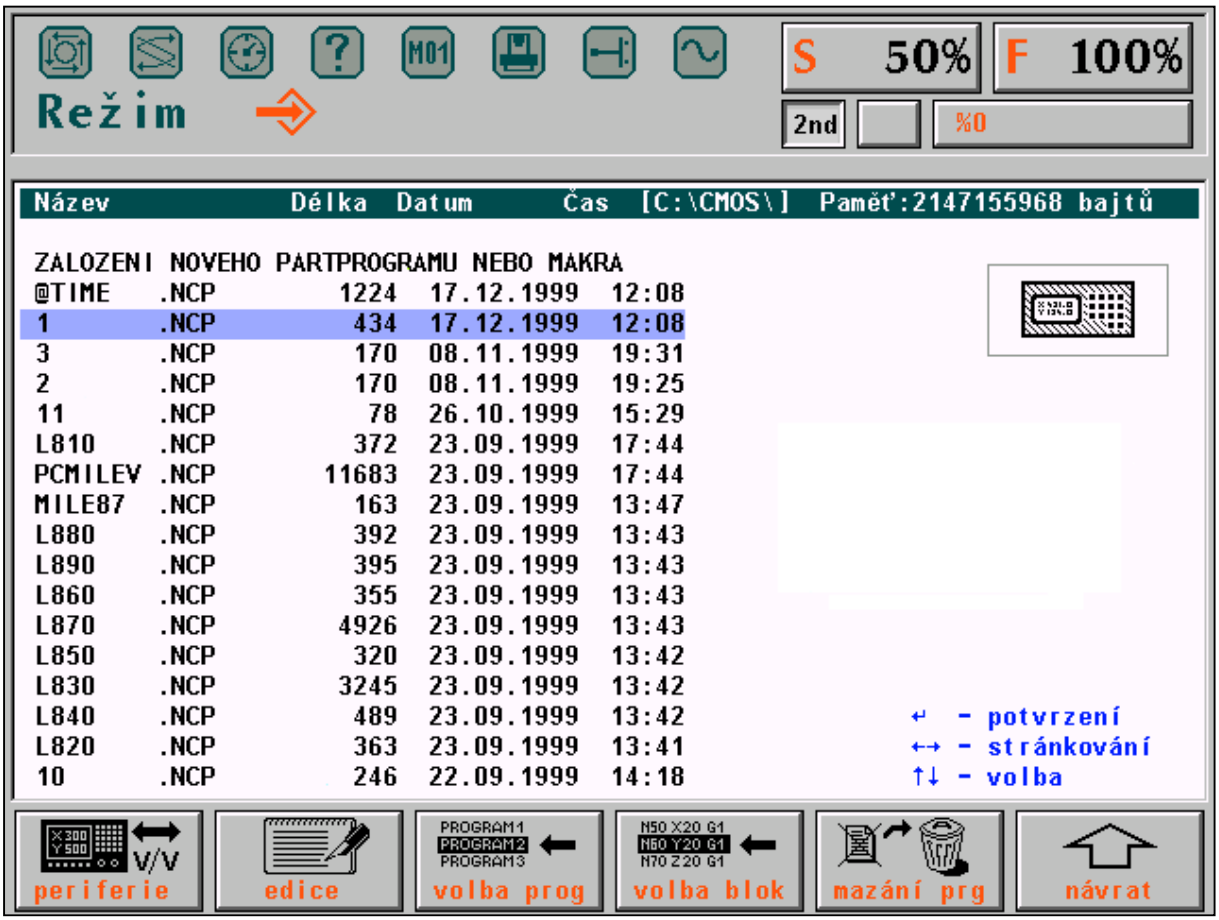
10. SELECTIONS OF THE PART PROGRAMS AND BLOCKS

10.1. Selection of the part programs

In the automatic modes the operations are performed in accordance with the entered part program. Before handling them the activation (preparation for control) of the relevant part program must be performed. The part program activation is to be performed by the following procedure:

