

# MT-CNC Repositioning and NC-block Restart

Applikation Manual

DOK-MT\*CNC-REPOS\*\*\*V15-ANW1-EN-P

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# 1 Introduction

The functions 'reposition' and 'NC-block restart' automate traversing back to the contour following a NC-program interruption.

After NC-program interruptions in which the operator withdrew the tool from the contour by means of jogging, e. g., to inspect the inserts on the tool, the '**reposition**' function allows the operator to return to the point of interruption, and the '**NC-block restart**' function allows him to traverse back to the starting point of the block.

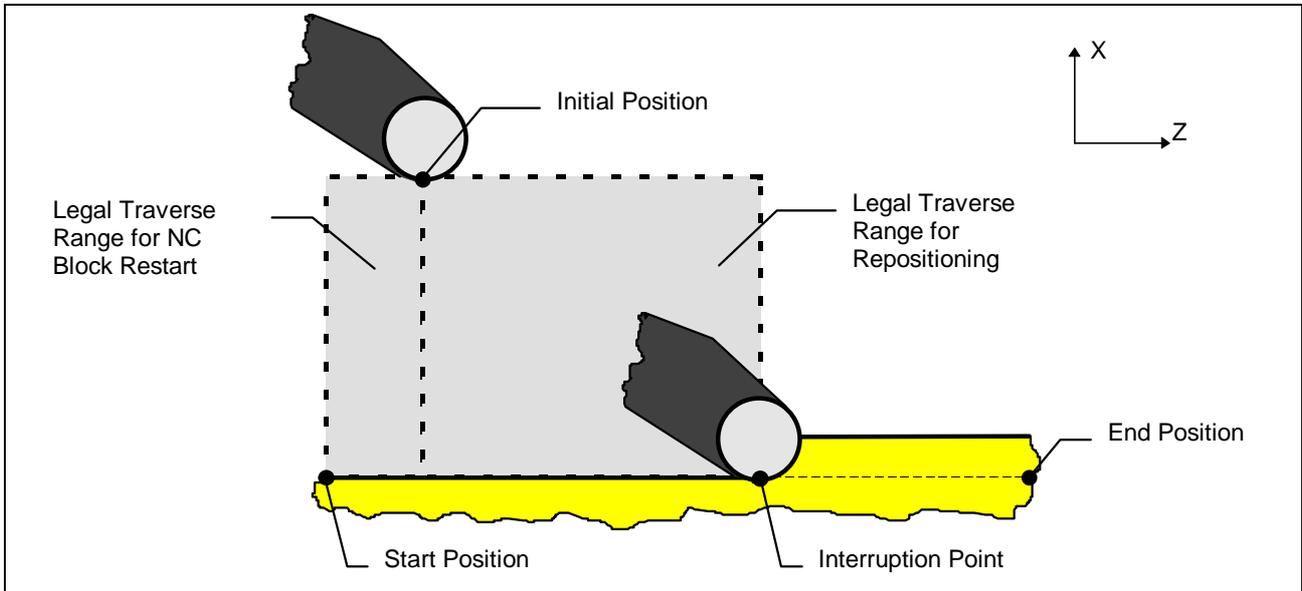


Figure 1-1: Repositioning and NC-block restart illustrated using an interruption of turning.

Both functions are available in the manual and automatic operating modes. In *manual mode* the control compensates for the difference between the target position and the actual position in the order in which the user presses the jog keys. In *automatic mode* the control guides the axes to their target position in a specified order—in some cases, simultaneously.

## 2 Operating Steps

### 2.1 Initial Situation for Repositioning and NC-block Restart

- The operator has interrupted NC-program execution in one of the program operating modes 'automatic', 'semi-automatic' or 'execute in manual mode.'
- The operator has removed the axes from the contour by means of jogging, and
- has not yet pressed Control-Reset.



**WARNING**

⇒ In all other situation in which the operator activates the function 'reposition' or 'NC-block restart,' the NC will ignore this request.  
Thus, the functions cannot be used from a reset state (after power-on, after end of NC-program, and after Control-Reset) if the tool has not yet left the contour.

