⊙ yuasa

PROCDEX

CPDX-6,8,10

OPERATION MANUAL

020829

I N D E X

INTRODUCTION

Thank you very much for choosing our CPDX Programmable Indexer. This Indexer has been newly designed and manufuctured precision indexer not only for time and cost saving purpose but also being designed considering maintenance, safety and durability.
However, you are requested to fully understand its operation method and necessary maintenance to get required accuracy and avoid accidents.
We hope you enjoy its excellent features and applications.

SPECIAL CAUTIONS

To operate this unit by following procedures described in following pages, however, you are requested to pay special attention to followings.

① POWER SOURCE FOR CONTROLLER : AC120V±10%, SINGLE-PHASE 3.5AMPS.

② Never apply voltage to the wires, No. ④ & ⑤ (Remote Start) and No. ③ & No. ③A (Emergency stop) of remote cables.

   OTHERWISE, IT MAY DESTROY CPU BOARD AND POWER SUPPLY BOARD.

③ Never use fingernails or pointed materials to press Controller Key Board to avoid Key troubles.

④ Place the controller where air can freely circulate and the place free from chips and dusts.

⑤ Always use FRL (Air filter, Regulator, Lublicator) to supply clean air to the air clamp unit.
   Otherwise, it may cause malfunctions on the indexer, such as insufficient piston rods return, failures of clamp/unclamp check cylinder or the solenoid valve for unclamp getting water into the inside of the indexer.

⑥ Time to time, check the motor cables for any damage, and if any damage is found, repair it with tape, etc immediately, and call your dealer to get a new cable to replace.
   Coolant entering into inside of the motor fin will cause encoder failure or wire damages. Therefore, check the bolts, nuts of the motor cable connector and the motor fin periodically.
   Never use this unit with loose bolts and nuts.

⑦ Avoid having tools or workpieces crash into the indexer.

⑧ When mounting jig and fixtures, etc on the indexer removing the standard scroll chuck, never use unnecessary long set bolts.
   Otherwise, it will cause machine vibration during rotation or oil leakage.

⑨ As the Z-Phase of the motor will be set as CPDX's Machine Zero, tolerances may be found by the wormgear backlash according to the origin return direction. The same can be said about Work Zero.
   So that, origin returns both to Machine Zero and Work Zero should be executed from the directions in which the backlashes are not found to the dividing angle.

NEGLECTING ABOVE CAUTIONS WILL VOID OUR WARRANTY POLICY.

TABLE O.D.		177 (6.97″)	220 (8.66″)	282 (11.10″)	
TABLE BORE		45 (1.77″)	63.5 (2.50″)	90 (3.54″)	
CHUCK	O.D.	167 (6.57″)	210 (8.27″)	274 (10.79″)	
	I.D.	44 (1.73″)	63 (2.48″)	90 (3.54″)	
	INNER JAW	4~42 (0.16~1.65″)	4~62 (0.16~2.44″)	4~88 (0.16~3.46″)	
	OUTER JAW	10~156 (0.39~6.14″)	10~180 (0.39~7.09″)	12~230 (0.47~9.06″)	
CENTER HEIGHT		130 (5.12″)	150 (5.91″)	190 (7.48″)	
PLACING DIRECTION		HORIZONTAL / VERTICAL			
GUIDE BLOCK WIDTH		18 h7 (0.709″)			
SPINDLE BRAKE TORQUE Kg.m (lbs/foot) *at 6Kg/cm² (85 PSI)		15 (110)	22 (160)	32 (232)	
BRAKE SYSTEM		PNEUMATIC : 5~7 Kg/cm² (70~100 PSI)			
PARALLELISM OVER TURRET FACE TO BASE		0.02 (0.0008″)			
TURRET AXIAL CONCENTRICITY		0.015 (0.0006″)			
CENTER BOSS CONCENTRITY		0.02 (0.0008″)			
BOTTOM TO SIDE BASE SQUARENESS		0.01 per 100 (0.0004″ per 4″)			
CHUCK CENTER CONCENTRICITY		0.03(adjustable to 0.013)0.0012″ (adujustable to 0.0005″)			
MAX.WORK LOAD	HORIZONTAL	80kg(180lbs)	120kg (265 lbs)	180kg (400 lbs)	
	VERTICAL	40 (90)	60 (133)	90 (200)	
MAX.THRUST	VERTICAL LOAD	500 (1100)	600 (1320)	700 (1540)	
LOAD AGAINST	HORIZONTAL LOAD	220 (485)	300 (660)	350 (770)	
CHUCK SURFACE	CIRCUMFERENTIAL	150 (330)	180 (400)	200 (440)	
LUBRICATION		OIL-BATH			
TOTAL GEAR REDUCTION RATIO		1 : 90			
INDEXING ACCURACY		within ±30″			
REPEATABILITY		within 10″			
BACKLASH		within 60″			
FEED RATE (rpm)		0.05 ~ 2 10 (5), 0.025 ~ 1 10 (5), 0.0125 ~ 0.5 10 (5)			
MOTOR		CLOSED-LOOP DC DRIVE			
WEIGHT	W / CHUCK	46Kg(101 lbs)	64.5Kg(142 lbs)	111.5Kg(246 lbs)	
	W / SUBTABLE	44Kg(97 lbs)	61.0Kg(134 lbs)	102.5Kg(226 lbs)	

DIMENSION
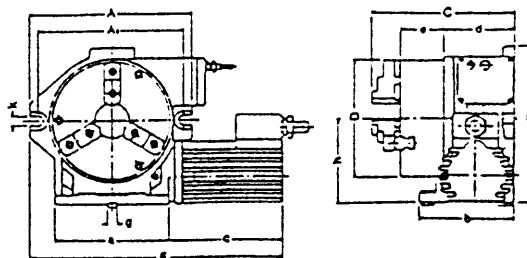
MODEL No.	A	A1	B	C	D	E	a	b	c	d	e	k	g	h (mm / inch)
CPDX- 6	250	220	240	225	167	421	184	155	204	114	66	18	18	130
	9.84	8.66	9.45	8.86	6.57	16.57	7.24	6.10	8.03	4.49	2.60	0.71	0.71	5.12
CPDX- 8	290	260	280	242	210	451	204	165	204	120	75	18	18	150
	11.42	10.24	11.02	9.53	8.27	17.76	8.03	6.50	8.03	4.72	2.95	0.71	0.71	5.91
CPDX-10	380	340	350	282	274	533	260	185	213	137	91	20	18	190
	14.96	13.39	13.78	11.10	10.79	20.98	10.24	7.28	8.39	5.39	3.58	0.79	0.71	7.48

CONTROLLER	CPNC-500
POWER	AC-120V 50/60HZ 3.5A SINGLE-PHASE
TEMPERATURE	OPERATING : 0℃ ~ 40℃ (32°F ~ 104°F)
	STORAGE : -20℃ ~ 60℃ (-4°F ~ 140°F)
HUMIDITY	Less than 75%
CONTROL AXIS	1 Axis
CONTROL SYSTEM	CLOSED LOOP SYSTEM
COMMAND SYSTEM	INCREMENTAL
DISPLAY	UNIVERSAL IN SEGMENTS
RESOLUTION	1'
MAX SETTING ANGLE	540°
MAX DIVISION	999
PROGRAM CAPACITY	99 steps × 17 programs
FEED RATE	0.05rpm ~ 2rpm、 (5rpm) 10rpm
	0.025rpm ~ 1rpm、 (5rpm) 10rpm
	0.0125rpm ~ 0.5rpm、 (5rpm) 10rpm
ROTATION DIRECTION	CW , CCW
ORIGIN RETURN	MACHINE-ZERO , WORK-ZERO
JOG FEED	RAPID (1rpm) , low (0.1rpm) , STEP FEED (1° ,0.008°)
EMERGENCY STOP	STOP WHOLE SYSTEM
JUMP FUNCTION	JUMP TO SUB-PROGRAM , ETC.
LOOP COUNT	A STEP CAN BE REPEATED 2 ~ 999 TIMES
KEY LOCK FUNCTION	DISABLES FRONT PANEL OPERATION (by Parameter)
DRY (TEST) RUN	ALL STEPS CAN BE EXECUTED AUTOMATICALLY (by Parameter)
PROGRAM PROTECTION	PROHIBITS PROGRAM CHANGE (by Parameter)
SOFT LIMIT	+ DIRECTION(0° ~ + 179°) (by Parameter)
	- DIRECTION(0° ~ - 179°)
SELF DIAGNOSIS	CHECK CONTROLLER'S CONDITION
EXTERNAL SINGNAL IMPUT	START , EMERGENCY STOP
EXTERNAL SIGNAL OUTPUT	STEP FINISH (1 , 1A) , (2 , 2A)
MOTOR	CLOSED-LOOP DC DRIVE
DIMENSIONS	303 × 330 × 163mm (11.9×13.0×6.4")
WEIGHT	7kg (15.43 LBS)

