Control systems
CNC8X9 - DUAL

PRODUCTION AND SERVICE

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Operation manual

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1. INTRODUCTION

1.1. Usage

Control systems of CNC836, CNC846 and CNC856 are the universal systems designed to control the cutters, lathes, drilling and boring machines and machine tools with maximum sicx controlled co-ordinates continuously. They allow the linear interpolation in six axes simultaneously, annular interpolation in any arbitrary plane given by the co-ordinating system of a machine, cutting of the single or multiple threads on a cylindrical or a conical surface, constant cutting speed, shift of the radius and distance corrections, displacement of co-ordinating system starting points and carrying out of firm drilling and threading cycles. Beside the control of machines themselves, they allow to adapt the part-programs i. e. inserting and removing of the part of the whole part-program from the system memory.

This system is designed for machines equipped with electric power units and it is possible to connect it to a machine with any arbitrary pitch of the feed screw. The pitch error and backlash may be compensated by the system.

Simple conception when maintaining all parameters being currently at modern CNC systems, low price and ability of adapting the machine controls to the requirements of our customers selectively make possible the modernization of old machines or the replacement of old NC as well as CNC systems.

Note:

The operation manual is the same for all the system types. The manual for the CNC836 type also is valid for the CNC846 and CNC856 types. Eventual differences between both system types are mentioned explicitly.

1.2. Basic technical parameters

The control system is a numeric electronic device consisting of two modules. Also the so-called machinery panel and manual panel may be connected to this control system optionally.

Control system

- motherboard with the 2 PENTIUM processors
- VGA plate to control colour or monochromatic screen
- plate to control the push-button board
- controller to control the disk, serial and parallel inputs
- power supply of 220 V/200 W
- display 9“ (CNC836), 14“ (CNC846), flat TFT 14“ (CNC856), monochromatic or colo
- boards to control the co-ordinates
- external boards to control the two-value inputs of 24 V/0,1 A, 50 V/2A, 110 V
- of the panel and the cassette is performed by the serial cable

Machinery panel

- direct control of selectable functions in accordance with the interface program
- manual knob
- potentiometers for manual control

Manual portable panel

- control of the co-ordinates by means of push-button s
- manual wheel (knob)
- TOTAL STOP push-button

1.3. System parameters

- number of controlled co-ordinates and spindles in the position feed back of maximum 6
- linear interpolation in 6 co-ordinates simultaneously
- circular interpolation in a plane
- control of the spindle in the speed and position feed back, positioning, C axis
- single and multiple threading on the cylinders, the cones and the frontal surface
- constant cutting speed
- movement along the spiral
- incremental measurement by 0,001 mm increments
- compensation of the non-linearity of the feed screw
- Reversal play compensation
- arbitrary calculation of number of the pulses to the path increment with the accuracy of +/-0,0001
- output analogue signal (0 – 10 V 2 kOhm)
- two-value inputs of + 24 V (number of them depends on requirement)
- two-value outputs (number of them depends on requirement)
- possibility to use the adapting relays (number of them depends on requirement)
- capacity of the backing memory: CMOS up to 2 Mbytes, HARD DISK (e. g. 2 Gbytes)
- maximum length of the part-program and edition are limited by the capacity of the dynamic storage (e. g. 16 Mbytes)
- monitoring of the graphic path
- information on usage of the system time
- dialog graphics to create the part-programs
- optional floppy disk drive to be connected
- optional connection to the DNC network with the TRANS adapters
- possibility to control the asynchronous motors by means of the frequency converters
-

1.4. Basic characteristics

PROGRAMMING (entry of the part-programs) is addressable in the whole program blocks with the variable block format. The path programming is incremental of absolute.

POSITION MEASUREMENT of the controlled co-ordinate is performed by means of the pulse rotary of linear sensor. Measurement of the spindle is performed by means of the pulse rotary sensor.

SPEED CONTROL of the feed is performed in the closed loop. The position feed back is closed through the microcomputer. The speed is scanned by means of the tacho generator which is a part of the drive unit speed loop (not included in the system). The start and alighting run transconductances are entered as a constant when adjusting the system with the machine.

RAPID TRAVERSE is introduced by means of the function G00. The rapid traverse sizes and the start and alighting run transconductances are entered as a constant when adjusting the system with the machine.

CORRECTION is selected by means of the relevant G function. The correction size is programmable by the D function. In one programming block, the radius correction as well as tool length correction may be programmed.

FIXED CYCLES are selected by the functions G81 up to G 89 in accordance with the ISO recommendations.

SUBPROGRAMS AND MACRO CYCLES allow to compensate the repeating part-program sections. Calling the macro cycle or part-program is performed by the relevant G function, macro cycle No. and subprogram No. by means of the L function and number of retries by means of the Q function.

MANUAL FEED CONTROL may be performed by the independent push-button s for every co-ordinate and direction.

MANUAL FEED CONTROL BY POTENTIOMETERS is delivered against a separate order. It is possible to combine even several co-ordinates arbitrarily which may run simultaneously and every of them with other speed. The speed is proportional to the potentiometer slight turning.

CONTROL IN THE JOG MODE is a travel by pre-selected increment in the range from 0,001 up to 500 mm.

CONTROL OF THE CO-ORDINATES may be performed by a hand-wheel (knob, hand-crank).

COPYING – when travelling in the so-called control co-ordinate, the controlled co-ordinate is operated depending on the copying probe deviation (linear position sensor).

2. WORK CONDITIONS

Correct and trouble-free operation of the systems CNC836, 846 and 856 may be guaranteed when meeting the following work conditions only:

a) the work environment of the system modules shall be normal in accordance with the CSN 330300 without any influences of aggressive gases or vapours, ambient temperature range may be + 5^{o} up to 48^{o} C without any auxiliary thermal radiation, relative humidity of maximum 70 %, and the work environment without any conductive dust.

b) building-in of the system into the equipment located in the environment which is active in accordance with CSN 330300 and CSN 332310 is allowed in that case only when the building- in method may guarantee the environment for the built-in modules in accordance with the Section a). With respect to especially difficult and expensive cleaning of the internal module parts it is necessary , when locating it in the dusty environment in accordance with CSN 332310, to assure the increased protection mode and careful filtration of the cooling air mainly in those points, where the extraordinary fine dust occurs. In the dusty environment where conductive dust occurs, the enhanced protection mode and careful filtration of the cooling air are necessary to avoid possible deterioration of the electric circuit by conductive dust sediments among the electric connections.

c) air pressure shall be in the range from 85 up to 110 kPa.

d) location and fastening of the control system shall be so that no mechanical impacts or vibration will be transferred to it and it may not be exposed to the direct sun light. To reach the optimum activity and maximum average period among the defects it is recommended to maintain the temperature range from + 15^{o} C up to + 38^{o} C and relative humidity from 40 up to 70 %.

3. ABBREVIATIONS USED

In this chapter some terms and abbreviations used in this chapter are explained:

WINDOW – part of the screen framed

SOFTWARE PUSH-BUTTON – push-button figure displayed in the MENU window. They are controlled by the push-button s F1 up to F6 located below the screen.

ADDRESS – the address is an alphabetical character (no digits) which is understood by the system . List of all addresses is mentioned in this manual in detail.

CURRENT ITEM – pressed-down push-button (address) and address value.

FILE – the file is a basic information set of a certain type stored in any recording device (memory). In the files, data are stored which are mainly part-programs, macro cycles, correction tables, starting point displacement, parameter tables and machinery constants. In the files, system parameters and help texts as well as further auxiliary information are stored.

STRING – the string consists of 1 up to 50 arbitrary characters following each other. This term is used to edit when searching the entered group of characters in the part-program for instance.

CANUL – is the abbreviation of CENTRAL CANCELLING, in the manual text also the abbreviation CA is used. The symbol // on the push-button is used to select the central cancelling mode.

AUT – mode of automatic part-program run.

BB – Abbreviation of BLOCK-BY-BLOCK (AUT mode modification).

TRANS – auxiliary device to simulate the periphery devices at NC and CNC systems (MEFI product). It is used in the DNC network.

TOC – abbreviation for the knob mode (hand-wheel).

POT – abbreviation for the potentiometers mode.

MAN – abbreviation for manual mode

RUP – abbreviation for the manual pre-selection mode

4. SYSTEM SWITCHING ON

The operation of the numeric systems CNC836/846/856 may be performed by the skilled person trained in the area of electric safety in accordance with the CSN 34 3100. This operator is allowed to handle the control elements on the system panel of the floppy disk drive. Any other handling procedures with the system are forbidden to be performed by the operator.
Activation and deactivation of the system is conducted concurrently with the turning on and the turning off of the machine. Usually the system is powered through the machine power box. After turning the power on and loading up of the operation system, the control program is loaded into the memory of the system. After some seconds the introduction picture with the text CNC836/846/856 and the number of the system version is indicated on the displaying panel. During this time, the system conducts internal tests as well as introduces communication between the panel and the cassettes. After elapsing of this time, the system conducts central cancellation automatically.

4.1. Configuration file CNC836.KNF

After turning on, certain parameters of the system are adjusted in accordance with the configuration file CNC836.KNF (Note: do not confuse this with the file of of the machinery constants TAB0.REK). **The same file name i. e. CNC836.KNF are used by the systems CNC846 and CNC856 too.** Changes in this file may be performed by the service worker or trained persons only. The basic setting up is performed together with the system installation and it shall not be changed. When changing it is necessary to follow the required syntax otherwise the system does not work correctly. Rules for changes in this file and comments to the individual parameters as well as current condition for the relevant version are mentioned in this file directly. The changes may be performed by means of the system editor (see below). **Changes in this file is applied after every new turning on of the system only.**

Overview of the parameters in the configuration file CNC836.KNF:
- path to the implicit directory with the part programs (usually CMOS memory)
- path to the directory on the floppy disk
- path to the directory on the HARD DISK (C:\SYST\PROG) or EPROM DISK (A:\PROG)
- type of the push-button board used
- co-ordinate name (approved names X, Y, Z, U, V, W, A, B, C)
- screen type (colour or monochromatic)
- requirements to file printout in directories regarding to alphabet, date or by combined manner
- filter for file name with the part programs
- filter for file name with the corrections
- filter for file name with the starting point displacement
- filter for file name with parameters
- filter for machinery constant files
- file name for system editor
- name of the system table of corrections
- name of the system table with the starting point displacement
- name for system table with parameters
- name of the system table of machinery constants
- constants to set the sensitivity and hysteresis of potentiometers of % F and % S.

- parameters of the serial channels
- connection to the DNC network
- machine type (mill, lathe)
- conversion program
- system word for lathes
- version No.
- memory population
- setting the grey colour

Detailed commentary to the configuration file is stated in the Appendix A2.

4.2. System memories

Control systems of the series CNC836/846/856 are delivered optionally with two basic memory kinds as follows:

1) with hard disk
2) optionally with the flash disk too

The basic board (motherboard) is populated with the dynamic memory with the capacity given by the number and size of the DIMM modules. Normally delivered size is 256 Mbyte. The size of this memory influences the maximum length of one part program which is to be edited and run in the system. The maximum length of one part program is equal to approximately one half of the memory populated. For this case, it is approximately 128 MByte.

The system control program is loaded into the dynamic memory after switching on the system either from the flash disk or from the hard disk depending on which memory from the above mentioned memories of the system is populated.

To backup the files with the part programs, the tables and other system files, the system is populated either by the flash disk or by the hard disk.
the D:\PROG sub-directory.

The system populated by the hard disk is marked as follows:

A – Floppy disk
It is accessible only if the system consists of the floppy disk. Connection of the floppy disk drive is stated in the configuration file CNC836.KNF.

B – Hard disk
The hard disk has the C:\SYST directory consisting of system program (corresponding with A:\ with the system with the EPRM board), C:\SYST\PROG sub-directory consisting of model shapes of tables (corresponding with A:\PROG with the systems with the EPRM card), C:\CMOS consisting of all backup data i. e. part programs, tables, machine constants (corresponding with D:\CMOS with the systems with the EPRM board).

Free capacity of the selected memory (A, B) is indicated in the format of file printout on the selected device (see below).

5. CONTROL PANEL OF THE SYSTEM

5.1. Screen panel

The control panel of the system CNC836 is solved so that the most possible simple operations without any waste handling procedures with the control element (push-button s) of the panel will be secured for the operators. Below mentioned is the description of them. The function of the individual push-button s is mentioned below in detail. All information on the system condition are displayed on the displaying unit of monochromatic or coloured screen and so it is accessible for the operators. The information layout on the screen is described in this chapter too.

5.2. Push-button s

The system panel CNC836 consists of a field with 7 x 5 push-button s, four push-button s marked with arrows (cursor arrows) and independent two push-buttons START and STOP as well as six so-called software push-button s located below the screen. The push-buttons are divided, in accordance with their function, into some groups. Their meaning is mentioned below. Detailed description of some push-button s is stated in further chapters of this manual.

Tlačítkové pole panelu CNC8x9

+X	+Y	+Z	MAN
-X	-Y	-Z	SEL PRG
+U	+V	+W	SEL BLK
-U	-V	-W	CONT
R /	& %	! „	USER
L 7	I 8	JK 9	MENU
D 4	F 5	Q 6	GRAF
S 1	T 2	P 3	WIN
M 0	N +/-	G .	//
= ●	DEL	↵	2nd

↖	↑	↗
←	^ ^ ^	→
↙	↓	↘

START

STOP

F1 F2 F3 F4 F5 F6

Softwarová tlačítka

Tlačítka k dispozici pro PLC a jiné použití:

POS G	KOR R									
KOR &	KOR D									

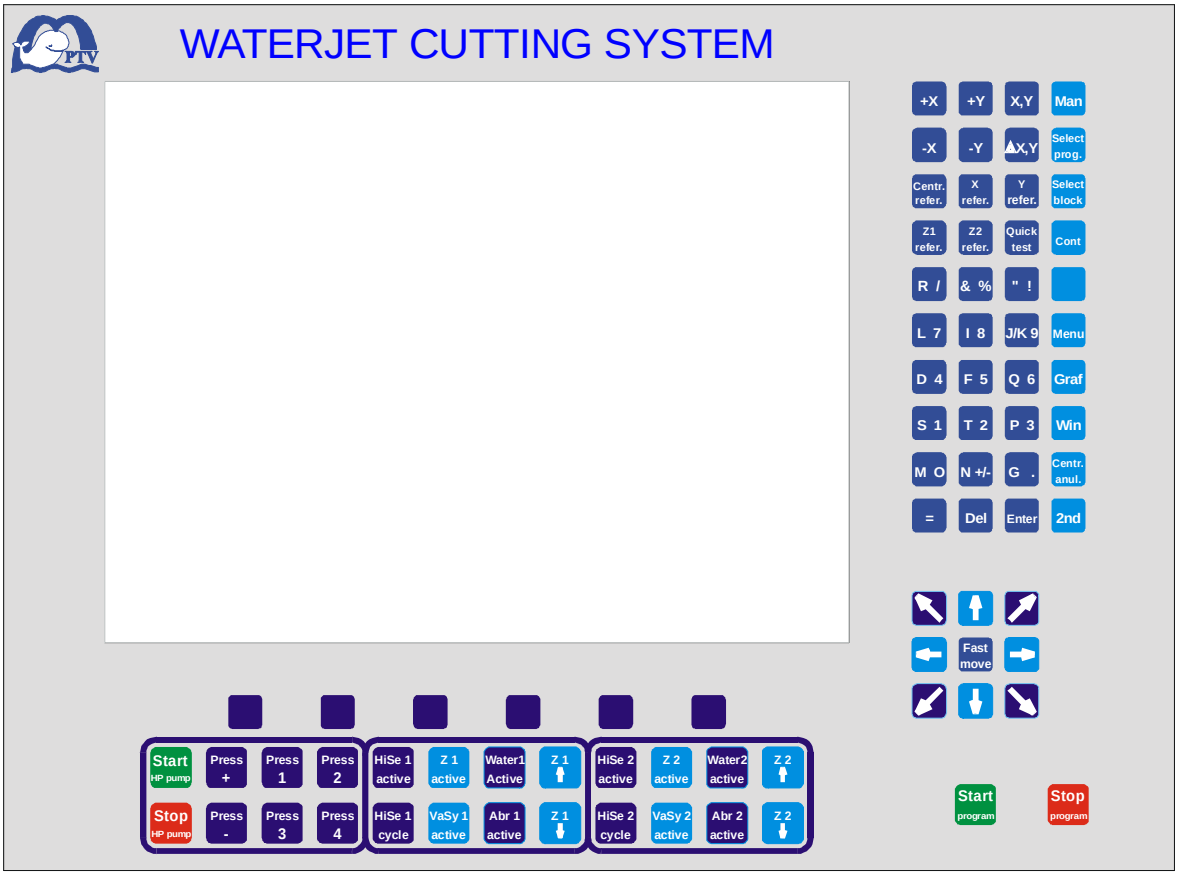
Push-button field of the panel CNC859

The system panel CNC846/856 consists of the field with 5 x 8 push-button s, other push-button s (cursor arrows and START and STOP) are the same as with CNC836 but the push-button s START and STOP are located above the each other and not next each other).

