PALPC

Programming Software for isel Controls

Programme operation

Overview of the programme functions

This section of the manual provides a general overview about the common structure of PALPC and the operation of the programme.

You will find a description of the PALPC programming language as well as samples for the solution of automation problems in the manual PALPC Programming Instruction resp. in the PALPC Online help.

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1 Menus

1.1 Menu File

Commands of the Menu File

The Menu **File** contains the following commands:

New	Creates a new document
Open	Opens an existing document
Close	Closes an open document
Save	Saves an open document under its filename
Save as	Saves an open document under a given filename
Print	Prints the document
Print Preview	Presents the document on the screen the way it would look printed
Print Setup	Chooses a printer and a printer connection
Exit	Ends PAL-PC

1.1.1 New

File - New

Use this command to create a new document in PAL-PC.

If you always need the same essential structure as the basis of your new programmes, then you can define an automatic code generation for this basic structure. Choose the menu item "Preferences - Editor - Automatic Code Generation". With every creation of a new file, this basic structure will be inserted automatically after generating the new PAL-PC source file.

To open an already existing file, use the command "Open."

Shortcuts

Toolbar:
Keyboard: Ctrl+N

1.1.2 Open

File - Open

Use this command to open an existing document in a new window. Several windows can be opened at the same time. With the help of the menu **Window,** you can switch between the several opened documents. Refer to: The command Window 1, 2, etc.

Hint: With PAL-PC Version 2.0 (PAL-PC V2.0) onwards you will be able to open and edit PAL-source files that were created by any version of PAL-PC up to Version 1.5 (PAL-PC V1.5). Since in PAL-PC V2.0 some functional and syntactic extensions were added, the editing of files with PAL-PC V1.5 that were created with PAL-PC V2.0 cannot be guaranteed.

You can create new documents by selecting "File - New".

Shortcuts

Toolbar:
Keyboard: Ctrl+O

1.1.3   Close

File - Close

Use this command to close all windows that contain the active document. PAL-PC will then suggest that you save changes on your document before closing. If you close a document without saving, all changes, which you have made since the last saving of the document, will be lost. Before a document will be closed without a title, PAL-PC will prompt the dialogue field "Save under" and suggests naming the document and then saving it.

A document can also be closed with the help of the closing symbol, as shown in the following:

1.1.4   Save

File - Save

Use this command to save the active document under its present name and directory. The first time a document is saved, PAL-PC will prompt the dialogue field "Save under", so that you can name your document. If you would like to change the name and the directory of an existing document, you can choose the command "Save under" as well.

While working with PAL-PC you should, during the creation of the programme, occasionally make use of the function "Save", in order to secure intermediate results.

Shortcuts

Toolbar:
Keyboard: Ctrl+S

1.1.5   Save under

File - Save under

Use this command to name and save the active document. PAL-PC will prompt the dialogue field "Save under", so that you can give your document a name.

This function is particularly useful if your existing document was already processed in similar form. The available file can then be stored under another name and be used as a basis for the new project.

To save a document under its existing name and directory, use the command "File - Save".

1.1.6   Print

File - Print

Use this command to print a document. With the selection of this command, the dialogue field "Print" appears, in which you can specify the page range you want printed, the number of copies, the executing printer and other preference options of the printer.

Shortcuts

Toolbar:
Keyboard: Ctrl+P

1.1.7   Print Preview

File - Print Preview

Use this command to view how the active document would look printed. By choosing this command, the main window will be replaced by the preview window, in which one or two pages are presented in printing format. In the toolbar of the preview window, you will have the possibility of specifying whether or not you want one or two pages to be shown at the same time. Furthermore, you can move forwards and backwards in the document, scale up or down pages, or start a printing job.

1.1.8   Print Setup

File - Print Setup

Use this command to assign a printer and a printer connection. After choosing this command the dialogue field "Print Setup" appears, with which you can determine the printer and its connection.

1.1.9 The commands 1, 2, 3, 4 (Menu File)

File - 1..., 2..., 3..., 4...

Use the numbers and file names listed at the end of the menu file in order to open one of the last four documents you have closed. Thereafter, choose the number of the document you would like to open.

1.1.10 Exit

File - Exit

Use this command to end your session with PAL-PC. Alternatively, you can choose the command "**Exit**" from the system menu of the application. PAL-PC will then ask you if you want to close the documents with unsaved changes.
.

Shortcuts

Mouse:	Double click on the system menu of the application

Keyboard:	ALT+F4

1.2 Menu Edit

Commands of the menu Edit

The menu **Edit** contains the following commands:

Undo	Undoes the last editing operation
Redo	Repeats the last Undo operation
Cut	Deletes text from the document and transfers it to the clipboard
Copy	Copies text from the document to the clipboard
Paste	Inserts text from the clipboard into the document
Paste Special	Inserts a link to text from another application from the clipboard

Select all	Selects the entire text in the current editor window
Find	Searches for a certain word or text in the current document
Find next	Searches for further occurrences of the previously searched text
Replace	Searches for text and replaces it by another text
Goto line	Jumps to the line with the desired line number
Teach-in/Move axes manual	Makes it possible to insert "move" instructions at the current cursor position
Execute up to current line, start Teach-in	Part execution of a programme up to the cursor position, and subsequently, initiation of the "Teach-in" procedure

1.2.1 Undo

Edit - Undo

Use this option to undo the last editing action(s) in the editor, if it is possible. If the last action cannot be undone, the command **Undo** will not be accessible. In order to process an undone edit operation again, use the command "Edit - Redo".