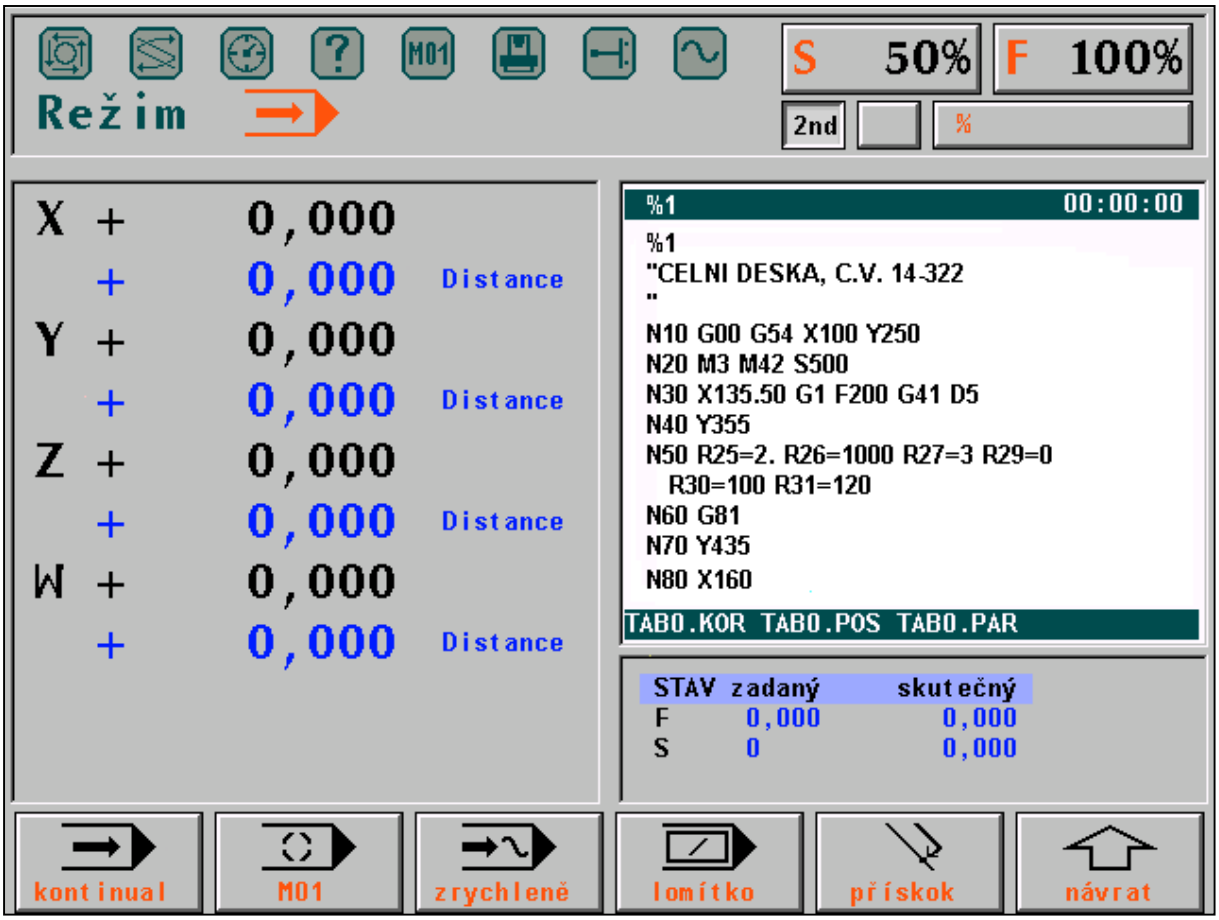
In the main menu, press down the PROGRAMS push-button . The part program list (see the figure) available in the system memory will be appeared. By means of the cursor up/down (with several programs also the arrow to the left and the arrow to the right) select the required part program and press down the PROGRAM SELECTION push-button . The syntactic checkup of the part program and loading into the work memory of the system will be done.