### 2.2 Repositioning and NC-block Restart in Manual Mode

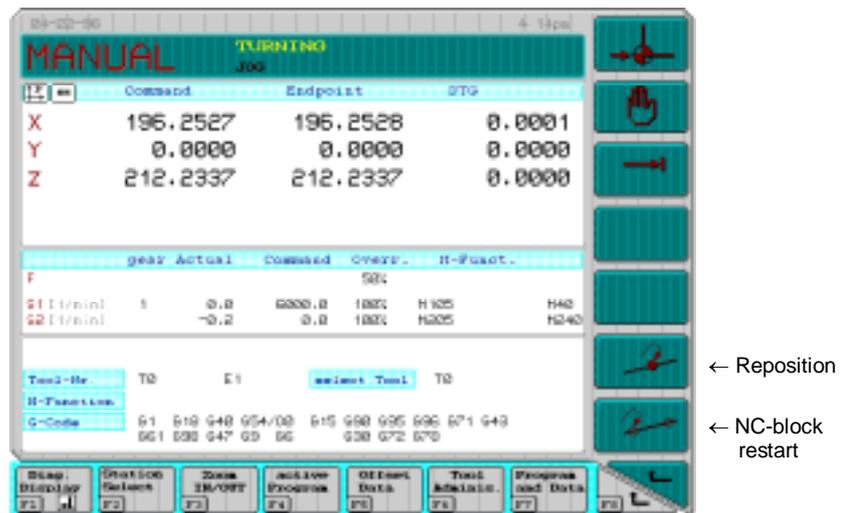


Figure 2-1: Example: Call repositioning / NC-block restart function in manual mode via Machine Keys



Figure 2-2: Example: REPOS screen for repositioning and NC-block restart.

**Operating Steps**

- 1) Select MANUAL mode
  - ⇒ Press the MANUAL control button if manual mode is not yet active.
- 2) Select repositioning or NC-block restart
  - ⇒ Select either repositioning or NC-block restart by pressing the appropriate button on the machine control panel.
  - The REPOS screen (see above) shows the following for each feed axis:
    - Final value
    - Command value and
    - Distance to go

Distance to go<sub>Repositioning</sub> : = Interruption position - actual position

Distance to go<sub>NC-block restart</sub> : = Block start position - actual position.
  - For spindles, the REPOS screen shows the actual value, the command value, the override and the actual and command M-function.
  - In addition, this screen shows the programmed and current F value (actual and command value), the feed override, the currently active NC-program, the current T-number, and the current M and G commands.
  - The user must adjust any axes and spindles which the REPOS screen identifies using an adjust symbol on the right side of the screen.
  - The REPOS screen also displays the return-to-position status for the tool storage axis. If the tool storage axis is not returned to position, the screen will display a adjust symbol following the T-word on the right side of the screen.
- 3) Press Machine Keys or axis jog buttons.
  - ⇒ Press the appropriate axis jog buttons to return the tool storage axis to its previous state if the REPOS screen displays the adjust symbol (indicating that an adjustment must be performed).
  - ⇒ Spindles identified by the adjust symbol on the REPOS screen must be returned to the status which they had before the

interruption by pressing the Machine Keys used for 'spindle adjustment.'

- ⇒ Any auxiliary functions interrupted, for example, coolant, must be reactivated.
- ⇒ The feed axes, marked by the REPOS screen with an adjust symbol , must be returned to their prior position with the aid of the axis jog buttons.

#### 4) Continue machining

- ⇒ Select the desired program operating mode by pressing the AUTO or SEMI-AUTO Machine Keys.
- ⇒ Continue machining by pressing the Start button.

## 2.3 Repositioning and NC-block Restart in NC-program Mode

### 1) Select repositioning or NC-block restart

- ⇒ Select the desired function in manual mode by pressing the 'reposition' or 'NC-block restart' button.
  - The REPOS screen which appears corresponds to that for repositioning or NC-block restart in the manual mode (see above).

### 2) Select the AUTO or SEMI-AUTO mode.

- ⇒ Press the Machine Key AUTO or SEMI-AUTO.

### 3) Press the start button.

- ⇒ Press the start button to start repositioning or NC-block restart.
  - The NC will then adjust the axes and spindles in a specified order.

---

**instruction:** The order in which the NC adjusts the axes and spindles and outputs the auxiliary functions can be specified by the machine builder in a REPOS subroutine. The machine builder can use any desired logic in this subroutine and thereby ensure that repositioning and NC-block restart will be performed reliably even in exception situations (even on complex machine systems).

---

- As soon as all the spindles and axes have adjusted to their former state and the REPOS subroutine execution is completed, the NC resumes program execution without interruption (or restart).

## 2.4 Recommendations for Repositioning and NC-block Restart

The operator should activate repositioning or NC-block restart in the manual mode and should only jog the axes so far toward the contour that it is certain that collisions will be avoided. The operator should then switch to the most recently active NC-program mode and should resume repositioning or NC-block restart by pressing the start button.

---

**instruction:** By changing to the 'automatic' mode ahead of time, tool racing and tool racing marks on the workpiece can be avoided since in automatic mode the NC continues NC-program execution without interruption (or without a restart) after repositioning or after NC-block restart (provided that single-block processing is not active).