CONTROLLER DIMENSION

unit: mm (inch)
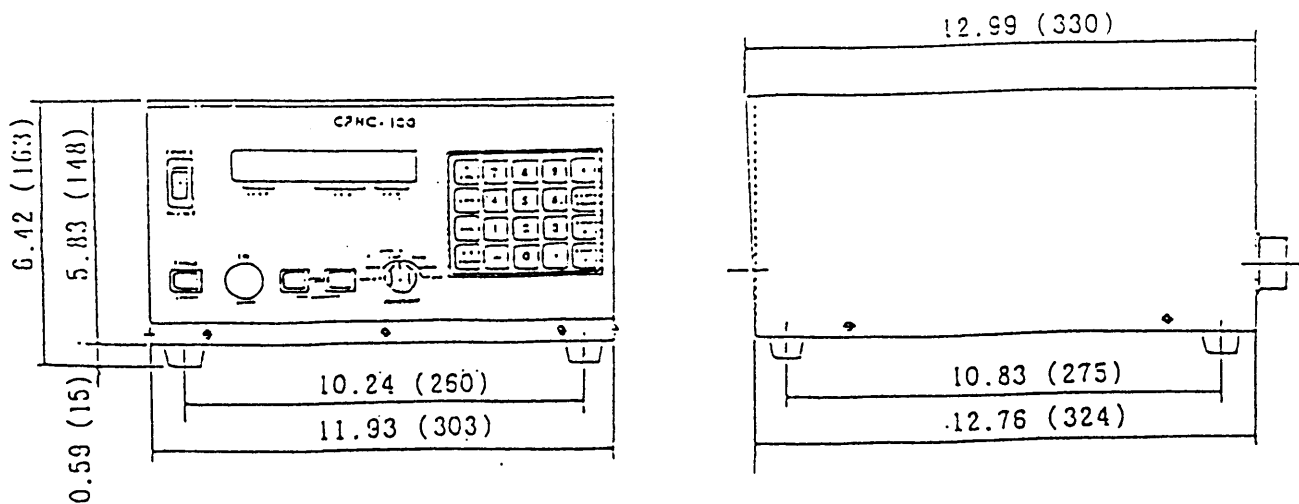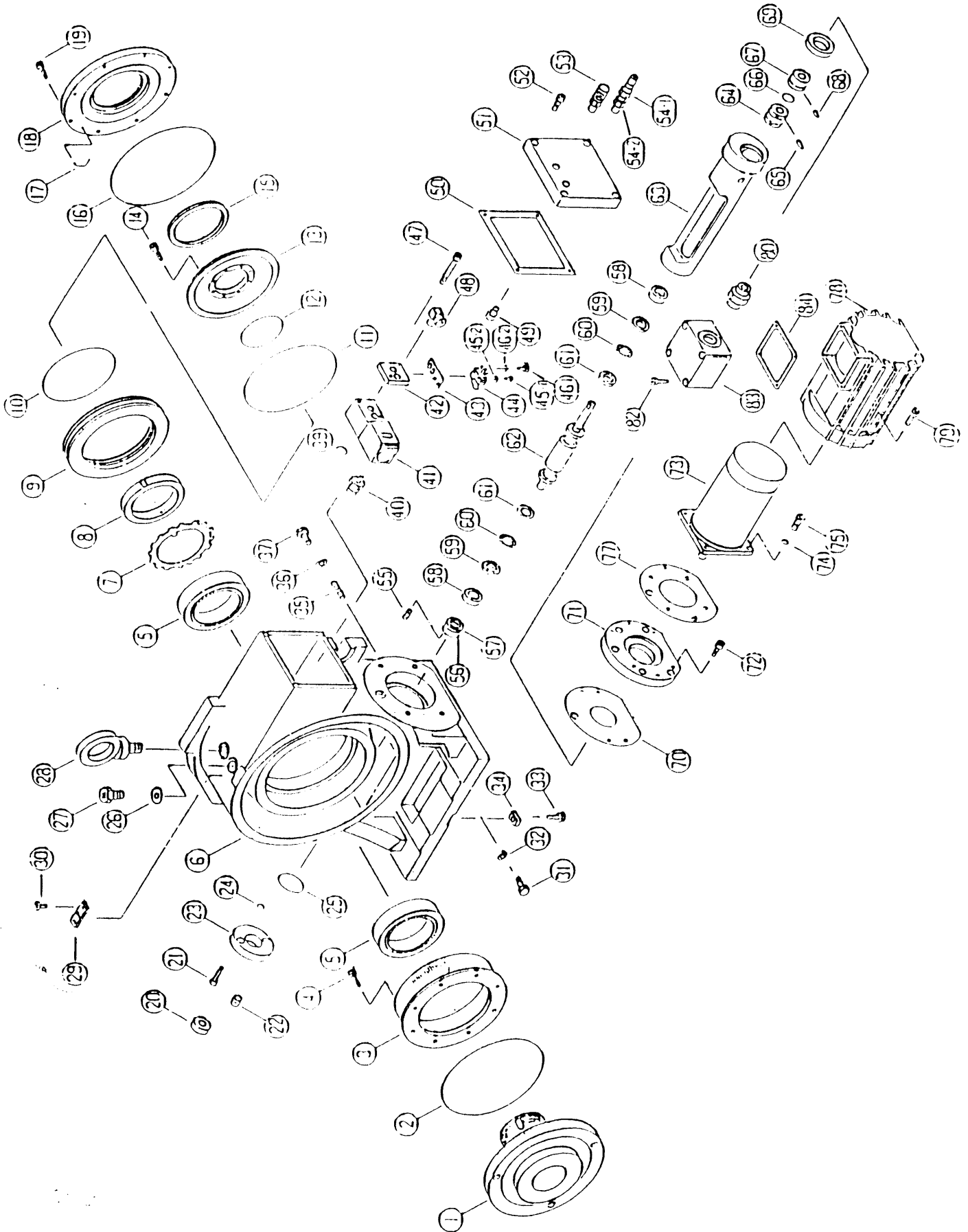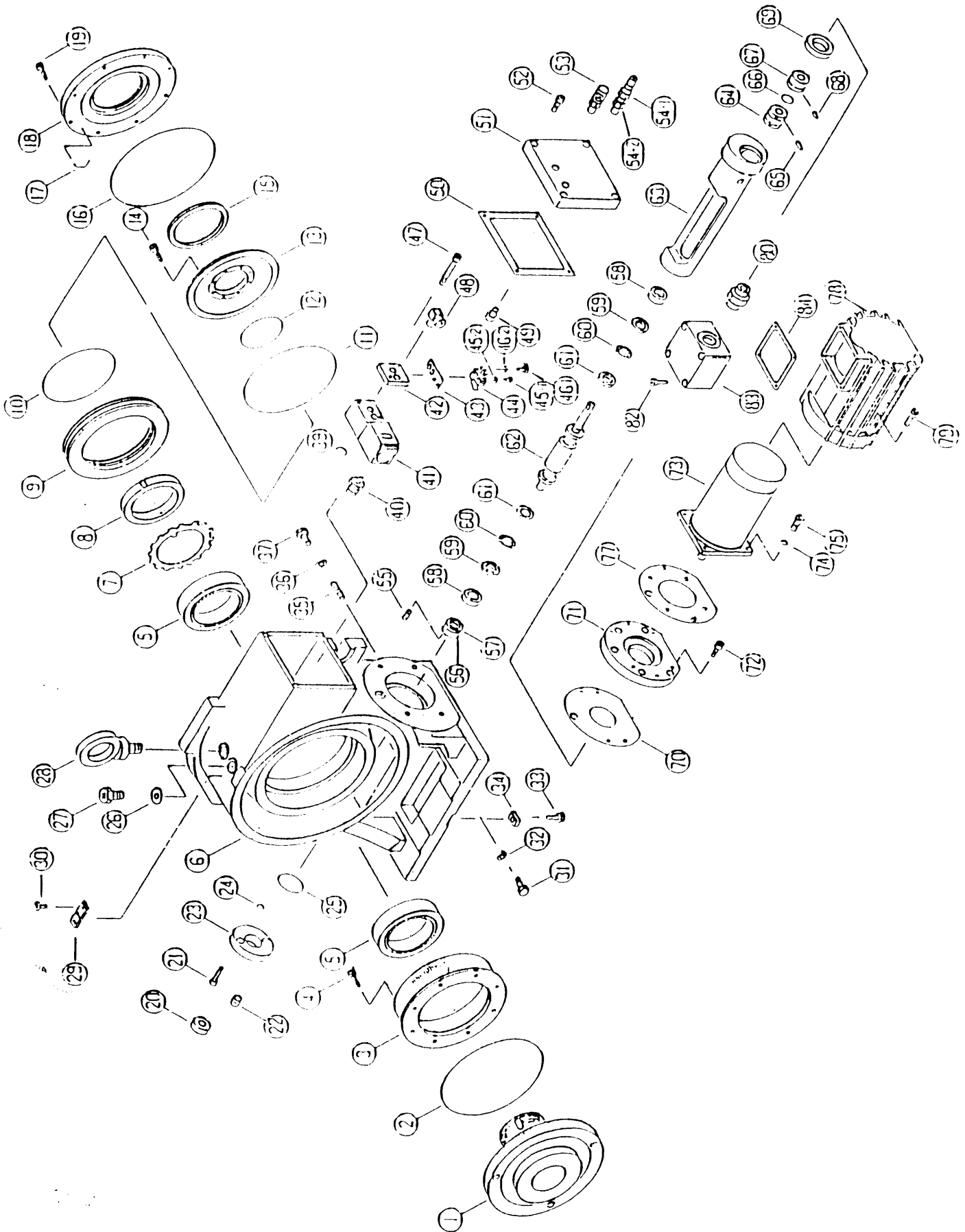
PARTS LIST

PART No.	PART NAME	Q'ty	SIZE		
			CPDX-6	CPDX-8	CPDX-10
1	Turret	1			
2	V Ring	1			
3	Worm wheel	1			
4	Hex. soket Bolt	8	M6×15	M6×18	M6×22
5	Roller bearing	2	32913	32917	32924
6	Body	1			
7	Lock washer	1	AW-13	AW-17	AW-24
8	Lock nut	1	AN-13	AN-17	AN-24
9	piston	1			
10	O Ring	1	G-105	G-135	G-185
11	O Ring	1	P-145	G-175	G-230
12	O Ring	1	AS568-036	S80	S112
13	Brake disk	1			
14	Hex. soket Bolt	8	M5×15	→	M6×15
15	Oil seal	1	KD75906	KD951106	KD1351507
16	O Ring	1	AS568-164	AS568-169	AS568-177
17	Piston return spring	4			
18	Thrust Plate	1			
19	Hex. Soket Bolt	2	M5×15	M5×15	M6×18
20	Oil gauge	1	VA-01	→	→
21	Hex. soket Bolt	2	M6×20	M6×20	M6×20
22	Hex. taper plug	1	PT1/8	→	→
23	Metal thrust Plate	1			
24	O Ring	2	P-7	→	→
25	O Ring	1	S 53	S 53	S 60
26	Seal washer	1	W8 S1	→	→
27	Hex. head bolt	1	M8×10	→	→
28	Eye bolt	1	M10	→	M12
29	Indicater	1			
30	Round machine screw	2	M3×4	→	M5×6
31	Hex. head bolt	1	M6×8	→	→
32	Seal washer	1	W6 S1	→	→
33	Hex. soket screw	2	M6×10	→	→
34	Guide block	2			
35	Hex. soket screw	2	M6×25	M6×25	M8×25
36	Seal washer	2	W6 S1	W6 S1	W8 S1
37	Hex. head bolt	2	M6×8	M6×8	M8×10
39	O Ring	3	S8	→	→
40	Cylinder	1	NSA6×5N-6		
41	solenoid air valve	1	O50E-11-DC24V		
42	Solenoid Plate	1			
43	Switch mounting board	1			

