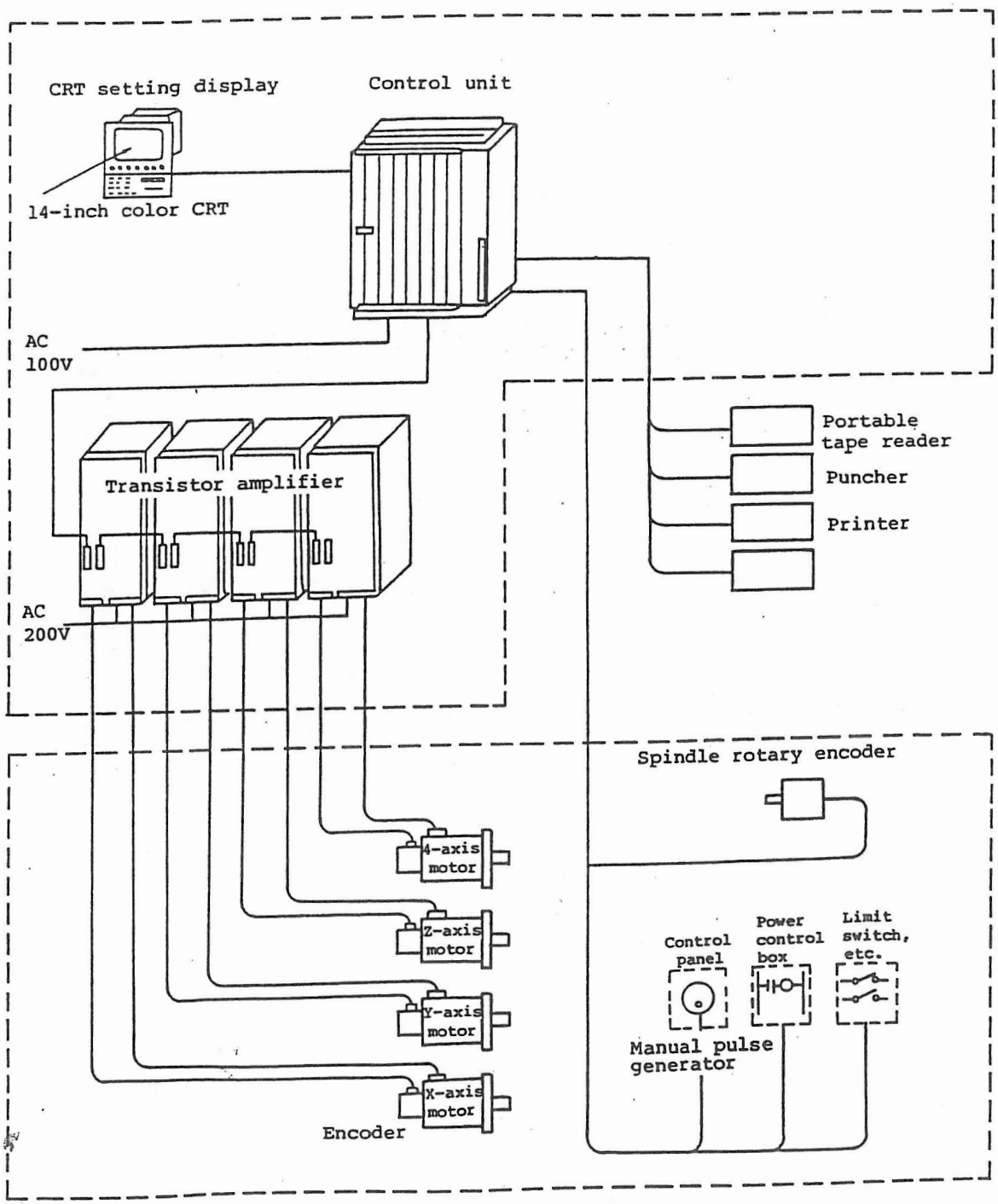
M32 - A

TROUBLE-SHOOTING GUIDE

1. Configuration

1-1 System configuration

The system using MAZATROL M-32A is generally composed of the following.



1-2 A list of component unit

The MAZATROL M-32A is composed of following parts.

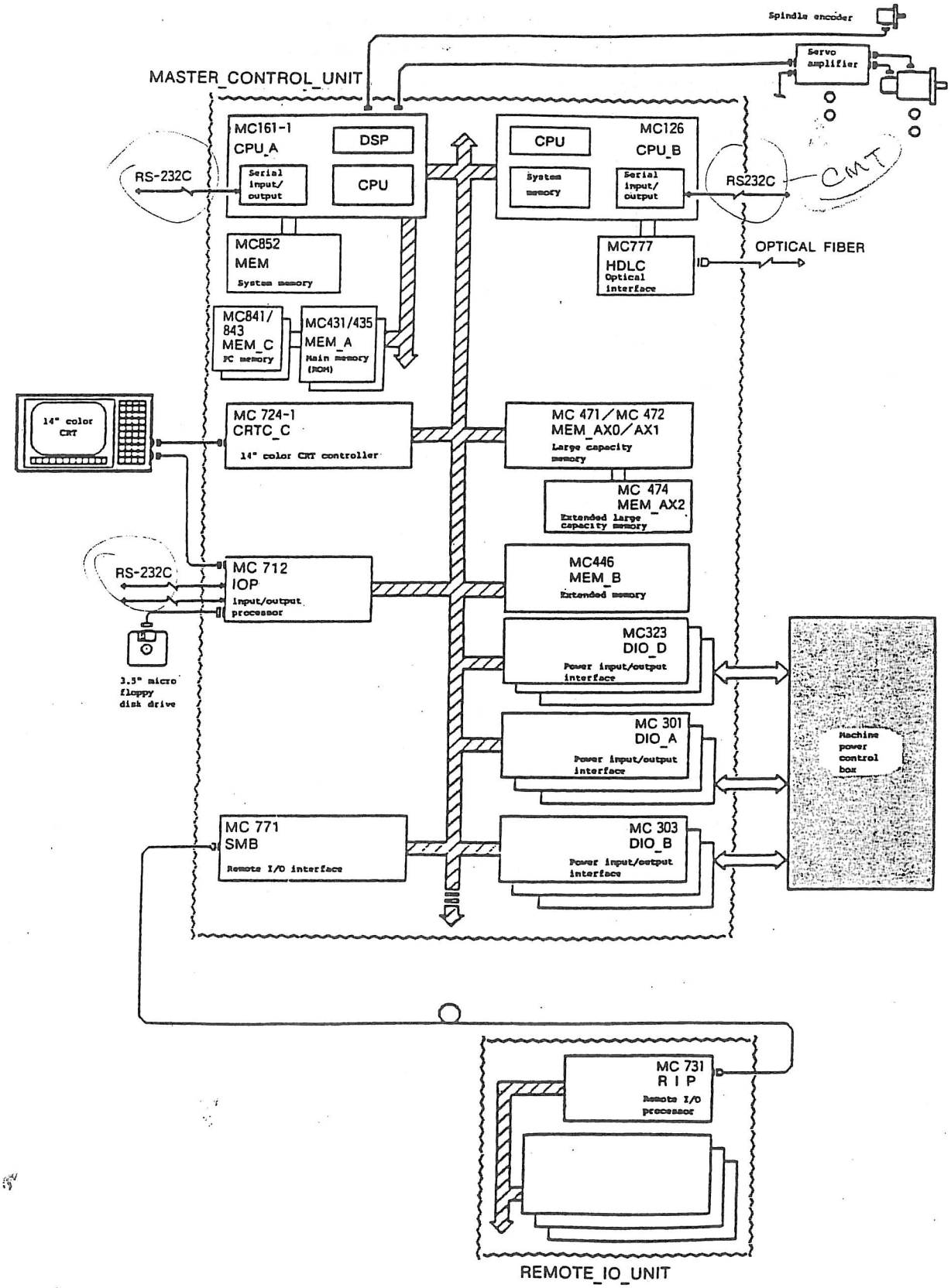
Component	Type	Q'ty	Specification
Main control unit MU311		1	NC main theoretical unit
	MC031	(1)	Back panel for 10 slots
	PD21 AVR	(1)	Power source
CRT unit (control board)	MB442 (14")	1	CRT setting display
	A1QA8DSP40	(1)	14" color CRT
	LT3B AVR	(1)	Power source
	KS-MB411	(1)	Data key
	KS-YZ402	(1)	Menu key
	MC221 OPBC	(1)	NC operation board I/F card
Transistor amplifier MR-S 11/12		For a number of shaft	Supplies electric current to motor
Motor HA-C		For a number of shaft	For control shaft driving
Detector		For a number of shaft	Encoder for machine position detection
Manual pulse generator HD52A		1	Manual handle
Rotary encoder		1	Main spindle motor position detection
Connection cable		Required number	Unit to unit connection cable

	Type	Specification
Floppy disk drive	FDM1332A	3.5" floppy disk (Format capacity: 1.18MB)
Printed circuit board	MC161-1 CPU_A TN831☐187	Main processor
	MC126 CPU_B TN831☐186	Additional processor (With arithmetic co-processor)
	MC431 MEM_A TN831☐431	Main memory up to 1.0MB
	MC435 MEM_A TN831☐435	Main memory (with option) (Up to 1.0MB + 128KB)
	MC841 MEM_C TN831☐841	User PC memory (Up to 256KB)
	MC843 MEM C TN831☐843	User PC memory (Up to 512KB)
	MC852 MEM TN831☐852	Main processor memory (Up to 256KB)
	MC446 MEM_B TN831☐446	Extended main memory (DRAM 2MB, SRAM 256KB)
	MC471 MEM_AX0 TN831☐471	Large capacity memory (256KB)
	MC472 MEM_AX1 TN831☐472	Large capacity memory (1MB)
	MC474 MEM_AX2 TN831☐474	Large capacity memory (768KB)
	MC724-1 CRTC_C TN831☐724	Controller dedicated to color CRT
	MC712 IOP TN831☐712	Processor dedicated to input/output control
	MC301 DIO_A TN831☐301	Manual handle interface 3-axis Contact input/output interface DI: 64, DO: 45
	MC303 DIO_B TN831☐303	Analog input/output interface Contact input/output interface DI: 48, DO: 45

(Continued)

	Type	Specification
Printed circuit board	MC323 DIO_D TN831□323	Analog input/output interface Contact input/output interface DI: 64, DO: 64
	MC731 RIP TN831□731	Remote IO interface (On remote IO unit side)
	MC771 SMB TN831□771	Remote IO interface (On main control unit side)
	MC777 HDLC TN831□777	HDLC interface
	MC062 BAT_B TN831□062	Battery card (For ROM bus)

1-3 Hardware configuration

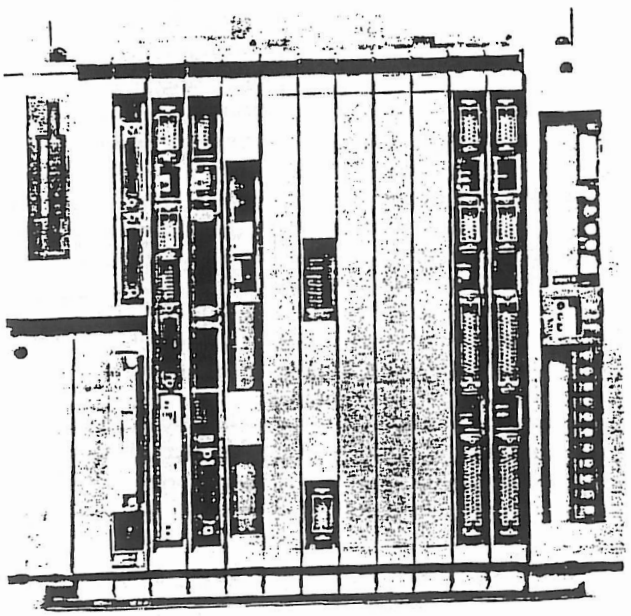


Printed circuit board standard accommodation diagram
(including optional specifications)