---

## 2.5 Legal Operator Actions Prior to Repositioning or NC-block Restart

### Modify Axis States

In jog mode, the operator is allowed to make virtually all feed axis, tool storage axis and spindle moves to move the tool away from the workpiece.

### Modify Zero Offsets

The active zero offset can be edited to allow the user to move and rotate the workpiece coordinate system and, thus, the workpiece contour.

---

**instruction:** If the user edits the zero offset data during an NC-program interruption, the operator thereby moves and rotates the point of interruption and the block starting point in addition to the programmed contour.

---

### Edit Tool and D-corrections

Any change in the tool corrections (including the D-corrections) during a program interruption will result in the tool holder to be shifted.

It can be especially advantageous to change the tool corrections and D-corrections during a program interruption and then to resume machining (without further operation actions) at the beginning of the block or at the point of interruption if a tool needs to be replaced due to wear or failure.

In addition, a gaging cut (scratching) can be performed at any desired location. To do this, the operator interrupts NC-program execution during a motion block, jogs the axes away from the contour, determines the actual dimension of the given geometry, and enters the difference relative to the specified dimension in the geometry or wear data for the active tool. He then continues program execution with the aid of the repositioning or NC-block restart functions.

### Activate and Deactivate Auxiliary Functions

Auxiliary functions — coolant, for example — can be activated or deactivated during an NC-program interruption using the machine operating keys on the PC or the push buttons on the BTM.

---

**instruction:** If the same auxiliary functions will need to be active at the start of repositioning or NC-block restart as were active prior to the interruption, it makes sense for the machine builder to back up the status of all relevant auxiliary functions in the SPS the first time a jog move is performed and to update them automatically when the functions are activated.

---

### 3 Repositioning and NC-block Restart in Manual Mode

#### 3.1 General Information

With repositioning and NC-block restart, the order in which the states and axis positions (which were in effect prior to the interruption) are restored using the jog keys is completely up to the operator.

When repositioning and NC-block restart are used in manual mode — as with jog — up to nine different feed axes and three spindles can be made to return to their status prior to the interruption.

#### 3.2 Feed Axes

The NC traverses the feed axes when jogging takes place utilizing the selected jog mode (PxxC.JOGMn). Unlike in jog mode, during repositioning or NC-block restart the NC prevents the target positions from being overshoot.

The operator can traverse the feed axes in the opposite direction within the permissible traverse zone (between the destination position and the initial position, see *Figure 1.1*), for example to traverse around an obstruction. As in jogging, the feed axes can be traversed in any desired order.

**instruction:** The destination position of modulo (endless rotating) rotary axes. As soon as the destination position is reached, the Graphical User Interface removes the corresponding adjustment symbol . If the operator traverses past the destination position, the user interface sets the adjustment symbol  again.

#### 3.3 Spindles

A positive edge on the corresponding Gateway interface signal restores the status prior to the interruption.

Status Prior to interruption (Commanded M-function)	Operating Mode	Signal to Be Activated
M03 Sxxx	Rotational speed control	AxxC.M3 or AxxC.M4
M04 Sxxx	Rotational speed control	AxxC.M4 or AxxC.M3
M05	Rotational speed control	AxxC.M5
M19 Sxxx	Position output	AxxC.M19

**instruction:** In order to be able to adjust the spindles, the ‘spindle adjust function’ should be implemented via Machine Keys for each spindle in the Graphical User Interface, and it should be integrated in the current SPS program using the appropriate temporary flags.  
 With rotary (C-)axis capable main spindles, the user can use the jog buttons to traverse to the rotary axis position which was in effect prior to the interruption.

## 3.4 Tool Storage Axes

During repositioning and NC-block restart the NC traverses NC- and SPS-controlled tool storage axes (including combined spindle/turret axes) as it would in jog mode whenever the jog buttons are pressed (gateway signals 'PxxC.MGPOS' and 'PxxC.MGNEG').

---

**instruction:** The target position can be overshoot with endless rotating NC- or SPS-controlled tool storage axes. As soon as the destination position is reached, the Graphical User Interface removes the corresponding adjustment symbol . If the operator traverses past the destination position, the Graphical User Interface sets the adjustment symbol  again.

---

## 4 Reposition and NC-block Restart in the Program-Driven Operating Modes

### 4.1 REPOS NC-subroutine

The REPOS subroutine allows the machine builder to adapt the contour approach strategy used for repositioning and NC-block restart to the given machine system and the given initial condition.

