# **MAZATROL** M PLUS Series MAINTENANCE MANUAL (SYSTEM)

# **CONTENTS**

Introduction	1
Chapter 1 Basic Operations for Maintenance	2
1. Release of coded key lock	
1-1 Prohibited operations	2
1-2 Operations for releasing key lock	
2. Erasing of entire memory	
2-1 Cards with memory mounted	
2-2 Memory clearing operations	4
3. Changing of option parameters	5
3-1 Mounting of options	9
4. Registering and reading parameters to the EEPROM	10
4-1 EEPROM operation format	10
4-2 Operations for registering and reading parameters to the EEPROM	10
5. Backing up of saved data	11
5-1 Types of saved data	11
5-2 Method for backing up saved data	11
6. File system configuration	12
6-1 File system format	12
7. Setting of data with special operations	14
7-1 Setting of calendar and timer	14
7-2 Setting of total time	14
7-3 Changing of file system directory	15
8. Initialization of data	16
8-1 Initialization methods	16
Chaper 2 System Maintenance Work	17
1. Software version upgrade	18
2. Addition of software options	19
2-1 Addition of synchronous tapping option	20
2-2 Addition of 48-digit program name option	21
2-3 Addition of inch/metric changeover option	22
3. Addition of large capacity memory	23
4. Addition of communication I/F card	24

#### Introduction

This manual describes the work and various operations required to service the MAZATROL Mplus. We hope that it will be a help for maintenance work.

This manual focuses only on the MAZATROL Mplus, and does not apply to other systems.

Chapter 1 describes the various operation methods required for the work. Additions will be made as required.

Chapter 2 describes the actual methods of main work anticipated to occur during maintenance.

Please refer to the Maintenance Manual (Hardware) BNP-B3869 when replacing the card.

# Precautions for Safety

Always read the specifications issued by the machine maker, this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use. Understand this numerical controller, safety items and cautions before using the unit. This manual ranks the safety precautions into "Danger", "Warning" and "Caution".

When the user may be subject to imminent fatalities or major injuries if handling is mistaken.

**△** WARNING

When the user may be subject to fatalities or major injuries if handling is mistaken

CAUTION

When the user may be subject to injuries or when physical damage may occur if handling is mistaken.

Note that even items ranked as " ACAUTION " may lead to major results depending on the situation. In any case, important information that must always be observed is described.

**⚠** DANGER

There are no 'Danger' items in this manual.

**↑** WARNING

There are no "Warning" items in this manual.

#### **↑** CAUTION

#### 1. Items related to this manual

- The instruction manual issued by the machine maker has a priority over this manual regarding items described as "Restrictions" and "Usage state".
- Please interpret items not listed in this manual as "not possible".
- This manual assumes that all option functions are provided. Check the specifications issued by the machine maker before using the system.
- Some screens and functions may differ or may not be usable depending on the NC system version.

#### 2. Items related to hardware replacement

- Release all static electricity accumulated in the body before starting work.
- · Avoid touching the electronic parts.
- · Note that carpets, etc., will generate static electricity with a very high voltage.
- The memory card (QX423, QX429, QX425) is backed up by the super capacitor, so finish the replacement within 30 minutes.
- Confirm that the NC power is OFF and that other workers cannot go near the power switch when replacing the hardware.
- Make sure that the person who replaced the hardware turns the power ON after the work is completed.

#### **↑** CAUTION

#### 3. Items related to preparing for maintenance

· Always set the \*stored stroke limit\*. When not set, the machine end may be collided into.

#### 4. Items related to maintenance work

- Press the emergency stop button before starting the work. If the button has to be released to confirm the operation, make sure that it can be pressed immediately.
- Do not let unnecessary workers enter the area when opening the power distribution panel door and servicing the system.

# Chapter 1 Basic Operations for Maintenance

# Chapter 1 Basic operations for maintenance

The minimum operations required for servicing the system are described in this chapter.

# 1. Release of coded key lock

Functions and screens that are not used by the user are locked with a coded key, and normally cannot be operated.

#### 1-1 Prohibited operations

- ① Rewriting of system parameters
  - · According to following HIDDEN PARAMETER screen.
- Setting of forced output
  - · Setting on MEMORY MONITOR screen.

VEDC:0::		ļ			•	
VERSION		ł	1/0	WRITE		
			WRITE	CANCEL		

- ③ Writing/reading data to EEPROM
  - Setting on MEMORY MONITOR screen.