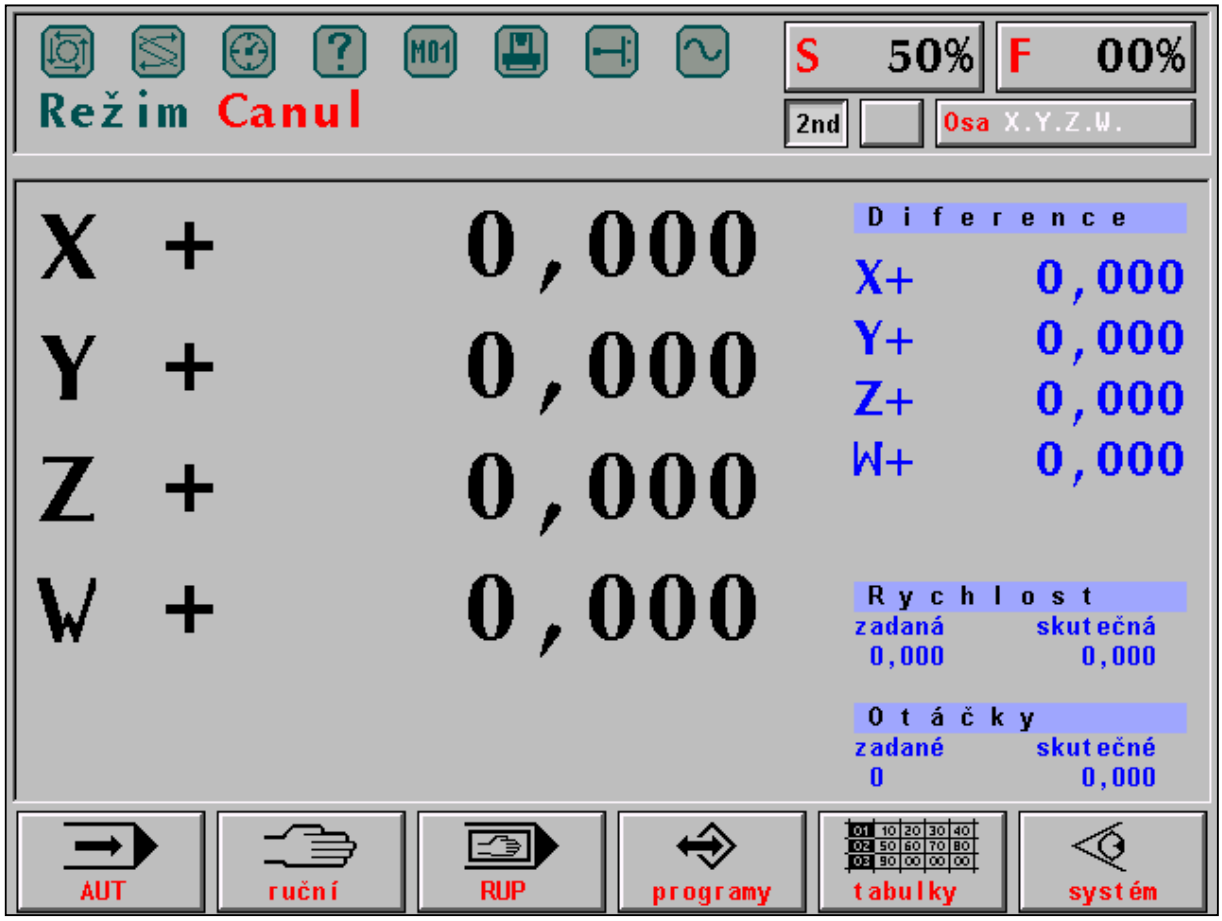
Meanings of the push-button s

- **software push-button s** perform the function regarding to actually displayed graphical or text symbol located in the lower part of the screen. The software push-button s are situated below the screen and they are not marked with any inscription. In the text of this manual these push-button s are marked sometimes as F1 up to F6 generally. F1 is the left edge push-button below the screen. F6 is the right edge push-button also located below the screen.
- **push-button s +X, +Y, + Y, +U, +V, +W, -X, -Y, -Y, -U, -V, -W** (also A, B, C) are the names of co-ordinates and they have the meaning the **movement start** in the relevant axis and relevant direction in the MAN and JOG modes. In other cases (editor and RUP mode) they have the meaning of the sign-free co-ordinate name. Push-button names of the co-ordinates are specified by the actual configuration for a given machine.
- **Push-button field** to enter addresses, digits, signs and decimal points. It is used mainly in the RUP mode and during the editing procedure, seldom during any other modes. If a push-button is provided with two marks located below each other, this push-button has two meanings. The switching-over procedure is performed by the 2nd push-button (secondary function).
- **MENU push-button** is designed to select the basic mode menu.
- **HELP push-button** – after pressing down this push-button , the interactive help with the short description of the menu push-button meanings is displayed in the right window which are active now. Pressing down this push-button again, the help is cancelled.
- **WIN push-button** serves to select the indication. By means of this push-button it is possible to select any other screen format than default one in every time.
- **// push-button** is designed to select the CANUL (central cancellation) mode.
- **2nd push-button** – by means of this push-button , second function of these push-button s having two meanings is selected. The status of this push-button is indicated in the right part of the mode window permanently (see below).
- **Arrow push-button** – four push-button s marked by arrows re the cursor push-button s used to edit, indication selection etc. With two-axis machines (e.g. lathes) they may be configured for manual mode for a travel in the relevant direction.
- **START and STOP push-button s** are designed for automatic and manual mode.
- **MAN push-button** – push-button to switch the so-called auxiliary manual travels rapidly. It allow the travel in axes without any change of the original mode. Do not confuse them with MAN software push-button (see Description of Manual Modes).
- **^^^ push-button** – it is the push-button usable in the MAN („manual feed“) mode only. If pressed down and held simultaneously with the co-ordinate push-button , the relevant co-ordinate is moved by rapid feed.
- **“_|” push-button** – the ENTER key has the meaning of confirmation push-button of the row end when editing, selecting the indication and confirming in the query windows.

- **DEL push-button** – (DELETE). It is designed to delete erroneously loaded values in the RUP mode or the editor.
- **= push-button** – this push-button is used to write in the parametric programming in the editor. For details on parametric programming see the "PROGRAMMING MANUAL".
- **space push-button** is used to separate the individual addresses in the editor visually. By the parameter No. $06 in the configuration file CNC836 may be set in the case when the 2nd push-button shall be pressed before pressing the space push-button . If the second character, mentioned in the parameter, is M, the space on a common push-button shall be situated with the = character down. If mentioned any other character the space on the common push-button shall be situated with the = character up. The down location has a certain advantage consisting of the possibility to write in several space after each other the editor without the necessity to press-down the 2nd push-button again.



5.3. Displaying unit



The whole screen surface is divided into the basic areas (windows): MODE, FORMAT and MENU. In the following figure, the MODE window in the upper screen part is illustrated. The FORMAT window is situated in the middle part and MENU window is located in the upper part of the screen.

Režim Canul = Canul mode
ruční = manual
programy = programs
tabulky = tables
systém = system
rychlost = speed
zadaná = theoretical
skutečná = actual
otáčky = revolutions
zadané = theoretical
skutečné = actual
diference = difference
osa = axis

MODE window
In the MODE window, the currently selected mode either by text (on the above illustrated figure the CANUL (central cancellation) mode or mainly in a graphical form is indicated permanently. In the right MODE window part, the override status such as %S, %F, 2nd push-button status, displacement status from the programmed path (on the above illustrated figure it is the question of the unmarked push-button) and status of co-ordinates from the point of view of travelling into reference positions are indicated permanently.

In the upper window part, 8 LEDs are illustrated which indicate some statuses of the system. "Lighting" diode is emphasized. The diodes indicate the following statuses:

Description of the indication diodes:

THE SYSTEM RUNS. The diode is ON if the system run i. e. if performed automatic or manual mode.

THE FUNCTIONS NOT FULFILLED. The diode lights if technological functions are in progress. It is ON on the block start and OFF after finishing it. Upon interruption of the block by the STOP push-button , the diode remains ON – the block is not finished. Technological functions in progress may be finished by central cancellation only.

TIME DELAY. The diode is ON during the TIME DELAY programmed by the G04 function.

OPERATION ERROR. The diode indicates unimportant operation error e. g. when loading more digits than allowed for a given address. It gets OFF after the first correct selection.

M01. It is ON if programmed the function with the same name with selected mode AUT/M01.

MACHINE ERROR. It indicates that the machine is not ready for run. This signallizing device is controlled by the PC program.

TERMINAL SWITCHES. The diode indicates the contact with the limiting terminal switch. This indication is added with the relevant error message.

INPOS. If the diode is ON the movement in the co-ordinates is performed. After reaching the position this diode gets OFF. If the diode fails to get OFF after reaching the position by the co-ordinate, the difference (i. e. difference of actual and theoretical positions) is greater than the value set for the machine constant No. 6 or No. 7 or if the co-ordinate fails to reach its position completely. After removing this defect, it is possible to increase the tolerance (if the decreased accuracy may be acceptable) by change of the above mentioned machine constant for erroneous co-ordinate. Furthermore it is recommended to set the zero (drift) correctly for the relevant co-ordinate (to be performed by the service).

FORMAT WINDOW
The format window is located in the middle part of the screen. Information which are indicated here depend on the mode selected. To each mode an default format is assigned

which is appeared after selecting the mode. The operator has the possibility to change the default format by means of the indication selection (WIN).
The format window may be divided in two separate windows by the indication selection with various information displaying in the each window. For detail see the chapter dealing with the indication selection. The format window control is described in the chapter dealing with the indication selection too.

MENU WINDOW
6 so called software push-button are displayed in the menu window. They are controlled by the function push-button s F1 up to F6 located below the screen. Their meanings are alternated in accordance with the text or graphical symbol displayed on the relevant push-button . The description of the software push-button s currently displayed in the menu window may be obtained by pressing down the HELP push-button . The format window is divided into two separate windows with the short description of the current software push-button s displaying on the right window. When pressing down the HELP push-button again, the format will be returned back into its original status.

5.4. Floppy disk drive
The floppy disk drive 3,5" is not a standard part and it is built in the system based on a separate order only. It is suitable if the system is not connected into the DNC network. It is located on the operation panel. When handling the floppy disk drive and floppy disks it is necessary to pay attention to prevent from data damage. It is recommended to remove the floppy disks from the floppy disk drive as soon as the data were loaded into the system and put them into the floppy disk box. Do not move the protection sheet piece and do not touch the magnetic surface of the floppy disks by fingers. It is forbidden to insert other objects than floppy disks into the floppy disk drive.

5.5. Connection to the DNC network
The connection to the DNC network is the most effective data (part programs) transmission method to transmit it from the technologist′s workstation into the control system and vice versa. It is very easy to backup the data and the system tables in the external computer through the DNC network to avoid the data and table losses. The connection of the system to the DNC network is not visible because the interconnection cable is usually led from the rear part of the panel together with the other distributions through the machine inside.

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

6.1.1. 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.

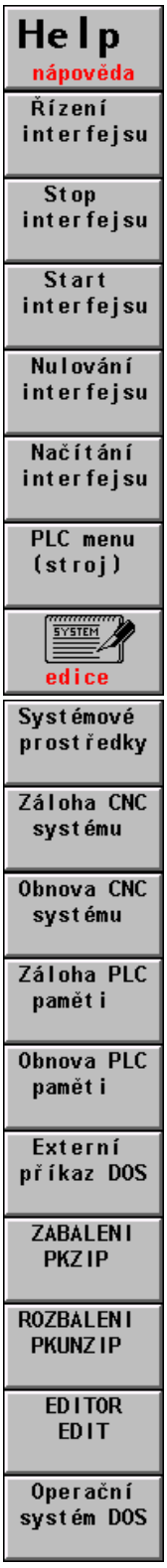
INPUT/OUTPUT from the hard disk (or EPRM memory). The transmission direction is selected by the direction push-button . In the case of the EPRM memory only one direction is approved.

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



calling up the system HELP

INTERFACE CONTROL – push-button - the entry into sub-menu of the interface control. It is possible to lock this menu by machine constant.

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.

interface START starts the user interface.

interface RESET performs the activity written in the interface program in the PIS_CLEAR module.

interface reading into the RAM memory when debugging .

push-button for PLC program creator disposal if used the MENU possibilities. It calls up the user menus of the PLC program.

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.

entry into the sub-menu of the system resources to backup the system and start of the external DOS programs.

creating the backup file of the system files.

restoration of the system files from the backup file.

creating the backup for the PLC needs.

restoration of the PLC files

the sub-menu of the external DOS commands entry.

external DOS commands, PKZIP program start.

external DOS commands, PKUNZIP program start.

external DOS commands, EDIT program start.

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

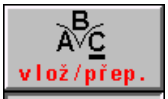
entry into the file with a table (tables) of starting point displacement

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

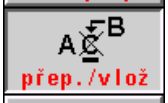
entry into the file with a table of machine constants

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

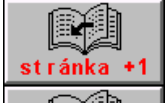
block finish point marking

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

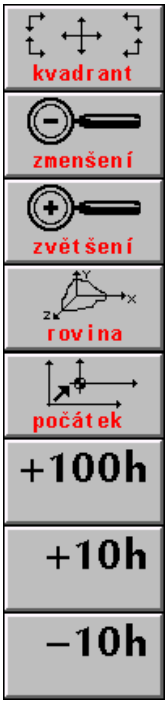
editor finish with file storing under any other name

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)

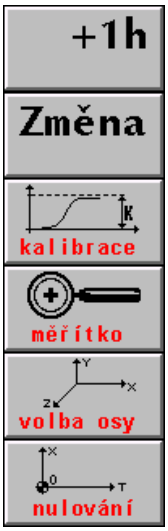
graphics – plane selection

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

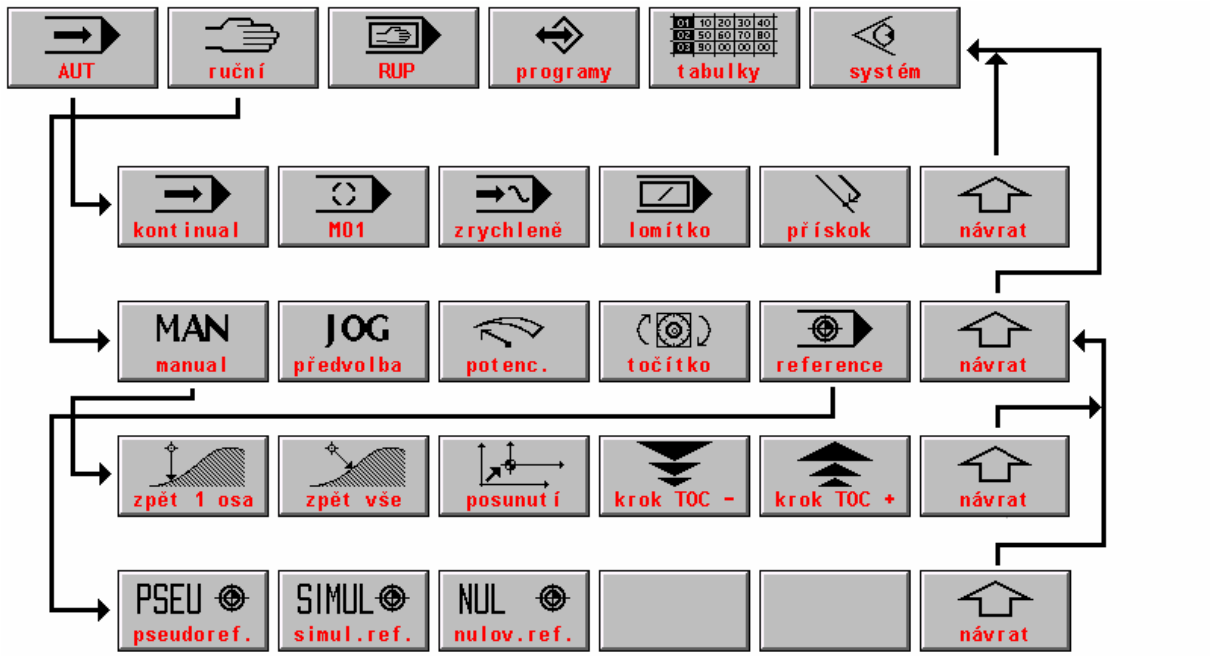
The main MENU is selected from every of levels by pressing down the MENU push-button . The main menu is included in the following software push-button s:

- 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

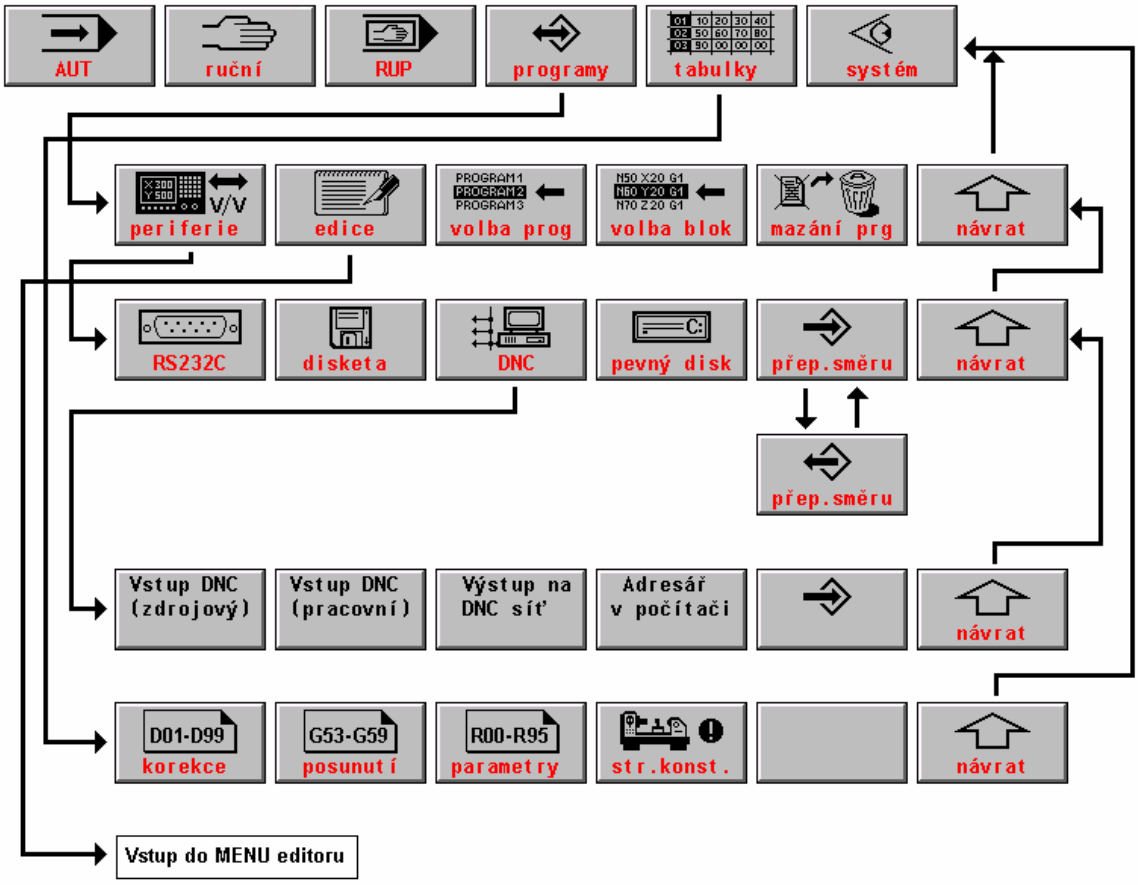


ruční = manual
programy = programs
tabulky = tables
systém = system
zrychleně = accelerated

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).

