⊙ yuasa

PRODEX

CPDX-4

OPERATION MANUAL

021003

I N D E X

SPECIFICATIONS

mm (inch)

INDEX HEAD			
SPINDLE O.D.			98 (3.86)
SPINDLE BORE I.D.			29 (1.14)
CHUCK	O.D.		102 (4.02)
	I.D.		32 (1.26)
	INNER JAW		3~30 (0.12~1.18)
	OUTER JAW		3~86 (0.12~3.39)
COLLET TO BE USED			Std. 5C Collet (Option)
CENTER HEIGHT			110 (4.33)
SETTING POSITION			HORIZONTAL / VERTICAL
GUIDE BLOCK WIDTH			18 (0.709)
SPINDLE BRAKE TORQUE Kg.m(lbs/ft) at 6kg/cm² (85PSI)			6 (43.4)
BRAKE SYSTEM			PNEUMATIC : 5~7 Kg/cm² (70~100 PSI)
MAX.WORK LOAD kg(LBS)	HORIZONTAL		20 (44)
	VERTICAL		10 (22)
MAX.THRUST LOAD AGAINST CHUCK SURFACE kg(LBS)	VERTICAL LOAD		200 (440)
	HORIZONTAL LOAD		75 (165)
	CIRCUMFERENTIAL		50 (110)
TOTAL GEAR REDUCTION RATIO			1 : 72
INDEXING ACCURACY			within ± 30″
REPEATABILITY			within 10″
BACKLASH			within ± 60″
FEED RATE (rpm)		0.5~5	25
		0.25~2.5	12.5
		0.125~1.25	6.25
MOTOR			CLOSED-LOOP DC DRIVE
WEIGHT kg (LBS)			32.5 (71.7)

DIMENSION
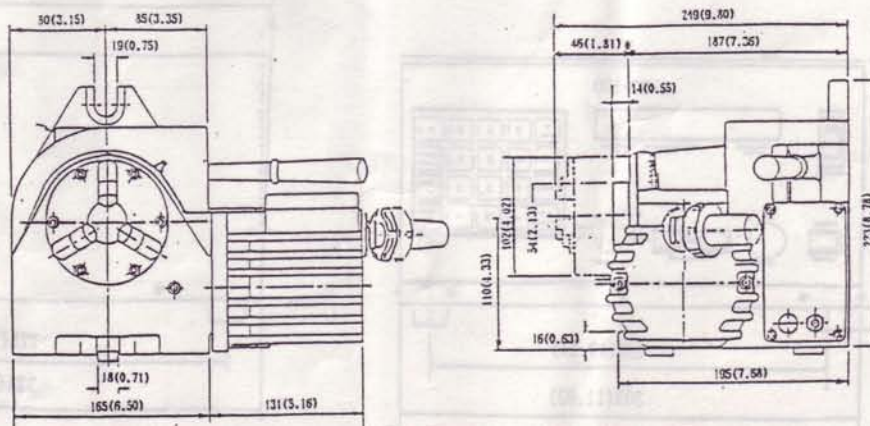
| CONTROLLER	CPNC-100
POWER	AC-120V 50/60HZ 3 AMPS SINGLE-PHASE
TEMPERATURE	OPERATING : 0℃ ~ 40℃ (32° F ~ 104° F)
	STORAGE : -20℃ ~ 60℃ (-4° F ~ 140° F)
HUMIDITY	Less than 75%
CONTROL AXIS	1 Axis
CONTROL SYSTEM	CLOSED LOOP SYSTEM
COMMAND SYSTEM	INCREMENTAL
DISPLAY SYSTEM	UNIVERSAL IN SEGMENTS
RESOLUTION	1'
MAX SETTING ANGLE	540°
MAX DIVISION	999
PROGRAM CAPACITY	99 steps×17 programs
FEED RATE	0.5 rpm~5 rpm、 25 rpm
	0.25 rpm~2.5 rpm、 12.5 rpm (by Parameter.)
	0.125 rpm~1.25 rpm、 6.25 rpm (by Parameter.)
ROTATION DIRECTION	CW , CCW
ORIGIN RETURN	MACHINE-ZERO , WORK-ZERO
JOG FEED	RAPID (1rpm) , low (0.1rpm) , STEP FEED (1° ,0.025°)
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 SIGNAL 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	11 kg (24.3 LBS)

