6. SYSTEM CONTROL

The system control is simple and the basic procedures may be mastered by the operators after short training, especially when they worked with any similar NC or CNC system. With one exception (CANUAL mode), the selection of all the modes is performed by means of so-called software push-button s the graphical illustration of which is offered in the MENU window in the lower screen part.

6.1. Summary of software push-buttons

6.1. Main menu

AUT mode, automatic working in accordance with the pre-selected part program.

Manual modes, general symbol for modes MAN, JOG, REF, TOČ, POT.

RUP mode (manual block pre-selection) - run of one pre-programmed block.

Work with memory generally. After pressing down, the list of all part programs is appeared. Then the sub-menu for input/output, part program editing, block selection and memory deleting is called up.

Work with tables generally. It is called up for the selection of the actual table

Diagnostics, system means, input into the DOS, PLC.

6.1.2. AUTOMATIC MODE menu

AUT mode with the BB modification ("block by block"). After selection of it, the part program run will be stopped after block finishing.

AUT mode with the M01 modification. After selection of it, the part program run will be stopped on the block end in which M01 was programmed.

AUT mode with the AVP modification. Run of the part program with selected speed regardless to the programmed speed. It is possible to select the simulation run (SIM) alternatively

AUT mode with the / ("slash") modification. If selected it the part program blocks are omitted in which the slash is programmed.

Return to the programmed path by accelerated feed (G00) approved.

Return to the MENU of the previous level (generally valid for all MENUS)

kontinual = continual zrychlene = accelerated lomítko = slash
prískok = in-feed návrat = return

6.1.3. MANUAL MODE menu

Manual travel mode for all axes generally. After pressing down the push-button the F1 up to F6 push-button s became functions push-button s for negative movement directions.

JOG mode, feed by pre-selected speed path which is pre-selected for the manual modes.

POTENTIOMENTERS mode. Feed of the individual axes controlled by the potentiometers on the machine panel. The direction is selected by the switches on the machine panel.
KNOB mode. Feed of the selected axis by the knob located in the control panel.

REFERENCE mode. Travel to the reference positions, possibility of pseudo-reference

PSEUDOREFERENCE, resetting the co-ordinate position in any arbitrary point to zero.

REFERENCE SIMULATION. It sets the prompt “all axes referenced”. It does not change the co-ordinate position in the indication.

REFERENCE CANCELLATION. It resets the prompt of the reference setting, it does not change the co-ordinate position. It is not possible to run the automatic mode as well as the RUP mode

Return approval of one selected axis to the programmed path after previous movements by auxiliary manual travels.

Return approval of all axes to the programmed path after previous movement by auxiliary manual travels.

Request to displace the programmed path.

předvolba = preselection
točítko= knob
pseudoreference = pseudo-reference
nulov. ref. = reference cancellation
zpět vše = return of all

potenc. = potentiometers
reference = reference
simul. ref = reference simulation
zpět 1 osa = return of one axis
posunutí = displacement

6.1.4. Menu for work with memory, peripheries

periphery selection for data input and output (of the part programs) generally.

EDITION, editor entry. Editing the file selected from the file offer.

PART PROGRAM SELECTION, a part program selected from the file offer is prepared to start rum from the start automatically.

BLOCK SELECTION, a part program selected from the file offer is prepared to rum from the selected block automatically.

DELETE FILE. Selected file will be deleted from the memory after further approval

INPUT/OUTPUT from the reading device (here, serial input RS232C). The transmission direction is selected by the software push-button to switch over the direction.

INPUT/OUTPUT from the floppy disk, if any. The transmission direction is selected by the direction push-button .

INPUT/OUTPUT from the DNC. Communication with the master computer by the DNC protocol.

INPUT/OUTPUT from the hard disk (or EPRM memory). The transmission direction is selected by the direction push-button . In the case of the EPRM memory only one direction is approved.

TRANSMISSION DIRECTION SELECTION. Reading into the system. Changeover push-button for writing.

TRANSMISSION DIRECTION SELECTION. Reading from the system. Changeover push-button for reading.

periferie = periphery
volba prog. = program selection
mazání prg = delete program
pevný disk = hard disk
edice = edition
volba bloku = block selection
disketa = floppy disk
přep. směru = direction changeover

6.1.5. System menus

Help nápověda	calling up the system HELP
Řízení interfejsu	INTERFACE CONTROL – push-button - the entry into sub-menu of the interface control. It is possible to lock this menu by machine constant.
Stop interfejsu	push-button to control the interface – interface STOP stops the run of the interface user program and starts the system interface which does not perform any activity.
Start interfejsu	interface START starts the user interface.
Nulování interfejsu	interface RESET performs the activity written in the interface program in the PIS_CLEAR module.
Načítání interfejsu	interface reading into the RAM memory when debugging .
PLC menu (stroj)	push-button for PLC program creator disposal if used the MENU possibilities. It calls up the user menus of the PLC program.
 edice	entry into the system directory, it displays all files included in the backup memory in the CMOS directory with the following possibilities of edition of all text files without any syntactic check-up.
Systémové prostředky	entry into the sub-menu of the system resources to backup the system and start of the external DOS programs.
Záloha CNC systému	creating the backup file of the system files.
Obnova CNC systému	restoration of the system files from the backup file.
Záloha PLC paměti	creating the backup for the PLC needs.
Obnova PLC paměti	restoration of the PLC files
Externí příkaz DOS	the sub-menu of the external DOS commands entry.
ZABALENI PKZIP	external DOS commands, PKZIP program start.
ROZBALENI PKUNZIP	external DOS commands, PKUNZIP program start.
EDITOR EDIT	external DOS commands, EDIT program start.
Operační systém DOS	the MS DOS command row entry.