Shortcuts

Toolbar:
Keyboard: Ctrl+Z or
            ALT-Backspace

1.2.2 Redo

Edit - Redo

Use this option to redo the last undone operation from the editor window, it this is possible. This means that changes of the text in the editor can be undone in steps with "Edit - Undo", conversely, these changes can be recalled in steps with the "Redo" option.

1.2.3 Cut

Edit - Cut

Use this command to remove the current marked text from the document and to transfer it to the clipboard. The command cannot be chosen if no text has been marked.

Cutting and transferring the text to the clipboard replaces the text that was previously there.

Shortcuts

Toolbar:
Keyboard: Ctrl+X

1.2.4   Copy

Edit - Copy

Use this command to copy the marked text to the clipboard. The command cannot be chosen if no text has been marked.

Copying the text to the clipboard replaces the text that was previously there.

Shortcuts

Toolbar:
Keyboard: Ctrl+C

1.2.5   Paste

Edit - Paste

Use this command to insert a copy of the content of the clipboard at the insert position. This command will not be available if the clipboard is empty.

Shortcuts

Toolbar:
Keyboard: Ctrl+V

1.2.6   Paste special

Edit - Paste Special

This command opens the dialogue field "Paste Special". With the dialogue field "Paste Special", the content of the clipboard, which could be in a different format as used by PAL-PC, can be absorbed into the current document.

Paste

    Click on this to paste the copied data into the document. Changes in the inserted data will not be reflected in the original document, and changes in the original document will not influence this document.

As

    Is used to define how the data are inserted into the document. This option is not available for all document types. For a PAL-PC document you should, in general, select the option "Unformatted text".

Result

    Shows a preview of the made selection. With this, you can experiment with different selections without having to insert the data into the document.

If you like to insert the data into the current document, click on "OK". In order to cancel the procedure, select "Cancel" or "ESC".

1.2.7   Select all

Edit - Select All

Choose this command in order to select the entire text of the current document and to proceed with an operation with this selection of text, e.g. copy to clipboard.

1.2.8 Find

Edit - Find

This command opens the dialogue field "Find". With its assistance, you can search for the required text within the active document. If the search procedure should be successful, PAL-PC marks the found text and the dialogue field "Find" will be closed. If no match was to be found, PAL-PC indicates that the text was not found.

Find
Is used to enter the text that should be found. This can be one or several words.

As word
Searches only for complete words, which means the search text will not be found if it is part of a longer word.

Upper and lower case
Will find only text where the upper and lower cases appear in the same way as in the text that you previously entered in the field "Find".

1.2.9 Find next

Edit - Find next

Use this command to repeat the last, or most recent, search procedure.

Shortcut
Keyboard: F3

1.2.10 Replace

Edit - Replace

This command opens the dialogue field "Find and replace". To replace text within the current document, proceed as follows:

- Enter in the field "Find", the text you would like to replace, which can be one or several words.

- Insert in the field "Replace", the text, which should replace the found text.

- If you would like to replace all found text passages at once, click on "Replace all".

- To individually replace the text at the passages where it occurs, click on "Find next" and then "Replace".

1.2.11   Goto line

Edit - Goto line

Opens a dialogue field where you can enter a line number at which, after clicking "OK", the cursor will be positioned.

1.2.12   Teach-in/Move axes manual

Edit – Teach-in/Move axes manual

Overview
Preparation of the "Teach-in"
Preferences and Operation
Takeover of commands into to the PAL-PC source file
Paste and overwrite mode

Overview

This command opens the dialogue field "Teach-in/Move axes manual". With the help of this, you can:

- Move the axes of the machine "manually".

- Address positions by using the "Teach-in Programming" and transfer as a PAL-command into the active document. For this work variant, an opened PAL-PC source file is necessary, in which commands formatted by the "Teach" dialogue can be inserted.

If no window with a document is open, you can use the dialogue field to move the axes of the machine manually, e.g. for service purposes or for simple procedures (drilling, slot milling, etc.)

The actual purpose of this dialogue is the so-called "Teach-in". This means that the axes can be moved to a certain position that will be taken up later in the process. This position can be adjusted as a PAL-PC command with a click on the button "Normal" or "Fast" at the current cursor position into the active document. The generated command is thereby formatted.

```
"Normal"   moveto   100.00(xx),    50.00(yy),    50.00(zz),0(32);
"Fast"     moveto   150.00(x),    100.00(y),     50.00(z),0(32);
```

The position to be moved to is X = 100 mm, Y = 50 mm and Z = 50mm. The used speed is xx, whereby xx is a substitute symbol for one in the declaration block of the programme-defined step frequency. Because of this, at the beginning of the PAL source file, the following lines, for example, should be written in the declaration block, which determine the speed or step frequency:

```
#define (xx)  (1000);
#define (x)   (1500);
#define (yy)  (1000);
#define (y)   (1500);
#define (zz)  (1000);
#define (z)   (1500);
```

Preparation of the Teach-in

The "Teach-in" process can be prepared by using several actions. To select these actions the following dialogue "Preparation of the Teach-in" is used.

Now you can choose which action should subsequently be executed.

Execute a Soft-Reset
> Choose this option to send the "Reset" command to the controller before going on to work with the controller. The Reset command can be used, for example, to end a running programme that is in the memory of the interface card. Normally the controller does not accept DNC-commands if the programme in the memory is running. By using the "Reset" command, the running CNC-programme will be terminated and further work in the "Teach-in" mode is possible.

Process a reference move of all axes
> A reference move of all axes will be initiated. You should activate this option if you always have to refer your task in the "Teach-in" mode to the machine zero point.