CONTROLLER DIMENSION

unit: mm (inch)

PARTS BREAKDOWN

PARTS LIST
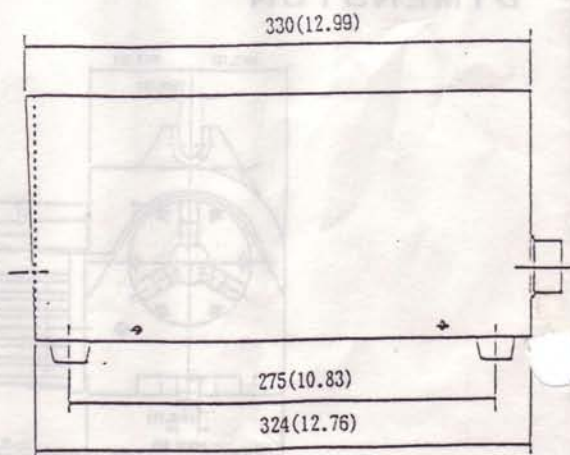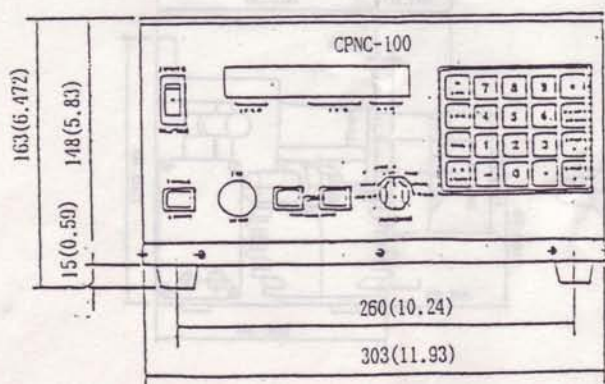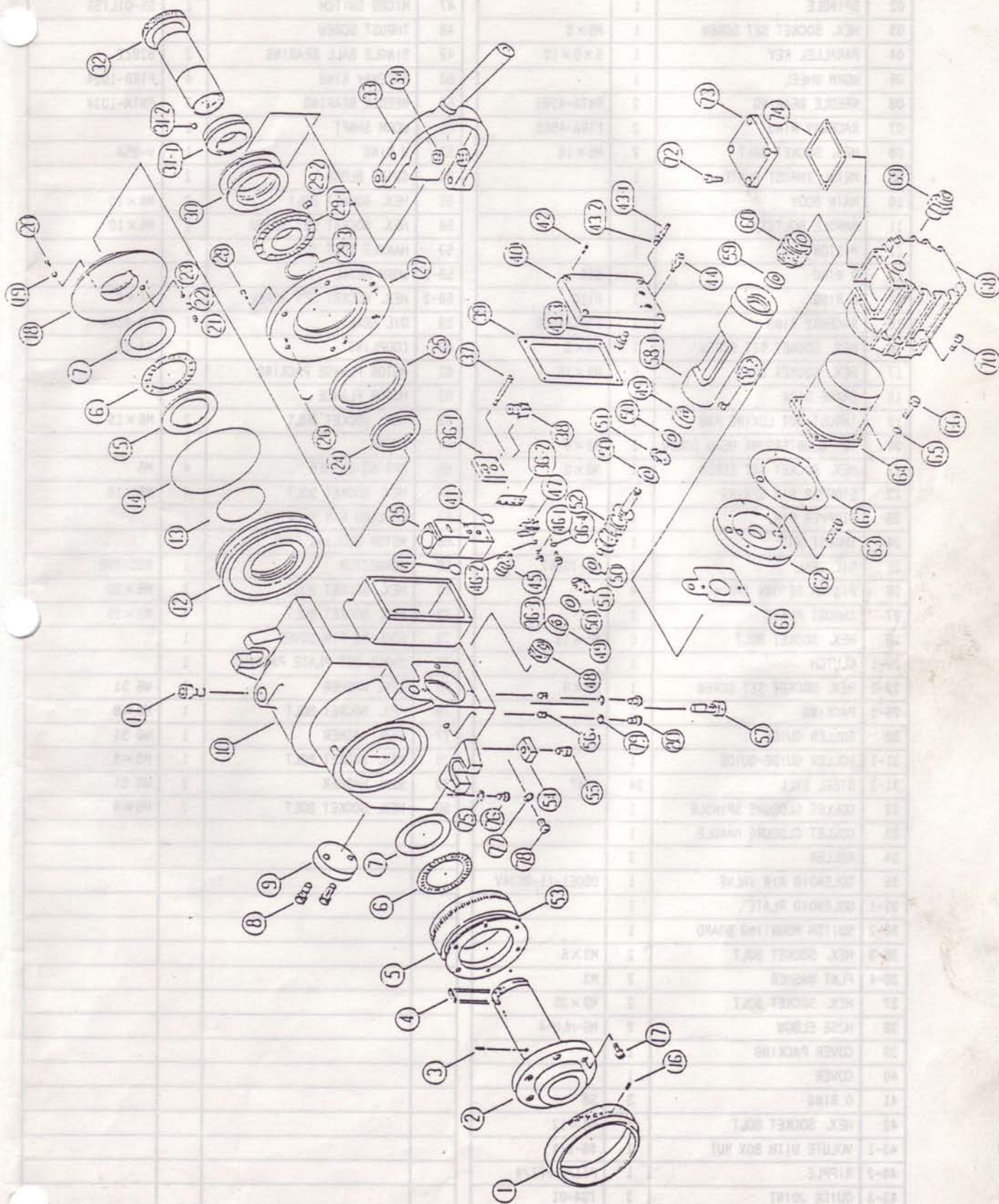
| PART No.	PART NAME	Q'ty	SIZE
01	SPINDLE DEGREE WHEEL	1	
02	SPINDLE	1	
03	HEX. SOCKET SET SCREW	1	M5×8
04	PARALLEL KEY	1	5×5×10
05	WORM WHEEL	1	
06	NEEDLE BEARING	2	FNTA-4565
07	RACEWAY RING	2	FTRA-4565
08	HEX. SOCKET BOLT	2	M6×18
09	METAL THRUST PLATE	1	
10	MAIN BODY	1	
11	HANDLE BOLT(S)	1	
12	PISTON	1	
13	O RING	1	G55
14	O RING	1	P110
15	RACEWAY RING	1	FTRC-4565
16	HEX. SOCKET SET SCREW	1	M4×6
17	HEX. SOCKET BOLT	6	M5×15
18	BRAKE DISK	1	
19	THRUST NUT LOKING PAW	1	
20	90° COUNTERSUNK HEAD SCREW	1	M3×8
21	HEX. SOCKET SET SCREW	1	M6×6
22	STOPPER PIN SPRING	1	
23	STOPPER PIN	1	
24	THRUST NUT	1	
25	OIL SEAL	1	KE-70907
26	PISTON RETURN SPRING	4	
27	THRUST PLATE	1	
28	HEX. SOCKET BOLT	6	M5×12
29-1	CLUTCH	1	
29-2	HEX. SOCKET SET SCREW	1	M5×8
29-3	PACKING	1	
30	ROLLER GUIDE	1	
31-1	ROLLER GUIDE-GUIDE	1	
31-2	STEEL BALL	24	1/4"
32	COLLET CLOSURE SPINDLE	1	
33	COLLET CLOSURE HANDLE	1	
34	ROLLER	2	
35	SOLENOID AIR VALVE	1	050E1-11-DC24V
36-1	SOLENOID PLATE	1	
36-2	SWITCH MOUNTING BOARD	1	
