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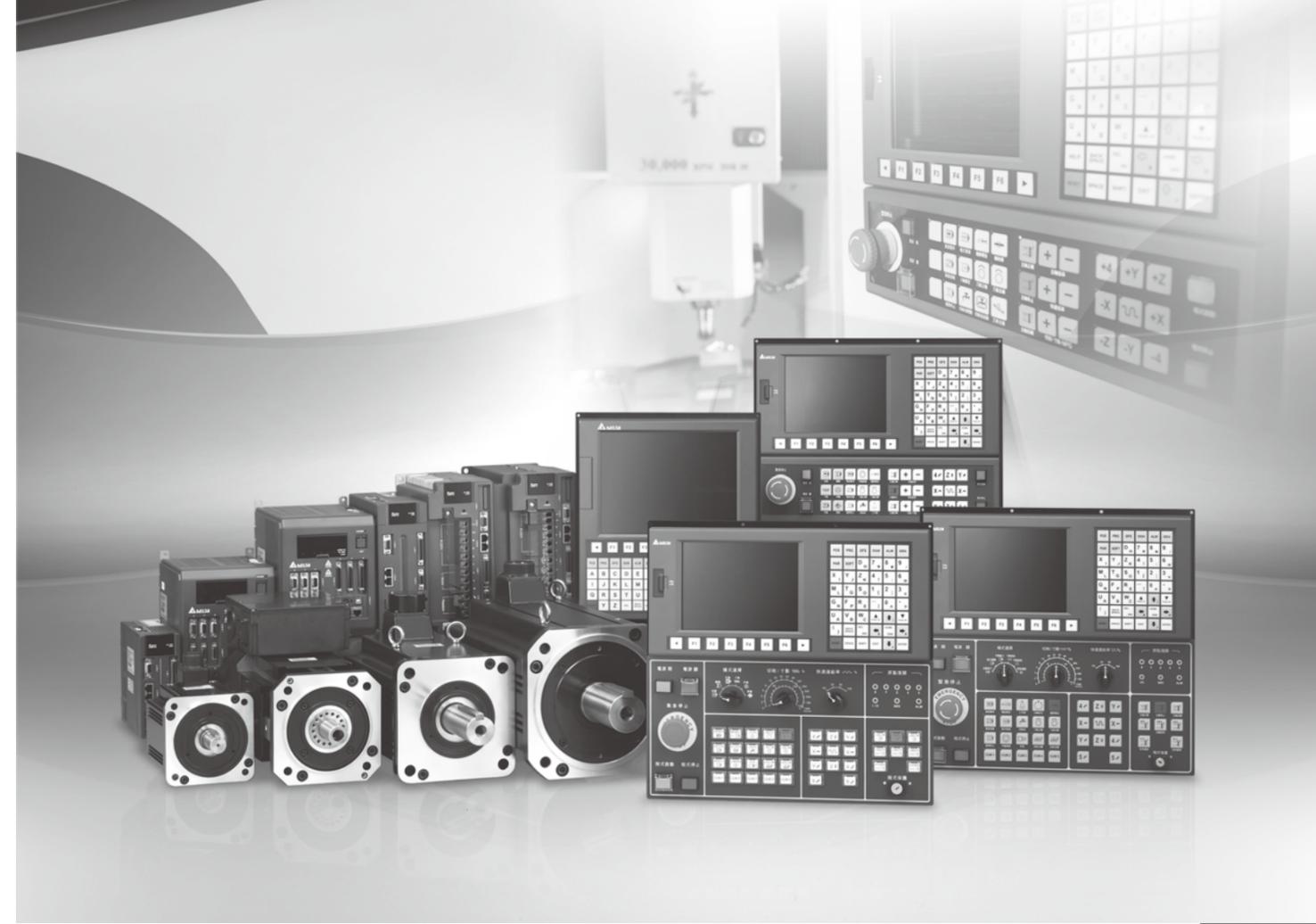
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Delta CNC Solution
NC300 Series Operation Manual



Delta CNC Solution NC300 Series Operation Manual

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Appendix A: Group function map

Chapter 1: Table of group menu

1.1 Table of system group menu

<u>POS coordinates function</u>			
Layer 1	Layer 2	Layer 3	Layer 4
ABS	-	-	-
REL (Connect to the physical axis to display the axial clear function)	CLR ALL	-	-
	CLR X	-	-
	CLR Y	-	-
	CLR Z	-	-
	CLR A	-	-
	CLR B	-	-
CLR C	-	-	-
MECH	-	-	-

[Program Edit mode]

<u>PRG program function file manager</u>			
Layer 1	Layer 2	Layer 3	Layer 4
COPY FILE	-	-	-
PASTE	-	-	-
DEL (file/folder)	-	-	-
SEL TOGL	-	-	-
CANCEL	-	-	-
SEL ALL	-	-	-
SEQUENCE	NAME	-	-
	SIZE	-	-
	DATE	-	-
NEW FILE	-	-	-
FOLDER	-	-	-
RENAME	-	-	-
FIND FILE	-	-	-
MERGE	-	-	-
MACRO	-	-	-
DXF	-	-	-

PRG program function_ file editor				
Layer 1	Layer 2	Layer 3	Layer 4	
File editing	COPY	-	-	
	PASTE	-	-	
	DEL	-	-	
	UNDO	-	-	
	B START	-	-	
	B END	-	-	
	LABLE	-	-	
	STRING	NEXT	-	-
		PREV	-	-
		REPLACE	-	-
REPLACE ALL		-	-	

[Auto mode]

Layer 1	Layer 2	Layer 3	Layer 4
SF set	-	-	-
START	RUN	-	-
FILE SCAN	LOAD	-	-
	CLR	-	-
	CLR ALL	-	-

[JOG / MPG Feeding mode] program editing

Layer 1	Layer 2	Layer 3	Layer 4	
SF set	-	-	-	
TEACH	RAPID	-	-	
	LINEAR	-	-	
	ARC	P1	-	-
		P2	-	-
		P3	-	-
		PLANE SEL	-	-
	DEL	-	-	
	SAVE	-	-	
	NEW FILE	-	-	
MECH / ABS	-	-		

[Manual Input mode] program editing

Layer 1	Layer 2	Layer 3	Layer 4
LOAD	-	-	-
SAVE	-	-	-
CLEAR	-	-	-

[Homing mode] program editing

Layer 1	Layer 2	Layer 3	Layer 4
SF set	-	-	-

Offset (OFS) function						
Layer 1	Layer 2	Layer 3	Layer 4			
COORD	AUTO	CLR REL	-			
		CLR ALL	-			
		SET L	-			
		SET L/2	1 st POINT			
			2 nd POINT			
			SET			
	SET P	-				
	ABS	-	-			
	INC	-	-			
	SQUARE		X1	-		
			X2	-		
			Y1	-		
			Y2	-		
			SET	-		
			SET Z	-		
			CIRCLE		P1	-
					P2	-
	P3	-				
	SET	-				
	SET Z	-				
	CUTTER	ABS	-	-		
INC		-	-			
H SET		-	-			
CLEAR		H/D	-			
		WEAR	-			
		LIFE	-			
		ALL	-			
MAGA	Maga 1	SET (※ jog mode)	-			
		RST ALL(※ jog mode)	-			
		LOCK (※ jog mode)	-			

		UNLOCK (※ jog mode)	-
	Maga 2	SET (※ jog mode)	-
		RST ALL(※ jog mode)	-
		LOCK (※ jog mode)	-
		UNLOCK (※ jog mode)	-
MACRO	LOCAL	-	-
	GLOBAL	-	-
	HOLD	-	-
	EXPAND	-	-

Graphic (GRA) function

Layer 1	Layer 2	Layer 3	Layer 4
CUTTING PATH	X-Y / Y-Z / X-Z / X-Y-Z	-	-
	CENTER	-	-
	ZOOM IN	-	-
	ZOOM OUT	-	-
	DRAW	-	-
	STOP DRAW	-	-
	UP	-	-
	DOWN	-	-
	LEFT	-	-
	RIGHT	-	-
CUTTING PREVIEW (※Auto Mode)	X-Y / Y-Z / X-Z / X-Y-Z	-	-
	CENTER	-	-
	ZOOM IN	-	-
	ZOOM OUT	-	-
	PREVIEW	-	-
	CANCEL PREVIEW	-	-
	UP	-	-
	DOWN	-	-
	LEFT	-	-
	RIGHT	-	-

Alarm (ALM) function

Layer 1	Layer 2	Layer 3	Layer 4
ALARM	-	-	-
HISTORY	CLR ALL	-	-

Diagnosis (DGN) function			
Layer 1	Layer 2	Layer 3	Layer 4
PROCESS	SET	-	-
	CLR TIME	-	-
	CLR NR	-	-
USER VAR	USER VAR	DEL	-
		US DEC	-
		HEX	-
		S DEC	-
		FLOAT	-
	SYS VAR	-	-
	M VAR	DEL	-
		US DEC	-
		HEX	-
		S DEC	-
FLOAT		-	
MLC	BIT	X	-
		Y	-
		M	-
		A	-
		T	-
		C	-
	REG	T	-
		C (16)	-
		C (32)	-
		D	-
		V	-
		Z	-
		US DEC	-
		HEX	-
		S DEC	-
		FLOAT	-
	DEV MON	US DEC	-
		HEX	-
		S DEC	-
		FLOAT	-
EDITOR (※edit mode)	LD	-	
	LDI	-	
	LDP	-	
	LDF	-	
	OUT	-	
	APP	-	
	—	-	
		-	
	DEL V-LN	-	
	ADD LN	-	
	DEL LN	-	

		DEL	-	
		LABLE	-	
		TABLE	-	
		SYMBOL	X	
			Y	
			M	
			A	
			T	
			C	
			D	
			P	
			I	
			DEL	
		COPY		
		PASTE		
		SAVE	-	
		IMPORT	IMPORT	
		EXPORT	EXPORT	
			NEW FILE	
		JUMP TO	-	
SELECT	-			
CUT	-			
COPY	-			
PASTE	-			
SET(※edit mode)	ON	-		
	OFF	-		
	RUN/STOP	-		
JUMP TO	-	-		
SYS MONI	SRV MONI	-	-	
	I/O MONI	-	-	
	VAR MONI	SYS VAR	-	
		CH VAR	-	
		AXIS VAR	-	
		IF VAR	-	
		MLC VAR	-	
		US DEC	-	
		BIN	-	
		HEX	-	
S DEC	-			
STATUS	SYSTEM	-	-	
	FW SN	-	-	
	HW SN	-	-	
	M STATUS	DEL	-	
PWD	S SCP	UNLOCK	-	
		LOCK	-	
		SYS CHECK	-	
	M SCP	PWD CHG	-	
		LOCK/UNLOCK	-	
		RST U1	-	

		RST U2	-	
		ENABLE	OK	
			CANCEL ALL DEFAULT	
	U1 SCP	RESET	-	
		PWD CHG LOCK/UNLOCK	- -	
	U2 SCP	PWD CHG LOCK/UNLOCK	- -	
		EXPIRE	SETTING RELEASE	- -
	EXP SCP		PWD CHG LOCK/UNLOCK	- -
			TUNING (※jog or hand wheel mode)	NEXT AX READ COMPUTE WR GAIN WR NOTH RUN JOG ← JOG → POS 1 POS 2 TAP RIV SERVO SYN CONTROL
	TEXT WR	-	-	
IMPORT	IMPORT SEL ALL CLR ALL	- - -	- - -	
	EXPORT	EXPORT SEL ALL CLR ALL	- - -	- - -
		LOGO WR	-	-

Parameter (PAR) function

Layer 1	Layer 2	Layer 3	Layer 4
PROCESS	-	-	-
OPERATE	-	-	-
MAGA	-	-	-
SPINDLE	-	-	-
MACHINE	-	-	-
HOME	-	-	-
NETWORK	DEFAULT	-	-

COMP	OK	-	-
	um	-	-
	um+	-	-
	IMPORT	-	-
	IMPORT+	-	-
SYSTEM	DEFAULT	-	-
	COLOR	-	-
MLC	DEFAULT	-	-
	COLOR	-	-
GRAPHIC	DEFAULT	-	-
	COLOR	-	-
SERVO	READ	-	-
SEARCH	-	-	-
CONFIG (Except Auto and MDI mode)	OK	-	-
SET RIO (Except Auto and MDI mode)	OK	-	-
PAR GROUP	SAVE	-	-
	DEL GROUP	-	-
	WRT PAR	-	-
	READ PAR	-	-
	PAR SEQ	-	-
	ALLOCATE	-	-

Software Panel (SOFT) function

(Example: without physical control panel)

Control panel functions	Program execution	Hand wheel simulation	Tool magazine forward	Spindle forward
	Stop execution	Mechanical lock	Tool magazine backward	Spindle stop
	Single step pause	Program dry run	Chip removal forward	Spindle backward
	Selection stop	Mechanical lock	Chip removal backward	
	Single step ignore	Z-axis lock	Blow air	Spindle positioning
	Cutting fluid	Working light	Program protection	Limit remove

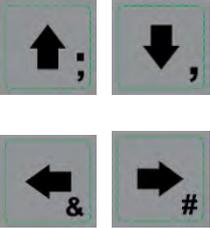
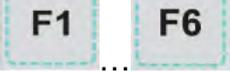
Factor adjust	Increasing	-	-	-
	decreasing	-	-	-
	100%	-	-	-
	0%	-	-	-
Axis operations	X←	-	-	-
	X→	-	-	-
	Y↗	-	-	-
	Y↘	-	-	-
	Z↑	-	-	-
	Z↓	-	-	-

Software Panel (SOFT) function
(Example: with physical control panel)

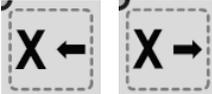
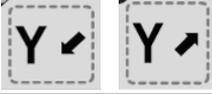
Layer 1	Layer 2	Layer 3	Layer 4
Control panel functions	Program dry run	Chip removal forward	-
	Function lock	Chip removal backward	-
	Z-axis lock	Auto power off	-
	Mechanical lock	Z-axis lock	-
	Spindle positioning	Self-define 1	-
	Blow air	Self-define 2	-

1.2 Primary control panel function keys

Name	Description	Modes that having this function
	One of the group keys. Coordinates display group key.	Every mode
	One of the group keys. Program edit group key.	Every mode
	One of the group keys. Coordinates setup and tool offset setup group key.	Every mode
	One of the group keys. Diagnosis function, system parameter, and system status group key.	Every mode
	One of the group keys. Alarm display group key.	Every mode
	One of the group keys. Path display group key.	Every mode
	Special group key. System parameter setup group key.	Every mode
	Special group key. Software control panel group key.	Every mode
	Reset key	Every mode
	Axis position and command code	PRG group
	Numeric key (computing symbol)	PRG, OFS, DGN group
	Decimal point (computing symbol)	PRG, OFS group
	Negative sign (computing symbol)	PRG, OFS group
	Page up and page down respectively	PRG, OFS, DGN group

Name	Description	Modes that having this function
	Arrow keys (Up, Down, Left and Right) (computing symbol)	PRG, OFS, DGN group
	Jump to beginning (end) of word	PRG group
	Space	PRG group
	Upper/lower case shift	PRG group
	Delete (Insert)	PRG group
	Delete letter in front of cursor	PRG group
	Enter key	PRG, OFS, DGN group
	Exit dialog box	PRG, DGN group
	Parentheses	PRG group
	Left and right function key	Every mode and group function
	Function key	Every mode and group function

1.3 Secondary control panel function keys

Name	Description
	Auto mode: The program executes the specific mode
	Edit mode: File management and program editing mode
	Jog mode: Machine tools operation mode
	Hand wheel mode: Hand wheel operates machine tools axis
	Manual mode: Simple program input and execution mode
	Homing mode: Rapidly return to home sensor
	X-axis forward, X-axis backward: In JOG mode, manually operate X-axis in forward or backward direction
	Y-axis forward, Y-axis backward: In JOG mode, manually operate Y-axis in forward or backward direction
	Z-axis forward, Z-axis backward: In JOG mode, manually operate Z-axis in forward or backward direction
	Rotation-axis forward, Rotation-axis backward: In JOG mode, manually rotate the axis in forward or backward direction
	Spindle forward: Spindle moves forward in manual control
	Spindle stop: Spindle stops in manual control
	Spindle backward: Spindle moves backward in manual control
	Cut feeding and jog ratio increasing/decreasing adjustment
	Fast feeding ratio increasing/decreasing adjustment

Name	Description
	Spindle speed ratio increasing/decreasing adjustment
	Single step pause: After enabling the function, the system stops execution when finish one single step.
	Limit release: When the limit protection is effective, it is the main key to clear the limit alarm.
	Single step ignore: Enter “ / ” in the front and press  to enable this function.
	Tool magazine forward: In safe mode, it enables the tool magazine to move one position
	Tool magazine backward: In safe mode, it enables the tool magazine to reverse one position
	Selection stop: Press  and enter M01 command to enable this function
	Hand wheel simulation: During the program execution, after enabling this function, the hand wheel can be used to control the speed
	Cutting fluid ON/OFF: The switch of switching On/Off the cutting fluid
	Working light: The switch of turning On/Off the working light

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Chapter 2: Table of function groups

2.1 Auto mode (AUTO)

The system must be set to AUTO mode before a program is executed. This enables users to validate machining program, cutting conditions, and coordinates of positions before execution as well as to avoid unexpected operation by incorrectly pressing keys in non-auto mode. In this mode, only executing program file is allowed; functions such as program editing and manually operating the axial movement are not available here.

2.2 Program edit mode (EDIT)

Program editing only can be done in EDIT mode. In EDIT mode, users may access various program editing functions available in PRG group. Please note that program execution and limiting axial operating direction are not allowed.

2.3 Manual input mode (MDI)

Users can input a single block program in the screens of PRG group and execute it in MDI mode. As most MDI programs are simple ones manually entered by users, there is no need to have too much program content. MDI's PRG group screens allow a single block program of up to 17 statements. Functions of program editing, program execution or manually operating axis directions are not available in this mode.

2.4 Hand wheel feeding mode (MPG)

In Hand wheel mode, it allows users to manually control the axis via external hand wheel. Users are able to manually control the moving direction of each axis more promptly and accurately. Functions such as program editing, program execution, and jog operation are not available in this mode.

2.5 Jog feeding mode (JOG)

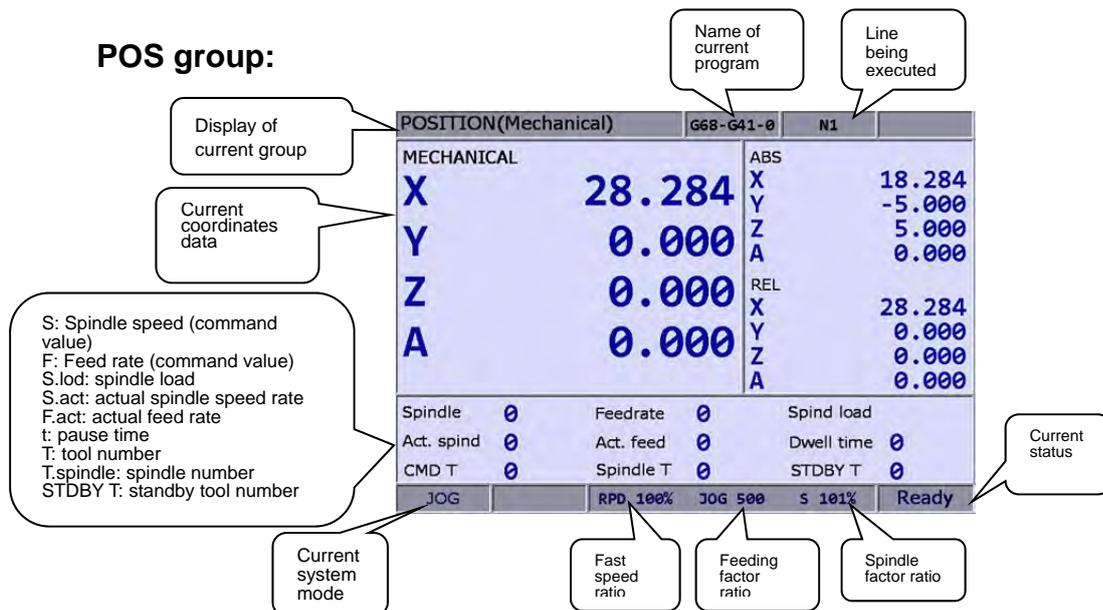
Pressing relevant axial movement keys in secondary control panel can do axial jog offset in JOG mode. The speed and distance of each jog movement is controlled by the jog factor key. With the rapid feeding activation key and axial keys, the workbench can be moved. The axial moving speed is set by the rapid factor and can enable moving the workbench in long distance of each axis. Both program execution and editing functions are unavailable in JOG mode. Only manual axial offset with relevant axial movement keys can do in secondary control panel.

2.6 Home mode (HOME)

The HOME mode simplifies the manual origin reset operation. When the system is set to Home mode, users can use axial movement keys on the secondary control panel and the axis will return to its mechanical origin. After re-starting the controller, it is required to conduct homing procedure first to make each axis return to the origin. When homing completed, program can then be executed. Otherwise, the controller stops the program execution function.

2.7 Group screen overview

Screens of function groups of this controller provide a full range of information. Some of the screens of each group are illustrated below.



As shown in the figure above, the system status column tells the status of this system for the controller user's reference. Valid statuses of the system in terms of priority are: MLC stop, servo not ready, emergency stop, in process, in operation, program stop, and preparation completed.

PRG group: (auto mode)

The screenshot shows the 'PROGRAM(Program execute)' screen. Callouts identify the following elements:

- Name of current program:** 037
- Line being executed:** N1
- Display of current group:** PROGRAM(Program execute)
- Program content being executed:** The list of G-code lines (N10 to N90).
- Information of each coordinate that has been executed:** The table showing MECH, ABS, RESIDUAL, and G54 coordinates.
- Current system mode:** AUTO
- Each current motion rate:** RPD 100%, F 30%, S 101%
- Legend:** F.act: actual feed rate, S.act: actual spindle speed, D: tool radius compensation ID, H: tool length compensation ID, T: tool ID, F: Feed rate, S: Spindle speed, t: pause time, CYC: Single processing time.
- Current command status:** M00 G00 G17 G90 G23 G94 G21 G40 G49 G80 G98 G50 G64 G69 G15 G54

MECH	ABS	RESIDUAL	G54
X 28.284	X 18.284	X 0.000	X 10.000
Y 0.000	Y -5.000	Y 0.000	Y 5.000
Z 0.000	Z 5.000	Z 0.000	Z -5.000
A 0.000	A 0.000	A 0.000	A 0.000

Program edit mode:

The screenshots show the 'PROGRAM(File manage)' and 'PROGRAM(File edit)' screens. Callouts explain the following elements:

- File list:** A list of files with columns for Name, Size, Date, and Time.
- File information:** Data on size of file/folder, modification date and time, etc.
- File contents:** The G-code statements contained in the selected file.

CF:	Size	Date	Time
00819.NC	497 KB	2008/06/30	04:51
01433.NC	24 MB	2011/12/08	15:33
0102-GMC	6 MB	2012/07/25	14:54
00920.NC	335 KB	2008/02/05	00:02
01453.NC	24 MB	2012/04/16	18:13
00422	189 B	2012/06/27	18:50
015.NC	144 B	2012/06/21	11:15
01044.NC	115 B	2008/03/11	07:27
03007	271 KB	2012/02/23	18:27
00401	276 B	2012/03/26	13:58
0447	367 B	2012/07/31	16:39
037	271 KB	2012/05/15	13:05
02005	84 B	2013/01/29	09:51

PROGRAM(File edit)	037	N1	SFT
00037			
N10 G00 G57 Z 0.25000			
N20 G00 X 0.36264 Y 0.34746			
N30 G01 Z-0.10000 F 200.			
N40 G01 X 0.33430 Y 0.37996 F500.00			
N50 G01 X 0.31345 Y 0.41995			
N60 G01 X 0.29428 Y 0.48578			
N70 G01 X 0.29178 Y 0.55160			
N80 G01 X 0.30345 Y 0.61243			
N90 G01 X 0.33179 Y 0.66909			
N100 G01 X 0.36931 Y 0.72325			
N110 G01 X 0.41432 Y 0.76741			
N120 G01 X 0.46851 Y 0.80741			
N130 G01 X 0.52770 Y 0.83990			
N140 G01 X 0.55354 Y 0.85157			
N150 G01 X 0.58189 Y 0.86157			
N160 G01 X 0.61023 Y 0.87073			

Manual input mode:

PROGRAM(Program execute)		MDI	N1	
G00G90G40G49G17			ABS	
G58X0.0Y0.0			X	18.284
G01X100.0Y0.0F1000			Y	-5.000
X100.0Y100.0			Z	5.000
X0.0Y100.0			A	0.000
M30			RESIDUAL	
			X	0.000
			Y	0.000
			Z	0.000
			A	0.000
M00	G00	G17	G90	G23
G54			G94	G21
F 0	S 0	D 0	H 0	T 0
			t 0	
MDI		RPD 100%	F 30%	S 101%
				Ready

Manual mode

Coordinates information

Display the information of absolute/remaining coordinate

The information of feed rate, spindle speed and compensation

Command status

OFS group: (coordinates system data)

OFFSET(Set coord system)		037	N1	
OFFSET		G54	MECH	REL
X	0.000	X 0.000	X 28.284	X 28.284
Y	0.000	Y 0.000	Y 0.000	Y 0.000
Z	0.000	Z 0.000	Z 0.000	Z 0.000
A	0.000	A 0.000	A 0.000	A 0.000
G55		G56		
X	55.000	X 56.000		
Y	55.000	Y 56.000		
Z	-55.000	Z -56.000		
A	0.000	A 0.000		
AUTO		RPD 100%	F 30%	S 101%

Coordinates system setup
Offset coordinates /G54-G59

Coordinates information
Mechanical/relative coordinates

Tool data:

OFFSET(Cutter register)		037	N1		
Num	Length	Radius	Len wear	Rad wear	LIFE
1	-50.000	1.000	0.000	0.000	1
2	-100.000	5.000	-1.000	-0.500	0
3	-100.000	3.000	0.000	0.000	0
4	-100.000	4.000	0.000	0.000	0
5	0.000	5.000	0.000	0.000	0
6	-60.000	6.000	0.000	0.000	0
7	-70.000	7.000	0.000	0.000	0
8	-80.000	8.000	0.000	0.000	0
9	-90.000	9.000	0.000	0.000	0
10	-100.000	10.000	0.000	0.000	0
11	-110.000	11.000	0.000	0.000	0
12	-120.000	12.000	0.000	0.000	0
13	0.000	13.000	0.000	0.000	0
14	-140.000	14.000	0.000	0.000	0
15	-150.000	15.000	0.000	0.000	0
		MECH	Z	0.000	
AUTO		RPD 100%	F 30%	S 101%	Ready

Compensation ID (H/D)

Compensation data
Tool length and radius as well as length and radius compensation

Compensation data input column

Auxiliary display
Display current mechanical coordinates and actual position of the Z-axis

Gain adjustment:

The screenshot shows the 'DIAGNOSE(Servo Tuning)' interface. At the top, it displays '037', 'N1', and 'SFT'. Below this, there are fields for 'Ch' (0), 'Axis' (X), 'Current' (0%), and 'JL/Jm' (0.0). A table lists parameters with their 'Calculate' and 'In Drive' values. To the right, there are input fields for 'MECH' (28.285), 'POS 1', 'POS 2', 'Rigidity' (1), 'BW' (100 Hz), 'JL/Jm' (4.0), 'Acc. Time' (200 ms), 'S Time' (20 ms), 'Speed' (3000 mm), and 'Interval' (500 ms). Buttons for 'JOG' and 'Ready' are at the bottom.

Callouts:

- Servo parameter ID / Servo parameter ID and name:** Points to the 'No.' and 'Parameter Name' columns of the parameter table.
- Anchor point setup / Anchor point 1 / Anchor point 2:** Points to the 'POS 1' and 'POS 2' input fields.
- Adjustment conditions:** Points to the 'Acc. Time', 'S Time', 'Speed', and 'Interval' input fields.
- Calculation result after adjustment / Display calculation result of auto gain:** Points to the 'Calculate' column of the parameter table.
- System existing settings / Display active servo settings:** Points to the 'In Drive' column of the parameter table.

MLC operation/edit:

The screenshot shows the 'DIAGNOSE(MLC Edit)' interface. It displays a ladder logic diagram with components like M500, M67, M68, M1088, X257, X258, X259, X260, VRT D1, and MOV instructions. The status bar at the bottom shows 'LD M500', 'R:0, C:1', '1513/10240', and 'Ready'.

Callouts:

- MLC program:** Points to the ladder logic diagram.
- Input column:** Points to the input components (X257, X258, X259, X260) in the diagram.

Chapter 3: POS group

The POS group function is for displaying different coordinates, including data on mechanical, absolute, and relative coordinates. The display can up to three straight line axes and one rotation axis based on the settings of the number of rotation axes.

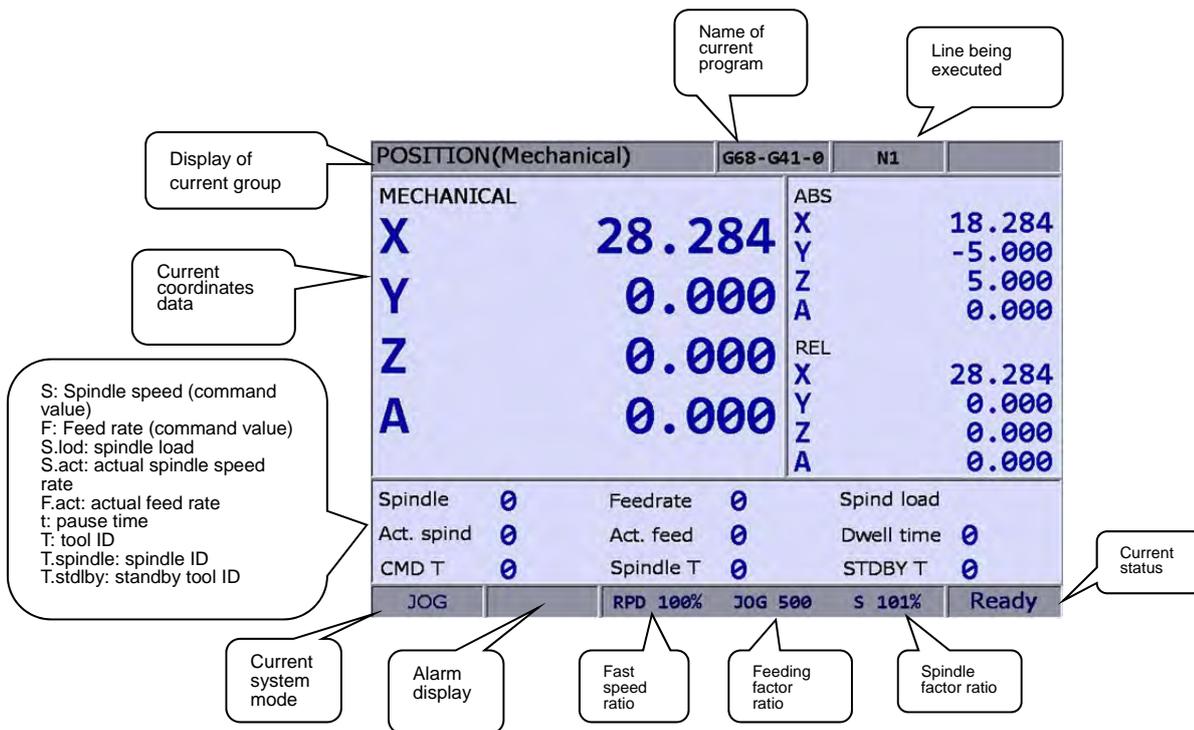


Figure: 3-1-1

3.1 Absolute coordinates

The absolute coordinate value is displayed based on the origin of the G code. Coordinate-values are used to validate the movement position of a single block. See below for operation details:

- Press the **POS** key to enable the display of coordinate group function, namely absolute coordinates, relative coordinates, and mechanical coordinate options on the function bar.
- Press the **F1** key (ABS) to enter the absolute coordinates screen.

3.2 Relative coordinates

The relative coordinates indicate the moving distance from the origin.
See below for operation details:

- (1) Press the  key to display the coordinate group function. Items such as absolute, relative, and mechanical coordinates are shown in the function bar.
- (2) Press the  key (REL) to enter the relative coordinates screen.
- (3) Press the  key (CLR ALL) in the lower layer function bar to clear relative coordinate value of all axes.
Press the  key (CLR X) to clear the relative coordinate value of the X-axis.
Press the  key (CLR Y) to clear the relative coordinate value of the Y-axis.
Press the  key (CLR Z) to clear the relative coordinate value of the Z-axis.
Press the  key (CLR A) to clear the relative coordinate value of the A-axis.
Press the  key (CLR B) to clear the relative coordinate value of the B-axis.
Or press the  key (CLR C) of the next page to clear the value shown on relative coordinates of the C-axis.

Note: Clear function for X-, Y-, Z-, A-, B-, and C-axis is displayed only when they are set to correspond to actual axes.

3.3 Mechanical coordinates

The mechanical coordinate data is defined based on the real mechanism. This data is unchangeable and cannot be cleared. And this data does not vary with the selected workpiece coordinates.

See below for operation details:

- (1) Press the  key to enable the coordinate group function display. Items such as absolute, relative, and mechanical coordinates are shown in the function bar.
- (2) Press the  key (MECH) to enter the mechanical coordinates screen.

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Chapter 4: PRG group

The PRG group manages and edits G code and macro files. The file explorer is divided into three sections: (1) CF Card, internal memory, USB drive, and network; (2) folders and G code files; (3) G code files only. Each section has its exclusive functions, e.g. breakpoint search function under auto mode and program entry and execution under manual mode. Program modification and management functions are also provided here, including program file management and editing.