PART No.	PART NAME	Q'ty	SIZE CPDX-6	SIZE CPDX-8	SIZE CPDX-10
4 4	Micro Switch	1	SS-01L155		
4 5 - 1	Round small screw	2	M2.3 × 10	→	→
4 5 - 2	Flat Washer	2	M2.3	→	→
4 6 - 1	Hex. socket bolt	2	M3 × 5	→	→
4 6 - 2	Flat washer	2	M3	→	→
4 6	Flat washer	2			
4 7	Hex. socket screw	2	M3 × 35	→	→
4 8	Hose elbow	2	M5HLU-4	→	→
4 9	Quick Joint	3	TS4-01	→	→
5 0	Packing for cover A	1			
5 1	Cover A	1			
5 2	Hex. soket screw	4	M4 × 35	M4 × 15	M4 × 15
5 3	Muffler	1	KM-11	→	→
5 4 - 1	Volute with box nut	1	#03-1/4	→	→
5 4 - 2	Nipple	1	PT1/8-PF1/4		
5 5	Hex. soket screw	2	M4 × 12	→	→
5 6	Thrust screw B	1			
5 7	Thrust screw A	1			
5 8	Single ball bearing	2	6000	6000	6200
5 9	Outer ring	2	GS1226	GS1226	GS1730
6 0	Thrust needle bearing	2	NTB1226	NTB1226	NTB1730
6 1	Inner ring	2	WS1226	WS1226	WS1730
6 2	Worm shaft	1			
6 3	Worm metal	1			
6 4	Oldham coupling	1	MMZ-25(9.5 × 10-34)		
6 5	Techno hex. soket set screw	4	M5 × 6	→	→
6 6	O Ring	1	CO 0407A		
6 7	Seal collar	1			
6 8	Hex. soket set screw	2	M5 × 6	→	→
6 9	Oil seal	1	AD26387	→	→
7 0	Motor flange packing	1			
7 1	Motor flange	1			
7 2	Hex. soket screw	4	M6 × 15	→	→
7 3	MOTOR	1	CLOSED LOOP	→	→
7 4	Spring washer	4	M5	→	→
7 5	Hex. soket screw	4	M5 × 15	→	→
7 7	Cooling fin packing	1			
7 8	Motor cooling fin	1			
7 9	Hex. soket screw	2	M6 × 25	→	→
8 0	Connector	1			
8 2	Hex. soket bolt	4	M5 × 50	→	→
8 3	Motor cable set plate	1			
8 4	Cable set plate packing	1			

PREPARATIONS

1) UNPACKING

When you receive the unit, check all of followings are included.

a) INDEX HEAD WITH MOTOR & CABLE

b) CONTROL BOX (CPNC-500)

C) POWER CABLE   11.8 ft (3.6 m)

d) REMOTE CONTROL CABLE   16.4 ft (5 m)

e) OPERATION MANUAL

f) INSPECTION SHEET

2) Wipe off the rust proof oil with light oil.

Never use thinner (Or, the paint will come off.)

To move the unit, use eyebolts with wire ropes having good balance.

3) Check the machine table surface for cracks or burrs and clean the table where you are mounting the unit.

4) When using the head in Vertical position. set the guide block to the head and insert it to the machine table T-SLOT.

5) Set the head to the machine table securely using clamp bolts.

6) Air supply for air clamp unit.

The built-in air cylinder unit will clamp the spindle.

To use this function, connect air to the unit.

a) Air must be set to 5 ~ 7Kg/cm² (70 ~ 100 PSI).

b) The air solenoid valve will be off in Clamp condition and will be on in Unclamp condition.

c) Always use F.R.L (air filter, Regulator, Lubricator) unit when supplying air to the head, Oil for Lubricator : Turbine Oil Kind-1 (ISO VG32)

(Note) If you don't need air clamp function, air is not needed.

In this case, set the perameter (PA) 14 to be on (1).

7) Connecting Cords.

Connect the motor cable from the index head to the connector located on the controller back panel.

8) CONNECTING TO AN EXTERNAL MACHINE

When performing automatic operation interfacing the index head with an external machine, use the remote cable.
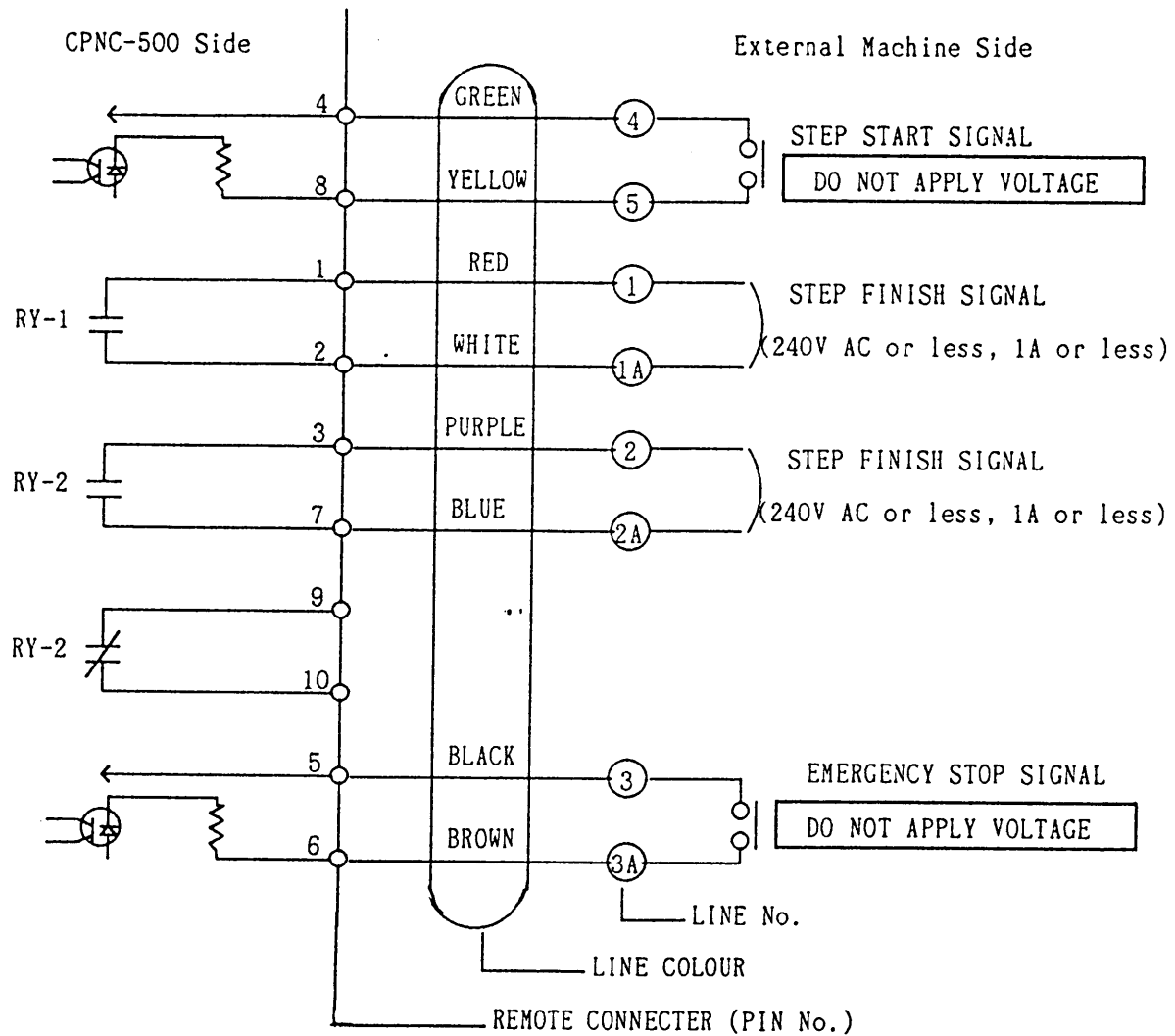
When line ④ and line ⑤ are on, the index head makes one step of indexing and will make the step finish relay (RY-1, RY-2) ON after finishing indexing, however, you can select which relay to be ON by setting of rc function.
(See P.21 for rc)

Some external machine will require you to set parameters, PA01 and PA02.
(See P.29 for PA01 and PA02)

CONNECTING TO NC MACHINE

Use an external FIN mode as an output mode of M signal of on NC machine.
In this case, set parameter PA01 = 1 , PA02 = 0 , PA12 = 0 and rc to 01.
Connect step start signal lines ④ and ⑤ to the normal open terminal of the relay for M function.
When the step finish signal line ① and ①A are connected to the M function FINISH line (M FIN), M function cancel signal and command to go to the next block are supplied.

CONNECTING TO GENERAL-PURPOSE MACHINE SUCH AS MILLING MACHINE AND DRILLING MACHINE WITH AUTOMATIC CYCLE FUNCTION

In this case, set parameter PA01 to OFF, PA02 to OFF, PA12 to OFF and rc to 1.
Set rc of the final process to 0 or 2.
(When parameter PA13 is ON and rc at the final process is set to 2 the buzzer
sounds for one second after completion of the final process.)

a) Step (index) start signal | Do not apply Voltage to line ④ and line ⑤ . |
    When using a relay that is turned on after completion of automatic cycle of an
    external machine and is turned off while the external machine is operating.

CPNC-500 Side   External Machine Side
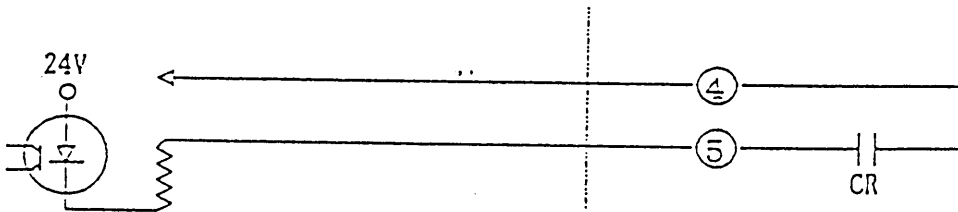
When outputting a position signal at which the table is returned after
completion of automatic cycle of an external machine by a limit switch.
(Turn off the limit switch by starting the table etc.)