řízení interfejsu = interface control
start interfejsu= interface start
načítání interfejsu = interface reading in

stop interfejsu = interface stop
nulování interfejsu = interface reset

(stroj) = (machine)
záloha CNC systému = CNC system backup
obnova CNC systému=CNC system restoration
Externí príkaz DOS= External DOS command
záloha PLC paměti = PLC memory backup
obnova PLC paměti = PLC memory restoration
Zabalení PKZIP = PKZIP zip
Rozbalení PKUNZIP = PKUNZIP unzip
Operační systém DOS = DOS operation system

systémové prostředky = system resources
záloha PLC paměti=PLC memory backup

6.1.6 Table menu

entry into the file with a table (tables) of corrections

entry into the file with a table (tables) of starting point displacement

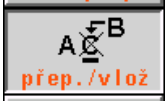
entry into the file with a table (tables) of parameters

entry into the file with a table of machine constants

Korekce = correction
posunuti = displacement
parametry = parameters
str. konst. = machine constant

6.1.7. Editor menu

inserting a character on the cursor position



overwriting a character on the cursor position

deleting a character on the cursor position

deleting a character before the cursor position

entry into the menu block operations

entry into the browsing menu

entry into the menu of the editor finish

block start point marking

block finish point marking

displacement of the marked block on the cursor position

copy of the marked block on the cursor position

deleting the marked block

displacement by one page (18 rows) towards the file start

displacement by one page (18 rows) towards the file end

displacement to the file start

displacement to the file end

searching the string

editor finish with file storing

editor finish without file storing

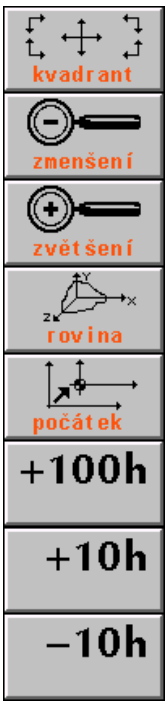
editor finish with file storing under any other name

PRINTER. Printing the whole file (e. g .part program) or only marked file parts from the EDITOR. It is possible if the printer is connected to the system only.

Entry into the dialog creation of the part program from the editor

vlož/přep. = insert/overwrite
přep../vlož = overwrite/insert
mazání BS = delete BS
blokové op = block operations
konec edit = editor finish
začátek bl. = block start
konec bl. = block finish
přesun bl = block displacement
kopie bloku = block copy
výmaz bloku = block deleting
stránka = page
začátek = start
konec = finish
hledání = searching
uložit = save
neuložit = not save
uložit jako = save as
tiskárna = printer
dialog = dialog

6.1.8. Menu conditioned by the indication selection



graphics – selection of displaying quadrant

graphics – scale selection (reduction)

graphics – scale selection (magnification)

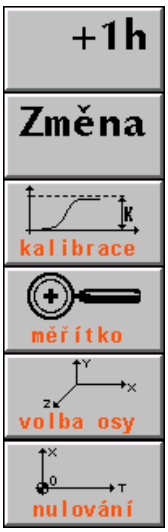
graphics – plane selection

graphics – selection of the starting point of drawing

add to the hexadecimal address of the memory 100H

add to the hexadecimal address of the memory 10H

subtract from the hexadecimal address of the memory 10H



subtract from the hexadecimal address of the memory 1H

PLC memory bit value change on the cursor position. Conditioned by the approval of the machine constant

maximum and minimum calibration for graphic course of the deviation monitoring

scale selection for graphic course of the deviation monitoring

axis selection for monitoring of the graphic course of the deviation monitoring

Resetting the deviation course, starting point of drawing in the zero point

kvadrant = quadrant
zmenšení = reduction
zvětšení = magnification
rovina = plane
počátek = starting point
kalibrace = calibration
změna = change
meřítko = scale
volba osy = axis selection
nulování = reset

6.1.9. Menu of dialog creation of the part programs called up from the editor

icon selection of the part program graphic creation

entry into the menu of the dialog graphic creation finish of the part program

confirmation of the generated block or blocks and block entry

finish of the interactive creation and connection of the generated blocks to the file in the editor

finish of the interactive creation without connection of the generated blocks to the file in the editor.

volba ikon = icon selection
konec tvorby = creation finish
ulož. blok = block saving
uložit = save
neuložit = do not save