All NC commands are legal in the REPOS subroutine (as in the homing program). In addition to using the NC commands to restore the original axis states (G77), the user can program logic commands and activate or deactivate auxiliary functions which may or may not be active during the process (for example, 'coolant on').

The '.REPOS' label must be programmed at the beginning of the REPOS subroutine, and the NC-command RTS must be programmed at the end of the subroutine. The NC-command RTS is necessary for the NC to retain a previous state and not reset it and to continue program NC-program execution without interruption.

As in an advance program, reverse vectors can be programmed in the REPOS subroutine. If a reverse is performed during repositioning or NC-block restart, the NC branches to the valid reverse label and continues machining there before it branches to the '.HOME' label.

The user can store the REPOS subroutine in the current NC-program, in the NC-program 99, or in the NC-cycle memory.

### 4.2 NC Command 'NC-block Restart/Repositioning'

#### General Information

G77 causes the NC to restore the original state for the programmed axes. G77 is active only for the block in which it is located (NC-block active). The syntax is identical to that of the axis homing cycle (G74).

Note that an F-value is present in each G77 block in which a feed axis is programmed. If this is not the case, the NC interrupts NC-program execution at the beginning of the block and generates the appropriate error message.

#### Feed Axes

With G77, the NC adjusts the existing distance to go between the target position and the current actual position using a G00-like interpolation routine.

During an active G77 block, the NC retains all the technology-related functions, in particular the G-codes. However, it does not take into account all G-codes affecting interpolation, nor does it take the tool radius path correction into account (as in jog mode).

#### Spindles

'G77 S<sub>j</sub> 0' (j = " , 1, 2, 3) causes the NC to restore the most recently active RPM speed for spindle 'j', or it causes the NC to traverse to the specified destination position.

When traversing to the destination position, the NC or the digital drive will travel at the positioning RPM speed specified in the axis parameters or drive parameters. An additional or S-value is not needed for specifying the positioning speed.

---

**instruction:** With rotary (C-)axis capable spindles and with spindles to which a rotary axis is assigned, the operating mode 'spindle or rotary axis mode' must be stored in the PLC in the event of program interruptions. It must be taken into account since the command 'G77 Sj 0' will result in a program interruptions and error message if 'spindle mode' was present before the interruption. Similarly, 'G77 C0' results in an error message if 'rotary axis mode' was present prior to the interruption.

---

## Tool Storage Axis

NC- and SPS-controlled tool storage axes (including combined spindle/turret axes) must be adjusted in the REPOS subroutine by means of the NC-command MTP. When MTP is called, the NC traverses to the location which had been traversed to prior to the interruption (by means of MTP, MMP, MRF, MHP, MFP and MOP). A speed does not need to be specified.

As in NC-program controlled mode, the tool storage axis can sometimes traverse asynchronously with the other axes. The machine builder can, if need be, use the NC-command MRY to synchronize the asynchronous movement of the tool storage system with that of the remaining axes.

## 5 Limitations

Links and NC-block active Functions The links and NC-block active functions which are deactivated during jogging are not activated by the NC until NC-program execution resumes. Links and NC-block active functions remain deactivated during repositioning and NC-block restart in manual mode and in the NC-program operating modes.

### 5.1 Axis Switching

Axes which are not in the primary process when jogging is first performed remain in this process during repositioning and NC-block restart if the process parameter Bxx.036 'Manual Axis Jogging causes Reset' is set to 'no'.

Only axes which are present in the process can be adjusted during repositioning and NC-block restart.

### 5.2 Coordinate Transformation Function

During repositioning or NC-block restart, the NC traverses the axes which are involved in the coordinate transformation (typically 'X' and 'C') in the Cartesian coordinate system, as in jog mode, if the user traverses the respective axes.

In the REPOS subroutine, the target position must be programmed using the axis names for the fictive Cartesian axes when the transformation function (G31, G32) is active.

## 6 Machine Parameters

### 6.1 Adjustment Window for Repositioning and NC-block restart

<b>Name</b>	Window for Repositioning and NC-block restart
<b>Axis parameter</b>	Cxx.086
<b>Type</b>	Axis parameters for: <ul style="list-style-type: none"> <li>• digital and analog linear axes</li> <li>• digital and analog rotary axes</li> <li>• digital rotary (C-)axis capable main spindles</li> </ul>