CPNC-500 Side   External Machine Side
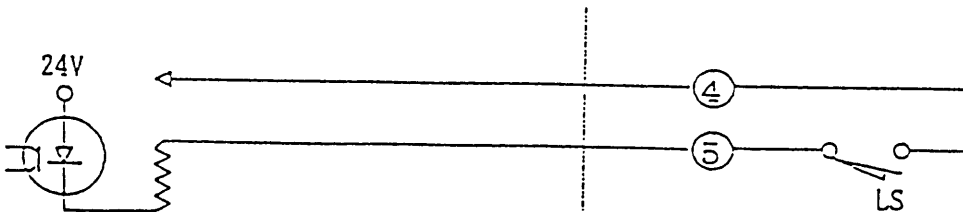
b) Step (index) finish signal (external machine start signal)
    The automatic input switch should have memory function by means of the relay.

CPNC-500 Side   External Machine Side
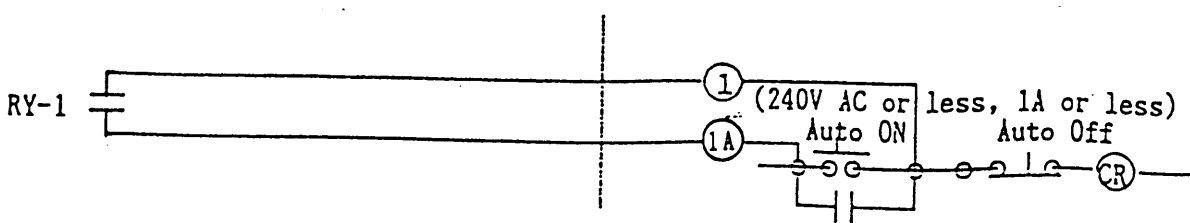
C NTROLLER PANEL
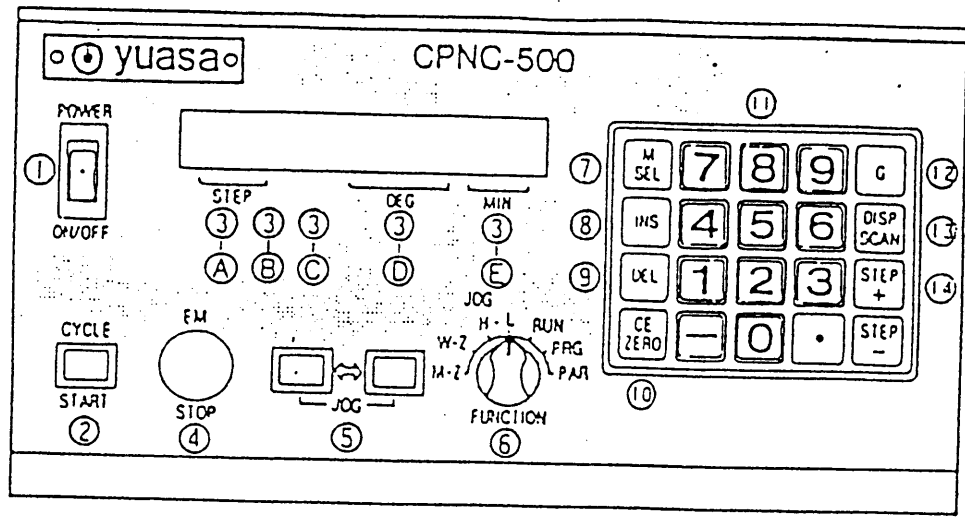
POWER SWITCH

START SWITCH

L .PLAY   ③-Ⓐ STEP No.

          ③-Ⓑ MOTOR Z-PHASE DISPLAY

          ③-Ⓒ FUNCTION DISPLAY

          ③-Ⓓ DEGREE DISPLAY

          ③-Ⓔ MINUTE DISPLAY

EMERGENCY STOP BUTTON

JOG (MANUAL) SWITCH

FUNCTION SWITCH

⑦ MEMORY SELECT KEY

⑧ INSERT KEY

⑨ DELETE KEY

⑩ CLEAR KEY/WORK - ZERO SET KEY

⑪ DATA ENTRY KEY

⑫ SPECIAL COMMAND CODE KEY

⑬ DISPLAY SCAN KEY

⑭ STEP (+),(-) KEYS

XPLANATIONS OF KEYS / SWITCHES

POWER SWITCH   ON / OFF

START SWITCH   CYCLE / START

Pushing this switch in RUN mode (set the Function Switch to Run position) will make one step motion.

Pushing this after setting the Function Switch to M-Z (W-Z) will make the head return to the Machine ZERO (Work Zero).

When the head returns to each ZERO, the head will take shorter direction to each ZERO.

DISPLAY

     ③-Ⓐ   STEP No.   01 ~ 99

③-⑧   MOTOR Z-PHASE DISPLAY (When the motor phase is at its Z-PHASE, this
                            will light.)

③-ⓒ   FUNCTION DISPLAY
③-ⓓ   DEGREE DISPLAY ⎤
③-ⓔ   MINUTE DISPLAY ⎦ ANGLE DISPLAY (in Sexagesimal System)

E.M
◎
STOP

4) EMERGENCY STOP SWITCH   STOP

When this switch is pushed while the head is rotating, the head will stop
immediately and the display shows " ERROR ".
Also " error " will be displayed while the head is stopping, and the head will
not accept next index start signal.

After the head is stopped, clear it by the ZERO (CE) key and the spindle return to
the machine ZERO (MZ - RETURN).
This Emergency Stop Switch cannot stop the external machine.

5) MANUAL JOG SWITCH   ⎡‾‾‾⎤   ⎡‾‾‾⎤
                            ⎣___⎦   ⎣___⎦
                              ⎣___ JOG ___⎦
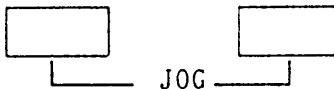
These switches can be used when the Function Switch is at JOG-H or JOG-L
position.
JOG - H : Push and hold the switch, and the spindle will rotate at 1RPM.
          Or one quick push will make one step feed for 1° .
JOG - L : Push and hold the switch, and the spindle will rotate at 0.1RPM.
          Or, one quick push will make one step for 0.008° .
※ Also, this switch will be used for setting Machine - ZERO
   (See P15 for Machine - ZERO Setting.)

6) FUNCTION SWITCH
   7 functions are avilable as follows.
   a) M-Z : Machine Zero Return
              This mode is used when Machine Zero Return (Manually) is needed.
              Push start switch in this mode to return the spindle to Machine Zero.
   b) W-Z : Work Zero Return
              This mode is used for returning the spindle to the Work Zero.
              In this mode, press the start switch to return the spindle back to
              the work Zero.
   c) JOG-H : Jog (Hi Speed)   ⎤ This mode is used when jog feeded, and
   d) JOG-L : Jog (Low Speed) ⎦ push the Button to jog the spindle head.
   e) RUN   : Run
              This mode used when running the entered program.
    *The step No. showing current spindle position is the step No. for next
     program step.

f) PRG : Program

This mode is used for entering program. (When the controller is in this mode, the display will be blinking.)

g) PAR : Parameter

This mode is used for setting the Parameter. (When the controller is in this mode, the display will be blinking.)

7) MEMORY SELECT KEY [M SEL]

When the function switch is at PRG position, the controller becomes program Selection Mode, and Program No. can be changed.(See P.17 for Program Selection.)

When the function switch is at RUN, JOG, WZ or MZ position, a program No. being presently selected will be displayed by pushing this key, and the display will return to show previous program No. when the key is released.

This key is used to check the Memory No., but cannot change the program No.

8) Insert Key [INS]

This Key works only in PRG mode. ``

This Key is used to insert a program in a present program. To insert a Program, call the Step No. next to the Step No. where you want to insert and press the Insert Key. By doing that, " 000.00 " , " F (MAX) " , " L001 " and " rc01 " are inserted there, and the steps further to the Step where aboves are inserted will be renumbered automatically.

If you have used upto 99 steps, the previous Step No.99 will be cancelled after the insertion.

After finishing the insertion, change the " 000.00 " , " F (MAX) " , " L001 " and " rc 01 "to desired program.

* However, if you have used JP 96(Jump Function)in previous program,the Step No. where you have commanded to jump will not be renumbered. therefore change that Step No. without fail.

9) Delete Key [DEL]

This Key works only in PRG mode, and is used for deleting a part of program already entered. To delete a part of the program, call the Step No. where you want to delete by Step (+) or (-) key, and press the Delete Key.

The step will be deleted and further steps will be automatically renumbered.

* However, if JP 96 (Jump Function) was used in the program. the Step No. where you have commanded to jump will not be renumbered, therefore, do not forget to remumber the Step No.

(Note) When the step No.02 contains End99 (End89), the program in step No.01 cannot be deleted.

10) Clear Key, Work Zero Set Key

a) Clear key

This Key works only in PRG mode.

When you wish to change the entered data, push this key to clear the data, and enter a new data.

Also this Key is used for clearing whole entered program. In PRG mode, push this and hold for 5 seconds. After clearing all the steps No.01 through No.99 rapidly, the display shows Step No.01 again. After clearing the whole program, Loop count and rc are reset to " 1 " , Feed Rate (F) is reset to " 100 " (10RPM) when PA15=0 or, " 50 " (5RPM) when PA15=1.

* MEMORY ALL CLEAR

When a memory has been all cleared with PA07=10, the step angle at step No.01 will be 0° and End99 will be set at No.02 through No.99.

When a memory has been all cleared with PA07=00, the step angle at all the Steps (No.01 through 99) will be reset to 0° .

(The PA07 has been set to "10" when shipped from our factory.)

⎡ CLEARING ERROR CODES AND " ERROR "

This Key is also used for clearing ERROR CODES (E3, E8, E9, EA, Eb, EC, Ed, EE , EF) and " ERROR "display. ⎤

b) Work Zero Set Key

This Key is used for setting the Work Zero. (See P.15)

11) DATA ENTRY KEYS

These keys work in PRG or PAR mode.

In PRG mode, these will be used for data entry and for setting a parameter in PAR mode.

See P.15 (How to set the Work Zero) for PA19.

See P.16 (How to set the soft limit) for PA23, 24, 25.

12) SPECIAL COMMAND KEY | G |

This key works PRG mode and is used for entering special codes (commands).

For example, when you wish to enter Arc98, push | G | key and enter 98.

13) Display Scan Key

This key works in PRG or RUN Mode.

This key is used for changing the display mode.

In Run mode, each time the key is pressed, the display will show position of

the Spindle, Step Size, Feed Rate, Loop Counts and then rc.