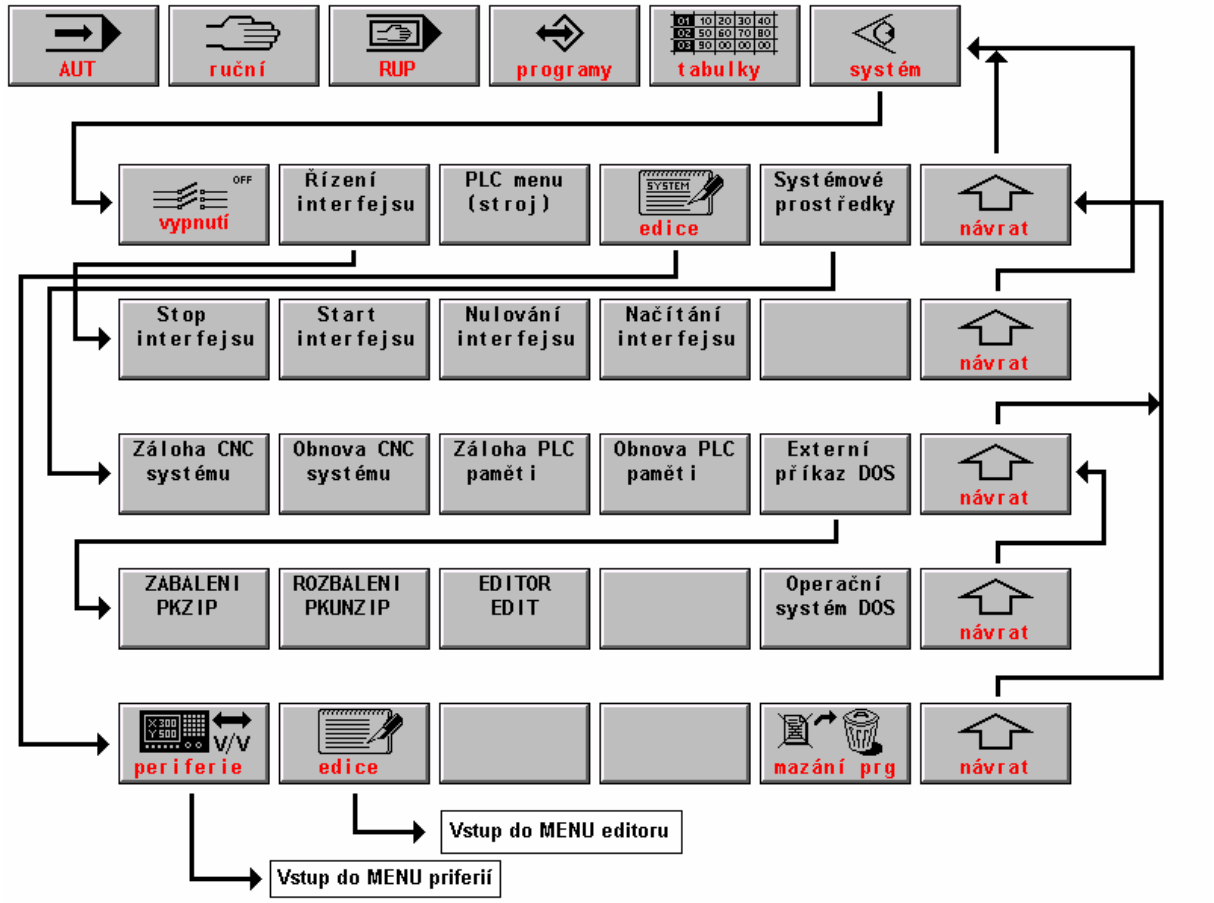
6.2.2. Work menu structure with memory and tables



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

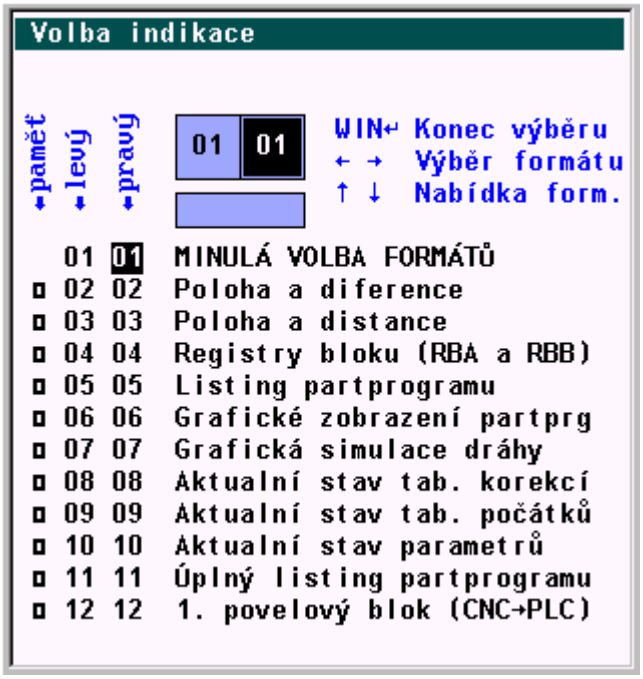


ruční = manual
tabulky = tables
řízení interface = interface control
edice = edition
návrat = return
start interface = interface start
záloha CNC systému=backup of the CNC system
načítání interface = interface reading in
externí příkaz DOS = DOS external command
Operační systém DOS = DOS operation system
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 ←→ - format selection
pravý = right ↑↓ - 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:

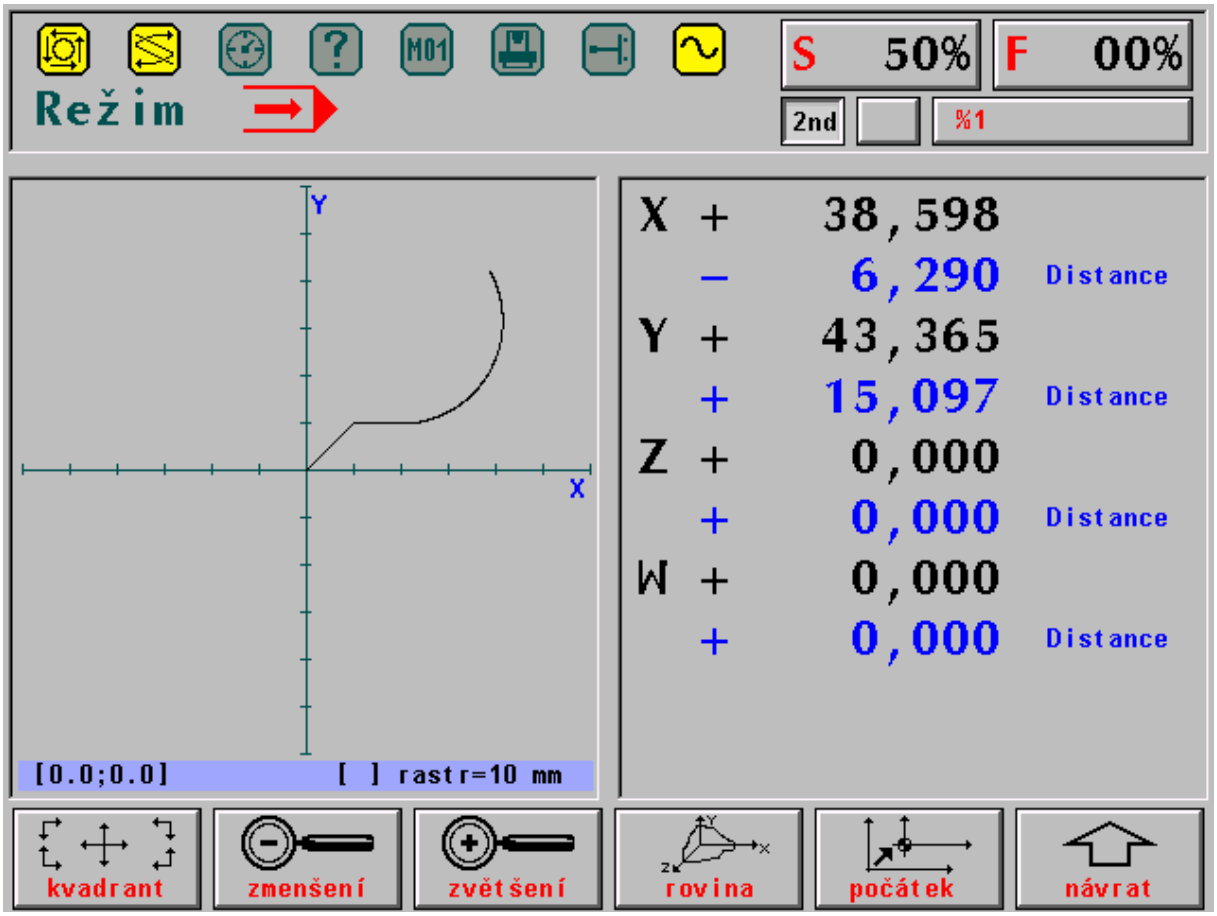
In the brackets the co-ordinates of the starting point of the displayed co-ordinate system related to the reset machine point (parameter 49 (4) = 1) or absolute co-ordinates in the

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.

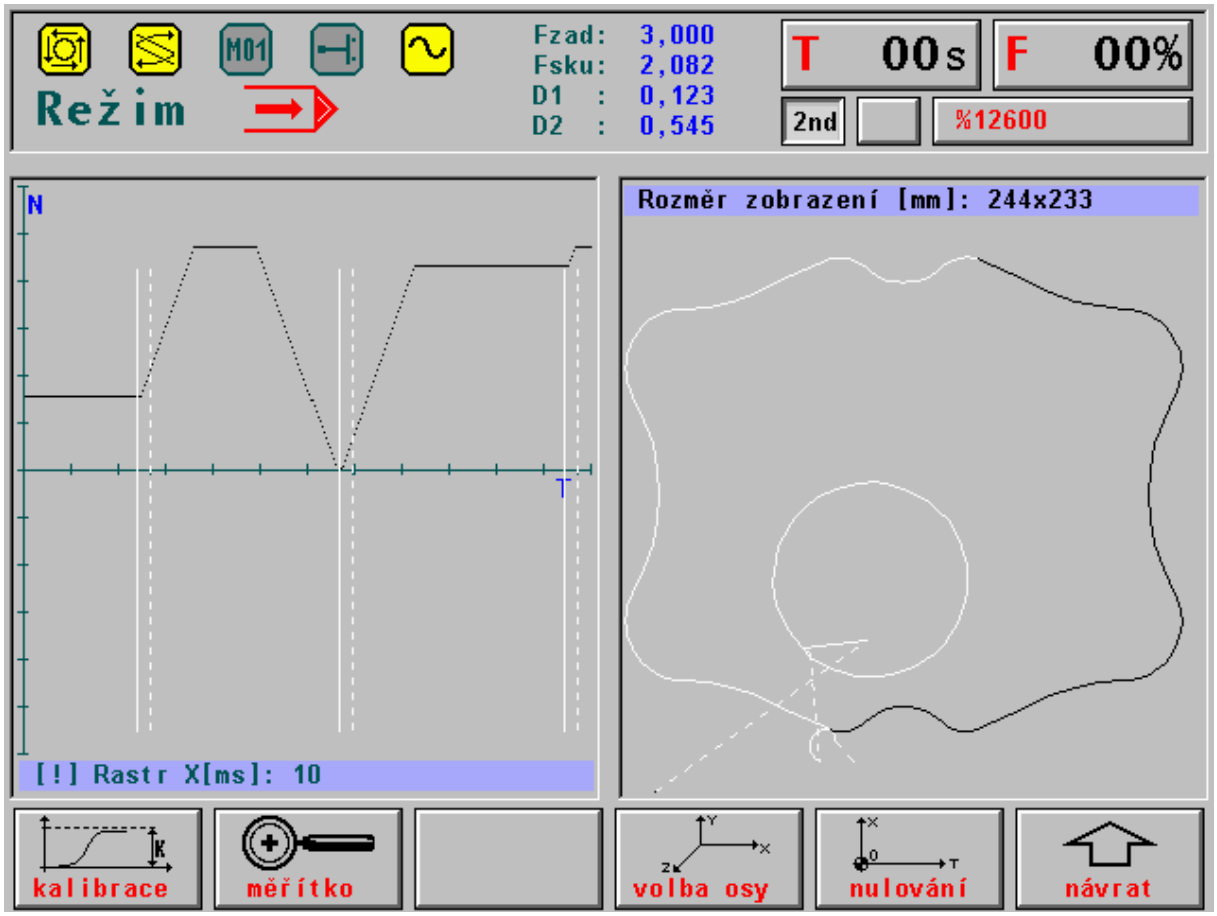


Režim = mode
Kvadrant = quadrant
Zmenšení = reduction
Zvětšení = magnification
Rovina = plane
Počátek = starting point
Návrat = return

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

7. DATA INPUT/OUTPUT

In the systems CNC836/846/856 mainly part programs are to be understood under data. To the data, with which the operators work, firm cycles and correction tables, parameters, starting point displacement belong. Generally machine constants, tables of non-linear corrections, configuration system file and error message file of the PLC program belong too. However the operators do not work with this data usually.

From the point of view, the most important thing to do is to be familiar with the input and output of the part programs.

All data are stored in the system, in the files in the backup memory which may be CMOS memory type ("D" disk) or hard disk if the system consists of it ("C" disk). In the system delivery , sample files of the firm cycles, files with tables with zero values and other system files are prepared. The part programs shall be read into the file stored in the system memory from any input device. With systems CNC836/846/856, the following inputs are possible:

- serial channel RS232C – COM1 without a log (standard)
- serial channel RS232C – COM1 with a log of the DNC network of the MEFI company (standard)
- floppy disk drive (optionally)
- DNC network type NOVELL (optionally)

All above mentioned inputs are both-directional i. e. they allow the data output from the system too.

7.1. File names

To distinguish the files in the memory from the point of view of the listing to the system screen the file suffixes (similar as with the PCs) are used which are defined in the configuration file CNC836.KNF. From the point of view of operators it is the question of completely unimportant information because the suffixes are assigned automatically.

Note:
The files may also have a mark prefix which is specified in the system configuration file. The prefix has, however, no practical importance. It is possible to mention it because of compatibility for the case of DNC network with communication adapters TRANS if the system CNC836 is assembled in this network.

In the configuration file CNC836.KNF the following names or filters for names are listed explicitly:

∗.NCP	file names with the part programs
PEVNECYx.NCP	file names with the firm cycles, x specifies the PC version
TAB0.REK	file name with the machine constants
TAB0.KOR	file name with the correction table
TAB0.POS	file name with the table of starting point displacements
TAB0.PAR	file name with the parameter table

It is recommended to maintain these setting if possible.

Instead of the asterisk, maximum 8 arbitrary characters approved for the relevant file name are stated with an actual file with the part program. All characters illustrated on the system push-button board inclusive of digits except marks for per cent, slash, dot and & may be used.

One of the possible methods is to mark the file names with the part programs by numbers equal to the number after the part program per cent character. Generally, the file name with the part program is not limited at all.

7.2. File contents

Because the files located in the system may be edited and, in the case of the part programs, created, the conditions to be kept in the case of entries are mentioned as follows:

PART PROGRAMS:

The files with the part programs are shaped as described in the programming instructions. The part program start point shall consists of % (per cent) character after which maximum 6-digit number follows, then the individual blocks of the part program starting with the N character and maximum 8-digit number follow. One block may be written in the several rows too. The further block starts with the N character again. The file with the part program ends with the * (asterisk) character. This character is, however, not to be written because it is not located on the push-button board and so it is added into files automatically.

Note:

The asterisk shall be provided in every file end if the file is prepared on the external device (computer) and it is read in from the serial channel RS232. The asterisk, in this case, serves as the reading terminal character.

TABLES :

With the files TAB0.KOR, TABN0.POS, TAB0.PAR and TAB0.REK, the TAB shapes from the syntactic point of view are similar. They start with the key word $KOR or $PAR or $POS or $REK. Any arbitrary comment may be inserted in front of these key words.

Behind the key words the table with the following shape follows:

Correction tables:

$KOR

01:	R = 0.0	X = 12.00	Y = 100.000	Z = 200.000	4 = 0.000
02:	R = 0.0	1 = 0.00	2 = 0.000	3 = 0.000	4 = 0.000
03:		1 = 0	2 = 300.000		

The correction table consists of two-digit number of the correction table following with colon. The radius correction marked by R and the length correction for maximum four axes marked by X, Y, Z, 4 follow. Instead of X, Y, Z the sequence No. of a co-ordinate i. e. 1, 2, 3 may be mentioned. Behind the equal sing the correction value is stated. Among the names of co-ordinate, equal sing and value no spaces may be inserted. If the correction value is stated without the decimal point, this is understood as mm i. e. 2.0 i 2 is the correction entry of 2 mm. The negative value is entered with minus sign, for positive value no sign has to be entered. In the file TAB0.KOR may be max. 99 correction tables. If any correction table is not mentioned in the file, its content for this system is of zero value. Also not all items shall be mentioned in the individual correction tables. In the table 03 of the above mentioned example the radius correction and length correction of the third and fourth corrections are not stated.

All these items shall be understood as the zero values. If required to add any further correction table by means of the editor it is recommended to copy the whole row by block copy and to adapt the values and the table No. in the copied row. It is necessary to use this procedure because no colon push-button is available on the push-button board.

Note:
For lathes which have the co-ordinating system X, Z (X is the first axis, Z is the second one) it is necessary to add the number 2 instead of Z so that the fact that it is the question of the second axis will be emphasized. In the system CNC836, the sequence Nos. 1, 2, 3 are implicitly assigned to the axes X, Y, Z. For lathes the letter Y shall be used in this case which, however, does not corresponds to the axis name.

File contents of the TAB0.KOR file is written in the table in the internal system memory after switching on and after every edition, if the edited file is stored.

TABLE OF THE STARTING POINT DISPLACEMENT
$POS

53.	X = 0.0	Y = 12.00	Z = 100.000	U = 200.000	V = 0.000	W = 0.000
54.	X = 0.0	Y = 0.00	2 = 0.000	4 = 0.000	5 = 0.000	6 = 0.000
55:	1 = 0.0	2 = 0	3 = 200			

Rules of the entries into the displacement tables are the same as in the case of corrections. For lathes, the above mentioned note is valid.