Set the current reached position as zero point
> This option selects the reached position as the "Teach" zero point. This option is to be activated if you have a preference for using a taught motion sequence in several places in your programme, e.g. for repeated milling of a break-through at different positions on the workpiece. At the first output position the motion sequence will be taught, and, at the following positions, inserted as a copy after activating a local zero point with "#null xyz".

Delete the programme memory of the controller
> Before opening the "Teach" dialogue, the programme memory of the controller will be deleted. This option is compatible with the current controller types, however, it is primarily meant for work with future controller types.

Preferences and Operation

The controller elements of the dialogue have the following functions:

Step range
> With this combination field, you can adjust the step range. The step range is the covered distance that is maximally driven if the respective key for the axis movement remains held down until the end of a movement.

Vteach [Hz]
> This control element makes the adjustment of the current step frequency, as used in the

dialogue field, possible. The step frequency will be indicated in Hertz.

Position abs.

Here you can see the "absolute" position of the axes that corresponds to the reference point of the machine. The scale of the position will be in millimetre.

Position rel.

Shows the "relative" position of the axes that corresponds to the zero point set previously. For simpler movement on well-known routes, a zero point can be set at any position, to which this scale then refers. The zero point can be set by pressing the button "0".

Movement of the axes

This button is used to move the axes. Depending on the adjusted step range, the complete route will be driven if the button is kept held down, or a partial route of the adjusted step range will be driven if the button for the movement of the axes is released earlier.

Reference

Proceed with a reference movement of all axes of the machine.

Teach-"0"

Sets a local zero point. At this local zero point the position designation, as indicated by "Position rel.", is set.

Preferences

Opens a dialogue in which you can specify the behaviour in the "Teach-in" mode

The option "movements with adjusted step range proceed to the end" means that movements, once started, will be continued until the end of the adjusted movement route, even if the corresponding function key is not held down anymore. Therefore, you should only choose this option if you require movements with constant distances for your application.

The option "terminate movement by releasing the respective key" causes the cancellation of a commenced movement as soon as the respective function key is released. You should use this option in order to avoid the accidental collision with the superstructures, spindles, accessories, etc. of your equipment.

Takeover of commands in the PAL-PC source file

Normal Abs.
Detects the current position, formats a command in the PAL-source code syntax and inserts this command into the text at the current cursor position in the source code if a window with a PAL-document is open. The step frequency of the respective axes is denoted in the created command by the shortcut xx, yy or zz. The movement command used is the instruction for a movement to an absolute position, whereby the coordinates that refer to the machine zero point are used.

Example of a created instruction line:
```
moveto    46.50(xx),    37.15(yy),   -23.73(zz),0(32);
```

Fast Abs.
Detects the current position, formats a command in the PAL-source code syntax and inserts this command into the text at the current cursor position in the source code if a window with a PAL-document is open. The step frequency of the respective axes is denoted in the created command by the shortcut x, y or z. The movement command used is the instruction for a movement to an absolute position, whereby the coordinates that refer to the machine zero point are used.

Example of a created instruction line:
```
moveto    18.40 (x),    32.55 (y),   -13.73 (z),0(32);
```

Normal Rel.
Detects the current position, formats a command in the PAL-source code syntax and inserts this command into the text at the current cursor position in the source code if a window with a PAL-document is open. The step frequency of the respective axes is denoted in the created command by the shortcut xx, yy or zz. The movement command used is the instruction for a relative movement whereby the coordinates that are used are the ones available after setting a local zero point.

Please consider the following:
A local zero point can either be defined by the command "#null x,y,z;" in the declaration part, or by activating the button "Teach-0" in the "Teach" dialogue. If you would like to use the local coordinates, you should, in any case, insert the instruction "null xyz;" into your PAL-PC-programme before the insertion of the taught position.

Example of a created instruction line:
```
moveto     9.75(xx),    14.32(yy),    -7.33(zz),0(32);
```

Fast Rel.
Detects the current position, formats a command in the PAL-source code syntax and inserts this command into the text at the current cursor position in the source code if a window with a PAL-document is open. The step frequency of the respective axes is denoted in the created command by the shortcut x, y or z. The movement command used is the instruction for a relative movement whereby the coordinates that are used are the ones available after setting a local zero point.

Example of a created instruction line:
```
moveto    17.90 (x),    21.98 (y),   -12.68 (z),0(32);
```

Please consider the following:
A local zero point can either be defined by the command "#null x,y,z;" in the declaration part or

by activating the button "Teach-0" in the "Teach" dialogue. If you would like to use the local coordinates, you should, in any case, insert the instruction "null xyz;" into your PAL-PC-programme before the insertion of taught position.

Paste and overwrite mode

Position the cursor over the PAL-PC source file wherein you would like to insert the movement instruction.
When inserting the text, please consider that, depending on whether the paste mode or the overwrite mode in the editor is active, the subsequent behaviour of the programme will be different.

Active overwrite mode:

Active paste mode:

If the paste mode is active, a complete instruction line, as well as a line break, will be inserted. If the cursor is positioned at the beginning of a line in which some text is already present, then this line will be shifted downward. If the cursor is positioned in the middle of a line with text, the "move" command will be inserted at the cursor position and the rest of the original line will be shifted downward. As a precaution, check the position of the cursor before you give the instruction to insert a "move" command.

If the overwrite mode is active, the existing line from the cursor position onwards will be overwritten. At the end of the line no real line break will be inserted; the cursor is only moved to the beginning of the next line.
The insertion of commands from the "Teach" dialogue in the overwrite mode is useful if you have, for example, a general programme framework for a task in which process one or more positions have to be taught. In this case, you may proceed as follows:

Open a template file or create a new PAL-PC-file with the automatic generator of a programme framework.

Execute the programme until the point at which the target position has to be taught.