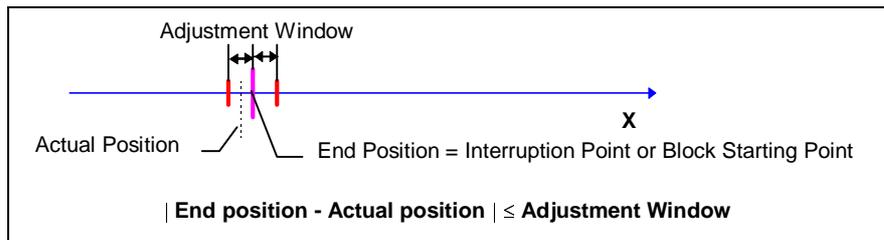


Figure 6-1: Adjustment window

<b>Purpose</b>	The machine builder can use the adjustment window for each feed axis (with meanings: X, Y, Z, U, V, W, A, B, C in the coordinate system) to define when the axis is considered to be fully adjusted when repositioning or NC-block restarts are performed.  A value '0' specifies that the respective axis is ignored when repositioning and NC-block restarts are performed. All other values cause the NC to monitor the difference between the end position and the actual position during repositioning and NC-block restart.
<b>Value range</b>	0.1 - 200000 [mm]
<b>Default</b>	0.2 [mm]

**instruction:**

- In general, spindles must always be adjusted.
- In the case of NC-controlled tool storage axes, the NC does not evaluate this parameter. Instead, it only evaluates the process specific parameter Bxx.045 'Reposition Tool Storage Axis' that can be set to 'yes' or 'no'.
- When the coordinate transformation is active with fictive axes, the NC uses the adjustment window of the axis whose meaning in the coordinate system is 'X'.
- The functions reposition and NC-block restart can only be used in a logical manner if the machine builder sets the process parameters Bxx.036 'Manual Axis Jogging causes Reset' and Bxx.032 'Reverse Program Execution Required' to 'no'.

## 6.2 Reposition Tool Storage Axis

<b>Name</b>	Reposition Tool Storage Axis
<b>Process parameter</b>	Bxx.045
<b>Purpose</b>	The machine builder can use this parameter to set whether NC- and SPS-controlled tool storage axes are to be adjusted when repositioning or NC-block restarts are performed. Entering 'yes' causes the tool storage axis to be taken into account when the group signal 'status prior to interruption restored' is generated.
<b>Value range</b>	Yes / no
<b>Default</b>	No

## 7 Gateway Control and Status Signals

### 7.1 Control Signals 'Repositioning' and 'Restart'

<b>Name</b>	PxxC.REPOS (REPOSitioning) PxxC.RESTA (REStArt)	
<b>Purpose</b>	When the control signal PxxC.REPOS is set, the SPS activates repositioning and when the control signal PxxC.RESTA is set the SPS activates NC-block restart.	
<b>Evaluation</b>	The NC does not evaluate these control signals unless: the operator has interrupted NC-program execution in one of the program operating modes 'automatic', 'semi-automatic' or 'execute in manual mode' the operator has left the contour by jogging axes in the 'manual' mode the operator has not yet pressed Control-Reset. In all other situations the NC ignores these gateway signals.	
<b>Meaning</b>	PxxC.REPOS = '0':	Do not activate repositioning
	PxxC.REPOS = '1':	Perform repositioning
	PxxC.RESTA = '0':	Do not activate NC-block restart
	PxxC.RESTA = '1':	Perform NC-block restart

---

**instruction:**

- As soon as the SPS resets the control signals PxxC.REPOS or PxxC.RESTA, the NC stops repositioning or NC-block restart in the manual mode after the current motion has been completed. From this point on, the NC traverses the axes in jog mode. Thus, it is now possible to travel beyond the end position.
  - In the program operating modes it is important to be certain that the SPS does not cancel the control signals PxxC.REPOS or PxxC.RESTA too soon during execution of the REPOS subroutine, since executing a G77 command when PxxC.REPOS or PxxC.RESTA are not active will result in an NC-program interruption and an error message.
- 

<b>Recommendation</b>	The SPS generally should allow the control signals PxxC.REPOS and PxxC.RESTA to remain active after activation of repositioning or NC-block restart (including the associated screen) until the NC removes the gateway status signal PxxS.REPOS 'Reposition.Restart allowed' or until the operator terminates repositioning for the NC-block restart.
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### 7.2 Status Signal 'Reposition.Restart allowed'

<b>Name</b>	PxxS.REPOS (REPOSitioning or restart allowed)
<b>Purpose</b>	Each time NC-program processing is interrupted, the NC sets the status signal PxxS.REPOS. This indicates to the SPS that repositioning or NC-block restart can be performed.
<b>Evaluation</b>	The NC sets the status signal PxxS.REPOS each time the program is interrupted and does not reset it until program execution is resumed or until the program is terminated by a Control-Reset.
<b>Meaning</b>	PxxS.REPOS = '0': Repositioning/NC-block restart not allowed PxxS.REPOS = '1': Repositioning/NC-block restart allowed