M-32A

	10	9	8	7	6	5	4	3	2	1
MC062	MC431/MC435+MC841/MC843	MC1612	MC1611-1+MC8522	MC1126+MC777	MC4461-1/MC446	MC4711/MC4722/MC4722+MC4744	MC7241-1		MC3XX#4 or MC7711	MC3XX#3	MC3XX#2	MC3XX#1	AVR

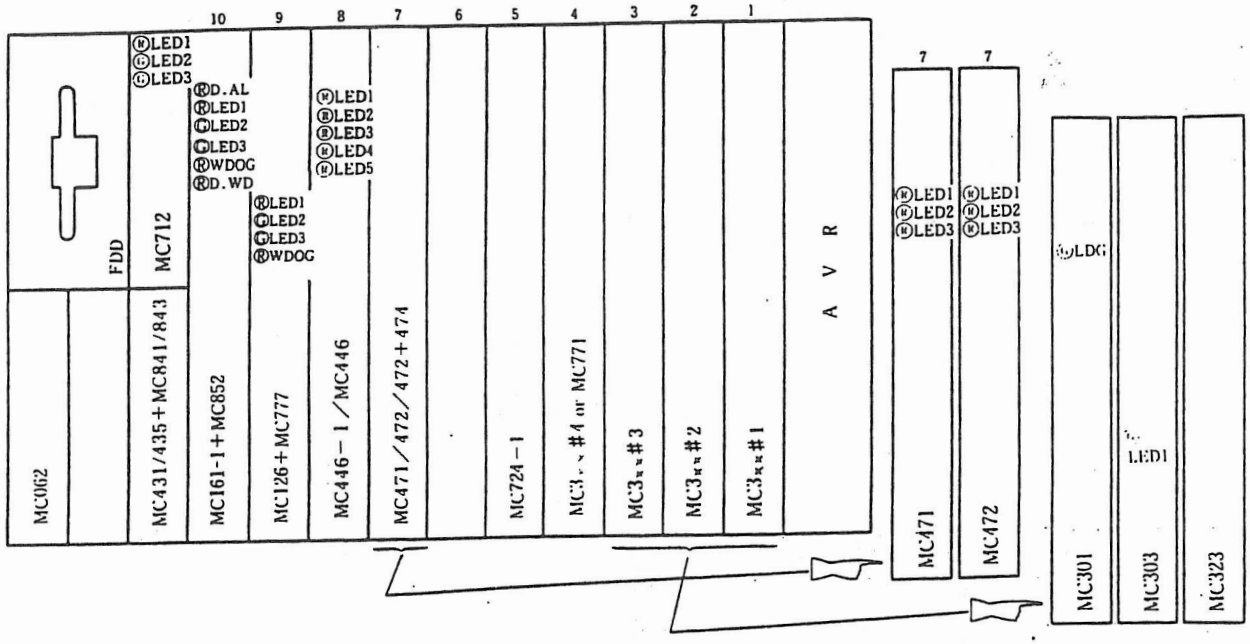
External view of main unit



M-32A

3-2 List of LEDs of each card (unit)

3-2-1 M-32A



Card name	LED name	Status		Error contents	Countermeasures
		Normal	Abnormal		
MC712	LED1	x	o	System alarm	Normally this LED is lit up only at the time of initializing after resetting, if the LED remains lit up constantly, replace with a normal card.
	LED2	o/Δ	x	System ready A	Replace the MC712 card when LED1 and LED2 extinguish simultaneously, and the MC201 card on board side when LED2 only extinguishes.
	LED3	o/Δ	x	System ready B	
MC161 -1	LED1	x		→	The contents of error may differ due to the combination. Refer to the item 3-3-5.
	LED2	Δ			
	LED3	Δ			
	WDOG	x	o	Watchdog alarm	Replace with a normal card.

(Continued)

Card name	LED name	Status		Error contents	Countermeasures
		Normal	Abnormal		
	D. AL	x	o	DSP alarm	Check that the CAM11 connector is connected. After checking the breakage of the cable, if the lamp lights up, replace the card with a good one.
	D. WD	x	o	DSP watchdog alarm	
MC126	LED1	x		→	The contents of error may differ due to the combination. Refer to the item 3-3-5.
	LED2	o			
	LED3	o			
	WDOG	x	o	Watchdog alarm	Replace with a normal card.
MC446	LED1	x	o	DRAM parity error	Reload the data again for performance, and if the LED still lights up, replace with a normal card.
	LED2	x	o	SRAM parity error	
	LED3	x	o	DRAM battery alarm	Charge or replace the battery.
	LED4	x	o	SRAM battery alarm	Charge or replace the battery, and reconfirm the machining data.
	LED5	x	o	Memory guard error	The system gets defective.
MC471	LED1	x	o	Parity error	Reload the data again for performance, and if the LED still lights up, replace with a normal card.
	LED2	x	o	Memory guard error	The system gets defective.
	LED3	x	o	Battery alarm	Charge or replace the battery, and reconfirm the machining data.
MC472	LED1	x	o	Parity error	Reload the data again for performance, and if the LED still lights up, replace with a normal card.
	LED2	x	o	Memory guard error	The system gets defective.
	LED3	x	o	Battery alarm	Charge or replace the battery, and reconfirm the machining data.

(Continued)

Card name	LED name	Status		Error contents	Countermeasures
		Normal	Abnormal		
MC301	LDG	o	x	Output photo-coupler power	The LED is extinguished only at CPU resetting. Hence, with this LED extinguished, the system S/W is not running, so that when this state continues, it is necessary to replace the MC161-1 or MC126 card.
MC303	LED 1	o	x	Output photo-coupler power	

o: Lit up Δ: Flickering x: Extinguished

3-2-2 CPU card LEDs

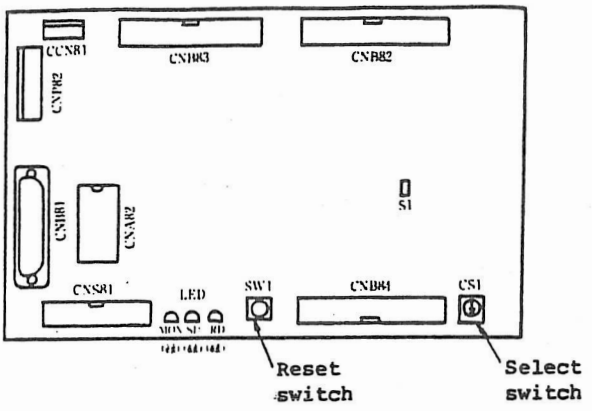
The LEDs 1,2 and 3 of CPU cards MC161 and MC126 are the LEDs transmitted from the system software. The error contents differ according to the combinations of these LEDs.

LED1	LED2	LED3	Error contents	Countermeasures
x	o	o	Parity error	Reload the RAM data on the CPU card for performance; if the error still remains, replace with a normal card.
x	o	o	Write guard error	The system gets defective.
o	x	o	Bus error	
o	o	o	System error	
o	x	x	Zero operation	Confirm the parameter machining data.

o: Lit up x: Extinguished

3-2-3 LEDs on operation board side

MC221



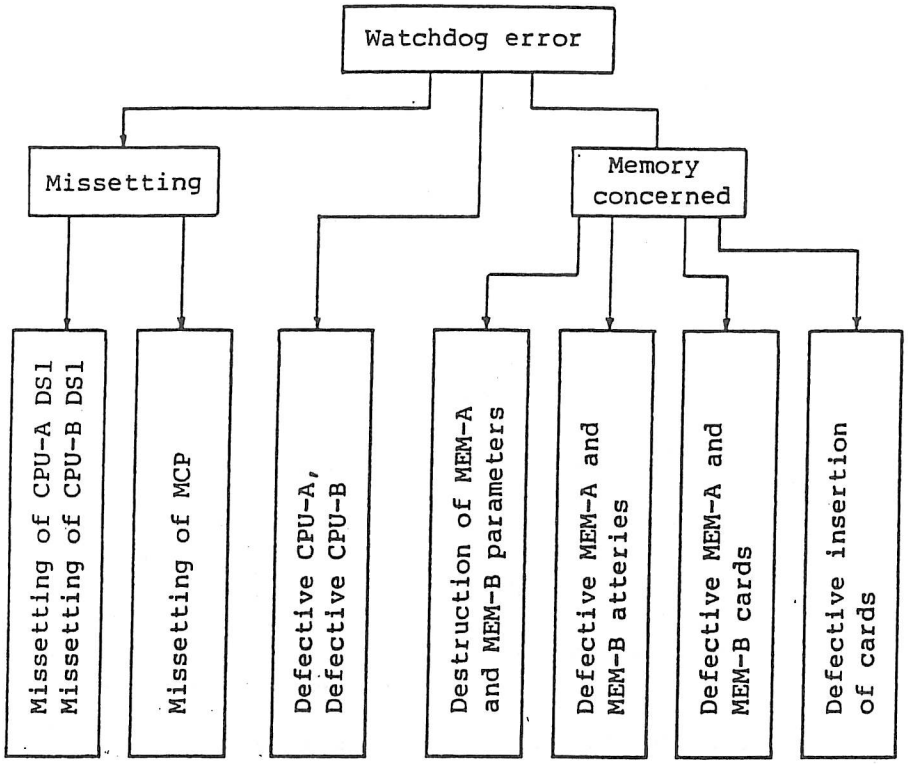
Card name	LED name	Status		Error contents	Countermeasures
		Normal	Abnormal		
MC221	RD	o/Δ	x	Received signal (remains extinguished when not connected to NC)	Replace the MC712 card if RD and SD as well as the LED3 of MC712 card on the control unit side are extinguished, with the MON flickering. If the status does not turn for better, replace this card with a normal one.
	SD	o/Δ	x	Transmitted signal (remains extinguished when not connected to NC)	
	MON	Δ	o/x	System monitor (flickers periodically)	Replace with a normal card.