PARAMETER TABLES:
$PAR

00:	0.00
01:	10.00
03:	0.00

The file provided with the parameter table is not very important because the parameter tables are mostly filled in directly in the part program (see the Programming Manual). The file with the parameters may have maximum 96 parameters (0 up to 95). The contents of the parameter files are overwritten into the internal system table after switching on the system and for the edition. The file consists mainly of filling in the parameters by zeroes.

TABLE OF MACHINERY CONSTANTS:
$REK

00:	+00000.024	: comment
01:	-00000.025	: comment
03:	00000.26	: comment

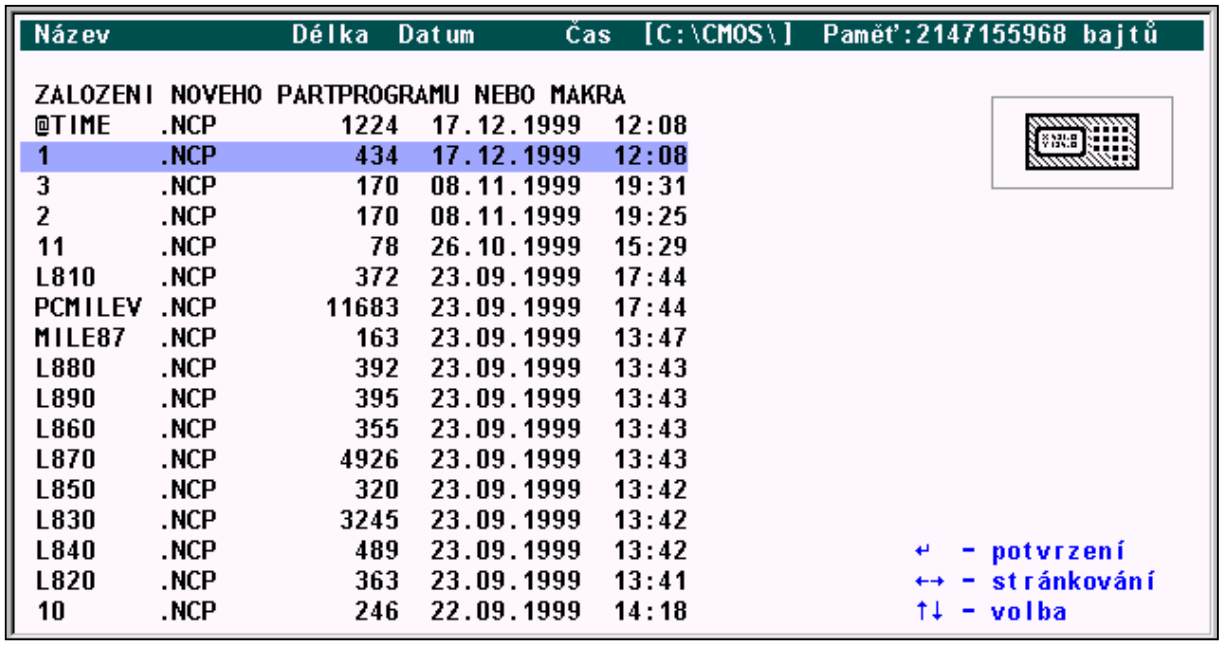
The file with the machinery constants has the similar shape as the parameter file. Behind the constant NO. and the colon the plus sign is located (it may not be mentioned) or minus sign and 8-digit number with the decimal point behind the fifth digit. The comment may be added behind the semicolon. The above mentioned syntax is obligatory. The file contents are described in an separate chapter.

7.3. File listing

The overview of the files with the part programs stored in the system memory provides the listing which will be appeared after pressing down the PROGRAMS push-button s (F4 in the main menu) – see the figure. In the listing, the file name inclusive of suffix, file length in characters and date and time at which entries were made into this file. From the figure it is visible that the file names may be arbitrary in principle. The system panel symbol in the frame informs that the relevant listing of the file is from the system memory. In other cases, as below mentioned, the symbols may illustrate the file listing on a floppy disk, hard disk or in any connected computer. From the memory marking [C:\CMOS] (it is the question of the hard disk system) may be understood that it is the question of the system memory listing. In the information frame the remaining free memory capacity in the relevant memory in characters (bytes) is mentioned too.

The file with which it will be operated furthermore (e. g. when editing or copying) is emphasized in the frame. When selecting the file list, the second row is emphasized i. e. usually the file (part program) with which is worked currently and which is dated with the most current date. On the figure, the third row is emphasized. After pressing down the EDITION push-button , the 1.NCP file would be opened.

Note:
File sequence in the listing may be influenced by setting of the $9 parameter in the CNC836.KNF file. The files may be ordered according the alphabet, date, time or the first file according the date and time and other files according the alphabet.



Název = name délka = lenght čas = time
paměť = memory bajtů = bytes volba = selection
potvrzení = confirmation stránkování = paging
Založení nového partprogramu nebo makra = establishment of a new part program or macro.

- if pressed the ENTER push-button in the selected file or the part program, its syntactic checkup is performed.

- if pressed the cursor arrow push-button to the left/to the right the listing paging i. e. further pages of programs (one page consists of 18 rows) are displayed.
- pressing down the cursor arrow push-button up/down the movement through the listing is performed. It serves to select the program for editing and selecting the program or block.
- pressing down any arbitrary push-button , so-called filter will be run which displays only the programs which start by pressed down push-button . Pressing down the same push-button again the filter will be extended to further characters. E. g. after pressing down the L push-button and 8 push-button , the listing of files, which names starting with L8 will be displayed.

Pressing down the TABLES push-button in the main menu and then pressing down the CORRECTION, PARAMETER DISPLACEMENT or CONSTANT push-button s, the list of the files in the same format as illustrated in the figure will be appeared. The filter for the tables, however, displays only the file with the relevant suffix. For instance, after pressing down the TABLES and CORRECTION push-button s, the listing (mainly) consisting from only one file TAB0.KOR will be displayed.

And vice versa, after pressing down the SYSTEM push-button in the main menu and then EDITION –system push-button the listing of all files stored in the system memory regardless to their suffix will be displayed. The listing of the part programs, all tables and other system files will be displayed.

7.4. Serial input/output – hardware requirements

The input/output (I/O) is performed from the COM1 serial channel from the standard 9-pin connector CANON located on the rear part of the panel. Because the panel is usually built in the hanging case or any other suitable closed case located next to the machine, the output from this connector is usually conducted by the prolongation cable coupling to the accessible place in this case and terminated by a connector. Here, regarding to requirements, the 9-pin or 25-pin connector CANON (for connection of cables and lengthening cables see the Appendix) may be used.

Equipment to be connected to this connector is e. g. LAPTOP, NOTEBOOK, TRANS or computer of the PC type. Only the setting of the configuration parameters in the file CNC836.KNF is decisive if the transmission is performed from the COM1 without or with the DNC protocol. In the case of the DNC protocol connected to the current loop line the TRANSRED (conversion of RS232 to the current loop line) reduction shall be incorporated between the connector and the DNC distribution. Both inputs manners (without or with the DNC protocol) may not be used simultaneously. The change is performed by setting of the configuration parameters in the file CNC836.KNF.

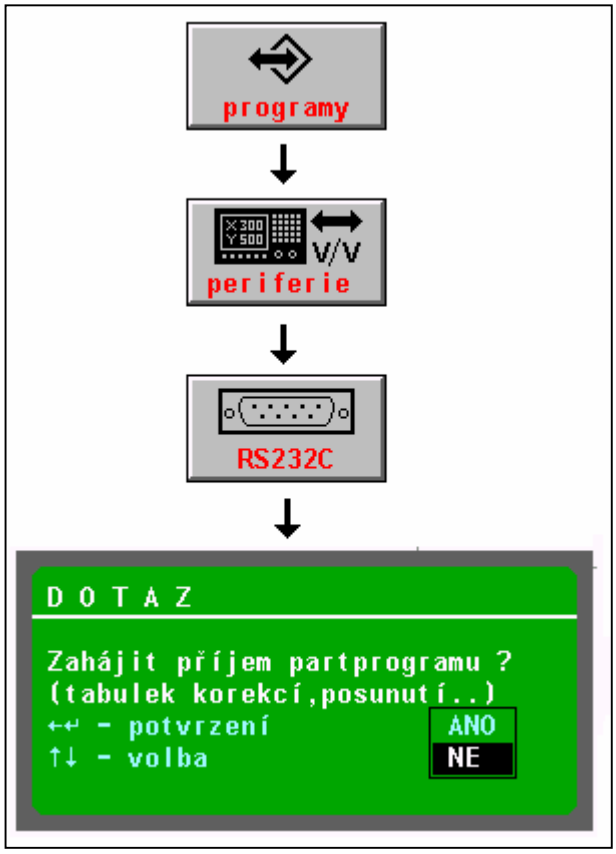
7.5. Serial part program I/O – without any protocol

Setting of the transmission parameters in the configuration file CNC836.KNF:
$43 parameter = 18 “recommended transmission velocity of 4800 Bd”
$46 parameter = N “DNC protocol NO”

Setting of the transmission parameters of the serial channel in the external device (e. g. NOTEBOOK):
mode COM1: 4800, n,8,2

7.5.1. Input into the system

Control sequence (see the figure)
In the main menu, the PROGRAMS push-button and then the PERIPHERY and then RS232C shall be pressed down.



The query is appeared whether the part program reception may be started. By means of the cursor arrow push-button , select "YES" (by default "NO" is set) and confirm by the ENTER push-button or the cursor arrow left key.

The system waits now for the character reception from the serial input. Only after the transmission on the external device (e. g. NOTEBOOK) is started, the data receipt starts . The data transmission is indicated by a styled stop watch. After the date are received, the system asks for the file name under which the part program will be saved in the system memory. BY default, the file name as a number is offered which was found behind the % mark. The file name may be confirmed by the ENTER push-button or any other name may be selected by keyboard entry.

When transmitting the data into the system, the transmission on the system shall be started first and then that on the NOTEBOOK. shall be started later.

programy = programs
periferie = periphery
DOTAZ = query
zahájit příjem partprogramu = is the part program reception to be started
(tabulek, korekcí, posunutí) = (tables, corrections, displacements)
potvrzení = confirmation
volba = selection

Warning:

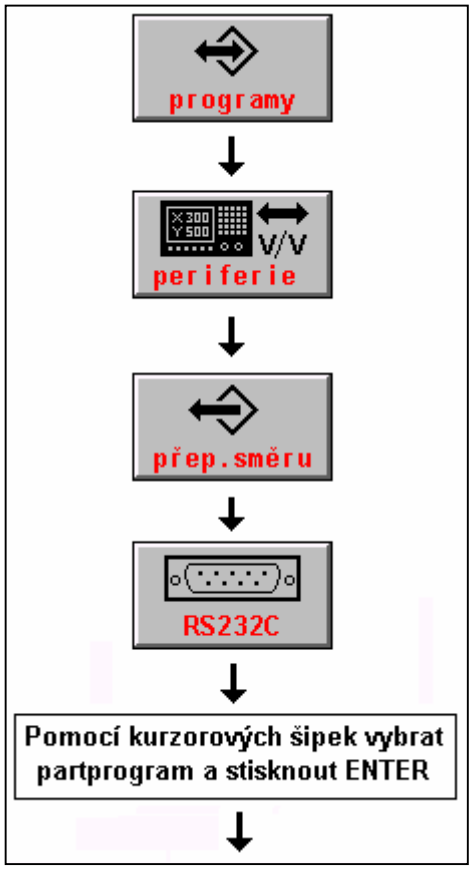
The part program file received shall start with the % character and must be terminated by the asterisk, otherwise no reading-in will be possible.

Note:
It is possible to read-in the files with correction tables, starting point tables or parameter tables by means of the serial channel. In practice, it is not necessary usually because a copy of files with the tables is available in the system directly. The procedure is similar, only on the start the TABLES push-button shall be pressed instead of the PROGRAMS push-button , then the relevant table and then the PERIPHERY push-button . The further procedure is the same.

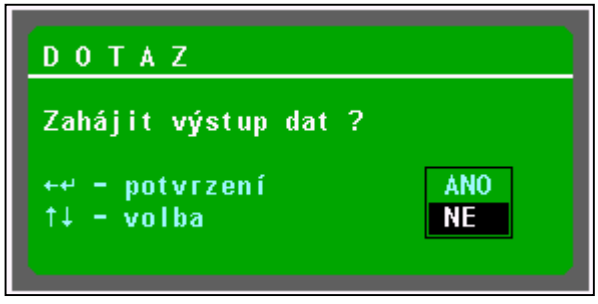
Received file with the table shall start with the relevant key word (e. g. $KOR, $POS etc.) and shall be terminated by the asterisk.

7.5.2. Output form the system

The part program (and tables) output control from the system to RS232C (e.g. into the NOTEBOOK) is similar with the exception that the output from the system is selected by the direction push-button . Before starting the transmission the receiving side shall already be prepared for the reception.



Control procedure (see the figure)
In the main menu, press down the PROGRAMS push-button and then the PERIPHERY push-button . Then press down the direction change push-button (the direction from the system) and the push-button RS232. Select the program the output of which is required by the cursor and press down the ENTER push-button . The window with the query is appeared whether the data transmission is to be started. When confirming by YES, the system starts to transmit data to RS232. The receiving side shall be prepared to receive the data transmission

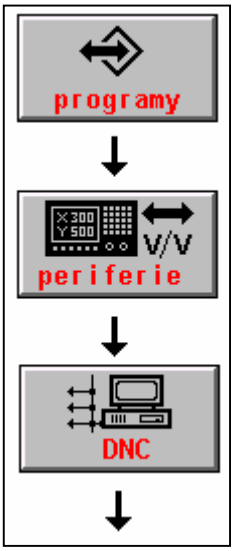


Programy = programs
Periferie = periphery
Přep. směru = direction change
Pomocí kurzorových šipek vybrat partprogram a stisknout ENTER.
Select the part program by means of the cursor arrows and press down the ENTER push-button .

DOTAZ = query
Zahájit výstup dat? = Is the data transmission to be started?
Potvrzení = confirmation
Volba = selection
Ano = yes
Ne = no

7.6. Serial I/O of the part programs – with the DNC protocol.
The MEFI connection of the system to the DNC network is the most effective method to input and output the part programs as well as backup of all system files.

Setting of the configuration parameters in the file CNC836.KNF is as follows:
$43 parameter = 18 "recommended transmission velocity of 4800 Bd"
$46 parameter = A/W "DNC log, a = for DOS, W = for WINDOWS 95/98"
$46 parameter = XX "WHEERE xx is the system No. in the DNC network



On the computer connected, the software for MEFI DNC network shall be installed. The installation and usage are described in the communication instructions for the TRANS adapter.

The part program transmission from the connected computer shall be performed in accordance with the following procedure:

In the main menu, the PROGRAMS push-button , then PERIPHERY push-button and then DNC push-button shall be pressed down.

programy = programs
periferie = periphery

The menu is appeared which is illustrated in the following table.

Vstup DNC (zdrojový)	Vstup DNC (pracovní)	Výstup na DNC síť	Adresář v počítači

Vstup DNC (zdrojový) = DNC input (source)
Vstup DNC (pracovní) = DNC input (work)
Výstup na DNC síť = Output to the DNC network
Adresář v počítači = Directory in the computer

Press down the push-button "Directory in the computer". The communication will be performed and the part program list will be displayed in the relevant directory on the connected computer. Select the required part program by the cursor and press down the push-button "DNC input (source)". The window with the name of the selected file will be

displayed and the confirmation of the transmission start by the ENTER push-button of arrow left push-button will be required.

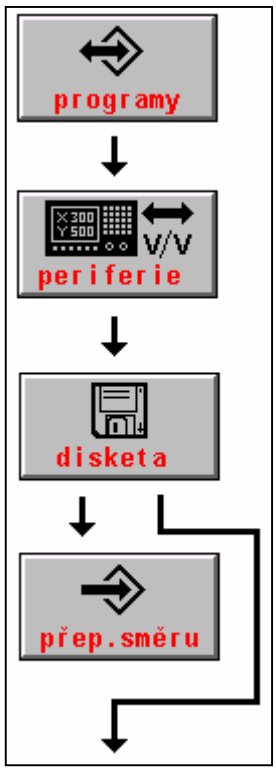
Note 1:
If stored lot of files on the connected computer in the relevant directory (e. g. 100 and more), the transmission of the file list may be delayed. If known the file name which shall be transmitted, it is better to select directly the DNC INPUT (SOURCE) instead of the DIRECTORY IN THE COMPUTER. The window for file name entry is appeared. Entry the file name and press down the ENTER push-button . The condition to perform this entry is that the characters which are absent on the system push-button board shall not be used.

Note 2:
The DNC INPUT (WORK) push-button is used to transmit the part program which was sent from the system into the computer in the case that the DNC network is so configured (uses various suffixes for files transmitted towards the PC – TRANS and TRANS – PC). This problem is described in detail in the manuals to the DNC network with the communication adapters TRANS.

The part program output to the DNC network i. e. transmission of part program files to be archived in the connected computer is performed by the similar process. After pressing down the DNC push-button , the part program listing is appeared in the system (in the listing, the system symbol is illustrated). Required part program is to be selected by the cursor and then the OUTPUT TO DNC NETWORK push-button is to be pressed. During two transmission the accurate number of transmitted bytes is indicated in the system which is simultaneously the information that the transmission is conducted correctly.

Note 3:
*By means of the DNC transmissions, the files with other suffixes than those configured for the part programs (usually *NCP) and tables may not be transmitted. To transmit these files it is suitable to use so-called CNC system backup. For details see the separate chapter.*

7.7. Input/output from the floppy disk



It is possible in the case only when the system has a built in floppy disk unit. From the floppy disk, it is possible to read-in the file (part program) into the backup system memory or to archive the file from the system memory to the floppy disk.

Part program reading-in procedure from the floppy disk into the system is similar as with the serial input. Select the floppy disk push-button instead of the RS232 push-button symbol.

Control procedure (see the figure):
In the main menu, press down the PROGRAMS push-button and then PERIPHERY push-button . Then press down the FLOPPY DISK push-button .

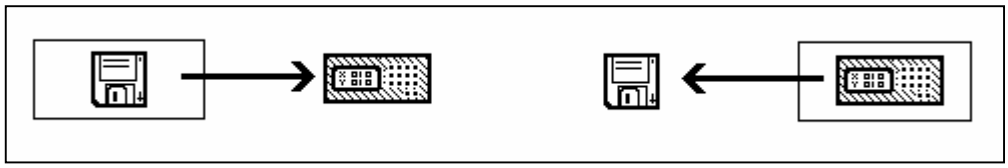
After pressing this push-button the part program list on the floppy disk is appeared. Only the files with the part programs or files with the part program suffixes are displayed. When such a file (usually

with the NCP suffix) is not stored on the floppy disk, the error message will be issued.