VERSION			MEMORY EE PROM	START

- Display of HIDDEN screens
  - CPTION PARAMETER screen

(OPTION PARAMETER)

PITCH ERROR COMPENSATION screen (PITCH ERROR COMP.)

SERVO PARAMETER screen

(SERVO PARAMETER)

SPINDLE PARAMETER screen

(SPINDLE PARAMETER)

CUTTING PARAMETER screen

(CUTTING PARAMETER)

Menus on PARAMETER screen (Normal)

C-COND. MATERIAL	C-COND.	USER PARAM	MACHINE PARAM (Hidden)			
OPTION PARAM	PITCH ERROR	SERVO PARAM	SPINDLE PARAM	CUTTING PARAM		

MEMORY SCOPE screen

(MEMORY SCOPE)

KEY HISTORY screen

(KEY HISTORY)

· Cutting conditions learning

Language list

(LANGUAGE LIST)

Menus on MAINTENANCE screen (Normal)

DIAGNOS	DIAGNOS	ALARM HISTORY	LADDER MONITOR	1	HARDWARE MONITOR	ı
MEMORY SCOPE	KEY HISTORY	CUT COND LEARN				LANGUAGE LIST

# 1-2 Operations for releasing key lock

	e released with the following procedure. The released key is he will automatically be re-locked when the power is turned ON a	•
_	RAMETER screen or MAINTENANCE screen. u selection key, and then input 1 1 3 1 INPUT in	n the shown order.
The menu of the H	DDEN screen will appear when the menu selection key is pres	sed.
	Menu keys	Ť
Screen selection key		Menu selection key

## 2. Erasing of entire memory

The entire memory area of the system is cleared when replacing or mounting a card with a memory.

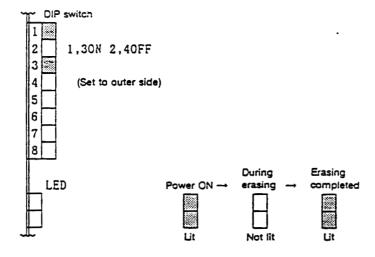
#### 2-1 Cards with memory mounted

- ① QX141 (CPU card)
- 2 QX423, 429, 425 (Standard SRAM and large capacity memory)
  - · Standard SRAM (QX423)
  - Large capacity memory (QX423, 429, 425)

#### 2-2 Memory clearing operations

Erase the entire mounted memory with the following procedure.

- 1 Turn the NC power OFF.
- 2 Set the QX141 card DIP switch (1 and 3 ON, 2 and 4 OFF).
- ③ Turn the NC power ON.
  When the power is turned ON, both LEDs will go out, and clearing of the RAM will start.
  Clearing is completed when both LEDs light.
- Return the QX141 card DIP switch settings.
- 5 Turn the power OFF when completed.



#### 

- When the power is turned ON in the 1 and 3 ON and 2 and 4 OFF setting state, all data
  including the machining programs and parameters will be erased. Always back up the
  memory before starting this operation.
- Note that there is no procedure to stop the erasing processes once the power is turned ON
  in the 1 and 3 ON and 2 and 4 OFF setting state, so take care to the DIP switch settings
  when replacing the CPU card (QX141).

# 3. Changing of option parameters

The option parameters (O1 to O108) include the following types.

- 1) Those automatically set when the power is turned ON.
- 2) Those copied from the EEPROM when the power is turned ON.
- 3) Those set according to the mounted hardware.
- 4) Those rewritten on the OPTION screen.

Rewriting of the type 1) to 3) parameters will be invalid after the system is started. Note that the type 2) parameters cannot be rewritten.

1)

add	Parameter label	pos	Details
019	C_PARA.option1	bit1	Optional block skip (8 sets)
		bit3	G code inch/metric changeover
		bit4	Uni-direction positioning
		bit5	R designation arc
		bit6	Helical
020	C_PARA.option2	bit0	Hypothetical axis interpolation
		bit6	Synchronous feed
021	C_PARA.option3	bitO	Linear acceleration/deceleration before cutting feed interpolation
		bit1	No. 2 cutting feed override
		bit2	Automatic corner override
		bit3	No. 2 miscellaneous function
		bit4	S-analog output
		bit7	Tool life control (usage time accumulation function)
022	C_PARA.option4	bitO	Tool life control (+ spare tool selection function)
		bit1	Tool position offset
		bit2	Radius compensation/nose R compensation
		bit5	Program tool compensation input
		bit6	Tool compensation No. automatic selection
		bit7	Hole drilling canned cycle
023	C_PARA.option5	bit3	Variable command
		bit5	Program coordinate rotation
		bit6	User macro
	 	bit7	User macro interrupt
024	C_PARA.option6	bit1	Program mirror image
		bit7	Program parameter input