In Program mode, the display will show Step Size, Feed Rate, Loop Counts, and then rc.

14) STEP (+) key / (-) key   STEP +   STEP -

These keys work in RUN, PRG, PAR modes.

These keys will be used to enter a parameter or to check the entered programs or parameters.

Step (+) key will move Step No. or parameter No. increased by one and Step (-) key will move the Step No. down. However, you cannot step down lower than step No. 01 and cannot step up to higher Step No. contains END 89.

(You can go over the step No. contain END99 to further step No.s)

Either of the keys is pressed and held for more than one second, the key will repeat stepping downwards or upwards at the rate of 18 steps per second.

HOW TO SET MACHINE ZERO

As the Z-Phase of the motor will be set as the Machine Zero (indexer's), so the Machine Zero can be set every 4° .

For example, if you want to set 0° of the indexer degree indicator as the machine Zero;

a) Set the Function Switch to PAR position,and call the parameter 23 (PA23) by pushing Step (+) key and set PA23 to "0" (PA23=0).

b) Set the Function Switch to JOG-H (or JOG-L) and set the indexer table position at 358° ~359° by pushing the JOG switch.

c) Set the Function switch to PAR position, call PA22 by pushing Step (+) key and set the PA22 to "1" (PA22=1).

d) Set the Function switch to M-Z, then press and hold the JOG (+) key to search the Motor Z-phase.

As soon as the search is finished, the display stops and shows "01.P000.00" .

NOTE) When you have left your finger off the Jog Switch while you are searching Z-Phase , repeat from C).

Set the vernier location (Indicator of 0°) to the position of table 0° if necessary, by adjusting the screws at the indicator.

HOW TO SET WORK ZERO

Set the Function Switch to PAR and call PA19 using step (+) key and check if the Value of PA19 is 0. If the PA19 is 0, start to set from C).

If the PA19 is not 0, set the Work-Zero as follows.

a) Set the function to M-Z. Push start key to return to MACHINE-ZERO.
b) Set the Function Switch to PAR.

   Push Step (+) key to call PA19 and press $\boxed{\begin{array}{c}\text{CE}\\\text{ZERO}\end{array}}$ key to have PA19=0.

c) Rotate the indexer to your desired position which you want to appoint as the
   Work - Zero by program or jog switch.,
d) Set the Function Switch to PAR to call PA19.

   Press $\boxed{\begin{array}{c}\text{CE}\\\text{ZERO}\end{array}}$ key, (PA19 = nnn.nn : Work - Zero position).

   After the Work - Zero is·already set, the Function Switch to M - Z and the
   display will show the Machine - Zero position against the Work - Zero (Ex. if
   90° is the Work - Zero, 270° will be displayed.)

HOW TO SET SOFTWARE LIMIT

a) Purpose: To set a certain range of the indexer's movement by CPU.

* WARNING: The software limit cannot perfectly prevent an accidental overtravel
          or overrun.

          You are recommended to make a mechanical stopper or a limit switch.

The range for setting software limit is 0° ~ +179° in + (plus) direction and
0° ~ -179° in − (minus) direction.
When the indexer is running as per a program, the indexer will stop its motion
before executing the step going over the software limit, and "ERROR" will be
displayed.

b) Procedure:
   ● Set the Function switch at PAR Mode.
   ● Set PA23 to "0" (PA23=0).
   ● Call PA24 and or PA25, and enter the positive number (integral numbers only
     between 0~179) to be set.
     (PA24 for +(plus) direction, PA25 for −(minus) direction.)
     Examples: 45° = 45 at PA24, -90° = 90 at PA25
   ● Set the Function switch at W-Z (Work Zero)Mode, push the Cycle Start switch
     until the indexer returns to the work zero.
   ● Set the Function switch at PAR Mode, and set PA23 to "1" (PA23=1).

   Now you have finished setting up the software limit.
   Example   45° ~0° (Work-Zero)~ -90°

c) Effect/Non-effect
   the Effect or Non-effect for software limit can be done by PA23 without
   changing the set data (entered in PA24 and PA25).

SPECIAL CODES   (G CODES)

1) Hr 00 : Machine Zero Return (Enter G 00)

Wherever the spindle is, the spindle will return to the Machine Zero as soon as this command is executed.

2) Hr 0 : Work Zero Return (Enter G 0)

Wherever the spindle is, the spindle will return to the Work Zero as soon as this command is excecuted.

(Note)   When either of the command (Hr 00 or Hr 0) is used, the spindle takes the direction near to each ZERO when returning to the ZERO.

3) End 99 : Program End (Enter G 99)

This is the code for "Program End".

In Run Mode, when the controller steps upto the Step No.which contains this mode, the controller will finish the program and step No.will return to No.1.   ..

However, in program mode, you can step upto further step numbers even if End99 has been entered.

4) Arc 98 : Arc Angle Division (Enter G 98)

This code is used to divide the desired arc angle into 2~999 equal parts easily. Especially, when you wish to divide an indivisible angle (snch as 10° into 3 equal parts) into equal parts, this special code is very useful.

Enter the division number into the Loop Count (L).

5) noP 97 : Dwell (Enter G 97)

When this special code is used, the controller will reject the command from the cycle start switch and it will cause Program Dwell.

The period (seconds) for Program Dwell, loop count is used.

The controller will cause the delay for the seconds equal to 1/10 of the loop counts.

This will enable the Program Dwell for the seconds between 0.1 and 99.9 seconds.

6) JP 96 : Jump Function (Enter G96)

This step size is the command for "Program Jump".

When this is used with a loop count in a step, the controller will jump to the specified step No. by the loop count.

After have jumped to the specified (by Loop Count) Step No., the

indexer will run as per the progarm entered in the Step No.

After jumped to a Step No., you can jump to other Step No.infinitely,

however, when paging a subroutine program with using rJP95, the maximum

nest to return to other Step No. is 8 times only counting from the last

JP96 command executed.

7) rJP 95   :   Program Return Jump (Enter G 95)

When this command has been entered in a Step No. the indexer returns

to the next Step No. which contains a JP96 (PROGRAM JUMP COMMAND), and

repeats the program in the returned Step No.

However this rJP95 has been used without a JP96 command, the display

shows "ERROR" in running the indexer.

In using this command with JP96 to page a subroutine program, the

maximum nest for return is limited to 8 times.

8) End 89   :   Progarm End (Enter G 89)

When the indexer runs upto the step No. contains End89, the program

will be finished and will return to Step No. 01.

When End89 is entered, you cannot go upto further step No.even if using

step (+) key.

To enter G – Codes, push G key and enter the Code. For example, when entering JP96,
enter G 9 6 .

However, as, Arc98 is being different form other codes, you can enter the Angle to be
devided in the same Step, the Arc98 will not be cancelled even if you try to cancel it
with CE key, therefore, you have to delete the program in the Step No. contains
Arc98 to enter a new program there.

F — FUNCTION

The speed of the indexer can be controlled by this function. When a whole program has been cleared in a Program Memory, all the steps will still contain 100 (10RPM) when PA15 = 0 and 50 (5RPM) when PA15 = 1.

If you need to change the feed rate, you can enter desired Feed rate according to following chart. The parameters, PA03 and PA04 will effect to the Feed rates, select right Feed rates.

UNIT: rpm

PA 03	PA 04	F 0	F 1	F 2	F·3	F 4	F 5	F 6	F 7	F 8	F 9	F 10	F 11	F 12
0	0	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2
1	0	0.025	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6
0	1	0.0125	0.025	0.05	0.075	0.1	0.125	0.15	0.175	0.2	0.225	0.25	0.275	0.3

PA 03	PA 04	F 13	F 14	F 15	F 16	F 17	F 18	F 19	F20	F50	F100
0	0	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	5.0	10.0
1	0	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0	5.0	10.0
0	1	0.325	0.35	0.375	0.4	0.425	0.45	0.475	0.5	5.0	10.0

L — FUNCTION

When this function is used in a program Step No., the controller repeats the prog as per the entered L - Value. When a whole program in a program Memory has been cleared, all the steps will contain 1 (L1), therefore, the program will be execut only once, however, when you enter a number (for repeat) between 2~999, the progr will be repeated by the number of the times entered in L - Function.

In Run mode and when the display mode is for Loop Counts, the display shows the remained number of the loop counts.

Also the L - Function is used with Special commands, the program will not be repeated.

Arc98·······Entering a division number.

noP97·······Entering the time for program dwell.

(Program will dwell for 1/10 seconds of entered L - Value.)

JP 96······Entering the Step No. to where the program Jumps.

rc — FUNCTION (REMOTE CONTROL)

The index finish signal to be output can be obtained from the pair of lines ① & ①A
and ② & ②A. . The line for output can be selected by setting rc Values(rc =
00, 01, 02, 03, 04).

* The output means the relay contained in CPNC-500 will be on.

rc = 00 Neither the pair of ① and ①A nor the pair of ② – ②A will output
signals.

01 The pair of ① – ①A output signals.

02 The pair of ② – ②A output signals.

03 Both the pair of ① – ①A and the pair of ② – ②A will output signals.

04 Neither of the pair of ① and ①A nor the pair of ② – ②A will output
signals. But the next steps are automatically executed.

"01" is stored in every step No. in the erased memory.

When the machine is operated with loop count set at 2 or more and it is operated by
Arc98 with a Loop count (over 2), the output signal is applied to Line No.① and ①A
after finishing each indexing. After the final operation, the output signal is
applied according to rc set values.

However, this output signal is supplied only when the input signal is applied by
remote control cable No. ④ and No. ⑤ , and it varies according to PA 01 ,02, 12.

CLAMP OPEN — FUNCTION

By using the Values 10, 11, 12, 13 and 14 for rc Function, the indexer will not be
clamped in the step No. where you have entered any of rc = 10, 11, 12, 13, 14, and
the unit waits for next command for indexing, and will restart indexing upon receipt
of next input command.

If one step contains more than one motion, above will work on the last motion
programmed in the step.

If next step contains End99 (End89), the unit will be clamped irrespectively of rc
values.

rc = 10 No. output. Clamp is open and waits for next command input.

11 Outputs to ① & ①A . Clamp is open and waits for next input.

12 Outputs to ② & ②A . Clamp is open and waits for next input.

13 Outputs to ① & ①A and to ② & ②A .
Clamp is open and waits for next input.

14 No output. Next step will be excuted automatically with clamp remaining
open.

* However, these functions work only when getting input through the lines ④ & ⑤ ,
and also will be varied by how you set PA01, 02, and 12.

