

siemens

SINUMERIK 810/820
SINUMERIK 850/880
Measuring Cycles, Version 10

Installation Guide

09.92 Edition



SINUMERIK 810 SINUMERIK 820 Measuring Cycles

Service Documentation

Installation Guide

Software version: see page 1-1

January 1990 Edition

**SINUMERIK 850
SINUMERIK 880**

Measuring Cycles

Difference Description

Installation Guide

Service Documentation

Supplement February 1990

Introduction

Notes for the reader

This documentation for the SINUMERIK 850/880 supplements the Measuring Cycles Installation Guide SINUMERIK 810/820, Order No. 6ZB5 410-0CU02-0BA0.

Both these documentations on the SINUMERIK 810/820 and the SINUMERIK 850/880 together make up the complete Installation Guide for the SINUMERIK 850/880 Measuring Cycles.

Alter the following pages, please:

Section	Page	Replace	Insert
1	1		X
2	2-1		X
3	3-1		X
4	4-5		X
4	4-6		X
4	4-14		X
4	4-15		X
5	5-1		X
7	7-1		X
7	7-2		X

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SINUMERIK 810/820
SINUMERIK 850/880
Measuring Cycles, Version 10

Installation Guide

09.92 Edition

Supplement/Correction

Order No.: 6ZB5410-0CU02-0AN0

These sheets constitute a **supplement/correction** to the edition

SINUMERIK 810/820
SINUMERIK 850/880
Measuring cycles, version 10
Installation Guide

01.90 Edition **Order No.: 6ZB5 410-0CU02-0BA0 and**
02.90 Edition **Order No.: 6ZB5 410-0CU02-0BN1**

Please replace the following pages in Sections 4, 5 and 7:

Page	Replace
4-13/4-14	X
4-21	X
5-1/5-2	X
7-1/7-2	X

Printing history

Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the "Remarks" column.

Status code in "Remarks" column:

A . . . New documentation **B** . . . Unrevised reprint with new Order No.
C . . . Revised edition with new status

Edition	Order No.	Remarks
01.90	6ZB5 410-0CU02-0BA0	A

Other functions not described in this documentation might be executable in the control. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

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1 General Requirements

Option: B 78

NC software version: The following software versions are the precondition for being able to use the measuring cycles:

SINUMERIK System 810 GA 1 starting with SW02
SINUMERIK System 810 GA 2 starting with SW01
SINUMERIK System 810 GA 3 starting with SW01
SINUMERIK System 820 GA 2 starting with SW01
SINUMERIK System 820 GA 3 starting with SW01

Required memory capacity: The measuring cycles are supplied on a diskette (Format PG675) and must be read into the part program memory or included in the UMS.

Required memory capacity for full utilisation:

T version (package 3) approx. 21 000 characters
T version (package 3.1) approx. 5 200 characters
(parts of package 3 required)

M version (package 4) approx. 31 000 characters

PLC program: No PLC program is required for the measuring cycle function. The measuring function is activated in the cycles by the @ 720 ... command.

Axis arrangement: For correct operation of the measuring cycles the machine axes must be arranged as specified in DIN 66217.

1 General Requirements

Option: B 78

NC software version: The following software versions are the precondition for being able to use the measuring cycles:

SINUMERIK 850 from SW02/76
SINUMERIK 880 from SW02/76

Required memory capacity: The measuring cycles are supplied on a diskette (Format PG675) and must be read into the part program memory or included in the UMS.

Required memory capacity for full utilisation:

T version (package 3) approx. 21 000 characters
T version (package 3.1) approx. 5 200 characters
(parts of package 3 required)

M version (package 4) approx. 31 000 characters

2 Jumpering / Connection

The jumperings on the interface module are dependent on the probe/probe interface used.

Module designation: 6FX 1121-2BA
6FX 1121-2BB

Operation type	Edge	Level	Sensor 1			Sensor 2					
			S3.1		S1.1	S2.1	S3.2		S1.2	S2.2	
			N	P			N	P			
open collector relay contact		open (+5 V)									
		closed (0 V)									
TTL (5 V)		+5 V									
		0 V									
24 V		+24 V									
		0 V									

Dip Fix closed

SP 03682.0







Terminal strip X111

1	0	Measuring pulse Ground	Sensor 1 Sensor 1
2	0		
3	0		
4	0	Measuring pulse Ground	Sensor 2 Sensor 2
5	0		
6	0		

2 Jumpering / Connection

The jumperings on the interface module are dependent on the probe/probe interface used.

Module designation: SINUMERIK 850 SINUMERIK 880
 6FX 1121-8BA 6FX 1124-0BA
 6FX 1121-8BC

Operation type	Edge	Level	Sensor 1				Sensor 2			
			S1.1	S1.2	S2.1	S2.2	S1.3	S1.4	S3.1	S3.2
open collector relay contact		open (+5 V)								
		closed (0 V)								
TTL (5 V)		+5 V								
		0 V								
24 V		+24 V								
		0 V								

Dip Fix closed

SP 03682.0

Terminal strip X111

1	0	Measuring pulse Ground	Sensor 1 Sensor 1
2	0		
3	0		
4	0	Measuring pulse Ground	Sensor 2 Sensor 2
5	0		
6	0		

3 Functional Test

3.1 Service display

The measuring signal can be checked via the diagnostics menu "PLC status".

		System 810 GA1	System 810 GA2,GA3 820 GA2,GA3
		Status display	Status display
Probe deflected	1	IB 24.5	FY 24.7
Probe deflected	2	IB 24.6	FY 24.6

3.2 Test program

The measuring function can be tested with the following example of a test program without using the measuring cycle subroutines. Moreover, the scatter (repeat accuracy) of the entire measuring system (machines-probes-signal transfer to the NC) can be determined with the aid of the program. In other words, those measuring errors can be ascertained which are not subject to a trend.

```
%MPF 1
N5  G00 G94 Z ... F150      / Preposition to approx. 1 mm before measuring position
N10 G01 @720 R1 K1 Z ...   / Approach to probe, command value approx. 1 mm
                             behind measuring position
N15 @714                   / Empty buffer memory
N20 R0=R1                   / Reload actual value of measuring position into parameter R0
N25 G04 F2                  / Note down value of parameter R0
N30 @100 K-5                / Return to N5
N35 M30
```

3 Functional Test

3.1 Service display

The measuring signal can be checked via the diagnostics menu "PLC status".

	SINUMERIK 810 GA1	SINUMERIK 810 GA2, GA3 810 GA2, GA3	SINUMERIK 850 SINUMERIK 880
	Status display	Status display	Status display
Probe 1 deflected	IB 24.5	FY 24.6	FY 24.7
Probe 2 deflected	IB 24.6	FY 24.7	FY 24.6

3.2 Test program

The measuring function can be tested with the following example of a test program without using the measuring cycle subroutines. Moreover, the scatter (repeat accuracy) of the entire measuring system (machines-probes-signal transfer to the NC) can be determined with the aid of the program. In other words, those measuring errors can be ascertained which are not subject to a trend.

```
%MPF 1
N5 G00 G94 Z... F150 / Preposition to approx. 1 mm before measuring position
N10 G01 @720 R1 K1 Z... / Approach to probe, command value approx. 1 mm
                          behind measuring position
N15 @714 / Empty buffer memory
N20 R0=R1 / Reload actual value of measuring position into parameter R0
N25 G04 F2 / Note down value of parameter R0
N30 @100 K-5 / Return to N5
N35 M30
```

4 Machine Data for Measuring Cycles (MDC)

The machine data for measuring cycles (MDC) are stored in the R parameter memory R158 to R199.

Moreover, the measuring cycles use the R parameters R110 to R133 as imperial value memory (EV memory) and the area 134 to 157 for storing the mean values (MV).

Hence, when using the measuring cycles the R parameter range from **RZ 110 to R199** is not available for other applications.

Note: The R parameters 110 to 199 (machine data for measuring cycles) are not protected. They can be changed by programming or by manual data input! This leads to the risk of collision for the probe.

The manual data input can either be locked or enabled for 2 part areas of the memory. The areas are determined with the NC machine data MD14 to MD17.

MD No.	14	Machine data	for cycles starting with	R parameter
MD No.	15	Machine data	for cycles up to	R parameter
MD No.	16	Machine data	for cycles starting with	R parameter
MD No.	17	Machine data	for cycles up to	R parameter

The machine data for cycles can be interlocked via the password and the setting data for cycles via the keyswitch.

Input, therefore, is only possible under defined preconditions:

Password	NC - MD 5005 bit 3	Keyswitch	Input possible
On	0	X	in the area MD 14 to MD 15
Off	0	X	in the area MD 16 to MD 17
Off	1	On	in the area MD 16 to MD 17
Off	1	Off	Input not possible

Example for the definition of areas (MD/SD cycles):

MD 14 = 100	Machine data (Input via password)	R100
		R109
MD 16 = 110	Setting data (Input via keyswitch)	R110
MD 17 = 133		R133
	Machine data (Input via password)	R134
MD 15 = 199		R199

MD5005 = XXXX1XXX

Note:

If measurements are made in different channels, the values of the R parameters 110 to 199 (machine data for measuring cycles) must be entered in the relevant global R parameters (several times, if necessary).

T measuring cycles (package 3) and M measuring cycles (package 4) can never be used together, since the MDC in the two packages have different meanings (see lists in Section 7).

4.1 MDC Turning machines

Cycle machine data			
R158	Tool change position X axis for tool measurement		
	Input limits	Increment	Units
	0 Rmax	0.001	mm

Used by measuring cycle: L971

Cycle machine data			
R159	Tool change position Z axis for tool measurement		
	Input limits	Increment	Units
	0 Rmax	0.001	mm

Used by measuring cycle: L971

Parameters R158 and R159 are used to determine a tool change position at which all tools that can possibly be used on the machine can be changed at the tool probe without collision (Fig. 4.1).

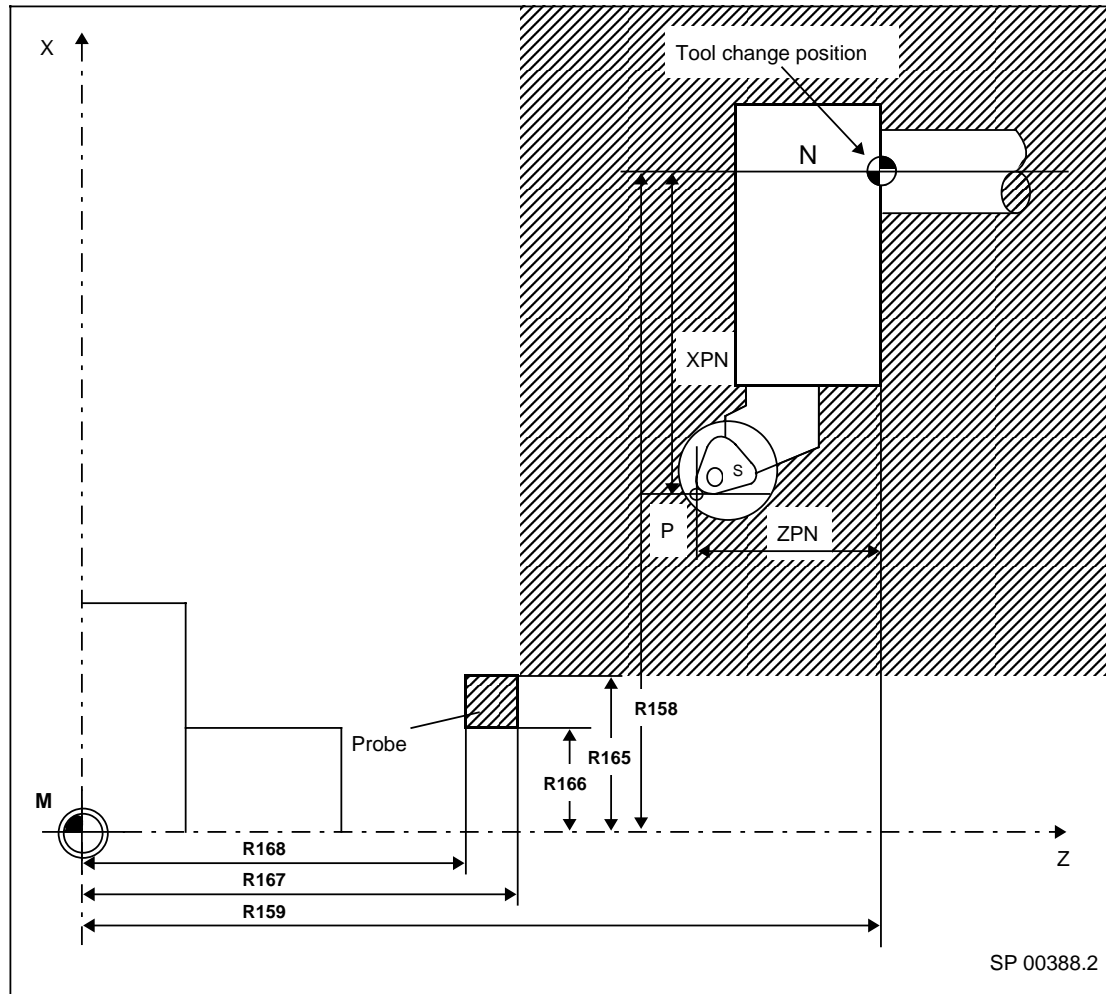


Fig. 4.1 Tool change position

The tool point P is only allowed to be situated in the shaded area.

Cycle machine data			
R160	M function for unlocking with of M19		
	Input limits	Increment	Units
	1 99	1	–

Used by measuring cycle: L974

When using the measuring versions "single point measurement with reversal" and "multi point measurement at the circumference", the workpiece (spindle) is turned through the cycle via the M19 function. Considering the fact that some machine manufacturers initiate indexing after M19, this indexing must be cancelled before a new M19.

This M function is therefore output in the measuring cycle before each M19.

If indexing is not provided on the machine, a non interfering value (e.g. 09 M09 coolant off) should be entered in the MDC, since the value "0" would cause programmed stop (M00).

Cycle machine data			
R161	M function (L967: Triggering for FB50)		
	Input limits	Increment	Units
	1 99	1	–

Used by measuring cycle: L974 (810 GA2, GA3 and 820 GA2, GA3 only)**Effect of the M function in the PLC (FB50):**

- R98 and R99 read
- R98 = 1 transfer value 1 to R79 (TO area)
 transfer D No. of tool (R99) to R80
- = 2 lock tool (R99)
 (is set in L899, if the alarm "permissible dimensional
 difference exceeded" is output).

R99 = Tool number (T number)

Cycle machine data			
R160	M function for unlocking with M19		
	Input limits	Increment	Units
	1 99	1	–

Used by measuring cycle: L974

When using the measuring versions "single point measurement with reversal" and "multi point measurement at the circumference", the workpiece (spindle) is turned through the cycle via the M19 function. Considering the fact that some machine manufacturers initiate indexing after M19, this indexing must be cancelled before a new M19.

This M function is therefore output in the measuring cycle before each M19.

If indexing is not provided on the machine, a non interfering value (e.g. 09 M09 coolant off) should be entered in the MDC, since the value "0" would cause programmed stop (M00).

Cycle machine data			
R161	M function (L967: Triggering for FB116)		
	Input limits	Increment	Units
	1 99	1	–

Used by measuring cycle: L974 (only SINUMERIK 850)

Effect of the M function in the PLC (FB116):

- R98 and R99 read
- R98 = 1 transfer value 1 to R79 (TO area)
 transfer D No. of tool (R99) to R80
- = 2 lock tool (R99)
 (is set in L899, if the alarm "permissible dimensional
 difference exceeded" is output).