# 1) (continued)

add	Parameter label	pos	Details
025	C_PARA.cption7	bit0	No. 2, 3 and 4 reference point return
		bit1	Start position return
		bit2	Reference point compare
		bit3	Rotary coordinate system setting
İ		bit4	Automatic corner chamfer R2
		bit7	Program restart
026	C_PARA.cption8	bit0	Memory-type pitch error compensation
		bit1	Memory type relative position compensation (straightness, squareness)
		bit2	Soft limit
		bit4	Stroke check before movement
		bit5	External deceleration
		bit7	Automatic/manual simultaneous operation
027	C_PARA.cption9	bit3	Skip function
	,	bit4	Multi-skip function
029	C_PARA.oction11	bit2	Computer link .
		bit4	Manual tool length measurement
		bit7	Soft limit before movement 2
O30	C_PARA.option12	bit0	DDB I/F
		bit1	External search
		bit4	External machine coordinate system offset input (thermal displacement compensation)
		bit5	(DDB)
		bit6	(DDB)
		bit7	(DDB)
O31	C_PARA.option13	bit2	Ladder monitor
		bit7	Manual skip

2)

add	Parameter label	pos	Details
019	C_PARA.option1	bit7	Spiral circuit
O20	C_PARA.option2	bit1	Thread cutting
022	C_PARA.option4	bit4	3D radius compensation
023	C_PARA.option5	bit4	Image rotation
024	C_PARA.option6	bit0	Scaling
		bit3	Automatic corner chamfer R
		bit4	Geometric
027	C_PARA.option9	bit2	Automatic tool length measurement (G37)
į		bit5	Compare stop
O28	C_PARA.option10	bit6	External operation
		bit7	External workpiece coordinate system offset
029	C_PARA.option11	bit5	Geometric 2
		bit6	Geometric 1B
O30	C_PARA.option12	bit2	External tool offset input/output-
		bit3	External workpiece offset input/output
033	C_PARA.option15	bitO	Commercial printer
		bit1	Five-face machining
		bit2	High-speed machining
		bit3	Shape compensation
		bit5	PLC control axis
		bit6	Inverse time feed
		bit7	Dynamic compensation
034	C_PARA.option16	bitO	3D coordinate conversion command exclusive for HV (G68, G69)
		bit1	HV control function
		bit2	Simple synchronous control
O35	C_PARA.option17	bit0	One-touch inch/metric changeover
		bit2	Addition workpiece coordinate system selection
		bit3	Spline interpolation
		bit4	SHG control
		bit5	G00 inclined constant control
		bit6	Comment search
		bit7	Synchronous tapping cycle

# 2) (continued)

add	Parameter label	pos	Details
036	C_PARA.option18	bitO	EIA conversion
039	C_PARA.yo39	bit0	MAZATROL 3D
040	C_PARA.yo40	bitO	DNC
041	C-PARA.yo41	bitO	E:A/ISO
O91	C-PARA.yo91	bit1	Program name 48 digits

#### 3-1 Mounting of options

The options include those supplied with the hardware and those supplied with the software. Refer to Chapter 2 for the actual work procedures.

#### (1) Hardware option

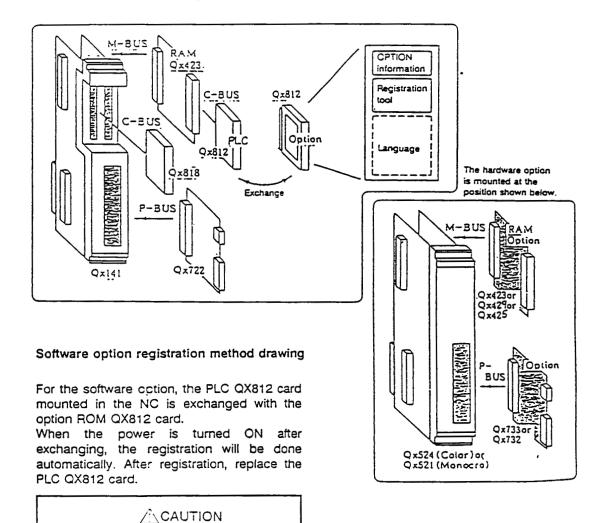
The option is automatically validated when the hardware is mounted, so mount the card to the designated position beforehand.