o: Lit up Δ: Flickering x: Extinguished

3-3 Likely causes of alarm

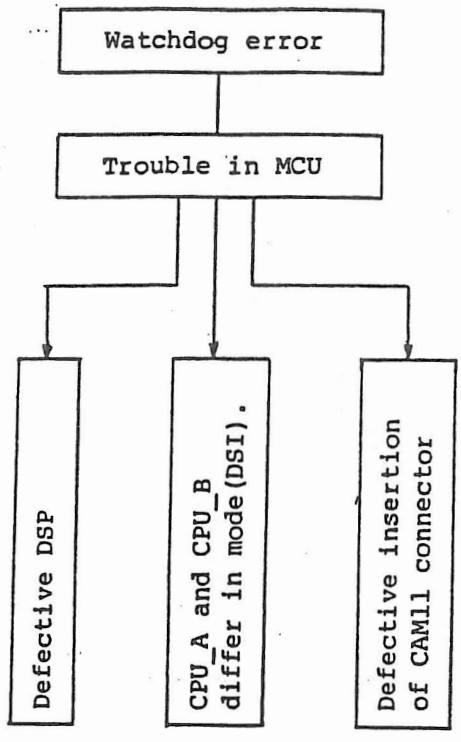
1. WDOG Watching error

(1) With CPU-A WDOG, CPU-B WDOG lit up



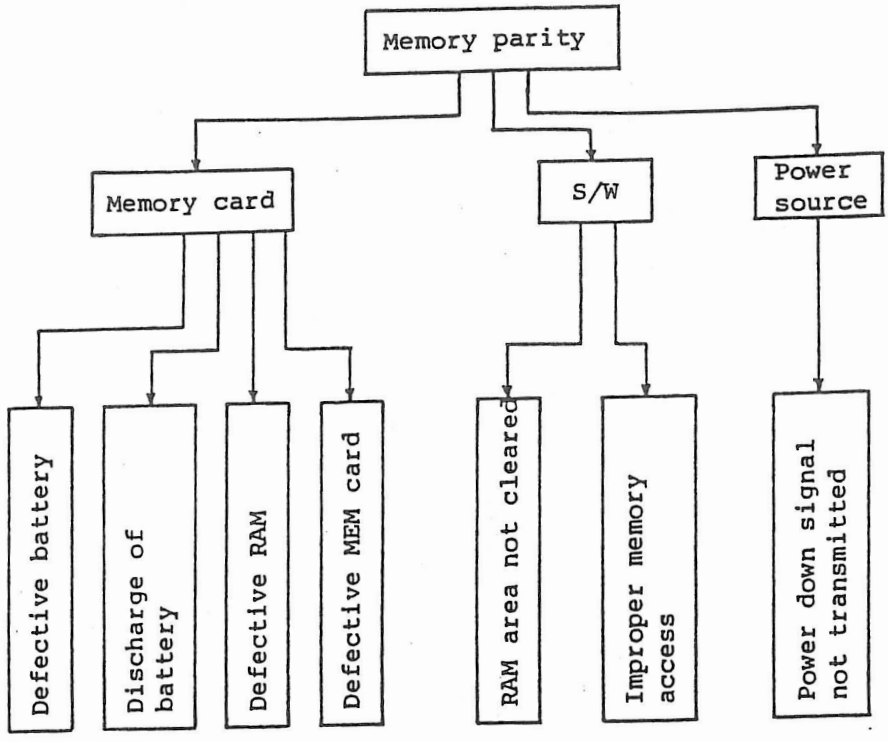
The "Watchdog Error", occurring when the system fails to run properly in order to assure the safety of system, is capable of bringing the system to an immediate stop. In a system such as NC, running at real time, a periodical routine is formed, with a specific counter getting reset every time the system passes through the routine. Should the system fails to run normally due to some reason, the system can not pass through the routine, and the counter does not get reset. If a lock of a constant frequency is provided to the clock terminal of the counter, the counter overflows, and the output thus obtained interrupts the CPU, making it possible to take urgent and appropriate measures.

(2) With D. WD lit up

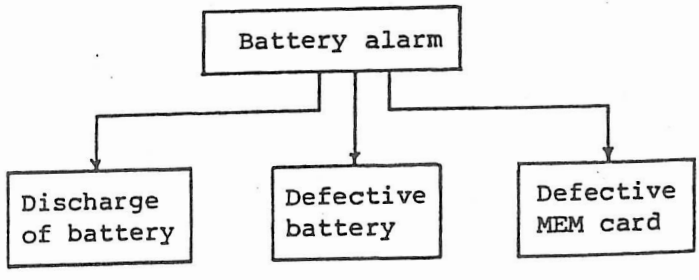


The watchdog error of MCP is the watchdog error of MCU (servo system) against the watchdog error of CPU as an error of the total system. The watchdog error of DSP occurs when 1 servo processing can not be carried out in less than a certain time period (normally 1.7 ms) or when MCU main processing falls behind the time.

2. MPE memory parity



3. BAT battery alarm



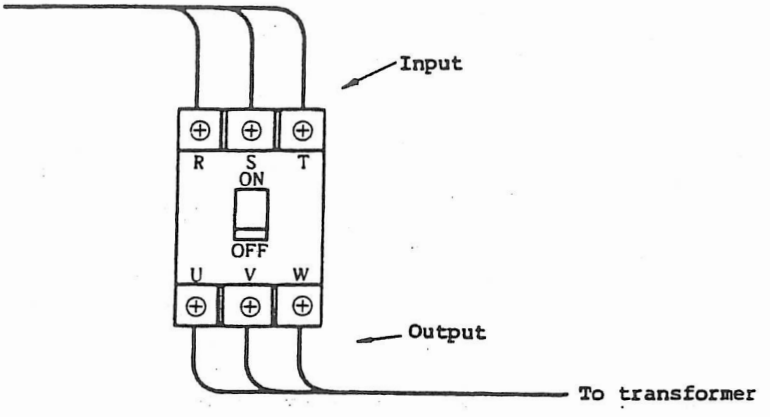
The battery breaks down when the MEM card is placed on a metallic desk or when the battery is installed with wrong polarity. In such case, immediately exchange the battery.

3-4 Inspection procedures for troubles

(1) Confirmation of power voltage

Confirmation of input power voltage

The 3-phase input power voltage is supplied to the NC side no-fuse breaker terminals R.S.T. through the machine side no-fuse breaker. Hence, make sure that the specified voltage is applied to R.S.T. terminals.



The single-phase input voltage is connected to the terminal stand of the DC power PD21 of control unit. Make sure that the terminal stand is applied with the specified voltage of AC100V ±15%.

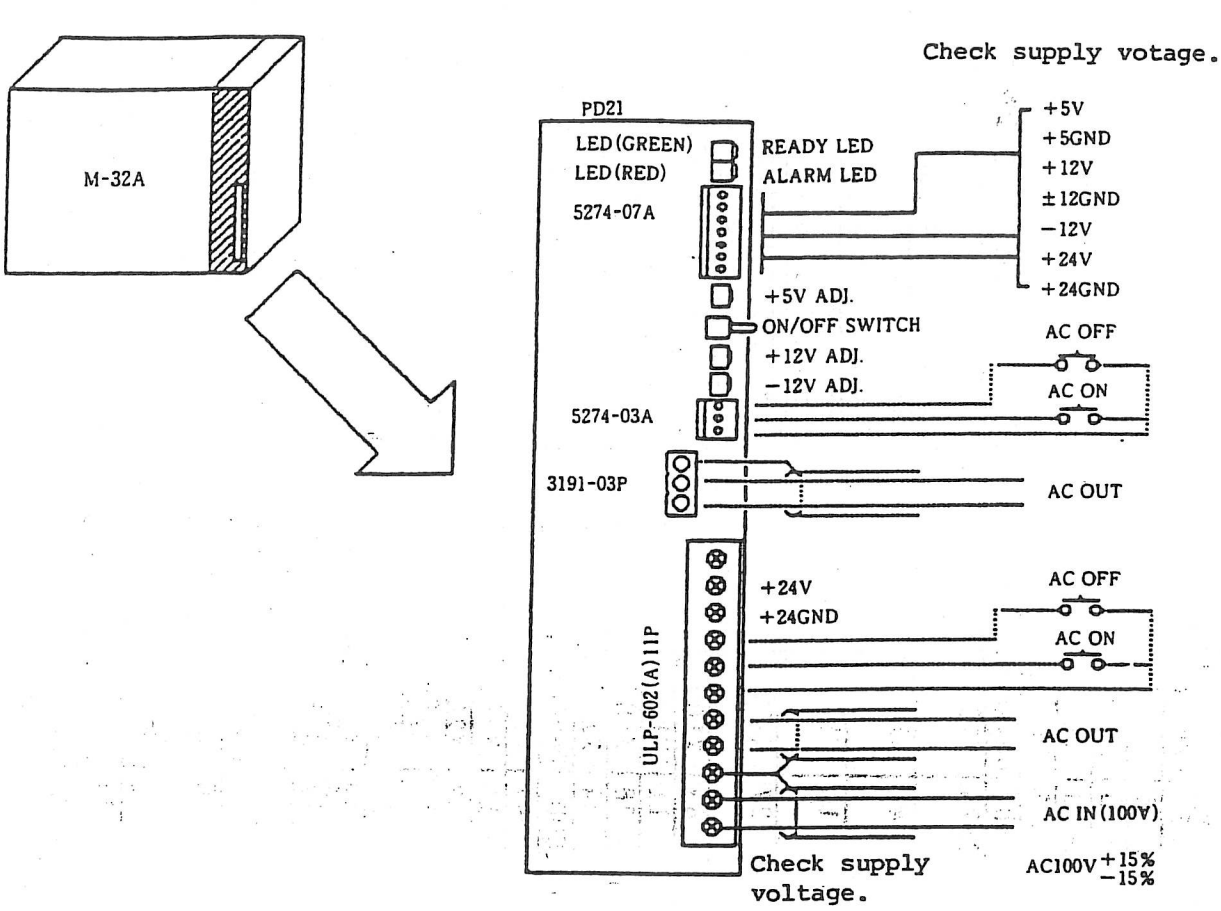
Confirmation of DC power voltage

The DC power voltage is supplied to the DC power PD21 connector of control unit; make sure that the connector is applied with the specified DC voltage.

	Max. total regulation	Max. ripple voltage	Voltage regulating rheostat
+5V	-2% ∿ + 2%	∿ 50mV	In Fig.: +5V ADJ
+12V	-2% ∿ + 2%	∿ 60mV	In Fig.: +12V ADJ
-12V	-2% ∿ + 2%	∿ 60mV	In Fig.: -12V ADJ
+24V	-20% ∿ +10%	∿200nV	—

Turn the variable resistance clockwise to increase the voltage.

(2) Connection of power



Input signal from machine (1/4) [First card]

Table 4-1-1

Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X0			12-36	X8			12- 1
X1			- 4	X9			19
X2			- 22	XA			34
X3			- 37	XB			2
X4			- 5	XC			20
X5			- 23	XD			35
X6			- 38	XE			3
X7			- 6	XF			21
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X10			12-26	X18		*Reference postion return near point detection 1	12-24
X11			42	X19		*Reference postion return near point detection 2	39
X12			10	X1A		*Reference postion return near point detection 3	7
X13			27	X1B		*Reference postion return near point detection 4	25
X14			43	X1C			40
X15			11	X1D			8
X16			28	X1E			41
X17			44	X1F			9
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X20		*Stroke end -1	12-47	X28		*Stroke end +1	12-12
X21		*Stroke end -2	15	X29		*Stroke end +2	29
X22		*Stroke end -3	32	X2A		*Stroke end +3	45
X23		*Stroke end -4	48	X2B		*Stroke end +4	13
X24			16	X2C			30
X25			49	X2D			46
X26			17	X2E			14
X27		*Emergency stop	50	X2F			31
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X30			11-10	X38			11-14
X31			17	X39			1
X32			4	X3A			8
X33			11	X3B			15
X34			18	X3C			2
X35			5	X3D			9

X36			12	X3E		16
X37			19	X3F		3

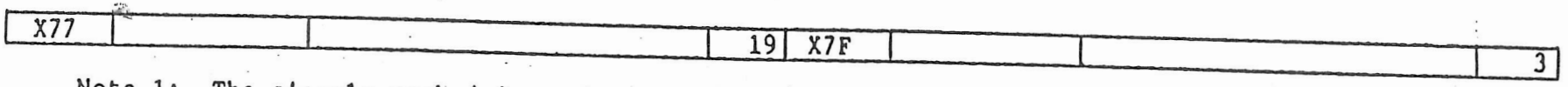
Note 1: The signals marked * are handled at B contact circuits.

330HM, 335M INTERFACE TABL

Input Signal from Machine (2/4) Second card

Table 4-1-7

Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X40			-36	X48			- 1
X41			4	X49			19
X42			22	X4A			34
X43			37	X4B			2
X44			5	X4C			20
X45			23	X4D			35
X46			38	X4E			3
X47			6	X4F			21
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X50			-26	X58			-24
X51			42	X59			39
X52			10	X5A			7
X53			27	X5B			25
X54			43	X5C		*Reference postion return near point detection 5	40
X55			11	X5D		*Reference postion return near point detection 6	8
X56			28	X5E			41
X57			44	X5F			9
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X60			-47	X68			-12
X61			15	X69			29
X62			32	X6A			45
X63			48	X6B			13
X64		*Stroke end -5	16	X6C		*Stroke end +5	30
X65		*Stroke end -6	49	X6D		*Stroke end +6	46
X66			17	X6E			14
X67			50	X6F			31
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X70			-10	X78			-14
X71			17	X79			1
X72			4	X7A			8
X73			11	X7B			15
X74			18	X7C			2
X75			5	X7D			9
X76			12	X7E			16



Note 1: The signals marked * are handled at B contact circuits.
Note 2: DI for X70 - X7F exists only in DIO-A or DIO-D card.

Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X100			82-36	X108		NC reset	82- 1
X101			4	X109			19
X102			22	X10A			34
X103			37	X10B			2
X104			5	X10C			20
X105			23	X10D			35
X106			38	X10E			3
X107			6	X10F			21
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X110			82-26	X118			82-24
X111			42	X119			39
X112			10	X11A			7
X113			27	X11B			25
X114			43	X11C			40
X115			11	X11D			8
X116			28	X11E			41
X117			44	X11F			9
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X120			82-47	X128			82-12
X121			15	X129			29
X122			32	X12A			45
X123			48	X12B			13
X124			16	X12C			30
X125			49	X12D			46
X126			17	X12E			14
X127		*Emergency stop	50	X12F			31
Device	Abbreviation	Signal name	CMD	Device	Abbreviation	Signal name	CMD
X130			81-10	X138			81-14
X131			17	X139			1
X132			4	X13A			8
X133			11	X13B			15
X134			18	X13C			2
X135			5	X13D			9
X136			12	X13E			16
X137			19	X13F			3

Note 1: X108 is the fixed device number assigned to NC reset. Be sure to assign it to the NC reset signal of CNC input on user PLC.

Note 2: X127 is set to 1 at emergency stop.

Device	Abbreviation	Signal name
X140		
X141		
X142		
X143		
X144		
X145		
X146		
X147		

Device	Abbreviation	Signal name
X148		
X149		
X14A		
X14B		
X14C		
X14D		
X14E		
X14F		

Device	Abbreviation	Signal name
X150		
X151		
X152		
X153		
X154		
X155		
X156		
X157		

Device	Abbreviation	Signal name
X158		
X159		
X15A		
X15B		
X15C		
X15D		
X15E		
X15F		

Device	Abbreviation	Signal name

Device	Abbreviation	Signal name

330HM, 335M INTERFACE TABLE

Sensor Input Signal Table (1/1) MOTION CONTROL PROCESSOR CARD Table 4-4-1

Device	Abbreviation	Signal name	CNA	Device	Abbreviation	Signal name	CNA
X178		(Skip 1)	18- 1				
X179		(Skip 2)	2				
X17A		(Skip 3)	5				
X17B		(Skip 4)	6				
X17C		Interrupt signal 1	8				
X17D		Interrupt signal 2	9				
X17E		Interrupt signal 3	12				
X17F		Interrupt signal 4	13				

Device	Abbreviation	Signal name	CNA	Device	Abbreviation	Signal name	CNA

Device	Abbreviation	Signal name	CNA	Device	Abbreviation	Signal name	CNA

Device	Abbreviation	Signal name	CNA	Device	Abbreviation	Signal name	CNA
							9
							16
							3

Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
X180	RDY1	Servo ready	axis 1	X188	AX1	Axis selection output	axis 1
X181	RDY2	Servo ready	axis 2	X189	AX2	Axis selection output	axis 2
X182	RDY3	Servo ready	axis 3	X18A	AX3	Axis selection output	axis 3
X183	RDY4	Servo ready	axis 4	X18B	AX4	Axis selection output	axis 4
X184	RDY5	Servo ready	axis 5	X18C	AX5	Axis selection output	axis 5
X185	RDY6	Servo ready	axis 6	X18D	AX6	Axis selection output	axis 6
X186				X18E			
X187				X18F			
Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
X190	MVP1	Axis moving	axis +1	X198	MVM1	Axis moving	axis -1
X191	MVP2	Axis moving	axis +2	X199	MVM2	Axis moving	axis -2
X192	MVP3	Axis moving	axis +3	X19A	MVM3	Axis moving	axis -3
X193	MVP4	Axis moving	axis +4	X19B	MVM4	Axis moving	axis -4
X194	MVP5	Axis moving	axis +5	X19C	MVM5	Axis moving	axis -5
X195	MVP6	Axis moving	axis +6	X19D	MVM6	Axis moving	axis -6
X196				X19E			
X197				X19F			
Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
X1A0	ZP11	First reference position arrival	axis 1	X1A8	ZP21	Second reference position arrival	axis 1
X1A1	ZP12	First reference position arrival	axis 2	X1A9	ZP22	Second reference position arrival	axis 2
X1A2	ZP13	First reference position arrival	axis 3	X1AA	ZP23	Second reference position arrival	axis 3
X1A3	ZP14	First reference position arrival	axis 4	X1AB	ZP24	Second reference position arrival	axis 4
X1A4	ZP15	First reference position arrival	axis 5	X1AC	ZP25	Second reference position arrival	axis 5
X1A5	ZP16	First reference position arrival	axis 6	X1AD	ZP26	Second reference position arrival	axis 6
X1A6				X1AE			
X1A7				X1AF			
Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
X1B0	ZP31	Third reference position arrival	axis 1	X1B8	ZP41	Fourth reference position arrival	axis 1
X1B1	ZP32	Third reference position arrival	axis 2	X1B9	ZP42	Fourth reference position arrival	axis 2

X1B2	ZP33	Third reference position arrival axis 3	X1BA	ZP43	Fourth reference position arrival axis 3
X1B3	ZP34	Third reference position arrival axis 4	X1BB	ZP44	Fourth reference position arrival axis 4
X1B4	ZP35	Third reference position arrival axis 5	X1BC	ZP45	Fourth reference position arrival axis 5
X1B5	ZP36	Third reference position arrival axis 6	X1BD	ZP46	Fourth reference position arrival axis 6
X1B6			X1BE		
X1B7			X1BF		

Device	Abbreviation	Signal name
X1C0		—
X1C1		—
X1C2		—
X1C3		—
X1C4		—
X1C5		—
X1C6		—
X1C7		—
Device	Abbreviation	Signal name
X1D0		
X1D1		
X1D2		
X1D3		
X1D4		
X1D5		
X1D6		
X1D7		
Device	Abbreviation	Signal name
X1E0	JO	Jog mode
X1E1	HO	Handle mode
X1E2	SO	Incremental mode
X1E3	PTPO	Manual desired feed mode
X1E4	ZRNO	Reference position return mode
X1E5		
X1E6		
X1E7		
Device	Abbreviation	Signal name
X1F0	MA	Control equipment ready
X1F1	SA	Servo ready
X1F2	OP	Auto running
X1F3	STL	Auto run start
X1F4	SPL	Auto run stop
X1F5	RST	resetting
X1F6	CXN	Manual desired feed
X1F7	RWD	Rewinding

Device	Abbreviation	Signal name
X1C8		—
X1C9		—
X1CA		—
X1CB		—
X1CC		—
X1CD		—
X1CE		—
X1CF		—
Device	Abbreviation	Signal name
X1D8		
X1D9		
X1DA		
X1DB		
X1DC		
X1DD		
X1DE		
X1DF		
Device	Abbreviation	Signal name
X1E8	MEMO	Memory mode
X1E9	TO	Tape mode
X1EA		—
X1EB	DO	MDI mode
X1EC		
X1ED		
X1EE		
X1EF		
Device	Abbreviation	Signal name
X1F8	DEN	Move command completion
X1F9	TIMP	All axes in-position
X1FA	TSMZ	All axes smoothing zero
X1FB		—
X1FC	CXFIN	Manual desired feed completion
X1FD		—
X1FE		—
X1FF	HINT	High speed interpolation

Device	Abbreviation	Signal name
X200	RPN	Rapid traverse feed
X201	CUT	Cutting feed
X202	TAP	Tapping
X203	THRD	Thread cutting
X204	SYN	Synchronous feed
X205	CSS	Constant peripheral speed
X206	SKIP	Skip
X207	ZRNN	Return to reference position
Device	Abbreviation	Signal name
X210	AL1	NC alarm 1
X211	AL2	NC alarm 2
X212	AL3	NC alarm 3
X213	AL4	NC alarm 4
X214	SIGE	S analog input gear number invalid
X215	SOVE	S analog maximum or minimum over
X216	SNGE	No S analog selection gear
X217	ASLE	Axis selection invalid
Device	Abbreviation	Signal name
X220	DM00	M single output M00
X221	DM01	M single output M01
X222	DM02	M single output M02
X223	DM30	M single output M30
X224		
X225	GR1	Spindle gear shift command 1
X226	GR2	Spindle gear shift command 2
X227		—
Device	Abbreviation	Signal name
X230	MF1	Miscellaneous function strobe 1
X231	MF2	Miscellaneous function strobe 2
X232	MF3	Miscellaneous function strobe 3
X233	MF4	Miscellaneous function strobe 4
X234	SF1	Spindle function strobe 1

Device	Abbreviation	Signal name
X208	INCH	Inch input
X209	DLKN	Display lock
X20A	FIDN	F 1-digit command
X20B	TLFO	Tool life management output (M)
X20C	SUPP	Spindle rotation speed upper limit over
X20D	SLOW	Spindle rotation speed lower limit over
X20E	TLOV	Tool life over (L)
X20F	BATAL	Battery alarm
Device	Abbreviation	Signal name
X218	F11	F 1-digit number
X219	F12	
X21A	F14	
X21B	F18	
X21C		
X21D		
X21E		
X21F		
Device	Abbreviation	Signal name
X228	EF	External operation strobe
X229	MMS	Manual value command
X22A		
X22B		
X22C		
X22D		
X26E		
X22F		
Device	Abbreviation	Signal name
X238	TF1	Tool function strobe 1
X239	TF2	Tool function strobe 2
X23A		
X23D		
X23C	BF1	Second miscellaneous function strobe 1

X235		—	X23D	BF2	Second miscellaneous function strobe 2
X236		—	X23E	BF3	Second miscellaneous function strobe 3
X237		—	X23F	BF4	Second miscellaneous function strobe 4

coming to/from spindle drive

Device	Abbreviation	Signal name
X240		
X241	CDO	Current detection
X242	VRO	Speed detection
X243	FLO	Alarm
X244	ZSO	Zero speed
X245	USO	Speed reach
X246	ORAO	In-position
X247		
Device	Abbreviation	Signal name
X250		(Cycle start)
X251		(Feed hold)
X252		—
X253		—
X254		—
X255		—
X256		—
X257		—
Device	Abbreviation	Signal name
X260		—
X261		—
X262		—
X263		—
X264		—
X265		—
X266		—
X267		—
Device	Abbreviation	Signal name
X270		
X271		
X272		
X273		
X274		
X275		
X276		
X277		

Device	Abbreviation	Signal name
X248	SMA	Spindle ready on
X249	SSA	Spindle ready on
X24A	SEMG	Emergency stop
X24B	SSRN	Forward rotation
X24C	SSRI	Reverse rotation
X24D	SZPH	Z phase pass
X24E	SIMP	Position loop in-position
X24F	STLQ	Torque limit
Device	Abbreviation	Signal name
X258		(NC reset)
X259		—
X25A		—
X25B		—
X25C		—
X25D		—
X25E		—
X25F		—
Device	Abbreviation	Signal name
X268		
X269		
X26A		
X26B		
X26C		
X26D		
X26E		
X26F		
Device	Abbreviation	Signal name
X278		
X279		
X27A		
X27B		
X27C		
X27D		
X27E		
X27F		

Note 1: X240 - X247 are dedicated interface to MITSUBISHI spindle controller (FR-SF).
Note 2: X250 - X25F are reserved for computer link.

outputs from P.L.C.

Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y0			13-36	Y8			13- 1
Y1			4	Y9			19
Y2			22	YA			34
Y3			37	YB			2
Y4			5	YC			20
Y5			23	YD			35
Y6			38	YE			3
Y7			6	YF			21
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y10			13-26	Y18			13-24
Y11			42	Y19			39
Y12			10	Y1A			7
Y13			27	Y1B			25
Y14			43	Y1C			40
Y15			11	Y1D			8
Y16			28	Y1E			41
Y17			44	Y1F			9
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y20			13-47	Y28			13-12
Y21			15	Y29			29
Y22			32	Y2A			45
Y23			48	Y2B			13
Y24			16	Y2C			30
(Y25)	—	—	49	Y2D			46
(Y26)	—	—	17	Y2E			14
(Y27)	—	—	50	Y2F			31
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y30	—	—	-10	Y38	—	—	-14
Y31	—	—	17	Y39	—	—	1
Y32	—	—	4	Y3A	—	—	8
Y33	—	—	11	Y3B	—	—	15
Y34	—	—	18	Y3C	—	—	2
Y35	—	—	5	Y3D	—	—	9
Y36	—	—	12	Y3E	—	—	16
Y37	—	—	19	Y3F	—	—	3

Note 1: DO for Y25 - Y27 and Y30 - Y3F cannot be used.

Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y40			-36	Y48			- 1
Y41			4	Y49			19
Y42			22	Y4A			34
Y43			37	Y4B			2
Y44			5	Y4C			20
Y45			23	Y4D			35
Y46			38	Y4E			3
Y47			6	Y4F			21
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y50			-26	Y58			-24
Y51			42	Y59			39
Y52			10	Y5A			7
Y53			27	Y5B			25
Y54			43	Y5C			40
Y55			11	Y5D			8
Y56			28	Y5E			41
Y57			44	Y5F			9
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y60			-47	Y68			-12
Y61			15	Y69			29
Y62			32	Y6A			45
Y63			48	Y6B			13
Y64			16	Y6C			30
(Y65)			49	Y6D			46
(Y66)			17	Y6E			14
(Y67)			50	Y6F			31
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y70			-10	Y78			-14
Y71			17	Y79			1
Y72			4	Y7A			8
Y73			11	Y7B			15
Y74			18	Y7C			2
Y75			5	Y7D			9
Y76			12	Y7E			16
Y77			19	Y7F			3

Note 1: DO for Y65 - Y67 and Y70 - Y7F exists only in DIO-D card.

output from PLC. to machine

Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y100			83-36	Y108			83-1
Y101			4	Y109			19
Y102			22	Y10A			34
Y103			37	Y10B			2
Y104			5	Y10C			20
Y105			23	Y10D			35
Y106			38	Y10E			3
Y107			6	Y10F			21
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y110			83-26	Y118			83-24
Y111			42	Y119			39
Y112			10	Y11A			7
Y113			27	Y11B			25
Y114			43	Y11C			40
Y115			11	Y11D			8
Y116			28	Y11E			41
Y117			44	Y11F			9
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD
Y120			83-47	Y128			83-12
Y121			15	Y129			29
Y122			32	Y12A			45
Y123			48	Y12B			13
Y124			16	Y12C			30
Y125			49	Y12D			46
Y126			17	Y12E			14
Y127			50	Y12F			31
Device	Abbreviation	Signal name	CFD	Device	Abbreviation	Signal name	CFD

64-2

Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Y160			Y168		
Y161			Y169		
Y162			Y16A		
Y163			Y16B		
Y164			Y16C		
Y165			Y16D		
Y166			Y16E		
Y167			Y16F		
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Y170			Y178		
Y171			Y179		
Y172			Y17A		
Y173			Y17B		
Y174			Y17C		
Y175			Y17D		
Y176			Y17E		
Y177			Y17F		
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name

Data from PLC to CNC (1/8)

Table 4-10-1

Device	Abbreviation	Signal name	
Y180	DTCH1	Control axis removal	axis 1
Y181	DTCH2	Control axis removal	axis 2
Y182	DTCH3	Control axis removal	axis 3
Y183	DTCH4	Control axis removal	axis 4
Y184	DTCH5	Control axis removal	axis 5
Y185	DTCH6	Control axis removal	axis 6
Y186			
Y187			

Device	Abbreviation	Signal name	
Y190	M11	Mirror image	axis 1
Y191	M12	Mirror image	axis 2
Y192	M13	Mirror image	axis 3
Y193	M14	Mirror image	axis 4
Y194	M15	Mirror image	axis 5
Y195	M16	Mirror image	axis 6
Y196			
Y197			

Device	Abbreviation	Signal name	
Y1A0	*-EDT1	External deceleration	axis -1
Y1A1	*-EDT2	External deceleration	axis -2
Y1A2	*-EDT3	External deceleration	axis -3
Y1A3	*-EDT4	External deceleration	axis -4
Y1A4	*-EDT5	External deceleration	axis -5
Y1A5	*-EDT6	External deceleration	axis -6
Y1A6			
Y1A7			

Device	Abbreviation	Signal name	
Y1B0	*-AIT1	Auto interlock	axis -1
Y1B1	*-AIT2	Auto interlock	axis -2
Y1B2	*-AIT3	Auto interlock	axis -3
Y1B3	*-AIT4	Auto interlock	axis -4
Y1B4	*-AIT5	Auto interlock	axis -5
Y1B5	*-AIT6	Auto interlock	axis -6
Y1B6			
Y1B7			

Device	Abbreviation	Signal name	
Y188	*SVF1	Servo off	axis 1
Y189	*SVF2	Servo off	axis 2
Y18A	*SVF3	Servo off	axis 3
Y18B	*SVF4	Servo off	axis 4
Y18C	*SVF5	Servo off	axis 5
Y18D	*SVF6	Servo off	axis 6
Y18E			
Y18F			

Device	Abbreviation	Signal name	
Y198	*+EDT1	External deceleration	axis -1
Y199	*+EDT2	External deceleration	axis -2
Y19A	*+EDT3	External deceleration	axis -3
Y19B	*+EDT4	External deceleration	axis -4
Y19C	*+EDT5	External deceleration	axis -5
Y19D	*+EDT6	External deceleration	axis -6
Y19E			
Y19F			

Device	Abbreviation	Signal name	
Y1A8	*+AIT1	Auto interlock	axis +1
Y1A9	*+AIT2	Auto interlock	axis +2
Y1AA	*+AIT3	Auto interlock	axis +3
Y1AB	*+AIT4	Auto interlock	axis +4
Y1AC	*+AIT5	Auto interlock	axis +5
Y1AD	*+AIT6	Auto interlock	axis +6
Y1AE			
Y1AF			

Device	Abbreviation	Signal name	
Y1B8	*+MIT1	Manual interlock	axis +1
Y1B9	*+MIT2	Manual interlock	axis +2
Y1BA	*+MIT3	Manual interlock	axis +3
Y1BB	*+MIT4	Manual interlock	axis +4
Y1BC	*+MIT5	Manual interlock	axis +5
Y1BD	*+MIT6	Manual interlock	axis +6
Y1BE			
Y1BF			

Note 1: The signals marked * (under column Abbreviation) are handled at B contact circuits.

Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
Y1C0	*-MIT1	Manual interlock	axis -1	Y1C8	AMLK1	Auto machine lock	axis 1
Y1C1	*-MIT2	Manual interlock	axis -2	Y1C9	AMLK2	Auto machine lock	axis 2
Y1C2	*-MIT3	Manual interlock	axis -3	Y1CA	AMLK3	Auto machine lock	axis 3
Y1C3	*-MIT4	Manual interlock	axis -4	Y1CB	AMLK4	Auto machine lock	axis 4
Y1C4	*-MIT5	Manual interlock	axis -5	Y1CC	AMLK5	Auto machine lock	axis 5
Y1C5	*-MIT6	Manual interlock	axis -6	Y1CD	AMLK6	Auto machine lock	axis 6
Y1C6				Y1CE			
Y1C7				Y1CF			
Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
Y1D0	MMLK1	Manual machine lock	axis 1	Y1D8	+J1	Feed axis selection	axis +1
Y1D1	MMLK2	Manual machine lock	axis 2	Y1D9	+J2	Feed axis selection	axis +2
Y1D2	MMLK3	Manual machine lock	axis 3	Y1DA	+J3	Feed axis selection	axis +3
Y1D3	MMLK4	Manual machine lock	axis 4	Y1DB	+J4	Feed axis selection	axis +4
Y1D4	MMLK5	Manual machine lock	axis 5	Y1DC	+J5	Feed axis selection	axis +5
Y1D5	MMLK6	Manual machine lock	axis 6	Y1DD	+J6	Feed axis selection	axis +6
Y1D6				Y1DE			
Y1D7				Y1DF			
Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
Y1E0	-J1	Feed axis selection	axis -1	Y1E8		—	
Y1E1	-J2	Feed axis selection	axis -2	Y1E9		—	
Y1E2	-J3	Feed axis selection	axis -3	Y1EA			
Y1E3	-J4	Feed axis selection	axis -4	Y1EB			
Y1E4	-J5	Feed axis selection	axis -5	Y1EC			
Y1E5	-J6	Feed axis selection	axis -6	Y1ED			
Y1E6				X36E			
Y1E7				X36F			
Device	Abbreviation	Signal name		Device	Abbreviation	Signal name	
Y1F0	MAE1	Manual, automatic enable	axis 1	Y1F8			
Y1F1	MAE2	Manual, automatic enable	axis 2	Y1F9			
Y1F2	MAE3	Manual, automatic enable	axis 3	Y1FA			
Y1F3	MAE4	Manual, automatic enable	axis 4	Y1FB			
Y1F4	MAE5	Manual, automatic enable	axis 5	Y1FC			

Y1F5	MAE6	Manual, automatic axis 6 enable	Y1FD		
Y1F6			Y1FE		
Y1F7			Y1FF		

Note 1: The signals marked * (under column Abbreviation) are handled at B contact circuits.

Device	Abbreviation	Signal name
Y200	ZSL1	Origin position selection 1
Y201	ZSL2	Origin position selection 2
Y202		
Y203		
Y204		
Y205		
Y206		
Y207		
Device	Abbreviation	Signal name
Y210	MEM	Memory mode
Y211	T	Tape mode
Y212		
Y213	D	MDI mode
Y214		
Y215		
Y216		
Y217		
Device	Abbreviation	Signal name
Y220	NRST 1	NC reset 1
Y221	NRST 2	NC reset 2
Y222	RRW	Reset and rewind
Y223	*CDZ	Chamfering
Y224	ARST	Auto restart (L only)
Y225	GFIN	Gear shift completion
Y226	FIN1	Miscellaneous function completion 1
Y227	FIN2	Miscellaneous function completion 2
Device	Abbreviation	Signal name
Y230	ABS	Manual absolute
Y231	DLK	Display lock
Y232	FID	F 1-digit speed change effective
Y233	CRQ	Calculation request
Y234	RHD1	Integrating time input 1

Device	Abbreviation	Signal name
Y208	J	Jog mode
Y209	H	Handle mode
Y20A	S	Incremental mode
Y20B	PTP	Manual desired feed mode
Y20C	ZRN	Reference position return mode
Y20D		
Y20E		
Y20F		
Device	Abbreviation	Signal name
Y218	ST	Automatic operation start
Y219	*SP	Automatic operation stop
Y21A	SBK	signal block
Y21B	*BSL	Block start interlock
Y21C	*CSL	Cutting start interlock
Y21D	DRN	Dry run
Y21E		—
Y21F	ERD	Error detect
Device	Abbreviation	Signal name
Y228	TLM	Tool length measurement
Y229	TLMS	Tool length measurement 2
Y22A		—
Y22B	SRN	Program restart
Y22C	PB	Playback
Y22D	UIT	Macro interrupt
Y22E	RT	Rapid traverse feed
Y22F		
Device	Abbreviation	Signal name
Y238	*KEY1	Data protection key 1
Y238	*KEY2	Date protection key 2
Y239	*KEY3	Data protection key 3
Y23A	*KEY4	Date protection key 4 (spare)
Y23C		

Y235	RHD2	Integrating time input 2	Y23D		
Y236			Y23E		
Y237			Y23F	BDT1	Optional block skip

Note 1: The signals marked * (under column Abbreviation) are handled at B contact circuits.