Režim = mode	Název = name	Délka = length
Datum = date	Čas = time	Paměť = memory
Bajtů = bytes	potvrzení = confirmation	stránkování = paging
volba = selection	periferie = periphery	edice = edition
volba prog = prog selection	volba blok = block selection	mazání prg. = delete prg

návrat = return
Založení nového partprogramu nebo makra = establishment of new part program or macro.

If set the machine constant No. 99 - the third decade to 1, also firm cycles will be read into the memory automatically. Which file with the firm cycles will be read in, is determined in the configuration file CNC836.KNF. After PROGRAM SELECTION the AUT mode will be selected as a priority. It is possible to set by means of the machine constant (No. 97, sign) whether the AUT mode with the modification BLOCK BY BLOCK (BB) or to set the AUT mode only after selection.



Režim – mode
STAV zadaný = Status entered skutečný = true

kontinual = continual
zrychleně = by accelerating method
lomítko = slash
přískok = in-feed
návrat = return

The part program is ready to be started from the first block. By default, the format with two windows is determined for the AUT mode after selecting the part program. In the left window, the indication of co-ordinates and distance and in the right window the part program listing by the machine constant (No. 97, fourth decade) are located. It is possible to set

whether the listing from the internal system memory (status regarding to which the system runs) or listing from the file (also comments are visible) which may be changed by the eventual conversions.

In the upper status line of the listing, the program No. is indicated which is specified behind the % character. Generally, however, the file name may be different. The No. has no practical meaning.

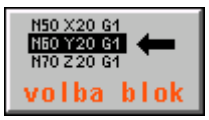
In the lower status line, the names of the selected files with the correction tables, displacements and parameters are indicated. It is used for checkup purposes for the case when using e.g. several files of the correction tables.

The modification BLOCK BY BLOCK may be cancelled before the start by the change-over switch CONTINAUL/BLOCK BY BLOCK or it is possible to set other AUT mode modification. It is possible to select any other display format by the indication selection.

If occurred any syntactic error in the file, the selection will not be run and the error window will appear. For error details see the EDITOR chapter.

10.2. Block selection

This mode is used when wanting to start the part program from any other than the first block.



The control procedure from the MAIN MENU is the same as with the part program SELECTION with the exception that the BLOCK SELECTION push-button shall be pressed instead the PROGRAM SELECTION push-button .

When the syntactic checkup performed and the program run without any error, the format for the automatic mode – listing and the co-ordinates (see the figure in the previous chapter) with the query window to enter the N block No. and the Q number of repetitions is indicated.

By means of the push-button s with numbers the required block No. is to be entered. The block No. may consists of maximum eight digits. when entering further numbers, the higher digit places disappear. By this method it is possible to correct the eventually erroneously entered block No. so that it is added by the zeroes until the window will be empty.

To delete the incorrect block No. , the DEL push-button may be used.

Dotaz = querry
Zadání čísla bloku = Block No. entry
potvrzení = confirmation

By pressing down of “Q” (or 2nd and Q) it is possible to switch-over to the entry of the number of repetitions. The number of repetitions shall be entered in the case only, when the skips with repetitions (G73, Qxxxx) or calling up the sub-programs or macro-cycles with the

repetitions are programmed in the part program and it is desirable to continue the part program after certain number of throughputs in cyclically repeated part of the part program.
By pressing down "N" (2nd N) it is possible to return back to the block No. entry. Confirmation of the BLOCK SELECTION is performed by pressing down of the ENTER push-button or CURSOR TO THE LEFT push-button . After BLOCK SELECTION and starting in the MODE window the AUT mode is set (with the eventual BB modification).

Note:
Before entering the block NO, do not forget to press 2nd if already not pressed, otherwise the digit will not be loaded when pressing down first. If 2nd is not pressed down and 6 is to be entered, the change-over to the Q repetition number entry (Q and 2 are on the same push-button). When occurring it press 2nd and N, whereby it will be switched-over to the window to block No. entry.

After confirmation of the selected block the program listing will be displayed from the selected block.