36-3	HEX. SOCKET BOLT	2	M3×5
36-4	FLAT WASHER	2	M3
37	HEX. SOCKET BOLT	2	M3×35
38	HOSE ELBOW	2	M5-HLU-4
39	COVER PACKING	1	
40	COVER	1	
41	O RING	3	S8
42	HEX. SOCKET BOLT	4	M4×12
43-1	VOLUTE WITH BOX NUT	1	#0-1/4
43-2	NIPPLE	1	PT1/8-PF1/4
43-3	QUICK JOINT	2	TS4-01
44	MUFFLER	1	KM-11
45	CYLINDER	1	NSA6×5N-6
46-1	ROUND SMALL SCREW	2	M2.3×10
46-2	FLAT WASHER	2	M2.3
47	MICRO SWITCH	1	SS-01LT55
48	THRUST SCREW	1	
49	SINGLE BALL BEARING	2	628ZZ
50	RACEWAY RING	4	FTRB-1024
51	NEEDLE BEARING	2	FNTA-1024
52	WORM SHAFT	1	
53	V RING	1	V-85A
54	GUIDE BLOCK	2	
55	HEX. SOCKET BOLT	2	M6×10
56	HEX. SOCKET SET SCREW	2	M5×10
57	HANDLE BOLT (L)	1	
58-1	WORM METAL	1	
58-2	HEX. SOCKET SET SCREW	1	M4×6
59	OIL SEAL	1	KD-8184
60	COUPLING	1	NA-15
61	MOTOR FLANGE PACKING	1	
62	MOTOR FLANGE	1	
63	HEX. SOCKET BOLT	2	M6×15
64	MOTOR	1	
65	SPRING WASHER	4	M5
66	HEX. SOCKET BOLT	4	M5×15
67	COOLING FIN PACKING	1	
68	MOTOR COOLING FIN	1	
69	CONNECTOR	1	RBC-206
70	HEX. SOCKET BOLT	2	M6×20
72	HEX. SOCKET BOLT	4	M5×15
73	COOLING FIN COVER	1	
74	CABLE SET PLATE PACKING	1	
75	SEAL WASHER	1	W6 S1
76	HEX. SOCKET BOLT	1	M6×8
77	SEAL WASHER	1	W6 S1
78	HEX. SOCKET BOLT	1	M6×8
79	SEAL WASHER	2	W6 S1
80	HEX. SOCKET BOLT	2	M6×8