Device	Abbreviation	Signal name
Y240		—
Y241		—
Y242		—
Y243		—
Y244		—
Y245		—
Y246		—
Y247		—
Device	Abbreviation	Signal name
Y250	HS21	Second handle axis number
Y251	HS22	
Y252	HS24	
Y253	HS28	
Y254	HS216	
Y255		
Y256		
Y257	HS2S	Second handle axis effective
Device	Abbreviation	Signal name
Y260		
Y261		
Y262		
Y263		
Y264		
Y265		
Y266		
Y267		
Device	Abbreviation	Signal name
Y270	CX21	Manual desired feed second axis number
Y271	CX22	
Y272	CX24	
Y273	CX28	
Y274	CX216	
Y275		
Y276		
Y277	CX2S	Manual desired feed second axis effective

Device	Abbreviation	Signal name
Y248	HS11	First handle axis number
Y249	HS12	
Y24A	HS14	
Y24B	HS18	
Y24C	HS116	
Y24D		
Y24E		
Y24F	HS1S	First handle axis effective
Device	Abbreviation	Signal name
Y258	HS31	Third handle axis number
Y259	HS32	
Y25A	HS34	
Y25B	HS38	
Y25C	HS316	
Y25D		
Y25E		
Y25F	HS3S	Third handle axis effective
Device	Abbreviation	Signal name
Y268	CX11	Manual desired feed first axis number
Y269	CX12	
Y26A	CX14	
Y26B	CX18	
Y26C	CX116	
Y26D		
Y26E		
Y26F	CX1S	Manual desired feed first axis effective
Device	Abbreviation	Signal name
Y278	CX31	Manual desired feed third axis number
Y279	CX32	
Y27A	CX34	
Y27B	CX38	
Y27C	CX316	
Y27D		
Y27E		
Y27F	CX3S	Manual desired feed third axis effective

Device	Abbreviation	Signal name
Y280	CXS1	Smoothing off
Y281	CXS2	Axis in dependency
Y282	CXS3	EX.F/MODAL.F
Y283	CXS4	G0/G1
Y284	CXS5	MC/INC
Y285	CXS6	ABS/INC
Y286	*CXS7	Stop
Y287	CXS8	Strobe
Device	Abbreviation	Signal name
Y290	G11	Spindle gear selection input
Y291	G12	
Y292		
Y293		
Y294	SSTP	Spindle OFF
Y295	SSFT	Spindle gear shift
Y296	SORC	Oriented spindle stop
Y297		
Device	Abbreviation	Signal name
Y2A0	*FV1	Cutting feed override
Y2A1	*FV2	
Y2A2	*FV4	
Y2A3	*FV8	
Y2A4	*FV16	
Y2A5		
Y2A6	FV2E	Second cutting override on
Y2A7	FVS	Override value setting system
Device	Abbreviation	Signal name
Y2B0	*JV1	Manual feedrate
Y2B1	*JV2	
Y2B2	*JV4	
Y2B3	*JV8	
Y2B4	*JV16	
Y2B5		
Y2B6		
Y2B7	JVS	Numeric value setting system

Device	Abbreviation	Signal name
Y288	SP1	Spindle override
Y289	SP2	
Y28A	SP4	
Y28B		
Y28C		
Y28D		
Y28E		
Y28F	SPS	Override value setting system
Device	Abbreviation	Signal name
Y298	OVC	Override cancel
Y299	OVSL	Manual override on
Y29A	AFL	Miscellaneous function lock
Y29B		
Y29C		
Y29D		
Y29E		
Y29F	QEMG	PLC emergency stop
Device	Abbreviation	Signal name
Y2A8	ROV1	Rapid traverse override
Y2A9	ROV2	
Y2AA		
Y2AB		
Y2AC		
Y2AD		
Y2AE		
Y2AF	ROVS	Override value setting system
Device	Abbreviation	Signal name
Y2B8	PCF1	Feedrate unit
Y2B9	PCF2	
Y2BA		Manual feedrate
Y2BB		Manual desired feedrate
Y2BC		
Y2BD		
Y2BE		
Y2BF		

Note 1: The signals marked * (under column Abbreviation) are handled at B contact circuits.

Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Y2C0	MP1	Handle feed/incremental feed maginfication power	Y2C8	TAL1	Tool error signal 1 (M)
Y2C1	MP2		Y2C9	TAL2	Tool error signal 2 (M)
Y2C2	MP4		Y2CA	TCEF	Data count validity signal (L, M)
Y2C3			Y2CB	TLFI	Tool life management input (M)
Y2C4			Y2CC		
Y2C5			Y2CD		
Y2C6			Y2CE		
Y2C7	MPS	Desired magnification power setting	Y2CF		
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Y2D0	SRN	Forward rotation	Y2D8		
Y2D1	SRI	Reverse rotation	Y2D9		
Y2D2	TL1	Torque limits L	Y2DA		
Y2D3	TL2	Torque limits H	Y2DB		
Y2D4	WRN	Forward indexing	Y2DC		
Y2D5	WRI	Reverse indexing	Y2DD		
Y2D6	ORC	Orient command	Y2DE		
Y2D7			Y2DF		
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Y2E0	*PCD1	PLC axis near point detection axis 1	Y2E8		
Y2E1	*PCD2	PLC axis near point detection axis 2	Y2E9		
Y2E2	*PCD3	PLC axis near point detection axis 3	Y2EA		
Y2E3	*PCD4	PLC axis near point detection axis 4	Y2EB		
Y2E4			Y2EC		
Y2E5			Y2ED		
Y2E6			Y2EE		
Y2E7			Y2EF		
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Y2F0			Y2F8		—
Y2F1			Y2F9		
Y2F2			Y2FA		
Y2F3			Y2FB		

Y2F4			Y2FC		
Y2F5			Y2FD		
Y2F6			Y2FE		—
Y2F7			Y2FF		—

Note 1: Y2D0 - Y2D7 are dedicated interface to MITSUBISHI spindle controller (FR-SF).

Device	Abbreviation	Signal name
R0		Analog input AI 1
R1		Analog input AI 2
R2		Analog input AI 3
R3		Analog input AI 4
R4		Analog input AI 5
R5		Analog input AI 6
R6		
R7		

Device	Abbreviation	Signal name
R8		Spindle command rotation speed input
R9		
R10		Spindle command end data
R11		
R12		
R13		
R14		
R15		

Device	Abbreviation	Signal name
R16		KEY IN 1
R17		FULL KEY IN (spare)
R18		Effective rotation speed of spindle
R19		
R20		M code Data 1
R21		
R22		M code Data 2
R23		

Device	Abbreviation	Signal name
R24		M code Data 3
R25		
R26		M code Data 4
R27		
R28		M code Data 1
R29		
R30		—
R31		

Device	Abbreviation	Signal name
R32		—
R33		
R34		—
R35		
R36		T code Data 1
R37		
R38		T code Data 2
R39		

Device	Abbreviation	Signal name
R40		
R41		
R42		
R43		
R44		Secondary miscellaneous function Data 1
R45		
R46		Secondary miscellaneous function Data 2
R47		

Device	Abbreviation	Signal name
R48		Secondary miscellaneous function Data 3
R49		
R50		Secondary miscellaneous function Data 4
R51		
R52		
R53		
R54		
R55		

Device	Abbreviation	Signal name
R56		
R57		
R58		
R59		
R60		
R61		
R62		
R63		

Note 1: [ ] : One word of 16 bits.

Device	Abbreviation	Signal name
R64		CRT screen control information
R65		
R66		
R67		
R68		PLC main scan time
R69		Emergency stop source
R70		DIO card information
R71		

Device	Abbreviation	Signal name
R72		User macro output #1032
R73		
R74		User macro output #1033
R75		
R76		User macro output #1034
R77		
R78		User macro output #1035
R79		

Device	Abbreviation	Signal name
R80		Expansion board input signal 1
R81		Expansion board input signal 2
R82		Expansion board input signal 3
R83		Expansion board input signal 4
R84		
R85		
R86		
R87		

Device	Abbreviation	Signal name
R88		
R89		
R90		
R91		
R92		
R93		
R94		
R95		

Device	Abbreviation	Signal name
R96		CNC software version code
R97		
R98		
R99		

Device	Abbreviation	Signal name

Device	Abbreviation	Signal name

Note 1: [ ] : One word of 16 bits.

Data from V. L. C. to Control

Device	Abbreviation	Signal name
R100		Analog output AO 1
R101		Analog output AO 2
R102		
R103		
R104		
R105		
R106		
R107		

Device	Abbreviation	Signal name
R116		7-segment display control
R117		
R118		
R119		
R120		
R121		
R122		
R123		

Device	Abbreviation	Signal name
R132		First cutting override
R133		Second cutting override
R134		Rapid traverse override
R135		—
R136		Manual feedrate
R137		
R138		—
R139		—

Device	Abbreviation	Signal name
R148		S analog override
R149		—
R150		
R151		
R152		Load meter display interface 1
R153		
R154		Load meter display interface 2
R155		

Device	Abbreviation	Signal name
R108		Spindle command rotation speed output
R109		
R110		
R111		
R112		KEY OUT 1
R113		FULL KEY OUT (spare)
R114		KEY OUT (not open to the user)
R115		

Device	Abbreviation	Signal name
R124		7-segment display data
R125		
R126		
R127		
R128		
R129		
R130		
R131		

Device	Abbreviation	Signal name
R140		Handle feed/incremental feed magnification power
R141		
R142		Manual desired feed First axis move data
R143		
R144		Manual desired feed Second axis move data
R145		
R146		Manual desired feed Third axis move data
R147		

Device	Abbreviation	Signal name
R156		OT ignore
R157		Near point ignore
R158		Alarm interface 1
R159		Alarm interface 2
R160		Alarm interface 3
R161		Alarm interface 4
R162		Operator message interface
R163		Language change interface

Note 1: 7-segment display interface of R116 - R131 is special option.
Note 2: [ ]: One word of 16 bits

Device	Abbreviation	Signal name
R164		Interrupt control signal
R165		Interrupt axis stop request
R166		Machine position read 1, 2
R167		Machine position read 3, 4
R168		Machine position read 5, 6
R169		Machine position read 7, 8
R170		
R171		

Device	Abbreviation	Signal name
R180		Expansion board output singal 1
R181		Expansion board output singal 2
R182		Expansion board output singal 3
R183		Expansion board output singal 4
R184		Expansion board output singal 5 (scan type only)
R185		
R186		
R187		

Device	Abbreviation	Signal name
R196		User PLC version code
R197		
R198		
R199		

Device	Abbreviation	Signal name

Device	Abbreviation	Signal name
R172		User macro input #1132
R173		
R174		User macro input #1133
R175		
R176		User macro input #1134
R177		
R178		User macro input #1135
R179		

Device	Abbreviation	Signal name
R188		
R189		
R190		
R191		
R192		
R193		
R194		
R195		

Device	Abbreviation	Signal name

Device	Abbreviation	Signal name

Note 1: [ ] : One word of 16 bits

BIT SELECTION PARAMETERS

7	6	5	4	3	2	1	0

(49)

