11. AUTOMATIC MODES

11.1. AUT mode

The AUT mode with the BB modification is usually set after the program SELECTION as a priority. The BB selection is cancelled before start of the debugged part program usually. By pressing down of the START push-button the part program start to be run. In every time during the part program run it is possible to press down one or several push-button s of AUT mode modification. The modification meaning is described below.

During the run and the part program the diodes SYSTEM RUNS, FUNCTIONS NOT FULFILLED and INPOS are ON.

Run part program may be stopped by pressing down the STOP push-button . After STOP only the diode FUNCTIONS NOT FULFILLED remains ON.

The part program may be continued by pressing down the START push-button only. If FUNCTIONS NOT FULFILLED diode is ON, the conversion to any other mode except the mode CENTTRAL CANCELLATION (CA) and auxiliary manual travels (AUTMAN) is not allowed. Usage of the auxiliary manual travels is described below.

The part program remains activated until the SELECTION of other part program or CA are not finished. After turning on the system no program is selected.

Sequence of the performed block is, beside the natural sequence, influenced by jumps, block repetitions, sub-program calling up, firm cycles and macro-cycles. Automatic run lasts until the part program is finished which is defined by the functions M02 or M30 which shall be programmed in the previously run block of the part program.

With the AUT mode it is possible to change the % F and % S override values. The interruption of the automatic run of the part programs (except STOP) may be caused by the following reasons:

- in the part program the function M01 is programmed and simultaneously the AUT mode modification and the M01 function (see below) are selected.
- in the part program block the function M00 is programmed.
- in the part program a logic error is occurred e. g. incorrectly calculated terminal point of the circle.
- defect of the co-ordinate or machine defect occur.

11.2. AUT mode modification

Automatic part program run may be influenced by AUT mode modifications. The modification may be selected in every time if the AUT mode is selected simultaneously even in the case when the system runs. The relevant modification will be applied in the moment which allows its engagement logically. The modifications may be combined arbitrarily or all of them may be used simultaneously. The modifications remains selected permanently (even in the case of the mode change) if they are not changed.

AUT – BB modification

The BB modification – BLOCK BY BLOCK. If it is selected, the interruption of the automatic run of the part program after every run block will be performed. If not required in the block, the spindle is not stopped and the cooling is not switched off. Further block shall be started by the START push-button again. If pressed the BB push-button during the block run (e. g. when running) the stop will be occurred on the end of this block. If pressed the BB push-button during the block run (BB modification engagement) and pressed again during the block run (BB modification disengagement – the push-button is toggled), no stop will be occurred on the block end.

Note: when using the G23 or G24 functions the stop may be occured in the next block.

AUT - M01 modification

AUT - M01 modification. When selecting it, the part program will be interrupted without losing information on the block end in which the M01 function is programmed. The activity is the same as with the programming of the M00 function in the part program (programming STOP) with the difference that the stop will occurred if the AUT.M01 modification is selected. After finishing of all operations in the program block the speed will be stopped and the cooling will be switched off (if controlled these functions by programmable interface). After pressing down of the START push-button the part program continues inclusive of restoration of the spindle speed function and cooling.

AUT modification / ("slash")

This modification of the AUT mode does not run (ignores) the part program blocks in which the "slash" is programmed.

AUT-AVP modification

The AUT-AVP modification is performed by the part program with the pre-selected velocity regardless to the velocity programmed in the part program (except the rapid feed). Influence of the %F override remains. It is used when debugging the part program without the tool when it is suitable to perform the movable blocks by higher velocity than the work feed from the time reasons. If selected the AUT-AVP modification, the velocity will be determined by pressing down the F address and entry of the required value with which the part program shall be run. If the AVP velocity is entered then, with the AUT-AVP modification selection, the AVP will be engaged from the next block i. e. n+1 block only during the run of the n-block.
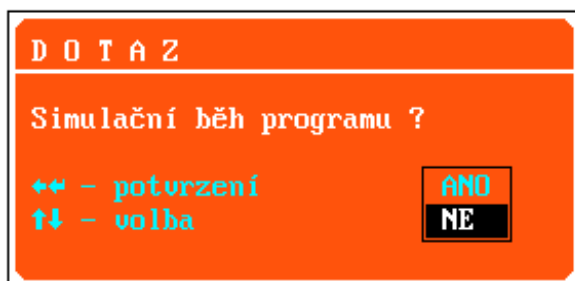
When selecting the AUT-AVP modification, the window with the query "SIMULATION RUN OF THE PROGRAM?" is appeared. If remains the NO selection, it will be possible to run the part program with the pre-selected velocity as mentioned above. If selected YES, the simulation mode or status when no voltage will be transmitted into the power unit will be activated. In this status it is possible to debug the part program by monitoring of the co-ordinates or graphically without moving the co-ordinates. This status may be used to train the operators. The simulation run is

cancelled by new reaching of the reference or selecting the pseudo-reference only. The simulation mode is indicated by the following symbol:

DOTAZ   Query

Simulační běh programu?   Simulation run of the program?
Potvrzení   ANO   confirmation   YES
Volba   NE   selection   NO

AUT – ND modification

The AUT – ND modification. This toggle push-button allows or locks the possibility of the return back to programmed path by the part program. It is possible to select this AUT mode modification after selecting the BLOCK SELECTION only.