6.2. Structure menu

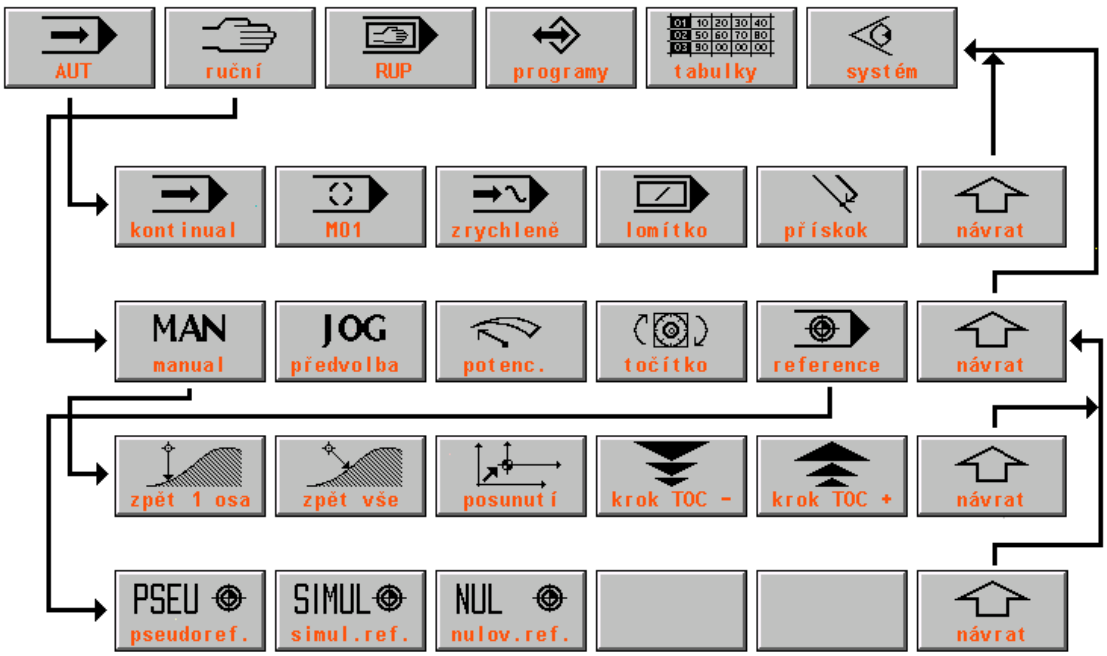
The main MENU is selected from every of levels by pressing down the MENU push-button . The main menu is included in the following software push-button s:

- automatic mode
- manual modes
- RUP mode
- work with memory
- work with tables
- system menus

Pressing down one of the push-button s the sub-menu is accessible which offers further selections.

Relationship of MENUs is mentioned in the following figures. Almost all MENUs consist of the F6 push-button RETURN (arrow in the up direction) which is the return into the previous MENU level. Structures illustrated on the following three menus originate from the main menu.