After eventual erroneous block No. entry, the error 6.15 "Error of the lower limit, block NO. not found" is displayed. The selection may be repeated.

10.2.1. Block selection with regard to the co-ordinate movement (recommendation)

Procedures described in this chapter (10.2.1.) are recommended by the producer for the block selection.

The block selection is usually performed in the situation when the tool is not in contact with the workpiece i. e. after block selection and start this path shall be reached first. It expect the condition when the system is in rest i. e. after central cancellation for instance. Generally there are two main cases:
- block selection of the so-called main sentence
- selection of the general block

The selection of the main sentence is used e. g. with long programs which have to be interrupted e. g. upon the shift finish and the shift start on the next day. Working procedure is interrupted, in this case, on any suitable place so that the continuation from the main sentence will be possible. The main sentences are programmed so as it will be the question of the part program start.

The second case is occurred when the program must be interrupted from any reasons (usually an emergency case, tool break etc.) in any general place in the block middle and then it is necessary to continue it either from the not finished block start point or from the interruption place.

Other point of view for the block selection gives the movement through the selected block. The following is distinguished:
- movement blocks
- non-movement blocks

The movement blocks are the blocks in which the movement along minimum one co-ordinate is programmed. Non-movement blocks are the blocks without any programmed co-ordinates i. e. blocks e.g .with the technological functions only.

The following description assumed the recommended setting of the machine constant NO. 53:

R53: x x x 3 x , 1 x x

With this setting the system harmonize the position with the programmed path by work feed in every time.

All kinds of corrections and starting point displacement inclusive of radius correction and additive displacement (of the revolving turret and programming to the zero tool) may be assigned to the selected block. From the point of view of corrections not limit exists when returning back to the path. It is expected the usage of the radius corrections with the terminal points of the blocks on the equidistance intersections (eighth decade of the machine constant R95 = 1).

When selecting the block it is necessary to consider:

whether the movable block
or non-movable block

is selected.

1. Selection of the movable blocks

When selecting the movable blocks, the system is "connected" to the programmed path by its work feed and calculates all correction kinds and starting point displacements immediately (inclusive of the radius correction). When requiring to repeat the whole block the selection of the previous block is shall be performed (see the chapter "Return to the path without any jumps).

This method is problem-free and so the selection of the movable blocks may be recommended.

When selecting a general block, the block with the movement shall be selected, if possible, and before the selection the place shall be reached from which the optimum movement into the terminal point of the selected block shall be performed.

Before selecting the block it is recommended to approximate the programmed path (e. g. in the MAN mode) suitably.

2. Selection of the non-movable block

When selecting the non-movable blocks two different requirements may be occurred as follows:

a) the system has to harmonize the position which is valid in the given block when selecting the non-movable block. In this case, the system will control the linear interpolation by means of the work feed to the valid measure in the given block. The system starts all correction kinds and starting point displacements immediately. This method is used when the programmed technology may be bound to the machine position in the given block (e.g. replacement of the tool). However, this method is not suitable to be used when performing the selection of the non-movable blocks which have the meaning of the "main sentences" of the program. The main advantage of this method is that the system will harmonize the position with the programmed path in every time. In the block, !0 or !1 shall not be programmed (see below).

b) the system does not perform any movement when selecting the non-movable block. So no harmonization of the position with the programmed path will be executed. It is expected that in the following blocks all co-ordinates will be programmed gradually (or simultaneously) and so the gradual harmonization of the position will be obtained. So, the system will not secure the harmonization automatically and the part program proposal method is very important. Such non-movable block may have the character of the "main sentence" (it has the similar properties as the program start). In the block, !0 or !1 shall be programmed.

To avoid sometimes not estimable co-ordinate movement, it is possible to mark the main sentences in the part program.

MAIN SENTENCE

It is possible to mark the main sentences in the part program by the ! character (exclamation mark) from the panel version 30.13.

!0 non-continual function valid in one block only serves to mark the "main sentences".