OPERATING INSTRUCTIONS

1. CENTERING

Center the chuck before starting operation.

If centering is omitted, dividing accuracy will be adversely affected.

Especially when resetting the chuck after once removed, be sure to center it.

Procedure :
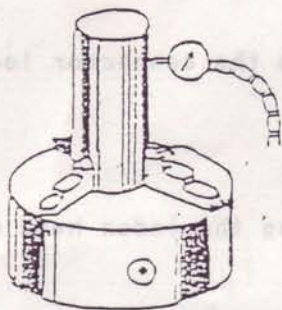
Clamp a test bar or workpiece with the chuck and apply a dial gauge to the outside of the test bar or workpiece.

Loosen the chuck set bolt (6 places) and adjust the runout with the adjust bolt provided on the side of the chuck until the runout is zeroed on the dial gauge during rotation.

Tighten the set bolt to fix the chuck.

2. OILING AND GREASING

Lubricate the unit after cleaning the grease nipple.

a) Supply spindle oil to the unit through the grease nipple located at the " 0 " indicator using an oil gun.

b) Grease the unit through the grease nipple (located at the bottom of unit) every 3 months.

PREPARATIONS

1) UNPACKING

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

a) INDEX HEAD WITH MOTOR & CABLE

b) CONTROL BOX (CPNC-100)

C) POWER CABLE   3.6 m (11.8 ft)

d) REMOTE CONTROL CABLE   5 m (16.4 ft)

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.)

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/cm^2 (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)