R99 = Tool number (T number)

PLC program (FB50):

```
      :  
      : C   DB10  
      : L   DL28  
      : T   FY170  
      :  
      :  
      :  
      :  
      : JU   FB50  
NAME  : WZAUS : ME  
DBEP  :      DB 100 (DB No. for data transfer to R98 and R99)  
R-KE  :      KF+98 (Fixed identifiers in parameters R98 and R99)  
R-TO  :      KF + 79 (Fixed TO area No. in R parameter R79!  
      :      Fixed D number in parameter R80)  
M-ST  :      F 170.5 (M85)  
NSBY  :      DR22 (Interface byte in DB36)  
WF    :      F 162.1 (Output signal: tool missing)  
      :  
      :      BE
```

PLC program (FB116):

```
      :  
      : C   DB10  
      : L   DL28  
      : T   FY170  
      :  
      : L   KB1      (1st magazine)  
      : T   FY100  
      :  
      :  
      : JU   FB116  
NAME : WZAUS : ME  
MANR :   FY100      (Entry of the magazine number)  
DBRP :   DB 100     (DB No. for data transfer to R98 and R99)  
KAN  :   FY100     (Number of the NC channel)  
R-KE :   KF+98     (Identifiers in parameter R98 fixed!)  
R-TO :   KF + 79   (TO area No. in R parameter R79 fixed,  
                  D number in parameter R80 fixed!)  
  
M-ST :   F 170.5   (M85)  
AUSP :   F0.1     (Criterion for disablement)  
IST  :   FY102     (Actual position of the magazine)  
NSBY :   DR22     (Interface byte in the DB36)  
WF   :   F 162.1  (Output signal: tool missing)
```

Cycle machine data			
R162 R163 R164	Deviations calibration tool		
	Input limits	Increment	Units
	0 Rmax	0.001	mm

Used by measuring cycle: L972

See figures 4.3 to 4.6

Cycle machine data			
R165 R166 R167 R168	Tool probe		
	Input limits	Increment	Units
	0 Rmax	0.001	mm

Used by measuring cycle: L971; L972

See figures 4.2 to 4.7

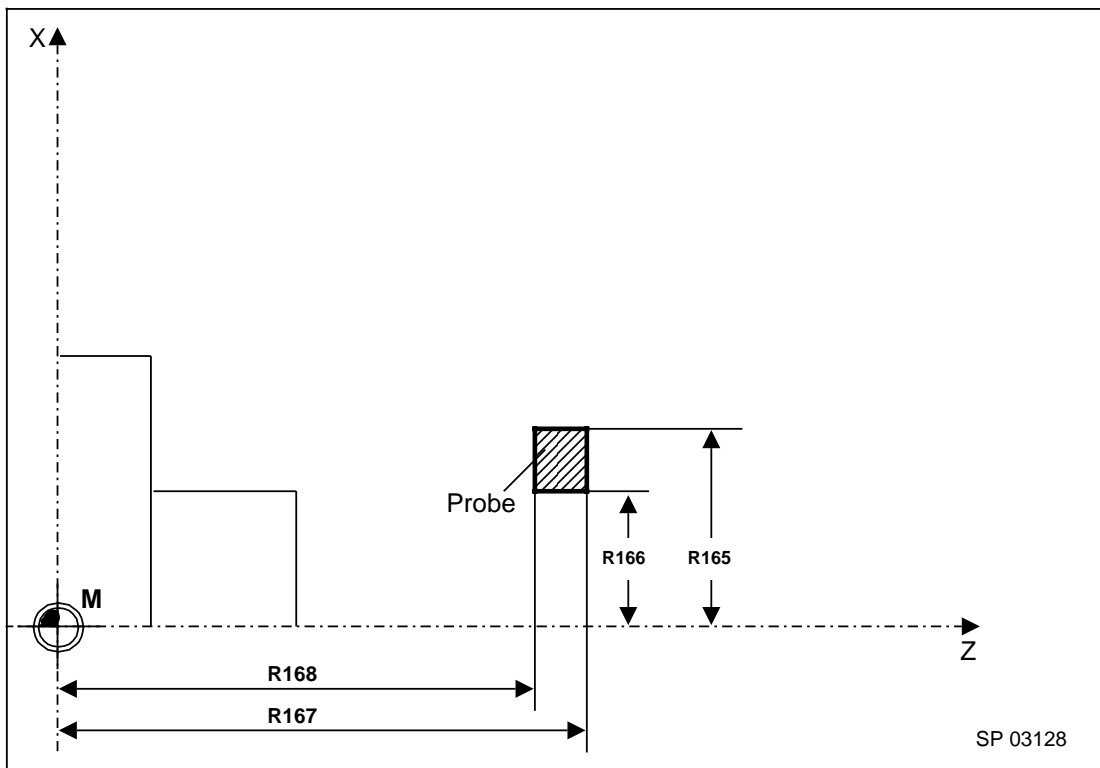


Fig. 4.2 Overview MDC tool measurement

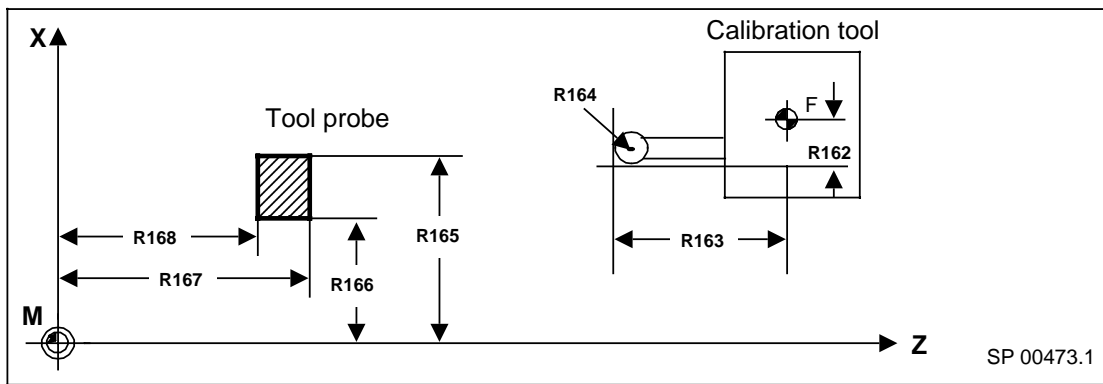


Fig. 4.3 Overview MDC: Tool probe: Calibration tool

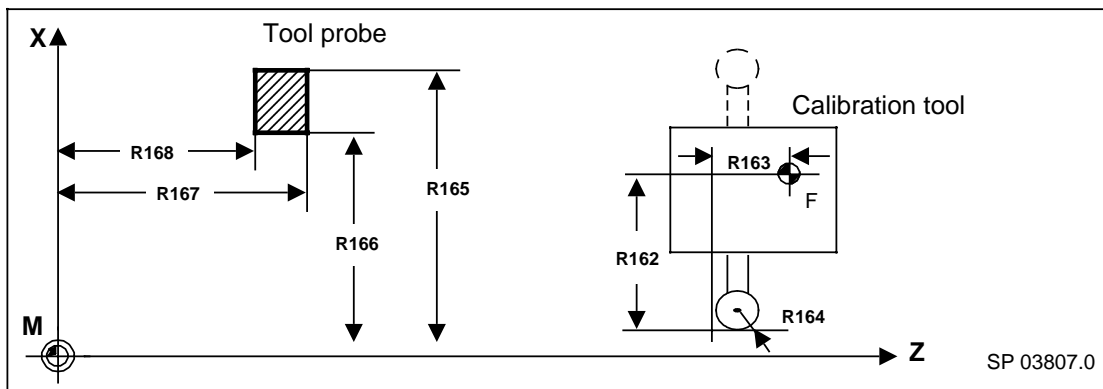


Fig. 4.4 Overview MDC: Tool probe: Calibration tool (X axis mirrored)

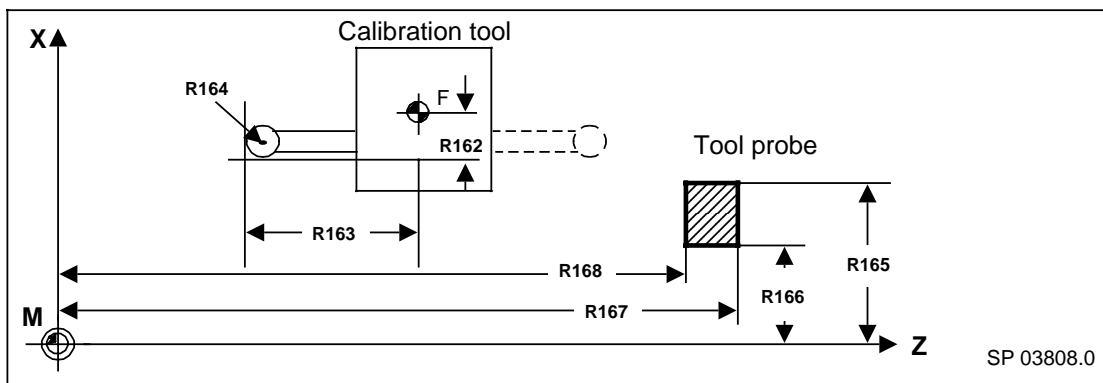


Fig. 4.5 Overview MDC: Tool probe: Calibration tool (Z axis mirrored)

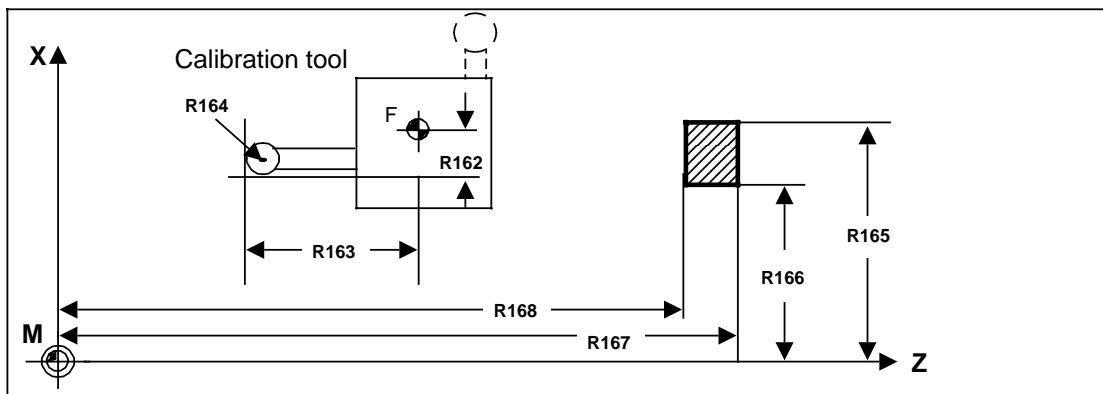


Fig. 4.6 Overview MDC: Tool probe: Calibration tool (X and Z axes mirrored)

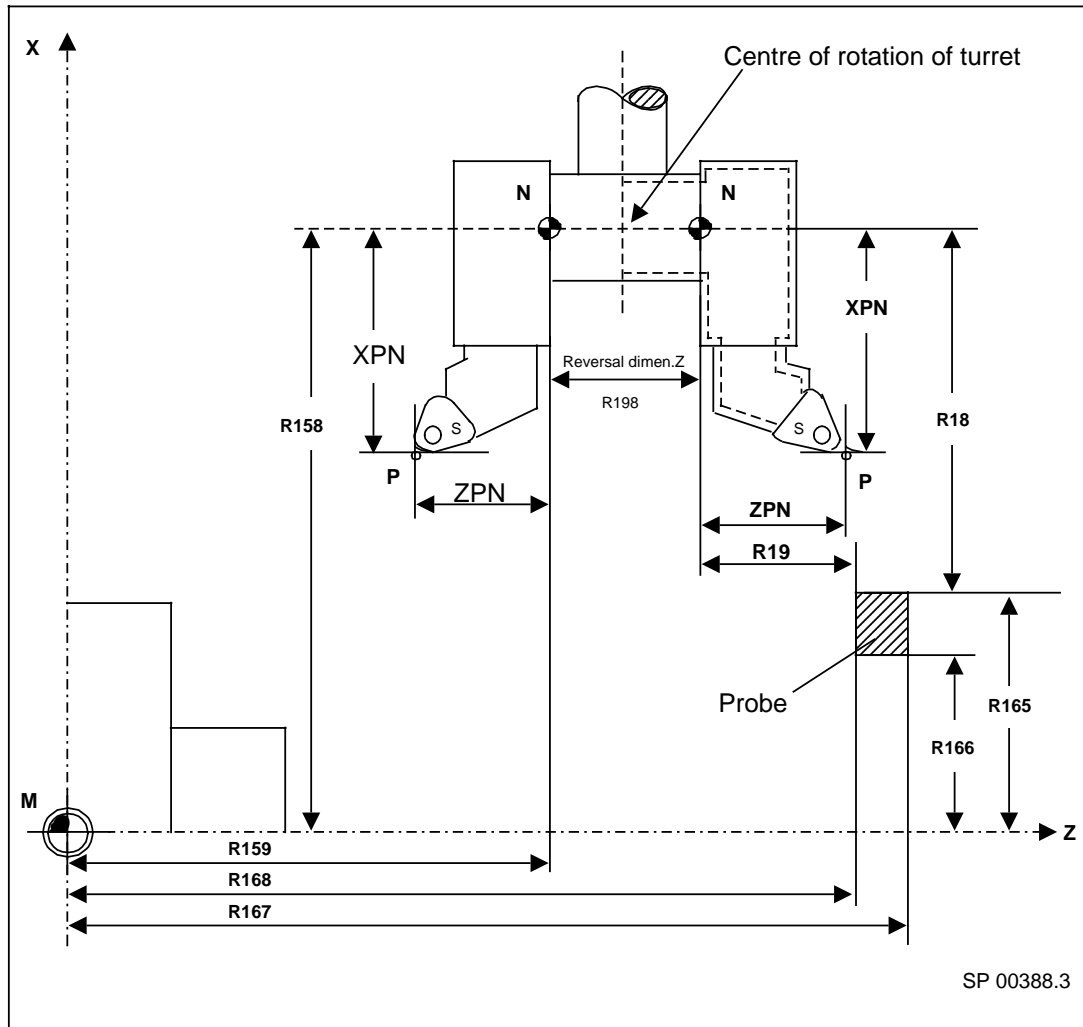


Fig. 4.7 Overview MDC: Tool probe: Calibration tool (Z axis mirrored)

Cycle machine data			
R169 : R196	Dimensions calibration groove (4 groove pairs)		
	Input limits		Increment
	0	Rmax	0.001
		Units	
		mm	

Used by measuring cycle: L973

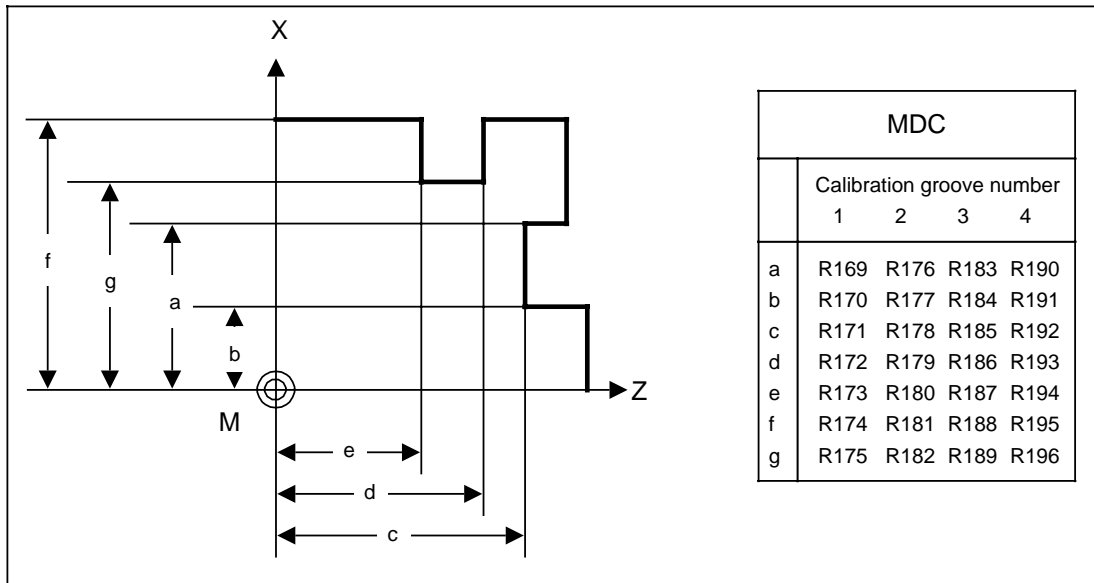


Fig. 4.8 MDC Calibration groove

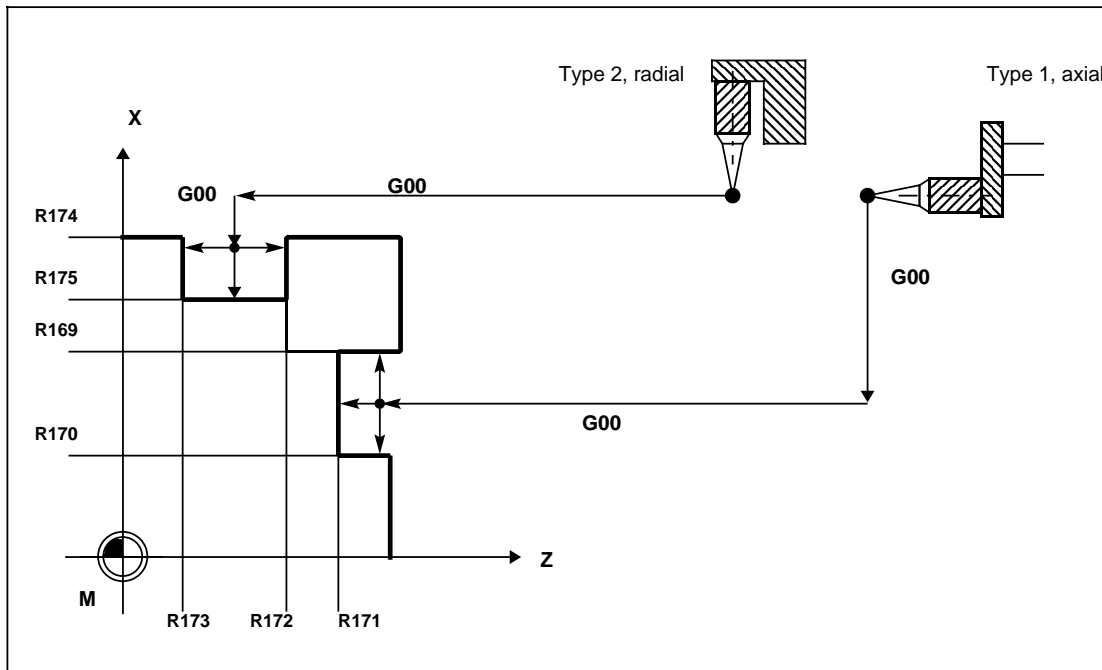


Fig. 4.9 MDC Calibration groove: e.g. calibration groove 1 (R12 = 0)