!1 continual function valid until revoking (e.g. ! 0) which marks all non-movable blocks as the "main sentences". When using the selections of the "main sentences" only, the function ! 1 may be set in the "priority block".

If selected the main sentence block ,no movement of the co-ordinates into the positions which were programmed previously but the co-ordinates "run" in accordance with the program starting by the main sentence. The movement occurs gradually only in the co-ordinates as programmed. If the co-ordinate is not programmed no movement will occur. By suitable programming of the main sentence, it is possible to secure the controlled reaching of the required positions. If programmed the movement in all co-ordinates in the main sentence, this block is not to be marked by the exclamation mark. If programmed the co-ordinates gradually in some blocks, it is recommended to program the exclamation mark.

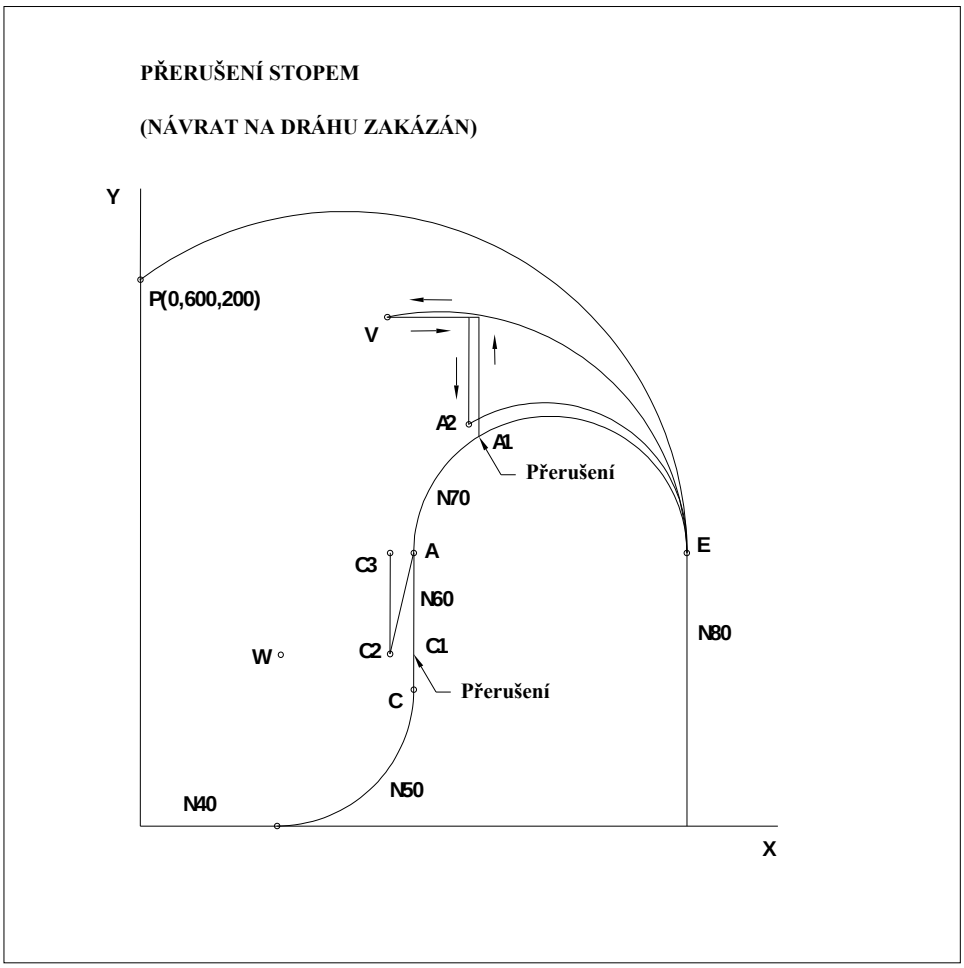
Because the co-ordinates go to the terminal points of the block by work velocity (velocity programmed in the block) when selecting the block, it is suitable to reach the required position in advance manually when the work velocity is low and the distance is big.