6.2.1. Structure of automatic and manual modes and RUP mode

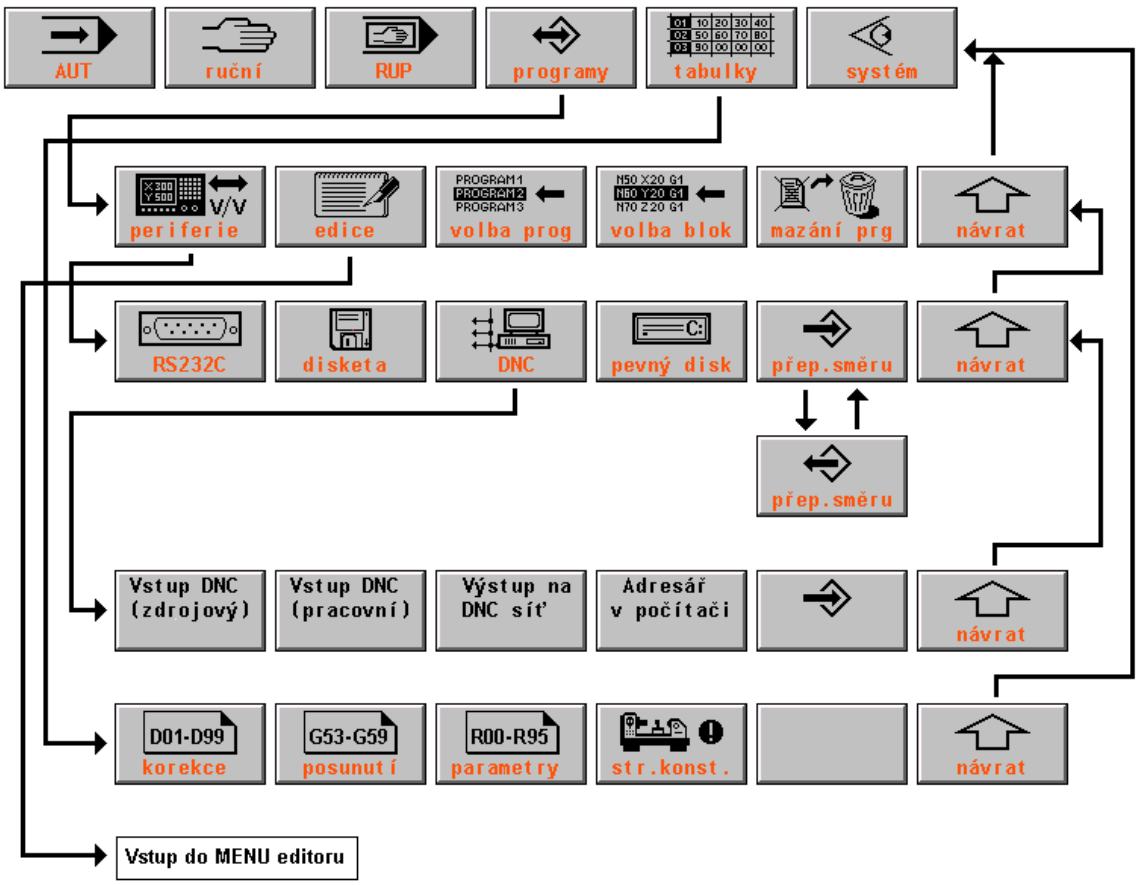


ruční = manual
programy = programs
tabulky = tables
systém = system
zrychleně = accelerated

lomítko = slash
přískok = in-feed
návrat = return
předvolba = pre-selection
potenc. = potentiometer
točítko = knob
reference = reference
zpět 1 osa = back by one axis
zpět všechny = back all
posunutí = displacement
krok = step
pseudoreference = pseudo-reference
simul. reference = simulated reference

Entry into the dialog graphics of the part program creation (conditional by the machine constant 99).

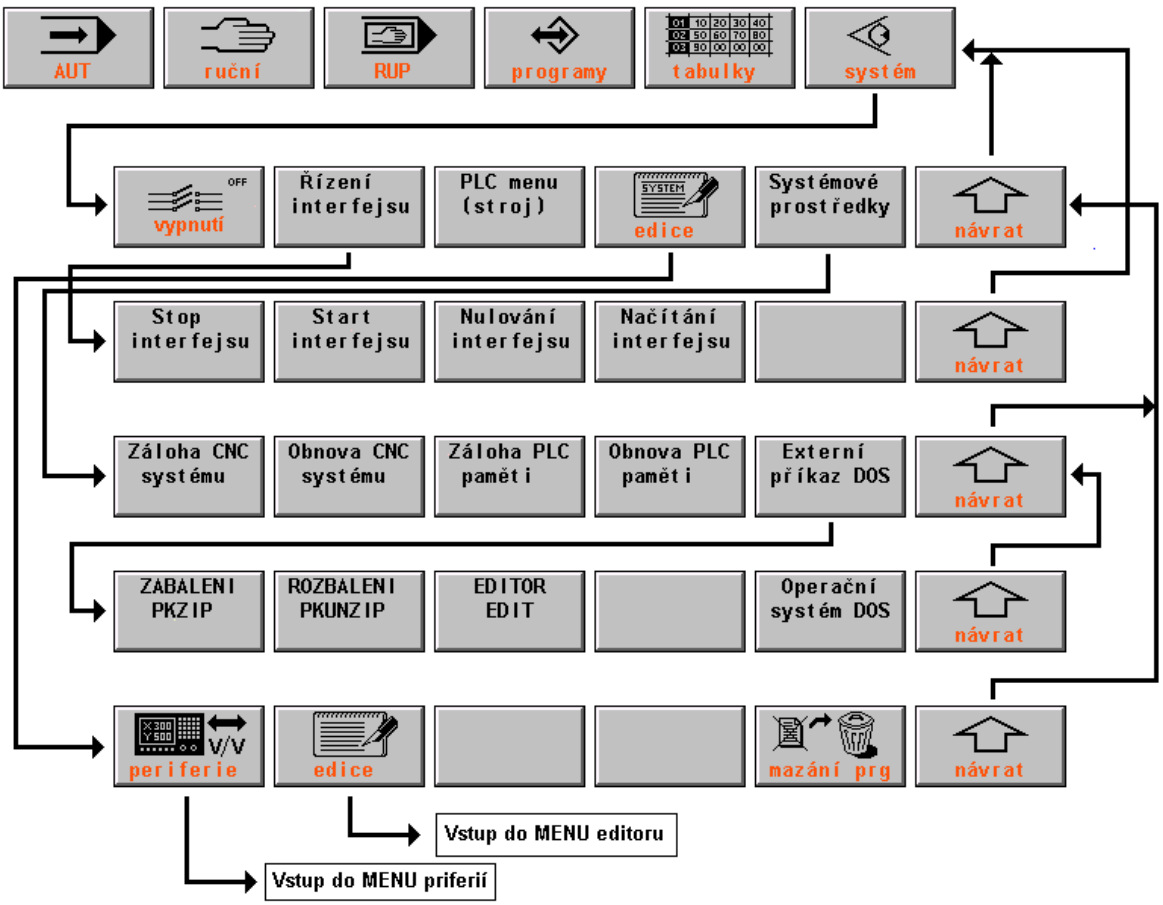
6.2.2. Work menu structure with memory and tables



ruční = manual
programy = programs
tabulky = tables
systém = system
periferie= periphery
edice = edition
volba prog. = program selection
volba blok = block selection
mazání prg. = lubrication program
návrat = return
disketa = floppy disk
pevný disk = hard disk
přep. směru = direction changeover
vstup DNC (zdrojový) = input of DNC (source)
vstup DNC (pracovní) = input of DNC (working)
Výstup na síť DNC = Output to the DNC network
Adresář v počítači = directory in the computer
korekce = correction
posunutí = displacement
parametry = parameters
stroj. konst. = machine constant

Entry into the editor MENU.