Cycle machine data			
R197	Reversal dimension in X axis		
	Input limits		Increment
	0	Rmax	0.001
			Units
			mm

Used by measuring cycle: L971, L972 (only if R199/1 = 1)

Cycle machine data			
R198	Reversal dimension in Z axis		
	Input limits		Increment
	0	Rmax	0.001
			Units
			mm

Used by measuring cycle: L971, L972 (only if R199/0 = 1)

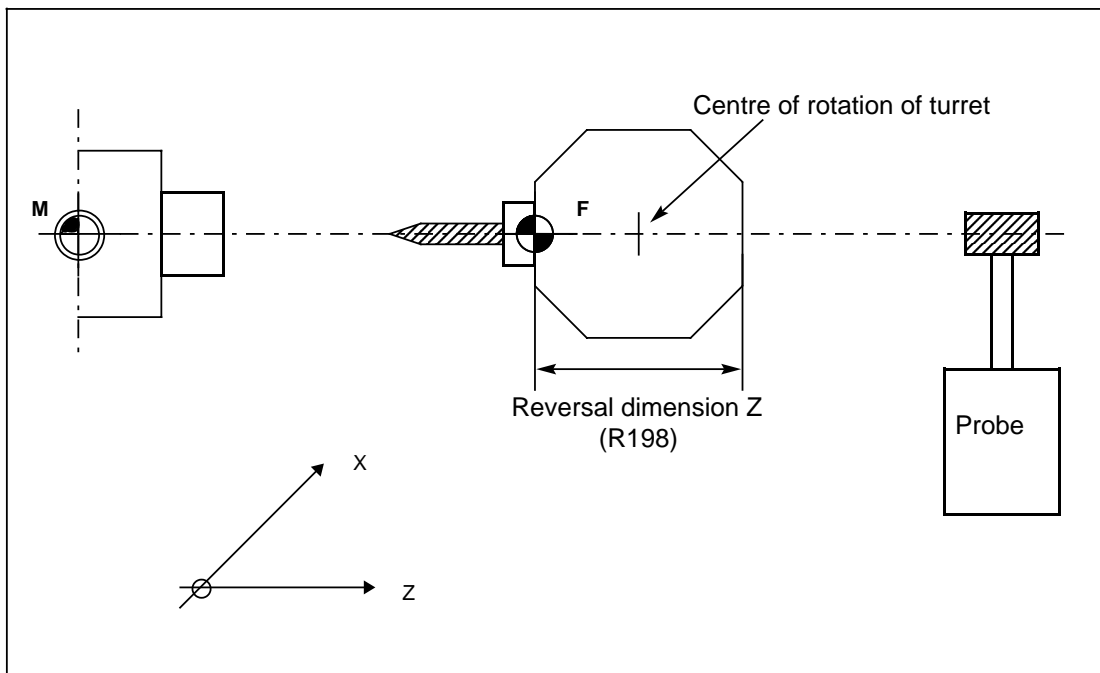


Fig. 4.10 Example: The Z axis must be mirrored for measurement!

	7	6	5	4	3	2	1	0
R199	Measuring input number 2 Workpiece measurement	Tool measurement	0	0	0	0	Mirroring X axis	Mirroring Z axis

Input in bit pattern

Bit 0	0	Z axis not mirrored for tool measurement
	1	Z axis mirrored for tool measurement
Bit 1	0	X axis not mirrored for tool measurement
	1	X axis mirrored for tool measurement
Bit 6	0	Measuring input 1 is activated in the cycle (L971 and L972) for tool measurement.
	1	Measuring input 2 is activated in the cycle (L971 and L972) for tool measurement.
Bit 7	0	Measuring input 1 is activated in the cycle (L973 and L974) for workpiece measurement.
	1	Measuring input 2 is activated in the cycle (L973 and L974) for workpiece measurement.

4.2 MDC Milling and machining centres

Cycle machine data			
R158	Distance workpiece probe to spindle centre abscissa		
	Input limits		Increment
	0	Rmax	0.001
			Units
			mm

Used by measuring cycle: L976

Cycle machine data			
R159	Distance workpiece probe to spindle centre ordinate		
	Input limits		Increment
	0	Rmax	0.001
			Units
			mm

Used by measuring cycle: L976

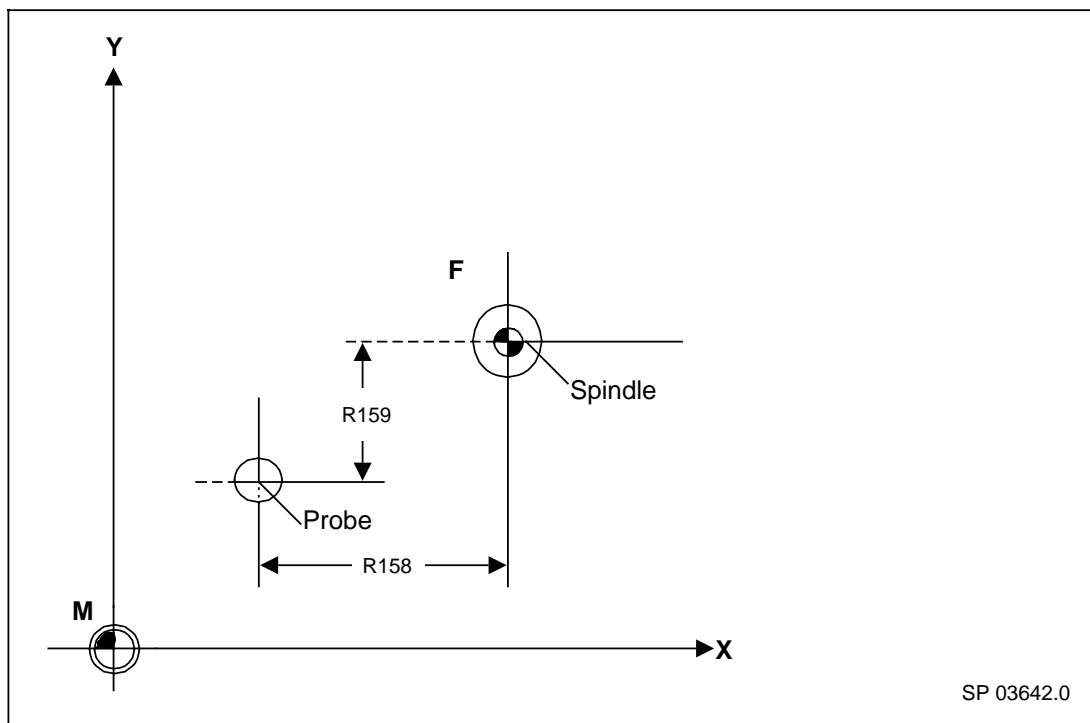


Fig. 4.11 Workpiece probe arranged offset from spindle centre

Cycle machine data			
R160	Reserve		
	Input limits	Increment	Units

Cycle machine data			
R161	M function (L967: Triggering for FB50)		
	Input limits	Increment	Units
	1 99	1	–

Used by measuring cycle: L977, L978, L979
 (810 GA2, GA3 and 820 GA2, GA3 only)

Effect of the M function in the PLC (FB50):

- R98 and R99 read
- R98 = 1 transfer value 1 to R79 (TO area)
 transfer D No. of tool (R99) to R80
- = 2 lock tool (R99)
 (is set in L899, if the alarm "permissible
 dimensional difference exceeded" is output).

R99 = Tool number (T number)

Cycle machine data			
R160	Reserve		
	Input limits	Increment	Units

Cycle machine data			
R161	M function (L967: Triggering for FB116)		
	Input limits	Increment	Units
	1 99	1	–

Used by measuring cycle: L977, L978, L979 (only SINUMERIK 850)

Effect of the M function in the PLC (FB116):

- R98 and R99 read
- R98 = 1 transfer value 1 to R79 (TO area)
 transfer D No. of tool (R99) to R80
- = 2 lock tool (R99)
 (is set in L899, if the alarm "permissible
 dimensional difference exceeded" is output).

R99 = Tool number (T number)

PLC program (FB50):

```

:
: C   DB10
: L   DL28
: T   FY170
:
:
:
: JU   FB50
NAME : WZAUS : ME
DBRP :   DB 100      (DB No. for data transfer to R98 and R99)
R-KE :   KF+98      (Fixed identifiers in parameters R98 and R99)
R-TO :   KF + 79    (Fixed TO area No. in R parameter R79!
                  Fixed D number in parameter R80)
M-ST  :   F 170.5   (M85)
NSBY  :   DR22      (Interface byte in DB36)
WF    :   F 162.1   (Output signal: tool missing)
:
: BE

```

} e.g. M function M85

PLC program (FB116):

```

:
: C   DB10
: L   DL28
: T   FY170
:
: L   KB1      (1st magazine)
: T   FY100
:
:
: JU   FB116
NAME : WZAUS : ME
MANR :   FY100 (Entry of the magazine number)
DBRP :   DB 100 (DB No. for data transfer to R98 and R99)
KAN  :   FY100 (Number of the NC channel)
R-KE :   KF+98 (Identifiers in parameter R98 fixed!)
R-TO :   KF+79 (TO area No. in R parameter R79 fixed,
               D number in parameter R80 fixed!)
M-ST :   F 170.5 (M85)
AUSP :   F0.1 (Criterion for disablement)
IST  :   FY102 (Actual position of the magazine)
NSBY :   DR22 (Interface byte in the DB36)
WF   :   F 162.1 (Output signal: tool missing)

```

Cycle machine data			
R162 : R167	Tool probe		
	Input limits	Increment	Units
	0 Rmax	0.001	mm

Used by measuring cycle: L975

MDC	G17	G18	G19
R162	- X	- Z	- Y
R163	+ X	+ Z	+ Y
R164	- Y	- X	- Z
R165	+ Y	+ X	+ Z
R166	- Z	- Y	- X
R167	+ Z	+ Y	+ X

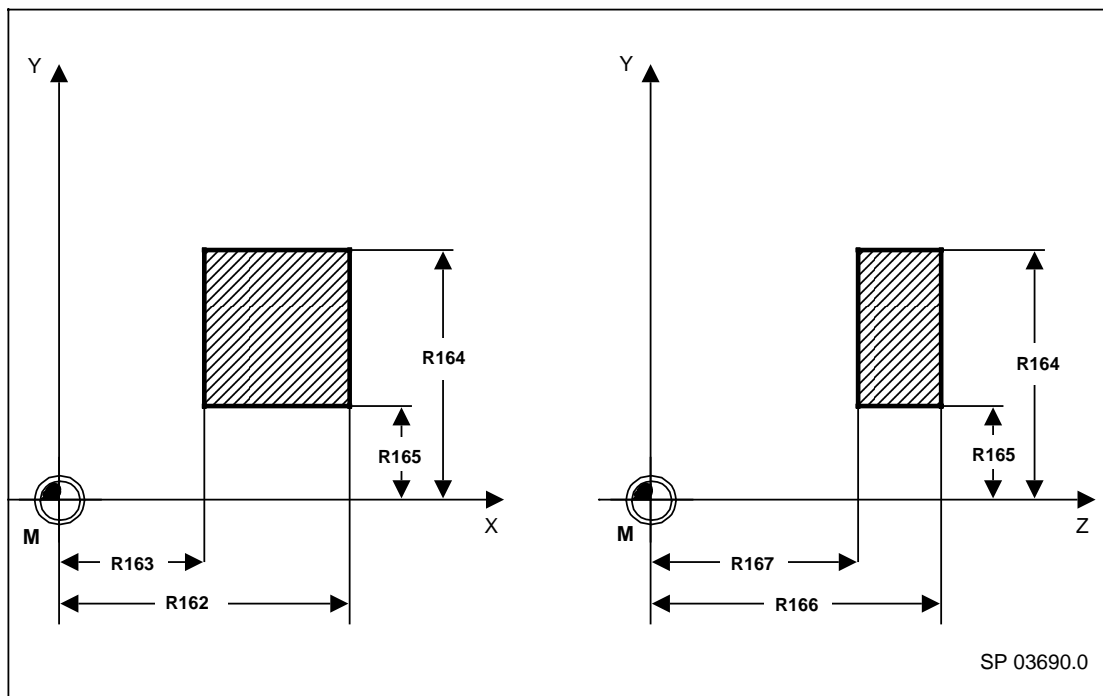


Fig. 4.12 Tool probe

Cycle machine data			
R168	Radius calibration tool		
	Input limits		Increment
	0	Rmax	0.001
			Units
			mm

Used by measuring cycle: L975

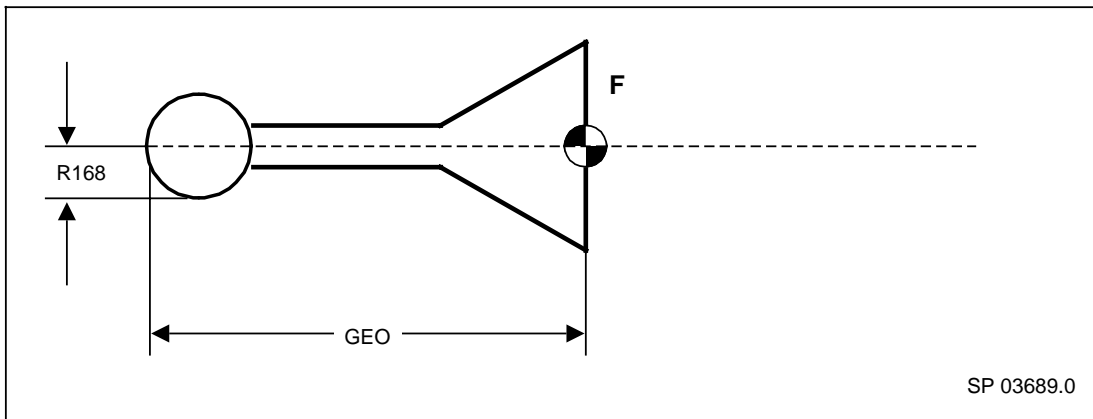


Fig. 4.13 Calibration tool

Cycle machine data			
R169 : R183	Dimensions reference bore (3 holes)		
	Input limits		Increment
	0	Rmax	0.001
		Units	
		mm	

Used by measuring cycle: L976

Reference hole				G17	G18	G19
1	2	3				
R169	R174	R179	Centre point reference hole	X	Z	Y
R170	R175	R180	Centre point reference hole	Y	X	Z
R171	R176	R181	Upper edge of reference hole	+ Z	+ Y	+ X
R172	R177	R182	Lower edge of reference hole	- Z	- Y	- X
R173	R178	R183	Reference hole diameter			

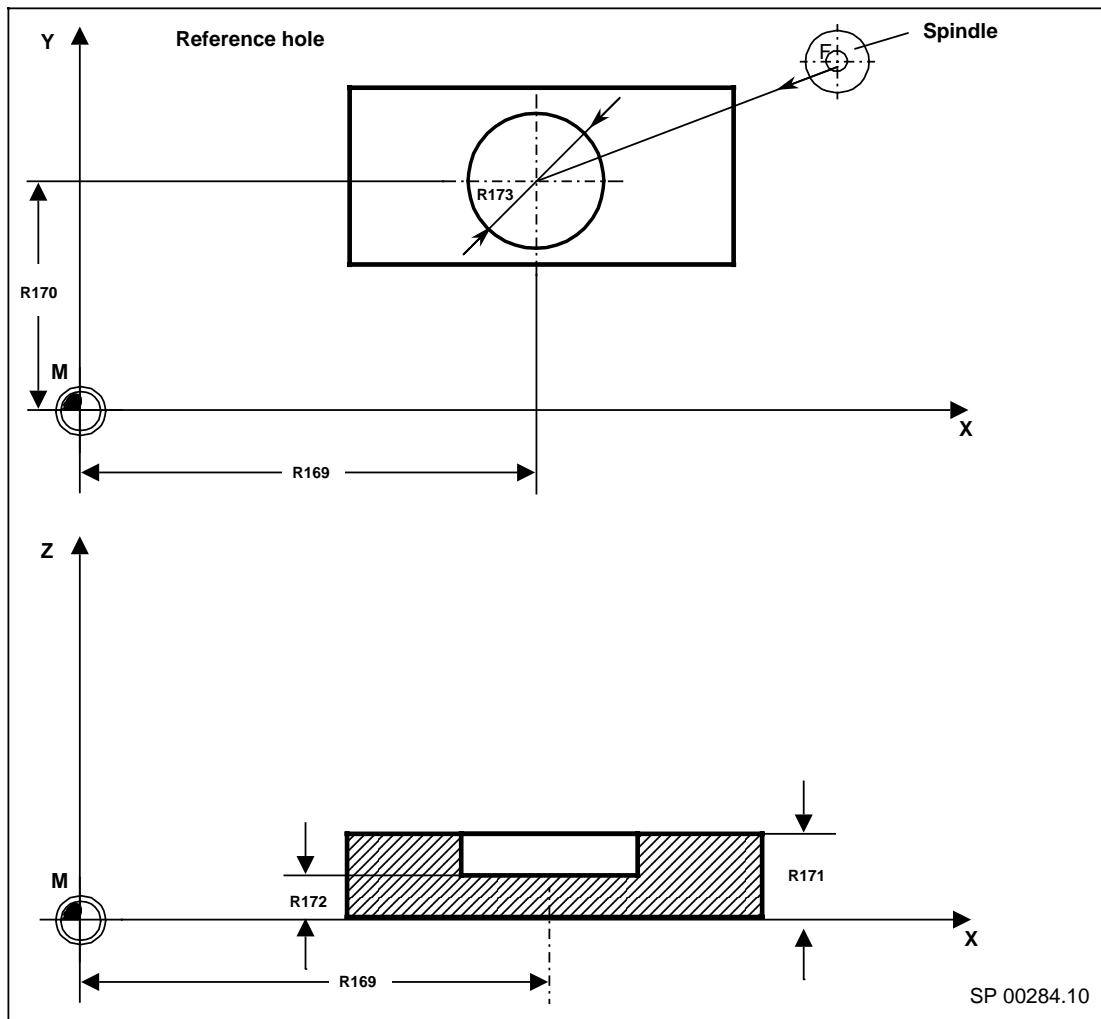


Fig. 4.14 Overview MDC reference hole(e.g. reference hole1)