If required to copy from the system to the floppy disk, press the FLOPPY DISK push-button and then the DIRECTION CHANGEOVER push-button . The part programs list of part programs in the system is appeared. Select the required part program by the cursor and press the ENTER push-button . The query to enter the file name which is to be copied to the floppy disk is appeared. By default, the name of the selected file is offered so it is not necessary to enter it. The only thing required is to confirm it by the ENTER push-button .

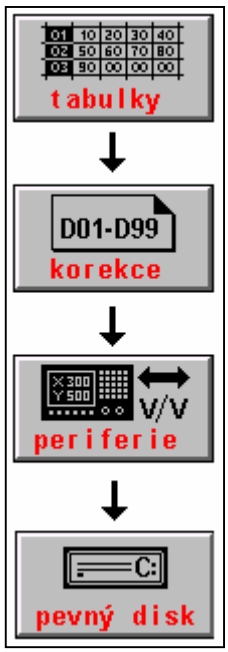
Programy = programs
Periferie = periphery
Disketa = floppy disk
přep. směru = direction change

Note:
In both cases the query may be appeared whether the file shall be overwritten, if any file with the same name is stored on the floppy disk or in the system. Selecting YES/NO the overwriting may be confirmed or rejected.



Information on the selected transmission direction may be obtained, beside the push-button of the direction change, by the figure illustrating which directory is written on the screen currently. Device, the directory of which is stated, is in the frame, and an arrow displays, which is the direction of the transmission (see the figure).

7.8. Input from the EPRM memory or the hard disk



It is used to copy the files from the directory PROG (A:\PROG with the systems provided with the EPRM board or C:\SYST\PROG with the system provided with the hard disk) consisting of sample files supplied by the producer. The files from the directory PROG are copied automatically into the directory CMOS (i. e. into the backup memory) if found in the CMOS directory no configuration file CNC.836.KNF. Practically it is used to copy the individual files e. g. tables for the case of destroying or losing them.

The copying procedure is the same as with the floppy disk. As an instance the reading procedure of the file TAB0.KOR.

In the main menu, press the TABLES push-button , then the CORRECTION push-button (or DISPLACEMENT, PARAMETERS or MACHINE CONSTANTS push-button s depending on which table shall

be copied), then the PERIPHERY and then the HARD DISK push-button s. The file listing with the suffix KOR (or POS or PAR or REK regarding to the table selected) will be appeared which are included in the PROG directory. Practically, minimum the file TAB0.KOR will be displayed.

Select the required file by means of the cursor arrow push-button s and confirm by the ENTER push-button . In the query window, the name of the selected file will be appeared which shall be confirmed by the ENTER push-button again.

In the case when this file is stored in the CMOS directory, confirm by the YES selection that it shall be overwritten.

NOTE:
Return transmission i. e. from the CMOS directory into the PROG directory is forbidden. In the case of the systems provided with the EPRM plates, it is the question of the ROM type memory into which it is not possible to make any entries.

Tabulky = tables
Korekce = correction
Periferie = periphery
Pevný disk = hard disk

Note:
Transmission of other files than tables is performed similarly but through the system directory i. e. from the main menu it starts by pressing down the SYSTEM, then EDITION - SYSTEM and then PERIPHERY and then HARD DISK push-button s. All files will be appeared from the PROG directory. After selecting of the required file, the further procedure is the same.

8. MANUAL MODES

8.1. Canul mode (CA, Central cancellation)

The central cancellation is the only mode which is not selected by a software push-button but an independent push-button is assigned for it on the keyboard which is marked //. After pressing it the CANUL message appears in the mode row. After pressing down the START push-button , the mode will be run. So, pressing down the // push-button without further pressing of the START push-button is not enough.

Note:
Eventual run of the central cancellation mode without following pressing down the START push-button may be provided by the PLC program.

The CA mode is the only mode without any movement. After start of the CA mode, the activation of the previously selected part program is cancelled. The CA mode does not cancel the position reference setting.

The CA mode is used to establish the original status of the system. The following functions (if not changed the priority block) are run: G01, G17, G98, G40, G94, G53, G80, G90, M05, M36, M09, M53, M48. This mode may be used to cancel the functions in progress ("FUNCTIONS NOT FULFILLED" indication) e. g. after stopping of the part program in the automatic mode when it is not assumed to continue by pressing down of the START push-button . When indicating "FUNCTIONS NOT FULFILLED" it is not possible to select any other mode except the auxiliary manual travels.

Note:
Function transmitted after CA may be influenced by user setting of the priority block. Setting of the priority block is described in the separate chapter.

8.2. MAN and AUTMAN modes (auxiliary manual travels)

Two kinds of the manual travels are built in the system. The older method is named MAN mode and the new one is named AUTMAN. The setting of the machine constant 233 is decisive when selecting one of two methods. The MAN mode is the older method and it is not used with the new systems. The movement control is practically similar, eventual exceptions are mentioned in the text.

8.2.1. AUTMAN – general description

In the system of the panel software version 20.17 and software version 4.027 (since October 12, 1998), beside the classical MAN mode, also the auxiliary manual travels named AUTMAN are available. It is not the question of the system mode but it is the question of the possibility of the manual travels in the most standard modes of the system. The auxiliary manual travels seem to be the immediate transfer into the MAN modes but without any mode alternation. It is to be seen that the most important usage of the auxiliary manual modes will be in the modes AUT, AUT after stop, AUT – BB and RUP. However, also rapid operative travels e. g. in the CA mode (central cancellation) will be used. The name AUTMAN will be used for the auxiliary manual travels.

The AUTMAN travels are activated by means of the software push-button MAN – manual (see the chapter 8.2.2.) or by the independent push-button with the inscription MAN in the push-button field (see the chapter 8.2.4.).

Note:
With the flame-cutting machines, the AUTMAN travels are activated by the cursor push-button s directly.

The auxiliary manual travels shall be approved by the machine constant NO. 233. If approved the MAN and AUTMAN modes have the same behaviour during the manual travel. Approval of the auxiliary manual travels is manifested by menu displaying for the auxiliary manual travels as illustrated on the following figure.

In the further description the recommended method of control is preferred i. e. the auxiliary manual travels are approved.

8.2.2. Setting of the auxiliary manual travels

To manage and set the auxiliary manual travels AUTMAN, the machine constant 233 is designed.

The first decade	0	Auxiliary manual travels AUTMAN are locked (the system will use the older mode MAN).
	1	Approval of the auxiliary manual travels.
The second decade	0	The external panel with the knob is forbidden in the AUTMAN mode.
	1	The external panel with the knob is approved in the AUTMAN mode.
The third decade		Reserve
The fourth decade	0/1/2/3	Method of movement approval in the AUTMAN mode is controlled by the PLC program (see the PLC manual – chapter “Auxiliary Manual Travels”.
The fifth and sixth decades	00	Holding the movement push-button s by means of doubled pressing is forbidden.
	xy	Period for doubled pressing of the movement push-button s to evaluate the holding of the auxiliary manual travels. By the individual pressing the holding is cancelled. Usual setting (multiple of 55 ms) is 08. Example: 8 x 55 ms = 440 ms.
Seventh decade	0	Pressing down the software push-button MAN activates the older MAN mode.
	1	Pressing down the software push-button MAN activates the auxiliary manual travels AUTMAN
Eighth decade	0	Holding the push-button s of the movement by means of holding of the MAN push-button is locked.
	1	Holding the push-button s of the movement by means of holding of the MAN push-button is approved.

Holding the movement in AUTMAN
Under holding, the status shall be understood in which it is possible to continue the movement without permanent push-button holding. The AUTMAN travel allows two holding methods. In the above mentioned machine constant it is necessary to select only one possibility of holding. The holding is not to be activated from the external panel with the knob.

The holding by means of the doubled pressing down of the knob activates the movement. The period between the doubled pressing down of the push-button may be set in the 5^{th} and 6^{th} decades of these constant. The holding is cancelled by pressing down of any arbitrary push-button inclusive of the pressing down of the movement push-button .

The holding by means of pressing down of the MAN push-button . The holding is activated by simultaneous pressing down of the axis movement push-button and the MAN push-button. The pressing order is not important. The holding is cancelled by the pressing down of any arbitrary push-button inclusive of movement push-button s. (without the MAN push-button). When wanting to activate the holding for several axes simultaneously press the MAN push-button first and holding this push-button pressed press the movement push-button of axes which shall run simultaneously. With this holding method it is possible to press down the rapid feed push-button in every time.

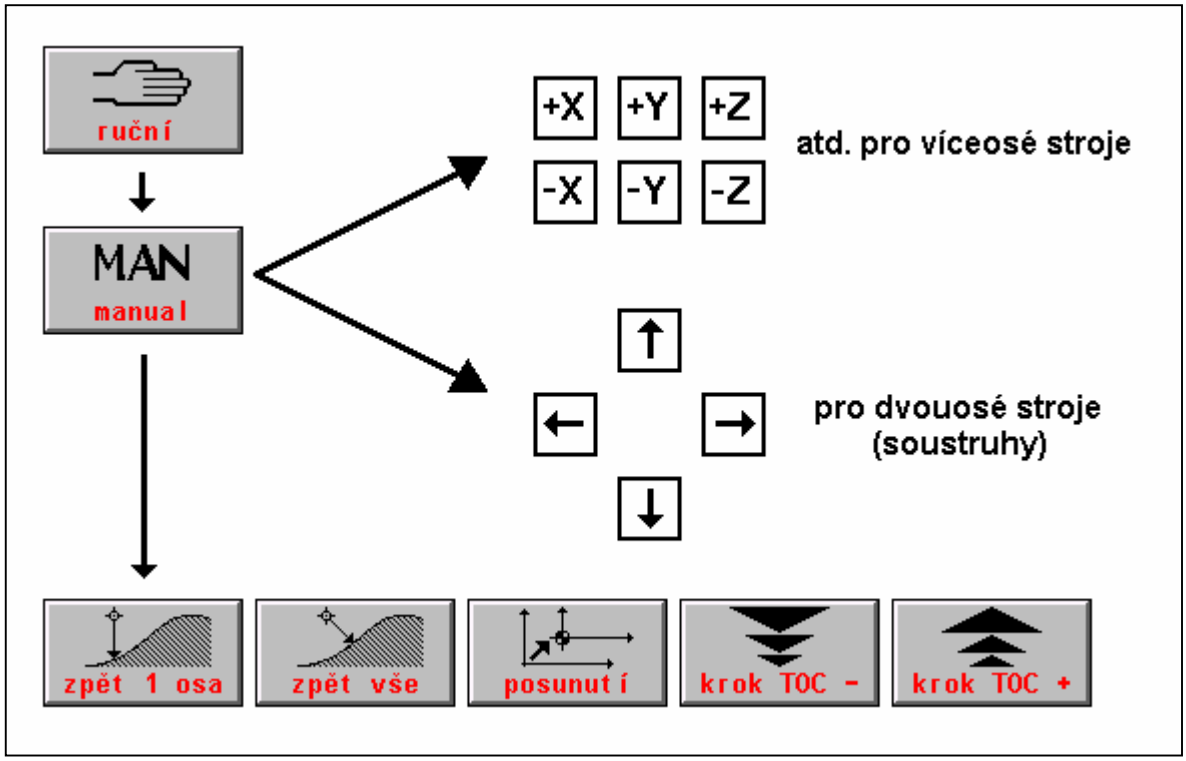
8.2.3. Control of auxiliary manual movements
Activation of AUTMAN is performed either by pressing down the software push-button MAN or the push-button MAN located on the system panel .
Note 1: with the flame-cutting machines it is to be selected by the pressing down the cursor push-button .
Note 2: activation and the complete management of the AUTMAN may be performed by the PLC program too.

From the basic menu, the selection is performed by gradual pressing down of the push-button RUČNÍ and MANUAL. Pressing down of the +X, +Y, +Z etc. the selected co-ordinate starts to be moved in the positive direction. In the negative direction it starts to be moved after pressing down of the push-button s –X, –Y, -Z, - U, -V, -W.

With two-axis machines (usually lathes) it is possible to approve the machine constant (99, sixth decade) using the alternative control of manual feeds by means of the cursor arrows. Setting of this constant it is possible to obtain the compliance of the true directions of the movements on the machine with the cursor arrow directions.

Note:

If controlled the manual feeds with the cursor arrows, it is not possible to select the indication



selection WIN.

zpět 1 osa = return of one axis
zpět vše = return of all
posunutí = displacement
krok TOC = TOC step
atd = etc.
pro víceosé stroje = for multiple-axis machines
pro dvouosé stroje = for two-axis machines
soustruhy = lathes

It is possible to select the simultaneous movement in two arbitrary co-ordinates simultaneously by pressing down then or. for the lathers, pressing down the cursor arrows.

Menu appearing after pressing down of the software push-button MAN i. e. menu of auxiliary manual travels is not used with normal travels in the MAN mode. The push-button s "return of one axis" return of all" and "displacement" are used mainly in the auxiliary manual modes e. g. when interrupting the automatic mode. These auxiliary manual modes will be dealt in the chapter Automatic Modes. The push-button s "step" are designed to select the knob step (see below).

Cancellation of the AUTMAN travels is to be performed by:
- the software push-button "RETURN" in the AUTMAN menu
- the START push-button in the case when the AUTMAN travels are performed in the stopped block (the lamp "FUNCTION NOT FULFILLED" is ON). The START push-button , however, starts the stopped block.
- the start of the CENTRAL CANCELLATION mode

- the selection and the start of any arbitrary mode.
- the MAN push-button (i .e. by the same push-button by which the AUTMAN was selected) in the case only when the holding by means of MAN push-button is not configured.

To stop the movement, the STOP push-button may be used too.

Note:
If the auxiliary manual modes are not approved by the machine constant, the above mentioned menu will be not displayed but only the keys with inscriptions of co-ordinates (older MAN mode method) will be displayed.

8.2.4. AUTMAN possibilities

As already mentioned, it is not the question of any new mode. In the auxiliary manual modes it is possible to travel with the same method as in the MAN mode with the exception that **no mode change is performed**. The AUTMAN mode may be selected e. g. in the mode AUT, CA or RUP even in the case when the mode is not completed i. e. in the STOP status for instance (the lamp "FUNCTION NOT FULFILLED" is ON). In the mode window no MAN mode is activated but the mode is activated which is selected in the moment of pressing (e. g AUT). If the AUTMAN mode is active, the MANUAL inscription is indicated in the actual item window.

Possibilities:
- travels by means of the direction or cursor push-button s on the system panel (see the chapter 8.2.2.)
- possibility of velocity change by new F function entry (see the chapter 8.3.5.).
- influencing of the velocity by means of the F % potentiometer (see the chapter 8.3.5.).
- possibility to use the manual knob for the previously selected co-ordinate (see the chapter 8.3.4.).
- possibility of travel in two axes simultaneously (or one axis and manual knob)
- possibility of return back to the place where the block was stopped in the AUT mode (see the chapter Automatic Modes).
- possibility of the external management from the PLC program.
- possibility of automatic holding of the knob of the selected movement.
- possibility of program path displacement

Note 1:
The auxiliary manual travels may be controlled from the external panel of the manual knob. In this case the manual knob panel push-button codes assume the auxiliary manual travels and they are not transferred into the PLC program (for details see the PLC Manual).

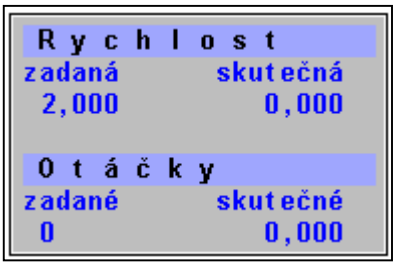
Note 2:
To control the movement, positioning units are used which are implemented in the system. The standard interpolator ins not used and so two co-ordinates are not controlled in the interpolation mode but independently on each other. This property shall be considered mainly when starting the return back to the original place of the previous stop for all co-ordinates for which the return path may not be linear.

For detailed description of the AUTMAN mode see also the Chapter Automatic Modes.

8.2.5. Velocity and the rapid fees of the manual modes

After turning on of the system the velocity for the AUTMAN, MAN and other modes is pre-selected and set in the machine constant No. 54.

The velocity for the manual modes (in the AUTMAN, MAN and JOG modes) may be changed by pressing down of the F push-button and entering new velocity. If the default format for the manual modes is selected the entered velocity is indicated in the field "ENTERED" (see the figure).



The velocity is entered in mm/min. i. e without the decimal point. After entering the velocity is displayed in the format with the decimal point i. e. in mm/min. It is possible to checkup it by repeated pressing down of the F push-button (see the figure).

Rychlost = velocity
Zadaná = theoretical
Skutečná = current
Otáčky = speed
Zadané = theoretical
Skutečné = current

Example:
F2000 is the velocity of 2 m/min. when entering. After entering the 2.000 will be indicated.
The velocity may be (even during the movement) influenced by the %F potentiometer in the range from 0 % up to 150 %.

When pressing down the ^^^push-button during the movement (DEL push-button and "harmonic curve" push-button), the co-ordinate will be run by rapid feed for the period of holding of this push-button . The rapid feed is not influenced by the % F override setting.

8.2.6. AUTMAN travel on the external panel

When connecting an external panel to the system, it is possible to control the co-ordinates from it. By pressing down the MAN push-button (in the push-button field, not in the software field), the AUTMAN auxiliary manual travels will be switched. The pre-selection of the co-ordinate is performed by pressing down of the relevant axis push-button . The movement start in the relevant direction is performed by pressing down of the plus (+) or minus (-) push-button . By pressing down the rapid feed push-button ("harmonic curve") the axis is travelled by the rapid feed.

It is possible to convert into the control of the selected axis by a the knob and back to the control by the push-button s.