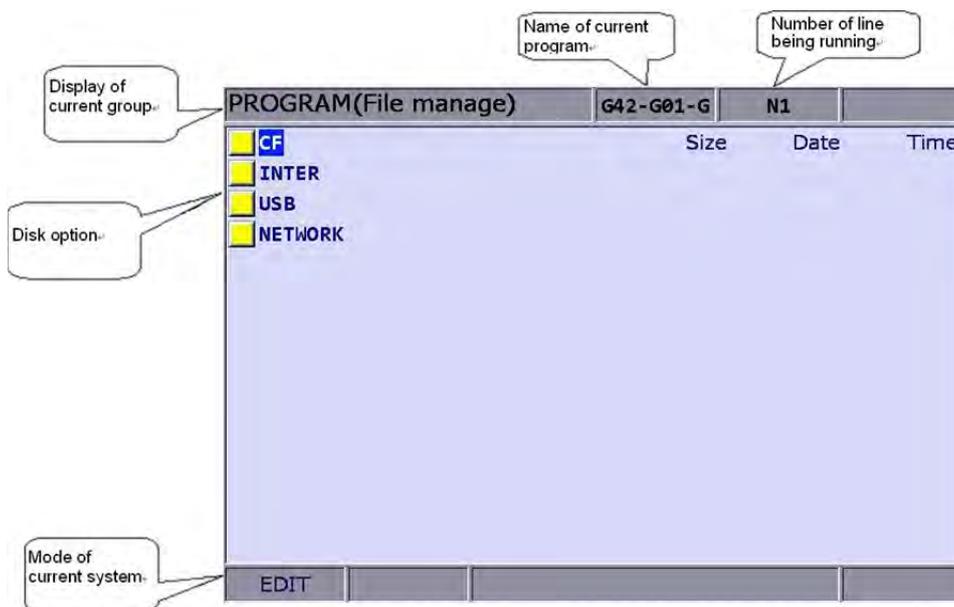


Figure 4-0-1

- (1) Switch to **Edit mode**, press the  key in primary control panel and displays the screen of [Program Function].

- (2) Press   or   keys to move the cursor in the file explorer screen and press the  key to enter the sub-manager screen to select G code files.

- (3) Select the desired G code file, press the  key to enter the file editing screen. Then, press   keys (scrolling one line up or down) or   keys (scrolling twenty lines up or down) to show the file contents.

Network setup parameters		
Code	Name	Range or Formats
10030	Host name	Length: 1 ~ 8 Actual setting: 1 ~ 8 characters
10031	IP address	Length: xxx · xxx · xxx · xxx Actual setting: 192 · 168 · 0 · 2
10032	Subnet mask	Length: xxx · xxx · xxx · xxx Actual setting: 255 · 255 · 255 · 0
10033	Default gateway	Length: xxx · xxx · xxx · xxx Actual setting: 0 · 0 · 0 · 0
10034	Network function ON	Length: 0 ~ 1 Actual setting: 1
10035	DHCP ON	Length: 0~1 Actual setting: 0
10036	IP address of remote computer 1	Length: xxx · xxx · xxx · xxx Actual setting: 192 · 168 · 0 · 1
10037	IP address of remote computer 2	Length: xxx · xxx · xxx · xxx Actual setting: 0 · 0 · 0 · 0
10038	IP address of remote computer 3	Length: xxx · xxx · xxx · xxx Actual setting: 0 · 0.0 · 0
10039	IP address of remote computer 4	Length: xxx · xxx · xxx · xxx Actual setting: 0 · 0 · 0 · 0
10040	IP address of remote computer 5	Length: xxx · xxx · xxx · xxx Actual setting: 0 · 0 · 0 · 0
10041	IP address of remote folder sharing	Length: 0 ~ 5 Actual setting: 0

Communication protocol of PC: Set up TCP/IP in Networking of the operating system (see Figure 4-1-2) or **CNC Network software → Setup**

Network setup in PC operating system:

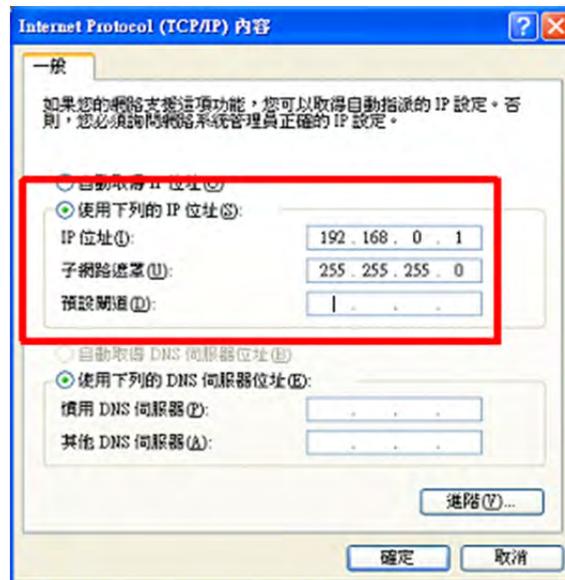


Figure 4-1-2

- Steps:** (a) Check "Use the following IP address" option then enter in sequence:
"IP address": **192 . 168 . 0 . 1**
"Subnet mask": **255 . 255 . 255 . 0**
(b) Press OK to complete the setting.

Network setup for Network software:

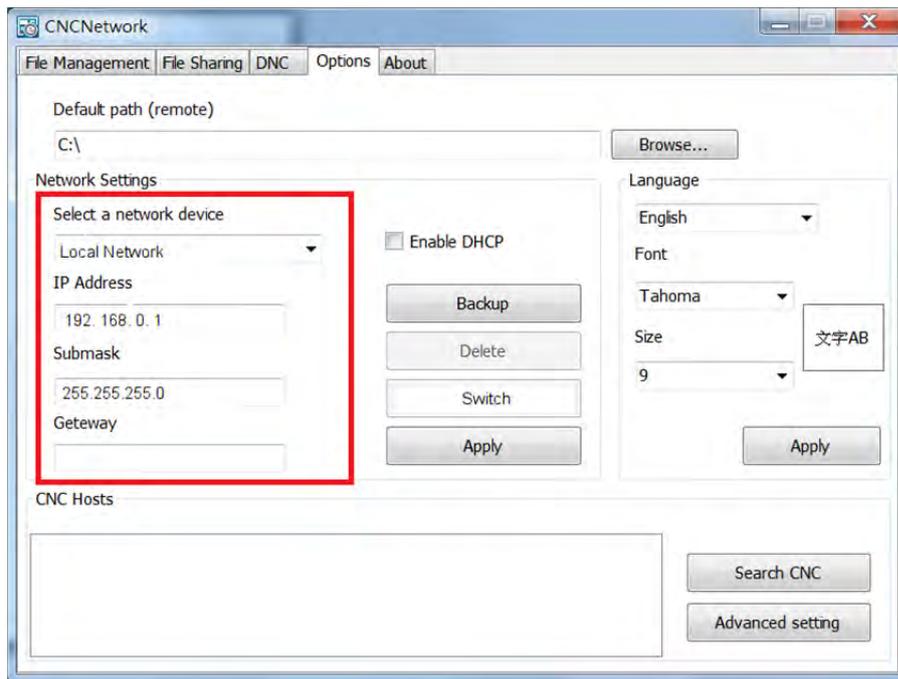


Figure 4-1-3

- Steps:** (a) Start the CNC Network software. Enter the Setup screen and enter the settings listed below in sequence:
"IP address": **192 . 168 . 0 . 1**
"Subnet mask": **255 . 255 . 255 . 0**
- (b) Press "Search CNC" to connect with the CNC based on the settings given here.

■ **DNC connection:**

Through Network software, users may open the shared files in file sharing list. Then, execute G code in transmission-along-with-machining (DNC) mode via Ethernet.

No extra disk space is required for file storage as only the path of shared files is recorded.

See the operation steps described below:

1. Complete the Ethernet communication setting for connection between PC and NC300 system.
2. Start the CNC Network software.
3. Click the Function bar - **DNC operation tab**.



Figure 4-1-4

4. Enter the "**EDIT mode**" of NC300 system then enter the top layer NETWORK\Option in file explorer.



Figure 4-1-5

5. After the shared file is displayed, select and open the G code file that has been set to share from the shared file.
6. Set NC300 to "Auto mode" then execute **Cycle start** to start running the G code file with DNC connection. The execution method is the same as the general file.
7. During DNC execution, file information can be displayed in the window of **DNC** provided by CNC Network software. The information includes name of connected system, name of running DNC file, total number of lines, executing line number and file contents. (File contents scroll down along with the execution progress as shown in Figure 4-1-6).

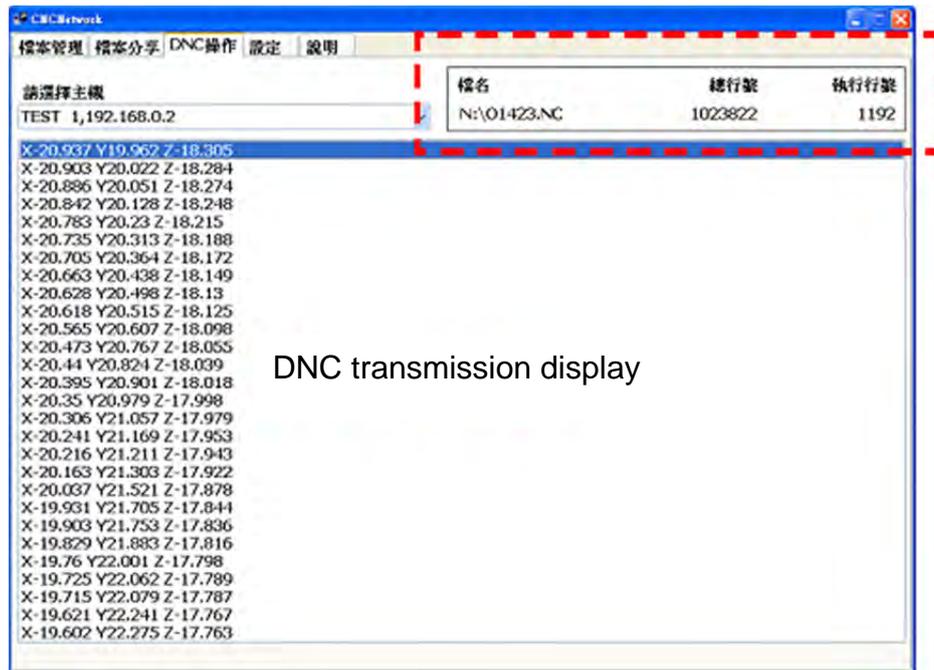


Figure 4-1-6

4.2 Add (create new file)

Users may use the Add function in "Edit mode" to create a new G code file from the controller interface. See the operation steps described below:

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to the screen of [PROGRAM].

(3) In the screen of [File manage], press  or  or  or  keys to move the cursor to the destination of the disk for file creation (e.g. the 2nd or the 3rd layer in CF or USB directory).

(4) Press the  function key to display the function on next page.

(5) Press the  key (NEW file) and the dialog box for file name will pop up.

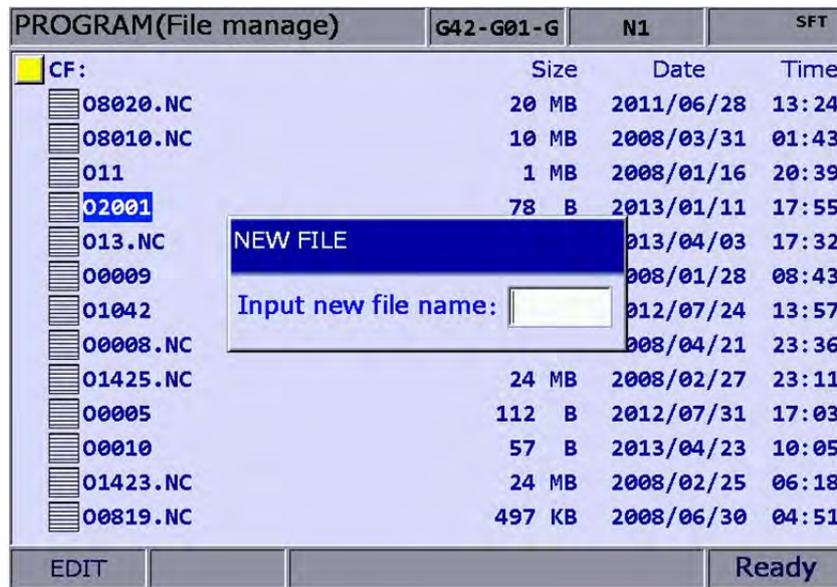


Figure 4-2-1

(6) Type alphanumeric letters (symbols are not included) in the box and press the

 key to create a new file.

Format of file name:

File format specifications	
Format of machining file name (G code)	No restriction on format of master file name (file name must be unique in one directory) O + 0001 ~ 8999 (for subroutines)
Format of macro file name (O Macro)	O + 9000 ~ 9999
Remarks in file name	Suffix a '-' symbol in the file name along with more alphanumeric letters
Allowable format of filename extension	.NC .ANC .CNC .PIM .TAP .PTP .UOO .DEMO
Format of M macro file name	M + 10000 ~ 29999
Format of G macro file name	G + 30000 ~ 49999
Maximum length of file name	31 (characters)
Storage location	Second and third management layer
Restriction symbol in file name	* / \ < > ? " :

Note:

- File name must be unique in one directory, e.g. O0001 and O1 are regarded as the same.
- Only the machining files are displayed in the screen of [File manage]. The macro files display only upon special permission.
- G code file name may include multiple decimal and the last decimal shall follow the naming rule; e.g. 1.1.1.1.**NC**.

4.3 Copy

This function enables users to copy existing files in the disk drive. See the operation steps described below:

- Set the system to "**EDIT mode**".

- Press the  key to switch to the screen of [PROGRAM].

- In the screen of [File manage], press ; , or   keys to move the cursor to the destination of the disk for file creation (e.g. the 2nd or 3rd layer under the CF or USB directory).

- Move the cursor to the target file to be copied.

- Press the  key (Copy file) to copy the file. Please note that it is required to execute the "Paste" function to create the target file.

4.4 Paste

As described in Section 4-3, it is required to execute this function together with the Copy function to copy a file. This function is one of the management functions of PRG Group. See the operation steps described below (continued from Section 4-3).

- (6) Press   or   keys to move the cursor to the disk, data directory or layer of the target file.
- (7) Enter the directory of the target file, press the  key (Paste). Then, enter a new name or use the old name of the target file in the popup dialog box. Press the  key and file copying and pasting is done.

Note:

- (a) Please note that if the newly copied file exists in the same directory, then its name must differ from the source one.
- (b) The system prompts an information box with the message 'Please copy a file at first' if no copy operation has been done beforehand. The file past function has no effect.
- (c) Files in the USB disk can be copied and pasted to CF card with the steps described above.

4.5 Delete (for files and folders)

This function deletes files and folders at the second layer of [File manage]. See the operation steps described below:

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to the screen of [PROGRAM].

(3) In the screen of [File manage], press  or  or   keys to move the cursor and press the  key to enter the disk location and data layer of the file or folder to be deleted.

(4) Point to the file or folder to be deleted.

(5) Press the  key (DEL) and the "Do you really want to delete?" dialog box will pop up. Press "Y" and the  key to delete the selected file or folder.

Note: The deleted file cannot be recovered by undoing the delete operation.

4.6 Select/Deselect multiple files

In addition to single file operation, users may use the select/deselect function key from the function bar in [File manage] screen to select/deselect multiple files for copying or deleting.

See the operation steps described below:

- (1) Set the system to "EDIT mode".



- (2) Press the PRG key to switch to the screen of [PROGRAM].

- (3) Enter the file directory for selecting multiple files.

- (4) In the screen of [File manage], use ; keys or keys to move the cursor to the desired files. Press the key (SEL TOGL) to select or deselect the file (see Figure 4-6-1). Press the key (SEL ALL), all files will be selected. For files that have been selected, pressing the key (CANCEL ALL) will cancel their selection.

PROGRAM(File manage)		G42-G01-G	N1	
CF:\POSITION	Size	Date	Time	
05405-1	1019 B	2012/07/20	10:07	
05405-2	330 B	2012/07/20	10:13	
05406-1	164 B	2012/07/24	09:03	
05406-2	164 B	2012/07/24	09:09	
1000	156 B	2012/08/30	14:35	
1111	65 B	2012/09/10	16:48	
1112	56 B	2012/07/10	16:45	
1113	65 B	2012/08/10	17:23	
1001	93 B	2012/09/04	15:07	
5401-01	303 B	2012/11/02	13:35	
G54-G28	499 B	2012/07/09	14:30	
G54-G28-1	753 B	2012/06/29	15:39	
05401	286 B	2012/06/26	08:53	

Figure 4-6-1

- (5) Press the key (Copy file) to copy multiple files.

(6) Move the cursor to another directory. Press the  key (Paste) to paste multiple files as shown in Figure 4-6-2.

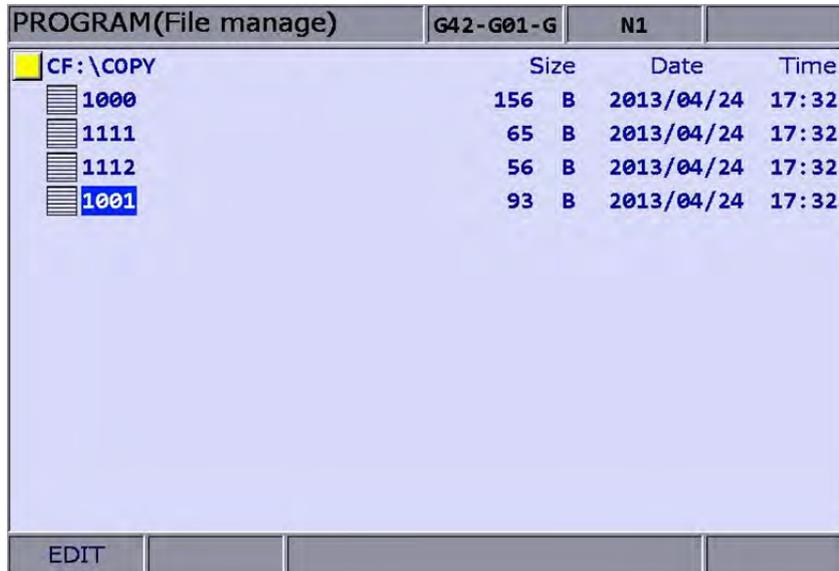


Figure 4-6-2

See the operation steps described below for deleting multiple files:

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to the screen of [PROGRAM].

(3) Enter the file directory for selecting multiple files.

(4) In the screen of [File manage], use ;  keys or   keys to move the cursor to the desired files. Press the  key (SEL TOGL) for selection. For files that have been selected, pressing the  key (SEL TOGL) again will cancel the selection.

(5) Press the  key (DEL) and the dialog box for confirmation will pop up (see Figure 4-6-3). Press "Y" and the  key to delete the selected files.

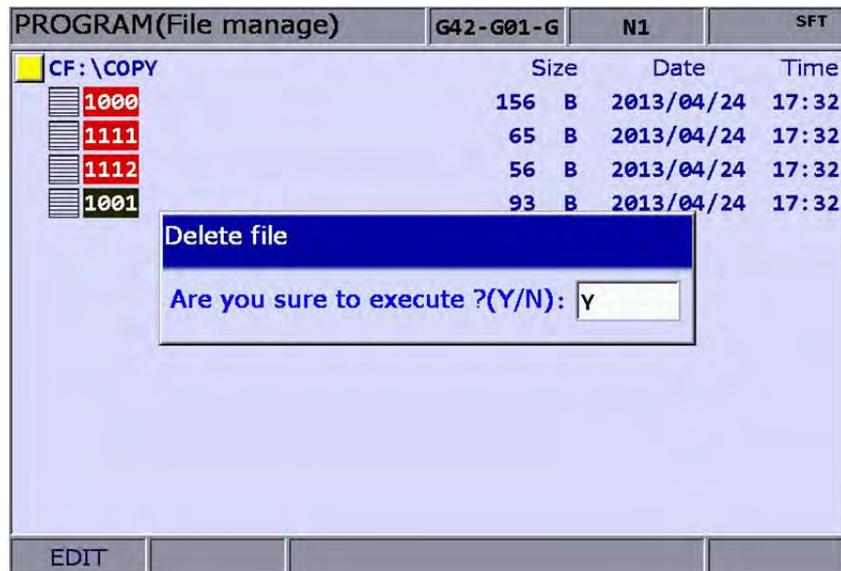


Figure 4-6-3

Note:

- (a) After copying multiple files in one directory, users shall paste them to another folder, which the path has to be different. If trying to copy multiple files in the same folder, the system prompts users to select another destination path and ignore the pasting operation.
- (b) When there are duplicated file names while copying multiple files, the NC300 numerical control system prompts users with an overwrite option dialog box. Users can select "Y" (yes) to overwrite the existing file, or select "N" (no) or press the "EXIT" key to ignore the pasting operation.

4.7 Rename

Use this function to change the name of existing files. See the operation steps described below:

(1) Set the system to "**EDIT mode**".

(2) Press the  key to switch to the screen of [PROGRAM].

(3) In the screen of [File manage], press ; , or   keys to move the cursor to the disk location and data layer for file creation (e.g. the 2nd or 3rd layer in the CF or USB directory).

(4) Press the  key to switch to the function bar at next page.

(5) Move the cursor to the file that you wish to rename. Then, press the  key (RENAME) and the dialog box for file name input will pop up.

(6) Enter a new name of the file which differs from any file in the directory and press the  key.

Note:

- (a) A G code file can be added in layer two or three but not layer one in [File manage].
- (b) The naming format for renaming and naming for new file follows the same rule. If user enters a name that already exists in the directory, an error message will pop up and the renaming will be invalid.

4.8 Create directory (Add folder)

New directory for G code files can be created in the second manage layer in [File manage]. That is, the second layer of [File manage] may contain both directory folders and G code files.

See the operation steps described below:

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to the screen of [PROGRAM].

(3) Press the  key to switch to the function bar at next page.

(4) Press the  key (FOLDER) in the second layer of the [File manage], the dialog box for entering directory name will pop up.

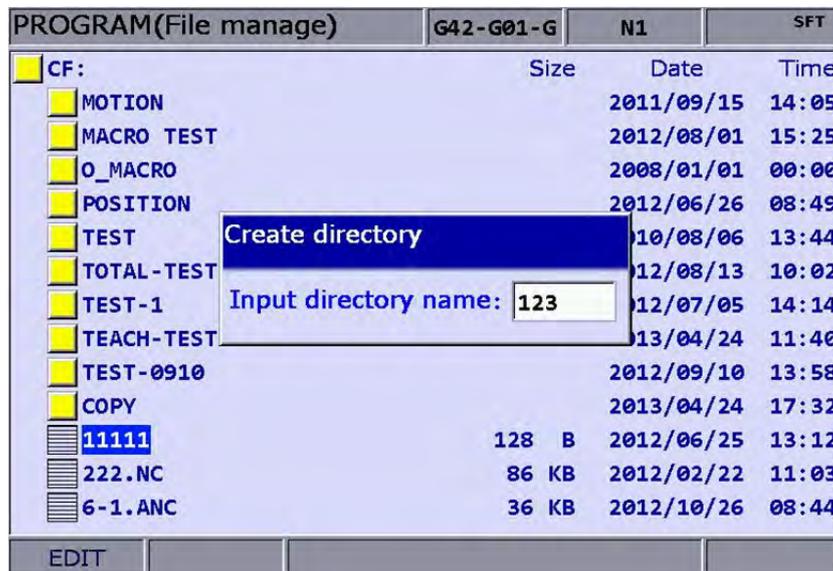


Figure 4-8-1

(5) Enter the name of the directory and press  key to complete the creation.

This creates a new directory in the second layer of [File manage]. Users now can do file creation and editing of files (such as G code files) at the third layer of [File manage].

Format of directory name:

Format of directory name	
Format of directory file name	Any alphanumeric letter
Maximum length of directory name	31 (characters)
Storage location	The 2nd management layer

4.9 File searching

This function enables users search among many files and open a desired G code file. With a given file name users can search and open files quickly.

- (1) Set the system to "EDIT mode".

- (2) Press the  key to switch to screen of [PROGRAM].

- (3) In the screen of [File manage], press  ;  keys or   keys

to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

- (4) Press the  key to switch to the function bar at next page.

- (5) Press the  key (FIND FILE) and the dialog box will pop up. Enter the desired file name in the box and press the  key to search and open the target file.

Note:

- (a) Instead of searching all directories, this file searching function is limited to one directory.
- (b) To find the correct file and open it, please enter the complete and exact file name you wish to search for.

4.10 File merge

This function copies and merges two G code files into one.
See the operation steps described below:

- (1) Set the system to "EDIT mode".

- (2) Press the  key to switch to screen of [PROGRAM].

- (3) In the screen of [File manage], press  ,  keys or   keys

to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

- (4) Select the G code file that desire to copy.

- (5) Press the  key (COPY FILE) to save the file in the system's clipboard.

- (6) Move the cursor to the directory of the target file to be merged.

- (7) Press the  key to switch to the function bar at next page.

- (8) Press the  key (MERGE) and the dialog box will pop up. Enter the

desired file name and press the  key to open the target file.

- (9) Move the cursor to the location in the target file to paste the source file. Press

the  key (Paste) to merge both files.

- (10) Execute auto save, either by switching mode, opening other files or pressing the RESET key, to complete the merge operation.

4.11 Sequencing

Users can arrange the sequence of directory and files by applying this function. This brings convenience when searching or managing files.

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to screen of [PROGRAM].

(3) In the screen of [File manage], press   keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

(4) Press the  key to switch to the function bar at next page.

(5) Press the  key (SEQUENCE) to display the function bar to the second row of the function page.

(6) Press the  key (NAME) and then the directory and file will be displayed by the sequence of number > English (from top to bottom). Press the  key (NAME) again, the displayed sequence will be English > number (from top to bottom).

(7) Press the  key (SIZE) and the file displayed sequence will start from small > large (from top to bottom). Press the  key (SIZE), the sequence will be large > small (from top to bottom).

(8) Press the  key (DATE) and then the directory and file will be displayed by the sequence of most recent > earlier (from top to bottom). Press the  key (DATE) again, the sequence will be earlier > most recent (from top to bottom).

4.12 Convert DXF files

This is the interface of file manager for DXF file. Users can select the DXF file first. Then, enter the parameters values to convert the DXF file to the G code file.

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to screen of [PROGRAM].

(3) Consecutively press the  key to switch the function bar to the third row of the function page in this layer.

(4) Press the  key (DXF) to display the interface of DXF file explorer.

(5) In the screen of [File manage], press ;  keys or   keys

to move the cursor and press the  key to select the DXF file to be converted.

(6) Then, a dialogue box will pop up and ask users to enter the value. See the figure below.

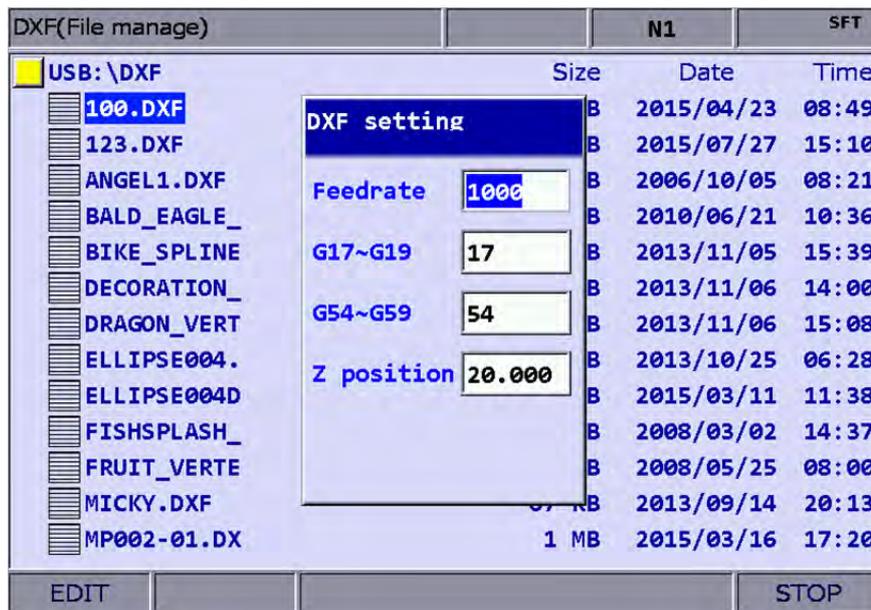


Figure 4-12-1

(7) When you complete the setting of parameters values, press the  key and an input box of "Enter new filename" will pop up.

(8) Then, press the  key to convert DXF file and G code file is stored in CF directory.

(9) Now, users can execute the G code file that is just converted from DXF file.

4.13 Macro file

This function manages and edits equipment-specific macro files. With the permission, users can use all the edit functions to manage and edit macro files as described in **Section 4.14**. Otherwise, users can only browse existing macro files but cannot view or edit the contents. **Please contact the local service provider for permission for macro file editing.**

4.14 File editing

The edit group function enables users to edit and manage G code files. After a G code file is opened in the screen of [File manage], it will switch to the page for file editing. Move the cursor to any location in the file and then use the text, number, or edit keys in primary control panel to edit as required. After the editing is completed, switching mode, pressing the RESET key or open other files will automatically save the file. See the steps described below for file editing:

- (1) Set the system to "EDIT mode".

- (2) Press the  key to switch to screen of [PROGRAM].

- (3) Press   keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

- (4) Select the desired G code file and press the  key to open the file and enter edit mode.

- (5) Use     keys to move the cursor to any location in the file.
- (6) Press the text, number, and edit keys in primary control panel to edit as required.
- (7) Save the changes by performing auto save operations, either by switching mode, opening other files, or pressing the RESET key.

Edit function specifications:

Edit function specifications	
The maximum number of characters per line	255 (characters)
Available editing modes	Edit mode
Size limit of editable files	Only the file with size less than 3MB can be edited.

Note:

- (1) The edit relevant function bar displays only when entering the "edit mode" of the file management or edit function. Otherwise, in non-edit mode, the PRG group function provides views and coordinates information display of currently open files only.
- (2) Users can insert the string to “ () ” in the end each block in G code file as the note. “ () ” cannot be placed at the front of the command block. Or the block will be regarded as the note and be ignored.

4.14.1 Search by line number

This function enables users to search contents in running G code files by line number. See the steps described below for file editing:

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to screen of [PROGRAM].

(3) Press ;  keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

(4) Select the desired G code file. Then, press the  key to open the file and enter the screen for file editing.

(5) Press the  key to switch to the function bar at next page.

(6) Press the  key (LABEL) and the dialog box for entering line number (key pad 0 ~ 9) will pop up.

(7) Enter the desired line number and press the  key. The cursor will move to the given line number and finish searching.

Line number search specifications

Line number search specifications	
Maximum length of searching string	62 (characters)
Format of searching string	Actual line number of program (key pad 0~9)

4.14.2 Search by strings

This function enables users to search the program by strings. Searching results vary with the fuzziness of keywords. The searched string can also be replaced by the new one that you entered.

See the steps described below for file editing:

- (1) Set the system to "EDIT mode".

- (2) Press the  key to switch to screen of [PROGRAM].

- (3) Press ;  keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

- (4) Select the desired G code file. Then, press the  key to open the file and enter the screen for file editing.

- (5) Press the  key to switch to the function bar at next page.

- (6) Press the  key (STRING) and the dialog box for entering the string will pop up. See the figure below.

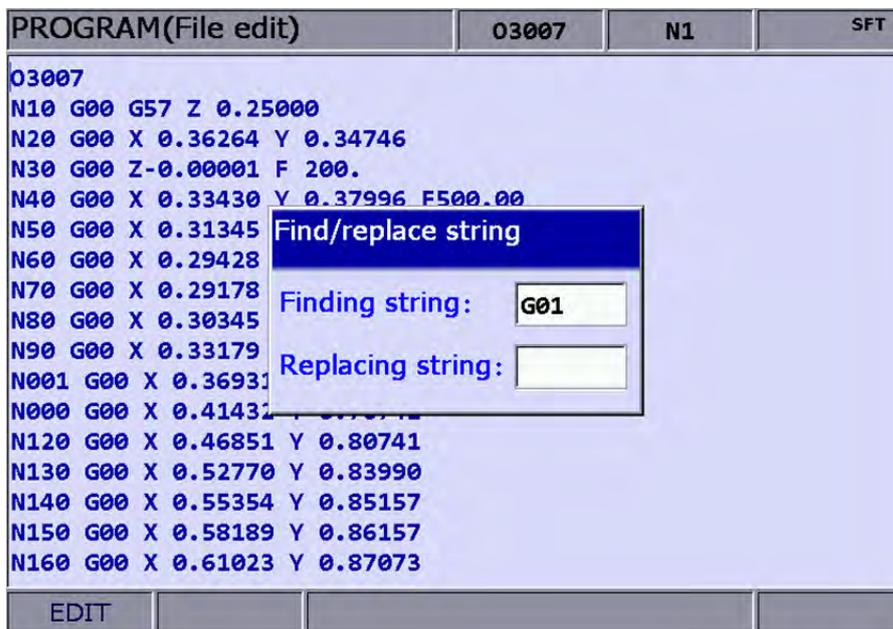


Figure 4-14-1

- (7) Enter the desired string to be searched and replaced and press the  key. The cursor will move to where the string occurred in the file.

- (8) The string will be highlighted in block and the 'Forward', 'Backward', 'Replace' and 'Replace all' options are displayed in the function bar.

- (9) Repeatedly press the  key (NEXT) to search the next match. Press the



key (PREV) to search the previous match.

- (10) Press the  key (REPLACE) and the system will replace one single string by the one you entered. Or you can press the  key (REPLACE ALL) to replace all strings that match to the searched one.