BIT 0 0 = TIMER SETUP VALUE SCREEN VALID
1 = TIMER PROGRAMMED VALUES VALID

BIT 1 0 = COUNTER SETUP VALUE SCREEN VALID
1 = COUNTER PROGRAMMED VALUES VALID

IF BITS 0 AND 1 ARE SET TO ZERO (0), THE VALUES SET IN THE PLC COUNTER AND TIMER SCREENS ARE IN EFFECT

IF BITS O AND 1 ARE SET TO ONE, THEN THE K OR H VALUES IN THE PLC PROGRAM ARE IN EFFECT

BIT 2 0 = TIMERS T96 TO T103 THE RETENTIION TIMERS LOSE THEIR VALUES IF THE POWER IS TURNED OFF

1 = THE RETAIN THEIR COUNT WHEN THE POWER IS TURNED OFF

BIT 3 0 = COUNTER C0 TO C23 LOSE THEIR COUNT IF THE POWER IS TURNED OFF

1 = COUNTERS 0 TO 23 KEEP THEIR COUNT WHEN THE POWER IS RTURNED OFF

BIT 5 0 = DIO 5 AND 24 VOLT POWER FAIL MONITOR ON

1 = DIO DIO POWER FAIL MONITOR OFF

BIT 6 0 = CRT SETTING & DISPLAY UNIT THERMAL ALARM DETECTION OFF

1 = CRT THERMAL ALARM DETECTION ON

BIT 7 0 = CONTROL THERMAL ALARM DETECTION OFF

1 = CONTROL THERMAL ALARM DETECTION ON

(50) BIT 0 0 = PLC ALARM MESSAGE OFF

1 = PLC ALARM MESSAGE ON

BIT 2 0 = PLC OPERATOR MESSAGE OFF

1 = PLC OPERATOR MESSAGE ON

BIT 4 0 = MESSAGE ALL SCREEN DISPLAY OFF

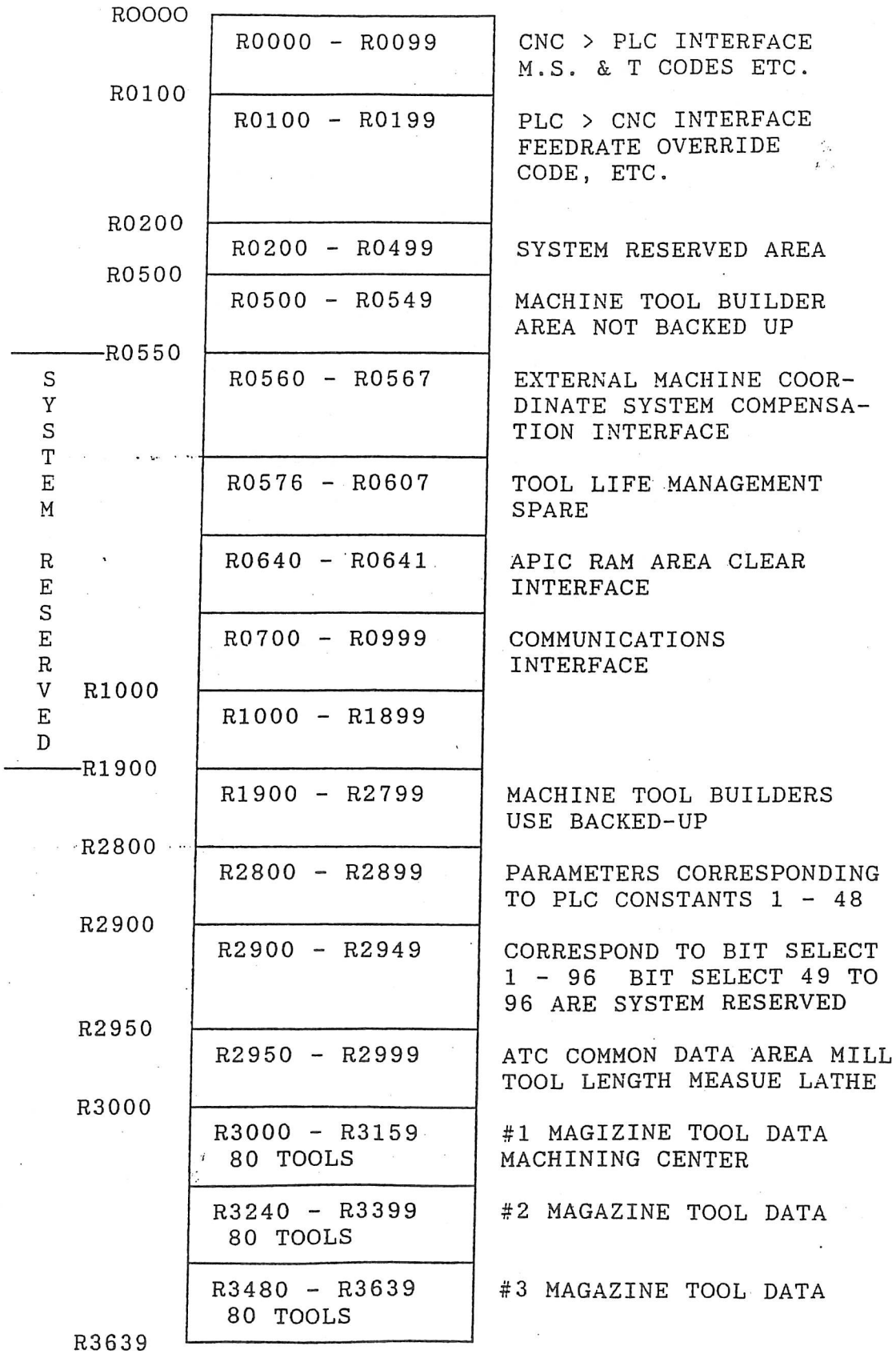
1 = MESSAGE ALL SCREEN DISPLAY ON

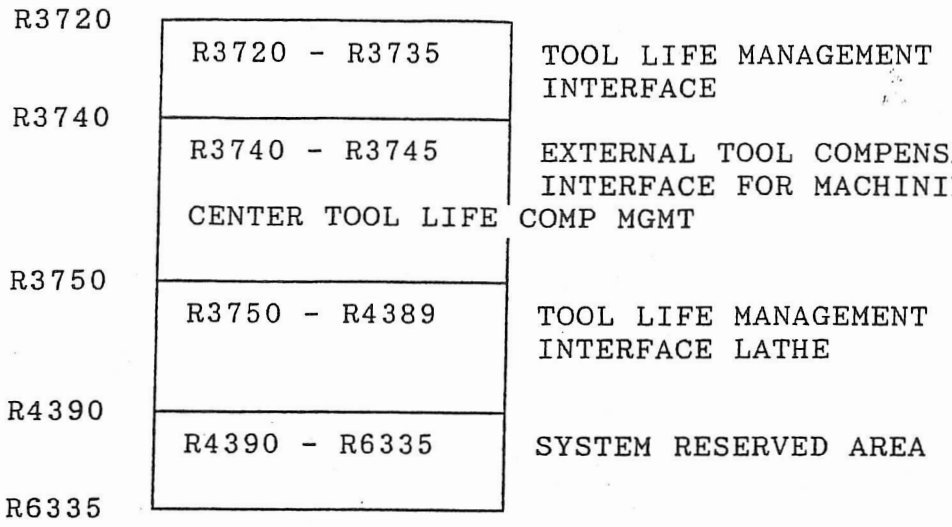
IF BIT 4 IS A ZERO, ALARMS AND OPERATOR MESSAGES ARE ONLY DISPLAYED ON THE ALARM PAGE.

IF BIT 4 IS ONE, THE FIRST 18 CHARTACTERS ARE DISPLAYED ON THE BOTTOM OF ALL APPLICABLE SCREENS. BIT 5 DETERMINES IF ALARM OR OPERATOR MESSAGES ARE DISPLAYED ON THE BOTTOM OF THE SCREENS

BIT 5 0 = WHEN BIT 4 IS A 1 ALARM MESSAGES ARE DISPLAYED ON ALL SCREENS.

1 = WHEN BIT 4 IS A 0 OPERATOR MESSAGES ARE DISPLAYED

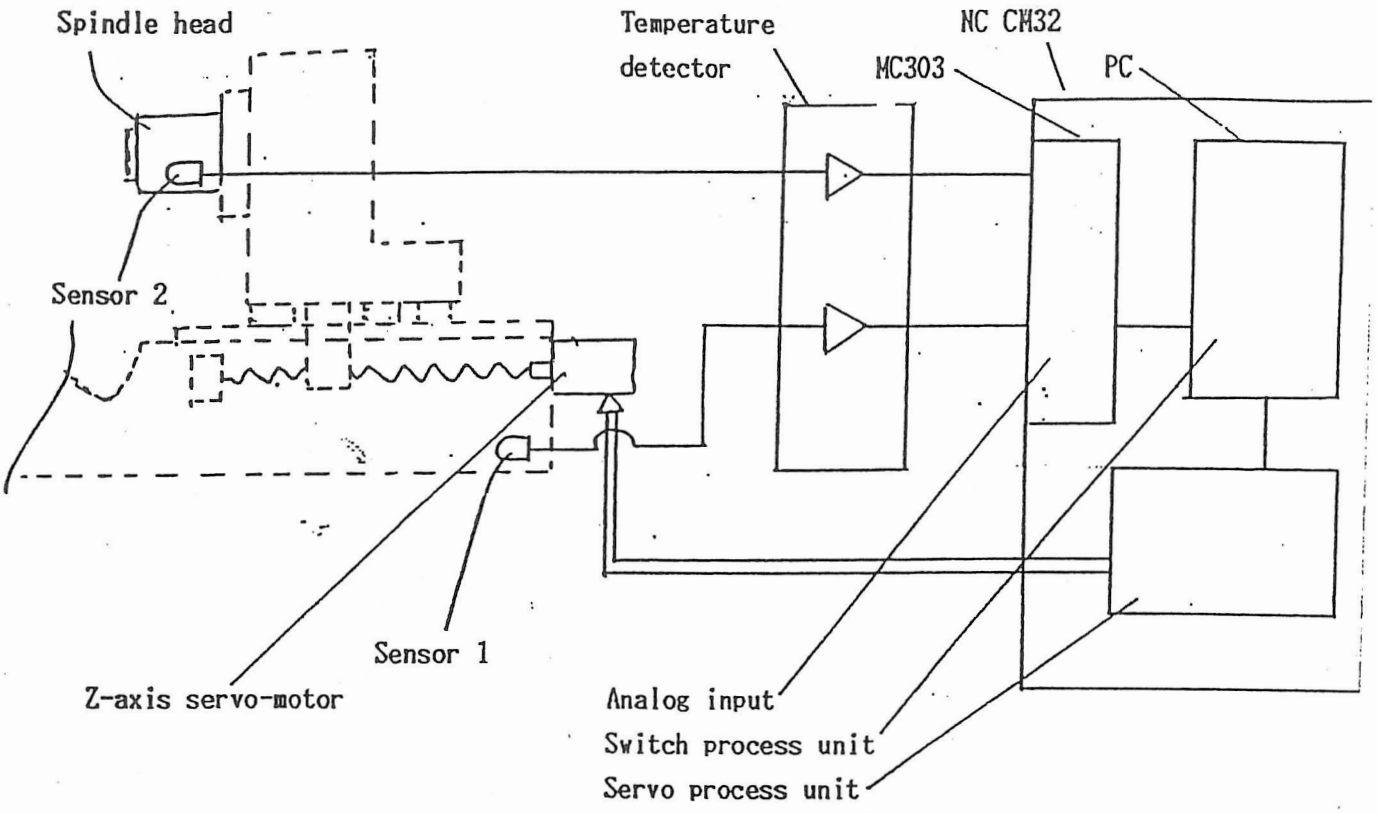

R0000
R0000 - R0099
CNC > PLC INTERFACE M.S. & T CODES ETC.
R0100
R0100 - R0199
PLC > CNC INTERFACE FEEDRATE OVERRIDE CODE, ETC.
R0200
R0200 - R0499
SYSTEM RESERVED AREA
R0500
R0500 - R0549
MACHINE TOOL BUILDER AREA NOT BACKED UP
R0550
SYSTEM RESERVED
R0560 - R0567
EXTERNAL MACHINE COORDINATE SYSTEM COMPENSATION INTERFACE
R0576 - R0607
TOOL LIFE MANAGEMENT SPARE
R0640 - R0641
APIC RAM AREA CLEAR INTERFACE
R0700 - R0999
COMMUNICATIONS INTERFACE
R1000
R1000 - R1899
R1900
R1900 - R2799
MACHINE TOOL BUILDERS USE BACKED-UP
R2800
R2800 - R2899
PARAMETERS CORRESPONDING TO PLC CONSTANTS 1 - 48
R2900
R2900 - R2949
CORRESPOND TO BIT SELECT 1 - 96 BIT SELECT 49 TO 96 ARE SYSTEM RESERVED
R2950
R2950 - R2999
ATC COMMON DATA AREA MILL TOOL LENGTH MEASUE LATHE
R3000
R3000 - R3159 80 TOOLS
#1 MAGIZINE TOOL DATA MACHINING CENTER
R3240 - R3399 80 TOOLS
#2 MAGAZINE TOOL DATA
R3480 - R3639 80 TOOLS
#3 MAGAZINE TOOL DATA
R3639