### 7.3 Status Signal ‘Conditions Restored’

<b>Name</b>	PxxS.CREST (Conditions RESTored)
<b>Purpose</b>	<p>By setting the status signal PxxS.CREST, the NC signals to the SPS that all axes which are involved in the repositioning or NC-block restart have assumed the condition which they had prior to the interruption. The NC considers the following to be relevant axes, whose status must be restored upon repositioning or NC-block restart:</p> <ul style="list-style-type: none"> <li>• all spindles</li> <li>• all rotary (C-)axis capable main spindles and combined spindle/turret axes if they were in spindle mode prior to the interruption</li> <li>• all feed axes (axis meanings X, Y, Z, U, V, W, A, B, C) whose axis parameter Cxx.086 ‘Window for Repositioning and NC-block restart’ is not equal to ‘0’ and</li> <li>• the if ‘yes’ was entered in process parameter Bxx.045 ‘Reposition Tool Storage Axis’ of NC- or SPS-controlled tool storage axis</li> <li>• The machine builder can use the group signal PxxS.CREST ‘Conditions restored’, for example, to ensure that all relevant axes are adjusted when manual mode is used.</li> </ul>
<b>Evaluation</b>	The NC only updates the status signal during repositioning or during NC-block restart if the corresponding control signals PxxC.REPOS or PxxC.RESTA are set to ‘1’.
<b>Meaning</b>	<p>PxxS.CREST = ‘0’: The status prior to the interruption has not yet been reestablished.</p> <p>PxxS.CREST = ‘1’: The status prior to the interruption is restored for all relevant axes</p>

**instruction:**

- Axes which are not adjusted or are not completely adjusted are not updated by the NC until the NC-program begins to execute again if new command values are output for the respective axes.
- The NC resets the status signal PxxS.CREST when the SPS withdraws the control signal PxxC.REPOS or PxxC.RESTA or when the operator subsequently once again withdraws an axis from the contour.

### 7.4 Gateway Signal Interactions

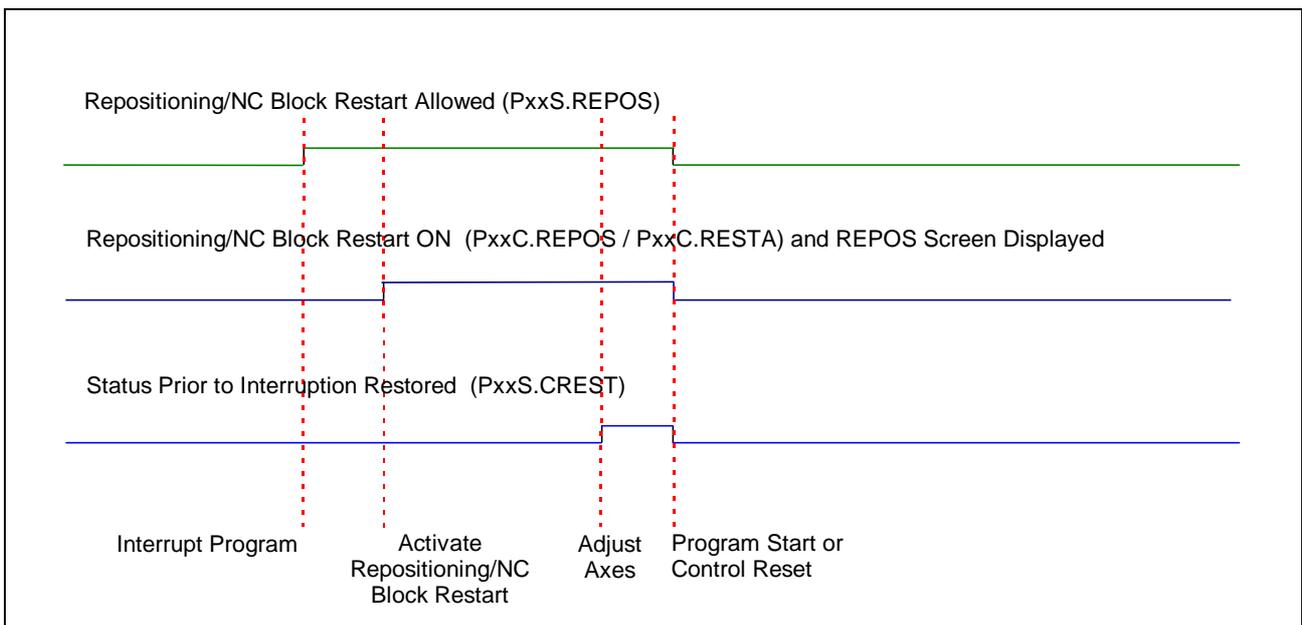


Figure 7-1: Gateway signal interaction for repositioning and NC-block restart.