Note) The entire memory must be erased when a memory card is mounted.

#### (2) Software option

The software option is supplied with a RCM cassette controlled by the manufacturing No. After the manufacturing No. is checked, the option information is registered into the EEPROM in the CNC unit. If there is a language in the ROM cassette, the CNC language will be rewritten to the ROM cassette language.

Note 1) The first language (English) cannot be rewritten.



# The hardware will be destroyed.

registration.

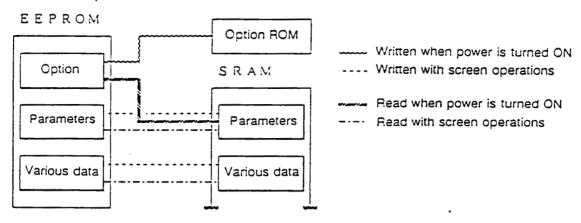
Do not turn CFF the NC power during

# 4. Registering and reading parameters to the EEPROM

All parameters of the MAZATROL Mplus can be registered into the EEPROM and read as required. Note that the option parameters are automatically read from the EEPROM when the power is turned ON

Note 1) The default parameters are always registered into the EEPROM when shipped from the Yamazaki Factory.

#### 4-1 EEPROM operation format



#### 4-2 Operations for registering and reading parameters to the EEPROM

The parameters are registered or read to the EEPROM with the following procedure.

- 1 Release the coded key lock.
- ② Select the MEMORY MONITOR screen with the following procedures.

- 3 Select the "MEMORY EEPROM" menu.
- 4 Input 1 in the parentheses after TYPE.
- (5) Move the cursor to ROM, and input the command No.

- 6 Press the START menu.
- (7) When registration has been designated, turn the power OFF and ON.

# 5. Backing up of saved data

There is some data used in the MAZATROL Mplus that is backed up by a battery even when the power is turned OFF.

However, this saved data will be erased when the memory is cleared, and may also be destroyed if the card is inadvertently contacted during replacement of the card.

## **↑** CAUTION

 Before performing work where the saved data might be destroyed, always back up the saved data.

#### 5-1 Types of saved data

Item	D	evice
nem	CMT	EEPROM
Machining programs	0	
Tool data	0	
Tool offsets	0	
Tool files	0	
Cutting conditions	0	0
Workpiece offsets	0	
User parameters (current)	0	0
Machine parameters (current)	0	0
User parameters (for inch/metric changeover)		0
Machine parameters (for inch/metric changeover)		0
Additional basic coordinates	0	
Macro variables	0	
Periodic inspection	0	0

#### 5-2 Method for backing up saved data

#### (1) When using CMT

This is a method opened to the end user, but there may be some data that cannot be backed up (refer to Section 5.1) or special operations may be required.

#### (2) When using EEPROM

Users who do not have a CMT can save specific data (refer to Section 5.1) by saving the data inside the NC.

# 6. File system configuration

The MAZATROL Mplus file system is operated with the following configuration.

Dev	Dir	Details
0	0	Machining program
1	0	System macros
1	1	MDI

The details of the file system are indicated with (Dev+Dir). \*00\*, normally indicated, is where the machining program is stored.

The system macros are transferred from the FROM when the power is turned ON, so the rewritten details are valid until the power is turned OFF.

MDI is a temporarily used area, and cannot be accessed from the EDIT screen.

#### 6-1 File system format

Each size of the MAZATROL Mplus file system is determined by the mounted memory capacity and the No. of programs.

The mounted memory capacity is determined by the option settings in \*10. Expansion memory\* and the addition of the \*large capacity SRAM card\* hardware.

014	Specifications
1	76 m
2	200 m
4	1000 m
10	2000 m
16	3000 m

Note 1)
O14 is automatically set.
The setting will be invalid even when manually rewritten.

The No. of programs can be set up to 960 programs with a multiplier of 16.

O100	No. of programs
2	32 programs
16	256 programs
32	512 programs
60	960 programs

O100 sets the value for No. of programs/16.