R20 M-CODE REGISTER
R36 T CODE

THERMAL DISPLACEMENT CORRECTION SYSTEM FOR H-400N M32

1. Structure



Sensor 1 (Room temperature)	
Sensor 2 (Spindle temperature)	: Thermister resistor
Temperature detector	: Resistence(Ω)- Voltage (V) transducer
NC analog input	: MC303 A D transducing function
Servo process unit	: Machine coordinates correction function(M32)

2. Specifications

1) Correction effective conditions

Auto-operation mode (Memory, Tape, HDLC)

Bit 4 of NC optional parameter 030 is "1".
(Optional software "8 EXTERNAL DI/DO" is necessary.)
Bit B of PLC parameter R2300 is "1".
Bit 0 of PLC parameter R2303 is "1".
(Selection of PLC open display)

2) Amount and time of correction

	Correction unit	Time
After a tool change	10 μm	50msec
Except above	0.5 μ	10sec

Make correction of about 1 μm per 1°C difference.

3) Correction hold function

Correction is not practiced until the next tool is changed if M code M155 is commanded.

4) PLC common parameter

No.	Contents	Unit	Standard
R2300-B	Parameter to select on(valid) or off(invalid) thermal displacement function 0: Off(invalid) 1: On(valid)	bit	1 is set.
R2300-C	Parameter to select to write or not a datum into a common variable. 0: Not write 1: Write	bit	0 is set.

R2300-C is a parameter for printing. To use this customers need to make a user macro program.
For a commom variable, use the following 4 numbers:

#526 : Temperature
#527 : Spindle temperature
#528 : Command correction amount (Present)
#529 : NC correction amount (NC status)

R2303-0	0 : Valid 1 : Invalid	bit	1 is set.
R2314	Parameter for overheat detection counter (Present sampling) - (Previous sampling) ≧ 20 + R2314 ↑ ↑ 50ms	0.1°C	0 is set.

When the above conditional formula is formed, proceed the following overheat process:

1. R2330 : Change the following bit data from "0" to "1" to transfer the status output from Common to Ladder.

   Bit 0 : Overheat
   Bit 1 : Detected temperature range error
   Bit 2 : Parameter error

   R 2317 : Other than 1 to 10
   R 2318 : Other than -20 to 50
   R 2319 : Other than 0 to 5

   Bit 3 : Error of a sensor or an amplifier or cable disconnection

2. Alarm display (Thermal displacement correction error)

3. Feed hold & spindle stop

※ When the difference of temperature between the room and the spindle becomes more than 15°C, proceed overheat process. (Correction is possible if the difference is less than 15°C.)

R2315	The interval for correction during machining A correction interval = 200 + R2315	Scan	0 is set.

(1 scan = 50ms) → Approx. 10 sec.
The correction amount is set by R2317.

R 2316	An interval for correction after a tool change A correction interval = 1 + R2316 = Approx. 50ms	Scan	0 is set.

The correction amount is set by R2318.

R2317	Amount of one correction during machining	0.5μm	1 is set.
R2318	Amount of one correction after a tool change	0.5μm	20 is set.

※ The correction amount is set small and the interval is set long so that the influence to a cutting face becomes least in machining. After a tool is changed, the correction amount is set large and the interval is set short so that the correction is made quicker for the next tool.

R2319	Threshhold and temperature for correction Temperature difference for correction = 2 + R2319 = 0.2°C	0.1°C	0 is set.

※ The temperature difference between the room and the spindle needed for a usual correction

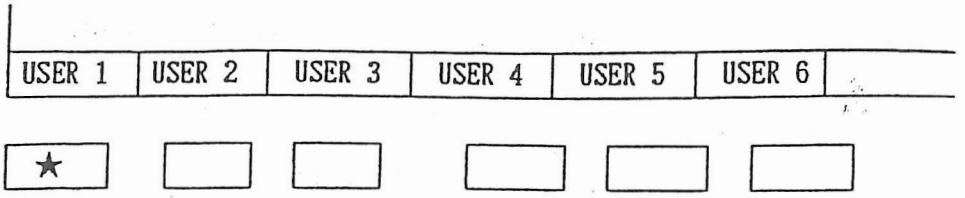
3. Open display to PLC (Thermal displacement correction status is shown.)

The method to select the display is as follows :

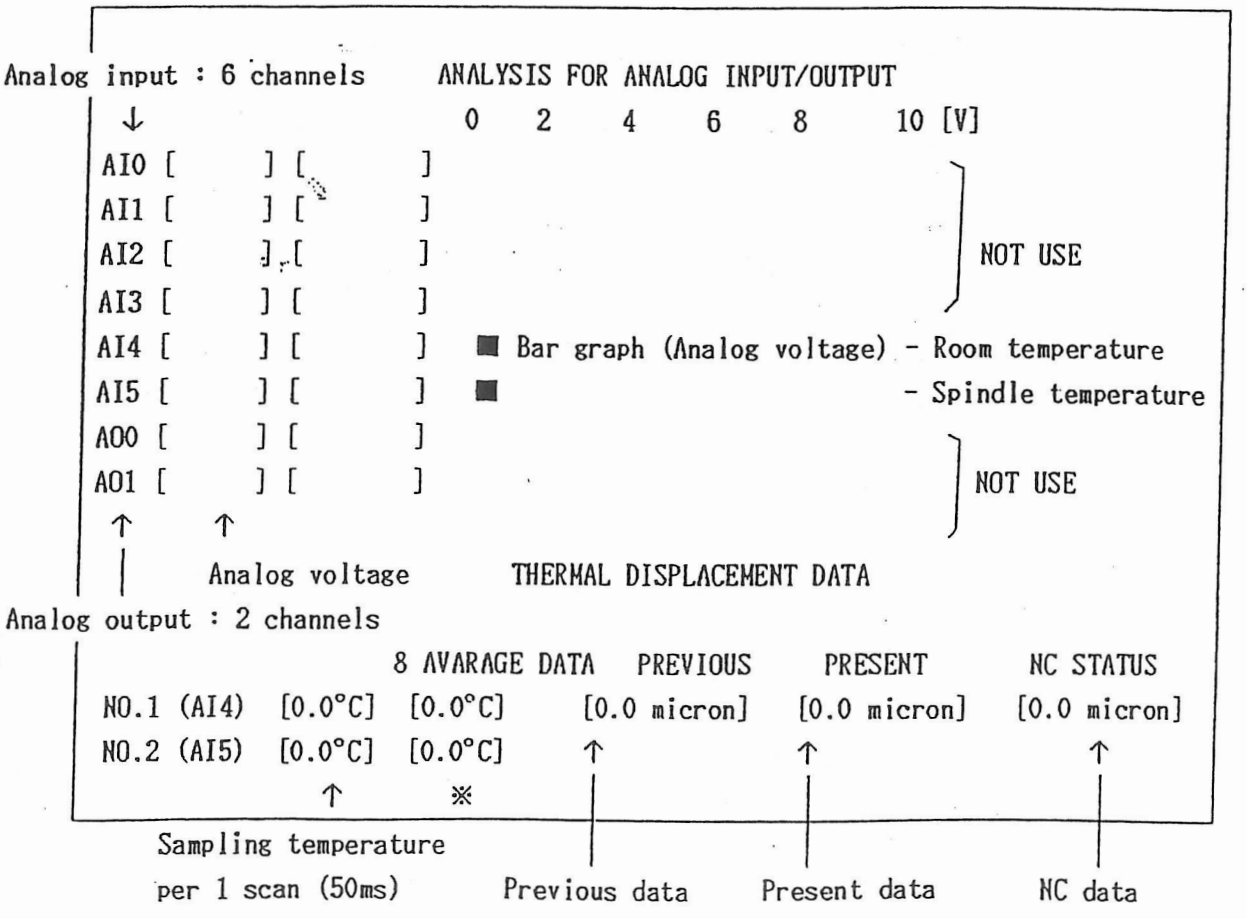
1. Press the key [MNT] .
2. Press the menu key [PLC] .

VIRSION	PLC	SERVO	SPINDLE	PLC I/F	LAD
	★				

. Press the key [USR 1] in the menu.



4. The following screen is displayed.

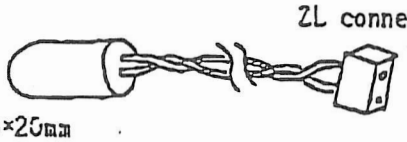


※ This is an avarage of 8 data out of 10, the maximum and the minimum are excluded, taken from the sample.

Sensor and amplifier for spindle thermal displacement compensation

※Thermister type sensor

Appearance



φ8×20mm

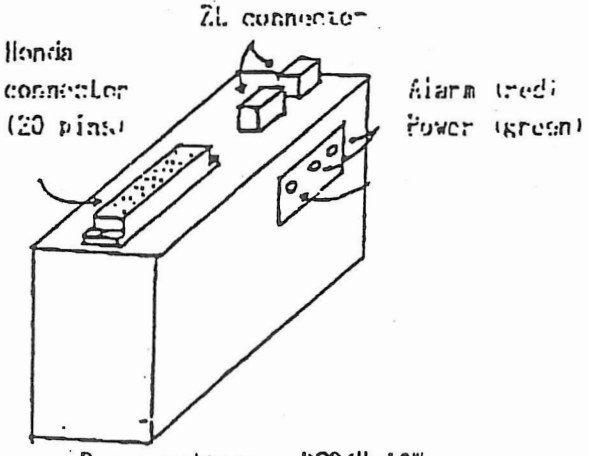
・Temperature range 0°C-250°C
・Resistance 17.6Ω±2.5%(50°C)

Comparison between voltage and temperature

Temp.(℃)	Resistance(Ω)	Voltage(V)
0	162.2	1.000001
5	125.8	1.267680
10	98.32	1.590844
15	77.45	1.974667
20	61.47	2.423792
25	49.12	2.942163
30	39.52	3.530082
35	32.00	4.186285
40	26.06	4.907693
45	21.36	5.683306
50	17.60	6.506512
55	14.58	7.363677
60	12.14	8.241260
65	10.16	9.123963
70	8.541	10.000000

※Amplifier

Appearance



Voltage vs temperature

Temp(°C)	Voltage (V)
0	0.994647-1.005354
10	1.584380-1.598520
20	2.414309-2.434159
30	3.518323-3.543206
40	4.893264-4.923205
50	6.490047-6.523055
60	8.223708-8.258913
70	9.982479-10.01752

・Power voltage DC24V±10%
・Output range 1V-10V
・Range of temperature measurement 0°-70°C
・Accuracy ±0.1°C

※ Honda connector