Cycle machine data			
R184 : R198	Workpiece probe (3 probes)		
	Input limits	Increment	Units
	0 Rmax	0.001	mm

Used by measuring cycle: L976, L977, L978, L979

Workpiece probe				G17	G18	G19
1	2	3				
R184	R189	R194	Probe ball diameter			
R185	R190	R195	Triggering point	- X	- Z	- Y
R186	R191	R196	Triggering point	+ X	+ Z	+ Y
R187	R192	R197	Triggering point	- Y	- X	- Z
R188	R193	R198	Triggering point	+ Y	+ X	+ Z

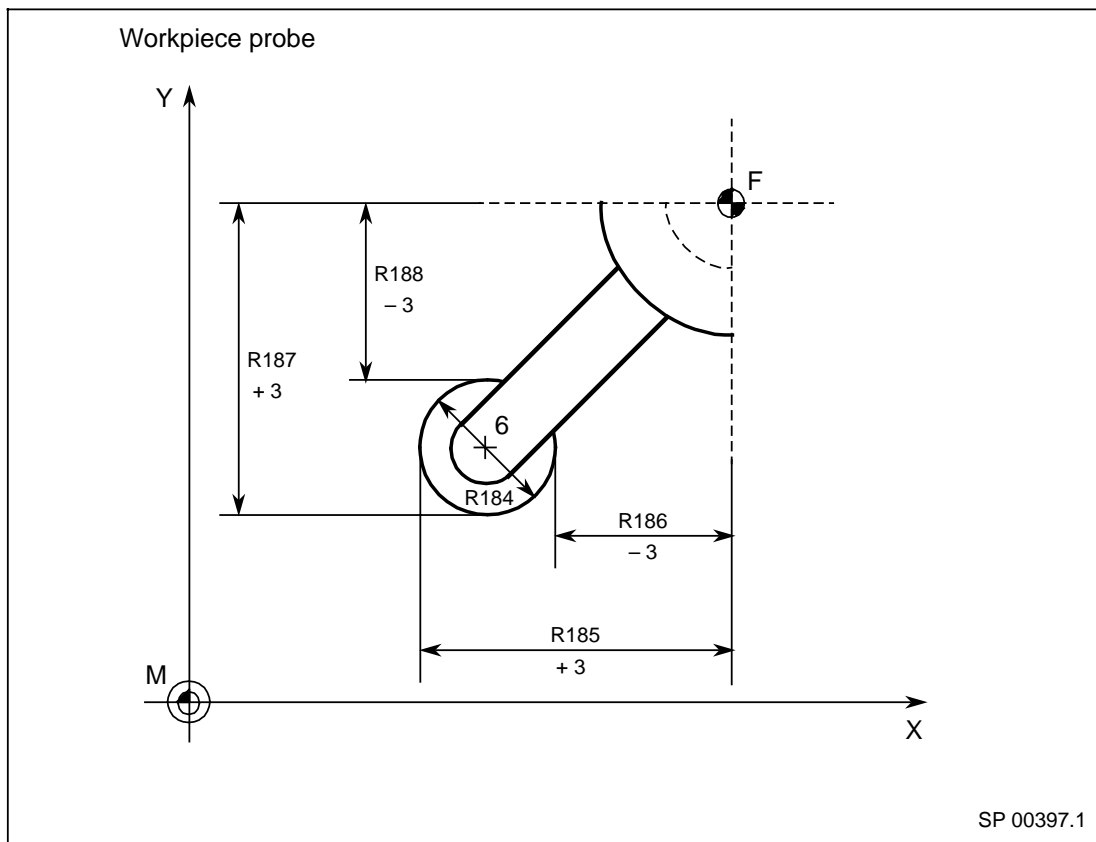


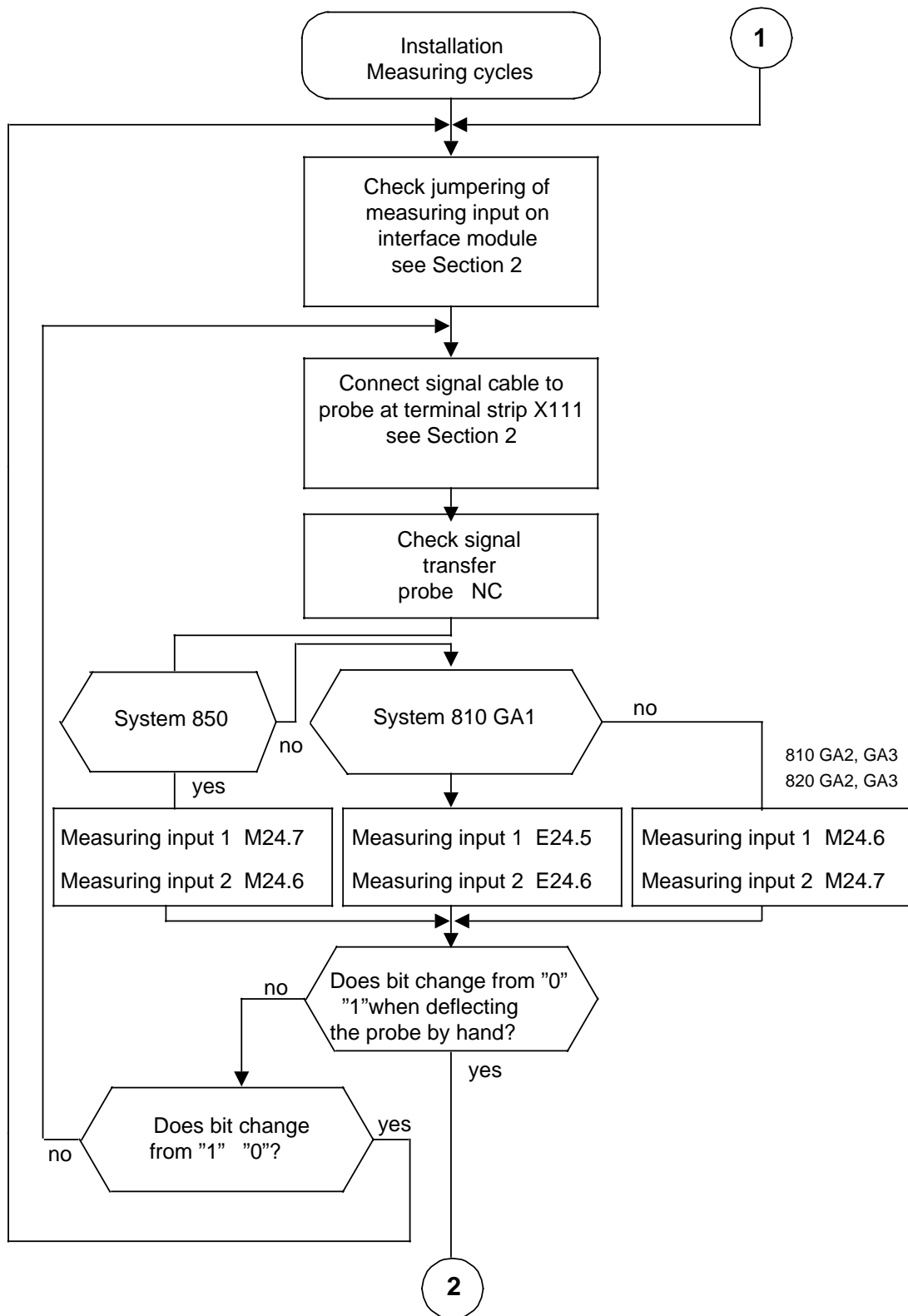
Fig. 4.15 Workpiece probe

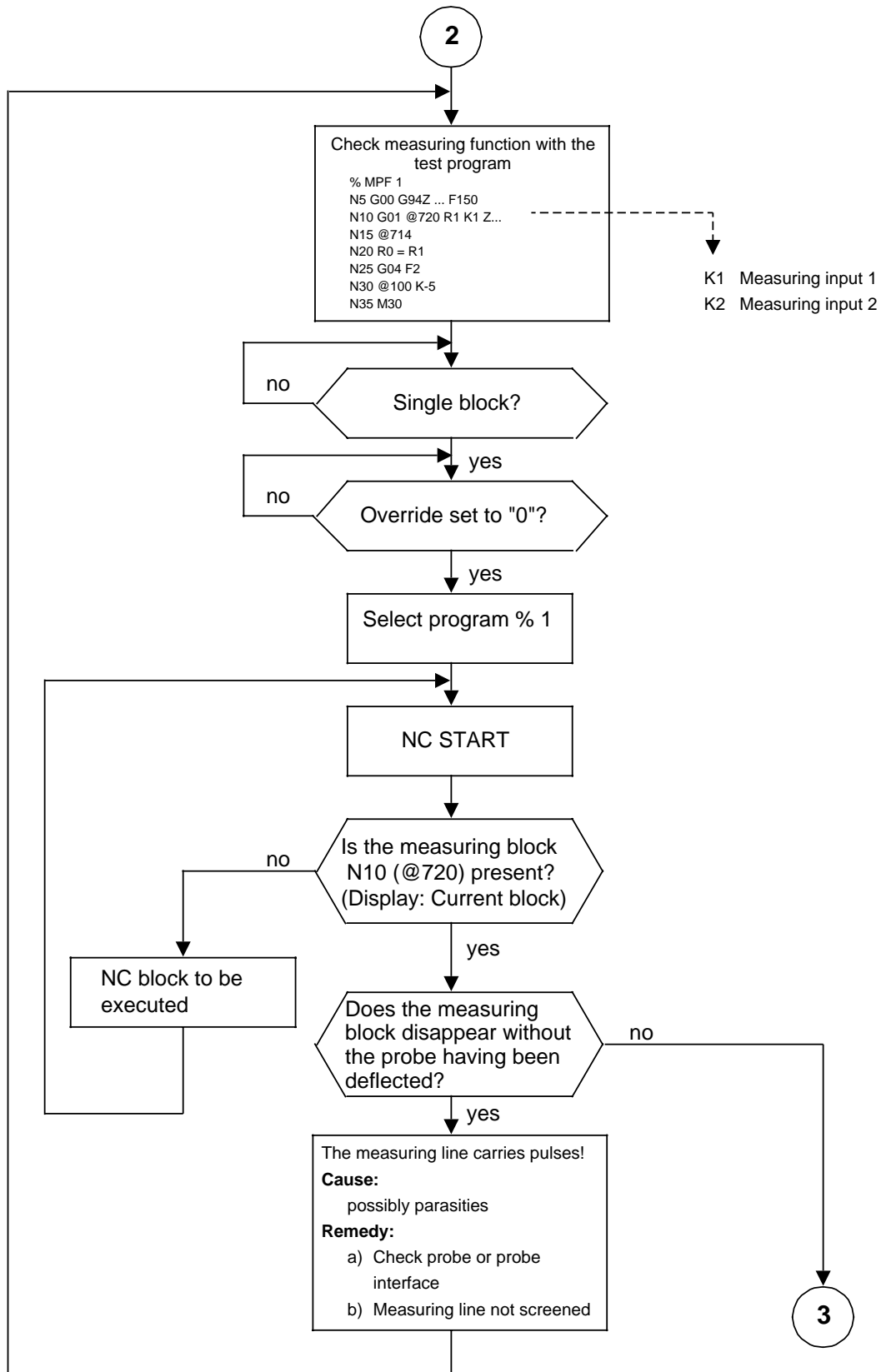
	7	6	5	4	3	2	1	0
R199	Measuring input number 2 Workpiece measurement	Tool measurement	Transfer ZO groups 0 (L960)	0	0	Mono probe different planes R13	0	0

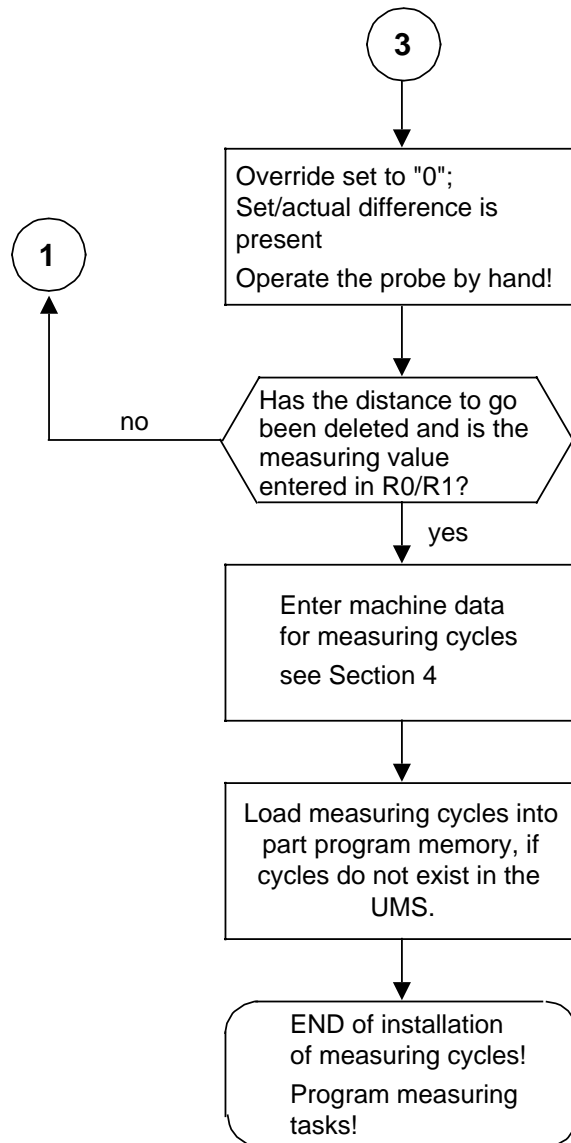
Input in bit pattern

Bit 2	0	Mono probe is used in one plane only.
	1	Mono probe is used in different planes. When the milling and machining centre is equipped with a swivle type-milling head it may be necessary to align the probe in the spindle other than in the G17 plane. In addition, parameter R13 (compensation angle position before calling the cycles L976, L977, L978 or L979) must be defined as well!
Bit 5	0	No transfer of ZO group.
	1	Measuring cycles L977 and L979 call the cycle L960 following ZO determination. L960 transfers the current ZO memory contents to the relevant R parameter area (R240 to R299).
Bit 6	0	Measuring input 1 is activated in the cycle (L975) for tool measurement.
	1	Measuring input 2 is activated in the cycle (L975) for tool measurement.
Bit 7	0	Measuring input 1 is activated in the cycle (L976, L977, L978 and L979) for workpiece measurement.
	1	Measuring input 2 is activated in the cycle (L976, L977, L978 and L979) for workpiece measurement.

5 Installation Flowchart







6 Input Displays for Measuring Cycles

6.1 Input displays for cycle package 3

6.1.1 General

The measuring cycles can be entered in the part program either by directly programming the R parameters or by means of menu displays with operator guidance.

Graphic input displays are available for all measuring versions of measuring cycle package 3 (measuring cycles for turning machines).

The measuring cycle displays can be obtained on diskette for the WS800 E MA-ED. Two diskettes are supplied for each language.

User menu numbers 102 to 121 have been used for configuring the menu tree of the measuring cycle displays.

The area 100 to 129 should be reserved for subsequent expansion of the measuring cycles.

The existing menu tree file of the measuring cycles (standard cycles and measuring cycles) can be used as a basis for configuring the entire user menu tree.

Find out whether files as identical names and variants are already available before converting the diskettes to WS800.