No. of registered programs		32	256	512	960	Capacity/ configuration	
Standard	Stand- ard	Tape registration length	76.1				0.5MB QX423
76m	alu	MAZ block	623				
	48	Tape registration length	74.5				
1		MAZ block	610				
48.25K	Tool registration information		160				
C100	No. of tool offset sets		128				
Expansion 1	Stand-	Tape registration length		243.3	227.9	200.6	0.5MB QX423
200 m	ard	MAZ block		1993	1866	1643	
	48	Tape registration length		230.3	201.8	151.8	
		MAZ block		1886	1653	1243	
159.50K	Tool reg	istration information		960	960	960	
27E00	No. of to	ol offset sets		512	512	512	
Expansion 2	Stand-	Tape registration length		1000.2	984.7	957.4	1.0MB QX423
1000m	ard	MAZ block		8193	8066	7843	+QX423
	48	Tape registration length		987.1	958.7	908.6	
		MAZ block		8086	7853	7443	
624.50K	Tool registration information			960	960	960	
9C200	No. of tool offset sets			512	512	512	
Expansion 3	Stand- ard	Tape registration length		2000.3	1984.9	1957.6	2.0MB QX423
2000m	aiu	MAZ block		16386	16260	16036	+QX429
	48	Tape registration length		1987.3	1958.8	1908.8	
		MAZ block		16280	16046	15636	
1239.00K	Tool registration information			960	960	960	
135C00	No. of tool offset sets			512	512	512	
Expansion 4	Stand-	Tape registration length		3277.2	3261.7	3234.5	2.5MB QX423
3000m	ard	MAZ block		26846	26720	26496	+QX425
	48	Tape registration length		3264.2	3235.7	3185.6	
		MAZ block		26740	26506	26096	
2023.50K	50K Tool registration information			960	960	960	
1F9E00	0 No. of tool offset sets			512	512	512	

Expansion 1 is not a hardware addition. This is a ROM cassette option.

<sup>1.</sup> The tape registration length is set using the min. No. of registered programs/16-digit program name as a reference.

<sup>2.</sup> The tape registration length and No. of registered programs are set during formatting. If the capacity or No. of registered programs is changed after formatting, reformatting will be required.

# 7. Setting of data with special operations

The data shown below cannot be easily changed by the user, and requires special operations.



- 1 Select the MANUAL mode.
- 2 Select the ERASE DISPLAY screen.
- 3 Select the "CURRENT TIME" menu.
- 4 The cursor will appear at the date data.
- (5) Input the date data to be set, and then press INPUT.
  - Ex.) To set the date to February 13, 1995.

9 5 · 0 2 · 1 3 INPUT

- 6 After step 5, the cursor will move to the time data. Input the time, and then press INPUT
  - Ex.) To set the time to 13 hours 45 minutes (13:45).

13 · 45 · 00 INPUT

#### 7-2 Setting of total time

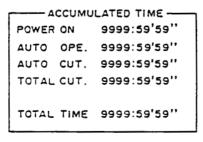
Five types of accumulated time will display. Use the following procedure to change the total time.

- 1 Select the MANUAL mode.
- 2 Release the coded key lock.
- 3 Select the OPTION PARAMETER screen, and turn O106bit0 ON.
- 4 Select the ERASE DISPLAY screen.
- Select the "ACCUMULATED TIME" menu.
- 6 Using the cursor keys, move the cursor to TOTAL TIME.
- Input the time data to be set, and then press INPUT .
  - Ex.) To set 2000 hours.

2000.00.00 INPUT

® Select the SYSTEM PARAMETER screen, and turn O106bit0 OFF.

If the data is correctly input, O106bit0 will automatically turn OFF.



'95.02.13 13:45'00"

## 7-3 Changing of file system directory

As explained in Section 6, the MAZATROL Mplus file system is divided into multiple directories and controlled. However, normally only the machining program can be viewed. Even when inputting or outputting data, only the machining program data can be handled.

#### Directory change procedure

- ① Release the coded key lock.
- 2 Select the OPTION PARAMETER screen.
- 3 Set 0108 to the directory to be viewed.

O108	Details
0	Machining program
1	System macro.

#### 3. Initialization of data

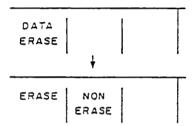
The data must be initialized when the entire memory has been erased, when the battery back up has been erased or when the memory has been destroyed.

After data initialization, that data or file can be used.

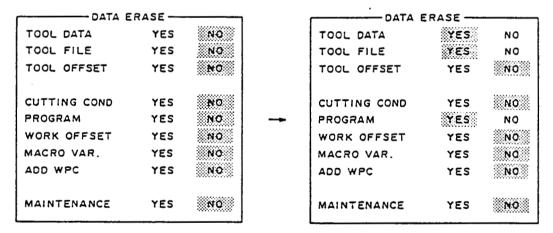
#### 8-1 Initialization methods

The data is initialized on the ERASE DISPLAY screen.