If the return back to the path approved: the illustrated figure is indicated in the mode window. If the return back to the path forbidden: the illustrated figure is not indicated in the mode window.

AUT - ND modification is not set with the recommended setting of the machine constant No. 53 i. e. after the block selection the return back to the path is forbidden by default. If wanting to be approved it, the above mentioned push-button shall be pressed.

If approved the return back to path, all co-ordinates travel, with the shortest possible path by the rapid feed, to the starting point of the programmed position (i. e. into the position which was previously programmed in the part program for a given co-ordinate) after the start of the part program. When introduced the radius corrections, the return is not correct (the system is not returned back to the equidistance intersection), and in the case of circles, errors "the terminal point does not lay on the circle" may be appeared. So it is recommended to keep the default setting – "return back to the path forbidden". Then the system reaches the terminal point inclusive of all corrections and displacements.

11.2.1. Auxiliary manual travels (AUTMAN) in the AUT mode
A very important possibility is the usage of the auxiliary manual travels in the AUT mode. When stopping the program by the STOP push-button it is possible to select and to start the central cancellation (CA) mode. In some cases, however, this method is not suitable. A classical case is the status when after the STOP in the AUT mode it is necessary to be removed from the workpiece but the spindle shall remain in rotation. The previous method i. e. CA is not to be used because after the CA start the spindle would stop in the status when the tool is in contact with the workpiece. The auxiliary manual travels will be used.

Press down the MAN push-button on the operator's panel. (Attention: it is not the question of the software push-button!) The AUT mode remains selected. The menu alternation and the MANUAL inscription in the window of the actual item indicated that the auxiliary manual travels were selected. The following menu will be set:

zpět 1 osa = return of one axis   zpět vše = return all
posunutí = displacement   krok TOC = TOC step
návrat = return

Upon the finish of the auxiliary manual travels (it is to be performed by repeated pressing down of the MAN push-button) the following options are available in the AUT or AUT – BB modes:

- the return back to the path in the auxiliary manual travels mode will be performed and the automatic mode continues in accordance with the programmed path after starting again.
- the complete return back to the path will be not performed and after repeated start, the automatic mode will be displaced depending on the part program (movable, non-movable blocks etc.) and the AUT – BB modification. This possibility is available for the completing purposes only and it is not recommended to use it. To displace the path, an independent Push-Button menu is available which is described below.
- the auxiliary manual travels are used for leaving the stop point (e. g. with the rotating spindle). Then the central cancellation and repeated program start by means of the block selection follow (the setting of the fifth decade of the machine constant R53 to the value of 2 or 3 is expected).
  Note: with the system from the panel version of 30.17 it is possible to assign the function which consolidates the central cancellation and the stopped block selection (the system stores the stopped block No.) to one designed push-button to accelerate the handling procedure.

Control procedure for the individual cases:

Return back to the path in the mode of the auxiliary manual travel
It is assumed that the A point will be reached in the mode of auxiliary manual travels after stopping the AUT mode in the P point (see the figure). Return back to the path into the P point (i. e. into the STOP point) is performed by pressing down of the "return of one axis" or "return all" push-button.
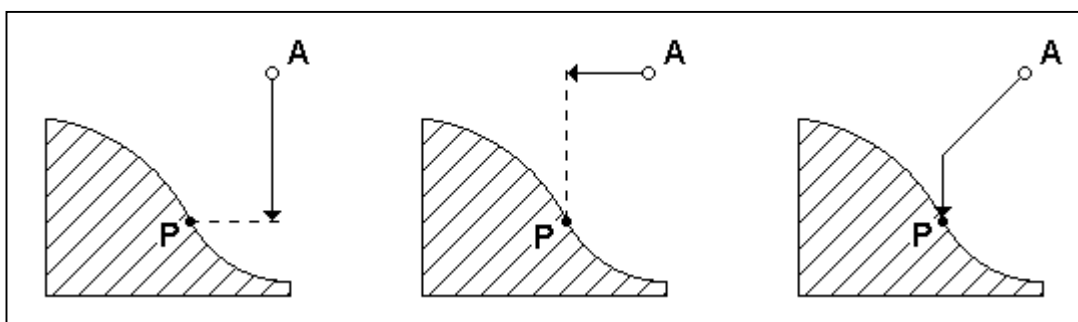
Before pressing down of the "return of one axis" push-button, the co-ordinate must be selected- After pressing down of the "return of one axis" push-button, the query window will be appeared (see the figure). Select "YES" and confirm by the ENTER push-button. The co-ordinate will be displaced into the stop position. If the A point is general
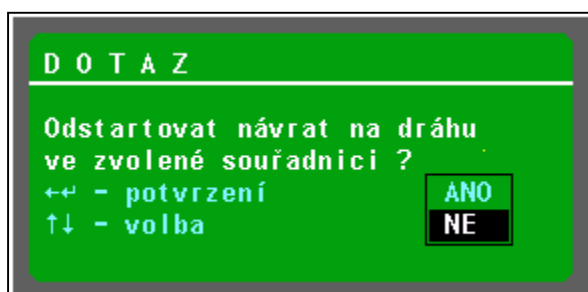
one, it is necessary, in the case of pressing down the "return of one axis" push-button, to repeat this procedure for further axis too to reach the P point gradually. When pressing down the "return all" push-button and the query start of the return back to the path in the selected co-ordinate? is confirmed , all co-ordinates which are located out of the programmed path will run simultaneously.