6.1.2 Diskette

The diskettes supplied contain the following files:

MESS1??T.*	Measuring cycle displays
BFM???T.*	Operator guidance macros for measuring cycles
MESSANWT.*	User menu tree for measuring cycles
DREHZYKL.*	modified standard display with exit to measuring cycle displays
ANWM810T.*	modified standard menu tree

For each language a specified version is used to prevent different languages from being bound together in one publication:

Version "D"	German
Version "E"	English

Obtainable from: E MA-ED

Order No.:	6FC9 372-3CA . .	German
	6FC9 372-3CB . .	English

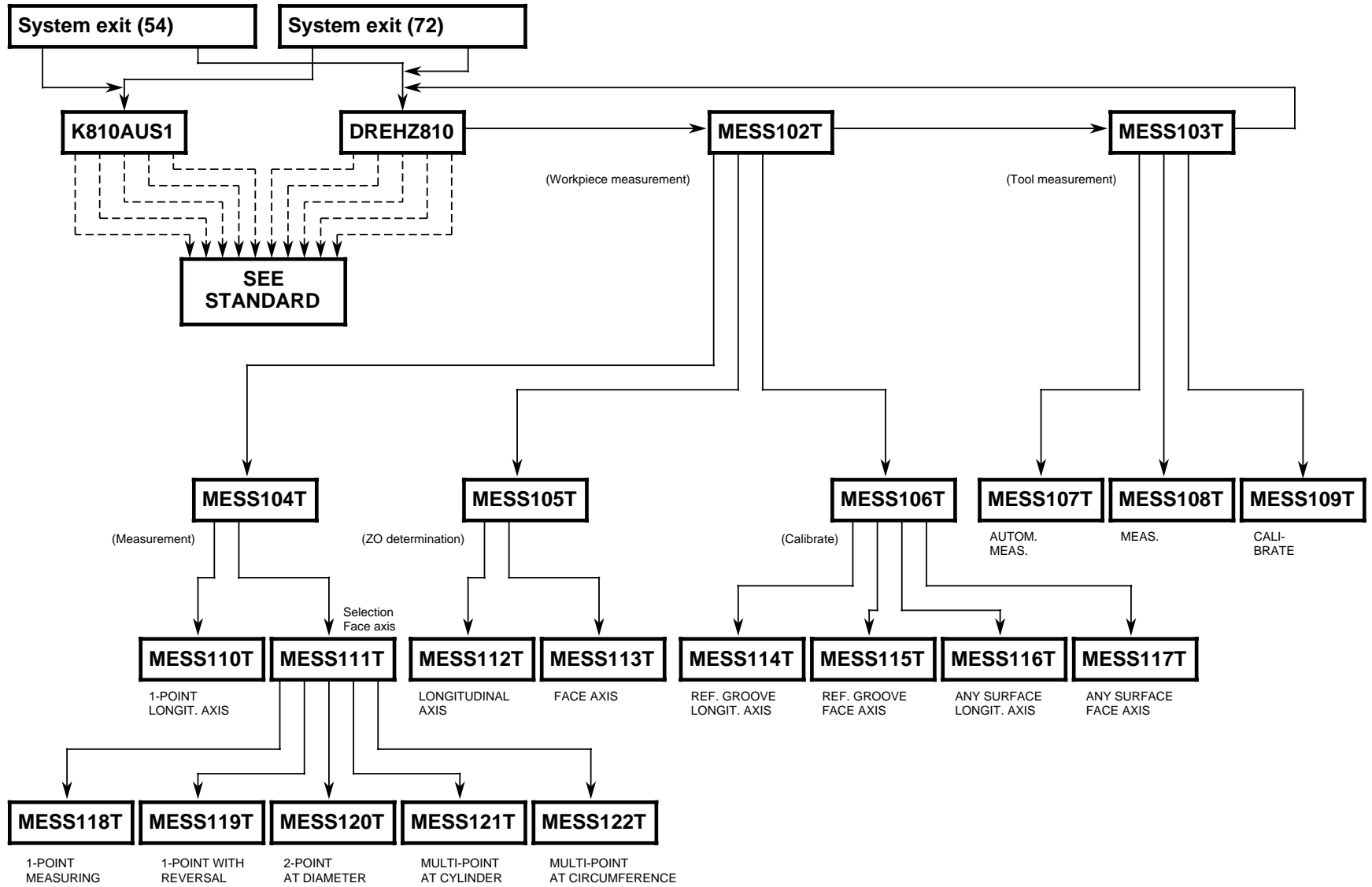
6.1.3 Linkage list

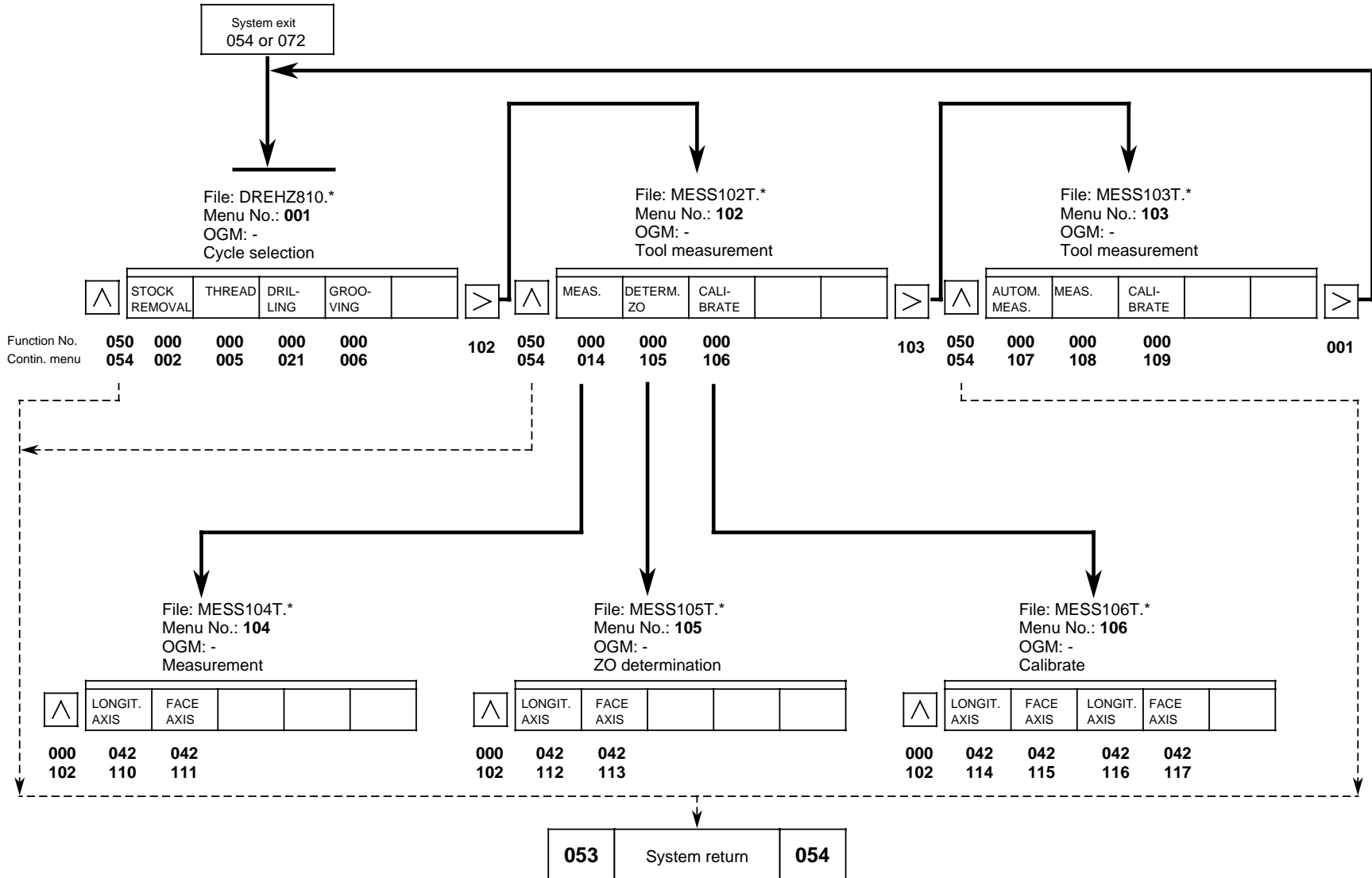
File name: MESSBINDT. LL*

Linkage list of standard cycles

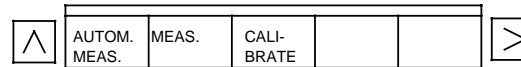
MESS102T	.	D
MESS103T	.	D
MESS104T	.	D
MESS105T	.	D
MESS106T	.	D
MESS107T	.	D
MESS108T	.	D
MESS109T	.	D
MESS110T	.	D
MESS111T	.	D
MESS112T	.	D
MESS113T	.	D
MESS114T	.	D
MESS115T	.	D
MESS116T	.	D
MESS117T	.	D
MESS118T	.	D
MESS119T	.	D
MESS120T	.	D
MESS121T	.	D
MESS122T	.	D
BFM112T	.	D
BFM113T	.	D
BFM114T	.	D
BFM115T	.	D
BFM116T	.	D
BFM117T	.	D
BFM118T	.	D
BFM971T	.	D
BFM972T	.	D
BFM973T	.	D
BFM 974T	.	D
L899D	.	B
L961	.	B
L962	.	B
L965	.	B
L966	.	B
L967	.	B
L968	.	B
L969	.	B
L971	.	B
L972	.	B
L973	.	B
L974	.	B
MESSANWT	.	D

6.1.4 Overview and branch displays package 3



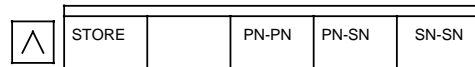


File: MESS103T.*
Menu No.: 103
OGM: -
Tool measurement



Function No. 050 000 000 000 001
Contin. menu 054 107 108 109

File: MESS107T.*
Menu No.: 107
OGM: %BFM 971
Automatic measurement



000 079 042 042 042
103 053 107 107 107

File: MESS108T.*
Menu No.: 108
OGM: %BFM 972
Measurement

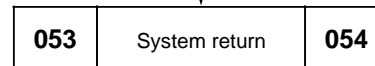


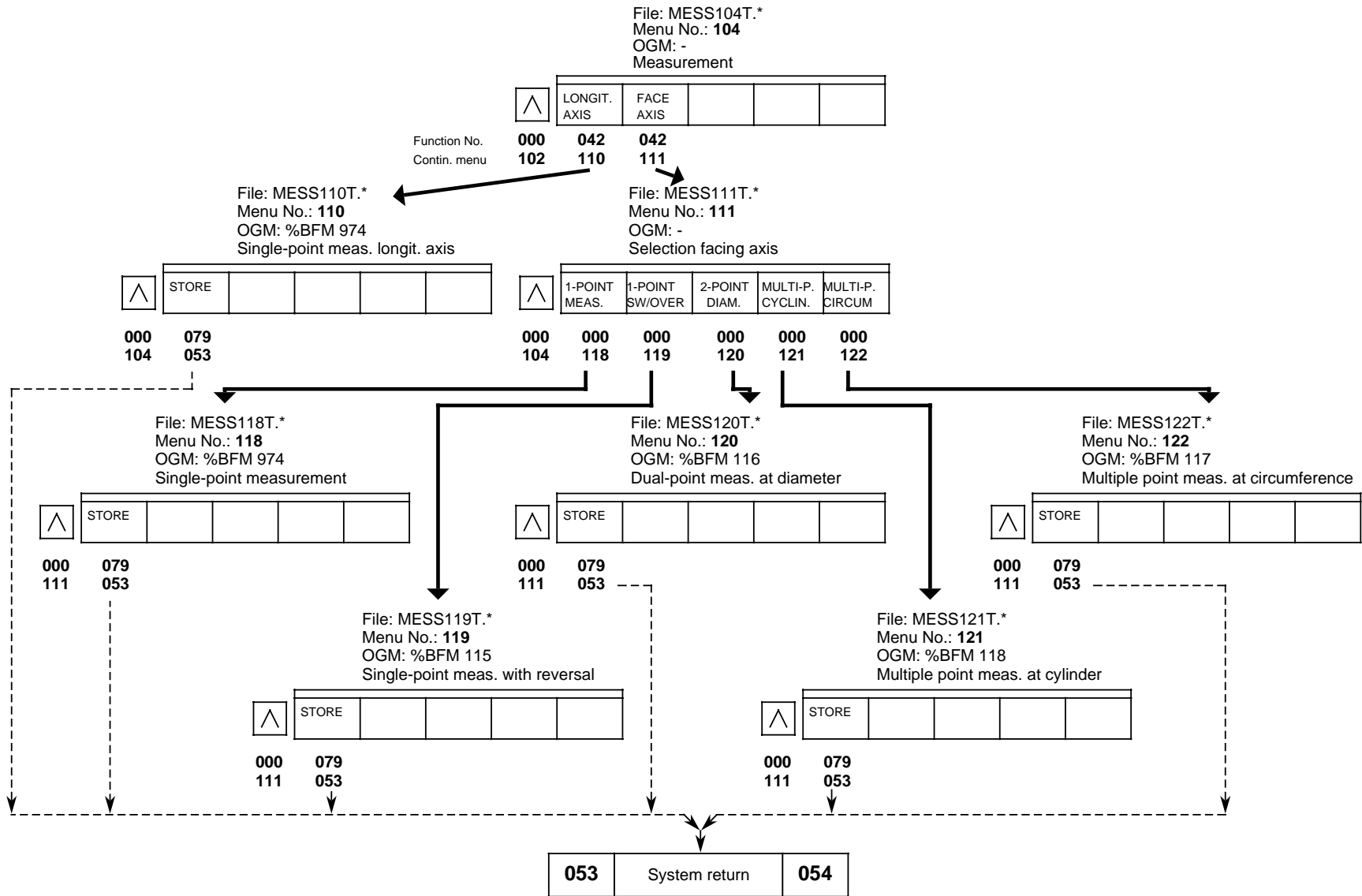
000 079
103 053

File: MESS109T.*
Menu No.: 109
OGM: %BFM 112
Calibrate



000 079
103 053





File: MESS105T.*
 Menu No.: 105
 OGM: -
 ZO determination

^	LONGIT.	FACE			
	AXIS	AXIS			

Function No. **000** **042** **042**
 Contin. menu **102** **112** **113**



File: MESS112T.*
 Menu No.: 112
 OGM: %BFM 114
 ZO determination longitudinal axis

^	STORE		POS. AX.	NEG. AX.
			DIRECT.	DIRECT.

000 **079** **042** **042**
105 **053** **112** **112**

File: MESS113T.*
 Menu-No: 113
 OGM: %BFM 114
 ZO determination face axis

^	STORE		POS. AX.	NEG. AX.
			DIRECT.	DIRECT.

000 **079** **042** **042**
105 **053** **113** **113**



053	System return	054
------------	---------------	------------

File: MESS106T.*
 Menu No.: 106
 OGM: -
 Calibrate

^	LONGIT. AXIS	FACE AXIS	LONGIT. AXIS	FACE AXIS	
---	-----------------	--------------	-----------------	--------------	--

Function No. **000** **042** **042** **042** **042**
 Contin. menu **102** **114** **115** **116** **117**

File: MESS114T.*
 Menu No.: 114
 OGM: %BFM 973
 Reference groove longit. axis

^	STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
---	-------	--	--	---------------------	---------------------

000 **079** **042** **042**
106 **053** **114** **114**

File: MESS116T.*
 Menu No.: 116
 OGM: %BFM 113
 Any surface longit. axis

^	STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
---	-------	--	--	---------------------	---------------------

000 **079** **042** **042**
106 **053** **116** **116**

File: MESS115T.*
 Menu No.: 115
 OGM: %BFM 973
 Reference groove facing axis

^	STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
---	-------	--	--	---------------------	---------------------

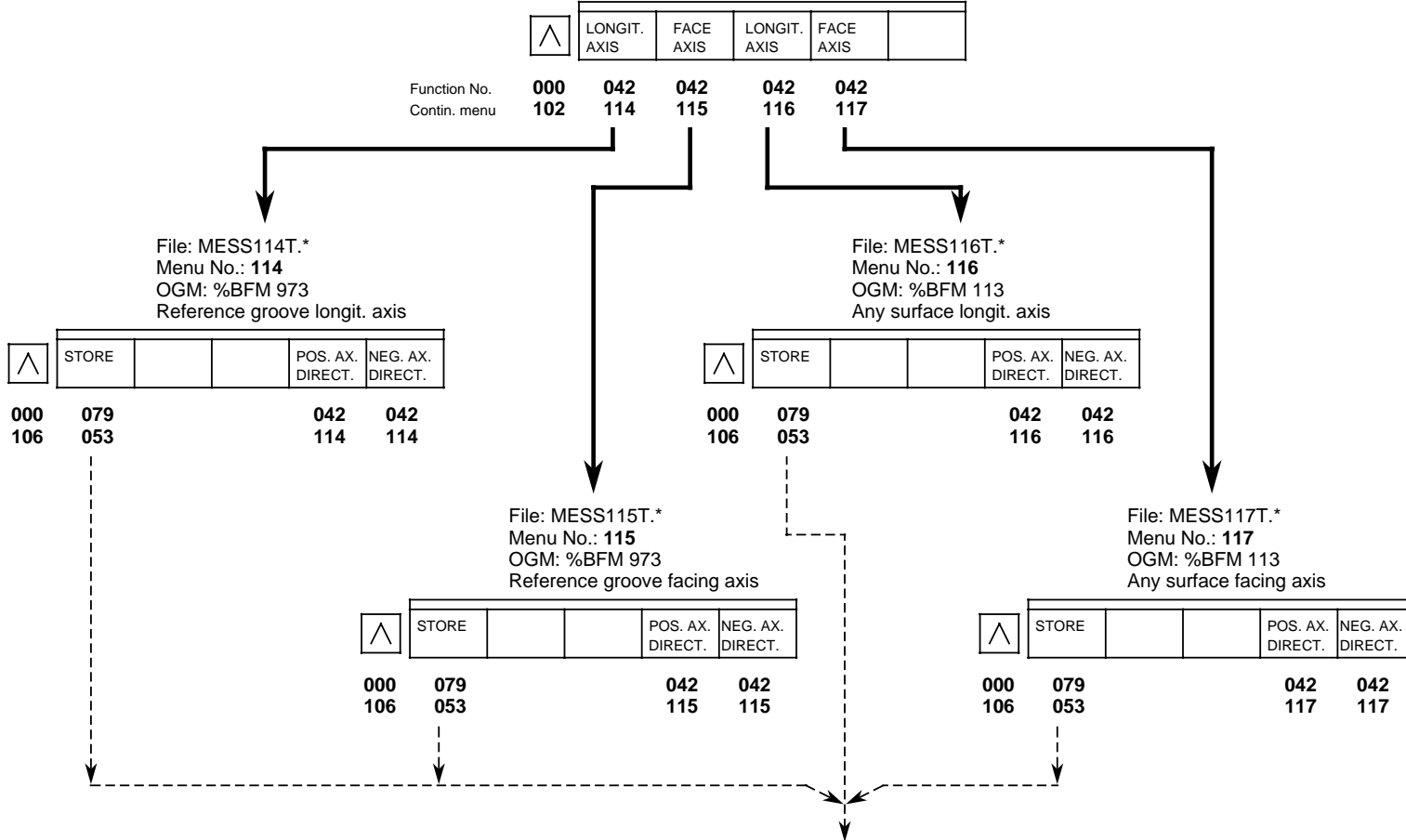
000 **079** **042** **042**
106 **053** **115** **115**

File: MESS117T.*
 Menu No.: 117
 OGM: %BFM 113
 Any surface facing axis

^	STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
---	-------	--	--	---------------------	---------------------

000 **079** **042** **042**
106 **053** **117** **117**

053	System return	054
------------	---------------	------------



6.2 Input displays for cycle package 4

6.2.1 General

The measuring cycles can be entered in the part program either by directly programming the R parameters or by means of menu displays with operator guidance.