When this screen is selected the 'DATA ERASE' menu will appear. When the menu key is pressed, the menus 'DATA ERASE' and 'NON ERASE' will appear for initializing the data.



Using the cursor keys, move the cursor to the item to be erased, and press the "DATA ERASE" menu to highlight the item.



To erase tool data, tool file and program

To initialize the data, select the required item from the "DATA ERASE" menu, and then press the following keys.

- 9 9 9 INPUT

Multiple items can be initialized simultaneously.

# **⚠** CAUTION

Data that has been initialized cannot be restored.
 Make sure that the selected item is the one to be erased.

# 7. Setting of data with special operations

The data shown below cannot be easily changed by the user, and requires special operations.

## 7-1 Setting of calendar and timer

- 1) Select the MANUAL mode.
- 2 Select the ERASE DISPLAY screen.
- 3 Select the 'CURRENT TIME' menu.
- 4 The cursor will appear at the date data.
- (5) Input the date data to be set, and then press INPUT.
  - Ex.) To set the date to February 13, 1995.

9 5 · 0 2 · 1 3 INPUT

6 After step 5, the cursor will move to the time data. Input the time, and then press INPUT

Ex.) To set the time to 13 hours 45 minutes (13:45).

13 · 45 · 00 INPUT

#### 7-2 Setting of total time

Five types of accumulated time will display. Use the following procedure to change the total time.

- 1 Select the MANUAL mode.
- 2 Release the coded key lock.
- 3 Select the OPTION PARAMETER screen, and turn O106bit0 ON.
- 4 Select the ERASE DISPLAY screen.
- Select the "ACCUMULATED TIME" menu.
- 6 Using the cursor keys, move the cursor to TOTAL TIME.
- nput the time data to be set, and then press INPUT .
  - Ex.) To set 2000 hours.

2000.00.00 INPUT

Select the SYSTEM PARAMETER screen, and turn O106bit0 OFF.

If the data is correctly input, O106bit0 will automatically turn OFF.

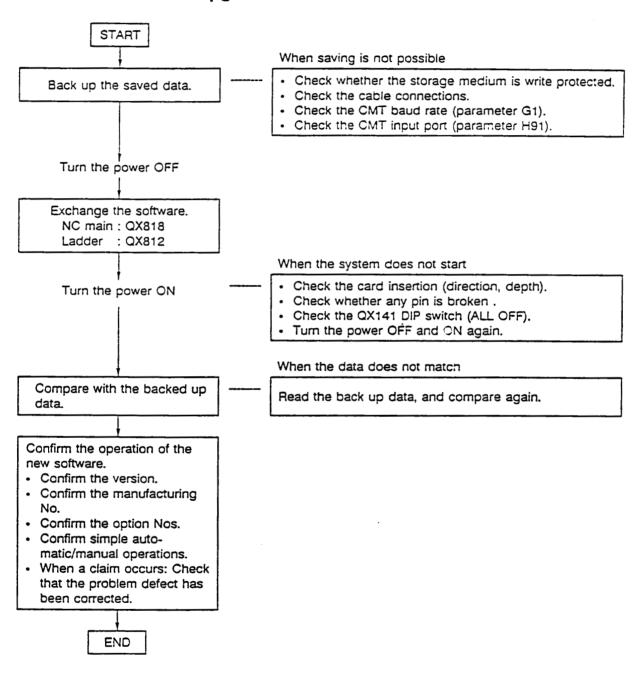
'95.02.13 13:45'00"

# Chapter 2 System Maintenance Work

# Chapter 2 System Maintenance Work

The procedures for servicing the system are described in this chapter.