- (11) Press the  key to exit the string search page. The function bar resumes displaying options of file editing
- (12) Please remember to save the editing result (It can save the file by switching modes, pressing 'RESET' or opening another file.)

String searching specifications

String searching specifications	
Available editing modes	Edit mode
Size limit of editable files	Only the file with size less than 3MB can be edited.

4.14.3 Block starting/ending point

This function simplifies file editing in case a large section of program modification is required. Users can define a block by defining its starting and ending point with the cursor then edit the block with delete, copy and paste functions.

See the steps described below:

- (1) Set the system to "EDIT mode".

- (2) Press the  key to switch to screen of [PROGRAM].

- (3) Press  ;  keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

- (4) Select the desired G code file. Then, press the  key to open the file and enter the screen for file editing.

- (5) Press the  key (B start) to set the current cursor position as the starting point of the block.

- (6) Use  ;  ,  &  # keys to move the cursor to the position as desired block end.

- (7) Press the  key (B end) to set the current cursor position as the end of the block. See the figure below.



Figure 4-14-2

- (8) Follows step (5) ~ (7) and press the  key (DEL) to delete the text in the given block.

(9) Follows step (5) ~ (7) and press the  key (Copy) to copy text in this block.

Move the cursor to the desired area for pasting and press the  key (Paste) to paste the selected text.

4.14.4 Delete (lines and blocks)

This function deletes the entire line where the cursor is located or the block set up earlier. It also can delete the text of the entire block with the setting of block at starting and ending points.

See the steps described below:

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to screen of [PROGRAM].

(3) Press ;  keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

(4) Select the desired G code file. Then, press the  key to open the file and enter the screen for file editing.

(5) Move the cursor to the line to be deleted and press  key (DEL) to delete the entire line.

(6) Delete a program block in the same way as described in **Section 4-14-3**. See step (8) for defining the starting and ending points of a block.

4.14.5 Copy and paste (line and block)

Move the cursor to the desired line. Then, press the copy function key and paste the text to the selected location; both copy and paste keys have to be used to fulfill the function. It allows users to copy the text in a single line but also the entire block.

See the operation steps described below:

(1) Set the system to "EDIT mode".

(2) Press the  key to switch to screen of [PROGRAM].

(3) Press ;  keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.

(4) Select the desired G code file. Then, press the  key to open the file and enter the screen for file editing.

- (5) Move the cursor to the desired line for copying and press the  key (Copy).
- (6) Move the cursor to the target location and press the  key (Paste) to paste the line.
- (7) The entire block can be copied as described in **Section 4-14-3**. See step (9) for defining the starting and ending points of a block.

4.14.6 Undo

Users can press the 'undo' key to cancel previous editing operations for up to seven steps.

See the steps described below:

- (1) Set the system to "**EDIT mode**".
- (2) Press the  key to switch to screen of [PROGRAM].
- (3) Press ;  keys or   keys to move the cursor and press the  key to go to the destination in the second or third layer in the disk.
- (4) Select the desired G code file. Then, press the  key to open the file and enter the screen for file editing.
- (5) Press the  key (Undo) to undo the last action.

4.15 Other mode functions

Auto mode (AUTO):

After entering the PRG group screen, the contents of the currently opened G code file will be displayed. Users will be able to view the status information of the currently opened/executed file as well as the line being executed. The PRG group function in auto mode displays information relevant to program execution and coordinates of movements during program running.

See the operation steps described below:

- Press **PRG** key in "Auto mode" to display status of program running in full screen as illustrated in the figure below.

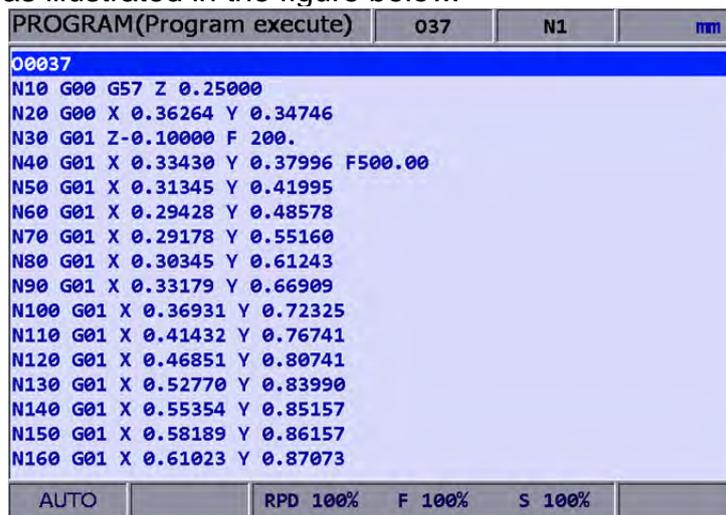


Figure 4-15-1

- Press the **PRG** key again to switch to the screen which displays both program and coordinates. See the figure below.

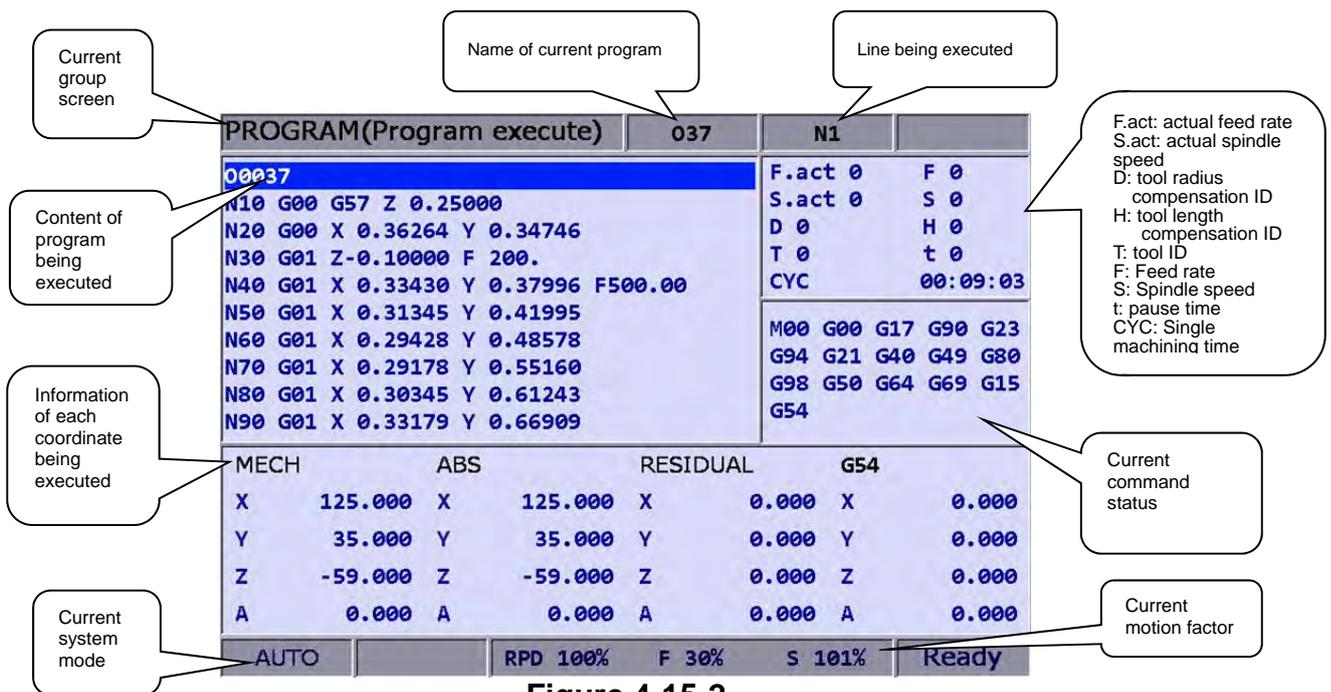


Figure 4-15-2

When program is stopped, the **breakpoint search function** (Search) in auto mode automatically records the line number where it is stopped (see DGN_system information for relevant information screen). ; it will quickly do the computing and execute the program content prior to the breakpoint . See the figure below for illustration.

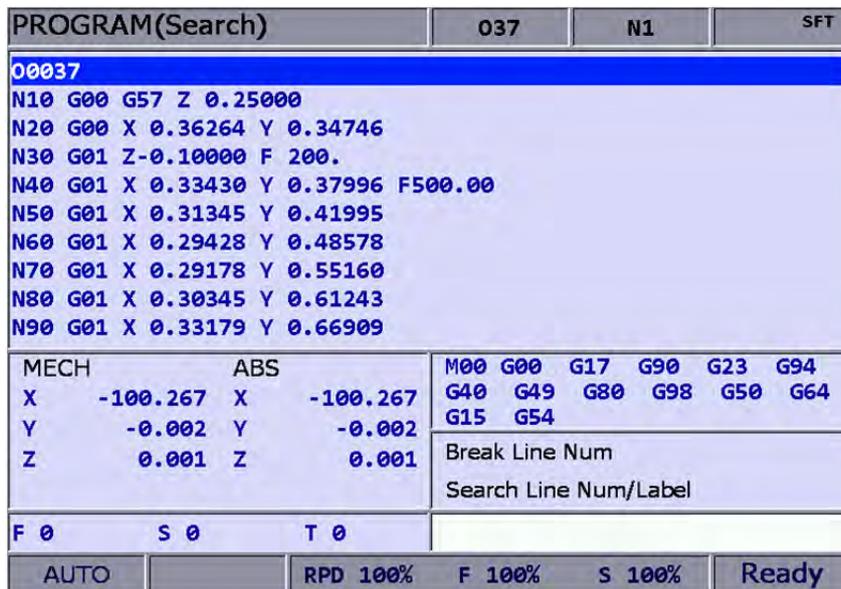


Figure 4-15-3

See the operation steps below:

- (1) Press the **PRG** key in "Auto mode" to enter the screen of [PROGRAM].
- (2) Press the **F2** key (START) and the screen of breakpoint search will pop up.
- (3) Refer to the breakpoint line number shown in the screen, enter the desired program line or sequence number. Then, press the **ENTER** key to complete the setting.
- (4) Press the **F1** key (RUN) to quickly execute the program and go to the re-starting line or sequence number.
- (5) Before executing to the specified line, the controller will automatically execute the program and record its status. The system stops at the breakpoint line and waits for its execution.
- (6) Press the "Cycle start" key to resume normal program execution.

Note:

- (1) The system stops program execution when reaching the block after the breakpoint. This block remains unexecuted until the Cycle start key is pressed and the system resumes normal operation.
- (2) Valid search formats are the line and N number of the program.
- (3) During program running or breakpoint search function is performing, any request for breakpoint search will be ignored as the system regards it as in program running status.

The **SF setup** function can be used to change the feeding speed (F command) and spindle speed (S command) during G code execution, see as Figure 4-15-4 below. By using SF setup function and entering the new command value, the speed command is changed when program running.

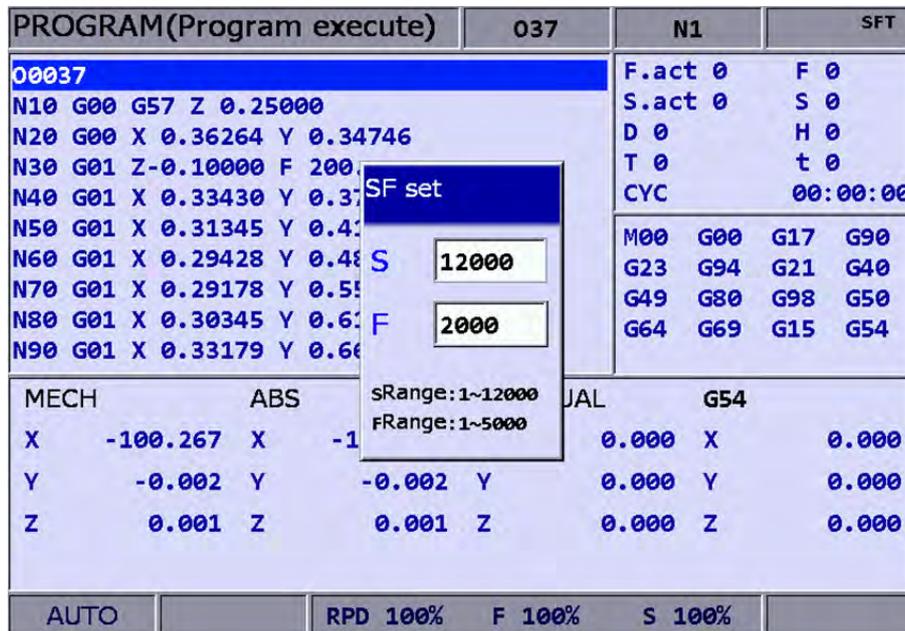


Figure 4-15-4

See the operation steps below:

- (1) In **Auto Mode**, press the  key to enter the screen of [PROGRAM].
- (2) Press the  key (SF set) and the dialog box for entering SF command will pop up.
- (3) Enter new S or F values, then press the  key and the speed is changed.

Note:

- (1) The SF settings are valid during single execution only while the S and F values in the G code remain intact. For a G code that requires repeated execution, it is recommended to edit the program and ensure the accuracy of speed commands in Edit mode.
- (2) After the S value is set, the spindle speed will be immediately changed in the G code. On the other hand, when the F value is set, the new feed speed (F command) takes effect only after new data in the system buffer is processed.
- (3) Do not use this function to change the existing speed command for a G code program without applying S and F commands.
- (4) In SF setting, F command is enabled by the function of “Enable feed rate speed setting “ in parameter No.10017.

By using the bar-code reader, the **File Scan** function can quickly load in and sequence the machining files that are named by bar code. This saves the time for file searching. The bar-code reader can be installed via the USB port.

PROGRAM(Barcode reader)	977025500	N1	mm
G0G90G40G49G17			
G54X100.Y0.A0.			FILE QUEUE
G1A90.F200000			9789575124298
G28A0.			9789572155516
A-90.			9770255007000
A190.			
A-190.			
A350.			
G28A100.			
G90A15.			
A35.			
A45.			
A60.			
A-75.			
A-90.			
A-105.			
A120.			
AUTO	RPD 100%	F 100%	S 100%
			Ready

Figure 4-15-5

See the operation steps below:

- (1) In **Auto Mode**, press the **PRG** key to enter the screen of [PROGRAM].
- (2) Press the **F3** key (SCAN) to switch the screen for displaying. See figure 4-15-5.
- (3) Use the bar-code reader to acquire the machining filename.
- (4) Press the **F1** key (LOAD) to load in the file content.
- (5) Or press the **F2** key (CLR) to delete one file that displayed on the top of the scanning list.
- (6) Or you can press the **F3** key (CLR ALL) to delete all files displayed from the list.

Note:

- (1) The machining file that will be loaded in the system by scanning its bar code should be created in CF card in advance. Also, its filename has to be identical to the bar code.

JOG and hand wheel feeding mode (JOG, MPG):

See the SF setting steps described below:

- (3) In JOG mode or MPG mode, press the  key to enter the screen for program execution.
- (4) Press the  key (SF set) and the dialog box for SF command input will pop up.
- (5) Enter new S or F values. Then, press the  key and the speed is changed.

Teach Programming : When users manually move the axis to any position, using function keys of teach programming can automatically convert the coordinates value of three axes into a motion command of one single block. This function shall be performed in JOG or Hand wheel mode. The function of **teach programming** is in PRG group, which can be operated in existing files or new files. Functions include rapid moving, linear cutting, arc cutting, deleting, creating files, saving files and selecting absolute / mechanical coordinates. It will automatically convert the file into the corresponded command format according to different functional selections. See below for the converting format.

Function	The converted command format
Create a new file when teach programming is enabled.	G90 G40 G49 G98 G50 G64 G80 G17 G69 G21 G54 G15 S3000 M03 F1000 ※According to the parameter (unit of length), it converts to G21 or G20 command.
Rapid	G00 + X_Y_Z_
Linear Cutting	G01 + X_Y_Z_
Arc Cutting	G02 or G03 + X_Y_Z_ + I_ J_ ※According to plane X-Y, Z-X and Y-Z, it converts to G17+I_ J_, G18+K_ I_ and G19+J_ K_ respectively.
Absolute Coordinate	G90 G00 (or G01/G02/G03) + X_Y_Z_
Mechanical Coordinate	G53 G00 (or G01/G02/G03) + X_Y_Z_

See the operation steps below for Teach programming:

- (1) In “JOG mode” or “hand wheel mode”, press the  key to enter the screen for performing the function.
- (2) Press the  key (TEACH) to enter the screen for teach programming.
- (3) Select the file and do teach programming in current file or new one. If desire to

do programming in current file, users have to open the file in **Edit Mode**. If

programming in a new file, press the **F6** key (NEW FILE) to enter the file

name in a pop-up input box. Then, press the **ENTER** key and users can create new files in current directory path.

- (4) Specify the data type of coordinates point. For example, to select the absolute

coordinate, press the second toolbar and then press the **F1** key (ABS). Or

press the **F1** key (MECH) once to switch the data type as mechanical coordinates.

- (5) Move the axis to the specified position in “JOG mode” or “Hand wheel mode”.

Then, press the **F1** key (RAPID) or the **F2** key (LINEAR) according to the requirement of motion mode, which means to insert the coordinates command at cursor position. And the coordinates command is generated based on the data type of its value.

- (6) To continue Step (5), when it specifies arc motion, press the **F3** key (ARC) to display the toolbar of arc cutting.

- (7) Then, specify arc plane setting. Press the **F4** key (PLANE SEL) to select plane of X-Y, Y-Z or Z-X.

- (8) Move and setup the start point, middle point and end point of the arc in

sequence by pressing **F1**, **F2** and **F3** key (P1, P2 and P3). When the setting of P3 is complete, it is automatically converted into arc cutting command. The system will determine whether it is G02 or G03 and calculate its radius value then figure out the arc direction based on the sequence between P1 and P3.

- (9) If the coordinates command is incorrect, move the cursor to the block. Press

the **F4** key (DEL) in the first layer of toolbar in teach programming to delete the block.

- (10) When complete the operation of teach programming, apart from the auto-saving function (RESET, system switch mode, file switch), users can

save the programming result when pressing the **F5** key (SAVE).

Note:

- (1) Teach programming has to be done in **Jog mode** or **Hand wheel mode**; otherwise, the function will not be displayed.
- (2) The file size for teach programming is the same as file editing (under 3 MB).

- (3) For files created by teach programming, its filename has to comply with the naming rules.
- (4) When continuously input two same points, the second point will be ignored so as to avoid the ineffectiveness of motion block.
- (5) P1, P2 and P3 of arc command needs to be set up in sequence. Their positions determine the arc direction command and the distance of the circle center.
- (6) When the function of teach programming is enabled and no file is opened, the system will generate a blank file named "TEACH.NC" in the directory at the cursor position (Default: The file is generated in root directory of CF). Then, users may directly use the function of teach programming.
- (7) In SF setting, F command is enabled by the function of "Enable feed rate speed setting " in parameter No.10017.

Manual input mode (MDI):

The PRG group provides simple program entry, save, clear, and execution functions in manual mode. See the figure below for the program editing screen. This is exclusive to manual mode. Before the manually edited program is loaded in the system, cursor displays in a regular form which means the program is not running. Users can enter up to 17 lines of program steps. It is required to **load** the program again before running it. Otherwise, it cannot be executed.

PROGRAM(Program execute)	MDI	N1	mm
G00G90G40G49G17		ABS	
G58X0.0Y0.0		X	-100.267
G01X100.0Y0.0F1000		Y	-0.002
X100.0Y100.0		Z	0.001
X0.0Y100.0			
X0.0Y0.0			
M30		RESIDUAL	
		X	0.000
		Y	0.000
		Z	0.000
M00 G00 G17 G90 G23 G94 G21 G40 G49 G80 G98 G50 G6			
G54			
F 0 S 0 D 0 H 0 T 0 t 0			
MDI		RPD 100%	F 100% S 100%

Figure 4-15-6

PROGRAM(Program execute)	MDI	N1	
G00G90G40G49G17		ABS	
G58X0.0Y0.0		X	125.000
G01X100.0Y0.0F1000		Y	35.000
X100.0Y100.0		Z	-59.000
X0.0Y100.0		A	0.000
X0.0Y0.0		RESIDUAL	
M30		X	0.000
		Y	0.000
		Z	0.000
		A	0.000
M00 G00 G17 G90 G23 G94 G21 G40 G49 G80 G98 G50 G64 G69 G15 G54			
F 0 S 0 D 0 H 0 T 0 t 0			
MDI		RPD 100%	F 30% S 101% Ready

Figure 4-15-7

The file **save** function saves the manual edit file in the current directory following the same naming rule that described in **Section 4-2 Create new file**. It requires giving a unique name in the current directory and with a format compliant with this standard. The **clear** function removes all contents in the programming page of manual mode. It functions the same as pressing and holds the RESET key for 3 seconds.

Note:

- (1) The RESET key has two functions in manual mode. The first one is the same as in auto mode which aborts the execution of a program and returns to the first line of a manual entry program. The second can clear the contents in the manual entry area by pressing and holding the RESET key for 3 seconds.
- (2) If the block of M30 is included, after the execution is complete, the cursor will return to the first line and execute line display.
- (3) If the block of M30 is not included, after the execution is complete, the cursor stops at the last line and executes cursor display.
- (4) If the last block of the program is M02, after the execution is complete, the cursor stops at the last line and executes line display.

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Chapter 5: OFS group

The OFS group provides setup functions for workpiece setup, cutting tool length or radius compensation, and variables of macros.

5.1 Coordinates setting

The coordinate system (G54 ~ G59) provides a function for setting multiple workpiece coordinate system. Together with the workpiece coordinates system (G54 ~ G59) command, the G code command simplifies coordinate calculation during program coding and enhances flexibility in changing coordinate data for machining. This data table enables users to designate coordinate data by working together with any workpiece coordinates system command in G54~G59 of G code as illustrated in the figure below.



Figure 5-1-1

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset menu].
- (2) Press the  key (Coord) to enter the screen of coordinates system setup function bar.

Note:

- (a) Setting up coordinate system is allowed only when no machining program is executing. Otherwise, data entry will be rejected by the system.
- (b) End of execution of a single block is regarded as in non-running status while a paused program is in running status.

5.1.1 Auto setting

The auto setting function inputs the current position of each axis to the coordinates system (G54 ~ G59) where the cursor is. The input method includes single axis, multiple axis and L/2. The L/2 input shall work together with the clear function of relevant axis. The auto setting function also clears the numeric values of a given coordinates system with sub-functions of relative clear, all clear, L input, L/2 input and P input.

The **All Clear function** clears all axes values of the current coordinates system to zero while all other coordinate systems' values remain unchanged.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (Coord) to enter the screen of coordinates system setup function bar.
- (3) Press the  key (Auto) to switch to the screen with the coordinates auto setup function bar.
- (4) Use     keys to move the cursor to the position of the specified coordinate system group.
- (5) Press the  key (CLR ALL) to remove all coordinates group data where the cursor resides.

- **Relative clear:** This function clears the relative coordinates that correspond to the cursor position. Axis types are determined by cursor position, while those irrelevant to the cursor remain unchanged. This function clears relative coordinate value in the coordinates display rather than the data of the actual workpiece coordinate system.
- **L/2 input:** When identifying the center of an object and to regard this center as the origin of the coordinate system, this function is able to automatically figure out the coordinate data and complete the setting.

See the operation steps below: (illustration based on X-axis)

- (1) In **[Jog mode]** or **[Hand wheel mode]**, move the mechanism to the X-axis of the workpiece coordinate and regard the first contact point as the origin on the X-axis.
- (2) Press the  key to enter the screen of [Offset].
- (3) Press the  key (Coord) to enter the screen of coordinates system setup function bar.
- (4) Press the Auto key to switch to the screen with the coordinates auto setup

function bar.



(5) Use these keys to move the cursor to the X-axis coordinates position of the specified coordinate system group.



(6) Press the F4 key (SET L/2) to enter the L/2 input screen.



(7) Press the F1 key (Point1). See Figure 5-1-2, the first circle on the rectangle turns red; this means the recording of the first mechanical coordinate value is complete.



Figure 5-1-2

(8) Move the mechanism to the contact point on the other side of the X-axis.



(9) Press the F2 key (Point2). See Figure 6-1-2. When the second circle turns red, it means the mechanical coordinate value of the second point has been recorded.



(10) Press the F3 key (SET). The system will figure out the origin on the X-axis of the workpiece coordinates. It will measure the distance from the mechanical origin to the end of the X-axis of the workpiece coordinates. This value times 0.5 will be the center on the X-axis of this coordinates.

■ **L input:** This function automatically inputs the current mechanical coordinates by individual axis. When the cursor is moved to the X, Y, or Z field of the specified coordinates system, the L input function inputs the current mechanical coordinate value to the field that corresponds to the cursor position. This function inputs single-axis coordinate data only. See the operation steps below:

(1) In **[Jog mode]** or **[Hand wheel mode]**, move the mechanism to the first contact point on the X-axis of the workpiece coordinates.

(2) Press the **OFS** key to enter the screen of [Offset menu].

(3) Press the **F1** key (Coord) to enter the screen of coordinates system setup function bar.

(4) Press the **F1** key (Auto) to switch to the screen with the coordinates auto setup function bar.

(5) Use **↑;**, **↓,**, **←&**, **→#** keys to move the cursor to the designated coordinate group and coordinate value of the axis. e.g. the setup position of X-, Y-, or Z-axis.

(6) Press the **F3** key (SET L) and the axis coordinate value input from the highlighted part is complete.

◆ Example of L input (for the X-axis):
Move the mechanism to the specified position in the coordinate system, as with the origin on the X-axis of the workpiece coordinates in Figure 5-1-4.

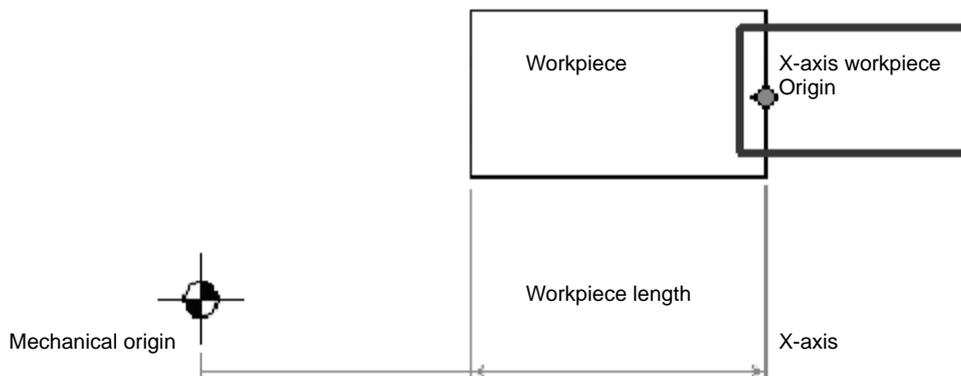


Figure 5-1-4

The mechanical coordinate data is shown in mechanical coordinate fields of Figure 5-1-5. Move the cursor to the specified coordinate group, such as G56 group in Figure 5-1-5. Then, press **F3** key (SET L) and the X-axis data of the mechanical coordinate is inputted to the X-axis fields of the G54 automatically. The single axis data input of the coordinate group is now completed.

OFFSET(Set coord system)				MDI	N1		
OFFSET		G54		MECH	REL		
X	0.000	X	0.000	X	125.000	X	0.000
Y	0.000	Y	0.000	Y	35.000	Y	35.000
Z	0.000	Z	0.000	Z	-59.000	Z	-59.000
A	0.000	A	0.000	A	0.000	A	0.000
G55		G56					
X	55.000	X	56.000				
Y	55.000	Y	56.000				
Z	-55.000	Z	-56.000				
A	0.000	A	0.000				
MDI		RPD 100%		F 30%	S 101%	Ready	

Figure 5-1-5

- P input:** This function inputs the coordinate center of multiple axes concurrently after the workpiece center point is calibrated. With P input function, more than one axis, including X-, Y- and Z-axis can be inputted.

See the operation steps below:

- (1) In **[Jog mode]** or **[Hand wheel mode]**, move the mechanism to the initial contact point on the X-axis of the workpiece coordinates.

- (2) Press the **OFS** key to enter the screen of [Offset menu].

- (3) Press the **F1** key (Coord) to enter the screen of coordinates system setup function bar.

- (4) Press the **F1** key (Auto) to switch to the screen with the coordinates auto setup function bar.

- (5) Use **↑ ;**, **↓ ,**, **← &**, **→ #** keys to move the cursor to the data position for the coordinates system group.

- (6) Press the **F5** key (SET P), multiple axis data is now automatically inputted into the highlighted coordinate group fields.

Note: Do not press **All Clear** function key to clear the coordinate value, or it would clear the coordinate values of all other axes that have been set.

- ◆ Example of P input:
Move the mechanism to the specified coordinate position, e.g. the workpiece origin in Figure 5-1-6. (Figure 5-1-6 indicates the relative position of the X- and Y-axis but not the Z-axis.)

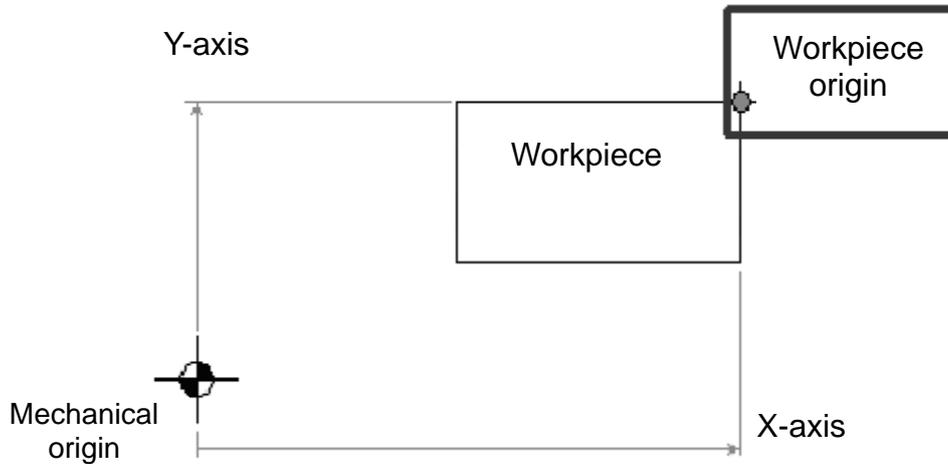


Figure 5-1-6

After the workpiece origin is calibrated, the mechanical coordinate data is shown in the mechanical coordinate fields in Figure 5-1-7. Move the cursor to the specified coordinates group (e.g. the G54 group in Figure 5-1-7). Press **F5** key (SET P), and then the X-, Y-, and Z-axis data of the mechanical coordinate are inputted to the mechanical coordinate fields of the G54 coordinates group. That is, the multiple axis data input for the axis group is completed.

OFFSET(Set coord system)				MDI	N1			
OFFSET	G54		MECH		REL			
X	0.000	X	0.000	X	125.000	X	0.000	
Y	0.000	Y	0.000	Y	35.000	Y	35.000	
Z	0.000	Z	0.000	Z	-59.000	Z	-59.000	
A	0.000	A	0.000	A	0.000	A	0.000	
G55		G56						
X	55.000	X	56.000					
Y	55.000	Y	56.000					
Z	-55.000	Z	-56.000					
A	0.000	A	0.000					
				MDI	RPD 100%	F 30%	S 101%	Ready

Figure 5-1-7

5.1.2 Absolute input

The value of coordinate system can be inputted manually by absolute or incremental value setups. This section explains the steps for absolute input.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset menu].
- (2) Press the  key (Coord) to enter the screen with coordinates system setup function bar.
- (3) Use     keys to move the cursor to the X-, Y-, and Z-axis setup positions of the specified coordinates system.
- (4) Input positive or negative values by pressing keys   -  . To enter a negative value, press the  key in advance. Press the  key to confirm the unit of values.
- (5) Press the  key (ABS) to enter the value of the coordinate.

Note:

- (a) The unit of value is mm. Value without decimal points is in unit of μm . That is, input value 123456 indicates 123.456 mm.
- (b) The absolute input can be made by step (5) as described above or by pressing the **ENTER** key.

- ◆ Example of absolute input:
 Move the tool center from mechanical origin to the origin of the workpiece coordinates.
 Next, input this coordinate value (X and Y) to the controller's OFS group (G54 ~ G59).
 Then, execute the corresponded command in the G code program and the setting for origin of the workpiece coordinates is complete.

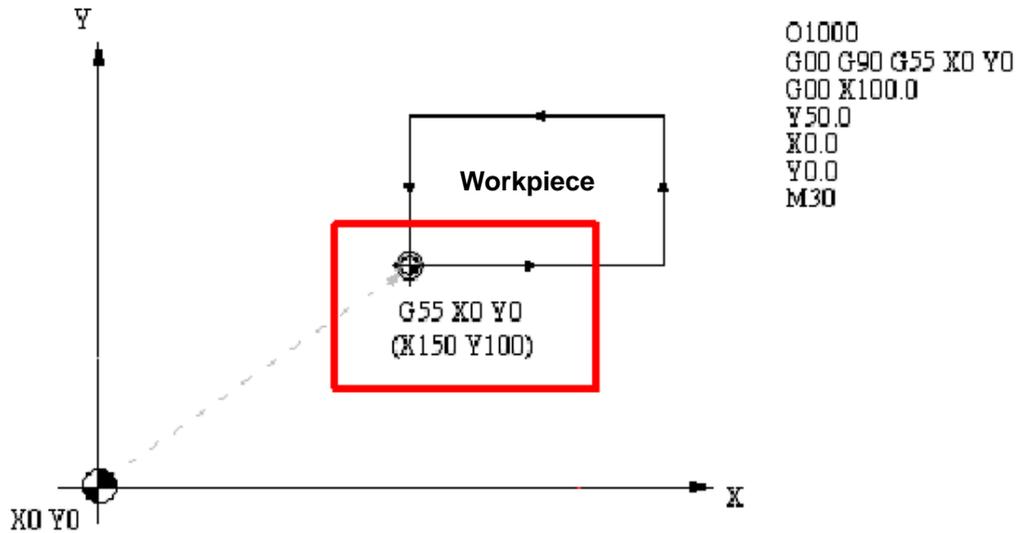


Figure 5-1-8

OFFSET(Set coord system)				MDI	N1
OFFSET		G54		MECH	REL
X	0.000	X	0.000	X	125.000
Y	0.000	Y	0.000	Y	35.000
Z	0.000	Z	0.000	Z	-59.000
A	0.000	A	0.000	A	0.000
G55		G56			
X	150.000	X	56.000		
Y	100.000	Y	56.000		
Z	0.000	Z	-56.000		
A	0.000	A	0.000		
MDI		RPD 100%		F 30%	S 101%

Figure 5-1-9

5.1.3 Incremental input

This is one of the manual methods for inputting coordinate data. Generally, incremental input is applied for fine tuning as the value is input incrementally. For example, if the original value is 150.000, with an incremental input of 5.000, the new value shall be 155.000.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (Coord) to enter the screen with coordinates system setup function bar.
- (3) Use ; ,  &  # keys to move the cursor to the X-, Y- and Z-axis setup position of the specified coordinates system.
- (4) Input positive or negative values by pressing keys  ^ -  /. To enter a negative value, press the  key in advance. Then, press the  > key to confirm the unit of value.
- (5) Press the  key (INC) to incrementally increase or decrease the axis.