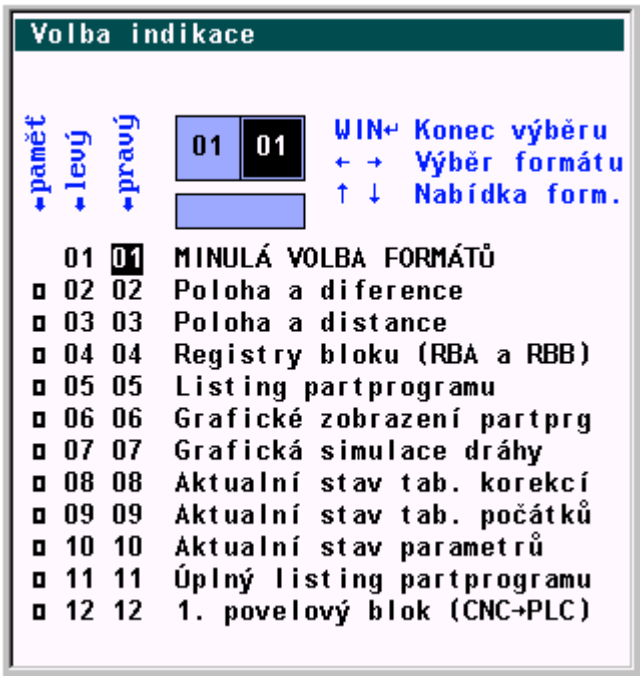
6.2.3. System resource structure



ruční = manual
tabulky = tables
řízení interface = interface control
edice = edition
návrat = return
start interface = interface start
záloha CNC systému=backup of the CNC system
načítání interface = interface reading in
externí příkaz DOS = DOS external command
Operační systém DOS = DOS operation system
mazání prg = delete program
vstup do menu editoru = entry into the editor MENU
vstup do menu periferií = entry into the periphery MENU
záloha CNC paměti = backup of the CNC memory
obnova CNC paměti = restoration of the CNC memory
programy = programs
systém = system
PLC menu (stroj) = PLC menu (machine)
systémové prostředky = system resources
stop interface = interface stop
nulovaní interface = interface reset
zabalení PKZIP = PKZIP zip
rozbalení PKUNZIP = PLUNZIP unzip
editor edit = edit editor
periferie = periphery

6.3. Indication selection - WIN

When selecting a mode, a certain format is selected automatically which is the most suitable one for the given mode. The operators have the possibility to change the format selected in accordance with requirements. The format changes are performed frequently e. g. when tuning part programs or when monitoring the machine statuses (function of terminal switches etc.). The change of the default format is possible in every time when pressing down the WIN push-button (except editing and MAN mode if the movement is controlled by the cursor arrows).



In the right window, the list of possible formats is displayed (see the Figure). The left window remains unchanged. When a format exists only in one window before pressing down the WIN push-button , it will be reduced to its half site and displaced into the left window.

By the indication selection it is possible to select a format in one large window or two (usually various windows) formats in the left and right windows. Formats are selected by the cursor arrows.

In the offer, two columns of numbers of formats for left window (“left”) and right window (“right”) are mentioned. Numbers are only of information meaning which format has been selected currently. Formats are selected in accordance with the format description located in the right from the numbers In every of windows various formats may be selected. When selecting the same format number for right and left windows, the format will be displayed in one large window only and the character size will be doubled. The selection is performed by the cursor arrows. For instance, when wanting to display current status of parameters (format 10) in the right window and current status of the correction table in the left window (format 8) is is necessary to reach 10 in the “right” column, to press the cursor in the left and to reach 8.

Indication selection

pamäť = memory 01 01 WIN – End of selection
ľavý = left ß à - format selection
pravý = right á â - format offer

01	01	Previous format selection
02	02	Position and difference
03	03	Position and distance
04	04	Block registers (RBA+ RBB)
05	05	Part program listing
06	06	Graphical display of partprg
07	07	Graphical path simulation
08	08	Correction table current status
09	09	Starting point table current status
10	10	Current status of parameters
11	11	Total part program listing
12	12	First command block (CNC-PLC)

If pressed down the ENTER push-button , required formats will be selected. When selecting any mode, only the formats will be selected which are prescribed by the default format of the given mode. When wanting to avoid it, do not press down the ENTER push-button if the cursor is located in the "left" column but the cursor shall be displaced to the left, to the "memory" column. The inscription "Memory!" will be displayed in the window under the format numbers. Now press down the ENTER push-button or the left arrow again. The selected formats became to to memory ones and this condition will persists even with the selection of any other modes until the format memory will be cancelled.

Cancelling the format memory is performed by a new indication selection with the selection confirming by the ENTER push-button in the "left" column i. e. without any memory. The memory is also cancelled if pressed down the ENTER push-button immediately after pressing down the WIN push-button when the cursor is on the row 01 PREVIOUS FORMAT SELECTION. This selection, as resulting from the inscription, selects the previously selected format and simultaneously it cancels the format memory.