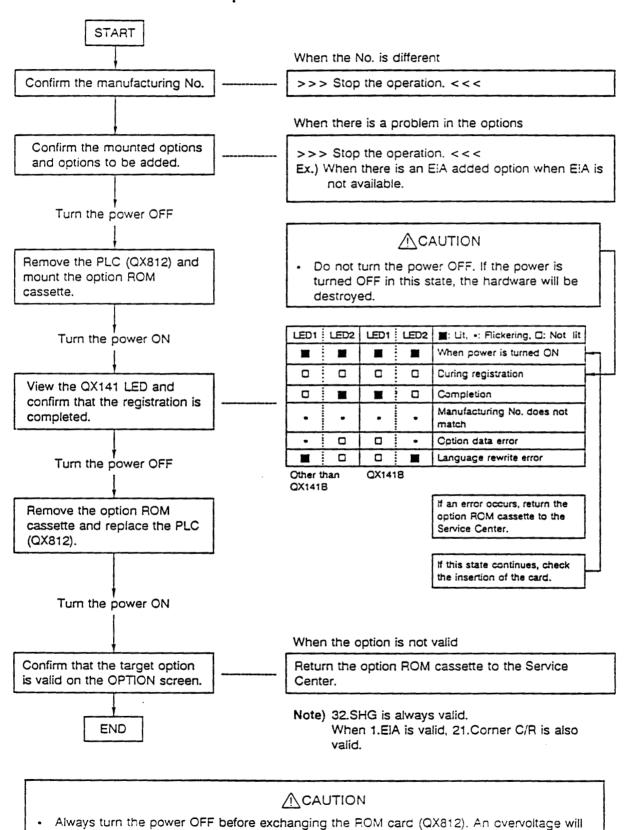
## 1. Software version upgrade



#### CAUTION

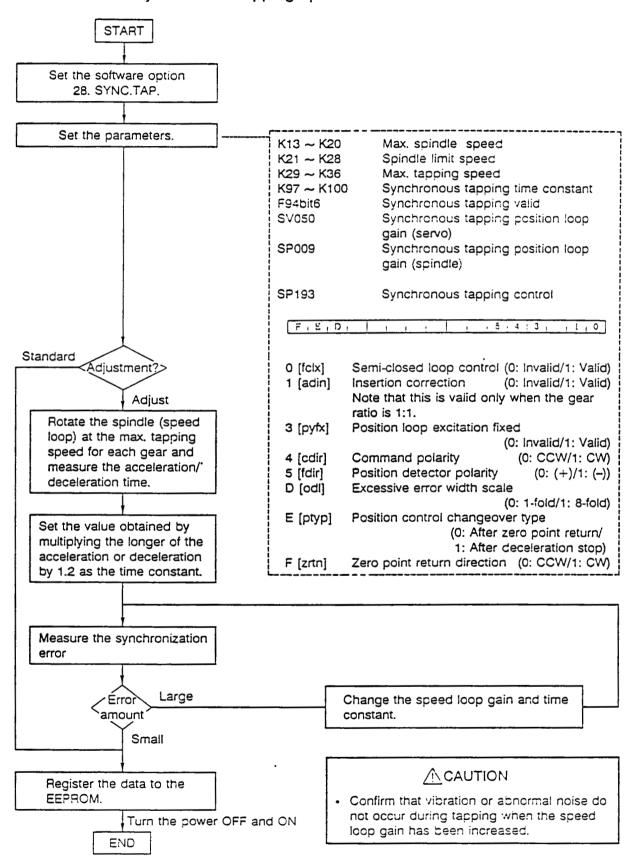
Always turn the power OFF before exchanging the ROM cards (QX818/QX812).
 An overvoltage will be applied on the card causing it to be destroyed.

# 2. Addition of software options

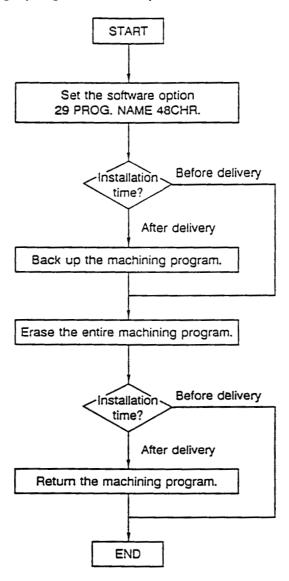


be applied on the card causing it to be destroyed.

#### 2-1 Addition of synchronous tapping option



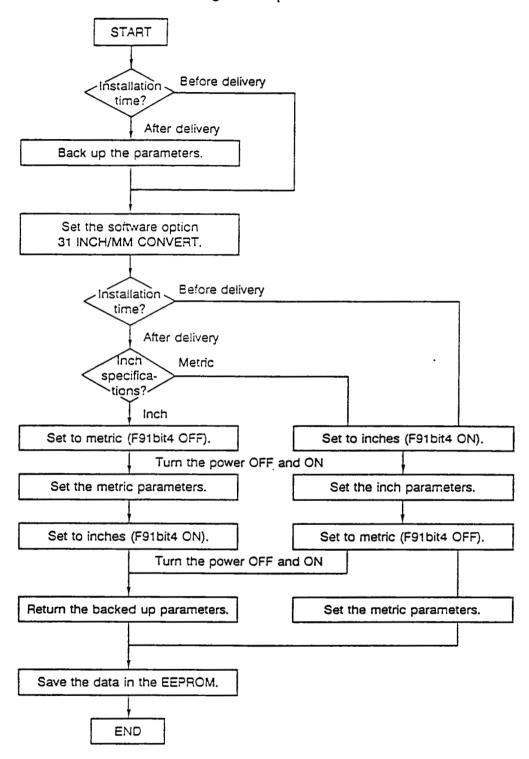
## 2-2 Addition of 48-digit program name option