Note:

- (a) When manually inputting the data, please make sure the value and the inputting method is correct so as to avoid the danger caused by any incorrect movement.

5.1.4 Rectangle center

This function assists users in setting up coordinate data of the rectangle center with a rectangle drawing as shown in the figure below. The system converts data of the four corners into coordinate value of the object's actual center as illustrated in the figure below.



Figure 5-1-10

See the operation steps below:

- (1) Press the **OFS** key to enter the screen of [Offset].
- (2) Press the **F1** key (Coord) to enter the screen with coordinate system setup function bar.
- (3) Use **↑**, **↓**, **←**, **→** keys to move the cursor to data fields for coordinates system designation.
- (4) Press the **F4** key (SQUARE) to enter the screen of rectangle center.
- (5) As guided by the rectangle shown in the screen, move the spindle center to the mechanical position of X1, X2, Y1 and Y2, press **F1**, **F2**, **F3**, **F4** (X1, X2, Y1, Y2) keys to set up the coordinates data of each point.
- (6) Press the **F5** key (Set) after coordinates of the four points are set, the system will figure out the coordinate data of the rectangle center and input the data to the coordinates system.
- (7) Set up the coordinate position by moving the Z-axis, press the **F6** key (SET Z) to set up the Z-axis coordinates of the workpiece coordinates group.

- ◆ Example of rectangle center:
 Firstly specify the fields of coordinates group. Then, manually move the spindle to the four corners of the object, enter the X and Y coordinates data of these 4 points as shown in Figure 5-1-11.



Figure 5-1-11

After the coordinates of the four rectangle corner points are set, press the **F5** key (Set); the system will then figure out the actual mechanical coordinates value of the rectangle object center and set up given coordinates system data as shown in Figure 5-1-12.



Figure 5-1-12

5.1.5 Circle center

This function sets up the coordinates data of the center of any ball object. Select any 3 points on the ball object and set up their coordinates data; the function can figure out the coordinates of the object center as shown in the figure below:



Figure 5-1-13

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (Coord) to enter the screen with coordinates system setup function bar.
- (3) Use     keys to move the cursor to data fields of the specified coordinates system.
- (4) Press the  key (CIRCLE) to enter the screen of circle center.
- (5) Move the mechanical position of P1, P2 and P3 as guided. Then, press the    (P1, P2, P3) keys to set up the position one by one.
- (6) After setting up coordinates of the three points on a circle, press the  key (Set); the system will automatically figure out the coordinates data of the circle center and input the data to the coordinates system.
- (7) Set up coordinate position by moving the Z-axis, press the  key (SET Z) to set up the Z-axis coordinates of the workpiece coordinates group.

- ◆ Example of circle center
 This function applies to any workpiece in a ball object. Manually move the spindle to access any three outer points on the circle, and then set up the coordinate value of these three points by relevant function keys as shown in Figure 5-1-14.

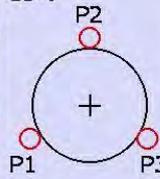
OFFSET(Set coord system)				037	N1	
OFFSET		G54		MECH	REL	
X	0.000	X	0.000	X	89.191 X -35.808	
Y	0.000	Y	0.000	Y	84.683 Y 84.683	
Z	0.000	Z	0.000	Z	-59.000 Z -59.000	
A	0.000	A	0.000	A	0.000 A 0.000	
G55		G56		G54	P1	
X	150.000	X	56.000		X: 65.716	
Y	100.000	Y	56.000		Y: 87.133	
Z	0.000	Z	-56.000		P2	X: 71.916
A	0.000	A	0.000		Y: 96.941	
					P3	X: 89.191
					Y: 84.683	
JOG		RPD 100%		JOG 500	S 101%	STOP

Figure 5-1-14

After the coordinates of any three outer points are set, press the **F4** key (Set), the system will then automatically figure out the actual mechanical coordinates value of the circle center and sets up given coordinates system data as shown in Figure 5-1-15.

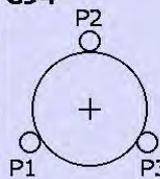
OFFSET(Set coord system)				037	N1	
OFFSET		G54		MECH	REL	
X	0.000	X	77.519	X	89.191 X -35.808	
Y	0.000	Y	86.536	Y	84.683 Y 84.683	
Z	0.000	Z	0.000	Z	-59.000 Z -59.000	
A	0.000	A	0.000	A	0.000 A 0.000	
G55		G56		G54	P1	
X	150.000	X	56.000		X: 65.716	
Y	100.000	Y	56.000		Y: 87.133	
Z	0.000	Z	-56.000		P2	X: 71.916
A	0.000	A	0.000		Y: 96.941	
					P3	X: 89.191
					Y: 84.683	
JOG		RPD 100%		JOG 500	S 101%	STOP

Figure 5-1-15

5.2 Tool register

This function varies with tool length compensation (G43 or G44, or cancel command G49) or radius compensation (G41 or G42, or cancel command G40). The tool register function covers tool length compensation, radius compensation, length wear compensation, and radius wear compensation and tool life span management functions.

The data fields correspond to H (tool length compensation) and D (tool diameter compensation) codes assigned by the machining program. The tool register settings can assign tool length or tool radius fields data to meet a given machining path and size without program modifications. The numeric data setup covers absolute input, incremental input, H setup, and data clearance functions. See the figure below for the tool compensation function screen.



Figure 5-2-1

Range of tool register values	
Range of tool length data	-2000.0 ~ 2000.0 mm
Range of tool radius data	-150.0 ~ 150.0 mm
Range of tool length wear compensation data	-2000.0 ~ 2000.0 mm
Range of tool radius wear compensation data	-150.0 ~ 150.0 mm
Range of tool life span	0 ~ 99999999 serves

- **Absolute input:** This is one of the manual data input methods. Use this function to input absolute values of tool length, tool radius, wear compensation or tool life span data. Absolute value input can also be done by pressing the **ENTER** key. See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (CUTTER) to enter the screen with the tool register function bar.
- (3) Use ; ,  &  keys to move the cursor to data fields for tool length, radius, wear, or life span designation.
- (4) Input positive or negative values by pressing keys   -  . To enter a negative value, press the  key in advance. Press the  key before entering the tool compensation data to ensure the unit of value. Only positive integers are valid input for tool life span.
- (5) Press the  key (ABS) to register absolute values.

Note:

The tool data fields are for individual compensation values. For example, when the length fields are highlighted, it means the input data is for tool length compensation.

- **Incremental input:** This is one of the manual data input methods. Use this function to input incremental values of tool length, tool radius, wear compensation or tool life span data.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset menu].
- (2) Press the  key (CUTTER) to enter the screen with the tool register function bar.
- (3) Use ; ,  & # keys to move the cursor to data fields for tool length, radius, wear, or life span designation.
- (4) Input positive or negative values by pressing keys   -  / . To enter a negative value, press the  key in advance. Press the  key before entering the tool compensation data to ensure the unit of value. Only positive integers are valid input for tool life span.
- (5) Press the  key (INC) to register incremental values.

- **H setup:** This function automatically inputs the height of Z-axis of current mechanical coordinates in assigned tool length compensation data (H) exclusively. It can prevent input error during manual setup by users as well as reduce the time required for value setup.

See the operation steps below:

- (1) In **[Jog mode]** or **[Hand wheel mode]**, move the Z-axis to specified coordinates height.

- (2) Press the  key to enter the screen of [Offset].

- (3) Press the  key (CUTTER) to enter the screen with the tool register function bar.

- (4) Use  ;  ,  &  # keys to move the cursor to the tool length fields for tool code designation.

- (5) Press the  key (SET H) to set the current Z-axis mechanical coordinates value in the given fields.

Note:

- (a) The H setup function applies to tool length data fields only.
- (b) Do not change values in OFS group during program execution. Enter values only when the program stops. The program stop status means the program is not in operation, a block is completed when single-block stop function is enabled, or after the RESET key is pressed.
- (c) The length wear value is reset to zero when inputting tool length value with H setup.

- **Clear:** This function clears tool compensation values with options of geometry, wear, life span, and all clear.

Geometry clear: clear all tool length and radius values.

Wear clear: clear all tool length compensation and radius compensation values.

Life span clear: clear all tool life span values.

All clear: clear all tool registry data.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (CUTTER) to enter the screen with tool register function bar.
- (3) Press the  key (Clear) to display clear function bar.
- (4) Press the  key (H/D) to clear tool length and radius values. Press the  key (Wear) to clear all tool length compensation and radius compensation values. Press the  key (Life) to clear all tool life span values. Press the  key (All) to clear all tool registry data.

5.3 Tool magazine register

This function manages the tool positions corresponding to the tool magazine after tool exchanges. The tool magazine data is a table recording the actual tool pot positions and tool ID of the machine. It not only records and displays the tool pot position of individual tools but also changes the tool sequence in tool magazine data fields with permission. **The tool magazine register function runs in Jog feeding mode only.** See the figure below.

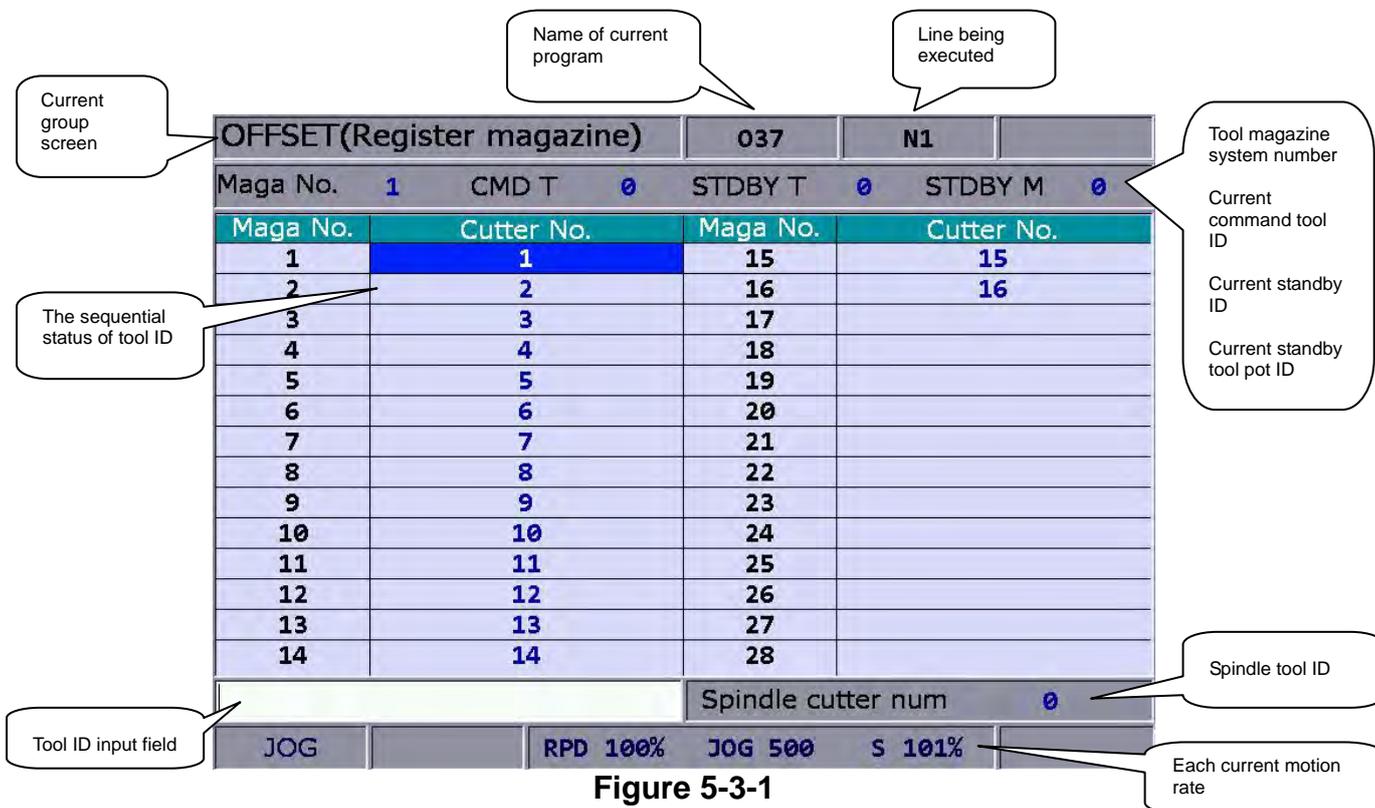


Figure 5-3-1

See the operation steps described below for tool magazine setup:

- (1) Set the system to "Jog feeding mode".
- (2) Press the **OFS** key to enter the screen of [Offset].
- (3) Press the **F3** key (MAGA) to enter the tool magazine data setup function screen.
- (4) Use **↑ ;**, **↓ ,**, **← &**, **→ #** keys to move the cursor to the assigned data fields.
- (5) Enter the newly changed tool ID, press the **F1** key (Set) (or press the **ENTER** key) to set up the position of new tool magazine.

- ◆ Example of tool ID exchange:
If the assigned tool ID duplicates one in existence, then it exchanges it with the one at the original place automatically. This ensures that each tool ID in the tool magazine does not duplicate another and prevents incorrect tool calling.

OFFSET(Register magazine)				037	N1		
Maga No.	1	CMD T	0	STDBY T	0	STDBY M	0
Maga No.	Cutter No.	Maga No.	Cutter No.				
1	1	15	15				
2	2	16	16				
3	3	17					
4	4	18					
5	5	19					
6	6	20					
7	7	21					
8	8	22					
9	9	23					
10	10	24					
11	11	25					
12	12	26					
13	13	27					
14	14	28					
				Spindle cutter num	0		
JOG		RPD 100%	JOG 500	S 101%	STOP		

Figure 5-3-2

OFFSET(Register magazine)				037	N1		
Maga No.	1	CMD T	0	STDBY T	0	STDBY M	0
Maga No.	Cutter No.	Maga No.	Cutter No.				
1	2	15	15				
2	1	16	16				
3	3	17					
4	4	18					
5	5	19					
6	6	20					
7	7	21					
8	8	22					
9	9	23					
10	10	24					
11	11	25					
12	12	26					
13	13	27					
14	14	28					
				Spindle cutter num	0		
JOG		RPD 100%	JOG 500	S 101%	STOP		

Figure 5-3-3

OFFSET(Register magazine)				037	N1		
Maga No.	1	CMD T	0	STDBY T	0	STDBY M	0
Maga No.	Cutter No.	Maga No.	Cutter No.				
1	2	15	15				
2	1	16	16				
3	5	17					
4	4	18					
5	3	19					
6	6	20					
7	7	21					
8	8	22					
9	9	23					
10	10	24					
11	11	25					
12	12	26					
13	13	27					
14	14	28					
				Spindle cutter num	0		
JOG		RPD 100%	JOG 500	S 101%	STOP		

Figure 5-3-4

■ **Operation description:**

Figure 5-3-2: initial status of the tool magazine with tools in it in numeric sequence

Figure 5-3-3: set position 1 = 2, and tools ID 1 and 2 in tool magazine 1 and 2 exchanges with each other.

Figure 5-3-4: set position 3 = 5, and tools ID 3 and 5 in tool magazine 3 and 5 exchanges with each other.

This demonstrates that tool IDs in the tool magazine exchange with each other after the tool ID of a given tool magazine number is changed. This eliminates errors caused by invalid tool ID accessing.

- **All reset:** The tool register also provides the reset function of tool magazine position. This resets the tool ID in the tool magazine to default, i.e. both tool magazine and tool ID are in numeric sequence. This function can be used for misplacement troubleshooting or tool ID reset.

See the operation steps below:

- (1) Set the system to "**Jog feeding mode**".

- (2) Press the  key to enter the screen of [Offset].

- (3) Press the  key (MAGA) to enter the screen of tool magazine data setup function.

- (4) Press the  key (RST ALL) to reset all tool magazine position records.

- **Tool magazine block:** This function blocks the tool magazine position not used by the program. Tools in a blocked tool magazine position cannot be called. If they are called incorrectly, the system blocks their use, warns with an error message, and will halt program execution immediately. This provides the protection mechanism against errors caused by incorrect tool calling. For example, users can block a tool magazine position with damaged positioning latch or that might interfere with adjacent large diameter tools. A blocked tool magazine position is identified by a different color.

See the operation steps below:

- (1) Set the system to **Jog feeding mode**.

- (2) Press the  key to enter the screen of [Offset].

- (3) Press the  key (MAGA) to enter the screen of tool magazine data setup function.

- (4) Use  ;  ,  &  # keys to move the cursor to assigned data fields.

- (5) Press the  key (LOCK) to block the tool magazine position as shown in Figure 5-3-5.

OFFSET(Register magazine)		037	N1				
Maga No.	1	CMD T	1	STDBY T	0	STDBY M	0
Maga No.	Cutter No.	Maga No.	Cutter No.				
1	1	15	15				
2	2	16	16				
3	3	17					
4	4	18					
5	5	19					
6	6	20					
7	7	21					
8	8	22					
9	9	23					
10	10	24					
11	11	25					
12	12	26					
13	13	27					
14	14	28					
			Spindle cutter num	0			
JOG		RPD 100%	JOG 500	S 101%	STOP		

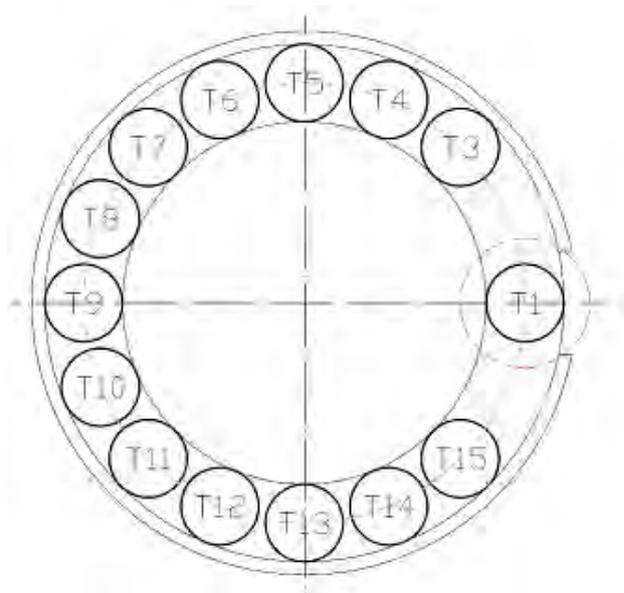
Figure 5-3-5

- ◆ Example of tool magazine block:
Use this function to block a tool magazine adjacent to one that has a large diameter tool. Blocking these two tool magazines can stop the operation of an improper tool ID calling program and protects tools from colliding with large-diameter tools in neighboring tool magazine.

OFFSET(Register magazine)		037	N1				
Maga No.	1	CMD T	1	STDBY T	0	STDBY M	0
Maga No.	Cutter No.	Maga No.	Cutter No.				
1	1	15	15				
2	2	16	16				
3	3	17					
4	4	18					
5	5	19					
6	6	20					
7	7	21					
8	8	22					
9	9	23					
10	10	24					
11	11	25					
12	12	26					
13	13	27					
14	14	28					
			Spindle cutter num	0			
JOG		RPD 100%	JOG 500	S 101%	STOP		

Assumption:
T1 holds a large diameter tool and sided by T2 and T16. To prevent them from interfering with each other, block T2 and T16 with this function as shown in the figure to the left.

Figure 5-3-6



When T1 holds a large diameter tool, it may interfere with adjacent tools as shown in the figure to the left. Once blocked by this function, the T2 and T16 tool magazine positions cannot be called any more.

Figure 5-3-7

■ **Tool magazine unlock:** This function can unlock the block tool magazine.

See the operation steps below:

(1) Set the system to **Jog feeding mode**.

(2) Press the  key to enter the screen of [Offset].

(3) Press the  key (MAGA) to enter the screen of tool magazine data setup function.

(4) Use     keys to move the cursor to the assigned data fields.

(5) Press the  key (UNLOCK) to unlock the tool magazine position.

(6) Users also can directly enter the tool ID in the data field of locked tool magazine

and then press the  key to unlock the tool magazine position.

※ Multi tool magazines management function

- For applications that require multiple tool magazine management systems, with the permission, users may open the multi tool magazine management function through the tool magazine parameter. Users may assign a different number of tool pots for each tool magazine as well as the corresponding tool ID. The [Tool Magazine 1 and 2] function bars are used for managing tool ID in either tool magazine system. Please contact an equipment dealer/service provider for multi tool magazine relevant functions.

OFFSET(Register magazine)		037	N1				
Maga No.	1	CMD T	1	STDBY T	0	STDBY M	0
Maga No.	Cutter No.	Maga No.	Cutter No.				
1	1	15	15				
2	2	16	16				
3	3	17					
4	4	18					
5	5	19					
6	6	20					
7	7	21					
8	8	22					
9	9	23					
10	10	24					
11	11	25					
12	12	26					
13	13	27					
14	14	28					
			Spindle cutter num	0			
JOG		RPD 100%	JOG 500	S 101%	STOP		

Figure 5-3-8

Note:

- The tool magazine ID can be set up in "**Jog feeding mode**" (JOG) only. The tool magazine setup option will not be shown in other modes.
- The special user permission is a must before doing tool magazine ID setup or reset.
- No tool IDs are identical in one tool magazine. When assigning one existing tool ID, the system will re-number this tool ID. In this case, the tool ID recorded at each address in tool magazine will be different to avoid incorrect tool calling.
- When the spindle's initial tool ID is set to T0, once T0 is placed in one tool magazine, that tool magazine is recorded as the position of T0 and cannot be blocked. When the field of tool magazine is T0, it is not allowed to block and the message "**Tool ID Tool magazine cannot be blocked**" will pop up.

5.4 Macro variable

Use variable input setup of this function along with variable command for various MLC data I/O, condition computing, and controls. The macro variable function covers local, global, retaining variables and expanded variables with values in double format.

OFFSET(Macro var-local)		037	N1	
No.	Value	No.	Value	
1	0.000	16	0.000	
2	0.000	17	0.000	
3	0.000	18	0.000	
4	0.000	19	0.000	
5	0.000	20	0.000	
6	0.000	21	0.000	
7	0.000	22	0.000	
8	0.000	23	0.000	
9	0.000	24	0.000	
10	0.000	25	0.000	
11	0.000	26	0.000	
12	0.000	27	0.000	
13	0.000	28	0.000	
14	0.000	29	0.000	
15	0.000	30	0.000	

JOG		RPD 100%	JOG 500	S 101%	STOP
-----	--	----------	---------	--------	------

Figure 5-4

5.4.1 Local variable

Local variables are used by the macro program in the local area and are **numbered from 1 ~ 50**.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (Macro) to enter the screen of variable entry.
- (3) Press the  key (Local) to enter the entry screen for field ID starting with number 1.
- (4) Use     keys to move the cursor to the desired variable data field.
- (5) Enter variable value and press the  key to complete the setting.

5.4.2 Global variable

Global variables are variables shared by the main programs, sub routines, and macro program and are **numbered from 51 ~ 250**.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (Macro) to enter the screen of variable value entry.
- (3) Press the  key (Global) to enter the entry screen for field ID starting with number 51.
- (4) Use     keys to move the cursor to the desired variable data field.
- (5) Enter variable value and press the  key to complete the setting.

5.4.3 Retaining variable

These variables retain system data after power outage and are **numbered from 1601 ~ 1800**.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (Macro) to enter the screen for variable value entry.
- (3) Press the  key (Hold) to enter the entry screen for field ID started with number 1601.
- (4) Use     keys to move the cursor to the desired variable data field.
- (5) Enter variable value and press the  key to complete the setting.

5.4.4 Expanded Variable

500 expanded variables can be used in the system. Its range is between **10001** and **10500**.

See the operation steps below:

- (1) Press the  key to enter the screen of [Offset].
- (2) Press the  key (MACRO) to enter the screen for variable value entry.
- (3) Press the  key (EXPAND). The screen jumps to the entry screen beginning with 10001.
- (4) Use ; ,  &  keys to move the cursor to the desired variable data field.
- (5) Enter variable value and press the  key to complete the setting.

Chapter 6: GRA group

The GRA group function displays trails during program running to help in ensuring correctness of the G code operation. It enables users to preview the machining graph and perform simulation of the current machining task. Its function also includes G code format examination and machining review. The initial screen of GRA group is determined by the setting value of parameters. See figure 6-0-1 or 6-0-2.

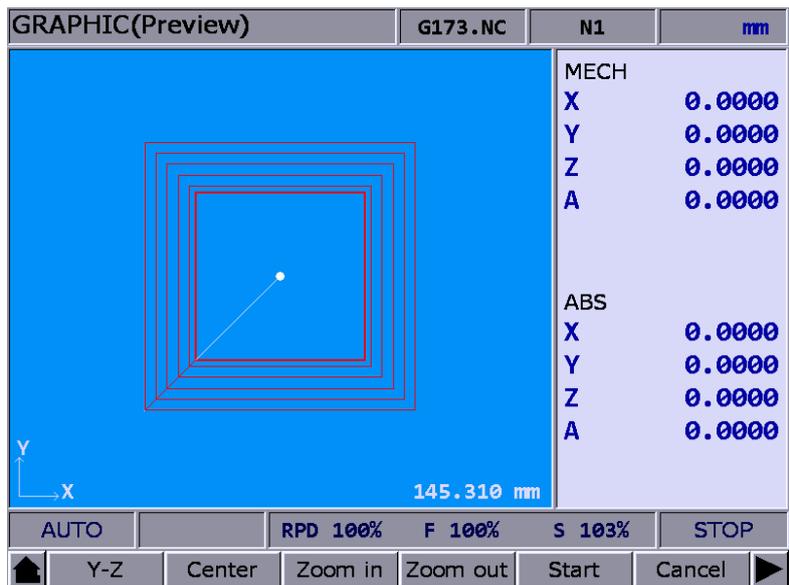


Figure 6-0-1

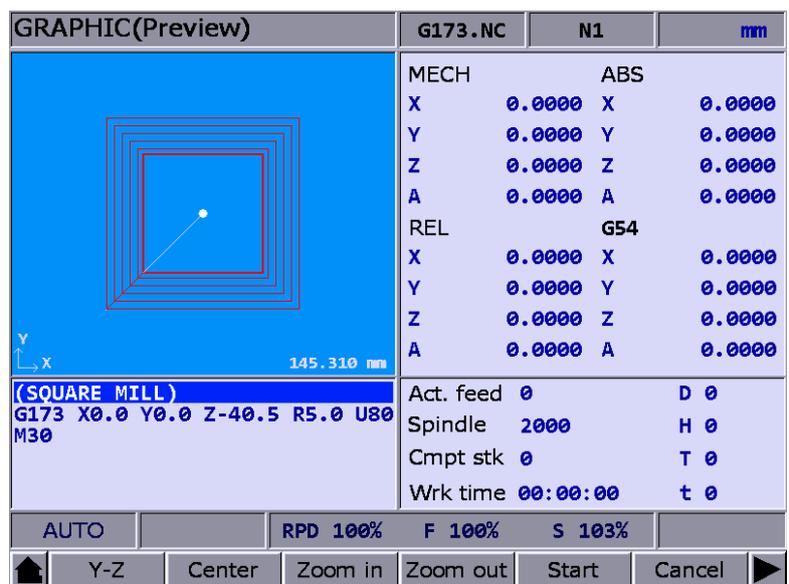


Figure 6-0-2

6.1 Machining Path

When executing machining program, if the screen is switched to GRA group, the system will draw the motion track of the current program in the screen. When it is used for machining, this function can help to check if the path conforms to the machining task. The motion track will be drawn when it executes machining program. And movement tracking of X-Y, Y-Z, X-Z as well as X-Y-Z plane will be provided. Users may zoom in, zoom out and moving the graph display. Use graph parameter 14003 to setup the display mode. Users may setup the positive position based on the machine type. When enabling machining path (PATH), the function of machining preview (PREVIEW) is disabled.

See the operation steps below:

- (1) Press the **GRA** key to enter the screen of [GRAPHIC].
- (2) Press the **F1** key (CUTTING PATH) to the graphic display function.
- (3) Press the **F1** key (X—Y) to display the movement trail for plane of X-Y; or press the **F1** key again to display the plane of Y-Z; or press the **F1** key again to display the plane of X-Z; or press the **F1** key again for the plane of X-Y-Z.
- (4) When machining program is running, entering GRA group will start drawing. Press the **F6** key (STOP DRAW) to stop the drawing function of machining path. Press the **F5** key (DRAW) to continue the drawing.
- (5) Press the **F2** key (CENTER) to move the current motion display to the center. Press the **F3** key (ZOOM IN) or the **F4** key (ZOOM OUT) to magnify or minimize the display.
- (6) Press **F1** (UP), **F2** (DOWN), **F3** (LEFT) and **F4** (RIGHT) keys (on the function bar at next page) to move the graph.

6.2 Machining Preview

This function is to preview the graph of machining path. It allows users to check if the format of G code is correct and preview the motion path without actually operating the machine tools. The machining preview displays the visual angle of X-Y, Y-Z, X-Z and X-Y-Z. Users may also zoom in / out and move the graph. The related parameters are the same as described in section 6.1. When enabling this function, actual machining operation is not allowed. Function of displaying machining path and machining preview cannot be activated at the same time. When enabling the function of machining path, please cancel the preview function or press the RESET key.

See the operation steps described below:

- (1) Press the  key to enter the screen of [GRAPHIC].
- (2) Press the  key (PREVIEW) to enter the screen for machining preview.
- (3) Press the  key (X-Y) to display the movement trail for plane of X-Y; or press the  key again to display the plane of Y-Z; or press the  key again to display the plane of X-Z; or press the  key again for plane of X-Y-Z.
- (4) Press the  key (PREVIEW) to view the machining result of G code file.
Press the  key (CANCEL PREVIEW) to stop the preview.
- (5) Press the  key (CENTER) to move the single block to the center of graphic display. Press the  key (ZOOM IN) or the  key (ZOOM OUT) to magnify or minimize the display.
- (6) Use  (UP),  (DOWN),  (LEFT) and  (RIGHT) keys (on the function bar at next page) to move the graph.

Note:

- (a) When activating the display of machining path, function of machining preview cannot be enabled.
- (b) When machining preview is enabled, actual machining operation is not allowed. Function of machining path and machining preview cannot be activated at the same time; before enabling machining path, please cancel the preview or press the RESET key.

- (c) During machining preview, switch the mode will force the preview function to be cancelled.
- (d) If the preview has been cancelled, the next preview will start from the initial block when enabling again.
- (e) The graph of machining path and machining preview might exceed the displaying frame because of the setting of workpiece coordinates. When drawing or preview is started, if users find no path or graph displays inside the frame, please press the CENTER key to move the current tracking to the center of the frame.

7.2 Alarm history (Message log)

This function records alarms and the related information generated by the system. Users may review all errors during program execution by sequence of the alarm time and type for troubleshooting and analysis. Data contained in each alarm record covers the occurring time and name of alarm. This screen displays up to 512 data. Apart from displaying messages, this function enables users to clear all alarm history. See the figure below.

ALARM(History)			00311	N452	
31	B103	ARC INTERF		2013/04/15	19:45:17
32	B103	ARC INTERF		2013/04/15	19:45:09
33	B103	ARC INTERF		2013/04/15	19:10:24
34	B103	ARC INTERF		2013/04/15	19:09:49
35	B103	ARC INTERF		2013/04/15	19:08:55
36	B103	ARC INTERF		2013/04/15	18:14:06
37	B600	PPI TOKEN ERROR (0, Line: 364)		2013/04/11	10:42:47
38	B604	PPI NONEXIST (0, Line: 2)		2013/04/10	14:25:18
39	B604	PPI NONEXIST (0, Line: 2)		2013/04/10	14:24:51
40	B604	PPI NONEXIST (0, Line: 2)		2013/04/10	14:24:25
41	B017	INVALID TOOL ASSIGMENT		2013/04/10	13:37:31
42	B017	INVALID TOOL ASSIGMENT		2013/04/10	13:37:11
43	B017	INVALID TOOL ASSIGMENT		2013/04/10	13:36:43
44	B017	INVALID TOOL ASSIGMENT		2013/04/10	13:36:11
45	1E00	X Axis : AL009 Excessive deviation		2013/04/10	10:23:29
<div style="display: flex; justify-content: space-between; width: 100%;"> AUTO RPD 100% F 30% S 101% RUN </div>					

Figure 7-2-1

See the steps below to clear all alarm history:

- (1) Press the  key to enter the screen of [Alarm].
- (2) Press the  key (History) to enter the alarm history page.
- (3) Press the  key (CLR ALL) and the confirmation dialog box will pop up.
- (4) Press "Y" (yes) key then press the  key and all alarm records will be removed.