6.3.1. Format list

In the system total 27 screen formats are stored with the present version. Other formats may be offered when pressing down on the 12th format by the cursor arrow down. The most formats with the number higher than 10 are, however designed to be used mainly for service and diagnostic purposes and they are not used during normal operation. And so, no detailed description is mentioned for these formats.

No.	Format name	Format description
1.	Previous format selection	After selecting the previously selected format combination will be displayed.
2.	Position and difference	Indicates the position and the difference (deviation). It is suitable to set the drift of co-ordinates.
3.	Position and distance	Indicates the position and the distance i. e. the distance to the block end. The default format for the AUTO mode.
4.	Block registers (RBA + RBB)	The RBA block register (active, i. e. currently running block)

5.	Listing part program	Part program listing form the internal memory of the system. The current status of the systém run i. e. eventual parameter conversions are included. The listing does not consists of comments. On the status bars, the No. of the part program, time of working and file names are indicated with the selected correction tables, displacement of the starting point and parameters. The lower window consists of programmed and actual velocity and spindle speed.
6.	Graphical display of the part program	Rapid drawing of the total part program. When running the part program, all finished blocks will be coloured. Running block flashes.
7.	Graphical simulation of the path	Indicates the path in the plane graphically. For details see the separate chapter.
8.	Current status of the correction tables	Status of corrections regarding to which the system works. Generally it is not necessarily equal to corrections in the TAB∗ ..KOR files, if writing corrections into the table by means of G functions directly from the part program.
9.	Current status of the starting point tables	Status of starting point displacement regarding to which the system works. Generally it is not necessarily equal to corrections in the TAB∗ ..POS files, if writing starting points into the table by means of G functions directly from the part program.
10.	Current status of the parameter table	Status of parameters regarding to which the system works. Mostly they are not equal to parameters in the TAB∗ ..PAR files because the parameters are mostly set from the part program directly.
11.	Total listing of the part programs	The format similar to the format No. 5 with the exception that the file is displayed from the part program directly i. e. all comments and the status before eventual part program conversion are displayed. Listing of the file does not indicate the macro-cycle and firm cycle courses.
12.	First command block (CNC – PLC)	Diagnostic format displaying signals transmitted from the system panel into the real time section.
13.	Second command block (CNC – PLC)	Diagnostic format displaying signals transmitted from the system panel into the real time section.
14.	First block of the return message	Diagnostic format displaying signals transmitted from the real time section into the system panel.
15.	Second block of the return message	Diagnostic format displaying signals transmitted from the real time section into the system panel.
16.	Interface inputs – cassette	Diagnostic format displaying the status of the input ports in the real time section.
17.	Interface outputs – cassette	Diagnostic format displaying the status of the output ports in the real time section.
18.	PLC inputs and outputs - panel	Diagnostic format displaying the status of the PLC inputs and outputs in the panel.
19.	Work memory of the interface	Diagnostic format displaying the PLC memory status. The work memory of the interface displays the content of any arbitrary address from the PLC program memory. The address is to be selected by means of the menu push-button s +100, +10, -10, +1 and “alternation” push-button . The menu will be displayed after selecting this format. The address is to be ascertained from the map after translating the PLC program. The “alternation” push-button is used to change any arbitrary bite of a variable. For details see the PLC Manual.
20.	Work memory of the CNC system	Diagnostic format displaying the CNC memory status in the panel. It is necessary to have the address map available (only for system producer).
21.	Position and difference of fifth – sixth axes	As the format No. 2 for the eventual fifth and sixth if they are not configured, the window is empty.

22.	Position and distance of fifth – sixth axes	As the format No. 3 for the eventual fifth and sixth if they are not configured, the window is empty.
23.	Diagnostics of the panel hardware	Diagnostic format to monitor the hardware status in the panel (push-button s, potentiometers, transmission errors etc.).
24.	Position deviation course	Diagnostic format, graphical course of entered value and deviations to monitor the power unit dynamics and the movement continuity (see figure below).
25.	Combination of position and listing	Combined format with three co-ordinates, listing and status window used for some machine types.
26.	Diagnostics of co-ordinates SU04.	Diagnostic format to monitor the board status of the co-ordinate control board SU04 or SU5.
27.	Diagnostics of non-linear corrections	Diagnostic format to monitor the introduction of software non-linear corrections.

6.4. Graphical displaying of the path

In the indication selection it is possible to select the graphical displaying of the path. Currently run path is indicated only i. e. actual (calculated) values currently sent to the drive units are displayed only. The selection of the graphical displaying of the path offers this menu to control graphics:

- QUADRANT - pressing down this one of nine possibilities of the co-ordinate cross-hair location is selected. By default, the co-ordinate cross-hair with the starting point in the window middle is selected. Furthermore is is possible to select the starting point in the lower left edge, in the middle of the lower side, in the lower right edge and the drawing in it will be reduced. Pressing down the push-button the actual drawing will be deleted.
- REDUCTION – pressing down this the scale is magnified because dimensions of the surface to be seen at once are magnified and the drawing in it is reduced. Pressing down the push-button the actual drawing will be deleted.
- MAGNIFICATION – pressing down this the scale is reduced because dimensions of the surface to be seen at once are reduced and the drawing in it is magnified. Pressing down the push-button the actual drawing will be deleted.
- PLANE – pressing down this one of four co-ordinating planes: X-Y, Y-Z, Z-X and X-4 may be displayed. With lathes (file CNC836.KNF, parameter No. 49(1) = S) only one plane: Z –X is approved. Pressing down the push-button the actual drawing will be deleted.
- STARTING POINT – Pressing down this the drawing will be deleted and the drawing procedure starts from the co-ordinate cross-hair (file CNC836.KNF, parameter No. 49 (4) = 1). Absolute co-ordinates of the starting point are stated in the upper beam. If it is located in the file CNC836.KNF, parameter No. 49 (4) = 0, the actual drawing will be deleted after pressing down the push-button but the drawing will be continued or started on the absolute co-ordinates mentioned in the upper row of the graphical format.