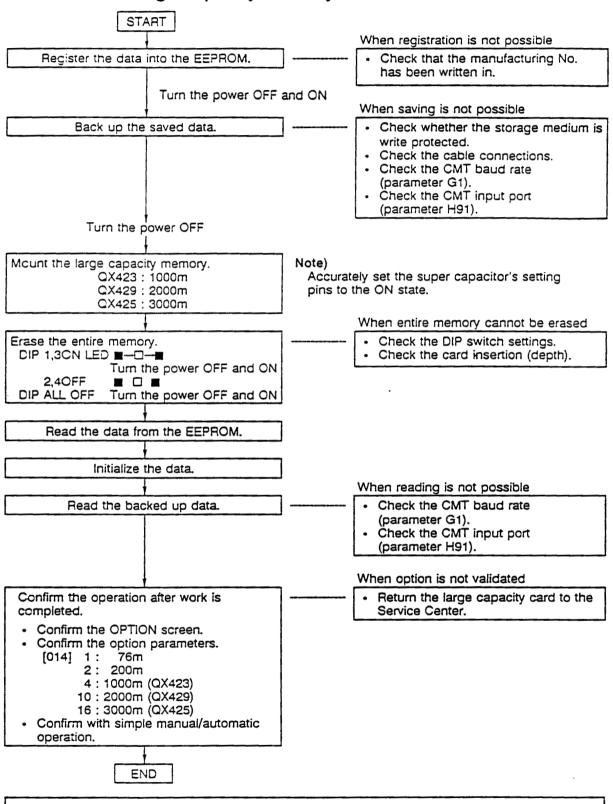
# **ACAUTION**

 This function is validated after the entire machining program has been erased. When adding options after delivery, always back up the machining program before starting this work.

# 2-3 Addition of inch/metric changeover aption



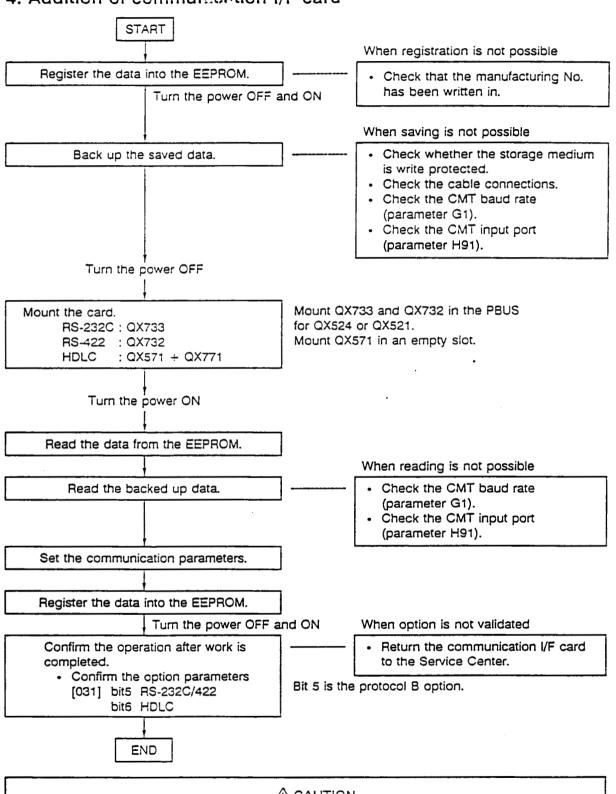
# 3. Addition of large capacity memory



#### **↑** CAUTION

 Always turn the power OFF before mounting the large capacity memory card (QX423/QX429/QX425). An overvoltage will be applied on the card causing the card to be destroyed.

#### 4. Addition of communication I/F card



#### **ACAUTION**

 Always turn the power OFF before mounting the communication card (QX733/QX732/QX571+QX771). An overvoltage will be applied on the card causing the card to be destroyed.

C 1995 MITSUBISHI ELECTRIC CORPORATION

ALL RIGHTS RESERVED



NOTICE: These products/technologies are subject to U.S. regulations and/or COCOM strategic restrictions; diversion contrary thereto is prohibited.