8.2.7. Control of travels in AUTMAN by means of the knob

To control the following two methods may be selected:

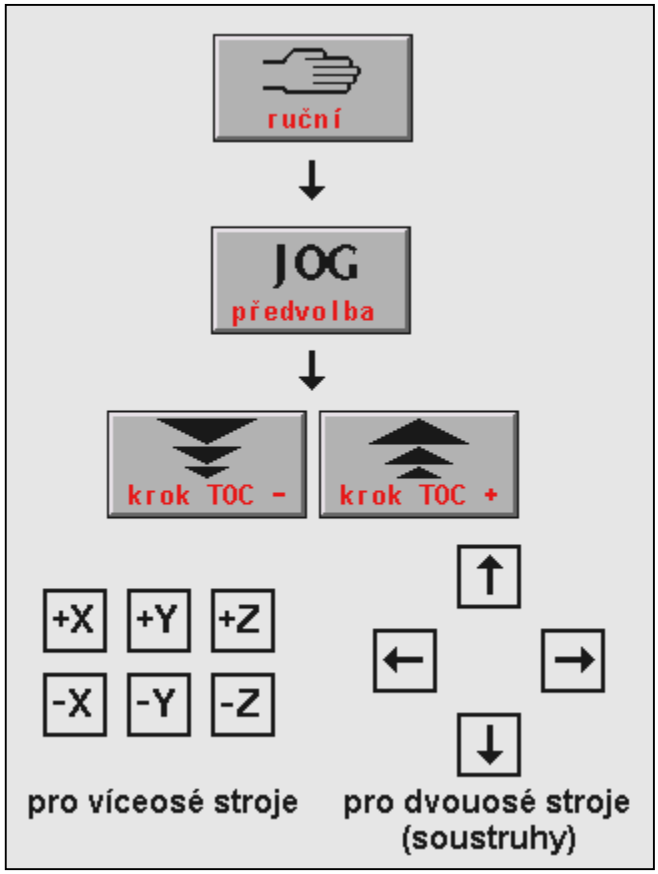
- system has the external panel with the knobs (from the MEFI company) connected as a serial periphery into the panel (machine constant 53, fourth decade = 1, machine constant 96, eighth decade = 0).
- the system has an independent knob connected into the co-ordinate control board (machine constant 53, fourth decade = 0, machine constant 96, eighth decade = 1).

The co-ordinate selection is performed by pressing down of one of the push-button s of the co-ordinates X. Y. Z etc. The co-ordinate selected is emphasized in the frame. By selection of the co-ordinate, the knob pulses start to be sensed by which the selected co-ordinate is controlled. The co-ordinate follows the direction of the knob rotation. It is possible to continue the movement control of the previously selected co-ordinate by the knob or it is possible to select any other axis for the movement controlled by the knob by means of the axis knob. In the menu it is possible to set the knob "step".

Note:
By pressing down the push-button s with the name of the co-ordinate and then pressing down the knobs + or – it is possible to control the travels by push-button s immediately. The travel controlled by the knob and push-button s may be combined arbitrarily.

8.3. JOG+ and JOG- modes

JOG (jogging) is the travel in the selected axis by the pre-selected path (1, 2, 5, 10. 20, 50, 100, 200, 500 microns and 1, 2, 5, 10. 20, 50, 100, 200, 500 mm) in positive or negative direction.



From the main MENU the selection is to be performed as follows:

Press the RUČNÝ push-button ant then the PRESELECTION push-button (JOG).

By means of push-button menu "TOC- step" and "TOC+ step" (with the multi-axis machines also by means of the cursor arrows) the path shall be pre-selected by which the co-ordinates shall be displaced.

Indication of the pre-selected path.

By pressing down the +X push-button or – X push-button the movement in the X co-ordinate in the positive or negative direction by pre-selected path may be started. Similarly, other co-ordinates

may be started. With the lathes the movement by pre-selected path will be started by pressing down the cursor arrow for the relevant direction.

Ruční – manual
předvolba = pre-selection
krok = step
pro víceosé stroje = for multi-axis machines
pro dvouosé stroje = for two-axis machines
soutruhy = lathes

When the JOG mode is interrupted by the STOP push-button before finishing the movement, the whole pre-selected path will be run by repeated pressing down of the movement start. If the movement is not finished (the diode FUNCTION NOT FULFILLED is ON) and the conversion into any other mode is wanted, it is possible to perform the central cancellation.

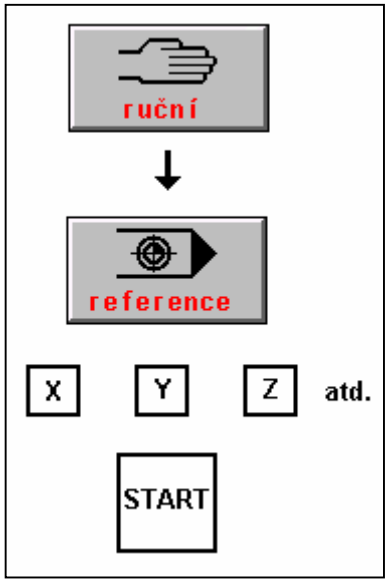
Warning:
The co-ordinates in the JOG mode are moved by the velocity which was selected for manual modes. In the JOG mode it is not possible to control the feed by the %F potentiometer because it is necessary to checkup before JOG mode selection if the %F value is not equal to zero. If started the JOG mode with zero override by a mistake, it is necessary to stop it by the STOP push-button and then the central cancellation shall be started (to cancel the "FUNCTION NOT FULFILLED"), to set the non-zero override and the JOG mode shall be selected again.

8.6. REFERENCE mode

This mode has to be selected as the first one after the system turning on. It performs the run of the individual co-ordinates into initial reference positions. Reaching the reference is performed by the rapid feed in every of co-ordinates separately. After reaching of the decelerating reference switch (ZRS) the velocity is reduced and the signal from the reference switch is awaited. The run velocity by the rapid feed may be reduced in every time, even during the movement, by the %F potentiometer. The velocity of the rapid feed of the reference reaching may be also limited by setting of the machine constants 10 – 15 (see the Description of the Machine Constants).

Before reaching the reference, it is recommended to check up visually if no co-ordinate is situated on the deceleration reference switch. If it is the case, leave the switch e. g. in the MAN mode and then perform the reference reaching. If the co-ordinate "stays" on the deceleration switch, it is not guaranteed thar the zero pulse from the measuring sensor which determined the reference position, is the first one after reaching the deceleration reference switch.
So the incorrect reference position could be used.

8.6.1. Reaching the reference



From the main menu, the selection is performed by the following procedure:

Press down the manual mode push-button "ručně".

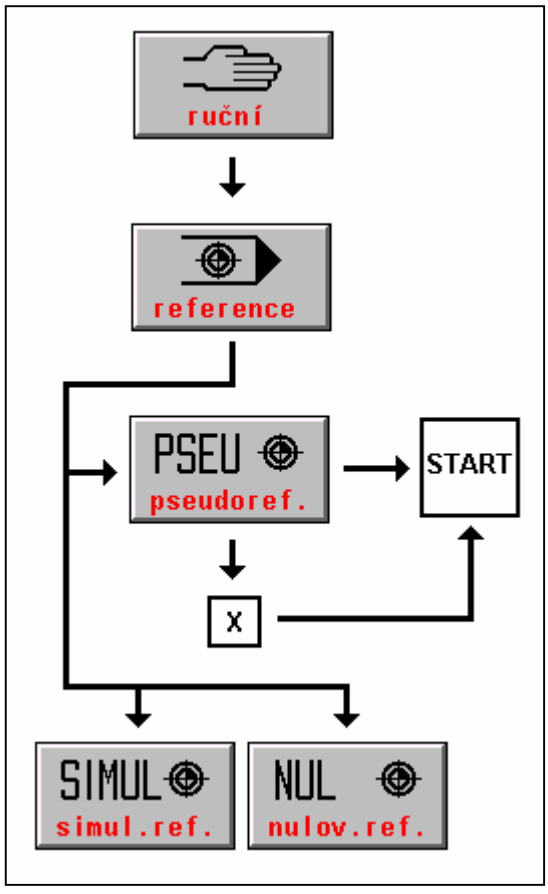
The co-ordinate is selected by pressing down of the push-button with its name (X, Y, Z etc. Regardless to a sing).

By pressing down the START push-button the selected co-ordinate runs into the reference position.
The travel direction into the reference for every of the axes is determined by machine constants 0 – 5 (see the file TAB0.REK).

Ruční = manual
Reference = reference
atd. = etc.

8.6.2. PSEUDOREFERENCE and REFERENCE SIMULATION

Beside reaching the reference it is possible to set the zero co-ordinate position in any arbitrary place, so-called pseudo-reference.



In the MENU window, three possibilities are offered to control the pseudo-reference.

PSEUDOREFERENCE. After pressing down of the push-button , all co-ordinates are selected (are appeared in the frame). After pressing down the START push-button all co-ordinates are set to zero..

If selected one co-ordinate, e. g. X (by pressing down of the X push-button , after doing it the co-ordinate will appear in the frame) this co-ordinate will be set only after pressing down the START push-button .

SIMULATION. After pressing down of this push-button the status "co-ordinates are in the reference" will be simulated. In the MODE window, in the reference frame, all co-ordinates

will be emphasized. The position remains unchanged.

RESET. After pressing down of this push-button the status “co-ordinates are not in the reference ” will be set. In the MODE window, in the reference frame, all co-ordinates will not be emphasized. The position remains unchanged.

Note:
Usage of the pseudo-reference with the machines where the classical reference switches are situated, it is not recommended to prevent from the accidental cancellation of the position. This possibility may be locked in the machine constants No. 0 up to 5 for each axis

9. INTERACTIVE ENTRIES INTO THE TABLES

Interactive entries into the tables accelerate and simplify the entry because it is not necessary to select the table modes and to enter the values by the editor but it is possible to perform the entry in the manual modes directly and, sometimes, from the automatic modes. To make the entry interactively into all below mentioned tables the following rules shall be followed:

In the table the movement along the row is performed by means of the cursor arrows, the next row or previous one may be reached by means of the "arrow up and down", for the down direction also ENTER push-button may be used. If failed to enter any valid value in the first row (table No.), no down movement will be approved. The flashing cursor determines the position on which the entry will be performed. It is possible to correct the values in the table on the screen arbitrarily, the entry into a file and a memory will be performed by pressing down the ENTER push-button on the last row of the form appeared on the screen only. If required to exit any entry without modifying the entry into a file or memory, press the same push-button by which the table was called out i. e. either D or & or F or R (or by eventual pressing down of 2nd in front of this character).

9.1. Interactive entry of the starting point displacement for lathes

The work method e.g. at a lather with the revolving turrets requires a higher number of functions to displace the starting points for the individual tools. The system CNC836 has only 7 G functions to displace the starting points. So, length corrections, & function programmed were used for these purposes which are similar in principle.

Automatic entry into the correction table for a selected tool:
This method of the entry into the correction table is used in the case only when the setting procedure of corrections for the individual tools is performed on the lathe directly.

The automatic entry is performed in the manual mode (MAN or TOC). The condition is to reset the length corrections or to select the correction table which consists of zero corrections. &0 shall be programmed, which disengage the length corrections. The &0 function may be entered e. g. in the RUP mode or simply by starting CA (central cancellation) which is the most suitable and the most simple method. Any other possibility to do it is to program &1100 Dxx where the zero corrections are loaded in the correction table No. xx.

In the MAN mode the Txx tools shall reach the defined position (e. g. contact of the tools with the workpiece) and the D push-button shall be pressed down. In the right window, the table for interactive entry (see the figure) is appeared. The entry will be performed into the

table of the co-ordinate which was selected in the MAN mode (when pressing down of the D and no co-ordinate was selected, the error message will be issued).

Interaktivní zápis do tabulky délkových korekcí Přepíše korekci zvolené souřadnice dle zadané polohy Zadej polohu od nuly	Interactive entry into the length correction table. It overwrites the correction of the selected co-ordinate in accordance with the position selected. Enter the position from zero
Posun kursoru Na posledním řádku = zápis do tab. D = ukončení bez zápisu	. cursor displacement on the previous row = entry into the table D = finish without any entry into the table

The required table No. is entered, usually equal to the tool No. Furthermore the distance from zero may be entered in the case when the tool position is not correct and the "zero" value will be required. E. g. a borer may reach the so-called "workpiece" contact i. e. the place in which "zero" is required for this tool. In this case, the distance from zero will not be entered and displayed zero is "approved" only. If tool is not in contact with material, distance to material, measured e.g. by means of the scale into the "distance from zero" will be entered. After approving, the indication data (i. e. true position) added by eventual "distance from zero" will be entered into the correction table under entered number D automatically.

The distance from zero is used mainly in the X axis where the start (zero) lays in the spindle axis. By means of a tool (e. g. knife), the workpiece circumference will be reached. The workpiece diameter is known (to be measured by the slide calliper). The half of the diameter, i. e. radius, is to be entered into the item "distance from zero" (to checkup the X axis the double, i. e. the diameter is displayed).

The entry into the correction table is performed gradually (with the disengaged length correction &) for all tools. Entered corrections for the individual tools may be inspected in the file TAB0.KOR. The entry is also performed in the table stored in the system memory.

Indication switching-over in accordance with the selected tool:
Usage of the entered values of the displacement is activated by programming of the control function &1100. Selecting Dxx, the values are appeared which are related to the given No. of a tool.

It is recommended to program the block with the addresses Dxx and Txx simultaneously.

Example of the part programs for a lathe:

% 1	
N05 G90 G54 G95 & 1100	"absolute programming, engagement of starting point and feed for a revolution, engagement of length corrections".
N10 D1 T1	"the tool No. T1 in accordance with the table No. 1 is selected".
N20 M3 S1000 M7	"the speed is started, the cooling is put into operation".
N30 X-10 Z55 G01 F100	

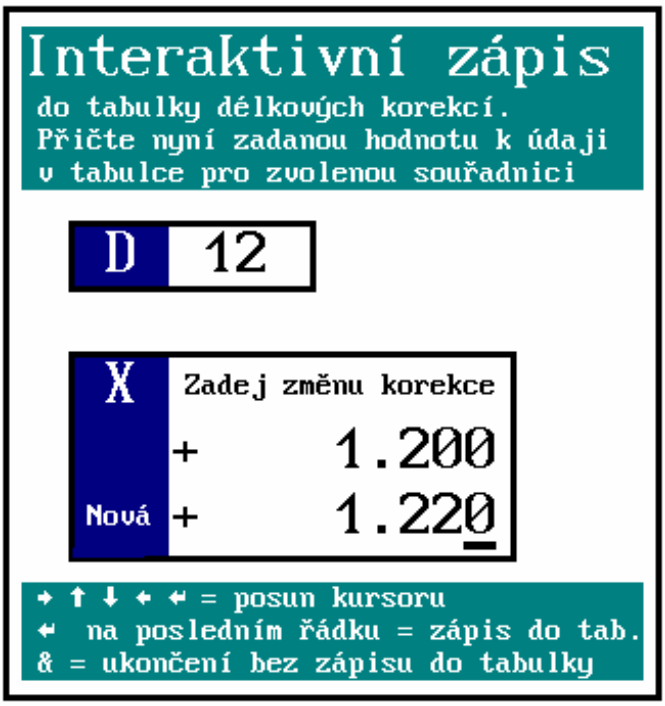
N40 X-20
N100 D2 T2 “the tool No. 2 is selected, the length correction in accordance with the table No. 2 is engaged.

N110 X-15, Z40

Note:
The interactive entry into the correction table is locked for the following cases:
a) if the minus (-) sign in included in the machine constant No. 65
b) if the machine constants No. 164 up to 165 are set in the machine constants (displacement of the tool heads).

9.2. Interactive addition of a value into the correction table

Automatic addition of a value into the correction table:



This function is used in the case only when it is necessary to change the value of the length correction by an entered value e. g. after measuring of a workpiece it is necessary to change the correction by some hundredths mm. Automatic addition (substraction) of a value entered by the operator to the value included in the table may be performed in the manual (MAN) or AUT mode.

In the MAN or AUT mode the push-button & is to be pressed. If the 2nd flag is not ON, the 2nd push-button shall be pressed before pressing the & push-button . In the right window the table for interactive addition/subtraction is appeared. Required table No. is to be entered which is usually equal to the tool No. Furthermore the axis may be selected by pressing down of the relevant push-button . The X axis is selected as the priority one. Then the value inclusive of the sign which is to be added (plus sign) or substracted (minus sign) from the value already entered in the table. By pressing down of the ENTER or arrow down key, the check data is appeared on the last row which is loaded into the table. By confirming of the ENTER key, the data is loaded into the table. If not required to load this data, press the & or 2nd and & keys in every time. So the return back to the mode will be performed without performing the entry into the table.

Interaktivním zápis do tabulky délkových korekcí. Přičte nyní zadanou hodnotu k údaji v tabulce pro zvolenou souřadnici	Interactive entry into the length correction table. The entered value will be added to the data in the table in the selected co-ordinate.

Zadej změnu korekce	Enter the correction modification
Nová	New
- posun kurzoru - na posledním řádku = zápis do tab. - & = ukončení bez zápisu do tab.	- cursor displacement - on the last row = entry into the table - & = finish without any entry into the table

9.3. Interactive entry of the radius correction into the table

Automatic entry of the radius correction into the system table and the file (e. g. TAB0.KOR(is performed in the manual mode (MAN or TOC).

The window for entering is called up by pressing down of the R push-button . In the right window the table for interactive entry of the radius correction is appeared. Required table No. in the range from 01 up to 00 is to be entered. Pressing down the ENTER push-button or cursor arrow down push-button the window to enter the radius correction will be reached (note: if entered the table No. 00, no transfer into the further entering is allowed).

Required radius correction is to be entered. It is possible to displace the cursor for entering or correcting a digit by means of the cursor arrow to the left or to the right.
After pressing down of the ENTER or arrow down push-button s, the entered value is displayed in the lower window for checking purpose again. Further pressing down of the ENTER (not by means of the arrow down) the entry into the system table as well as into the file is performed.