It is suitable to perform the selection of the co-ordinate system and scale before starting the program so that the whole drawing of the path will be visible because pressing down all push-button s from the graphic menu performs reset of the drawing surface. In the rectangle displayed in the lower part of the drawing surface the following data is indicated from the left to the right:

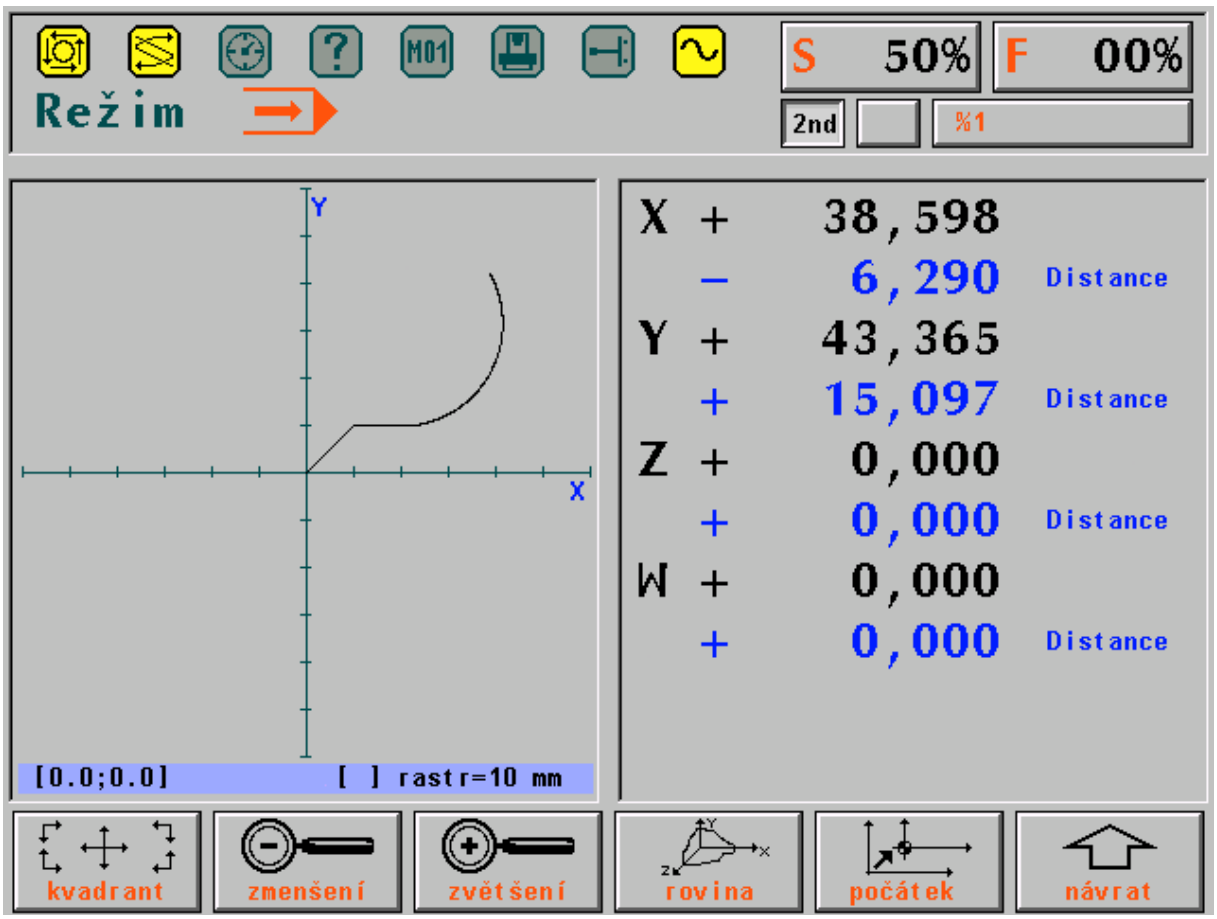
In the brackets the co-ordinates of the starting point of the displayed co-ordinate system related to the reset machine point (parameter 49 (4) = 1) or absolute co-ordinates in the

moment of pressing down the push-button "Setting the starting point" (parameter 49 (4) = 0) are mentioned.

If located any exclamation mark in the brackets, the path drawing is located outside of the drawing surface. If drawn the path in the drawing surface, the exclamation mark is disappeared.

Raster = distance of two graduation marks on the scales of the co-ordinate axes. The raster may be selected in the following sequence (in mm): 0.025, 0.1, 0.25, 0.5, 1.0, 2.5, 5.0, 10.0, 25.0, 50.0, 100.0, 250.0.