Graphic input displays are available for all measuring versions of measuring cycle package 4 (measuring cycles for turning machines).

The measuring cycle displays can be obtained on diskette for the WS800 E MA-ED. Two diskettes are supplied for each language.

User menu numbers 131 to 152 have been used for configuring the menu tree of the measuring cycle displays.

The area 130 to 170 should be reserved for subsequent expansion of the measuring cycles.

The existing menu tree file of the measuring cycles (standard cycles and measuring cycles) can be used as a basis for configuring the entire user menu tree.

Find out whether files as identical names and variants are already available before converting the diskettes to WS800.

6.2.2 Diskette

The diskettes supplied contain the following files:

MESS1??M.*	Measuring cycle displays
BFM???M.*	Operator guidance macros for measuring cycles
MESSANWM.*	User menu tree for measuring cycles
BOHRFRAE.*	modified standard display with exit to measuring cycle displays
ANWM810M.*	modified standard menu tree

For each language a specified version is used to prevent different languages from being bound together in one publication:

Version "D"	German
Version "E"	English

Obtainable from: E MA-ED

Order No.:	6FC9 372-3DA . .	German
	6FC9 372-3DB . .	English

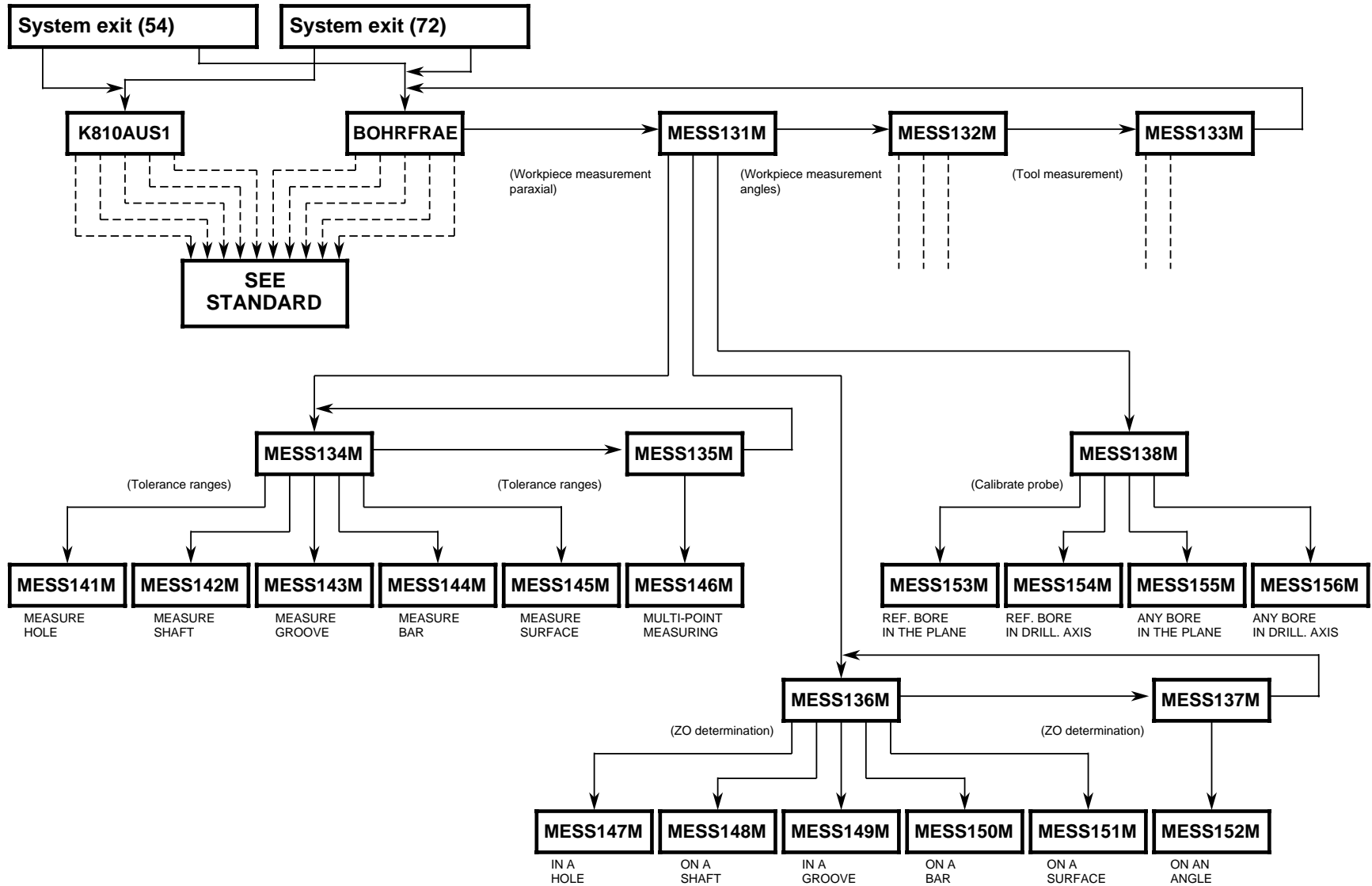
6.2.3 Linkage list

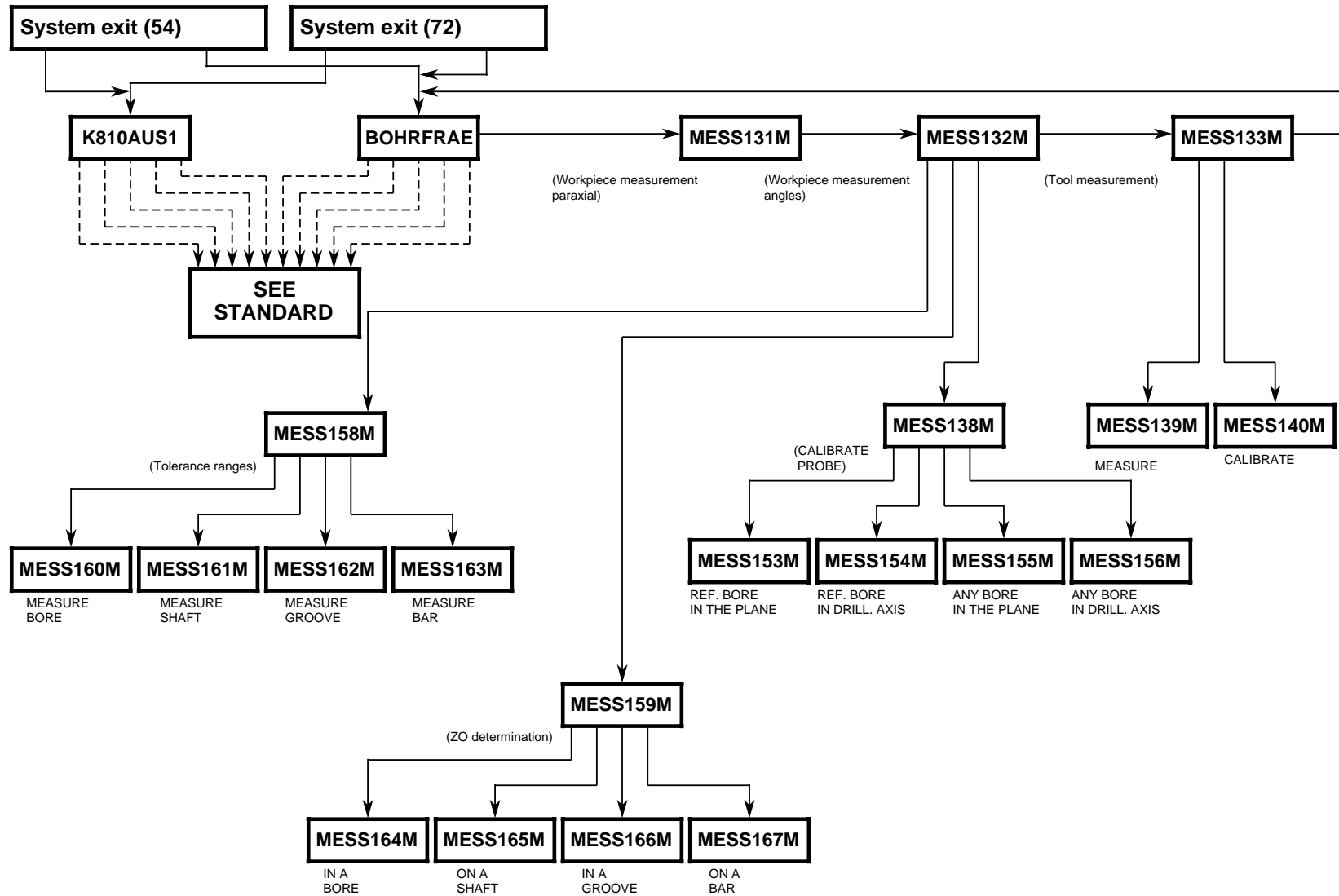
File name: MESSBINDM . LL*

Linkage list of standard cycles

MESS131M .	D	BFM119M .	D
MESS132M .	D	BFM120M .	D
MESS133M .	D	BFM121M .	D
MESS134M .	D	BFM122M .	D
MESS135M .	D	BFM123M .	D
MESS136M .	D	BFM124M .	D
MESS137M .	D	BFM125M .	D
MESS138M .	D	BFM126M .	D
MESS139M .	D	BFM127M .	D
MESS140M .	D	BFM128M .	D
MESS141M .	D	BFM129M .	D
MESS142M .	D	BFM130M .	D
MESS143M .	D	BFM131M .	D
MESS144M .	D	BFM132M .	D
MESS145M .	D	BFM975M .	D
MESS146M .	D	BFM976M .	D
MESS147M .	D	BFM977M .	D
MESS148M .	D	BFM978M .	D
MESS149M .	D	BFM140M .	D
MESS150M .	D	BFM141M .	D
MESS151M .	D	BFM142M .	D
MESS152M .	D	BFM143M .	D
MESS153M .	D	BFM144M .	D
MESS154M .	D	BFM145M .	D
MESS155M .	D	BFM146M .	D
MESS156M .	D	BFM979M .	D
MESS157M .	D	L963 .	B
MESS158M .	D	MESALARM .	C
MESS159M .	D	MESSANWM.	D
MESS160M .	D		
MESS161M .	D		
MESS162M .	D		
MESS163M .	D		
MESS164M .	D		
MESS165M .	D		
MESS166M .	D		
MESS167M .	D		
MESS170M .	D		

6.2.4 Overview and branch displays package 4





System exit
054 or 072

File: BOHRFRAE.*
Menu No.: 051
OGM: -

∧	DRILL. CYCLES	DRILL. PATTERN	MILLING CYCLES	MILLING PATTERN	>
Function No.	050	000	000	000	
Contin. menu	054	052	054	055	056
					131

File: MESS131M.*
Menu No.: 131
OGM: -
Workpiece meas. paraxial

∧	MEAS. W.PIECE	DETERM. ZO	CALI- BRATE		>
050	000	000	000		
054	134	136	138		132

File: MESS132M.*
Menu No.: 132
OGM: -
Workpiece meas. under any angles

∧	MEAS. W.PIECE	DETERM. ZO	CALI- BRATE		>
050	000	000	000		
054	158	159	138		133

File: MESS133M.*
Menu No.: 133
OGM: -
Tool measurement

∧	MEAS. W.PIECE	CALI- BRATE			>
050	000	000			
054	139	140			051

053 System return 054

File: MESS131M.*
 Menu No.: 131
 OGM: -
 Workpiece measurement paraxial

MEAS. W/PIECE	DETERM. ZO	CALI-BRATE		
---------------	------------	------------	--	--

Function No. 000 000 000 000 132
 Contin. menu 054 134 136 138

File: MESS138M.*
 Menu No.: 138
 OGM: -
 Calibrate probe

PLANE	DRILL. AXIS	PLANE	DRILL. AXIS	
-------	-------------	-------	-------------	--

000 000 000 000 000
 131 153 154 155 156

File: MESS136M.*
 Menu No.: 136
 OGM: -
 ZO determination

BORE	SHAFT	GROOVE	BAR	SURFACE
------	-------	--------	-----	---------

000 000 000 000 000
 131 147 148 149 150 151 137

File: MESS137M.*
 Menu No.: 137
 OGM: -
 ZO determination

ANGLE				
-------	--	--	--	--

000 000
 131 152 136

File: MESS134M.*
 Menu No.: 134
 OGM: -
 Tolerance range

BORE	SHAFT	GROOVE	BAR	SURFACE
------	-------	--------	-----	---------

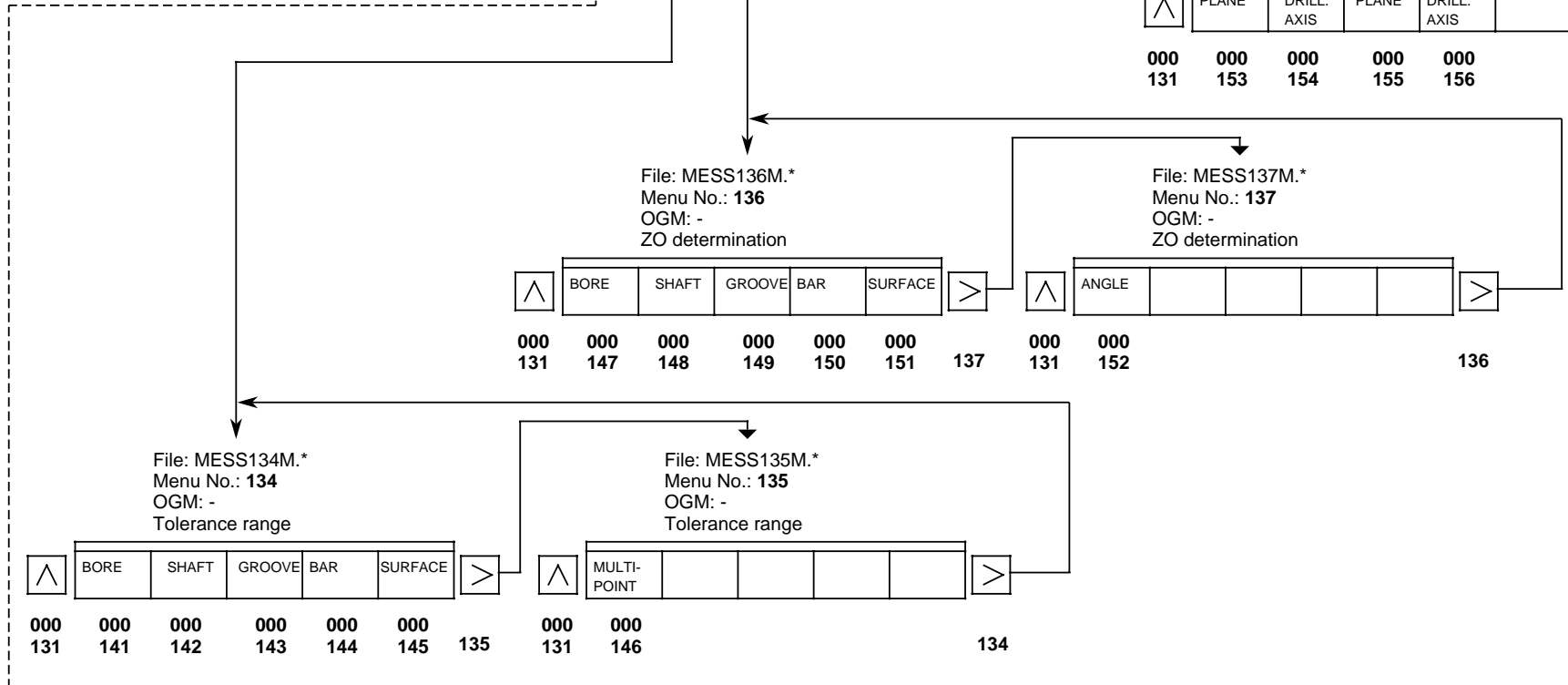
000 000 000 000 000
 131 141 142 143 144 145 135