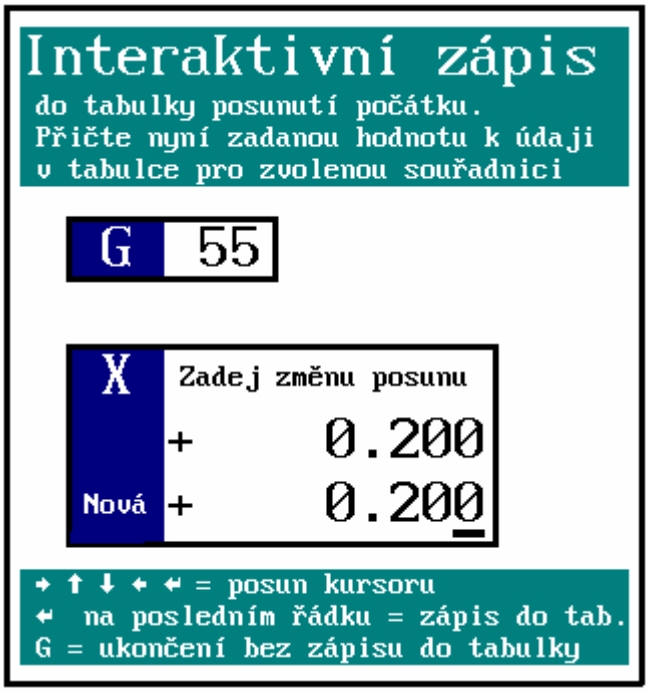
If not required to perform the entry, press the R push-button in every time again. The mode of the interactive entry is to be finished without any entry into the table.
Loaded radius corrections may be checked up in the file TAB0.KOR. The entry into the system table may be checked up in the indication selection (WIN).

Interaktivní zápis do tabulky poloměrové korekce. Přepíše poloměrovou korekci hodnotou Nyní zadanou	Interactive entry Into the table of the radius correction. It overwrites the radius correction by the value now entered.

Zadej polom. Korekci	Enter the radius correction
Nová	New
- posun kurzoru - na posledním řádku = zápis do tab. - R = ukončení bez zápisu do tab.	- cursor displacement - on the last row = entry into the table - R = finish without any entry into the table

9.4. Interactive addition of the starting point displacement

Automatic addition of the starting point displacement into the displacement system table as well as into a file (e. g. TAB0.POS). is performed in the manual mode (MAN or TOC) or in the automatic mode.



The window for entering is called up by pressing down of the G push-button . In the right window the table for interactive entry of the starting point displacement is appeared. Required displacement No. in the range from 53 up to 59 is to be entered. Pressing down the ENTER push-button or cursor arrow down push-button the window to enter the value will be reached (note: if entered no number in the range 53 up to 59, no transfer into the further entering is allowed).

The value to be added to the set displacement is to be entered. By the cursor arrow down or up the cursor for entering or correcting of the values may be displaced. After pressing down of the ENTER push button or arrow down, the value (new) is appeared in the lower window for the checking purposes which is the summation of the entered value with the value stored in the table. .

After pressing down of the ENTER push-button (not by the arrow down) the entry into the system table as well as into the file is performed.

If not required to perform the entry, press the G push-button in every time again. The mode of the interactive entry is to be finished without any entry into the table.

Starting point displacement entered may be checked up in the file TAB0.POS. The entry into the system table is possible to check up in the indication selection (WIN).

Interaktivní zápis do tabulky posunutí počátku.	Interactive entry into the table of the starting point displacement.
Přičte nyní zadanou hodnotu k údaji v tabulce	It adds the now entered value to the table data

pro zvolenou souřadnici	for the selected co-ordinate.
Zadej změnu posunu	enter the displacement change
Nová	New
- posun kurzoru - na posledním řádku = zápis do tab. - G = ukončení bez zápisu do tab.	- cursor displacement - on the last row = entry into the table - G = finish without any entry into the table

9.5. Interactive entry of the starting point displacement

The procedure is the same as described in the previous chapter with the exception that the value to be entered is loaded into the displacement table directly with the position related to the zero point of the machine (the offered value can be changed, of course). This procedure is used in the case when after manual reaching of the certain position this position is to be set to zero by means of the starting point displacement. If confirmed the offered value for the given co-ordinate, the value for selected displacement will be zero in this point. This procedure may be replaced by the pseudo-reference which also sets to zero the position in the given point but in spite of the pseudo-reference the position will not get lost the relation to the machine reference point, the starting point displacement will be activated only.

WARNING:

The addition and the entry into the displacement table may not be, in spite of the entry and addition into the correction table, combined. Which method of the displacement table influencing is approved in the relevant system, is given by the setting of the fourth decade of the machine constant No. 95.

2 and 3 in this decade allow adding, 0 and 1 in this decade allow entry.

Note:

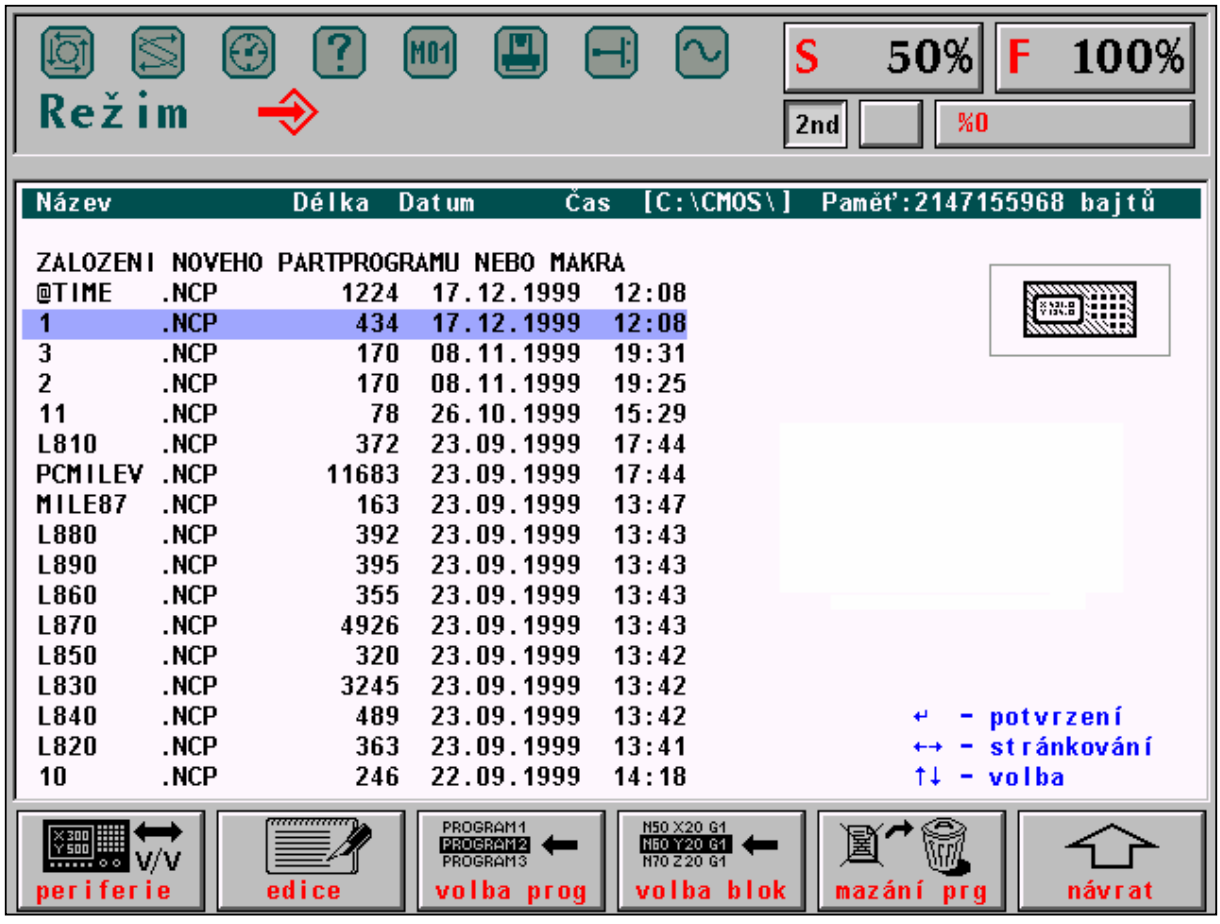
Values in this decade manage the entry into the correction table by means of the function G92 from the part program (see the Programming Manual).

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:

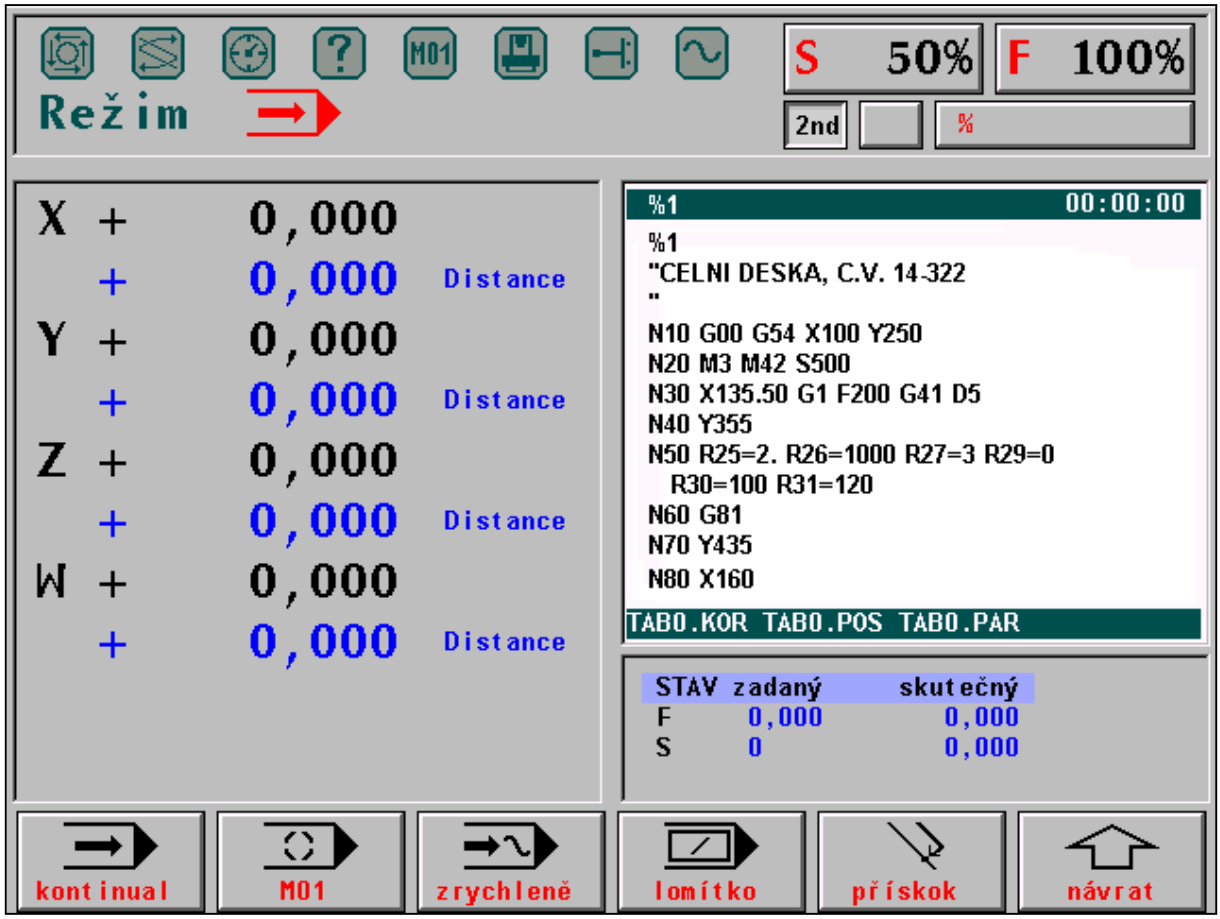
In the main menu, press down the PROGRAMS push-button . The part program list (see the figure) available in the system memory will be appeared. By means of the cursor up/down (with several programs also the arrow to the left and the arrow to the right) select the required part program and press down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

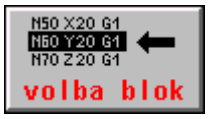
In the lower status line, the names of the selected files with the correction tables, displacements and parameters are indicated. It is used for checkup purposes for the case when using e.g. several files of the correction tables.

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

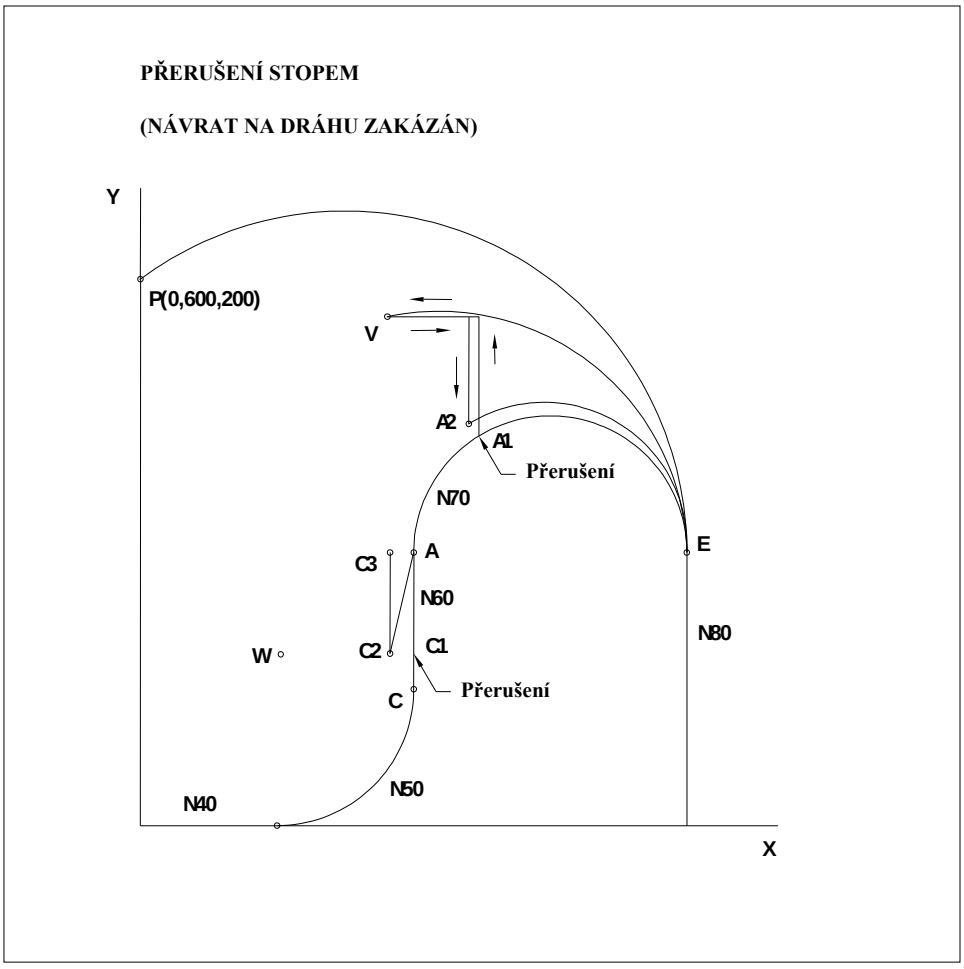
After selecting any arbitrary block, the output of all technological functions programmed from the starting point of the part program is performed. For instance when rotating the spindle it is not necessary to select the block directly in which the spindle is programmed if programmed in some of the previous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

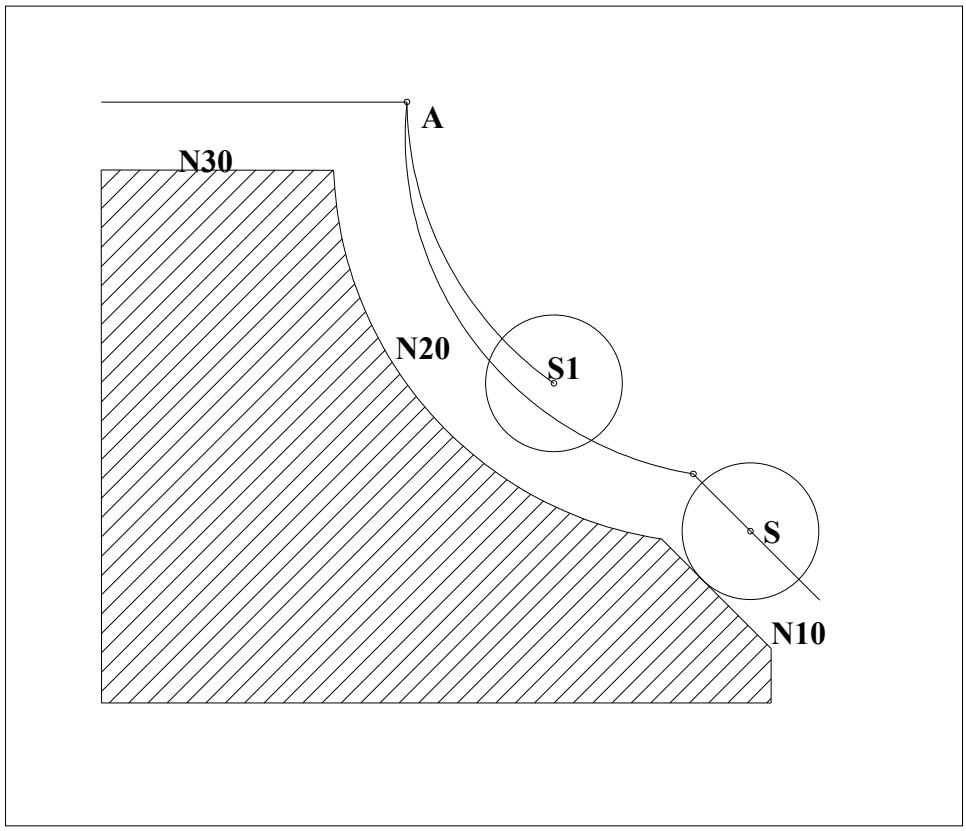
In both cases it is necessary, from the practical point of view, to approximate the programmed path in the AUTMAN travels as proximal as possible (to contact) so that the remaining of the interrupted block will be worked at all. See the chapter Automatic Modes.

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.



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

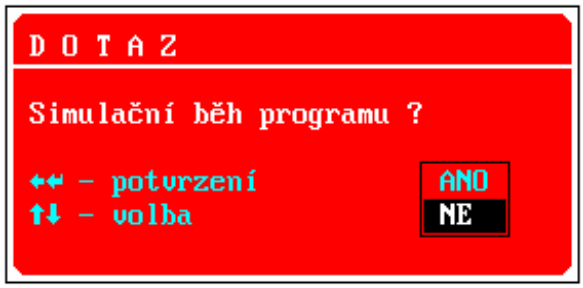
AUT - M01 modification. When selecting it, the part program will be interrupted without losing information on the block end in which the M01 function is programmed. The activity is the same as with the programming of the M00 function in the part program (programming STOP) with the difference that the 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.