Programming Example

1   INDEXING

PRG	0 1	n n n . n n	(BLINK)
CE ZERO	Press and hold for 5 seconds		
	0 1	0 0 0 . 0 0	(BLINK)
Enter 90	0 1	9 0	(BLINK)
STEP +	0 2	End 9 9	(BLINK)
RUN	0 1	P n n n . n n	(STEADY)
START	Run the program		
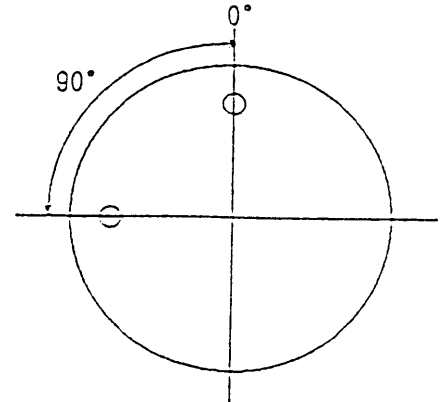
* Indexing 90'.

2   FEED RATE

PRG	0 1	n n n . n n	(BLINK)
CE ZERO	Press and hold for 5 seconds		
	0 1	0 0 0 . 0 0	(BLINK)
Enter 45	0 1	4 5	(BLINK)
STEP +	0 2	End 9 9	(BLINK)
Enter 180	0 2	1 8 0	(BLINK)
DISP SCAN	0 2	(5 0) F 1 0 0	(BLINK)
Enter 1	0 2	F 1	(BLINK)
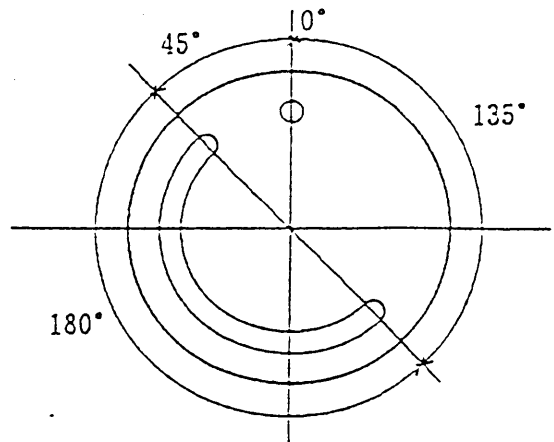
* After moved to 45° making
  180° cutting feed and then
  indexes 135°.
* When PA15 is set to 1, the
  display shows F50.

| [STEP +] | 03 End 99 (BLINK) | **4** |

Enter 135   03   1 3 5   (BLINK)

[STEP +]   04   End   99   (BLINK)   [CE ZERO]

RUN   01   P n n n . n n   (STEADY)

[START]   Run the program   Enter

                                                      [DISP SCAN]

3 LOOP COUNTS

PRG   01   n n n . n n   (BLINK)   Enter

                                                      [STEP +]

[CE ZERO]   Press and hold for 5 seconds

                                                 RUN

              01   0 0 0 . 0 0   (BLINK)   [START]

Enter 90   01   9 0   (BLINK)

[DISP SCAN] [DISP SCAN]   01   L   0 0 1   (BLINK)   **5**

Enter 4   01   L   4   (BLINK)   PRG

[STEP +]   02   End   99   (BLINK)   [CE ZERO]

RUN   01   P n n n . n n   (STEADY)

[START]   Run the program   * 90° Indexing X 4.

                                                      Enter

                                                      [DISP SCAN]

                                                      Enter

                                                      [DISP SCAN]
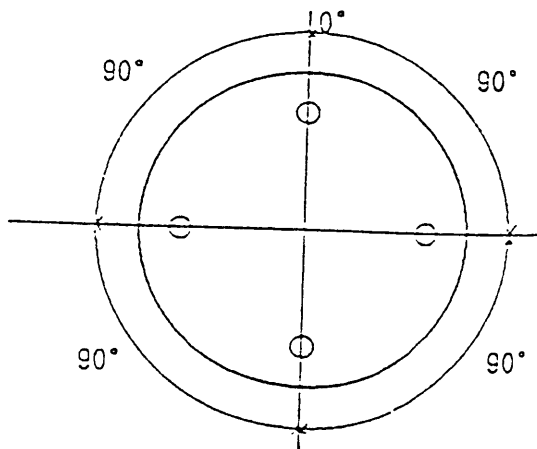
4 EQUAL CIRCLE DIVISION

PRG	0 1 n n n . n n	(BLINK)

| CE ZERO | Press and hold for 5 seconds |

	0 1 0 0 0 . 0 0	(BLINK)

Enter	G 98	0 1 G 9 8	(BLINK)

DISP SCAN	DISP SCAN	DISP SCAN	0 1 L 0 0 1	(BLINK)

Enter 23	0 1 L 2 3	(BLINK)

STEP +	0 2 E n d 9 9	(BLINK)

RUN	0 1 P n n n . n n	(STEADY)

| START | Run the program |
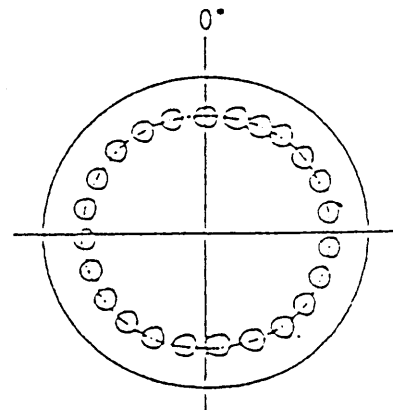
*Dividing 360° into 23 equal parts.

5 (ANY)ARC ANGLE DIVISION

PRG	0 1 n n n . n n	(BLINK)

| CE ZERO | Press and hold for 5 seconds |

	0 1 0 0 0 . 0 0	(BLINK)

Enter	G 98	0 1 G 9 8	(BLINK)

DISP SCAN	0 1 3 6 0 . 0 0	(BLINK)

Enter 90	0 1 9 0	(BLINK)

DISP SCAN	DISP SCAN	0 1 L 0 0 1	(BLINK)
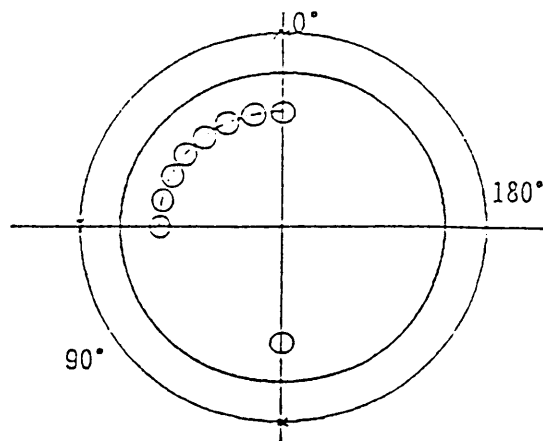
*Dividing 90° into 7 equal parts, and indexing 90° and 180°.

| Enter 7 | 0 1 | L   7 | (BLINK) |

| [STEP +] | 0 2 | End   99 | (BLINK) |

| Enter 90 | 0 2 | 90 | (BLINK) |

N
N
N
N
N
N

| [STEP +] | 0 3 | End   99 | (BLINK) |

| Enter 180 | 0 3 | 180 | (BLINK) |

N
N

| [STEP +] | 0 4 | End   99 | (BLINK) |

N .
N

| RUN | 0 1 | P n n n . n n | (STEADY) |

— — —

N
N
N

| [START] | Run the program |

— — —

N
N :
N -
N
N

PROGRAM JUMP FUNCTION (1)

Special Step Sizes are used. G 96 (Jp 96) is used for Program Jump, which allows
controller to jump from a step No. to any desired step No. in the program.
 G 95 (rJP 95) is used for returning the controller to the next higher step No.
where JP 96 has been entered.

For exa
Machine

Then, s
In this
execute
Indexin
entered
display

Following is an example that the function is used for using some step No.s as a
sub - program;

HOW

```
N 0 1   — — — — — — —  ⎫                    SUB-PROGRAM
N 0 2   — — — — — — —  ⎬       ┌─────────────────────────────┐
N 0 3   — — — — — — —  ⎭       │  N 1 1   — — — — — — —       │
N 0 4   J P 96  L 1 1          │  N 1 2   — — — — — — —       │
N 0 5   — — — — — — —  ⎫       │  N 1 3   — — — — — — —       │
N 0 6   — — — — — — —  ⎬       │  N 1 4   — — — — — — —       │
N 0 7   J P 96  L 1 1          │  N 1 5   — — — — — — —       │
N 0 8   — — — — — — —  ⎭       │  N 1 6   r J P — — — 9 5     │
N 0 9   — — — — — — —          │  N 1 7   End      9 9        │
N 1 0   End       9 9          └─────────────────────────────┘
```

1) Set

2) ᵢ dge

3) Get

PROGRAM JUMP FUNCTION (2)

The program capacity is 99 steps × 17 memories. However, if you need more capacity when a program does not need many steps, you can enter multiple different programs in a memory by using Jump Function.

```
N  01    JP96    L 5
N  02    JP96    L25
N  03    JP96   * L45
N  04    JP96    L70
N  05    ----------  ⎤
N  06    ----------  ⎥
                     ⎥  Program for A - Product
N  23    ----------  ⎥
N  24    JP96    L 1  ⎦

N  25    ----------  ⎤
N  26    ----------  ⎥  Program for B - Product
- - - - - - - - - - - ⎥
N  44    JP96    L 2  ⎦

N  45    ----------  ⎤
N  46    ----------  ⎥
- - - - - - - - - - - ⎥  Program for C - Product
N  68    ----------  ⎥
N  69    JP96    L 3  ⎦

N  70    ----------  ⎤
N  71    ----------  ⎥
N  98    JP96----L 4  ⎥  Program for D - Product
N  99    End     99   ⎦
```

For example, when you need to machine the (C) product, turn on the power and make Machine - Zero return.

Then, set the Function Switch to RUN position, go to Step No.03 by [STEP +] Key. In this condition, upon receiving a remote start signal input, the indexer will execute the motion entered at the step No.45 and will output a step finish signal. Indexing will be repeated upon receiving further remote start signals, and the motion entered in step No.68 will be final motion. For the second piece and further ones, the display will shows step No.45 and the step No.45 will be the start position.