Note: The system switches to ALM group screen whenever an error occurs. Users can also set up parameter 10016 (The popup screen when an alarm occurs). The system will not switch to ALM screen automatically when an alarm occurs.

Chapter 8: DGN group

The DGN group provides machining information, user variable, system monitoring, gain adjustment, and system interface functions to optimize the system. MLC diagnostics function is also provided for system to do MLC status monitoring or forced device ON/OFF, and password setup function for permission management. With this function, various system parameters can be imported / exported.

8.1 Machining information

This function sets up a number of machined and target machining workpieces. It also resets the time and number of machining workpieces that have been completed (Completed stocks) and target machining workpieces (Target stocks). See the figure below for the machining information page:

DIAGNOSE(PROCESS)		00311	N213
Total time	48563 : 08 : 01		
Single time	13 : 01 : 42		
Target stocks	150		
Completed stocks	20		
Date	2013/04/25	Time	08:38:56
AUTO	RPD 100%	F 30%	S 101%

Figure 8-1-1

See the operation steps below for machining information setup:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PROCESS) to enter the screen of machining information.
- (3) Press the  key (Set NR), the machining count setup screen will pop up as shown in the figure below.

DIAGNOSE(PROCESS)		00311	N250
Total time	48563:	08:	15
Single time	12:	01:	56
Target stocks	150		
Completed stocks	20		
Date	2013/04/25	Time	08:39:10
AUTO	RPD 100%	F 30%	S 101% RUN

Figure 8-1-2

- (4) Use ; , keys to move the cursor to the specified field.
- (5) Enter value in the range of 0 ~ 9999 and press the  key to complete the setting.

In the screen of [PROCESS], users can reset the machining time (Total/Single) and completed stocks. See the operation steps below for clearing the machining time:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PROCESS) to enter the machining information page.
- (3) Press the  key (CLR TIME) and the confirmation dialog box will pop up.
- (4) Press "Y" (Yes) key and press the  to reset the machining time of a single workpiece.

See the operation steps below for clearing the machining count:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PROCESS) to enter the machining information page.
- (3) Press the  key (CLR NR) and the confirmation dialog box will pop up.
- (4) Press "Y" (Yes) key and press the  to reset the count of workpieces that have been machined.

8.2 User variable

Function of user variable includes system variable, user variable and equipment variable. System variable is for monitoring the specific variable. User variable and equipment variable enable users to update and display device data in the embedded registers (range D512 ~ D1023). By displaying device types in registers users may change and monitor settings in the registers (D512 ~ D1023) for easier relevant devices control.

DIAGNOSE(User Variable)			00311	N312
No.	REG (D)	Value	Comment	
0	512	3	+-	
1	1000	0		
2	1005	0		
3	1010	65535		
4	1013	0		
5	1020	65535		
6	1023	150		
7				
8				
9				
10				
11				
12				
13				
14				

AUTO RPD 100% F 30% S 101% RUN

Figure 8-2-1

See the operation steps below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (User VAR) to enter the screen of variable monitoring.
- (3) Press the  key (User VAR) to enter the setting screen. Or you can press the  key (M VAR) to enter the setting screen of equipment variable.
- (4) Use ; , or   keys to move the cursor to the specified data field.
- (5) Enter the desired register number (D512~D1023). Then, press the  key to display the register data.
- (6) Move the cursor to the specified register data field and enter the appropriate value. Then, press the  key to complete the setting for the register.
- (7) Use  (US DEC),  (HEX),  (S DEC) or  (FLOAT) to select the display format.

F1

- (8) Move the cursor to the data field that requires to be deleted. Press the key (DEL) to delete the data.

8.3 MLC

The MLC diagnostics function displays current status of each MLC device for monitoring and forced ON/OFF. This helps users in inspecting system status or driving MLC device and provides MLC editing function as shown in Figure 8-3-1. The MLC diagnostics function covers bit device status, register status, device monitoring, MLC status operation and MLC editing function. See the sections below for operation steps.

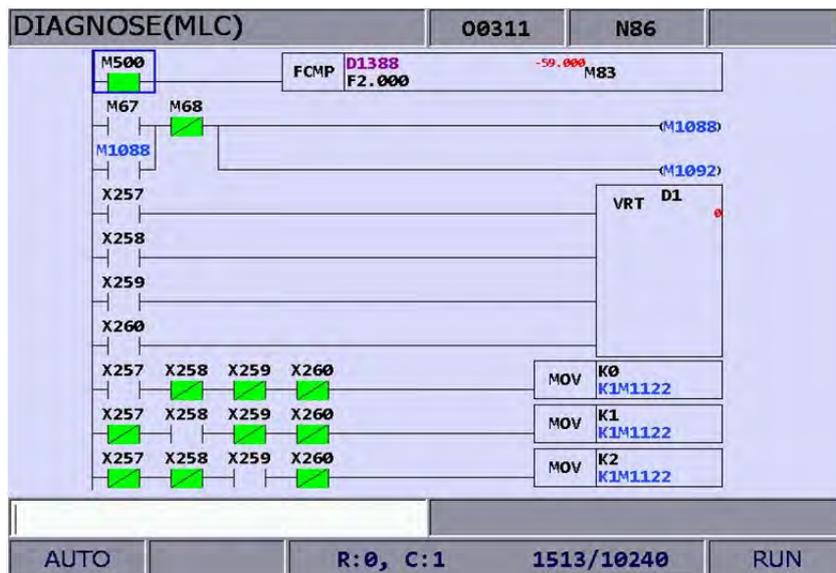


Figure 8-3-1

8.3.1 Bit

MLC programs apply many device commands to trigger ON/OFF operation. Status of these devices can be seen in this function screen. The bit function displays bit type device of MLC, searches devices, and forces ON/OFF operation.

See the operation steps below: (illustrated with M device)

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (Bit) to enter the screen of bit device status.
- (4) Press the  key (M) to switch to device M status display as shown in figure below.

DIAGNOSE(MLC Bit Device)				00311			N337				
	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	
M0	0	0	0	0	0	0	0	0	1	0	
M10	1	0	0	0	0	0	0	0	0	1	
M20	0	0	0	0	0	0	0	0	0	0	
M30	0	0	0	1	0	0	0	0	0	0	
M40	0	0	0	0	0	0	0	0	0	0	
M50	0	0	0	0	0	0	0	0	0	0	
M60	0	0	0	0	0	0	0	0	0	0	
M70	0	0	0	0	0	0	0	0	0	0	
M80	0	0	0	0	0	0	0	0	0	0	
M90	0	0	0	0	0	0	0	0	0	0	
M100	1	0	0	0	0	0	0	0	0	0	
M110	0	0	0	0	0	0	0	0	0	0	
M120	0	0	0	0	0	0	0	0	0	0	
M130	0	0	0	0	0	0	0	0	0	0	
M140	0	0	0	0	0	0	0	0	0	0	
AUTO				RPD 100%			F 30%		S 101%		

Figure 8-3-2

Move the cursor or search for the specified device field with the steps (1) ~ (4). See step (5) for device searching.

- (5) Enter the device name (e.g. 107) and press the  key (M) to search the desired device (M107).

The device status can be changed only when the system is in "NON-auto" mode. See step (6) for forced ON/OFF operation.

- (6) Select the device for the desired status change, press "1" and press the  key to force it ON (if it is in OFF status) or press "0" and press the  key to force it OFF (if it is in ON status) .

8.3.2 Register

Please refer to **Section 8-3-1**. As most system functions are triggered by MLC program, the MLC device features both bit and word type devices. This section explains the operation on word type devices.

See the operation steps below: (illustrated with register T)

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (REG) to enter the screen of register device.

DIAGNOSE(MLC Reg Device)		00311	N431
Dev	Value	Dev	Value
T0	2	T15	0
T1	1	T16	0
T2	0	T17	0
T3	0	T18	0
T4	0	T19	0
T5	0	T20	0
T6	0	T21	0
T7	0	T22	0
T8	0	T23	0
T9	0	T24	0
T10	0	T25	0
T11	0	T26	0
T12	0	T27	0
T13	0	T28	0
T14	0	T29	0

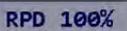





Figure 8-3-3

- (4) Press the  key (T) to enter the register T value setup page.
- (5) Enter the device name (e.g. "10") and press the  key to search device T10.
- (6) Enter the setting value in the field and press the  key to complete the setting.
- (7) Switch to the function bar in the last page. Use  (US DEC),  (HEX),  (S DEC) or  (FLOAT) to select the display format.

8.3.3 Device monitoring

This function sets up monitoring functions for up to 45 devices. See the operation steps below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (DEV MON) to enter the screen that displays device name as shown in figure 8-3-4.

DIAGNOSE(MLC Dev Monit)				00311	N70
No.	Dev	Value	Status	Comment	
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

AUTO RPD 100% F 30% S 101%

Figure 8-3-4

- (4) Enter the device name to be monitored as shown in figure 8-3-5. Up to 45 monitoring data entries can be set.

DIAGNOSE(MLC Dev Monit)				00311	N49	SFT
No.	Dev	Value	Status	Comment		
0	X113	####	0			
1	Y113	####	0	NC		
2	D1350	0	##			
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

AUTO RPD 100% F 30% S 101%

Figure 8-3-5

Device: Enter the name of device to be monitored in the highlighted field.

Value: Set up device status in the highlighted field.

Status: Enter digit 0 or 1 to set device status.

Different numeral systems can be used to switch between views of user settings including signed or unsigned decimal, hexadecimal numeral and floating point numerals. See Figure 8-3-6 for hexadecimal conversion and Figure 8-3-7 for floating point display.

DIAGNOSE(MLC Dev Monit)				00311	N21
No.	Dev	Value	Status	Comment	
0	X113	####	0		
1	Y113	####	0	NC	
2	D1350	0x0000	##		
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

AUTO RPD 100% F 30% S 101% RUN

Figure 8-3-6

DIAGNOSE(MLC Dev Monit)				00311	N388	SFT
No.	Dev	Value	Status	Comment		
0	X113	####	0			
1	Y113	####	0	NC		
2	D1350	0.000	##			
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

AUTO RPD 100% F 30% S 101%

Figure 8-3-7

8.3.4 Search line

Most system functions rely on devices triggered by MLC programs which are basically a set of command lines. This function enables users to search a program by line number.

See the operation steps below for searching a desired line in a MLC program.

- (1) Press the **DGN** key to enter the screen of [DIAGNOSE].
- (2) Press the **F3** key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Enter the specified MLC program line number and press the **F6** key (JUMP TO) to go to the target line.

8.3.5 Editor

The edit function in DGN group can manage and edit MLC program. Its operation interface enables users to edit the MLC program directly. **This function can be run in "Edit mode" only.**

I. Basic MLC command

A basic MLC command (including: LD, LDI, LDP, LDF, OUT, APP, —, |, INV) can be created with the functions described in this section. See Figure 8-3-3 for illustration.



Figure 8-3-8

See the operation steps below for command LD:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (EDITOR) to enter the MLC program editor screen as shown in Figure 8-3-6.
- (4) Use     keys to move the cursor to the specified edit place.
- (5) Enter the device name and press the  key (LD) and the device will be created successfully.

The steps described above apply to the creation of basic commands LDI, LDP, LDF, OUT, APP while step (1) ~ (4) apply to commands "—" and "|". Then, use the corresponding function key to complete the command as described above. The labeling function in MLC program is used to divide the section of the program and can be set in MLC program. To assign values from MLC table, users can press the function key to enter the setting page which shown as the figure below.

DIAGNOSE(MLC Table)		00311	N417	SFT
No.	Value	No.	Value	
0	0	15	12600	
1	20			
2	32			
3	50			
4	79			
5	126			
6	200			
7	320			
8	500			
9	790			
10	1260			
11	2000			
12	3200			
13	5000			
14	7900			
EDIT		R:139, C:1	1513/10240	STOP

Figure 8-3-9

II. Editing (cut, copy, and paste)

This is an MLC exclusive editing function. Users can use it for single line delete, cut, or copy or do the same to the MLC device command by circling. After an MLC program is edited, load it for compiling and saving.

See the operation steps below for the MLC editing function:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (EDITOR) to enter the MLC program editing page as shown in Figure 8-3-8.
- (4) Use , , , and  keys to move the cursor to the desired edit place.
- (5) Repeatedly press the  key to move the cursor to the last row of the function page in this layer.
- (6) Select the corresponded function key, such as  (CUT) to edit the selected line as required.

For MLC program editing, please press the relevant function key. Available functions are: circle, delete, cut, copy, paste, insert and delete line.

III. Symbol

This function enables users to search, delete, copy, and paste various types of devices. Available MLC program devices are represented by symbols: X, Y, M, A, T, C, D, P and I.

See the operation steps below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (EDITOR) to enter the MLC program editing screen as shown in Figure 8-3-6.
- (4) Use , , , and  keys to move the cursor to the desired edit place.
- (5) Press the  key to switch the function bar to the third row of the function page in this layer.

- (6) Press the  key (SYMBOL) to enter the device symbol function bar display.
- (7) Select the device type specific function key (e.g. Device X). Press the  key (X) to enter X device specific list and do delete, copy or paste function as desired.

The same operation steps (Section III: Symbol) apply to other symbols.

IV. MLC load, import, and export

After a MLC program is edited, it is required to save it for re-compiling. The saving function includes compiling and saving the file. Then, users should re-start the system to update the MLC program. Import and export MLC files can be done by using the corresponding function key.

8.3.6 Operation

The MLC program starts running automatically after the system is power on. The operation function can be used to manually switch the status of MLC program. That is, users can manually switch MLC running status from ON to OFF and vice versa. This is usually used for testing or inspecting system's MLC devices.

See the operation steps below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (SET) to enter the MLC execution status screen.
- (4) Press the  key (RUN/STOP) to switch execution status of MLC program.

Note:

The status information can be viewed when "MLC stops" after the MLC program execution is halted.

The function option can be used to force ON or OFF a MLC device.
See the operation steps below for forced ON:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (SET) to enter the MLC execution status screen.
- (4) Use ; ,  &  # keys to move the cursor to the specified device position.
- (5) Press the  key (ON) to switch on the device.

See the operation steps below for forced OFF:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (MLC) to enter the sub menu of MLC diagnostics.
- (3) Press the  key (SET) to enter the MLC execution status screen.
- (4) Use ; ,  &  # keys to move the cursor to the specified device position.
- (5) Press the  key (OFF) to switch off the device.

8.4 System monitoring

Computing results of the system can be displayed by type with this function, providing real data for users.

8.4.1 Servo monitoring

This function enables users to monitor the status of the servo drive including channel ports of each axis and the servo status. It provides the current status of the servo drive connected to the system as shown in Figure 8-4-1. In the figure below, the servo status of axis Z and the spindle are both Off and axis X and Y remain ON.

DIAGNOSE(Servo Monitor)				00311	N417	SFT			
Port	Channel	Axis	Servo Status	LOAD	Peak	MECH	Home	ABS	RST
1	0	X	ON	0 %	6 %	101.000	OK		
2	0	Y	OFF				OK		
3	0	Z	OFF				OK		
4	0	A	OFF				OK		
9	0	SP1	OFF				OK		

Figure 8-4-1

See the operation steps below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (SYS MONI) to switch to the system monitoring screen.
- (3) Press the  key (SERVO) to enter the servo monitoring screen.

8.4.2 I/O monitoring

NC300 system can add an external control switch through its I/O expansion module. Users can monitor the status of the expansion control panel connected to the I/O port.

See the operation steps below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (SYS MONI) to enter the screen for system monitoring.

- (3) Press the  key (I/O MONI) to enter the status monitoring screen for the I/O expansion module.

8.4.3 Variable monitoring

System variables: VS0 ~ VS31 and VS100 ~ VS131.

See the operation steps below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (SYS MONI) to enter the system monitoring function screen.
- (3) Press the  key to move the cursor to the second row of the function page in this layer.
- (4) Press the  key (VAR MONI) to display the variable monitoring screen.
- (5) Press the  key (SYS VAR) to enter the system variable monitoring screen.
- (6) Use   keys to scroll to the screen containing the desired variable.
- (7) Or you can enter the full name of the specified system variable and press the  key or enter the variable code and press the  key (SYS VAR) to search the desired system variable screen.

DIAGNOSE(System Var)		00311	N417	SFT
Num	Value	Num	Value	
VS0	0	VS16	0	
VS1	0	VS17	0	
VS2	0	VS18	0	
VS3	4	VS19	0	
VS4	0	VS20	0	
VS5	0	VS21	0	
VS6	0	VS22	0	
VS7	0	VS23	0	
VS8	0	VS24	0	
VS9	0	VS25	0	
VS10	0	VS26	0	
VS11	0	VS27	0	
VS12	0	VS28	0	
VS13	0	VS29	0	
VS14	0	VS30	0	
VS15	0	VS31	0	
EDIT				

Figure 8-4-2

Channel variable: VC0 ~ VC31, VC100 ~ VC131 and VC200 ~ VC231.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (SYS MONI) to enter the system monitoring function screen.
- (3) Press the  key to move the cursor to the second row of the function page in this layer.
- (4) Press the  key (VAR MONI) to enter the variable monitoring screen.
- (5) Press the  key (CH VAR) to enter the channel monitoring screen.
- (6) Use   keys to scroll the screen containing desired variable.
- (7) Or you can enter the full name of the specified system variable and press the  key or enter the variable code and press the  key (CH VAR) to search the desired channel monitoring screen.

Axis variable: VA0 ~ VA31, VA100 ~ VA131 and VA200 ~ VA231.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (SYS MONI) to enter the system monitoring function screen.
- (3) Press the  key to move the cursor to the second row of the function page in this layer.
- (4) Press the  key (VAR MONI) to enter the variable monitoring screen.
- (5) Press the  key (AXIS VAR) to enter the axis variable monitoring screen.
- (6) Use   keys to scroll the screen containing the desired variable.
- (7) Or you can enter the full name of the specified system variable and press the  key or enter the variable code and press the  key (AXIS VAR) to search the desired axis variable screen.

Interface variable: VH0 ~ VH31, VH200 ~ VH231 and VH400 ~ VH431 and VH800 ~ VH863.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (SYS MONI) to enter the system monitoring function screen.
- (3) Press the  key to move the cursor to the second row of the function page in this layer.
- (4) Press the  key (VAR MONI) to enter the variable monitoring screen.
- (5) Press the  key (IF VAR) to enter the interface variable monitoring screen.
- (6) Use   keys to scroll the screen containing the desired variable.
- (7) Or you can enter the full name of the specified system variable and press the  key or enter the variable code and press the  key (IF VAR) to search the desired interface variable screen.

MLC variable: VM0 ~ VM49

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (SYS MONI) to enter the system monitoring function screen.
- (3) Press the  key to move the cursor to the second row of the function page in this layer.
- (4) Press the  key (VAR MONI) to enter the variable monitoring screen.
- (5) Press the  key (MLC VAR) to enter the MLC variable monitoring screen.
- (6) Use   keys to scroll to the screen containing the desired variable.
- (7) Or you can enter the full name of the specified axis variable and press the  key. Or enter the variable code and press the  key (MLC VAR) to search the desired variable screen.

Use different numeral systems to switch between views of user settings including signed or unsigned numeral system, binary system and hexadecimal numeral.

8.5 Password setting

This function enables users to set up different permission levels for the system (system maintenance), equipment (mechanical equipment) and users (operation and use). It prevents unauthorized users from changing system settings.

8.5.1 System permission

The system permission function covers permission lock, permission unlock and system check. The password is composed of up to four alphanumeric characters (symbols excluded).

See the operation steps below for permission lock and unlock:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (S SCP) to enter the system permission lock/unlock function bar.
- (4) If the system permission is unlocked, press the  key (LOCK) to lock system permission.
- (5) If the system permission is locked, press the  key (UNLOCK) and an entry dialog box will pop up for users to enter permission password.
- (6) Enter a valid password and press the  key to unlock the permission.

Steps to inspect the system:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to display the password setup function bar.
- (3) Press the  key (S SCP) to enter the system permission lock/unlock function bar.
- (4) When the system permission is unlocked, press the  key (SYS CHECK) to see if there is any error occurs. If the item is checked, an error is found under the checked item.

8.5.2 Equipment permission

This function covers password change, permission lock, permission unlock, user 1 reset and user 2 reset. The password is composed of up to four alphanumeric characters (symbols excluded).

See the operation steps below for changing equipment permissions:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (M SCP) to enter the equipment permission function bar.
- (4) Press the  key (PWD CHG) and an entry dialog box will pop up as shown in Figure 8-5-1. Enter old password, new password, and new password again (for confirmation) as prompted.
- (5) Enter the passwords as prompted and press the  key.



Figure 8-5-1

See the operation steps below for equipment permission resetting:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (M SCP) to enter the equipment permission function bar.
- (4) Press the  key (UNLOCK) and an entry dialog box will pop up for users to enter the password when equipment permission is locked.
- (5) Enter a valid password and press the  key to revoke the equipment permission.

Note:

The default password of equipment permission is 0000, which means the permission is unlocked and all functions can be accessed. When the password is changed, the equipment permission is enabled and it means the related functions can be accessed with the permission only.

See the operation steps below for equipment permission lock up:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (M SCP) to enter the equipment permission function bar.
- (4) Press the  key (LOCK) to lock permission when it is revoked.

User reset function allows the equipment supplier to reset the user's password. Once the client forgets the password, the equipment supplier is able to reset as the default password. This function is active only when the password is not the default value. See below for the operation steps.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to display the password setup function bar.
- (3) Press the  key (M SCP) to display the equipment permission function bar.
- (4) Press  key (RST U1) /  key (RST U2) to reset the user's password.

Function Enabled is to enable/disable the group function. Once the group is canceled, the function will be disabled after the system is re-started up. See below for the operation steps.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to display the password setup function bar.
- (3) Press the  key (M SCP) to display the equipment permission function bar.
- (4) Press the  key (ENABLE) to enter the setting screen to enable the group function.
- (5) Use ;  keys to move the cursor to the field to be cancelled. Press the  key to cancel the selection. Then, press the  key once the setting is done. The setting will take effect after the system is re-started up.
- (6) If you wish to cancel the group function, press the  key (CANCEL) to exit the the setting page of group function.
- (7) If you wish to restore the system to the default setting, press the  key (DEFAULT) to restore the system to the initial setting of group function.

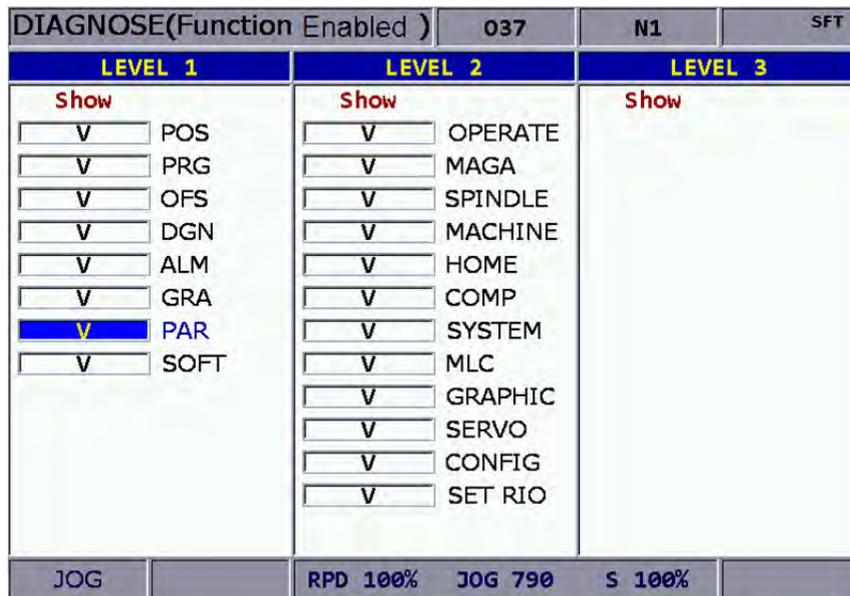


Figure 8-5-2

Restore Function

When the numerical control system has any error or the system data is seriously damaged, this function enables users to restore the damaged data through system backup. Users need to enter the restore screen to select the item to be restored.

Please note that permission is required to apply this function.

See below for the operation steps:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to display the password setup function bar.
- (3) Press the  key (M SCP) to display the equipment permission function bar.
- (4) Press the  key (RESTORE) and enter the screen to select the item to be restored. Use , , ,  keys to move the cursor. Then, press the  key to select the item to be restored.
- (5) To cancel the selection: Press the  key on the checked item to cancel the selection.
- (6) Press the  key (OK) to restore the system.

8.5.3 User permission

Users can set up User permission 1 and User permission 2. The permission function covers password change (PWD CHG), user account lockup (LOCK) and user account unlocking (UNLOCK). The password is composed of up to four alphanumeric characters (symbols excluded).

See the operation steps described below for changing user password (illustrated with User permission 1):

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) **If [User permission 1] is locked**, press the  key (U1 SCP) and the password entry dialog box for unlocking [User permission 1] will pop up.
- (4) Enter valid password and press the  key to to unlock [User permission 1] and display relevant function items.
- (5) Press the  key (PWD CHG) and an entry dialog box pops up for users to enter old password once and new password twice for confirmation.
- (6) Enter passwords as prompted and press the  key to complete the setting.

See the operation steps below for unlocking the user account:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to display the password setup function bar.
- (3) **When [User permission 1] is locked**, press the  key (U1 SCP) and the password entry dialog box for unlocking [User permission 1] will pop up.
- (4) Enter the valid password for [User permission 1]. Press the  key to unlock and display relevant function items.

See the operation steps described below for user permission lockup:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to display the password setup function bar.
- (3) **When [User permission 1] is unlocked**, press the  key (U1 SCP) to display relevant function items.
- (4) Press the  key (LOCK) to lock [User permission 1].

Note:

The function of user permission is the same as equipment permission. Its default password is 0000, which means all functions are available. If the user password is changed, the user permission is enabled.

8.5.4 Timed use

Users can assign a timed use of the controller to limit its use in a set period of time. The system controls given days or hours for the use of the controller automatically. Users can unlock or reset the time limit only with valid permission when the time limit is active. The "deadline" in the time limit screen remains blank when no time limit is set or the limit is unlocked as shown in Figure 8-5-3. If there is an active time limit in existence and it is locked, the "**deadline**" in the time limit screen indicates a valid due date as shown in Figure 8-5-4:



Figure 8-5-3



Figure 8-5-4

This screen helps users to know to which date the controller can be used normally. After the due date, the system will be locked unless the time limit is unlocked or extended to a later date. Otherwise, no G code program can be executed manually or automatically. **Please contact the dealer/service provider in case it is overdue.**

This function enables users to set up a time limit when there is no time limit in existence. See the operation steps described below for **time limit** setup:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (EXPIRE) to display the time limit information.
- (4) Press the  key (SETTING) to enter the limit setup page.
- (5) After entering the password of legal permission, the system's time limit control is activated.

See the operation steps described below for revoking a time limit. **Please contact the dealer/service provider for further information.**

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (EXPIRE) to display the remaining time information.
- (4) Press the  key (RELEASE) and a dialog box will pop up that requires users to enter the start code. See Figure 8-5-5.



Figure 8-5-5

- (5) With proper authorization, enter the start code and press the  key. Then, restart the system, the time limit is now unlocked.

Note:

After the time limit is unlocked, the "deadline" field turns blank, as shown in Figure 8-5-6. The screen indicates that the system does not have a time limit set up.



Figure 8-5-6

The management of time limit permission must go through the proper authorization to lock or unlock the time limit permission. When the time limit is activated, only when entering the correct password can the permission be unlocked. After the permission is unlocked, all time limit function is available, including password change and permission lock/unlock. The password is composed of up to 4 alphanumeric characters (symbol excluded).

See the operation steps described below for changing the password of time limit.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (EXPIRE) to display the remaining time information.
- (4) **When the permission is locked**, press the  key (EXP SCP) and the password entry dialog box will pop up for unlocking time limit.
- (5) Enter the valid password for time limit permission and press the  key to unlock time limit permission and display relevant function items.
- (6) Press the  key (PWD CHG), and an entry dialog box will pop up for users to enter old password once and new password twice for confirmation.
- (7) Enter passwords as prompted and press the  key.

See the operation steps described below for revoking the time limit permission.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (EXPIRE) to display the remaining time information.
- (4) **When the permission is locked**, press the  key (EXP SCP) and the password entry dialog box will pop up for unlocking time limit permission.
- (5) Enter the valid password for time limit permission. Then, press the  key to unlock the time limit permission and display relevant function items.

See the operation steps described below for locking the time limit permission.

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (PWD) to enter the password setup function bar.
- (3) Press the  key (EXPIRE) to display the remaining time information.
- (4) **When the permission is unlocked**, press the  key (EXP SCP) for displaying the relevant function items.
- (5) Press the  key (LOCK) and resume the permission lock.

8.6 System information

This function provides hardware and firmware program version of this system for system maintenance and performance optimization. It covers the options of system status, hardware and firmware serial number and equipment information. See the operation steps described below for system status display:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (STATUS) to enter the screen of system information.
- (3) Press the  key (SYSTEM) to enter the screen of system status information.

The firmware serial number function displays the firmware version number as well. See the operation steps described below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (STATUS) to enter the screen of system information.
- (3) Press the  key (FW SN) to display firmware version information as shown in the figure below.

DIAGNOSE(Firmware SN)		00311	N1	SFT
No.	Parameter Name	Status		
1	Version 1	00.020		
2	Version 1 Date	2013-03-20		
3	Version 2	00.029		
4	Serial number 1_(CP)	00.003		
5	Serial number 2_(PA)	00.000		
6	Serial number 3_(HM)	00.388		
7	Serial number 4_(MO)	00.012		
8	Serial number 5_(ML)	00.007		
9	Serial number 6_(FP)	00.005		
JOG		RPD 100%	JOG 500	S 101%

Figure 8-6-1

See the operation steps described below for hardware serial number display:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (STATUS) to enter the screen of system information.
- (3) Press the  key (HW SN) to display hardware version information.

See the operation steps described below for equipment information display:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key (STATUS) to enter the screen of system information.
- (3) Press the  key (M STATUS) to display the equipment information.
- (4) Users can enter the equipment information in this page or press the  key (DEL) to delete the equipment information where the cursor indicates.

8.7 Gain adjustment

The auto gain adjustment enables the system and the servo drive to work out even better motion control to meet different mechanical requirements of various machines. The NC300 controller accesses initial parameters of the servo and calibrates motion control with gain adjustment function. Then, it will send the result to the servo drive for unifying the control parameters of the controller and the servo drive. This brings the convenient when adjusting the gain and enhances the control accuracy for the system. Sub menu items of this function are described with the function screen as shown in the figure below.

The screenshot shows the 'DIAGNOSE(Servo Tuning)' screen. At the top, it displays '00311', 'N1', and 'SFT'. Below this, there are fields for 'Ch' (0), 'Axis' (X), 'Current' (0%), and 'JL/Jm' (0.0). A table lists parameters with columns for 'No.', 'Parameter Name', 'Calculate', and 'In Drive'. To the right, there are input fields for 'MECH' (101.012), 'POS 1', 'POS 2', 'Rigidity' (1), 'BW' (100 Hz), 'JL/Jm' (4.0), 'Acc. Time' (200 ms), 'S Time' (20 ms), 'Speed' (3000 rpm), and 'Interval' (500 ms). At the bottom, there are 'JOG' and 'Ready' buttons.

Callouts provide the following explanations:

- Servo parameter ID**: Servo parameter ID and name (points to the table header).
- Anchor point setup**: Anchor point 1/Anchor point 2 (points to POS 1 and POS 2).
- Adjustment conditions**: (points to the right-side input fields).
- Calculated results after adjustments**: Display calculated results after auto gain (points to the 'Calculate' column).
- Existing settings of the system**: Indicates servo settings currently used by the system (points to the 'In Drive' column).

Next axis: This function switches axial gain settings. The auto gain can be adjusted by individual axis. After the first axis is adjusted, users need to switch to the next one for its adjustment. See the operation steps described below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key to enter the next function page.
- (3) Press the  key (TUNING) to enter the auto gain setup page.
- (4) Press the  key (NEX AX) to switch to the next axis for its axial gain parameters setup.

Read the Servo: After the auto gain adjustment function is activated, its parameter values have been synchronized with those of the servo. To accommodate the function of gain adjustment, the calculated results after auto gain operation are not written back to the servo. This function can be used to restore servo parameters.

See the operation steps described below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key to switch to the next function page.
- (3) Press the  key (TUNING) to enter the auto gain setup page.
- (4) Press the  key (READ) to access parameter values from the servo.

Start, Jog←, Jog→, Positioning 1, Positioning 2: This sets up the operation of auto gain adjustment. It starts auto gain adjustment and sets up the positioning direction and operation. See the operation steps described below for continuous operation (Single-axis operation):

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key to switch to the next function page.
- (3) Press the  key (TUNING) to enter the auto gain setup page.
- (4) Press the  key to switch to the next function page.
- (5) Press the  key (JOG ←) to move to the left positioning point.
- (6) Press the  key (POS 1) to set the left positioning point.
- (7) Press the  key (JOG →) to move to the right positioning point.
- (8) Press the  key (POS 2) to set the right positioning point. The movement is now limited between both points.
- (9) Press the  key (RUN) to execute gain adjustment.
- (10) Press the  key (STOP) during auto adjustment. Then, the system will automatically calculate the best gain value.

Gain calculation: Users can change low-frequency rigid, bandwidth, or inertia ratio to fit individual machines. These values can be generated by this function automatically. See the operation steps described below for single axis operation:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key to switch to the next function page.
- (3) Press the  key (TUNING) to enter the auto gain setup page.
- (4) Use  and  keys to move the cursor to the low-frequency rigid, bandwidth, or inertia ratio fields for entering settings respectively.
- (5) Press the  key (COMPUTE) to generate new gain values.