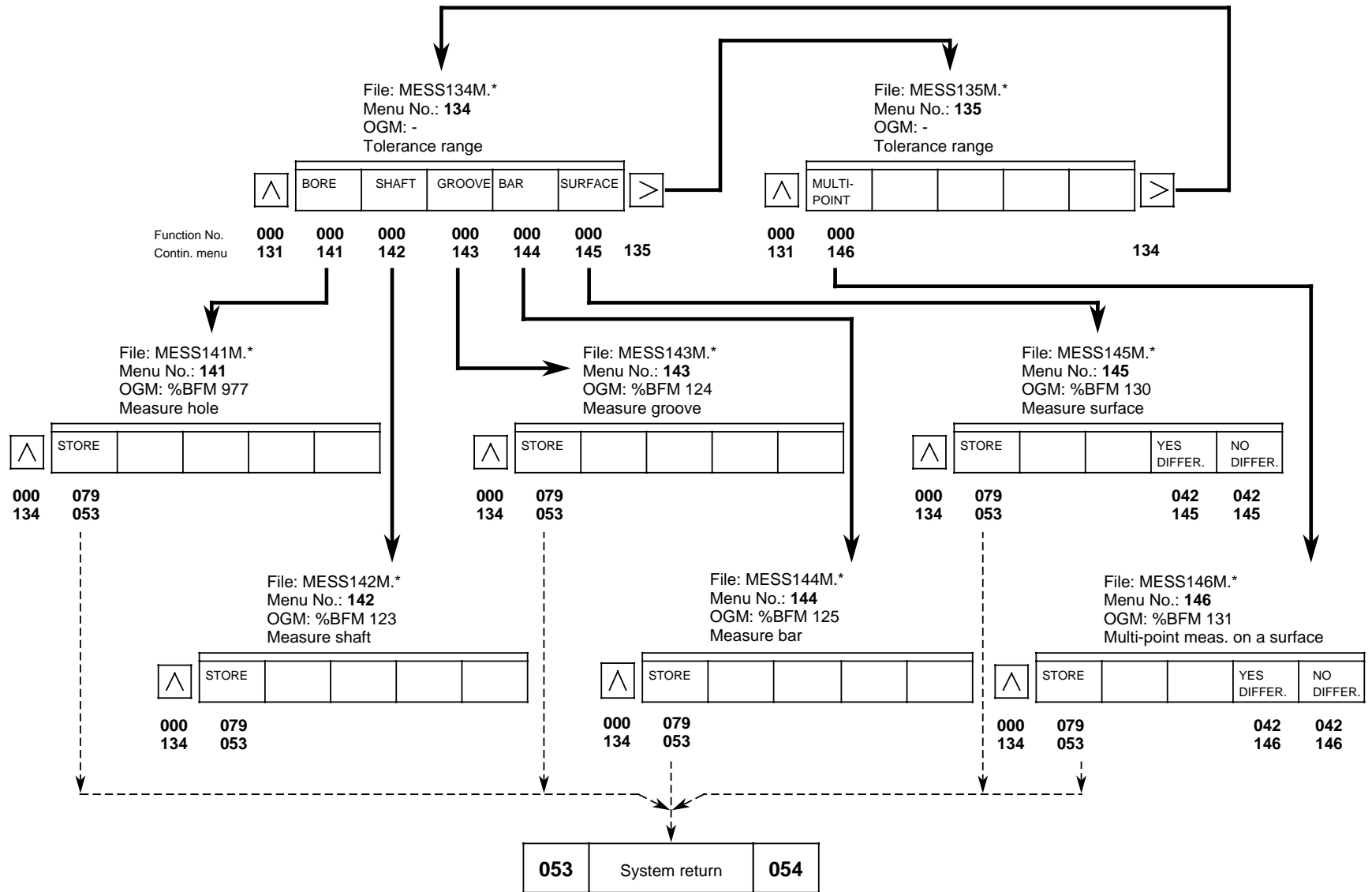
File: MESS135M.*
 Menu No.: 135
 OGM: -
 Tolerance range

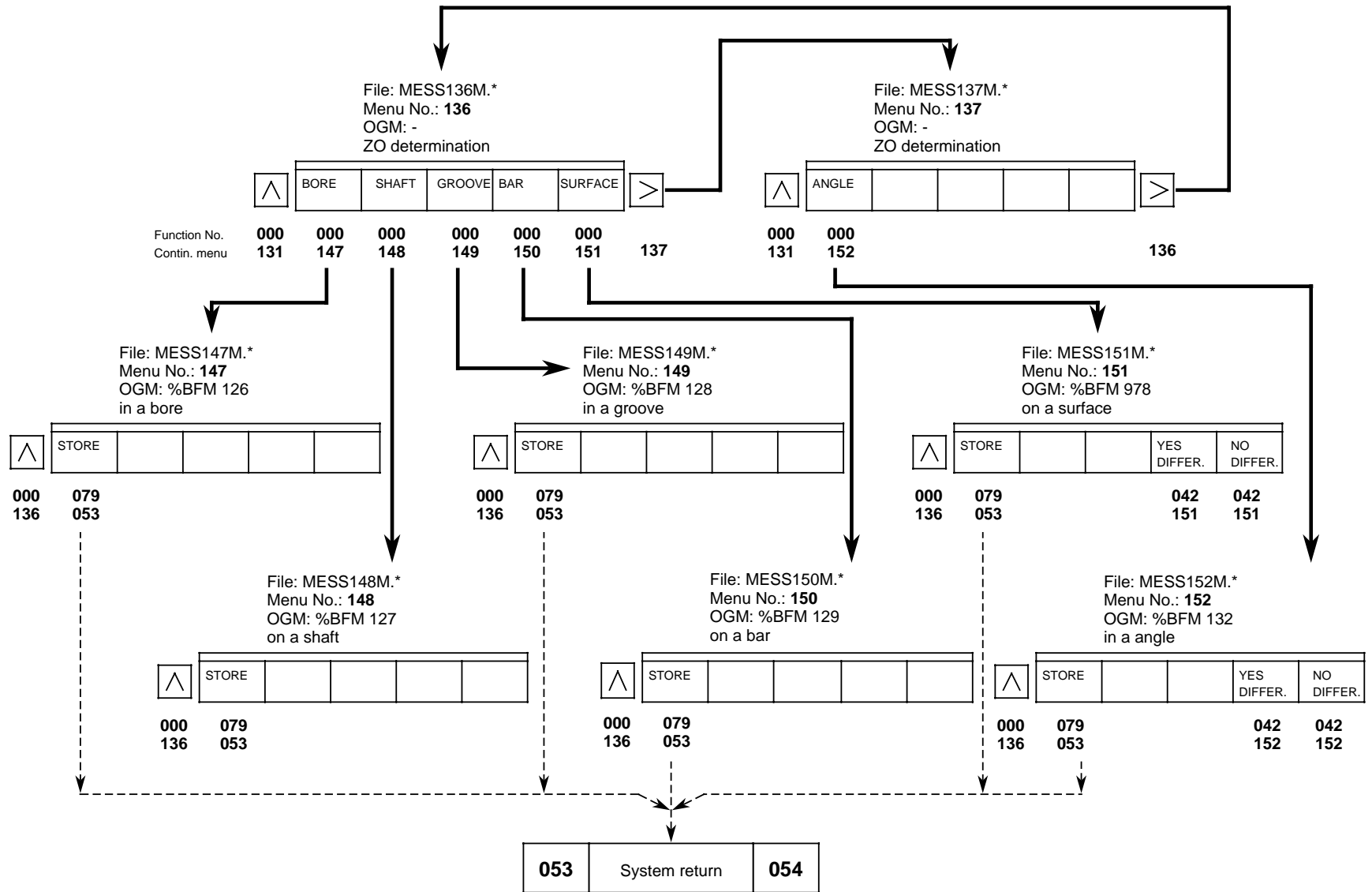
MULTI-POINT				
-------------	--	--	--	--

000 000
 131 146 134

053	System return	054
-----	---------------	-----







File: MESS138M.*
 Menu No.: 138
 OGM: -
 Calibrate probe

△	PLANE	DRILL. AXIS	PLANE	DRILL. AXIS	
---	-------	----------------	-------	----------------	--

Function No. 000 000 000 000 000
 Contin. menu 131 153 154 155 156

File: MESS153M.*
 Menu No.: 153
 OGM: %BFM 976
 Calibration in reference bore

△	STORE				
---	-------	--	--	--	--

000 079
 138 053

File: MESS155M.*
 Menu No.: 155
 OGM: %BFM 121
 Calibration in any bore

△	STORE				
---	-------	--	--	--	--

000 079
 138 053

File: MESS154M.*
 Menu No.: 154
 OGM: %BFM 120
 Calibration in reference bore

△	STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
---	-------	--	--	---------------------	---------------------

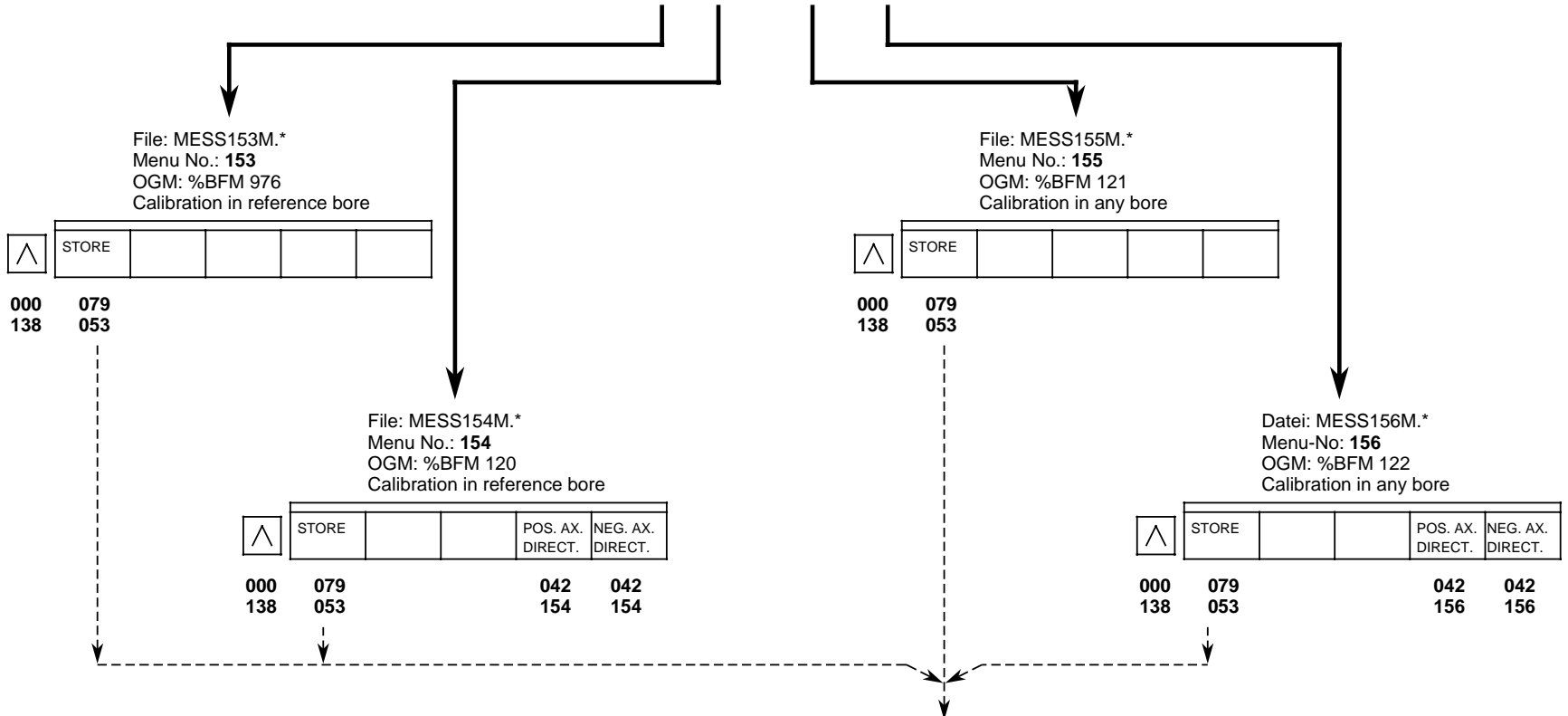
000 079 042 042
 138 053 154 154

Date: MESS156M.*
 Menu-No: 156
 OGM: %BFM 122
 Calibration in any bore

△	STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
---	-------	--	--	---------------------	---------------------

000 079 042 042
 138 053 156 156

053	System return	054
-----	---------------	-----



File: MESS132M.*
 Menu No.: 132
 OGM: -
 Workpiece meas. under any angles

MEAS. W/PIECE	DETERM. ZO	CALI- BRATE		
------------------	---------------	----------------	--	--

Function No. 050 000 000 000 133
 Contin. menu 054 158 159 138

File: MESS158M.*
 Menu No.: 158
 OGM: -
 Tolerance range

BORE	SHAFT	GROOVE	BAR	
------	-------	--------	-----	--

000 000 000 000 000
 132 160 161 162 163

File: MESS159M.*
 Menu No.: 159
 OGM: -
 ZO determination

BORE	SHAFT	GROOVE	BAR	
------	-------	--------	-----	--

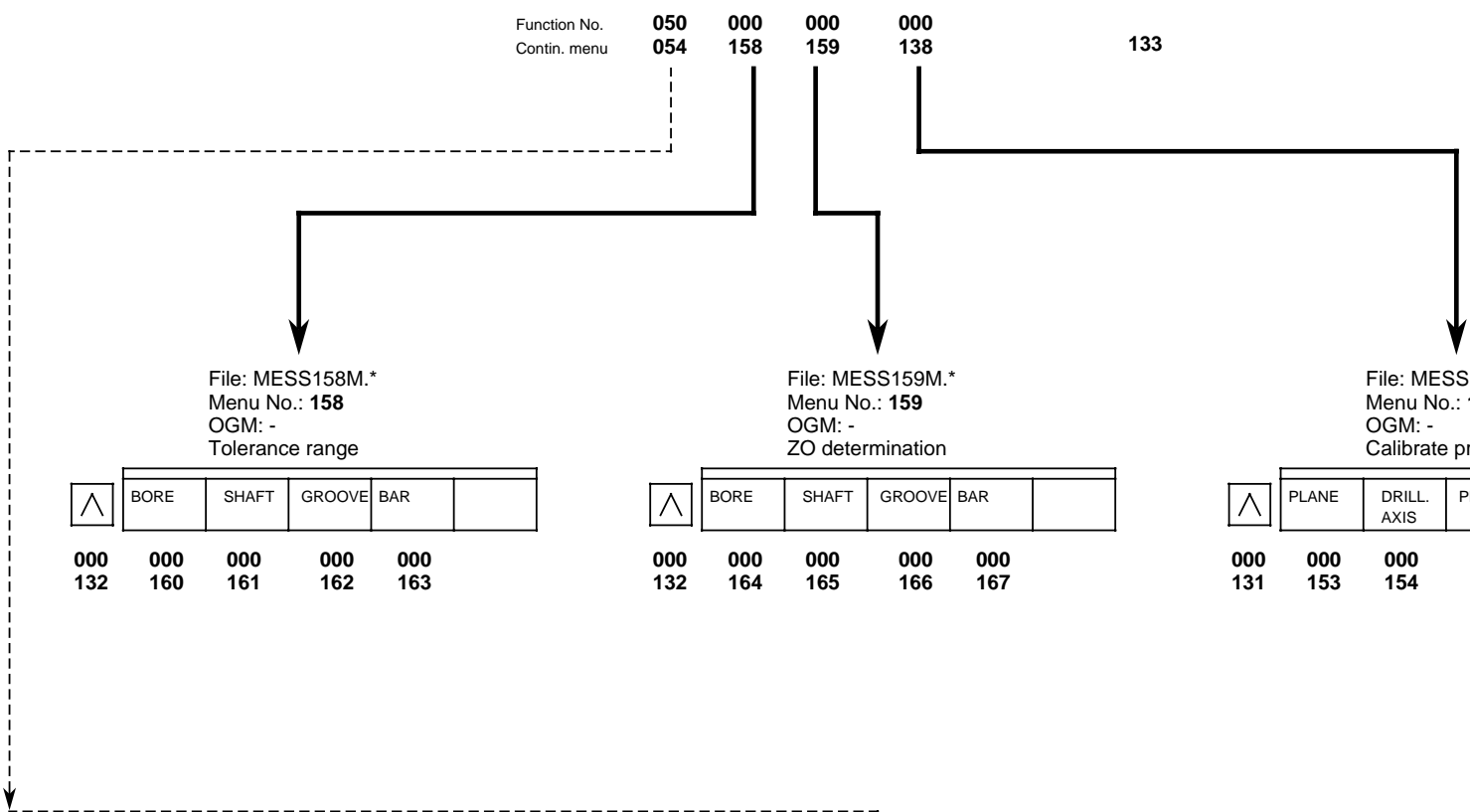
000 000 000 000 000
 132 164 165 166 167