Position the cursor at the first line of insertion. Check whether the overwrite mode is active. You can see this by referring to the status bar; the active overwrite mode is indicated by "ÜB". In the line of insertion, you can also leave a comment that describes the position that has to be taught. In this case, the positions for comments should be marked by prefixing space characters and not by tabulator characters. Please also ensure that sufficient space for characters is inserted for the expected length of the command that will be inserted in front of the comment.

Example:

Before the insertion of text, the source code is as follows:

```
                                              {First position for
measurement}
                                              {Safety height after
measurement}
```

After inserting the first taught position, the source code is as follows:

```
move      17.90 (x),    21.98 (y),   -12.68 (z),0(32);  {First position for
measurement}
                                                        {Safety height
after  measurement}
```

1.2.13 Execute up to current line, start Teach-in

Edit - Execute up to current line, start Teach-in

This function runs the PAL-PC-programme in the active window up to the position of the cursor and, afterwards, commences the dialogue for the "Teach-in" programming. If you have a PAL-PC-source programme, which, for example, works with relative movements in a continuous loop, you can consider this circumstance with the help of partial execution of the programme.

Further hints for the "Teach-in" programming: <u>Edit – Teach-in/Move axes manual</u>

Restrictions:

Partial execution of the programme - for example, if you work with forward jumps to branch target (labels) - is not possible. In this case, an error message will occur.

Example:

```
set_port 65529,128=0;                           {All exits on 0}

Check:
on_port 65531,1=0,4;                            {Bit 1 active:
Continuing 1...}
on_port 65531,2=0,4;                            {Bit 2 active:
Continuing 2...}
goto Check;

goto Start1;
goto Start2;

move  20(1000),0(1000),0(1000),0(1000);         {Basic position test}


Start1:                                         {Branch target 1}
move 50(1000),50(1000),0(1000),0(1000);         {Start position 1}

Start2:                                         {Branch target 2}
move 50(1000),100(1000),0(1000),0(1000);        {Start position 2}

move  100(1000),50(1000),0(1000),0(1000);
move  110(1000),60(1000),0(1000),0(1000);
move  100(1000),70(1000),0(1000),0(1000);
```

The execution up to the line marked in red is not possible, because both labels "Start1" and "Start2" cannot be reached in the context of partial execution and are therefore invalid.

Conversely, the execution up to the lines marked in blue is possible, because both the branches are instructed to the points "Start1" and "Start2" and the branch instructions are in the range of the partial execution.

1.3 Menu Transfer

Commands of the menu Transfer

The menu **Transfer** contains the following commands:

Compile and download to controller	Compiles the current document and sends it to the interface card.
Compile and write to CNC file	Compiles the current document, writes it into a CNC file.
Download CNC file to controller	Downloads a CNC file to the interface card.
Start	Starts a CNC date field in the memory of an interface card.
Clear RAM	Deletes the contents of the memory of the interface card.
Transfer RAM-contents to memory card	Transfers the contents of the memory of the interface card onto a memory card.
Terminal	Opens a terminal window for communication with the interface card.
Reset	Resets the connected interface card.
Reference movement of all axes	References all connected axes.
Reference movement - X	References the axis X.
Reference movement - Y	References the axis Y.
Reference movement - Z	References the axis Z.
Check Connection	Disconnects and re-establishes the connection to the interface card.

1.3.1 Compile and download to controller

Transfer - Compile and download to controller

The initiation of this instruction causes the PAL source code in the active editor window to be transferred into the CNC target format and, subsequently, for the CNC file to be transferred to the controller.

The CNC file will not be transferred if an error occurs during the compilation. After the prompt of an error message, the window "Result/List of errors" will be opened and the occurred error will be marked, where possible, in the source code.
If several errors have occurred, the next or previous error can be marked, respectively, by pressing the key F4 or by additionally holding down the "Shift" key (⇧).

F4 Show next error
Shift+F4 Show previous error

If the compilation could be executed without any errors, the source file will be transferred into a CNC target file, which can be found in the directory for CNC files (refer to Preferences - Directories and Files.) This created file will be transferred to the connected controller automatically. The download of the CNC file can be cancelled by clicking on "Cancel" or by pressing the ESC key.

Attention: If you use commands that are executed directly (#reference, #start) after the declaration section of your programme, the machine will be start working on it immediately. Hence, kindly ensure that the working room of the machine is free and that the cover of the machine is closed.

Shortcuts

Toolbar:
Keyboard: F7

1.3.2   Compile and write to CNC file

Transfer - Compile and write to CNC file

This instruction causes the PAL source code in the active editor window to be translated into the CNC target format and written into the appropriate CNC target file.

If an error occurs during the compilation, the file will not be created. After the prompt of a respective error message, the window "Result/List of errors" will be opened and the occurred error will be marked, where possible, in the source code. If several errors have occurred, the next or previous error can be marked, respectively, by pressing the key F4 or by additionally holding down the "Shift" key (⇧).

F4   Show next error
Shift+F4   Show previous error

If the compilation could be executed without any errors, the source file will be transferred into a CNC target file that can be found in the directory that was selected as the target directory in the preferences (refer to Preferences - Directories and Files.) This file can be transferred for execution to the controller with the help of the function "Transfer - Download CNC file to controller."

Shortcuts

Toolbar:
Keyboard: F8

1.3.3 Download CNC file to controller

Transfer - Download CNC file to controller

This function is used to transfer an already created CNC target file to the controller.

After selecting the function, the dialogue box appears for the process of file selection. The default directory of the dialogue box is the "Directory for target files", which can be specified in "Preferences - Directories and Files."