TECHNOLOGICAL FUNCTIONS

After selecting any arbitrary block, the output of all technological functions programmed from the starting point of the part program is performed. For instance when rotating the spindle it is not necessary to select the block directly in which the spindle is programmed if programmed in some of the previous blocks.

EXAMPLE:
Practical usage of the return back to the path, after selecting the block, some examples are below mentioned for recommended setting of the machine constant R53: x x x 3 x . 1 x x.
…
N10 Y400 G1 F300
N20 Z200
N30 Y0
N40 X150
N50 X300 Y150 J150 G3
N60 Y300 G1
N70 X600 Y300 1150 J0 G2
N80 Y0 G1

A) Interruption on the straight line
In the N60 block, the interruption by the STOP push-button in the C1 point on the line will be occurred. The AUTMAN travel will be activated and the W point will be reached in the X axis or Z axis and the central cancellation will be performed. Here, the broken tool will be replaced and in the AUTMAN travel the C2 point will be reached through the programmed path.



Přerušení stopem = Interruption by STOP
Návrat na dráhu zakázaný = return back to the path is forbidden

Přerušení = interruption

The selection of the N60 block is to be performed. After the start, the movement by the work velocity in the axes X, Y and eventually in the Z axis into the terminal point of the N60 block i.e. into the A point (all axes run in the N60 block so that the terminal point of the block in accordance with the part program was reached) will be performed. Further block (circle) is moved without any problem in this case.

Note:
Recommended setting of the fifth decade may be 2.
The machine type, among others, is decisive to set the fifth decade of the machine constant No. 53. Machines with the switching-over axes (one drive for several axes) shall be set to 2 usually because not all of some co-ordinates may not run simultaneously with these (rectangular) machines. Machines with the drive of all co-ordinates have the fifth decade set to 3.

If the machine constant No. 53 for the above mentioned example, fifth decade will be set to 2, the movement will be from the C2 point by the work velocity in the Y axis only into the C3 point to measure of 300. Axes Y and Z eventually will remain stationary (only the programmed axes of the NA6A0 block will run). Further block (circle) will be run in the case only when the X axis will be in the position 300 accurately, otherwise the error message "The terminal point does not lay on the circle" will be issued.

In both cases it is necessary, from the practical point of view, to approximate the programmed path in the AUTMAN travels as proximal as possible (to contact) so that the remaining of the interrupted block will be worked at all. See the chapter Automatic Modes.

B) Interruption on the circle
In the N70 block on the circle, the interruption by the STOP in the A1 point will be occurred. The AUTMAN travels shall be reached and then in the axes Y and X the V point shall be obtained where e. g. a broken tool will be replaces. Then the central cancellation will be performed. When setting the START after theN70 BLOCK SELECTION, the movement along the circle from the V point into the E point will be performed. This circle, however, is out of the workpiece. Practical usage may be taken place in the case only when returning from the V pint in the AUTMAN travels back to the programmed path as close as possible (to contact). This is illustrated in the figure as the A2 point (it is not drawn in the programmed path directly to be understood better). This point shall, in an ideal case, lay on the programmed circle. When selecting START after N70 BLOCK SELECTION, the movement from the A2 point into the E point along the circle will be performed, in an ideal case this movement will be performed along the original programmed path.

Note:
The setting of the fifth decade of the machine constant NO. 53 is not decisive fot the axis movement. Two axes of the programmed circle are run in every time.

Radius and length corrections when returning back to the path
If set the machine constant NO 53 in accordance with the above mentioned recommendations (fifth decade is 3 or 2) no limitation is available when returning back to the path from the correction point of view (radius corrections with the intersections of equidistances – machine constant No. 95, eighth decade = 1).

On the above figure, the tool path with the radius “r” is illustrated. When selecting the N20 block from any arbitrary point (e. g. from the S1 point) the A point will be reached which is the equidistance intersection. If the S1 point may reach the equidistance accurately (the edge will contact the workpiece), the movement from the interruption place along the same path as programmed will be performed.