The drawing is performed in two colours (shadows). The lighter drawing is designed for the work feed, for the rapid feed or introduced corrections the drawing is darker.
Note:
If selected "lathe" option of displaying(49(4) = 0) and the remote corrections of the individual tools are introduced, the graphical displaying often "leaves" the displaying surface and it is not visible.

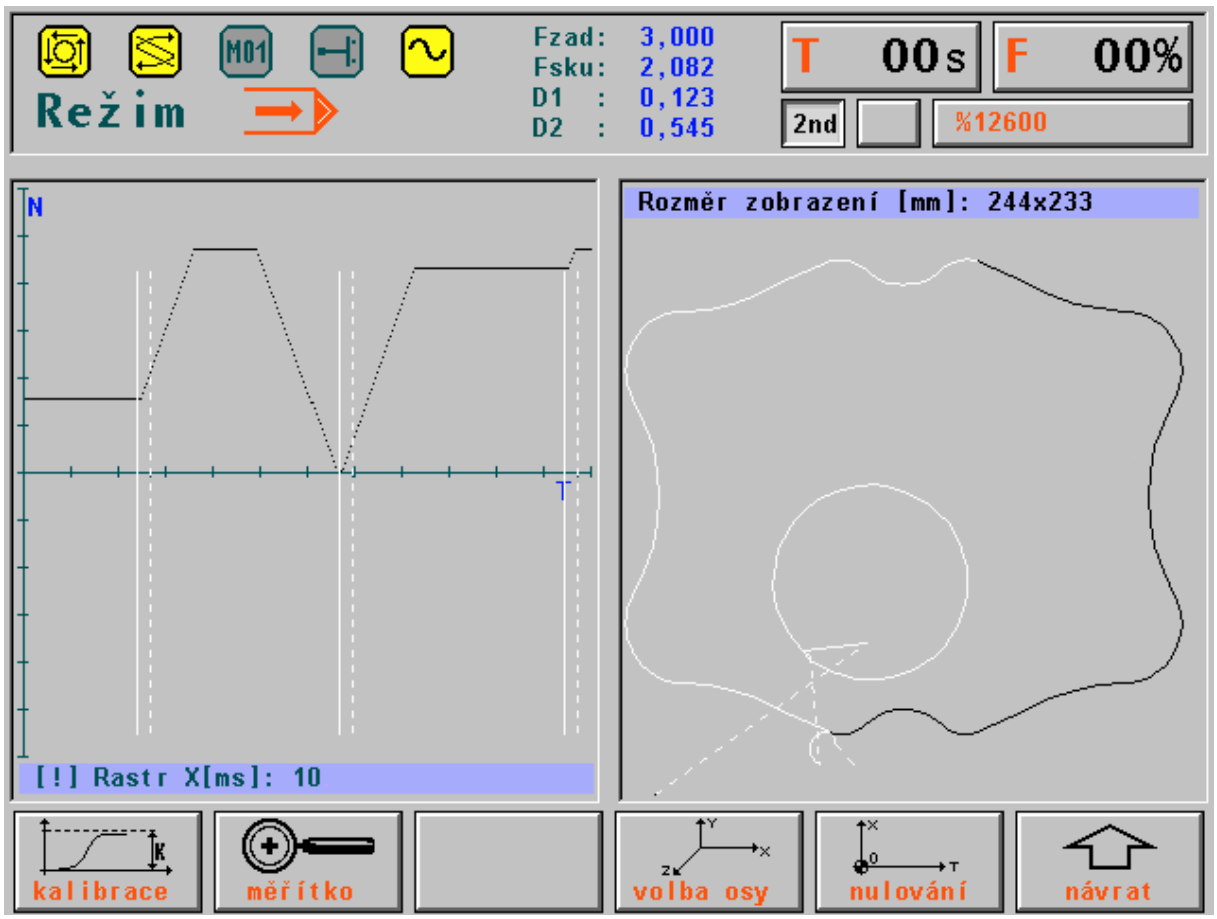


Režim = mode
Kvadrant = quadrant
Zmenšení = reduction
Zvětšení = magnification
Rovina = plane
Počátek = starting point
Návrat = return

6.5. Position deviation course and monitoring of the movement continuity
The format (in the indication selection WIN No. 24) is used to monitor and set the drive unit dynamics and to monitor the instantaneous velocity with continuous program run (G23).

To set the dynamics, the value of the difference counter of the selected axis and entered path for one cycle (10 ms) on the output from the interpolator is displayed. One pixel on the screen corresponds with one cycle of the interpolator (10 ms). The measurement shall be preceded by the calibration which sets the suitable scale for displaying. The calibration is started and stopped by the software push-button "calibration".

To control the continuity, the value of the instantaneous tangential velocity to the movement path is displayed. Vertical solid lines mark the periods of the individual blocks, vertical dashed lines marks the moment for the recognition possibility of the smooth continuation into the further block.



Režim = mode
Rozměr zobrazení = displaying dimension
Kalibrace = calibration
Měřítko = scale
Volba osy = axis selection
Nulování = reset
Návrat = return
Rastr = raster