Select the desired output file from the list of existing files and confirm this selection with "OK."

The selected file will now be transferred to the connected controller. The download of the CNC file can be cancelled by clicking on "Cancel" or by pressing the ESC key.

Attention: If you use commands that are executed directly (#reference, #start) after the declaration section of your programme, the machine will be start working on it immediately. Hence, kindly ensure that the working room of the machine is free and that the cover of the machine is closed.

Shortcuts

Toolbar:
Keyboard: F9

1.3.4 Start

Transfer - Start

This command starts the execution of a CNC programme that is already in the memory of the controller.

To transfer a programme into the memory of the controller, you can:

- Open a PAL-source programme and transfer it to the controller with the help of the function "Transfer - Compile and download to controller"

- Select an already compiled CNC target file with the help of the function "Transfer - Download CNC file to controller" and send it to the controller

- Plug in a memory card with a CNC programme on it in the respective slot at an interface card and press the "Reset" key at the interface card (only with interface cards with EA-extensions and memory cards)

Shortcuts

Toolbar:
Keyboard: Ctrl+RETURN

1.3.5   Clear RAM

Transfer - Clear RAM

With the help of this command, you can delete the programme memory of the controller. This command is usually used for testing or servicing purposes.

If the interface card or the controller should "hang" in an undefined state, you can try to reach a basic error-free state by using this command followed by the instruction "Reset."

1.3.6   Transfer RAM-contents to memory card

Transfer - Transfer RAM contents to memory card

For external storage of a CNC programme, the interface card supports, in combination with EA-extension, the usage of a check card memory. The memory card with 32 KB RAM-memory and integrated battery can be loaded with the complete contents of the interface card RAM. The content of the memory card can be written back at any time into the RAM of the interface card by pressing the "µP-Reset" button at the front.

The selection of this command leads to the CNC programme being transferred from the memory of the controller to a memory card.

1.3.7   Terminal

Transfer - Terminal

Overview
Self-test using the terminal window
Transfer of control and controlling codes
Trace-function using the terminal window

Overview

With the help of the terminal window, you can check the communication with the connected controller.

The terminal function establishes a direct connection between the interface card or the controller and a programme window. With the help of the terminal window, all described commands in the manual of the interface card can be tested. The terminal is also suitable in order to get used to the basics of process synchronisation. Subsequently, there will be the possibility of running the self-test of the interface card.

The allocation of the function keys is shown in the upper part of the terminal window, this is valid as long as the terminal window is open. Please consider the fact that the function keys used here might have a different function if the terminal window is closed.

Shortcuts

Keyboard: Ctrl+L

Self-test using the terminal window

If you press the "Start" button at the interface card during the turn on, the self-test of the interface card will be executed, During the self-test, the interface card moves the connected axes and then initiates the interface test, which sets out the ASCII-character-set at the interface each time a character is received. In order to use the self-test with PAL-PC, you have to open a terminal window and initiate a self-test on the interface card in it. If the interface card is correctly connected with the computer, the character set will, after the movement of the connected axes, appear on the screen and will be repeated until you press a key. After that, every single character you type in will be sent back as an echo from the interface card. You terminate the self-test by switching off the interface card.

Transfer of control and controlling codes

With the help of the terminal, you can send the so-called control and controlling codes to the interface card. For this purpose, it is necessary to key in the ASCII code of the control character in the following specific way:

- Activate the terminal window

- Press the ALT key and keep it pressed

- Now key in the ASCII code in the form of 0XXX, whereby XXX represents the controller-code; e.g. 0254 for a reset of the card. It is important that you put the 0 in front. The control and controller codes are, in greater detail:

0252	Self-test of the controller
0253	Stop of a movement (can be continued with @0S)
0254	Reset of the controller
0255	Break of a movement (cannot be continued)

View of sent control and controller codes in the terminal

The terminal window translates a controller code into plain text as soon it has been correctly recognized. The presentation is symbolic; it does not correspond with the actual characters sent over the interface.

"Trace" function using the terminal window

The "Trace" function of the interface card is used to test the interface card.

To activate the function "Trace" at the interface card, send the command "@0t" to the interface card, followed by <Return>. Subsequently, the address and number of the coordinates, the operation constant and the internal operation parameters that belong to the respectively processed instruction will be shown on the screen. After the execution of the command, the interface card waits for you to press the key ⏎ (<Return>). The "Trace" function can help one to understand some operations of the

interface card, such as branching and process synchronisation, more clearly.

The "Trace" mode can be terminated by pressing the key ⇦ (<BackSpace>). The ending of the procedure will be indicated by an output 65535 as memory cell counter by the interface card. A number smaller than 65535 and bigger than 65000 indicates that an error has occurred during the execution of the procedure.

1.3.8   Reset

Transfer - Reset

This function indicates a reset of the controller. If during development and test of the programme critical situations appear, then you stop the process and re-establish the initial state of the controller with the help of this command

In connection with the function "Clear RAM", you can set the controller back to start condition.

You can initiate a reset of the controller in the following way:

- Switch off and restarting of the controller

- Pressing the key "Reset" at the controller

- Execute the function "Reset" in the menu "Transfer"

- Opening of the terminal window and key in the controller codes "0254" while pressing the ALT button

1.3.9   Reference movement of all axes

Transfer - Reference movement of all axes

Often the processing of a workpiece corresponds with determined reference positions, e.g. the work piece zero point, the corner of a stop rail, a certain work piece height, etc. Therefore, it is necessary to know the so-called machine zero point.

A reference movement is used to identify the machine zero point at the beginning of the procedure. For this purpose, reference switches are built within the axes, which are approached during a reference movement and switch always at the same position of the axis. In this way the machine zero point is detected as repeatable.