File: MESS138M.*
 Menu No.: 138
 OGM: -
 Calibrate probe

PLANE	DRILL. AXIS	PLANE	DRILL. AXIS	
-------	----------------	-------	----------------	--

000 000 000 000 000
 131 153 154 155 156

053	System return	054
-----	---------------	-----



File: MESS158M.*
Menu No.: 158
OGM: -
Tolerance ranger

^	BORE	SHAFT	GROOVE	BAR	
---	------	-------	--------	-----	--

Function No. 000 000 000 000 000
Contin. menu 132 160 161 162 163

File: MESS160M.*
Menu No.: 160
OGM: %BFM 979
Measure bore

^	STORE				
---	-------	--	--	--	--

000 079
158 053

File: MESS162M.*
Menu No.: 162
OGM: %BFM 140
Measure groove

^	STORE				
---	-------	--	--	--	--

000 079
158 053

File: MESS161M.*
Menu No.: 161
OGM: %BFM 145
Measure shaft

^	STORE				
---	-------	--	--	--	--

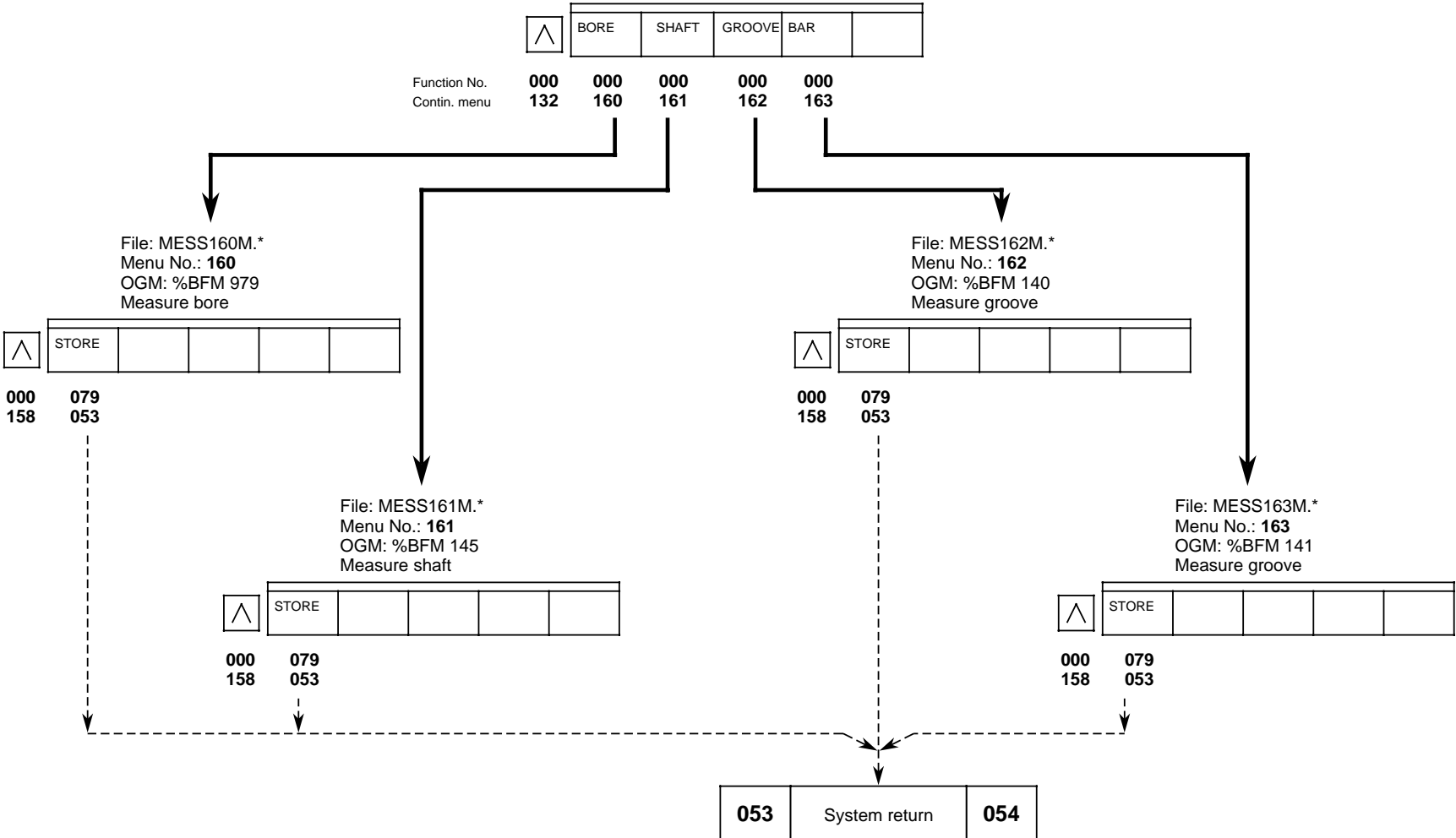
000 079
158 053

File: MESS163M.*
Menu No.: 163
OGM: %BFM 141
Measure groove

^	STORE				
---	-------	--	--	--	--

000 079
158 053

053	System return	054
-----	---------------	-----



File: MESS159M.*
Menu No.: 159
OGM: -
ZO determination

^	HOLE	SHAFT	SLOT	BAR	
---	------	-------	------	-----	--

Function No. 000 000 000 000 000
Contin. menu 132 164 165 166 167

File: MESS164M.*
Menu No.: 164
OGM: %BFM 142
in a bore

^	STORE				
---	-------	--	--	--	--

000 079
159 053

File: MESS166M.*
Menu No.: 166
OGM: %BFM 143
in a groove

^	STORE				
---	-------	--	--	--	--

000 079
159 053

File: MESS165M.*
Menu No.: 165
OGM: %BFM 146
on a shaft

^	STORE				
---	-------	--	--	--	--

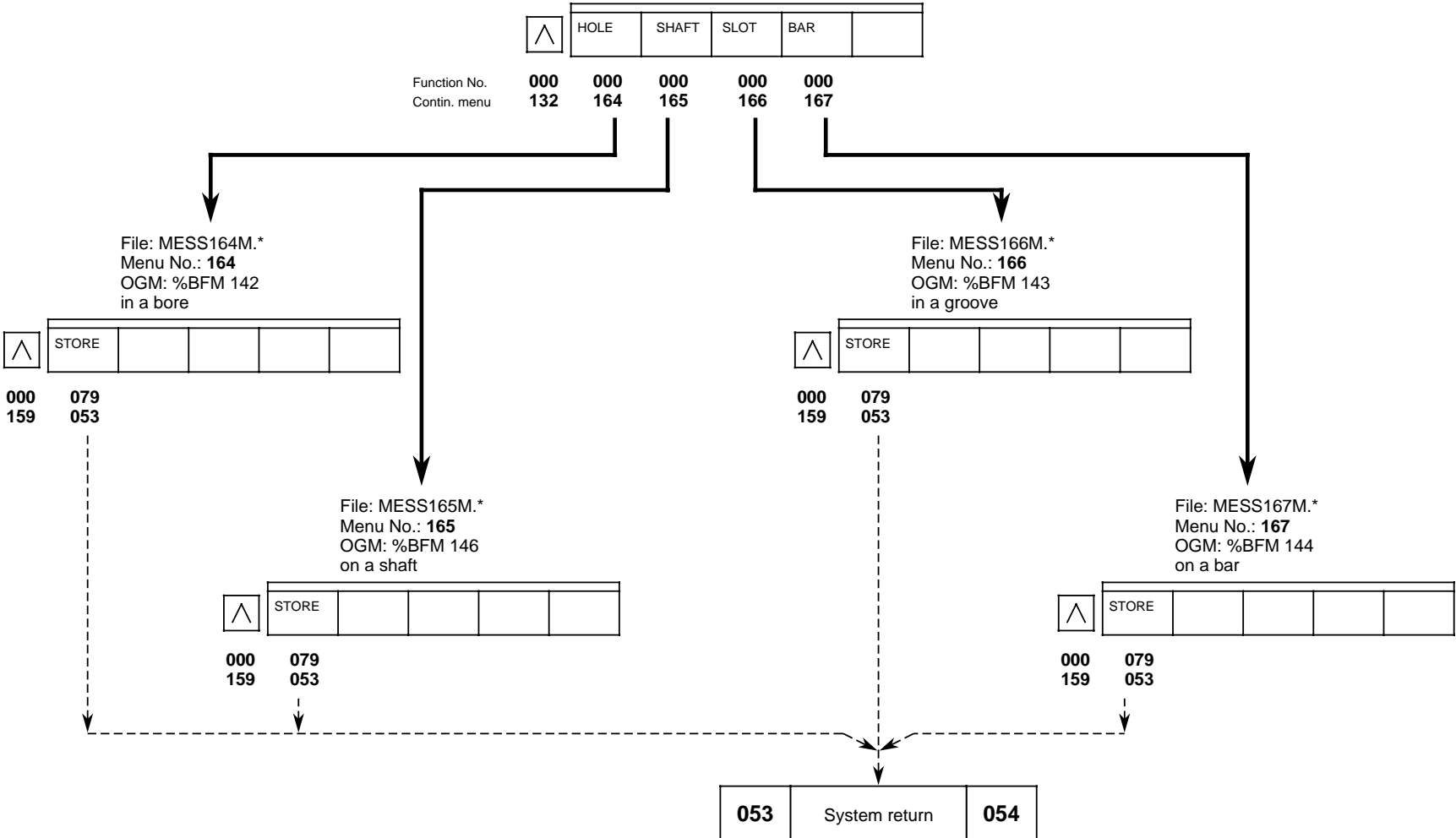
000 079
159 053

File: MESS167M.*
Menu No.: 167
OGM: %BFM 144
on a bar

^	STORE				
---	-------	--	--	--	--

000 079
159 053

053 System return 054



File: MESS133M.*
Menu No.: 133
OGM: -
Tool measurement

MEAS. W/PIECE	CALI- BRATE			
------------------	----------------	--	--	--

Function No. 050 000 000
Contin. menu 054 139 140 051

File: MESS139M.*
Menu No.: 139
OGM: %BFM 119
Measure

STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
-------	--	--	---------------------	---------------------

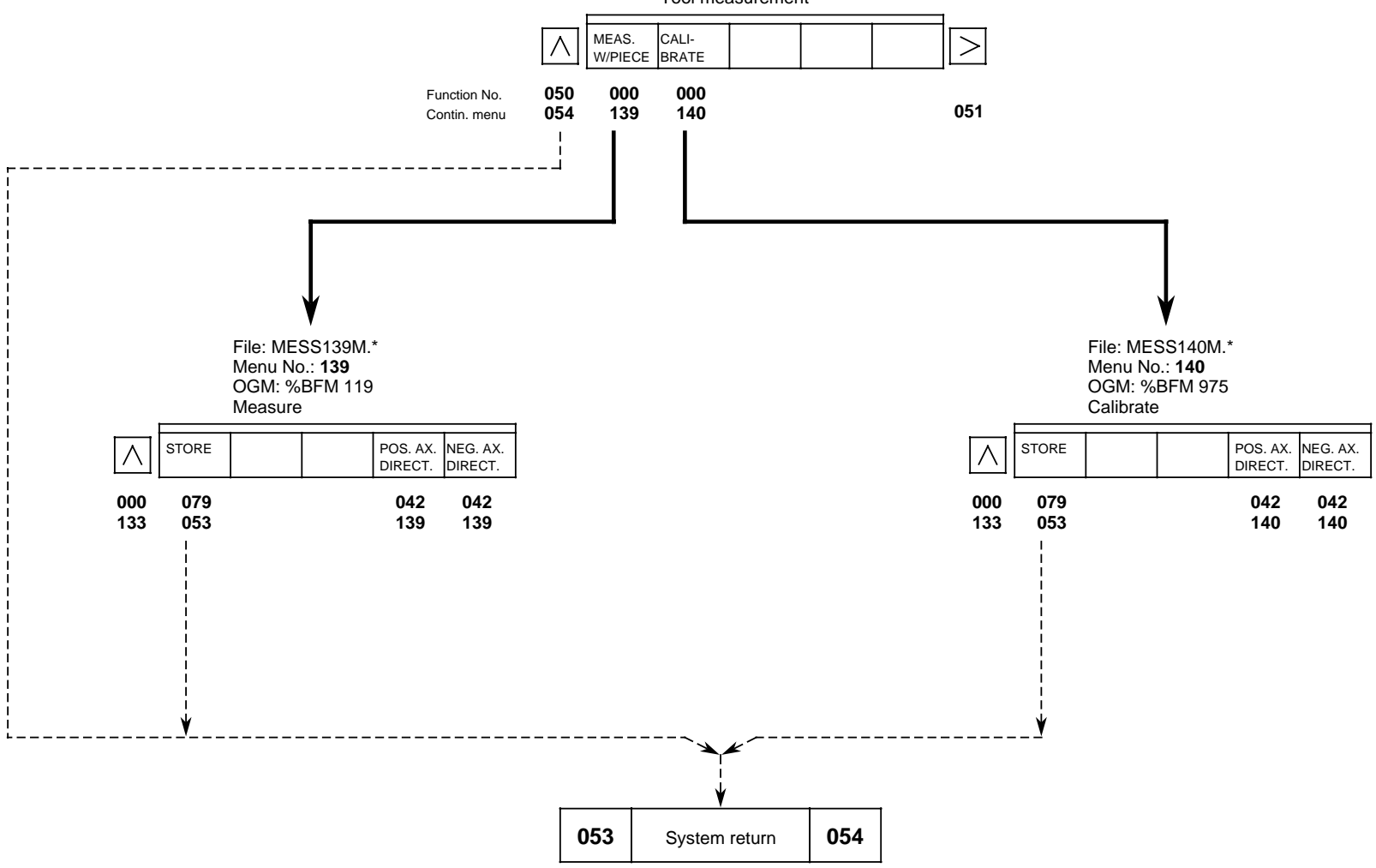
000 079 042 042
133 053 139 139

File: MESS140M.*
Menu No.: 140
OGM: %BFM 975
Calibrate

STORE			POS. AX. DIRECT.	NEG. AX. DIRECT.
-------	--	--	---------------------	---------------------

000 079 042 042
133 053 140 140

053	System return	054
-----	---------------	-----



7 Lists

7.1 MDC for turning machines

R110		R11=0	without empirical value
: Empirical values		R11=10	Empirical value from R110
R133		R11=33	Empirical value from R133
R134			
: Mean values			
R157			
R158	Tool change position in X axis for TO measurement		
R159	Tool change position in Z axis for TO measurement		
R160	M function for unlocking in the case of M19		
R161	M function (L967: Triggering for FB50 on 810/820 and FB116 on 850)		
R162	X	Deviations calibration tool	
R163	Z		
R164	B		
R165	minus	X direction	
R166	plus	X direction	Tool probe
R167	minus	Z direction	
R168	plus	Z direction	
R169	a		
R170	b	Calibration groove deviations	Calibration groove No. 1
R171	c		
R172	d	with R12 = 0	
R173	e		
R174	f		
R175	g		
R176		Calibration groove deviations	Calibration groove No. 2
:			
R182		with R12 = 1	
R183		Calibration groove deviations	Calibration groove No. 3
:			
R189		with R12 = 2	
R190		Calibration groove deviations	Calibration groove No. 4
:			
R196		with R12 = 3	
R197	Reversal dimension X axis		
R198	Reversal dimension Z axis		

Bit		7	6	5	4	3	2	1	0
	Measuring input number 2							SPI – X	SPI – Z
R199	Workpiece measurement	Tool measurement	0	0	0	0			

Input in bit pattern

7.2 MDC for milling and machining centres

R110 : Empirical values R133	R11=0 R11=10 R11=33	without empirical value Empirical value from R110 Empirical value from R133	
R134 : Mean values R157			
R158	Distance workpiece probe to spindle centre abscissa		
R159	Distance workpiece probe to spindle centre ordinate		
R160			
R161	M function (L967: Triggering for FB50 on 810/820 and FB1 16 on 850)		
	G17	G18	G19
R162	-X	-Z	-Y
R163	+X	+Z	+Y
R164 Deviations	-Y	-X	-Z
R165 Tool probe	+Y	+X	+Z
R166	-Z	-Y	-X
R167	+Z	+Y	+X
R168	Radius calibration tool		
	G17	G18	G19
R169 Centre point reference hole	X	Z	Y
R170 Centre point reference hole	Y	X	Z with R12 =1
R171 Upper edge of reference hole	+Z	+Y	+X
R172 Lower edge of reference hole	-Z	-Y	-X
R173	Reference hole diameter		
R174 : Deviations reference hole 2 R164			with R12 =2
R179 : Deviations reference hole 3 R183			with R12 =3
	G17	G18	G19
R184 Workpiece probe 1 Probe ball diameter			
R185 Triggering point	-X	-Z	-Y
R186 Triggering point	+X	+Z	+Y with R22 = 1
R187 Triggering point	-Y	-X	-Z
R188 Triggering point	+Y	+X	+Z
R189 : Workpiece probe 2 R193			with R22 = 2
R194 : Workpiece probe 3 R198			with R22 = 3

Bit	7	6	5	4	3	2	1	0
R199	Measuring input number 2		Transfer ZO groups L960	0	0	Mono probe diff. plane R13	0	0
	Workpiece measurement	Tool measurement						

Input in bit pattern

Siemens AG

AUT V230
Postfach 48 48
D-8500 Nürnberg 1
Federal Republic of Germany

Suggestions

Corrections

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Should you come across any printing errors when reading this publication, we would ask you to inform us accordingly, using this form. We would also welcome any suggestions you may have in the way of improvement.

Suggestions and/or corrections

Siemens AG
Automation Systems
for Machine Tools and Robots
Postfach 48 48, D-8500 Nuernberg 1
Federal Republic of Germany

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