HOW TO CHANGE A PROGRAM:

1) Set the Function Switch to PRG mode.

2) Page the step No. to be changed By [STEP +] or [STEP -] key.

3) Get the data to be changed [DISP]

4) Clear the data by $\boxed{\text{ZERO}}^{\text{CE}}$ key and enter a new data there.

  * As this Arc 98(G98) cannot be cleared by $\boxed{\text{ZERO}}^{\text{CE}}$ key, to change Arc 98(G98) to
    other data, delete the program step No. contains Arc 98 by using $\boxed{\text{DEL}}$ key and
    enter a new data after pushing $\boxed{\text{INS}}$ key.

5) Set the Function Switch to RUN position.

HOW TO SET A PARAMETER

1) Set the function switch to PAR mode.

2) Page the Parameter No. to be changed by $\boxed{\text{STEP}\atop+}$ or $\boxed{\text{STEP}\atop-}$ key.

3) Change the value of the Parameter to 0 or 1.
   (Pushing $\boxed{-}$ key will cause the value change to opposite one.)

  * Special setting methods are required for PA19, PA24, and PA25.
    See P.15 (How to set the Work - Zero) for PA19.
    See P.16 (How to set the Software Limits) for PA24, PA25.

4) Set the Function Switch to RUN Mode.

PA NO.		FUNCTIONS
PA 01	0/1	Changing Motion Mode for Step finish Signal Relays (RY-1, RY-2).
PA 02	0/1	
PA 03	0/1	1/2 Feed Rate (Invalid / Valid)
PA 04	0/1	1/4 Feed Rate (Invalid / Valid)
PA 05	0/1	Double Remote Input (Normal / Double)
PA 06	0/1	Input from Front panel start SW and Jog SW (Valid / Invalid)
PA 07	01/11	Program Change (PROHIBITED)
	10	Program Change (OK)
	00	Program Change (OK)
PA 08	0/1	Remote Start Input (Valid / Invalid)
PA 09	0/1	Setting Gear Reduction Ratio (1 = 1:90)
PA 10	0/1	Automatic Cycle Start (Invalid / Valid)
PA 11	0/1	Changing Motor Rotation Direction (CW / CCW)
PA 12	0/1	Step Finish Signal Relay (RY-1, RY-2) Output (OK / PROHIBITED)
PA 13	0/1	Buzzer Output (Invalid / Valid)
PA 14	0/1	AIR BREAK FUNCTION (Valid / Invalid)
PA 15	0/1	Changing Max Feed Rate (F100 / F50)
PA 17	0/1	Retry on positioning error (Valid / Invalid)
PA 18	0/1	Changing EM Stop Inputs (N.O / N.C)
PA 19	Θ	Work - Zero Setting Data
PA 22	0/1	Machine - Zero Search (Invalid / Valid)
PA 23	0/1	Software limit control (Invalid / Valid)
PA 24	0~ +179	Software limit in + Direction
PA 25	0~ -179	Software limit in - Direction

EXPLANATIONS FOR PARAMETERS

1) PA 01
2) PA 02 } Changing Motion Mode for Step Finish signal Relays (RY-1, RY-2)

		For Automatic Machine ⟨1⟩	For NC Machine	For Automatic Machine ⟨2⟩	For External Machine Control
PA01		0	1	0	1
PA02		0	0	1	1
rc	OUTPUT				
00,(10)	1-1A (RY-1)				
	2-2A (RY-2)				
01,(11)	1-1A (RY-1)	0.5 S		0.5 S	
	2-2A (RY-2)				
02,(12)	1-1A (RY-1)				
	2-2A (RY-2)				
03,(13)	1-1A (RY-1)				
	2-2A (RY-2)				
04,(14)	1-1A (RY-1)				
	2-2A (RY-2)				
		①	① ②	①	① ③

① INDEX FINISH
② REMOTE START INPUT OFF
   (Relay will not actuate when remote start input becomes OFF before index finish.)
③ Next Remote Start Input is ON.
   (Relay will not actuate when remote start input becomes ON before index finish.)

* When you have changed the PA01 or PA02, turn off the Power once and turn on the Power again. (the new value will be effective after turning the power again.)
   Also, when being used with an automatic machine ⟨2⟩ or for external machine control, do same thing to enter new values if you have changed rc setting values.

3) PA 03 : 1/2 Feed Rate.
   PA 03 = 0 Feed rate is as programmed.
   PA 03 = 1 The Speed will be halved.

* * Check P.20 for the relations between Feed rates and Parameters.
* * F50, F100 will not be effected by PA03, PA04.

4) PA 04 :   1/4 Feed Rate.

PA 04 = 0   Feed Rate is as programmed.

PA 04 = 1   Feed Rate will be 1/4 of the entered F-Value.

5) PA 05 :   DOUBLE REMOTE INPUT

PA 05 = 0   Normal Remote Input

PA 05 = 1   Double Remote Input

When this is ON (1), the rotary table will not move by one step unless the line between ④ and ⑤ is closed, opened, closed and opened.

The line between ④ and ⑤ must be closed for minimum 0.01 second and opened for more than 0.1 second.

This parameter is used when you wish to move the rotary table by one step with closing the switch twice by the X-Axis movement of a machine table.

6) PA 06 :   Input from Front Panel Start / Jog Switches.

PA 06 = 0   Start / Jog Switches can be used.

PA 06 = 1   Start / Jog Switches cannot be used.

7) PA 07 :   PROGRAM CHANGE

PA 07 = 10 ⎤
PA 07 = 00 ⎦ Can change a program

PA 07 = 11 ⎤
PA 07 = 01 ⎦ Disables Program change.

When whole program has been cleared (ALL CLEAR) with PA07 = 10, the step No. 01 will be set to 0° , and No.02 and further Step No.s will contain End99.

When ALL CLEAR has been done with PA07 = 00, all the step No.01~99 will contain 0° .

When ALL CLEAR has been done with PA07 = 11, 01, the attempt to change a program will be rejected and the display will show "ERROR".

In this case, push the ⌈CE ZERO⌋ key to get back the previous data on the display, change the PA07 to 10 or 00, and change the program.

8) PA 08 :   REMOTE INPUT

PA 08 = 0   Accepts Remote Input

PA 08 = 1   Reject Remote Input

9) PA 09
    PA 09
10) PA 10
    P 10
    PA 10

(CAUTION

11) PA 1
    PA 1
    PA 1
12) PA 1
    PA 1
    PA 1
(NOTE)

13) PA 1
    ⌈ 1
    PA 1

14) PA 1
    PA 1
    PA 1

15)
    PA

9) PA 09 :   Setting gear Ratio

   PA 09 = 1   This Parameter must be set to 1.(DO NOT CAHNGE THIS PA.)

10) PA 10 :   AUTOMATIC CYCLE START

   PA 10 = 0   One cycle start signal input will cause one step motion.

   PA 10 = 1   Will move automatically onto next steps and executes the step

               motions until the step No. contains End 89 or End 99, or until

               the final step.

               At the end, the controller returns to Step No.01 and will wait

               for further index start command.

(CAUTION)   When a program contains Jp96, the indexer may continuously

               rotates.

11) PA 11 :   REVERSING MOTOR ROTATION

   PA 11 = 0   CW

   PA 11 = 1   CCW

12) PA 12 :   STEP FINISH SIGNAL RELAY (RY-1/2) OUTPUTS.

   PA 12 = 0   Accepts the relay outputs.

   PA 12 = 1   Disables the relay outputs.

(NOTE)   Even the PA12 is 0, the setting value of PA01 and PA02 will

               effect to the motion modes of RY-1 and RY-2.

13) PA 13 :   BUZZER SOUND

   PA 13 = 0   Disable Buzzer Sound.

   PA 13 = 1   As per the motion of interface relay (RY-2), the buzzer will

               sound for one second.

               However, the Buzzer will sound only by receiving remote start

               input when the program of step No. contains rc 02(12), 03(13) and

               PA12 = 0.

14) PA 14 :   AIR BRAKE FUNCTION

   PA 14 = 0   Air Brake can work. (need air to the brake unit.)

   PA 14 = 1   Disables Air Brake. (when do not need the air brake.)

               When PA14 is 0, index will start after the air brake confirming

               signal becomes OFF or receiving index Start signal.

               The timing of index finish signal output will be different by

               the rc setting values, however, the index finish signal will be

               output after the Air Brake confirming Signal becomes ON.

               When PA14 is 1, index will be started 0.25 seconds after getting

               index start command, and will output Index finish Signal after

               finishing indexing.

15) PA 15 :   CHANGING MAX FEED RATE

   PA 15 = 0   When a whole program has been cleared by ALL CLEAR, all the

When using a sub table (Face Plate),apply a dial indicator to the T-Slot to measure the backlash.

b) How to adjust the Worm Gear Backlash.

1. Remove 4 Bolts ⑧② which are fixing Motor Cable Set Plate ⑧③ ,remove the Motor Cable Set Plate ⑧③ .
   Then pull the cables (loosely laying in the Motor Fin ⑦⑧) very carefully.

2. After removing 2 Bolts ⑦⑨ which are fixing the Motor Cooling Fin ⑦⑧ , pull back the Motor Fin by 50 ~ 60mm (2" ~ 2.4")

3. Turn up the cooling Fin packing ⑦⑦ and loosen (slightly) the 4 Bolts ⑦② fixing the Motor Flange ⑦① to the Main Body⑥.

4. Loosen 2 Bolts ②① fixing Metal Thrust plate ②③ slightly.

5. Remove 2 Hex Bolts ③⑦ located on the base bottom and you will see Hex socket set screw ③⑤ inside.

   To decrease the Backlash, after loosening A - set screw slightly and tighten B - screw by the same amount.

   To increase the Backlash, loosen B - screw and tighten A - screw.

   After tightening both screws (A & B) slightly and adjusting the backlash, tighten the Bolts ②① and tighten up A,B screws with same force. Then tighten up the Hex Bolts ③⑦ with Seal Washer ③⑥ .
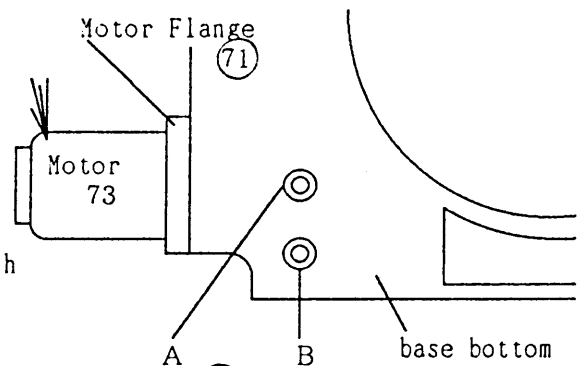
6. Tighten the 4 Bolts ⑦② fixing the Motor Flange ⑦① to the main body ⑥ .