After initiating the reference movement, all positions of the axes are set to 0.

Hint: The mechanical construction of the several axes can lead to, in the course of the procedure,

the reference switch being "overdriven"; this means that the cam is situated behind the clip of the reference switch. A reference move will first move in a negative axis direction, until the reference switch is found. This leads to the axis is being at its mechanical limit and the reference drive cannot be completed. In this case, you should turn of the controller, move the axis by hand out of the region of the end switch, and, after restarting, proceed with the reference movement again.

1.3.10 Reference movement - X

Transfer - Reference movement - X

This function is used to do a reference move only for the single axis X.

Further annotations: Refer to Reference movement of all axes.

1.3.11 Reference movement - Y

Transfer - Reference movement - Y

This function is used to do a reference move only for the single axis Y.

Further annotations: Refer to Reference movement of all axes.

1.3.12 Reference movement - Z

Transfer - Reference movement - Z

This function is used to do a reference move only for the single axis Z.

Further annotations: Refer to Reference movement of all axes.

1.3.13 Check Connection

Check Connection

Normally, PAL-PC automatically establishes a serial connection with known controllers and with reasonably actual controlling versions between PC and controller.

If, with the actual connection data, no connection to a controller can be established (the connection is interrupted, another controller was connected to the PC, a different serial interface was used, etc.) you can terminate the existing connection with the help of this function and re-establish it automatically. A dialogue is shown in which you will be asked if the controller is to be searched new. In this case, PAL-PC should find a connected and functioning controller. If you select "No", the current connection preferences will be kept.

You can find, in the status bar of PAL-PC, which controller was identified, the type of the controller and the current transmission rate.

Identified controller type IMC4

Shortcuts

Toolbar:

1.4 Menu View

Commands of the menu View

The menu **View** contains the following commands:

Toolbar   Fades in or out the toolbar
Statusbar   Fades in or out the statusbar

1.4.1 Toolbar

View - Toolbar

Use this command to fade in or out the toolbar. The toolbar contains several buttons of the most common commands of PAL-PC, e.g. Open File. If the toolbar is shown, a checkmark appears next to the menu entry.

Help on how to use the toolbar you will find under "Toolbar".

1.4.2   Statusbar

View - Statusbar

Use this command to fade in or out the statusbar. The statusbar describes the action that will be executed by the chosen menu entry or by pressing a button on the toolbar, and shows the condition of the certifiable keys. If the statusbar is shown, a checkmark appears next to the menu entry of the command.

You will find more help on how to use the statusbar under "Statusbar."

1.5   Setup

Commands of the "Setup" menu

The "Setup" menu contains the following commands:

In general   General preferences of the programme
Directory and file settings   Indication of source/target file path, filename extensions, etc
RS232   Setting of the transfer parameters
Control parameter   Setting of the preferences of the interface card
Editor - Automatic code generation   Configuration of automatic code generation with "File - New"
Editor - Font   Set the font used in the editor window
Editor - Colours   Set the colours used in the editor window

Terminal - Colours   Set the colours used in the terminal window

1.5.1   In general

Setup - In general

You set the general preferences for PAL-PC in this dialogue field.

- *Initialise controller automatically with programme start*
  Activating this control box leads to an immediate sending of the commands "Reset" and "Reference movement" to the controller after the start of PAL-PC and the establishment of the serial connection. The controller is already in an operative condition before the initial download of a CNC programme because of this.

- *Used Axes*
  If you use a single- or double-axes controller, you can make a pre-adjustment for the entire programme by defining the used axes here. The pre-adjustments are used e.g. during automatic code generating or at the referencing of the axes.

Select "OK" to accept the new settings or "Cancel" to close the dialogue field without saving the new settings.

1.5.2 Directory and file settings

Setup - Directory and file settings

The preferred directories of use by PAL-PC are set in this dialogue field. In these directories, source files are specifically searched and CNC target files are saved. For the common usage of PAL-PC, further options are adjustable.

- *PAL-PC Source Files*
  Indicates the directory in which PAL-PC source files are searched specifically, e.g. when using the command "File-Open."

- *Target files*
  Indicates the directory in which the compiled PAL-PC programme is specifically saved, e.g. when using the command "Transfer - Compile and write to CNC file."

- *Type of file as source file*
  Here you can insert which file extension should be used when opening files with the help of the dialogue "Open File."

- *Type of file as target file*
  Indicate here which file extension should be used when writing a CNC target file. The name of the CNC target file when using the function "Transfer - Compile and write to CNC file" is derived from the original name of the PAL-PC source file without file extension and the file extension indicated there.

- *The list of the files used recently contains ... files*
  A list of the most recently used files is available in the menu "File." This option allows you to specify how many file names are to be indicated in that list.

Select "OK" to accept the new settings or "Cancel" to close the dialogue field without accepting the new settings.

1.5.3 RS232

Setup - RS232

Although PAL-PC is automated to a large extent, it can happen under certain circumstances that with older types of controllers, the connected controller is not detected automatically. This dialogue box is used to manually set the used serial interface as well as the transmission rate. After that, you can try to establish a connection to the controller and to detect the version of the controller with the help of the terminal function. It is also possible to test the basic functions of the machine with the commands of the control protocol.

- *Interface*
  Here, select the serial interface that should be used for communication with the controller.

- *Transmission rate*
  Here you have the option of specifying the transmission rate.

If you are using an unknown controller with which you would like to establish a connection, the following procedure is suggested:

- Start the self-test of the controller/interface card by switching off the controller and restarting it by pressing the "Start" button.

- Select "COM1" as the interface and "9600 Baud" as the transmission rate.