Gain and resonance write-in: New gain values are generated after the auto gain adjustment has stopped. If they are the expected optimization values, please use this function to write them in the servo drive. See the operation steps described below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  function key to switch to the next function page.
- (3) Press the  key (TUNING) to enter the auto gain setup page.
- (4) Gain values are generated automatically after gain adjustment is complete.
- (5) Press the  key (WR GAIN) to write gain values in the servo drive. Then, press the  key (WR NOTH) to write resonance suppression values in the servo drive.

Note:

- (a) The newly generated gain adjustment results must be written in the servo drive before it can take effect.
- (b) After gain and resonance write-in function is executed, the servo parameters are updated and the old ones cannot be recovered. Please do the write-in with care.

Tapping adjustment: This function fine tunes the machine and servo for tapping application. See the operation steps described below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key to switch to the next function page.
- (3) Press the  key (TUNING) to enter the auto gain setup page.
- (4) Complete X-, Y- and Z-axis and spindle's gain adjustment first.
- (5) Repeatedly press the  key to enter the last page.
- (6) Press the  key (TAP RIV) to switch to the operation screen.
- (7) Press the  key (TAP SET) again and the confirmation dialog box will pop up. Press **Y** (Yes) key and press the  key to fine tune the machine for tapping.

Servo parameter: This function sets up the parameter for servo parameter display and setup in the gain adjustment screen:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key to switch to the next function page.
- (3) Press the  key (TUNING) to enter the auto gain setup page.
- (4) Repeatedly press the  key to enter the last page.
- (5) Press the  key (SERVO) to enter the servo parameter screen.
- (6) Move the cursor to the specified field and type in relevant data. Then, press the  key to set up a given field.

Synchronized control: This function can be applied when users need to synchronously control the master axis and slave axis. Before enabling this function, users have to complete the setting of parameters and channel. See the operation steps described below:

(1) Firstly, complete the setting of parameter 361 ~ 366 and channel axis.

(2) Press the  key to enter the screen of [DIAGNOSE].

(3) Press the  key to switch to the next function page.

(4) Press the  key (TUNING) to enter the auto gain setup page.

(5) Repeatedly press the  key to enter the last page.

(6) Press the  key (SYN) to switch to the operation screen.

(7) Then, press the  key (POS SET) to complete the setting.

8.8 Import

The system features a parameter import/export function for managing system parameters. Users can import correct parameters recover the system and export the modified parameter files for backup. This function can only be used with proper permissions. It can efficiently troubleshoot the system with parameter errors. See the operation steps described below for parameter import:

- (1) Press the  key to enter the screen of [DIAGNOSE].
 - (2) Press the  key to switch to the next function page.
 - (3) Press the  key (IMPORT) to display window of [FILE] (see Figure 8-8-1).
- Use ;  keys to select the file path and press the  key to access the file.

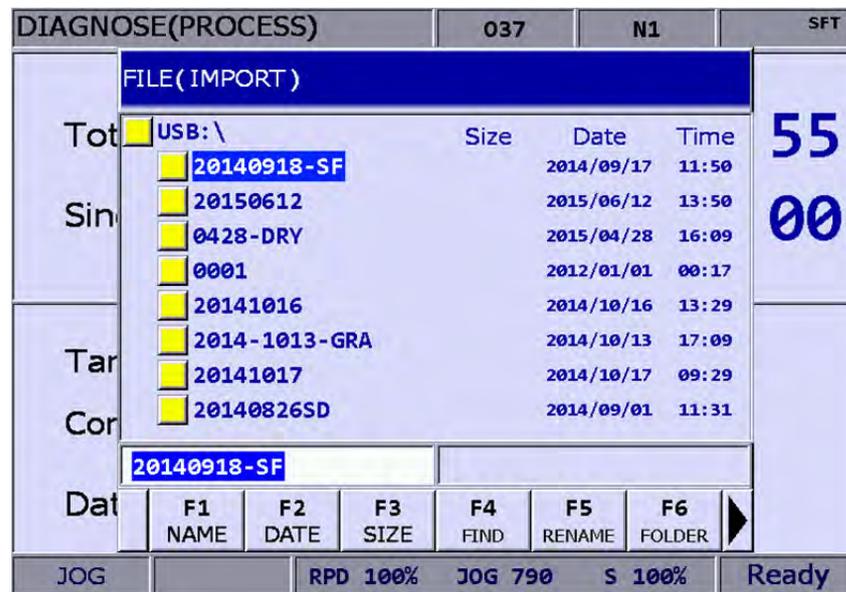


Figure 8-8-1

- (4) Use ; ; ;  keys to move the cursor. Press the  key to check the parameter items to be imported.
- (5) Press the  key (SEL ALL) to select all or press the  key (CLR ALL) to cancel the selected items to be imported.

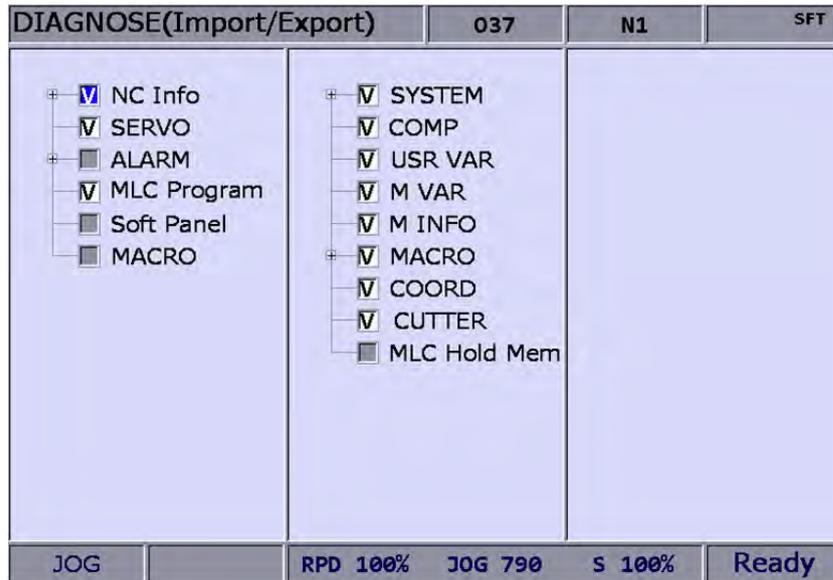


Figure 8-8-2

(6) Press the **F1** key (IMPORT) to display the dialog box for confirmation.

Enter "Y" (yes) and press the **ENTER** key, the data in the file will be imported to the system. Then, the importing progress will be displayed until it is complete.

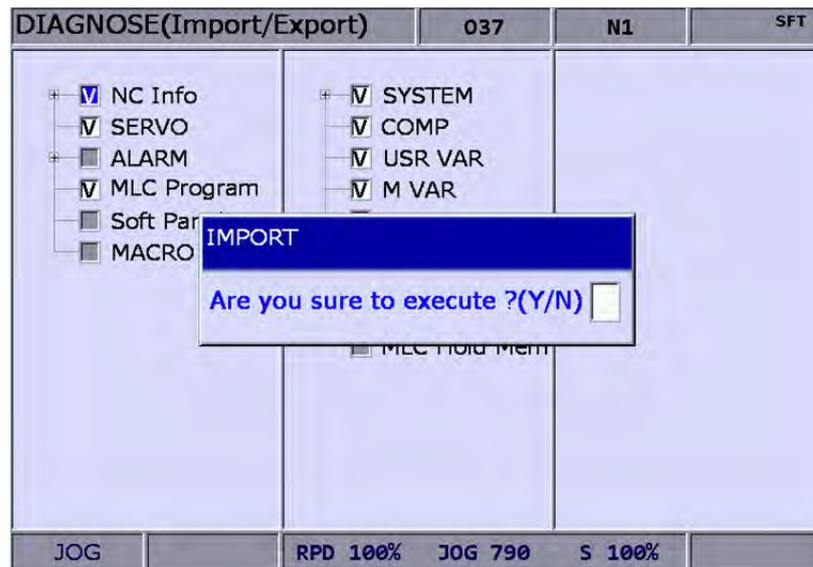


Figure 8-8-3

8.9 Export

Export function: System parameters may be modified to meet the requirements of different applications. After the system is optimized, this function can be used to export parameter values for backup and control. The exported file type includes parameter file, MLC and software panel. Please note that this function can be used only with proper permissions.

Type	Filename	Descriptions
Parameter file	PAR.ncp	NC information, servo parameters and alarms
MLC	MLC.gmc	MLC code
MLC	MLC.lad	Image file of MLC Ladder
MLC	MLC.lcm	Comments of MLC Ladder
Software panel	HMI.cin	Screen information and element property of the software panel
Software panel	HMI.img	Image file of software panel
Software panel	HMI.sci	Project of software panel

See the operation steps described below for parameter export:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Press the  key to switch to the next function page.
- (3) Press the  key (EXPORT) to enter the screen of parameter export selection.
- (4) Use     keys to move the cursor. Press the  key to check the items to export. Users may press the  key (SEL ALL) to select all or press the  key (CLR ALL) to cancel all the selected items to export.

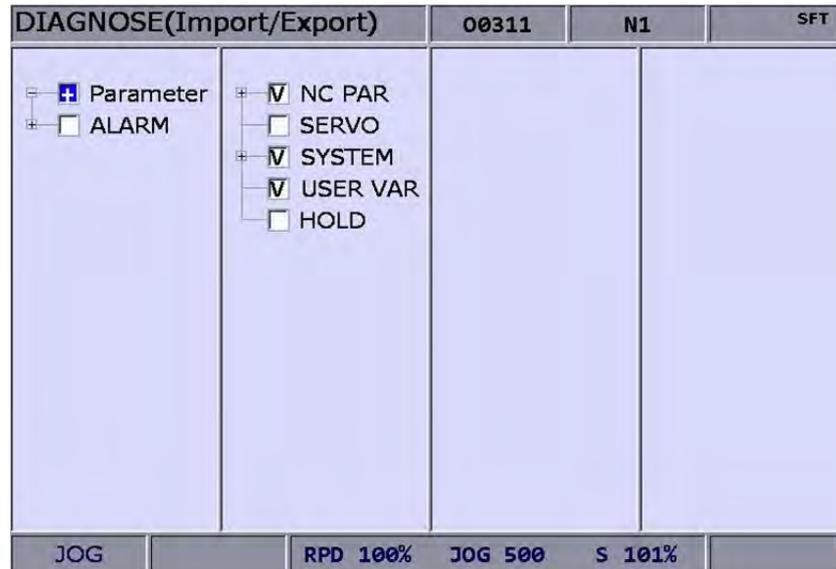


Figure 8-9-1

- (5) Press the **F1** key (EXPORT) to display the window of [FILE] (see Figure 8-9-2). Use **↑** and **↓** keys to select the file path of the saving destination or directly enter the file path in the directory. Then, press the **ENTER** to save the exported data in the specified data file.



Figure 8-9-2

- (6) After confirmed, the exporting progress will be shown before it is complete.
- (7) To create a new file and save the exported data to this file (see Figure 8-9-2), please name this file and then press the **F6** key (FOLDER) to save the data.

- (8) If the destination already contains an exported data file, a popup window will display “Update backup folder! Are you sure to execute?”. Press “Y” (yes) and



then press the key to replace the existing data file.

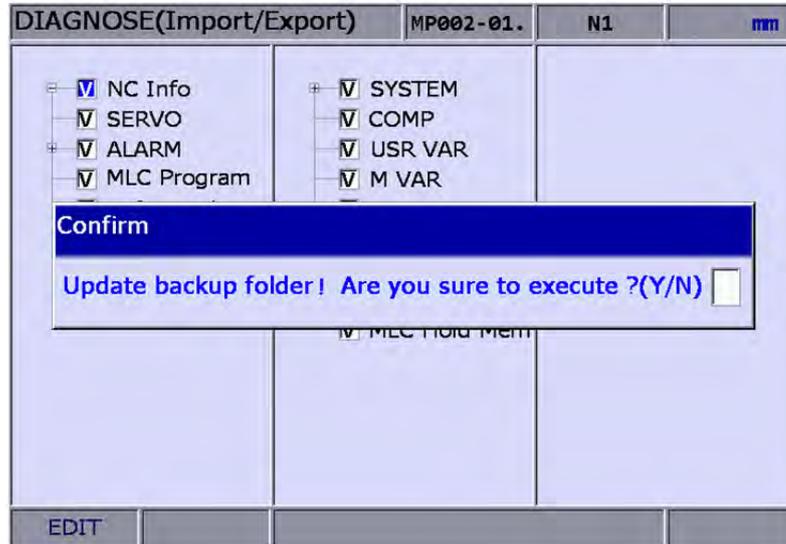


Figure 8-9-3

- (9) In addition, the file management function [FILE] can be operated by related function keys. (See Figure 8-9-2)

8.10 Multi language download

Language support of the group screens and function bars includes both Chinese and English. For other language support, please enhance the interface language with this multi-language downloading function. **Please contact the dealer/service provider for details.**

8.11 LOGO download

The startup screen of the system can be customized with user exclusive contents for logo presentation or other uses with this function. This function can be used only with proper permissions.

See the operation steps described below:

- (1) Press the  key to enter the screen of [DIAGNOSE].
- (2) Repeatedly press the  key to enter the function bar for displaying the next page.
- (3) Insert a USB drive containing the correct NC300 system startup screen file.
- (4) Press the  key (LOGO WR), a dialogue box will pop up.
- (5) Enter "Y". It automatically accesses and loads in the start-up file from the USB.
- (6) Restart the system after the LOGO image file is updated.

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Chapter 9: PAR group

PAR Group regulates and sets up a full range of system control and computing parameters for easy management and optimized setup. The PAR group covers the setup of parameters for operation, tool magazine, machining, spindle, mechanical, origin, compensation, and system.

After completing the parameter setting, please validate the setting according to their parameter types. There are three types: S: Power-off the servo drive; P: Power-off the system; R: Press the RESET key.

9.1 Machining parameter

The machining parameter sets up parameters for the maximum cutting speed, cutting and smoothing acceleration and deceleration time. These parameters bring a huge impact on machining quality. For the best operation effect, please set up these parameters based on actual requirements.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press  key (Process) to enter the screen of machining parameter setup.
- (3) Use ; , keys to move the cursor to the desired data field, and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-1-1.
- (4) Press the  key to complete the setting.

PARAMETER(Process)		N1	SFT
No.	Parameter Name		Value
309	Nominal arc feed rate	R	1000
310	Minimal arc feed rate	R	500
311	Overlapped speed reduction ratio	R	200
312	Cutting speed level	R	0
313	Smooth level	R	1
314	G1 speed	P	0
315	F0 Speed	P	100
316	G00 Rapid speed	R	5000
317	G00 Rapid ACC/DEC time	R	50
318	Maximum moving speed	R	5000
319	ACC/DEC time	R	150
320	S curve time constant	R	20
321	ACC/DEC time	R	15
322	S curve time constant	R	5
323	Arc. Radius tolerance	R	20

Range: 10 ~ 50000 (mm/min)

JOG	Ch 0	1/3
-----	------	-----

Figure 9-1-1

9.2 Operation parameter

Users can combine the execution and computing of a macro program in the G code file for composite motions. Users also can control or execute the execution of a macro program in the screen of [PARAMETER (Operation)].

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key (Operate) to enter the operation parameter setup screen.
- (3) Use ; ,  &  keys to move the cursor to the desired data field, and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-2-1.
- (4) Press the  key to complete the setting.

PARAMETER(Operation)		00311	N1	SFT
No.	Parameter Name			Value
3	GO9010	R		0
4	GO9011	R		0
5	GO9012	R		23
6	GO9013	R		24
7	GO9014	R		0
8	GO9015	R		0
9	GO9016	R		0
10	GO9017	R		0
11	GO9018	R		0
12	GO9019	R		0
13	MO9020	R		0
14	MO9021	R		6
15	MO9022	R		0
16	MO9023	R		16
17	MO9024	R		0
		Range: 0 ~ 1000		
JOG	Ch 0	1/6	Ready	

Figure 9-2-1

9.3 Tool magazine parameter

The tool magazine parameters set up relevant functions of the tool magazine including its mechanical type, quantity, and startup. For settings of tool magazine hardware relevant parameters, please contact the dealer/service provider.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key (Maga) to enter the tool magazine parameter setup screen.
- (3) Use ; , keys to move the cursor to the desired data field, and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-3-1.
- (4) Press the  key to complete the setting.

PARAMETER(Magazine)		00311	N1	SFT
No.	Parameter Name			Value
304	Magazine selection	P		18432
	• ATC enable flag			1
	• Set the magazine tool channel			0
	• ATC type			1
	• Set the search mode of the ATC tool change			0
	• Control type			0
336	Magazine control	P		0
	• ATC type			0
337	Magazine selection	P		1
	• Enable ATC 1			1
	• Enable ATC 2			0
338	ATC 1 station	P		16
339	ATC 1 init number	P		0
340	ATC 1 start number	P		1
341	ATC 2 station	P		50
				Range: 0 ~ 1
JOG	Ch 0	1/2	Ready	

Figure 9-3-1

9.4 Spindle parameter

The spindle parameters set up various spindle function including gains, maximum speed, and positioning errors.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key (Spindle) to enter the spindle parameter setup screen.
- (3) Use ;  keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-4-1.
- (4) Press the  key to complete the setting.

PARAMETER(Spindle)		N1	SFT
No.	Parameter Name		Value
399	Spindle mode	P	19
	• Spindle control flag		1
	• Closed loop control flag		1
	• Spindle control output		0
	• SP Type		1
	• Encoder type		0
401	Spindle import number	P	8
402	1st encoder pulse	P	1280
403	1st Gain	P	50
404	1st positioning speed	P	500
405	1st Spindle offset	R	0
406	1st speed in range	P	10
407	1st position In range	P	100
408	1st zero speed	P	5
409	1st Spindle speed	P	12000
		Range: 0 ~ 1	
JOG	Ch 0	1/2	Ready

Figure 9-4-1

9.5 Mechanical parameter

Users can set up the mechanical equipment relevant parameters of software/hardware limit, screw guide pitch and number of pulses of encoder.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key (Machine) to enter the mechanical parameter setup screen.
- (3) Use ; , keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-5-1.
- (4) Press the  key to complete the setting.

PARAMETER(Machine)		00311	N1		
No.	Parameter Name		X	Y	Z
602	1st Upper soft limit	R	100000.000	100000.000	100000.000
603	1st Lower soft limit	R	-100000.000	-100000.000	-100000.000
604	2ed Upper soft limit	R	100000.000	100000.000	100000.000
605	2ed Lower soft limit	R	-100000.000	-100000.000	-100000.000
628	Port polarity	P	0	0	0
	• CWL polarity		0	0	0
	• CCWL polarity		0	0	0
	• Home dog polarity		0	0	0
630	Encoder pulse count	P	1280	1280	1280
631	Shaft gear number	P	1	1	1
632	Motor gear number	P	1	1	1
633	Lead screw pitch	P	10	10	10
634	Control utility	P	1	1	1
	• Rotation mode		0	0	0
		Range: -100000 ~ 100000 (mm)			
JOG		Ch 0	1/1		

Figure 9-5-1

9.6 Origin parameter

The origin parameter sets up coordinates from mechanical origin to the fourth reference point and origin searching mode.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key (Home) to enter the origin parameter setup screen.
- (3) Use ;  keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-6-1.
- (4) Press the  key to complete the setting.

PARAMETER(Home)			N1	SFT	
No.	Parameter Name		X	Y	Z
606	Home absolute coordinate	P	0.000	0.000	0.000
607	2nd ref. position	P	3.000	3.000	-25.400
608	3rd ref. position	P	10.000	10.000	-50.800
609	4th ref. position	P	15.000	15.000	-76.200
610	2nd ref. position range	P	0.000	0.000	0.000
616	Homing mode	P	0	0	0
617	Homing criteria	P	1	1	1
	• Homing search direction		1	1	1
	• Homing mode Search dog for each		0	0	0
618	Rapid home speed	R	2000	2000	2000
619	Creep speed	R	200	200	200
620	Reference moving speed	R	10	10	10
624	Home detection length	P	100	2000	100
			Range: -100000000 ~ 100000000		
JOG		Ch 0	1/1	Ready	

Figure 9-6-1

9.8 Compensation parameter

The compensation parameter sets up relevant compensation data to compensate errors caused by mechanical factors during actual machine operation. That is to say, the compensation is given by the control system with considering the machine features.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key to switch to the screen with function bar.
- (3) Press the  key (Comp) to enter the compensation parameter setup screen.
- (4) Use  and  keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-8-1.

PARAMETER(Compensation)			N1		SFT
No.	Parameter Name		X	Y	Z
1000	Backlash amount	R	0.00000	0.00000	0.00000
1001	Compensation time	R	10	10	10
1002	Compensation delay time	R	0	0	0
1003	Friction comp amount	R	0.00000	0.00000	0.00000
1004	Friction comp time	R	10	10	10
1005	Friction comp delay time	R	0	0	0
1006	Compensation utility	R	0	0	0
	• Absolute or Relative		0	0	0
	• Friction positive direction		0	0	0
	• Friction negative direction		0	0	0
	• Friction compensation mode		0	0	0
	• LSC direction		0	0	0
1007	LSC point number	R	0	0	0
1008	LSC Space	R	10.00000	10.00000	10.00000
1009	LSC Offset	R	0.00000	0.00000	0.00000
			Range: -2 ~ 2 (mm, inch)		
JOG		Ch 0	1/10		

Figure 9-8-1

- (5) Press the  key to complete the setting.
- (6) Press the  key (um) to complete the setting of absolute length compensation in unit of um; or press the  key (um+) to complete the setting of incremental length compensation in unit of um.
- (7) Compensation data generated by calibration instruments can be converted by the CNC SOFT program. Press the  key (import) to import compensation data in absolute type; or press the  key (import +) to import

compensation data in incremental type.

- (8) After entering all compensation value, press the  key (OK) to confirm and update the compensation parameters.

9.9 System parameter

The system parameters enable users to customize operation environment including system date, system time, background color of screen, function bar color, and tab color. See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key to switch to the screen with function bar.
- (3) Press the  key (System) to enter the system parameter setup screen.
- (4) Use ; , keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-9-1.

PARAMETER(System)		N1	SFT
No.	Parameter Name	Value	
10000	Date	2015/11/18	
10001	Time	09:57:09	
10002	Language	0	
10003	Brightness	80	
10004	User defined language	0	
10008	System length type	0	P
10009	Sync coordinate setting	0	
	• Sync coordinate display	0	
	• Sync working coordinate display	0	
10010	Enable screen saver	0	
10011	Screen saver time 1	10	
10012	Screen saver brightness 1	60	
10013	Screen saver time 2	20	
10014	Screen saver brightness 2	30	
10015	User utility	0	P
		Format: Year/Month/Day	
JOG	Ch 0	1/5	Ready

Figure 9-9-1

- (5) Press the  key to complete the setting.
- (6) As for the setting of color items, press the  key (Color) and the color selection dialog box will pop up.
- (7) To reset the system environment back to its factory defaults status, press the  key (Default) and a confirmation dialog box will pop up.
- (8) Press "Y" (Yes) and the  key to reset the system back to its factory

defaults status.

9.10 MLC setting

This function sets up the display environment of the component device and color of the MLC ladder diagram.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key to switch to the screen with function bar.
- (3) Press the  key (MLC) to enter the MLC setup screen.
- (4) Use ; , keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-10-1.

PARAMETER(MLC)		00311	N1	
No.	Parameter Name	Value		
12000	Program title	for pc edit		
12001	Company name			
12002	Designer name			
12003	Show comments	0		
12004	Show symbol	0		
12005	Ladder color	0		
12006	Ladder text color	0		
12007	Ladder symbol color	0		
12008	Ladder cursor color	31		
12009	Ladder monitor color	2016		
12010	Ladder device comment color	36864		
12011	Ladder segment comment color	36864		
12012	Ladder row comment color	36864		
12013	Ladder monitor value color	63488		
12014	NC special device color	8799		
		Length: 0 ~ 20		
JOG		Ch 0	1/2	Ready

Figure 9-10-1

- (5) Press the  key to complete the setting.
- (6) As for the setting of color item, press the  key (Color) and the color selection dialog box will pop up.
- (7) To reset the system environment back to its factory defaults status, press the  key (Default) and a confirmation dialog box will pop up.
- (8) Press "Y" (Yes) and the  key to reset the system back to its factory defaults status.

9.11 Graph parameter

The graph parameter defines the display range of motion trails and provides plotting settings for GRA group.

PARAMETER(Graphic)		N1	SFT
No.	Parameter Name	Value	
14000	Graphic line color	0	
14001	Graphic background color	1183	
14002	Graphic display settings	1	
	• Graphic line width	1	
14003	Graphic utility P	0	
	• GRAPHIC default screen	0	
	• X-Y plane display direction	0	
	• Y-Z plane display direction	0	
	• X-Z plane display direction	0	
14004	Graphic area dimension on X-Y plane	138.889	
14005	Graphic area dimension on Y-Z plane	138.889	
14006	Graphic area dimension on X-Z plane	138.889	
14007	Graphic area dimension on X-Y-Z plane	138.889	
14008	Graphic utility P	0	
	• Automatically preview	0	
		Range: 0 ~ 65535	
JOG		Ch 0	1/1

Figure 9-11-1

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key to switch to the screen with function bar.
- (3) Press the  key (Graphic) to enter the graph parameter setup screen.
- (4) Use  and  keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen) as shown in Figure 9-11-1.
- (5) Press the  key to complete the setting.
- (6) As for the setting of color item, press the  key (Color) and the color selection dialog box will pop up.
- (7) To reset the system environment back to its factory defaults status, press the  key (Default) and a confirmation dialog box will pop up.
- (8) Press "Y" (Yes) and the  key to reset the system back to its factory defaults status.

9.12 Servo parameter

Through the servo parameter setup screen, the servo end can control and set up parameters.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Press the  key to switch to the screen with function bar.
- (3) Press the  key (Servo) to enter the servo parameter setup screen.
- (4) Use  and  keys to move the cursor to the desired data field and enter the proper values (Refer to the recommended values displayed at lower right corner of the screen).
- (5) Press  key to complete the setting.

PARAMETER(Servo)			N1		SFT
Group	No.	Parameter Name	X	Y	Z
P0	0	Firmware Version	1744	1744	1744
P1	1	Control Mode and Output Dirt	B	B	B
P1	8	Smooth Constant of Position	0	0	0
P1	36	Accel /Decel S-curve	0	0	0
P1	37	Load Inertia Ratio	10	40	10
P1	44	Gear Ratio(Numerator N1)	1	1	1
P1	45	Gear Ratio(Denominator M1)	1	1	1
P1	55	Maximum Speed Limit	3000	3000	3000
P1	62	Friction Compensation(%)	0	0	0
P1	63	Friction Compensation(ms)	4	4	4
P1	68	Position Command Moving Filter	4	4	4
P2	0	Position Loop Gain(Kpp)	157	157	157
P2	1	Kpp Gain Switching Rate	100	100	100
P2	2	Position Feed Forward Gain(Kpf)	0	0	0
P2	3	Smooth Constant of Kpf Gain	5	5	5
			Range: 0 ~ 65535		
JOG		Ch 0	1/3		

Figure 9-12-1

9.13 Channel setup

This function sets up the number and definition of the axis employed by a system as shown in Figure 9-13-1. The system mode cannot be set up in Auto and Manual modes.

PARAMETER(Ch/Axis Setting)							00311	N1	
Channel	Axis	Enable	NC	MLC	Port	Disp Name	Used port		
CH 0	X	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1		1	<input checked="" type="checkbox"/>	CH0 X
	Y	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2		2	<input checked="" type="checkbox"/>	CH0 Y
	Z	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3		3	<input checked="" type="checkbox"/>	CH0 Z
	A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4		4	<input checked="" type="checkbox"/>	CH0 A
	B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			5	<input type="checkbox"/>	
	C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			6	<input type="checkbox"/>	
	U	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			7	<input type="checkbox"/>	
	V	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			8	<input type="checkbox"/>	
	W	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			9	<input type="checkbox"/>	
	SP1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9			<input checked="" type="checkbox"/>	CH0 SP1

JOG RPD 100% JOG 500 S 101% Ready

Figure 9-13-1

See the operation steps below:

- Press the  key to enter the screen of [PARAMETER].
- Repeatedly press the  key to move the cursor to the third row of the function page in this layer.
- Press the  key (Config) to enter the screen for channel setup.
- Use  and  keys to move the cursor to the desired axis function fields, and then press the  key to select the axis and enable its attribute setting. Users can select the axis attribute of either NC or MLC as desired.
- To define axis attributes: Use  and  keys to move the cursor to the desired field and press the  key to check the field.
- After the axis attribute is defined, use  and  keys to move the cursor to the port field of the axis, press the  key and the port number entry box for setting up the port number will pop up, Then, press  [ ~  /

keys to enter a unique port number, press the  key and the port number of the axis is set.

- (7) Press the  key (OK) after all axes are defined.
- (8) Restart the NC300 control system to validate the setting.

Note:

- (a) Please check to activate the axis name before enabling the axis. Users can set up the definition to control the axis only after it is activated. Select either the NC or MLC axis (not both), and assign a port number (unique from other axis port numbers).
- (b) To disable (cancel) the axis function, move the cursor to the specified field and press the ENTER key to uncheck the item. Then the function of this axis will be disabled.
- (c) Parameter fields marked with the letter 'P' indicates that changes can take effect only after the NC300 control system is restarted. Otherwise, changes take effect immediately.

9.14 RIO setting

The NC300 numerical control system can have external control switch by increasing the I/O expansion module. The I/O function module can be enabled in RIO setting page as shown in Figure 9-14-1. See the operation steps below:

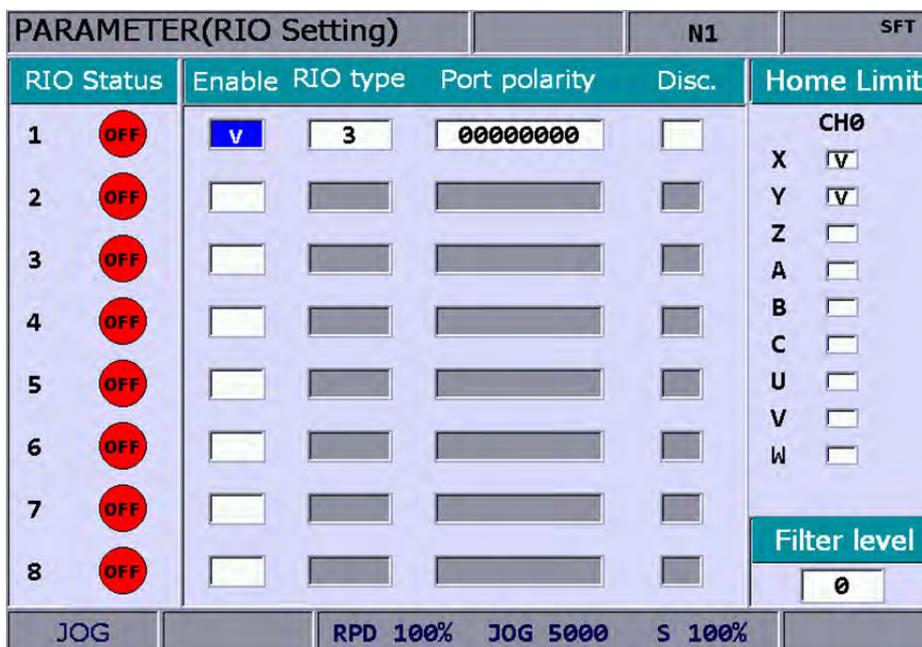


Figure 9-14-1

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Repeatedly press the  key to move the cursor to the third row of the function page in this layer.
- (3) Press the  key (Set RIO) to enter the I/O expansion module setup page.
- (4) Use  and  keys to move the cursor to the desired RIO port fields, press the  key to check the field and display the I/O setup screen of the selected port.
- (5) Use  and  keys to move the cursor to the polarity setup field, press the  key and the entry box will pop up. Then, press the  key after data entry and the polarity is set.
- (6) Then, use  and  keys to move to the field of [Disc.] (output when disconnected), press the  key to enable/disable the setting.

- (7) Press the  key (OK) after all I/O modules function are set.

9.15 Search

This function enables users to search and point to the desired parameter fields by entering parameter codes. It is faster and easier to access to the screen containing the given parameter.

See the operation steps below:

- (1) Press the  key to enter the screen of [PARAMETER].
- (2) Repeatedly press the  key to move the cursor to the third row of the function page in this layer.
- (3) Enter the parameter code to be searched in the field located at the lower bottom of the screen.
- (4) Press the  key (Search) to start searching.

Note:

Apart from using the function key to search the parameter, users can enter the parameter number in the screen of PAR group. The method is: **S + parameter number** and then press the ENTER key.

- (6) Use   keys to move the cursor to the desired group field and press the  key to complete the setting of parameter group. Or press the  key (READ PAR) when the cursor stops at the field of [GROUP], a confirmation box of reading the parameter will pop up. Then, press “Y” (Yes) and press the  key again to read the parameter value.
- (7) If you wish to delete the parameter group, use   keys to move the cursor to the desired group field, press the  key (DEL GROUP) and a confirmation box of “Delete the group” will pop up. Press “Y” and the  key to delete the group.
- (8) When entering multiple parameter groups, press the  key (ALLOCATE) and a confirmation box will pop up. Press “Y” and the  key. The system will divide the range of parameter value by the group number. Then the parameter value will be allocated to each group that you currently applied.
- (9) After completing the setting of parameter group, press the  key (SAVE) to see the setting screen and result and a confirmation box will pop. Then, press “Y” (Yes) and press the  key again to save the setting.
- (10) Use   keys to move the cursor to the specified group field and press the  key (WRITE PAR). A confirmation box will then pop up. Press “Y” and the  key again to write the value to the corresponding parameters.