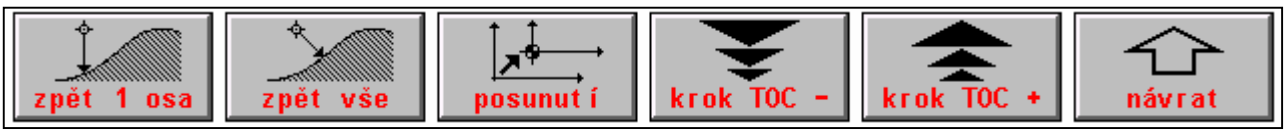
AUT - ND modification is not set with the recommended setting of the machine constant No. 53 i. e. after the block selection the return back to the path is forbidden by default. If wanting to be approved it, the above mentioned push-button shall be pressed.

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
posunutí = displacement
návrat = return

zpět vše = return all
krok TOC = TOC step

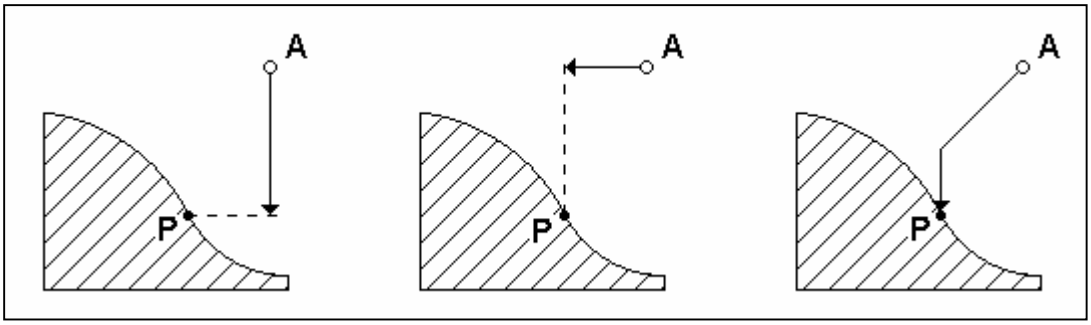
Upon the finish of the auxiliary manual travels (it is to be performed by repeated pressing down of the MAN push-button) the following options are available in the AUT or AUT – BB modes:

- 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.

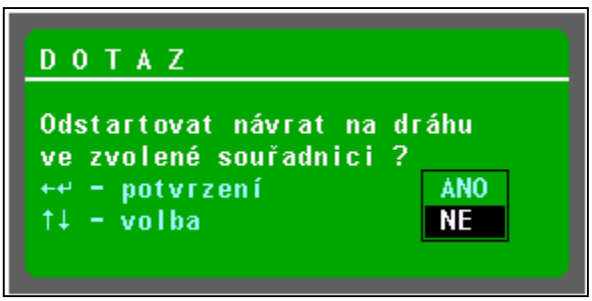
Control procedure for the individual cases:

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:

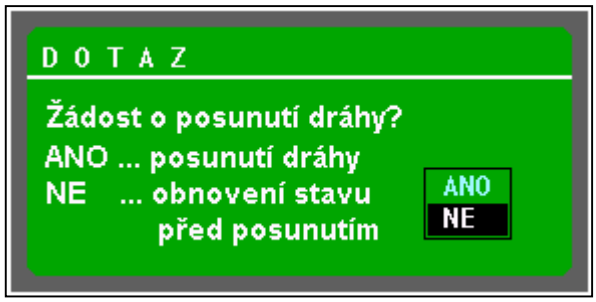
1. The program is stopped by the STOP push-button or by "block-by-block".
2. Press down the "displacement push-button – the "displacement request" will be appeared (after approximately one minute) and the software push-button will change the inscription to "DISPLACEMENT!". From this moment, the path 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.



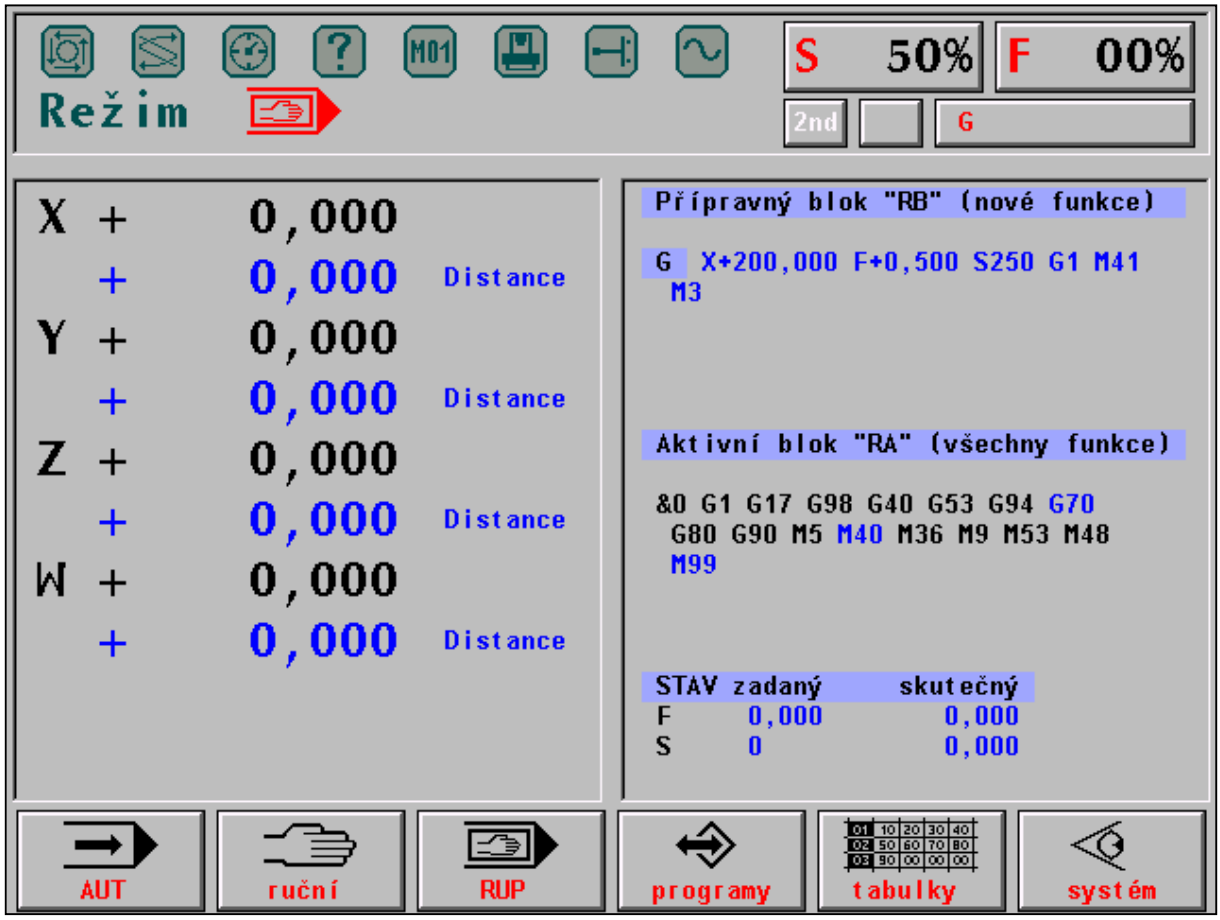
DOTAZ
Žádost o posunutí dráhy
ANO – posunutí dráhy
NE – obnovení stavu před posunutím

Query
Request to displace the path?
YES path displacement
NO restoration of condition before displacing

12. RUP MODE – MANUAL PRE-SELECTION OF THE BLOCK

It is possible to store into the system memory complete information in the scope of one program block with the possibility to run the whole entered information by means of the push-button, addresses and digits.
RUP mode selection procedure:

Press down the RUP push-button in the main menu. The format window is divided into two windows (if other display format is not memorized). The co-ordinates with distance are appeared in the left window, the preparing and active block are in the right window. The preparing block is empty and it is ready to enter the block. By pressing down of any arbitrary address, this address is appeared in the emphasized window and its numeric value may be entered. If numeric value is not set, any other arbitrary address may be pressed down. The active block indicated all functions which are valid in this given moment. Functions progammed in the previous block are emphasized. Functions which are mentioned in the active block have not to be programmed in the RUP block. In the relevant figure, the function G01 had not to be programmed in the RUP block because it is valid.



Režim – mode
nové funkce = new functions
všechny funkce = all functions
skutečný = true
programy = programs
systém = system
přípravný blok = preparing block
aktivní blok = active block
stav zadaný = status entered
ruční = manual
tabulky = tables

The procedure of entry and correction of already entered value may be explained by the following example:

Enter the block to program the linear feed in the X co-ordinate with the entered velocity (F) and engagement of the first transmission stage of the spindle (M41) and then the rotation of the spindle (S and M3).
This block will be entered as follows: X100 F500 S250 M41 M3 G01

Note:
No block No. will be entered in the RUP block. If done so, it has not meaning.

Upon entry of the above mentioned block, press down these push-buttons on the system panel (the individual pressing down steps are separated by commas, 2^{nd} is one push-button).
X, 2, 0, 0, 2^{nd}, F, 5, 0, 0, 2^{nd}, S, 2, 5, 0, 2^{nd}, M, 4, 2, ↓, 3, 2^{nd}, G, 1

Note:
Independent push-buttons for the G.N.S.T. are available on some panel types so that the 2^{nd} push button is not to be pressed for them.

If present several functions G or M in the block, so when selecting the second and further ones, the ↓ push-button shall be pressed down which offers empty G or M to enter a value.

The ↓ push-button is used for listing in an entered block. The listing procedure may start from the entered address up to the RUP block end which is marked by asterisk (information data only). Further pressing down causes the skip to the RUP block starting point which is marked as N0 (again, information data only without any practical meaning). Actual item (address) is located in an emphasized frame. This address may be cancelled by the DEL push-button. If required to correct an erroneously entered address it is not necessary to cancel it by the DEL push-button but it is enough to press down the relevant address again and its original value will be appeared in the actual item. Pressing down any arbitrary number, the old value will be overwritten by the new one.

The address indicated in the emphasized window is indicated in the block with other addresses too.

For completing purposes the parameter entry and entry of parametrically programmed address is mentioned but it is not important in the RUP mode. The entry of R10 = 30.2. shall be performed by : 2^{nd}, R, 1, 0, =, 3, 0, ., 2.

After pressing down of the = push-button, entered 10 disappears to allow the entry of 30.3. Entering other address or pressing down the ↓ push-button this entry will be formatted into the format R10=30.200.

Parametric address entry is performed by the following entry: X,2,0,=.

After pressing down of the further address or the ↓ push-button this entry will be normalized to XR20 and it means that the X axis will be moved to the measure which is in the 20. parameter.

To run the entered block automatically, press down the START push-button. If failed to enter e.g. the F velocity, the blocks will start but the relevant co-ordinate will not run because no velocity was entered. The lamp SYSTEM RUN, FUNCTIONS NOT FULFILLED and INPOS will be ON. Pressing down the STOP push-button the lamps will get OFF and the lamp FUNCTIONS NOT FULFILLED remains ON. In this stage, missing velocity may be programmed and the block is to be started again.

After correct block execution, all lamps will get OFF and the format of the preparing blocks will be cancelled. If interrupted the block by STOP and it shall not be continued, the CENTRAL CANCELLATION mode shall be selected the START push-button is to be pressed down. The CENTRAL CANCELLATION mode shall be used when the entered block has not to be run.

Note:
After STOP of the RUP mode in progress it is possible to re-program other functions or travels. After pressing down the START push-button, also the re-programmed functions will be run too.
After pressing down of the MAN push-button, also auxiliary manual travels in the RUP mode may be used but without any big practical meaning.

13. EDITOR

In the systems CNC836/846/856, the editor is built-in which is used by the same method to edit all text files i. e. to correct and create new part programs as well as to correct the tables and system files eventually. The control is performed by the whole screen and the screen orientation is to be executed by means of the flashing cursor.

13.1. Selecting a file to be edited

The file stored in the system memory is selected for editing from the offered list as follows:

To correct or to create part programs, press down the PROGRAMS push-button in the main menu. To correct tables select TABLES from the main menu and then from the sub-menu the relevant tables (CORRECTION, DISPLACEMENT, PARAMETERS, MACHINE CONSTANTS). To correct the system files, press down the SYSTEM, EDITION – SYSTEM in the main menu.

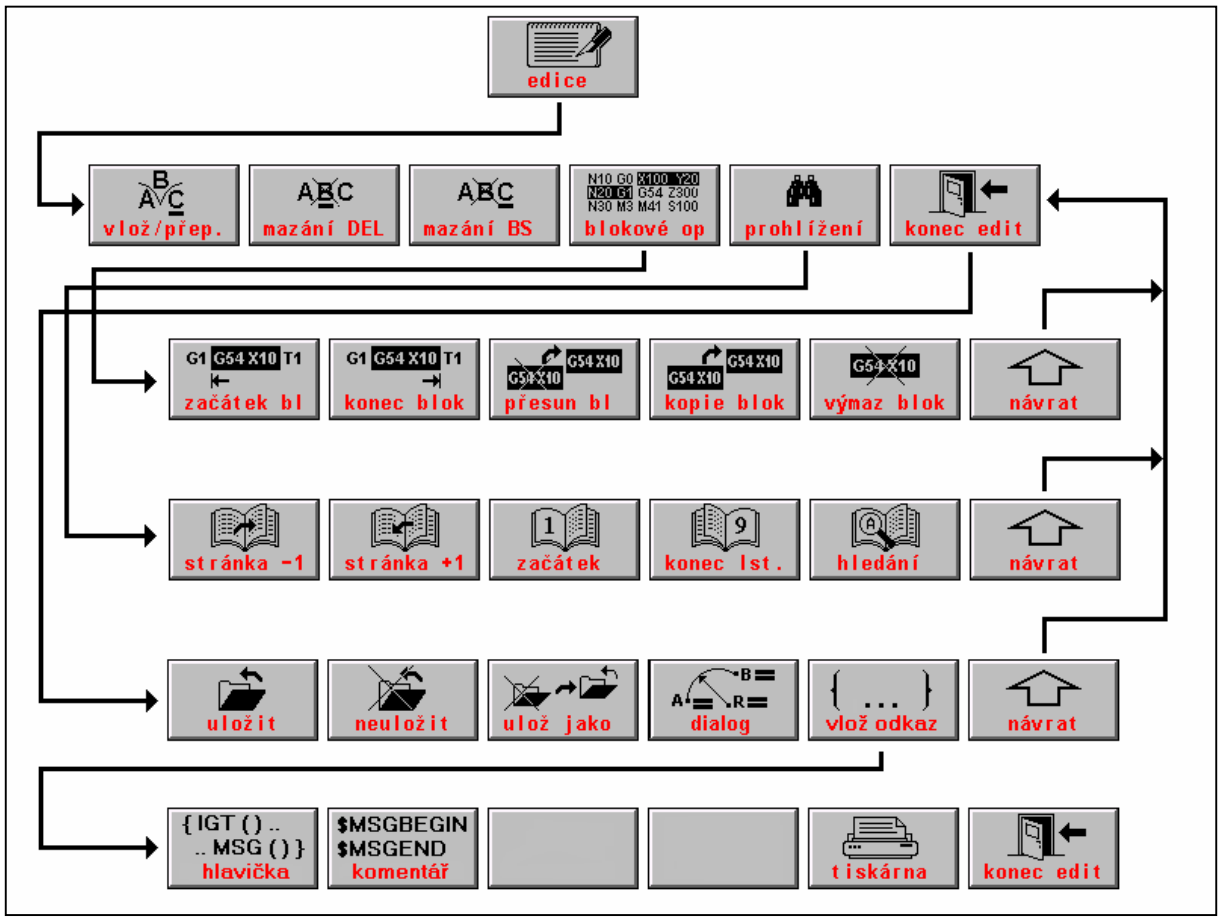
The list of files regarding to the relevant filter is appeared which are stored in the memory system. Select any required file by means of the cursor. To create a new file, position the cursor on the first row with the inscription “ESTABLISHMENT OF NEW PART PROGRAM (or TABLE). Press down the EDITION push-button.

13.2. Editor control

The EDITOR window format is limited by two information beams. If found in the edited file %, the message “part program % xxxxx is appeared in the upper beam where xxxxx is the part program No. When % is not found, the message “edition of the part program, the macro or the table” is appeared. Those are information message only without any significant importance.

In the lower beam, the message “FIND” is appeared after which the searching chain is to be entered (see below), the message “MARKING THE BLOCK” is in the right, where the status upon marking of the file part is indicated (see below). The editor is whole-figure one i. e. it is possible to move the cursor along the whole file and correct old or enter new data. During the editor input the cursor is located in the upper left corner. Rapid movement along a longer file is possible by means of the “BROWSING” sub-menu with the software push-buttons for listing of the pages and for jump to the starting and ending point of this file. All editing performed in the editor are performed in the work memory only. After finishing the editing procedure it will determine to which place the edited data are to be stored.

Two menu levels are available in the editor. It is possible to select three various sub-menus from the main menu. When pressing down the arrow “RETURN”, the return into the main menu is possible. Connection of the editor menu after pressing down of the EDITION push-button is illustrated in the following figure:



edice = edition
mazání = delete
prohlížení = browsing
začátek bloku = block starting point
přesun bl = block displacement
výmaz bloku = delete block
stránka = page
konec = end
uložit = store
uložit jako = store as
tiskárna = printer

vlož/přep = insert/overwrite
blokové op. = block operation
konec edit = edit end
konec bloku = block end
kopie bloku = block copy
návrat = return
začátek = start
hledání = searching
neuložit = do not store
dialog = dialogue

Push-button meaning in the editor main menu:

insert/ overwrite	The push-button to change the insert character mode and the overwrite character mode. “Insert character ” mode inserts a character on the cursor position. The cursor and the character to be located on the cursor position and all characters behind it will be shifted.

Overwrite/ Insert	Push-button to switch-over the insert character mode and the overwrite character mode. The “overwrite character” mode overwrites a character on the cursor position by any new character and the cursor will be passed to the next character.
delete	Deletes a character located on the cursor position. The cursor remains on its place. Note: the same function has the DEL push-button located on the operator panel.
delete BS	Deletes the character located in the left of cursor and the cursor will be moed to the left. It located on the row starting point, the “invisible” LF character will be deleted (row end) and two rows will be combined in one row.
block operations	Entry into the sub-menu of block operations
browsing	Entry into the sub-menu of browsing
edit end	Entry into the sub-menu of editor finish