- Open the terminal window of PAL-PC with the help of the function "Transfer-Terminal."

- If you are able to see some characters now, no matter how they look like or whether they are useful, this means that the interface has been correctly chosen. If you can see the message of the version from the controller or the ASCII-character set, then the transmission rate has also been set correctly.

- If no characters can be seen, adjust the interface in a different way and repeat the steps above

until you can receive characters in the terminal window.

- If characters are received but the transmission rate is adjusted incorrectly, select a different value and repeat the process until the ASCII-character set is shown in the terminal window.

Select "OK" to accept the new settings or "Cancel" to close the dialogue field without accepting the new settings.

1.5.4 Control parameter

Setup - Control parameters

This dialogue field is used to set the basic preferences of the control parameters, which are used during direct
addressing of the controller (e.g. when using the commands "Transfer - Reset" or "Transfer - Referencing of all axes")
or for the automatic code generation, as well as when creating a new file or when creating a command with the
function "Teach" and taking it over into the editor.

- *Equipment number*
  The equipment number is the "Address" which addresses the connected controller. The default value of the equipment number is always 0. This setting does not need to be changed if only one interface card is used. If more than one controller is used, the equipment number has to be set to the new value with the help of the corresponding command of the interface-protocol. Additionally the interface card has to possess a battery-backup so that the new value of the equipment number remains.

- *Motor steps/Rotation*
  The number of steps/revolution indicates a conversation factor to the PAL-PC compiler, into with which the work unit (millimetre) can be converted in the correct number of stepping motor steps.

Example:

The motor of the X-axis has 400 steps (marked on the motor), and the appropriate spindle has a gradient of 4 millimetres. Thus, the following results are calculated:

400 steps/4 mm = 100 steps/mm

When using a gear motor, the reduction has to be multiplied by the number of motor steps/rotation.

Example:

The motor of the X-axis has 400 steps as well as a gearbox 1:9 (9 rotations of the gearbox entry have to be done such that one rotation occurs at the exit of the gearbox) and the appropriate spindle has a gradient of 4 millimetres. Thus, the following results are calculated:

(400 steps * 9)/4 mm = 900 steps/mm

- *Spindle gradient*
  The indication of the spindle gradient is needed if the gradient is not already included in the result of motor steps/rotation. In this case, the spindle gradient is simply inserted in the way it is recorded in the documentation of the system.

- *Reference speed*
  Here you can set the speed with which the controller makes a reference movement. The indication of the speed is done in Hertz. For illustrative purposes: The indication 800 Hz as a reference speed X means that the stepping motor at the X-axis with a step number of 400 steps/rotation makes 2 rotations per second. A spindle gradient of 5 mm corresponds with a movement speed of 10 millimetres/second.

1.5.5   Editor

1.5.5.1   Automatic code generation

Setup - Editor - Automatic code generation

This dialogue field allows you to configure the automatic code generation, which is processed by creating a new file with the command "File - New."

Each option can be activated or deactivated individually with the help of the checkbox in front. If you do not want to use one or several options, you can switch these off here.

The options in greater detail:

- *Create comment and description block at the head of the programme*

In the underlying editor window, insert the text that should automatically be inserted at the beginning of the document when a new PAL-PC document is created. Often, a block of comments with information about the editor and the function of the programme is inserted at the beginning of the actual document. Thereafter, information about time and a brief description of subsequent changes in the programme are suggested for inclusion.

- *Insertion of #axis XYZ*
  Here you can specify that you want the insertion of the command #axis XYZ directly after the comment and description block. If you work predominantly with a one-axis or 2-axes system, you can change the preset text "XYZ" accordingly.

- *Insertion of #steps 400,400,400*
  In most cases, you can leave this option activated because the stepping motors at the axes in half-step mode generally correspond to that step number.

- *Insertion of #elev 5,5,5*
  This option inserts a command to specify the spindle gradient of the used axis (axes). You should change this command if you are using axes without a spindle gradient of 5 mm/rotation. Possible values of the spindle gradient are: 2.5, 4, 5 and 10.

- *Insertion of #ref_speed 800,800,800*
  Check this box to insert the command for specification of the reference speed on 800 Hz.

- *Insert source code block subsequent*
  This option activates the automatic insertion of an arbitrary source code block at the end of a new document. In the underlying editor window, you can insert commands, comments, definitions and so on, which you will subsequently need repeatedly.

Select "OK" to accept the new settings or "Cancel" to close the dialogue field without accepting the new settings.

1.5.5.2   Font

Setup - Editor - Font

The selection of this instruction opens the dialogue field "*Specify font",* with whose assistance you can select the font used in the editor window.

The listed field "*Font"* shows the fonts that are available on your PC. With the selection of the fonts in the field "*Example"* a sample of characters in the current selected font is displayed.

The field "*Font size"* causes an additional formatting of the characters; here you will also get the current selection displayed in the field "*Example"*.

The field "*Size"* specifies the character size of the used font.

Please consider that the selected font is used for the entire text in the editor window. In PAL-PC, it is not possible to format single characters.

Select "OK" to accept the new settings or "Cancel" to close the dialogue field without accepting the new settings.

1.5.5.3   Colours

Setup - Editor - Colours

This dialogue gives you the option of specifying the colours used in the editor window.

This dialogue gives you the option of choosing a colour for the background of the editor window, as well as a text colour:

Click on the option "*Background*" to choose the background colour of the editor window. With the button *"Text",* you can specify the text colour. The preview will always indicate the change in colours, as well as how the editor window would look like in the programme.

Select "OK" to accept the new settings or "Cancel" to close the dialogue field without accepting the new settings.