Note:

- (a.) Writing the value to parameters will replace the original parameter value in the system. Please make sure the parameter value is correct beforehand.
- (b.) Up to 20 groups with maximum 20 parameters for each group are supported.

Chapter 10: SOFT group

SOFT group is a special control function provided by NC300 numerical controller to replace the physical secondary control panel or special operation functions. With the CNC SOFT software, users can add a secondary control panel screen and use it to do exactly the operations available in the physical secondary control panel. This function can be used in environments without physical secondary control panel to support special repair servicing needs. Users may use it to add software keys with self-developed special controls for expanded functionality. This group function can replace the physical secondary control panel's control or function options.

10.1 Control panel (※Example: without physical operation panel)

See Figure 10-1-1 for an example of the function devices offered by this function. Keys and buttons of a physical secondary control panel are simulated with control components. Each device is turned on or off with relevant function key. Device types and priorities vary with user preference. Icons are sorted from bottom to top.

See the operation steps below for the operation of the control panel:

- (1) Press the  key to enter the SOFT group screen.
- (2) Press the  key (control panel) to enter the device function bar screen.
- (3) Use ; , keys to access the corresponding device function page as shown in Figure 10-1-1.



Figure 10-1-1

- (4) Use  ~  keys to enable or disable device function.

Control panel (※Example: with physical operation panel)

The software panel can define additional functions and locations which are required by expanded requirements. In a machine with physical secondary control panel, use the CNC SOFT software to add auxiliary configuration functions, including spindle tool release, auto chip removal and auto power off in the screen as shown in Figure 10-1-2.



Figure 10-1-2

See the operation steps described below for the operation of the control panel:

- (1) Press the  key to enter the SOFT group screen.
- (2) Press the  key (control panel) to enter the device function bar screen.
- (3) Use  ; , keys to enter the corresponding device function page.
- (4) Use  ~  keys to enable or disable device function.

10.2 Factor regulation (※Example: without physical operation panel)

Available factors are: cut feeding rate, fast feed rate, spindle speed, jog, and hand wheel.

Use the up and down arrow keys to select the factor type and operation as shown in Figure 10-2-1.

Range of cut feeding rate: 0% ~ 150% (in steps of 10%).

Range of fast feeding rate: F0, 25, 50, 100(%).

Range of spindle speed: 50% ~ 120% (in steps of 10%).

Range of jog factor: 0, 2, 3, 5, 8, 13, 20, 32, 50, 80, 120, 200, 320, 500, 790, 1260 mm/min.

Range of hand wheel factor: 0.001, 0.01, 0.1 (mm)



Figure 10-2-1

See the operation steps described below for factor regulation:

- (1) Press the  key to enter the SOFT group screen.
- (2) Press the  key (factor regulation) to enter the factor regulation setup screen.
- (3) Use  and  keys to point the setup box to the specified regulation icon as shown in Figure 10-2-1.
- (4) Available options in the setup box are: increasing, decreasing, 100%, and 0%. Press the relevant function key to adjust factors as desired.

10.3 Axis operation (※Example: without physical operation panel)

Use the SOFT group function to set the machine's individual axis for axial movements through software panel as shown in Figure 10-3-1.



Figure 10-3-1

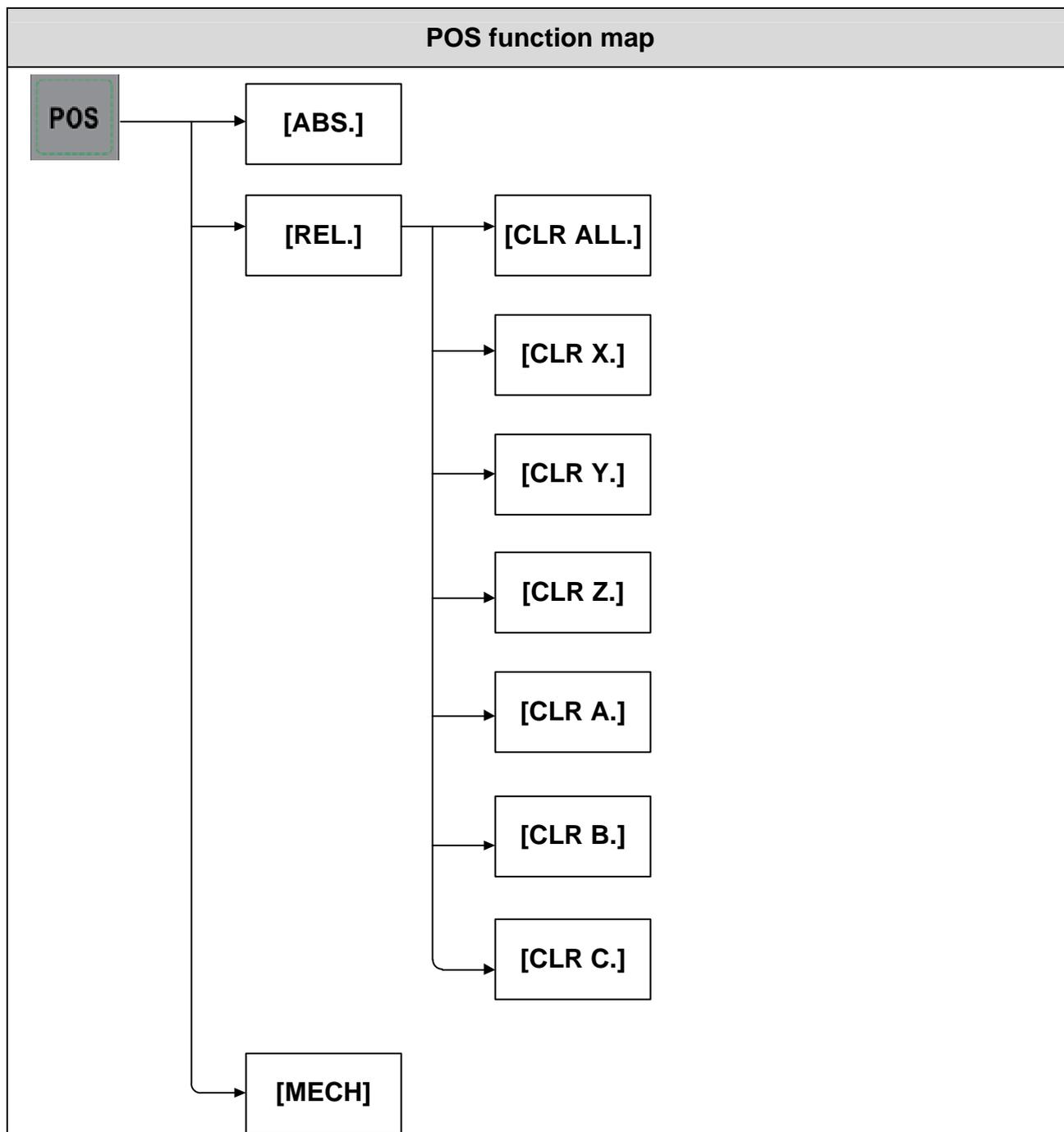
See the operation steps described below for axis operation:

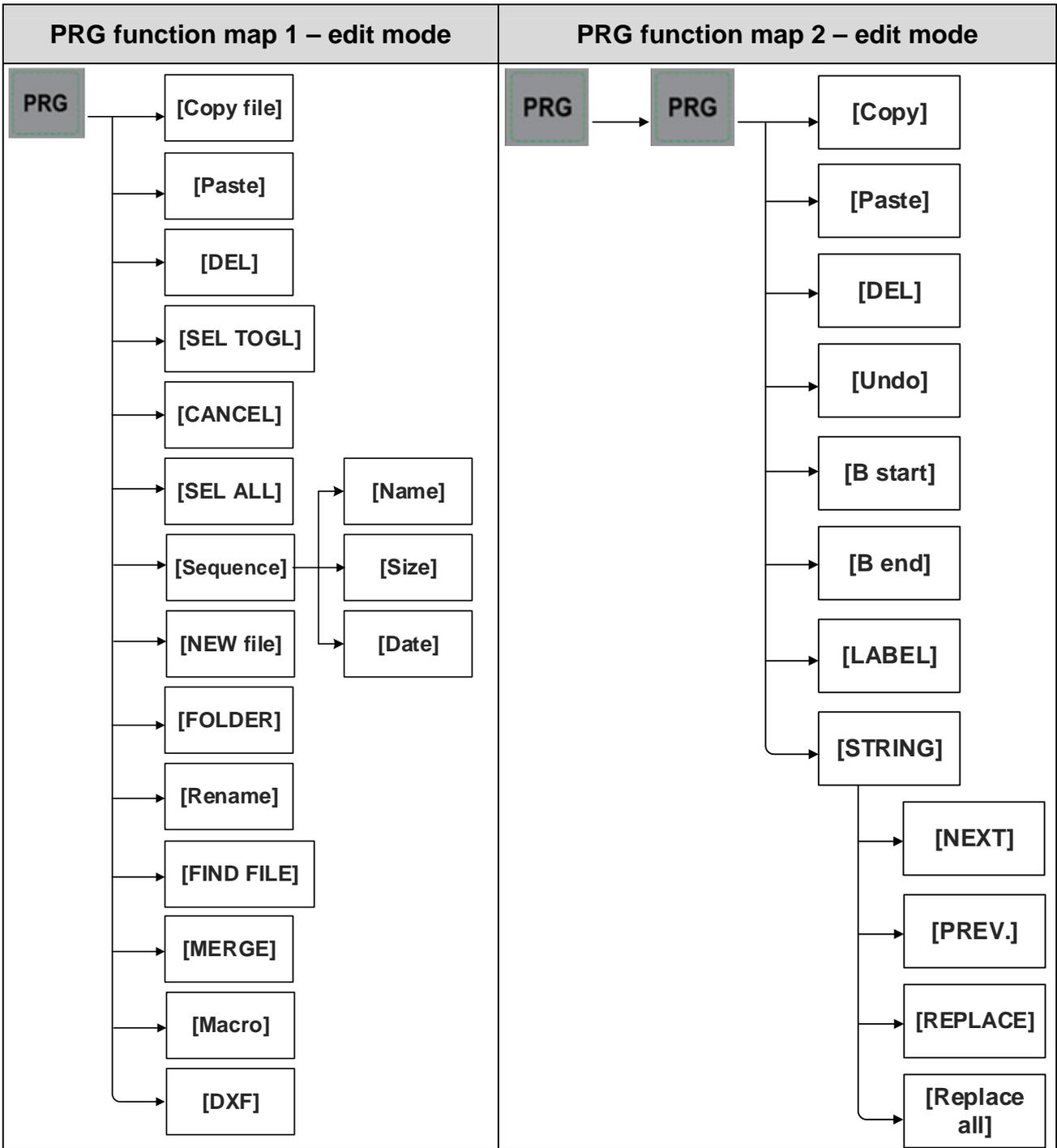
- (1) Press the **SOFT** key to enter the SOFT group function screen.
- (2) Press the **F2** key (axis operation) to enter the axis operation screen.
- (3) Use **F1** ~ **F6** keys to do axial movements.

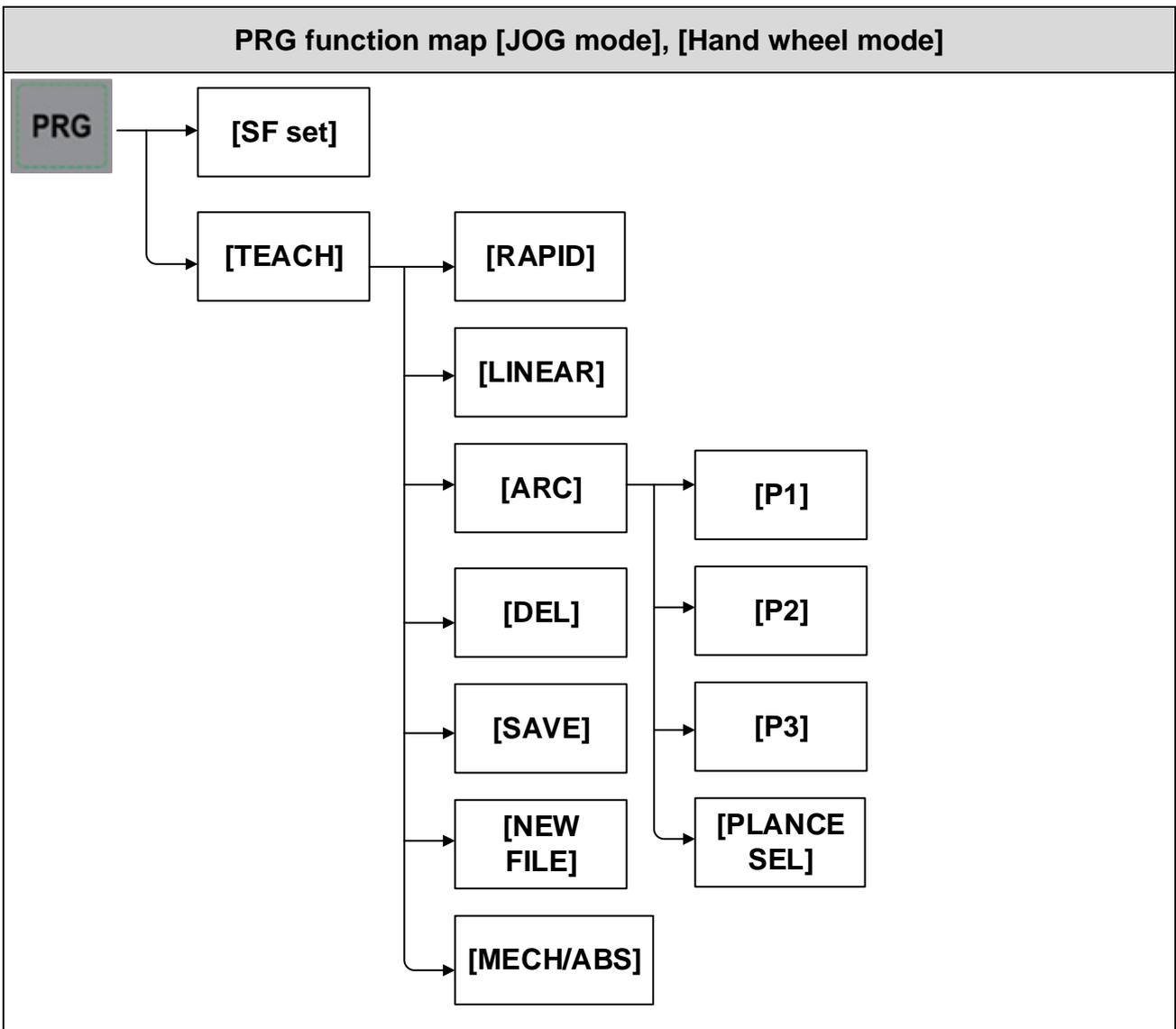
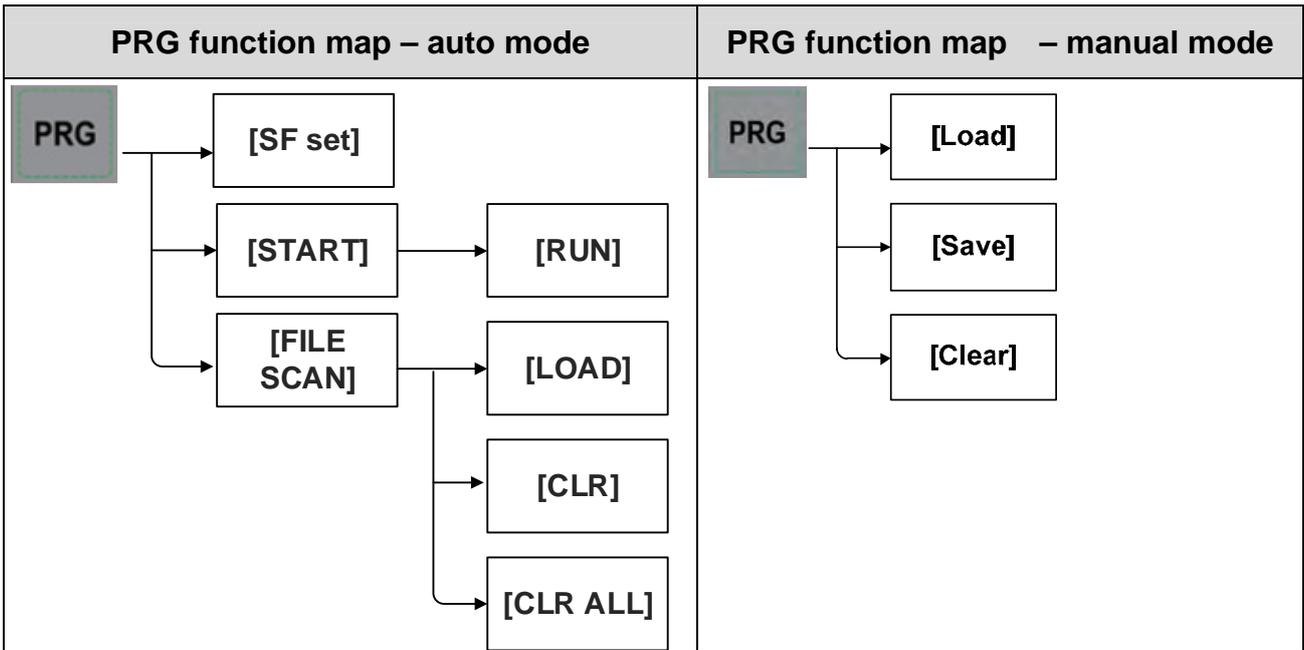
Note:

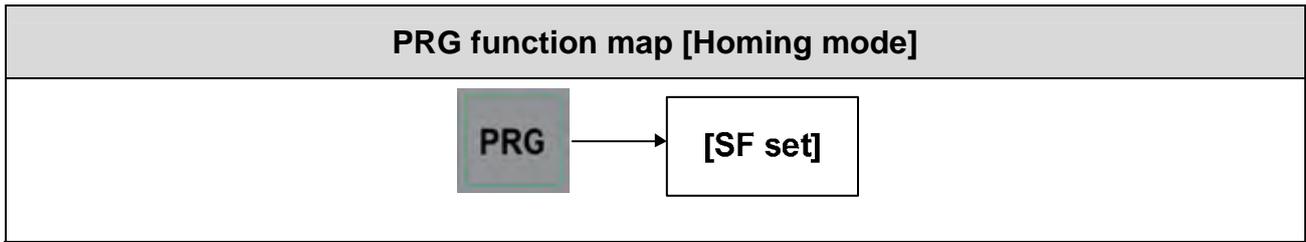
- (1) Configuration illustrations described here prioritize functions that are more likely to be used during machining. For instance, program execution, execution stops, and single block execution are placed in the first row. (They can be arranged as desired by the software.)
- (2) The travel distance (or speed) of axis operation varies with factor settings as described in Section 10.2.