DOTAZ		Query	
Odstartovat návrat na dráhu ve zvolené souřadnici?		start of the return back to the path in the selected co-ordinate?	
Potvrzení	ANO	confirm	YES
Volba	NE	select	NO

Return of all co-ordinates is performed along the path which is to be seen in the figure (they do not run into the P point by the linear interpolation in all axes). Each co-ordinate is moved into its position and after reaching it it stops. Other, if they are not in position, continue their movement.

After reaching the position (P point) the movement will be stopped. The program will run after pressing down of the START push-button.

Path displacement

The "Displacement" (=posunutí) push-button is designed for the permanent displacement of the programmed path. The displacement is valid until revoking it by the same push-button or after system switching off. Practical usage is e. g. when roughing the castings on big machines when it is necessary to run a certain section with displacement because some part of the casting is bigger than expected. It is possible to be returned back to the programmed path again after several blocks. The displaced path is practically to be added to the actual starting point displacement. It is possible in the part program stop status or after-block stop status or immediately after program selection, if already wanted to run with displacement from the part program starting point. The path displacement is included into the actual starting point displacement. If used the displacement, it is suitable to program the starting point displacement (G53 – G59) in the first block immediately to be given unambiguously to which starting point displacement the path will be added. If programmed no starting point displacement it will be added to the priority displacement (usually G53 or G54).
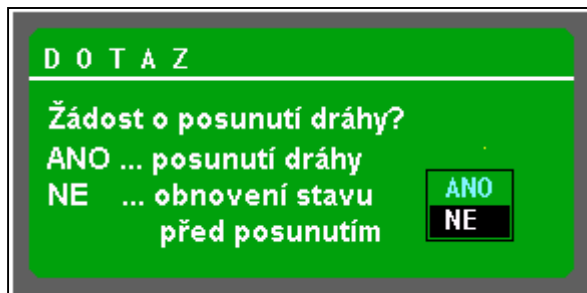
Displacement entry procedure:
1. The program is stopped by the STOP push-button or by "block-by-block".
2. Press down the "displacement push-button – the "displacement request" will be appeared (after approximately one minute) and the software push-button will change the inscription to "DISPLACEMENT!". From this moment, the path run in auxiliary manual travels will be included into the displacement.
3. In the auxiliary manual displacement the movement in the arbitrary axis by the required value will be performed.
4. Press down the "DISPLACEMENT" push-button, the push-button inscription will be changed into "displacement" again and the message "program path displacement entered" will appear. The displacement was finished and the path run in auxiliary manual travels will be included into the actual displacement (e.g. G54). It is possible to verify it in the

indication selection. The presence on the displaced path is indicated by the POS message in the window under % S override (next to 2nd).

5. After pressing down of the START push-button the program runs with the displaced path. The path will be displaced permanently until the displacement push-button will be pressed down again or the system will be switched off. The path displacement will not be stored in the file TAB0.POS so that after switching-on of the system it already is cancelled.

Procedure of displacement cancellation:
1. Press down the "displacement" push-button in the stop status
2. Because the displacement mode already is on, i. e. the run on the displaced path is performed, the query "request to displace the path?" is appeared after repeated pressing down of the "displacement" push-button (see the figure), because the system has to know, if required the displacement by further value or the displacement has to be cancelled. When comfirming with YES the displacement by one value will be performed. When confirming NO, al displacement will be lost and the program will be returned back to the programmed path on the end of the next block. If cancelled the displecement, POS indication in the window next to 2nd will disapear.

DOTAZ	Query
Žádost o posunutí dráhy	Request to displace the path?
ANO – posunutí dráhy	YES path displacement
NE – obnovení stavu před posunutím	NO restoration of condition before displacing