The dialogue field "Select colour"

Basic colour

Indicates the available basic colours. From the displayed basic colours, you can choose a colour by the simple click of a mouse. You can define a user-defined colour by clicking on the basic colour of the desired colour and then clicking on "*Define Colours.*"

User-defined colours
Indicates user-defined colours that you have already defined before.
To change the preference of a user-defined colour, click on the field of the user-defined colour and choose other colour settings. To define a new user-defined colour, click on an empty field for a user-defined colour, indicate a new colour and then click on "Add colour."

Define Colours
Indicates a colour matrix. To define a user-defined colour, click on an arbitrary point in the matrix. You can change the colour by moving the mouse horizontally, or the saturation by moving the mouse vertically. You can adjust the brightness or intensity by sliding the control right of the matrix.
The selected colour is shown in the field *"Colour/Basis."*

Intensity/Brightness control
Changes the brightness, which is basically the proportion of white and black in a colour. The appropriate value is shown in the field "*Brightness*".
Changes are reflected in the field *"Colour/Basis."*

1.5.6   Terminal

Terminal - Colours   Set the colours used in the terminal window

1.5.6.1   Colours

Setup - Terminal - Colours

This dialogue gives you the option of specifying the colours used in the terminal window.

This dialogue gives you option of choosing a colour for the background of the terminal window as well as a text colour:

Click on the button "*Background"* to choose the background colour of the terminal window. With the button *"Sent",* you can specify the colour for characters sent from the PC to the controller. "Receive" specifies the colour for characters that were sent from the controller to the PC. The preview will always indicate the change in colours, as well as how the editor window would look like in the programme.
.
Select "OK" to accept the new settings or "Cancel" to close the dialogue field without accepting the new settings.

The dialogue field "Select colour"

Basic colour
    Indicates the available basic colours. From the displayed basic colours, you can choose a colour with the simple click of a mouse. You can define a user-defined colour by clicking on the basic colour which corresponds with the desired colour, and then click on "*Define Colours.*"

User-defined colours
    Indicates user-defined colours that you have already previously defined.
    To change a preference of a user-defined colour, click on the field of the user-defined colour and choose other colour settings. To define a new user-defined colour, click on an empty field for a user-defined colour, indicate a new colour and then click on "Add colour."

Define Colours
    Indicates a colour matrix. To define a user-defined colour, click on an arbitrary point in the matrix. You can change the colour by moving the mouse horizontally, and the saturation by moving the mouse vertically. You can adjust the brightness or intensity by sliding the control to

the right of the matrix.
The selected colour is shown in the field *"Colour/Basis."*

Intensity/Brightness control
Changes the brightness - that means the proportion of white and black in a colour. The
appropriate value is shown in the field *Brightness*.
Changes are reflected in the field *"Colour/Basis."*

1.6   Menu Window

Commands of the menu Window

The menu **Window** offers the following instructions which permit you to set up several views of
diverse documents in the application window:

New Window   Creates a new window that displays the same document
Overlapping   Arranges the windows overlapping
Side by side.   Arranges the windows side by side
On top of each other   Arranges the windows one on top of each other
Arrange Icons   Arranges the windows by scaling them down to icons
Window 1, 2, ...   Switches to the indicated window

1.6.1   New Window

Window - New Window

Use this command to open a window that displays the same contents as the active window. You can
open several document windows, which makes possible for you to view different parts of a document
simultaneously. If you change the content in one of the open windows, the changes will
automatically be made in all windows containing the same document. If you open a new window, it
will be the new active window that will be displayed above all other opened windows.

1.6.2   Overlapping

Window - Overlapping

Use this instruction to arrange the open windows such that they overlap.

1.6.3   Side by side

Window - Side by side

Use this instruction to arrange the open windows side by side.

1.6.4   On top of each other

Window - On top of each other

Use this instruction to arrange the open windows one on top of each other.

1.6.5   Arrange Icons

Window - Arrange icons

Use this command to arrange the icons of minimized windows in the lower part of the main window. If an open document is placed there, it can happen that some or all icons are obscured, because they are situated underneath the document window.

1.6.6   Window 1, 2, ...

Window - 1..., 2..., etc.

At the end of the menu "Window", PAL-PC displays a list of the currently open document windows. A check mark is reflected in front of the document name of the active window. Select one document from the list to activate its window.

1.7   Menu Help (?)

Commands of the menu Help

The menu **Help** contains the following commands, which provide support for this application:

Help topics   Indicates the index of themes on which help is available
Programming manual   A manual on how to create a PAL-PC programme

<u>Help on help</u>   A manual on how to use the window "Help"
<u>About PAL-PC</u>   Indicates the version number of PAL-PC

1.7.1   Help topics

Help - Help topics

Use this command to display the content menu screen of the "*Help*" function. From this screen, you can jump to "instructions", which will show you, step by step, the usage of PAL-PC, or where you can have a look at various reference information.

Once you have opened "*Help*", it is always possible to click on the button "*Content*" to return to the content menu screen.

1.7.2   Programming manual

Help - Programming manual

Selecting this command will lead to help on how to programme a CNC controller programme with the help of PAL-PC. The programming manual gives you information about the syntax of PAL-PC and how you can use these individual instructions meaningfully in your programme.

Once you have opened "*Help*", it is always possible to click on the button "*Content*" to return to the content menu screen.

1.7.3   Help on help

Help - Help on help

Use this command to get instructions on how to use "*Help*".

1.7.4   About PAL-PC

Help - About PAL-PC

Use this command to display the copyright information and the version number of your PAL-PC copy.

2 Topics

2.1 Topic references

PALPC Topic references

...to be continued

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