches that are known from the graphics editor. Branching to a separate color window is no longer necessary.

- In analogy to the menus, the right-hand mouse button can now be used for aborting and exiting a dialog. Depending on the dialog, there may be an inquiry.

- If the integrated image editor has been opened but the dialog not yet been started (only the menu is visible), double clicking the mouse button on the individual image components is possible. This opens the dialog for the encountered element. If an element is not found at the mouse position, the dialog for the image mask appears. This is a very easy possibility of modifying existing images without extensive searching.

- In all dialogs that employ graphics, a separate switch [graphics editor], double clicking the mouse button, or pressing the <Space> bar on the graphic name directly opens the graphics editor. The graphics file is loaded automatically. The graphics file is loaded automatically.

- In all dialogs that contain a miniature position overview image (e.g. variable selection), the mouse button may be clicked on that image. The cursor jumps to the matching entry in the associated list. Usually, double clicking permits the entry to be edited (e.g. invoking the dialog to edit an indicator element).

- The graphics editor has an additional switch [Export] that permits the currently loaded graphics to be written as a PCX file.

- When graphics are imported, the zoom factor in x and y direction is displayed when the size of the graphics is defined. This is expedient to avoid beats in color-reduced graphics. This happens if the required size has been reduced by an integer multiple of the original size of the graphics.

- PCX and BMP graphics with palette information (virtually any 256-color graphics) and higher resolution (up to 24 bits; 'true color') can now be imported in the graphics editor. The colors are always reduced to 16, using different reduction principles. Either only the matching one of the 16 DOS colors is used (principle: 'most similar color') or the colors are

allocated according to the 'error distribution' principle. For this purpose, there is an additional 'Image type' option in the import function. The 'Photo' selection should be used for importing photo-realistic images. The 'error distribution' principle is used in this case. Thus, graduated color transitions are represented as realistic as possible. The 'Graphics' selection is suitable for importing schematic representations. Here, the 'most similar color' principle is used. Colored surfaces are represented as such. During import, it can additionally be defined whether or not the color palette, that usually accompanies each graphic element, shall be taken into consideration (Graphics import/Palette). Activating that option is expedient in most cases because this is the only way of recognizing the actually employed colors in the graphics. The only exception are graphics that have already 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 correctly be recognized during adjustment. Frequently, dark gray, for example, is recognized as light gray. De-activating the option brings back the correct colors. The selections 'Don't use palette' and 'Graphics' corresponds to the import behavior of the previous versions.

- In addition to the previous position indication, the graphics editor shows the position in the text grid. This is expedient when graphics are used as the background of variable outputs and if specific output areas shall be created for it.

- The <Alt>+Cursor keys can be used in the graphics editor for scrolling the graphics pixel by pixel. The components removed at one side are inserted at the opposite side. Pressing the <Alt>+<Backspace> keys cancels all modifications made to the pixels in a graphic element.

- There is an additional entry option on the main menu line. The related pull-down menu has the simulation entry allocated. Here, the speed of the simulation and the on line display during the work in the editor can be influenced. A peculiarity is that a specific display value can be set (using the bars) when simulation is switched off. This permits easy testing of indicator elements in off line mode.

- Internally, the archive no longer distinguishes between project archive and file archive. Albeit this distinction if still offered during storage, it is merely used for gathering the stored data in different ways. Distinction is not made when archives are fetched or deleted.

- In file archiving, there is now an additional 'Automatic reference' switch. If this switch is set, all graphics and ASCII character set files are automatically included in the marking when an image or base selection file is marked. Thus, individual images may now be archived completely. References to other image files are not taken into account. The total number of marked files is displayed.

- Archives may now be compressed. This can be done through an option in the archive dialog. This option drastically reduces the space required by the archives, in particular those which contain graphics. Due to the additional packing and unpacking, the procedures takes a bit longer.

- The new 'LoadArchive' function is available for the utilization in conjunction with soft keys and global keys. This function permits archives to be fetched without opening the editor. The password privilege for editing images is required. All files that are found in the archive will be overloaded without previous safety prompt. The screen is then updated so that all modifications become active immediately. This action shall enable the machine operator to load new files in a run version (version without an editor).

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 IN-DRAMAT menu items, <Alt>+<V> is also used for displaying the version).

Example
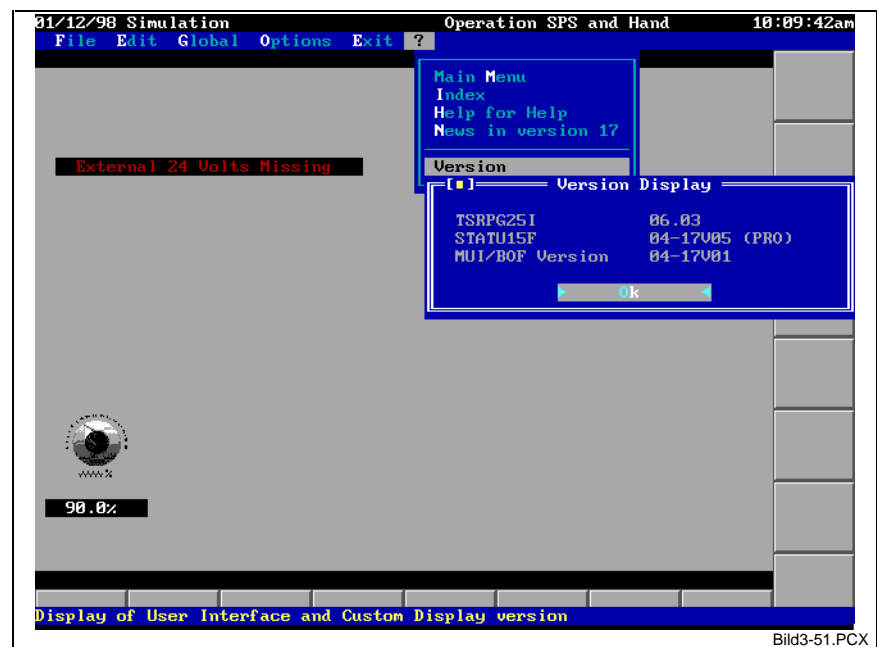
Fig. 3-51: Version display

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.

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Indramat

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5   Figure

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Kundenbetreuungsstellen außerhalb Europa / USA
Service agencies outside Europe / USA

Notes