Each time NC-program processing is interrupted, the NC sets the gateway signal 'repositioning / NC-block restart allowed' (PxxS.REPOS = '1').

After jogging is completed, the operator calls the function 'repositioning' or 'NC-block restart' by pressing the respective Machine Keys. The SPS then sets the Gateway control signals 'repositioning' (PxxC.REPOS = '1') or 'NC-block restart' (PxxC.RESTA = '1'). As soon as the operator has finished adjusting all axes, the NC reports this fact by setting the gateway status signal 'conditions restored' (PxxS.CREST = '1'). The NC resets these signal when the SPS withdraws the control signal 'repositioning' (PxxC.REPOS = '0') or 'restart' (PxxC.RESTA = '0') or the operator once again withdraws an axis from the contour.

The NC resets the signal 'repositioning / NC-block restart allowed' (PxxS.REPOS = '0') as soon as it resumes NC-program execution or the SPS issues a Control-Reset.

---

**instruction:** It is important to be certain that the SPS does not prematurely remove the control signal 'repositioning' PxxC.REPOS or 'NC-block restart' PxxC.RESTA while the REPOS subroutine is still executing. The SPS should not remove repositioning or NC-block restart until the status signal 'PxxS.REPOS' has a state '0'.

---

# 8 Example

In this example the functions 'repositioning' and 'NC-block restart' are to be implemented for a lathe having axes 'S1/C' (rotary (C-)axis capable main spindle), 'S2' (tool spindle), 'X' and 'Z' as well as an SPS controlled tool turret.

## 8.1 Configure Machine Keys

1) Call the function 'repositioning' or 'NC-block restart'

Both functions are to be called in manual mode by pressing a Machine Key (in the example: level 03). To accomplish this, place the necessary symbols and texts on the appropriate Machine Keys and enter the SPS Identifiers (in the example: 'mREPOS' and 'mRESTA') in the lines assigned to the Machine Keys. In addition to the SPS Identifiers, the level called when pressing the key, the function number 55 (REPOS function) and the name of the submodule must be entered (see also Graphical User Interface Setup Manual, 109-xxxx-xxxx-00 /EN xx.95).

The same level that is called when pressing the Machine Keys can be used for both functions, provided that the same functions have to be available to the operator during repositioning and NC-block restart.

Machine Key	SPS Identifier	Level	Function
MFK_HOME	MFK_HOME	03	00
MFK_JG08	MFK_JG08	03	00
MFK_JT09	MFK_JT09	4	00
		03	00
		03	00
mREPOS	mREPOS	09	55
mRESTA	mRESTA	09	55
		03	00

← Call Repositioning

← Call NC-block restart

Figure 8-1: Enter 'repositioning' and 'NC-block restart' calls in Machine Key table.

2) Call the functions 'spindle adjustment' and 'terminate'

For each spindle present in the selected level to be called (level 09 in the example, see the following figure), the corresponding spindle adjustment function, a termination function and, in some case, additional functions such as 'coolant on' must be activated. To accomplish this, determine the appropriate symbols and texts for the respective Machine Keys and enter the necessary data in the lines assigned to the Machine Keys in the Identifier setup table.

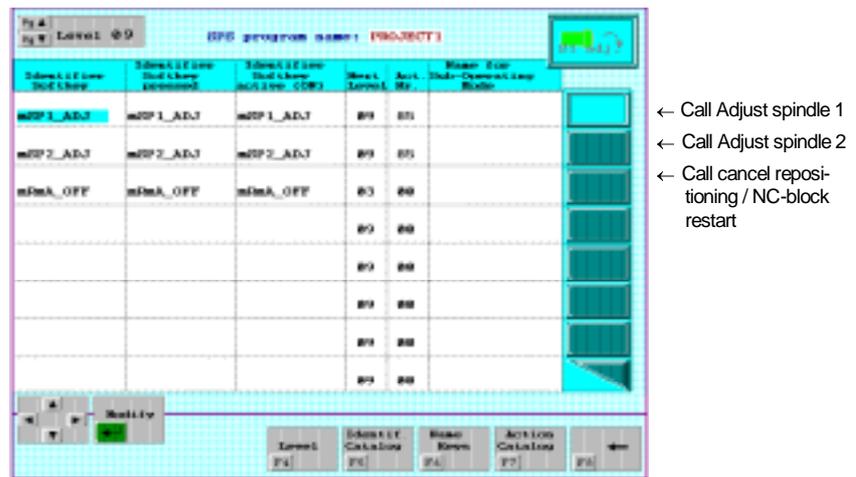


Figure 8-2: Enter 'adjust spindle 1/2' and 'cancel repos/restart' calls in Mach.Key table.