7. Insert the Motor Fin ⑦⑧ into the Motor ⑦③ and tighten the 2 Bolts ⑦⑨ to fix the fin.
   Check if the Motor Fin Packing ⑦⑦ is between the Motor Flange ⑦① and the Motor Fin ⑦⑧ .
   Otherwise, coolant may go into the inside of Motor Fin and will cause damage to the encoder.
   WARNING : Neglect this will void Warranty.

8. Insert the cables (had been pulled out in 1.) carefully into the clearance of the Motor Fin ⑦⑧ and make sure the cable connector part locate at the motor Cable Set Plate ⑧③ .

9. Attach the Cable set Packing ⑧④ to the Motor Fin ⑦⑧ and fix the Motor set Plate ⑧③ with 4 Bolts ⑧② .
   Also, be carefull to do this since coolant may enter inside of the Motor

(NOTE)   After finishing aboves, measure the Backlash again.
          If the Backlash is too small, motor may lose its control and may not
          trun to the programmed angle position.
          If still much backlash is still found even the worm and wheel are
          deeply engaged, adjust the backlash in thrust direction.

 C) How to adjust the backlash of the worm shaft in the thrust direction
     1. Remove metal thrust plate ㉓ and drain oil. at this time, be careful
        not to lose two O Rings ㉔ and O Ring ㉕ .
     2. Remove Hex. socket screws ㊵ and Thrust screw B ㊶ .
     3. Backlash of the worm shaft in the thrust direction can be eliminated by
        tightening Thrust screw A ㊲ provided next to Thrust screw B ㊶ .
        The top pf Worm shaft ㉒ has tapped hole of M5. Screw a hexagon
        socket head bolt of M5 in it, and use an allen wrench in order to
        tighten Thrust screw A ㊲ checking the condition of Worm shaft 62 .
       (Be sure not to tighten too much. Do not forget to remove the bolt which
        has been screwed in the top of worm shaft.)
     4. After adjustment, screw Thrust screw B into the position it touches to
        Thrust screw A and return by one or one and half rotation, and then
        align the bolt hole of Thurst screw B and the tapped hole of Thurst
        acrew A. After that, tighten Hex. socket screw ㊵ , insert two O Rings
        ㉔ and O Ring ㉕ , and reset Metal thurst plate ㉓ without fail.
        After ressembled apply lubrication oil to the unit.

2) Regarding Air Brake CLAMP / UNCLAMP
    The air supplied to the Air Brake cyclinder will be also supplied to the
    Clamp check cylinder ㊵ and wil push the piston to actuate the Clamp check
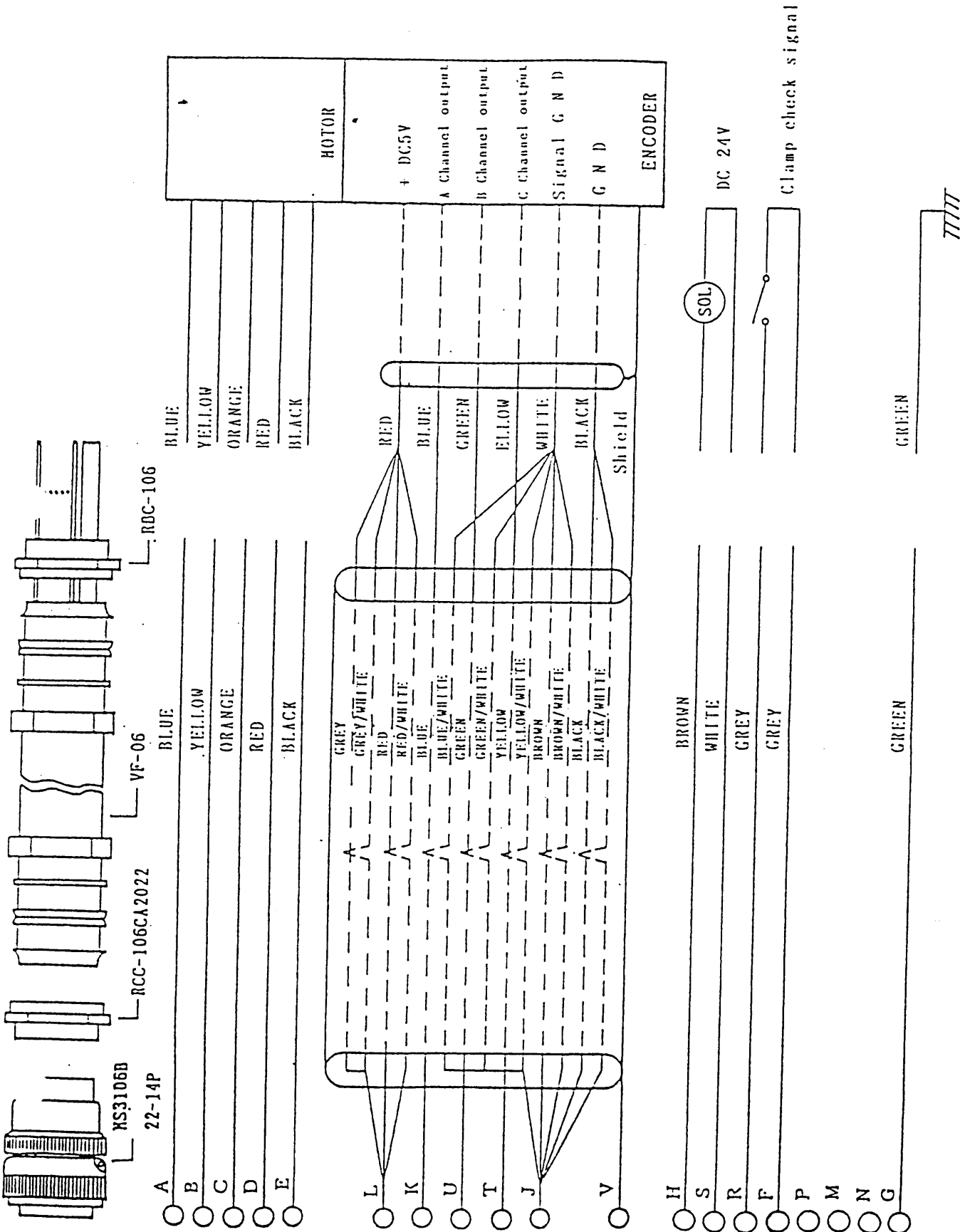   micro switch ㊸ .
    After receiving index start signal, the air pressure for the air brake and
    micro switch will be off.
    If you have experienced E4 Error especially, you are requested to replace or
    adjust the presure of the micro switch, remove the Cover A ㊿ first.
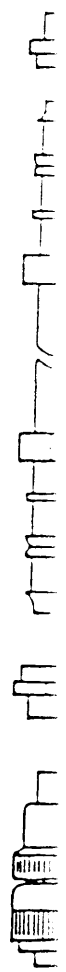
MOTOR WIRING DIAGRAM

CPDX-6,8,10
(MOTOR・ENCODER)

ELF DIAGNOSIS

ERROR CODE	POSSIBLE CAUSES, NECESSARY ADJUSTMENT
E 0 Controller Fault	ROM Error, Errors in writing or reading ROM. Turn the power ON/OFF and repeat it to reset. Call for service if "E 0" is still displayed.
E 1 Keys / Switches	Keys / Switches might be shorted. Repeat POWER ON / OFF to reset them. Replace them even if "E 1" is still illuminated.
E 3 Program Check	Program or Parameter might have been changed. Clear the "E 3" by CE / ZERO key, check the parameters and program. (Re-enter the program for safe.)
E 4 Brake Error	Check PA14 and turn POWER ON again. CPDX has Brake (Clamp) function need to set PA14=0 when this function is needed by getting air supply. When not using this function, set PA14=1 . Following the adjustment when getting E 4 error is using brake function with PA14=0 by getting air supply. E 4 appears when trying to clamp but the spindle was already unclamped. Check if air pressure is adequate (to be 85 PSI), and check micro switch with a tester if the pressure is OK. The connection between F and R pins of the motor cable cannon plug must be on when the air is connected to be brake (Clamp) unit and must be OFF when air is disconnected. Then, remove the cover A ⑤⑴ and check if the air hose is bent and check the motion of the piston which pushes the clamp check micro-switch. Also check the solenoid valve. The solenoide valve is 3-Port / Normal-Close with spring return, 24V DC type.
E 8 Stopped by STOP command	Clear E 8 by CE / ZERO key, do M-Z return. This E 8 will appear when the time of stop command input is less than 0.2 seconds or due to other unknown failures.
E 9 Driver Fault	Clear E 9 by CE / ZERO key and do M-Z Return.
E A Encoder Fault (Pulse Count)	Clear E A by CE / ZERO key and do M-Z Return, or reset the Machine-Zero.
E b Encoder Fault (A,B-Phase)	Clear E b by CE / ZERO key and do M-Z Return, or reset the Machine-Zero.
E C Stopped by Panel STOP	Clear E C by CE / ZERO key and do M-Z Return.

ERROR
E d Stopped
E E Stopped limit
E F Z-Phase
Erro

ERROR CODE	POSSIBLE CAUSES, NECESSARY ADJUSTMENT
E d Stopped by Remote	Clear E d by CE / ZERO key and do M-Z Return.
E E Stopped by software limit	Clear E E by CE / ZERO key and do M-Z return or set the M-Z (Machine Zero)
E F Z-Phase Research Failure	Clear E F by CE /ZERO key and do M-Z Return or reset the Machine-Zero.
Error	- Data input error in PRG or PAR mode. - Attempted to change or (all) clear a program when program change is prohibitted. (PA17=1) - When tried to do Return Jump more than 9 times. ※ "Error" appears in above cases. 　This code can be cleared by CE / ZERO key, however, clear "Error" by CE / ZERO key after returning to provious mode if you have changed the mode.
[NOTE]	After clearing Error code, if the postion of Machine-Zero has been changed, reset the Machine-Zero.