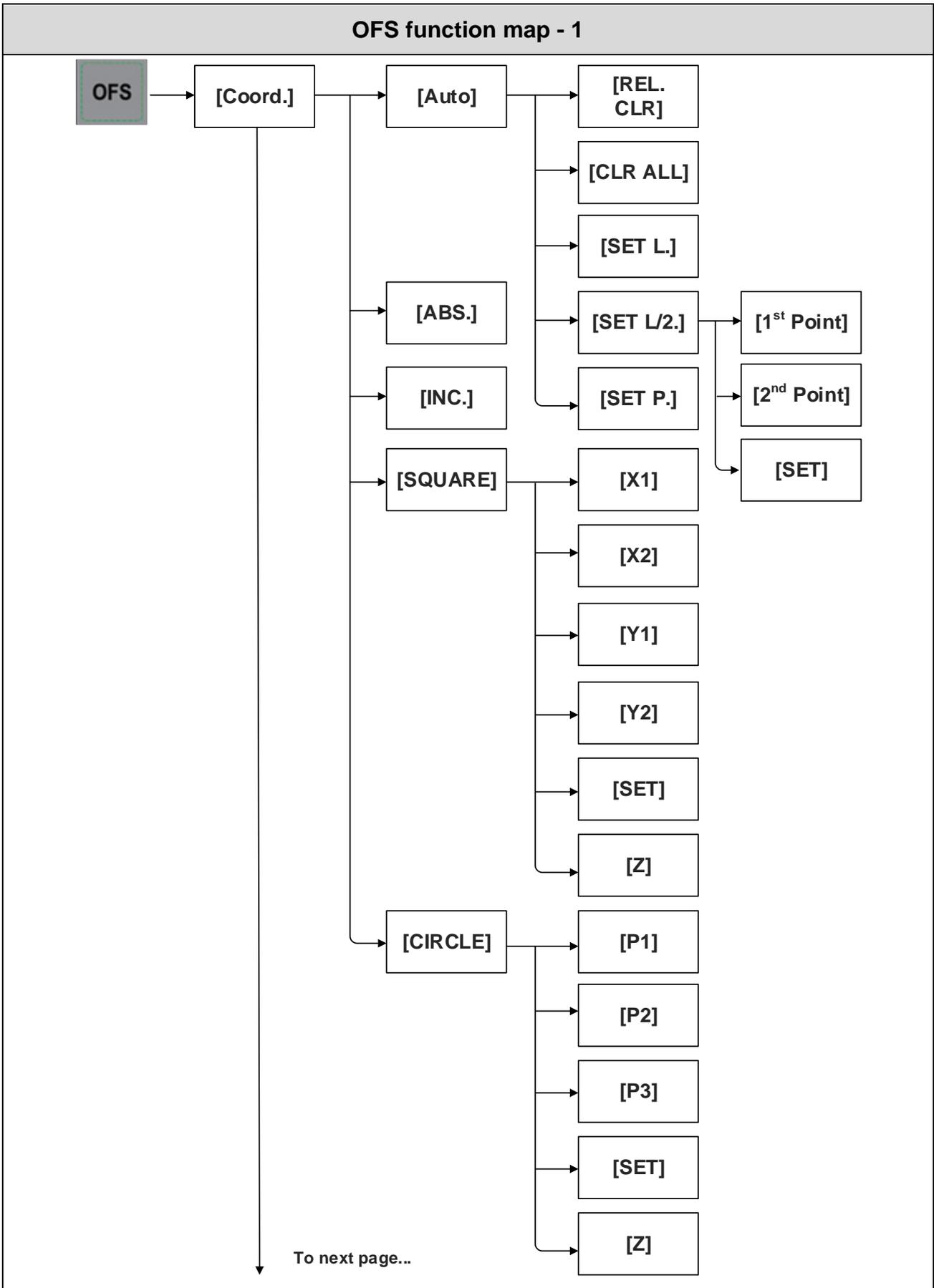
Appendix A: Group function map

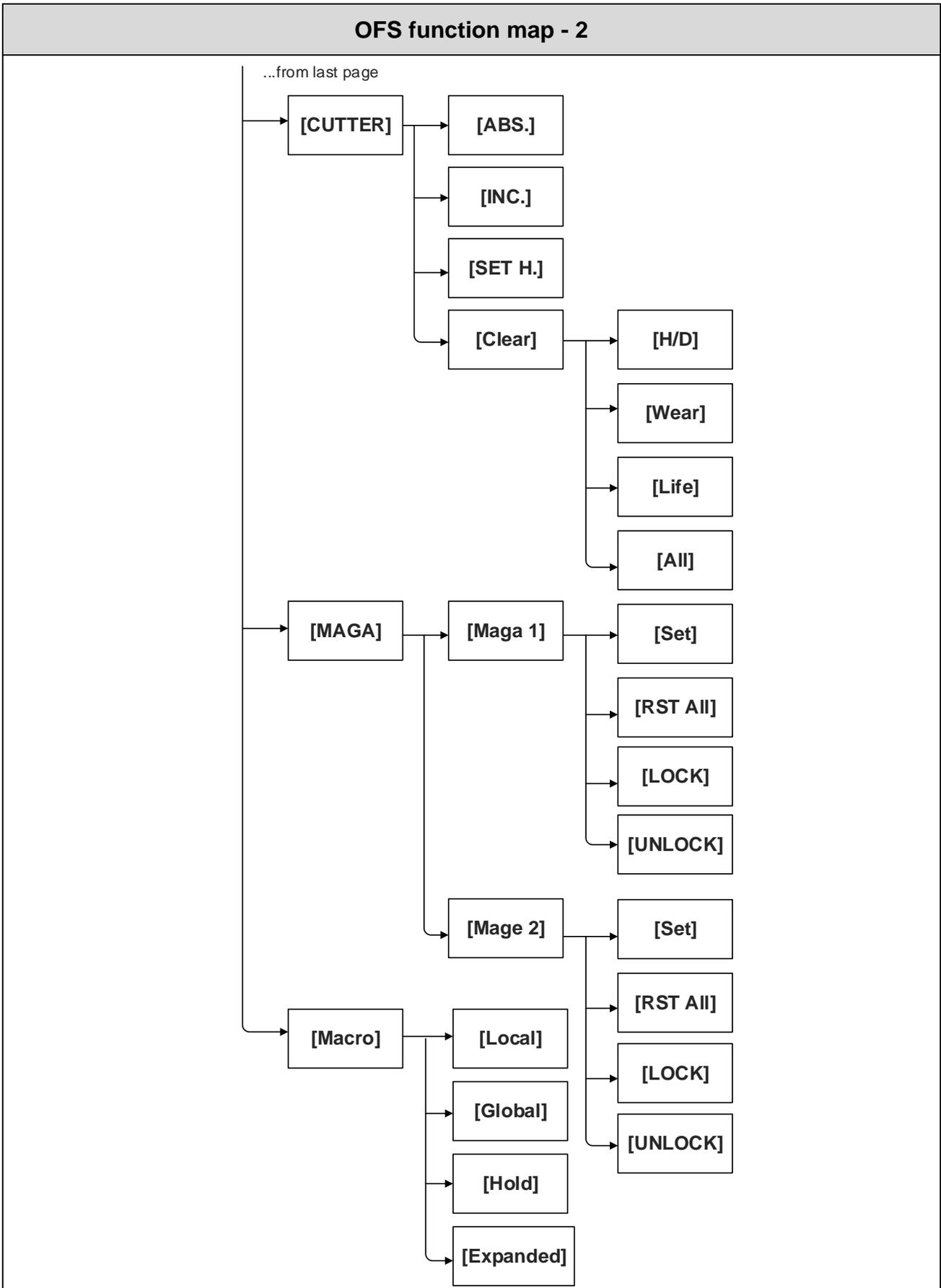


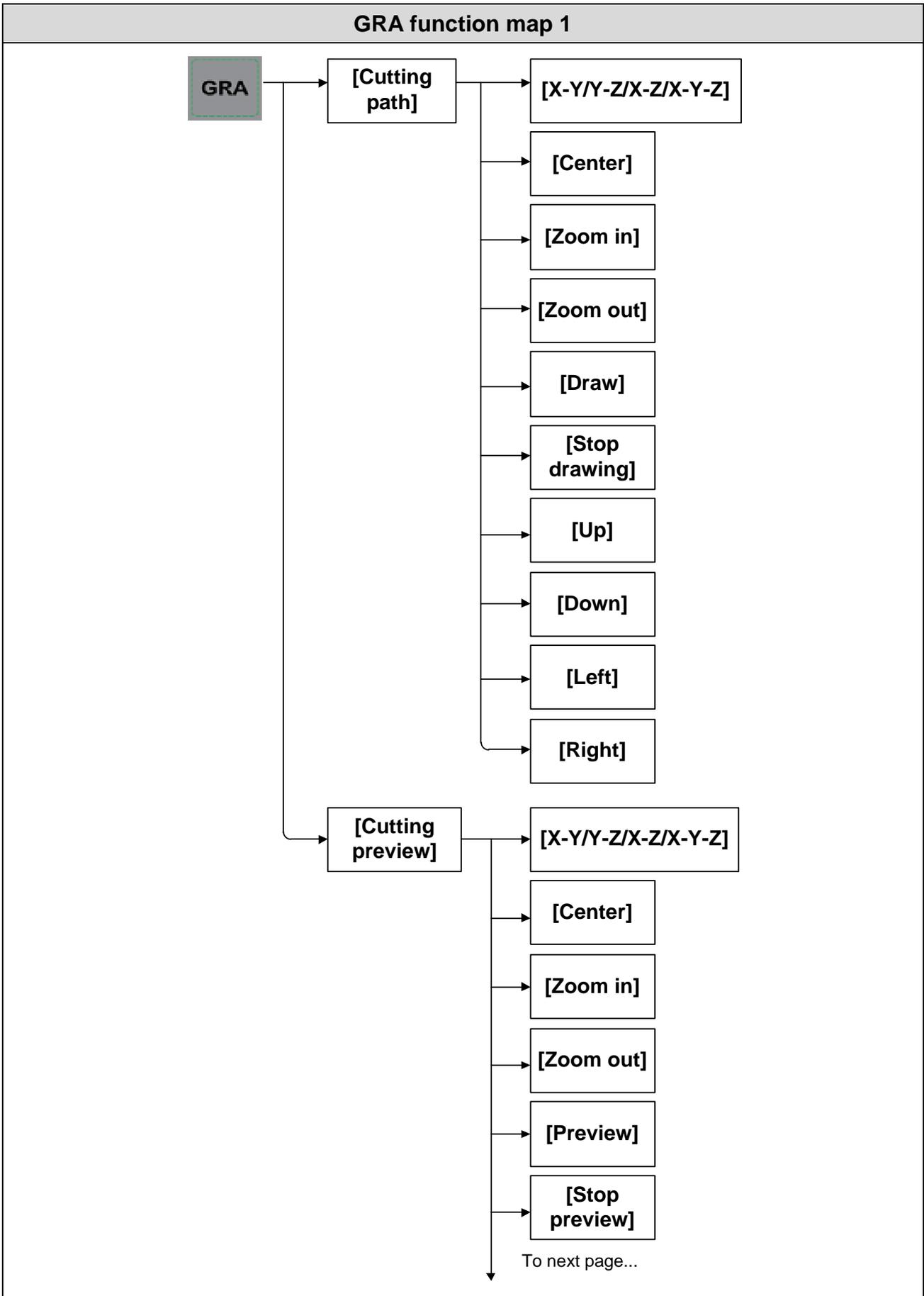




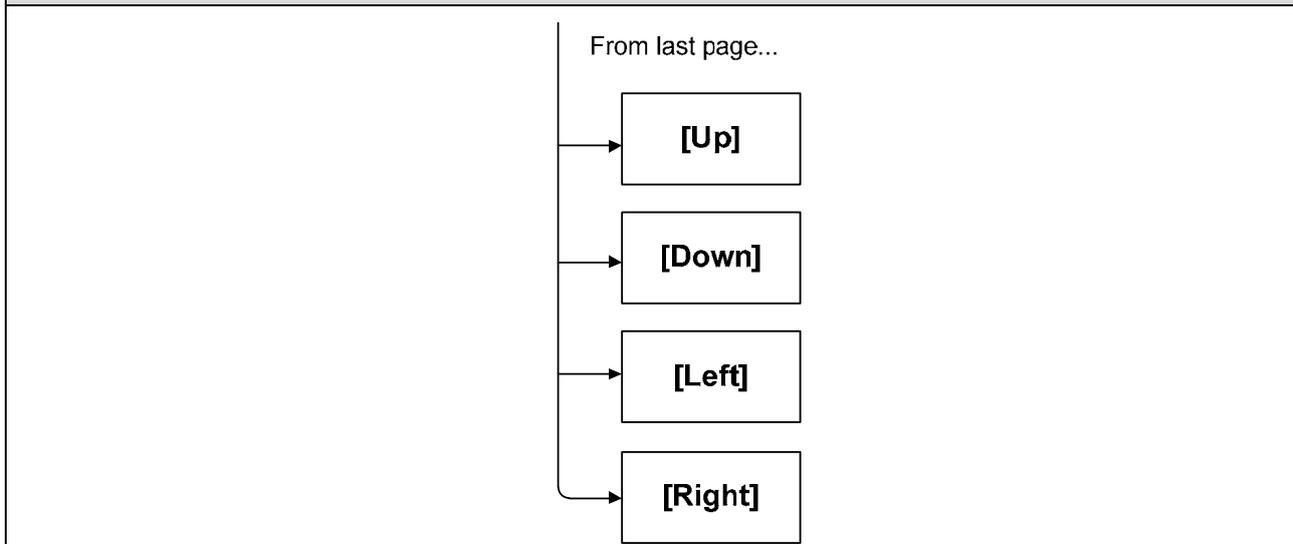




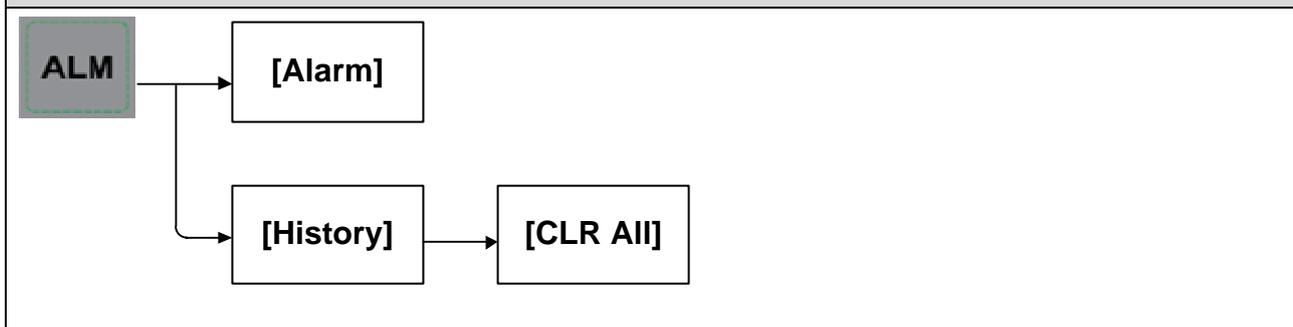


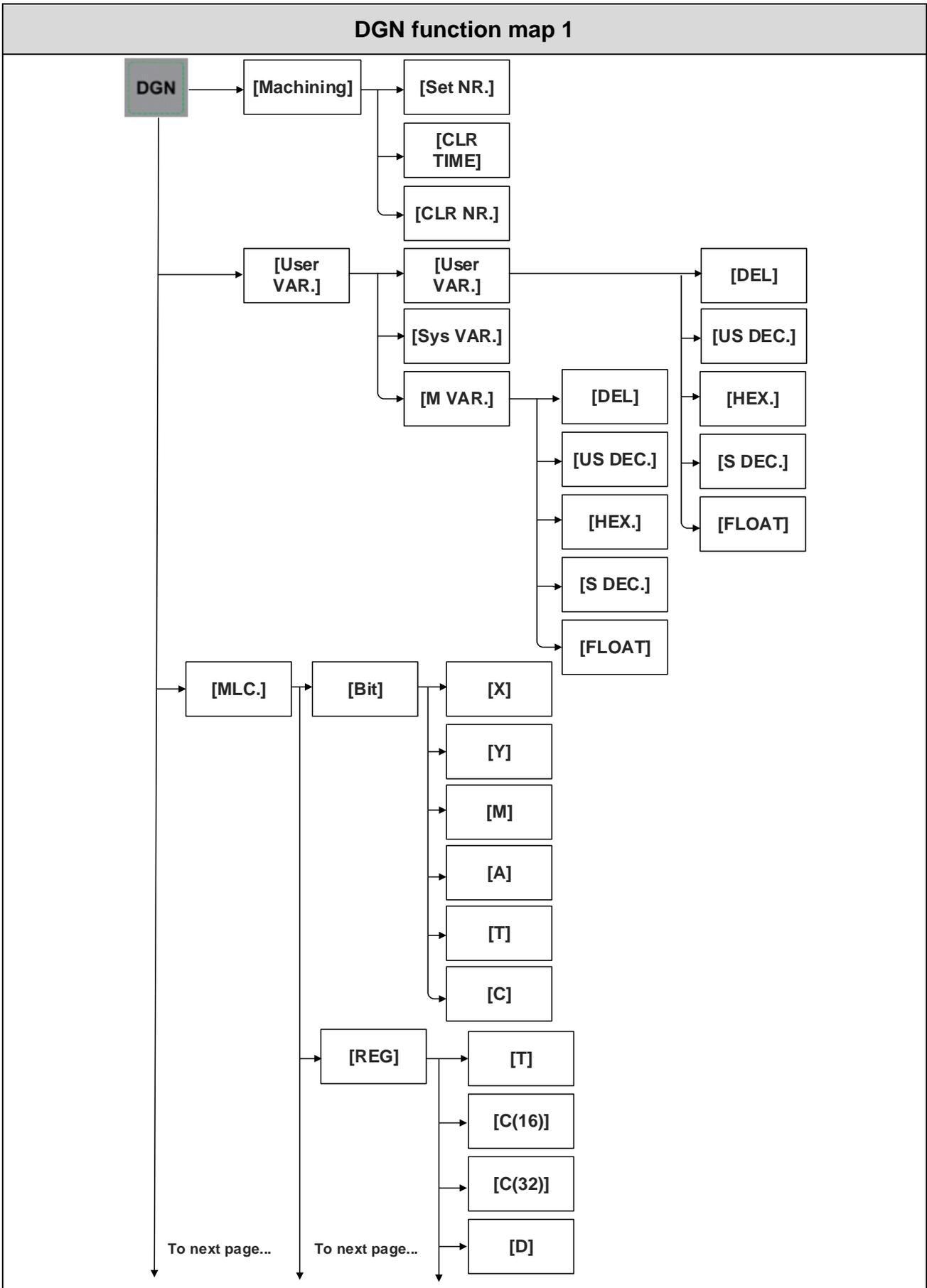


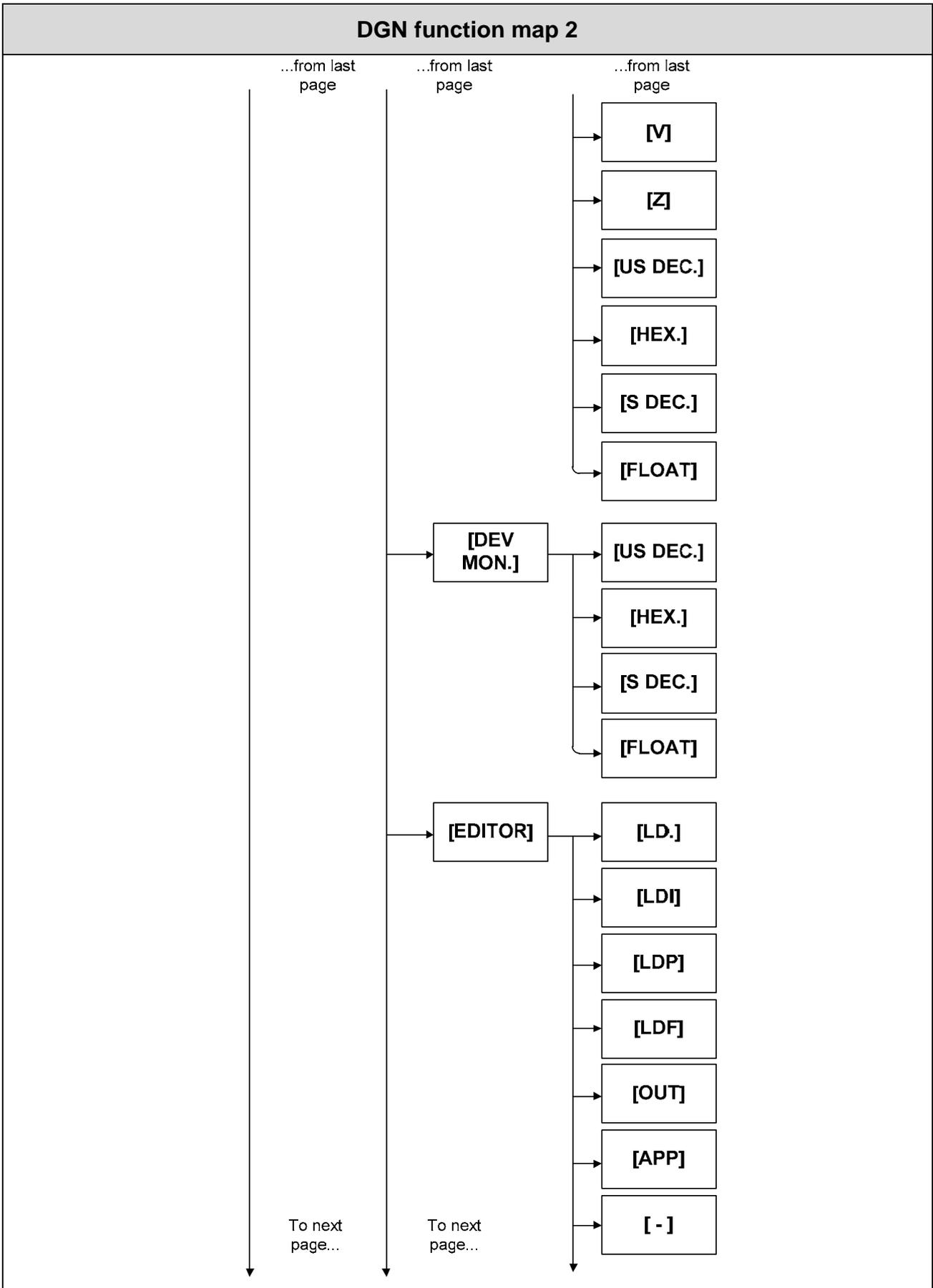
GRA function map 2

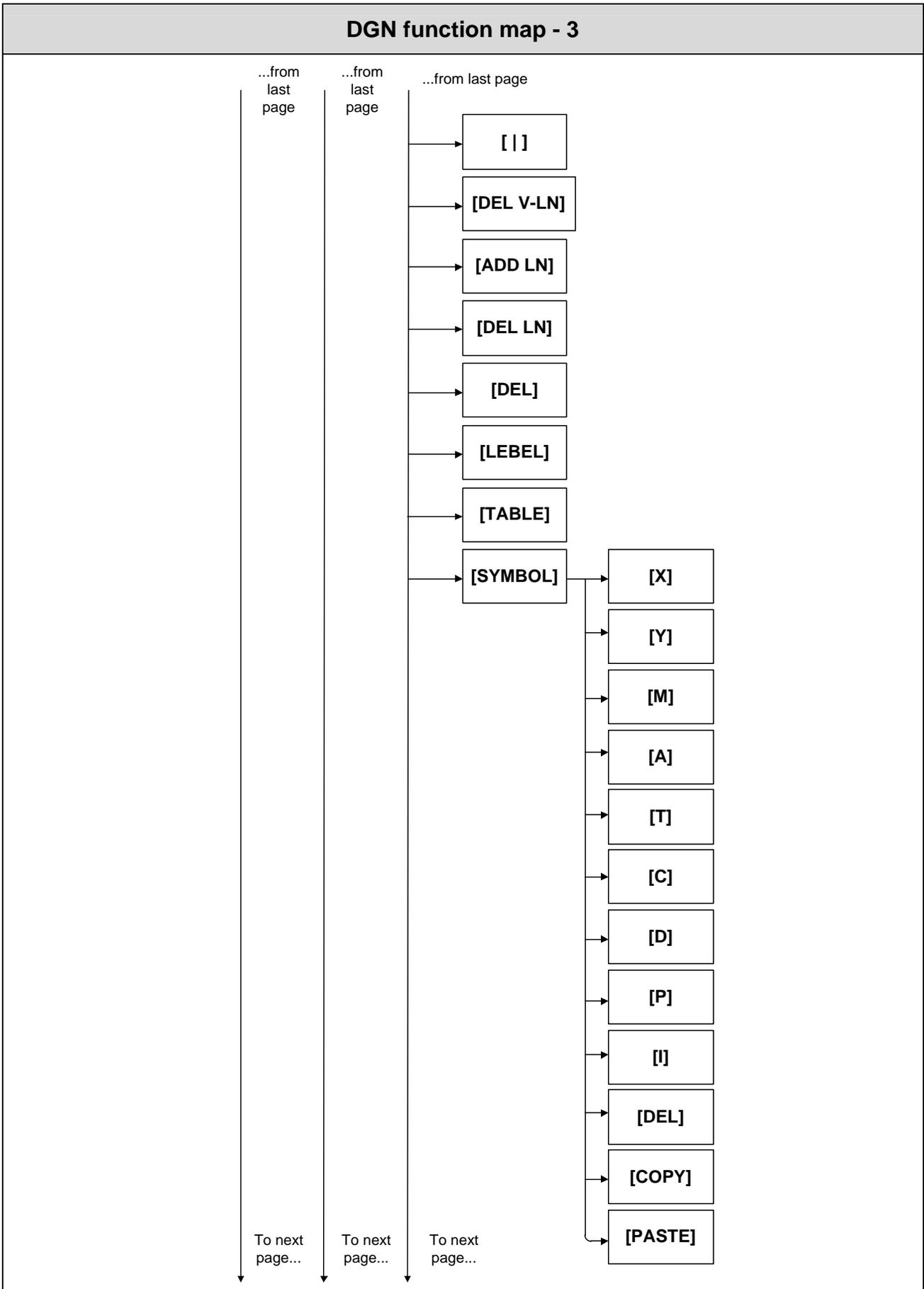


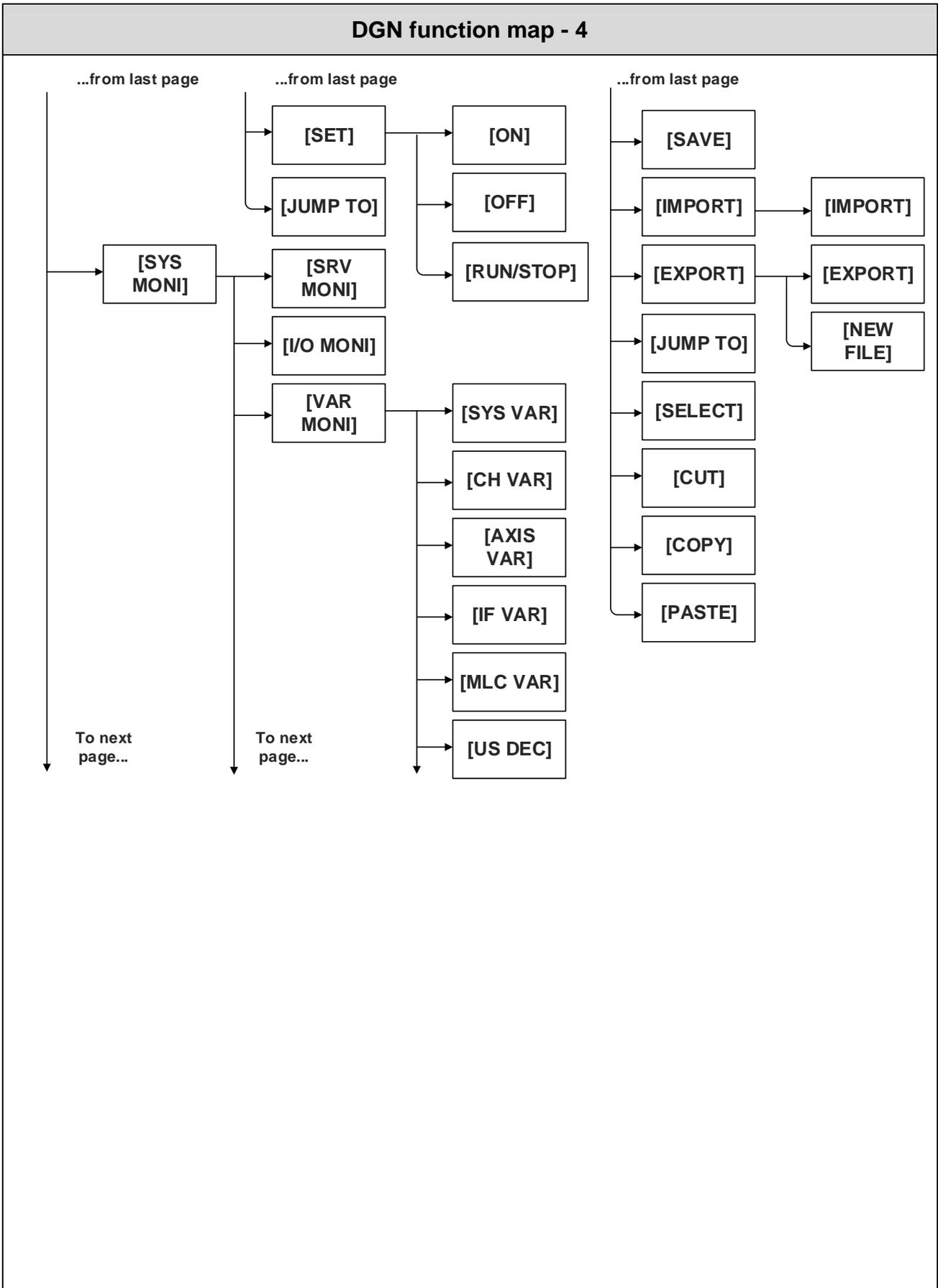
ALM function map

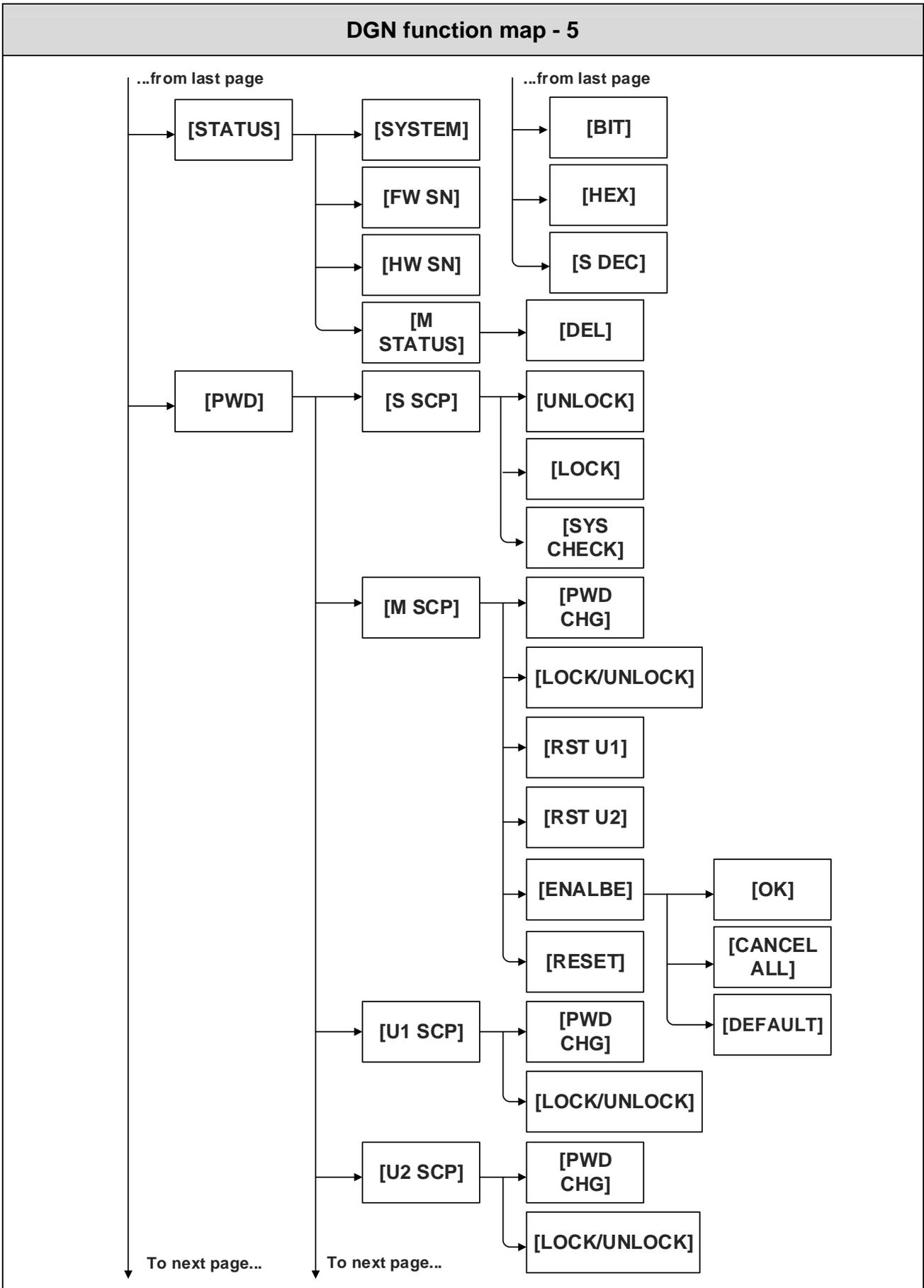


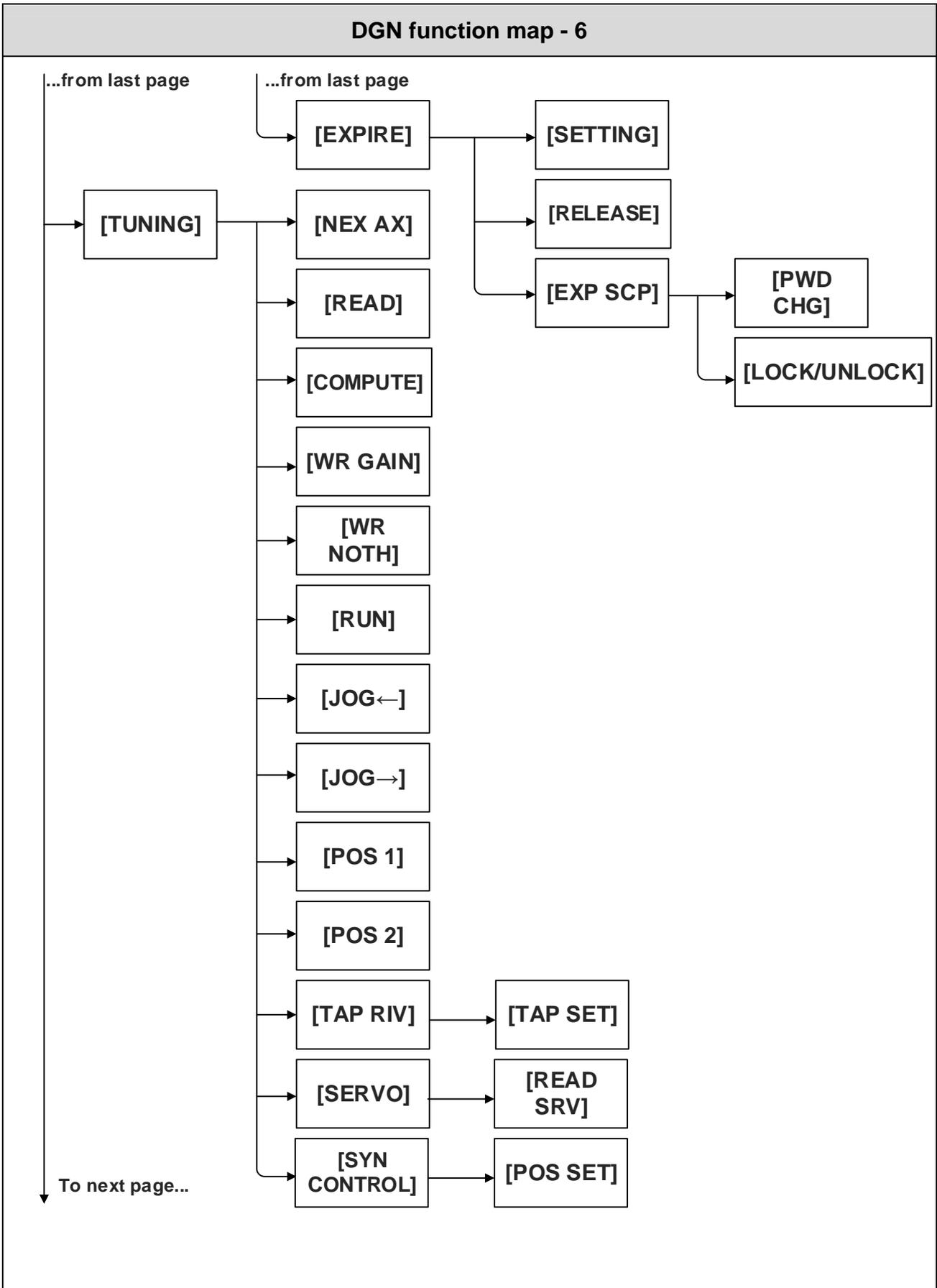


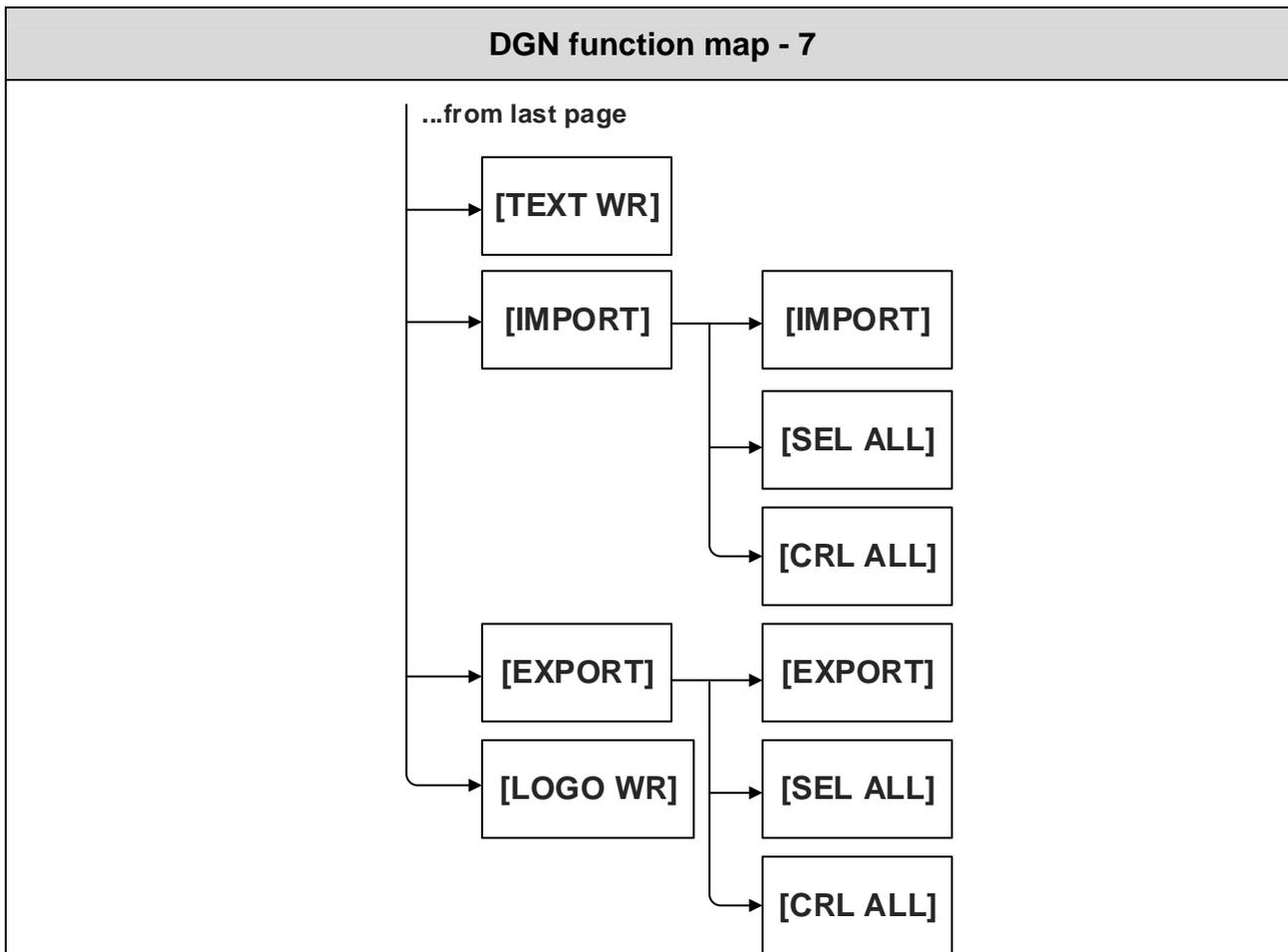


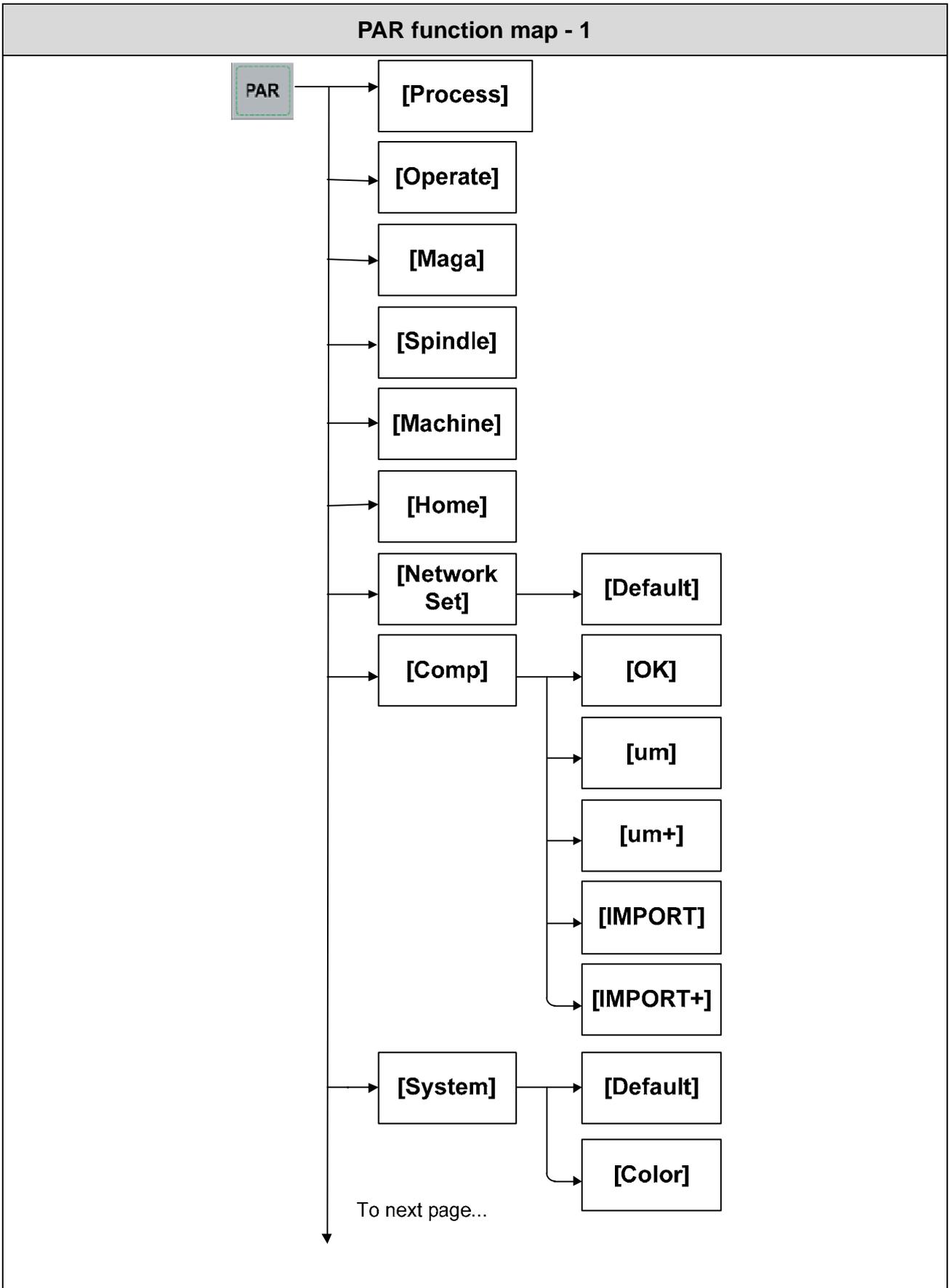


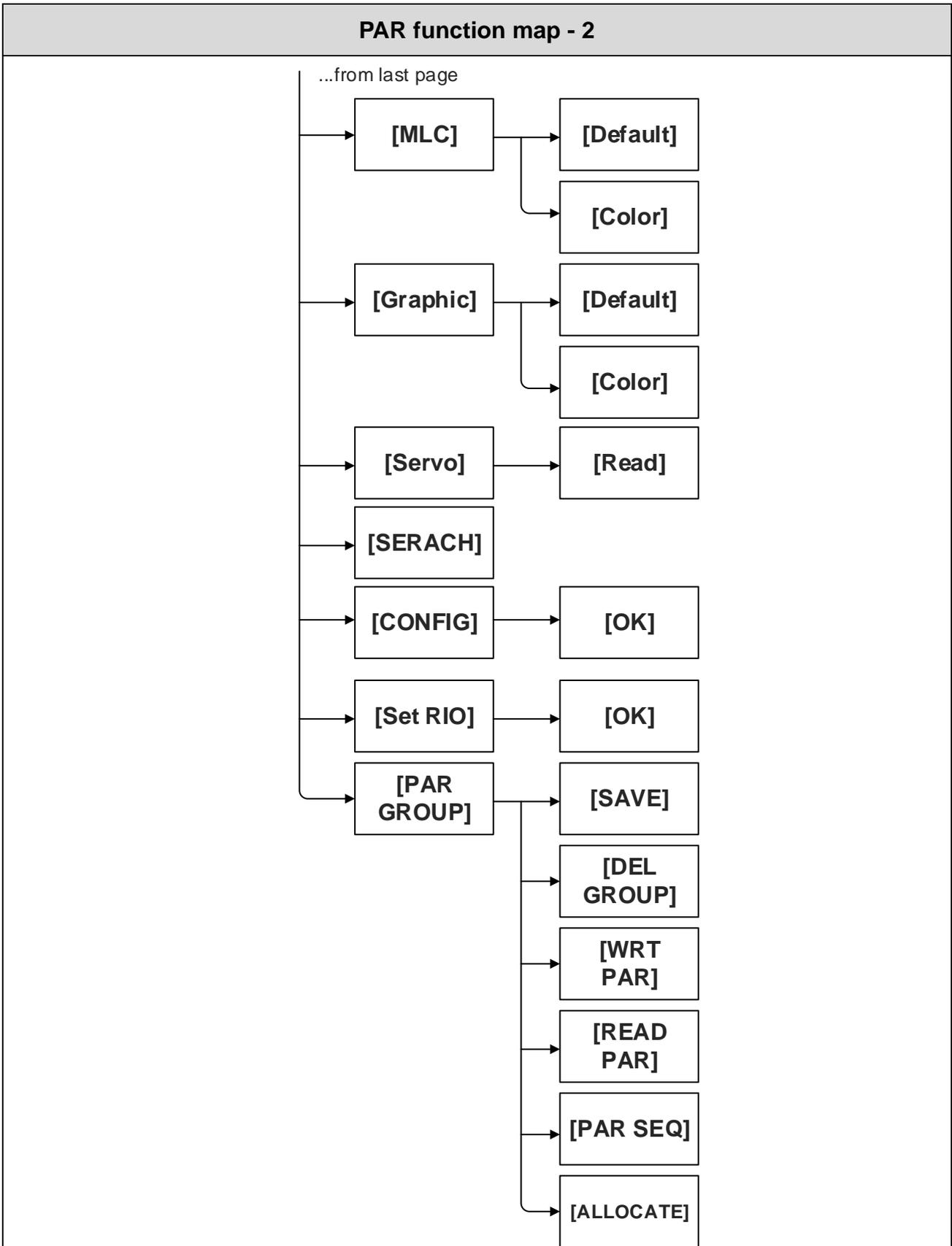












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