3) Special Characteristics of the 'Adjust Spindle' Function

When the Machine Keys 'adjust spindle' are pressed, the Graphical User Interface sets the Identifiers which were assigned in column 1 of the Machine Key table (in the example: 'mSP1\_ABGL' or 'mSP2\_ABGL'). In addition, depending on the command M-function it sets the corresponding auxiliary flags 'mAxxCM3,' 'mAxxCM4,' 'mAxxCM5' or 'mAxxCM19' for approximately 400 ms. These flags are to be assigned to the corresponding gateway control signals of the spindle whose axis number is 'xx' (see SPS program below). Be certain that the Identifiers (names) of these auxiliary flags cannot be changed.

## 8.2 SPS Program

### Activating and Deactivating the 'Repositioning' and 'NC-block Restart' Functions

```

1 | (*Repositioning and NC-block restart permitted*)
2 | P00S.REPOS mRaR_OFF                                     mRaR_OK
   |-----|-----|-----|-----|-----|-----|-----|-----|-----|
   | P00S.REPOS..... Repositioning/NC-block restart possible  BOOL
   | mRaR_OFF..... Repositioning/NC-block restart off.....  BOOL
   | mRaR_OK..... Enable for repos./NC-block restart ....  BOOL

3 | (*REPOSITIONING*)
4 | mREPOS      mRaR_OK      mRESTA                               P00C.REPOS
   |-----|-----|-----|-----|-----|-----|-----|-----|-----|
   | P00C.REPOS
   |-----|-----|-----|-----|-----|-----|-----|-----|-----|
   | mREPOS..... REPOSITIONING.....  BOOL
   | mRaR_OK..... Enable for repos./NC-block restart ..  BOOL
   | mRESTA..... NC-BLOCK RESTART.....  BOOL
   | P00C.REPOS..... Repositioning.....  BOOL
   | P00C.REPOS..... Repositioning.....  BOOL

5 | (*NC-BLOCK RESTART*)
6 | mRESTA      mRaR_OK      mREPOS                               P00C.RESTA
   |-----|-----|-----|-----|-----|-----|-----|-----|-----|
   | P00C.RESTA
   |-----|-----|-----|-----|-----|-----|-----|-----|-----|
   | mRESTA..... NC-BLOCK RESTART.....  BOOL
   | mRaR_OK..... Enable for repos./NC-block restart ....  BOOL
   | mREPOS..... REPOSITIONING.....  BOOL
   | P00C.RESTA..... NC-block restart.....  BOOL
   | P00C.RESTA..... NC-block restart.....  BOOL
    
```





## 8.3 REPOS NC-subroutine

```

; Adjust tool turret
;
N0001  .REPOS
        BES .NO_MTP 29                ;Tool drive connected ?
N0002  MTP                            ;Adjust tool turret
;
; Adjust spindles
;
N0003  .NO_MTP
        BES .ROTMOD 30                ;S1/C in rotary axis mode ?
N0004  G77 S1=0                        ;Adjust S1
N0005  G77 S2=0                        ;Adjust S2
;
; Adjust feed axes
;
N0006  .REPOSW
        @100=M(5)                    ;Coolant on ?
N0007  M=@100 MRY                    ;If necessary, turn on coolant and wait for tool
                                        turret
N0008  @100=G(2)-17 BEQ .REP_17        ;G17 active ?
N0009  G77 Z0 F2000                  ;G18 or G19 is active, adjust axis Z
N0010  G77 X0 F2000 RTS              ;Adjust axis X
;
N0011  .REP_17
        G77 X0 F2000                  ;G17 is active
                                        ;Adjust axis X
N0012  G77 Z0 F2000 RTS              ;Adjust axis Z
;
N0013  .ROTMOD
        @100=G(17)-31 BEQ .TRANSF     ;S1/C in rotary axis mode
                                        ;Coord. transformation active ?
N0014  G77 C0 F5000 S2=0 BRA .REPOSW ;Adjust C axis and S2
;
N0015  .TRANSF
        @100=M(5)                    ;Coord. transformation is active
                                        ;Coolant on ?
N0016  M=@100 MRY                    ;If necessary, turn on coolant and wait for tool
                                        turret
N0017  G77 X1=0 Y1=0 F5000          ;Adjust axis X1 and axis Y1
N0018  G77 Z0 F2000 RTS              ;Adjust axis Z

```

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