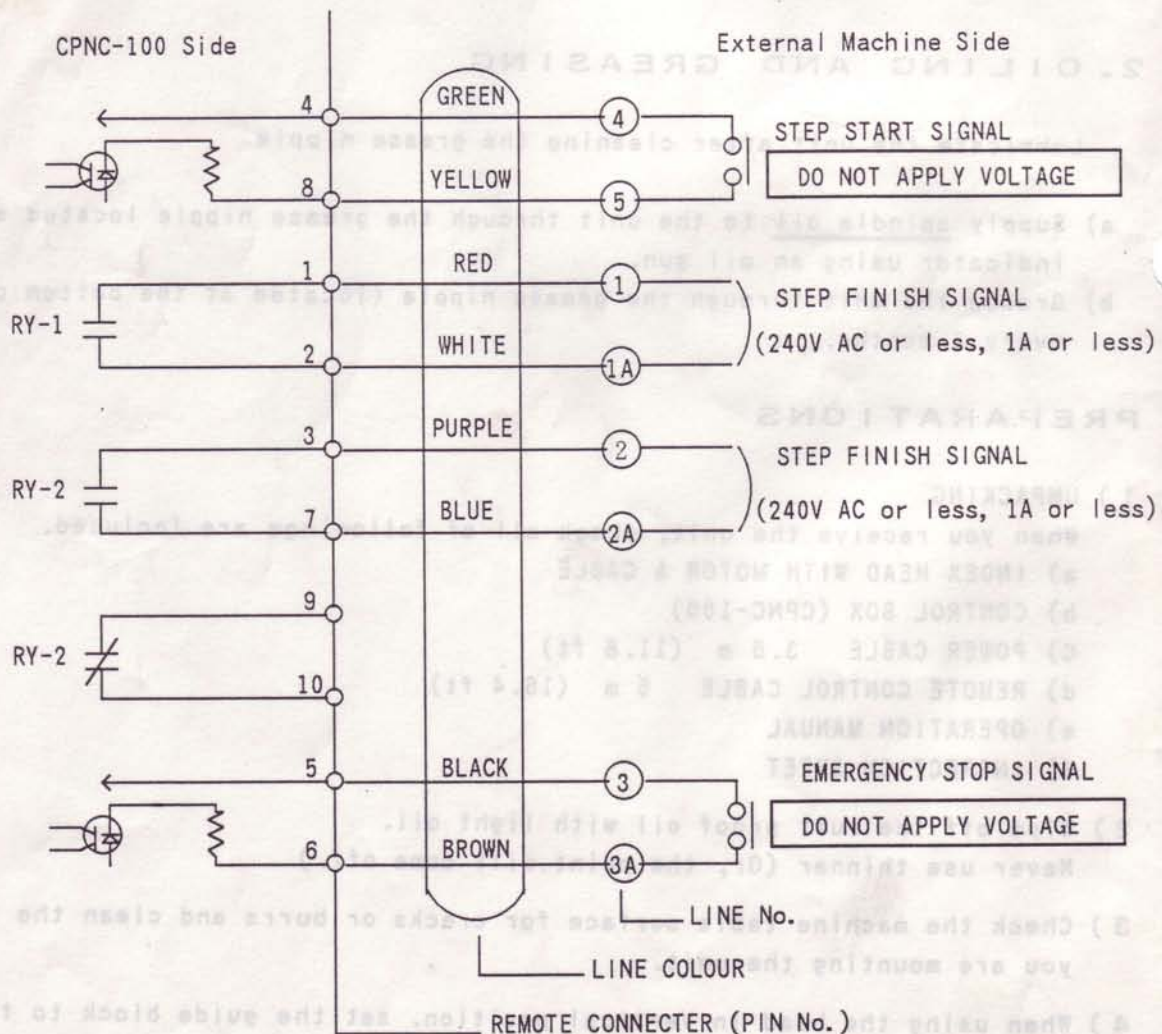   (Note) If you don't need air clamp function, air is not needed.

        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.

CPNC-100 Side   External Machine Side

Pin	Colour	Pin	Signal
4	GREEN	4	STEP START SIGNAL
8	YELLOW	5	DO NOT APPLY VOLTAGE
1	RED	1	STEP FINISH SIGNAL
2	WHITE	1A	(240V AC or less, 1A or less)
3	PURPLE	2	STEP FINISH SIGNAL
7	BLUE	2A	(240V AC or less, 1A or less)
9			
10			
5	BLACK	3	EMERGENCY STOP SIGNAL
6	BROWN	3A	DO NOT APPLY VOLTAGE

RY-1 (between lines 1 and 2)
RY-2 (between lines 3 and 7)
RY-2 (between lines 9 and 10)

LINE No.

LINE COLOUR

REMOTE CONNECTER (PIN No.)

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, howev—,

you can select which relay to be ON by setting of rc function.
(See P.19 for rc)

ome external machine will require you to set parameters, PA01 and PA02.
(See P.27 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
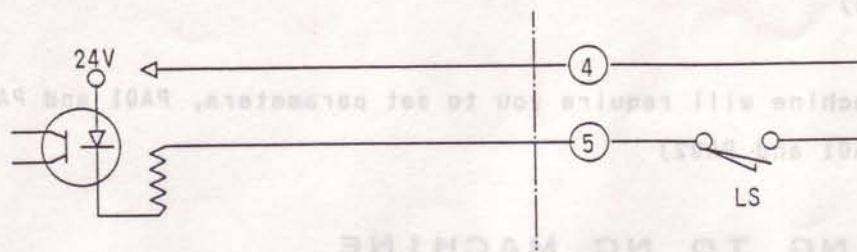external machine and is turned off while the external machine is operating.

CPNC-100 Side   External Machine Side

24V

4

5

CR
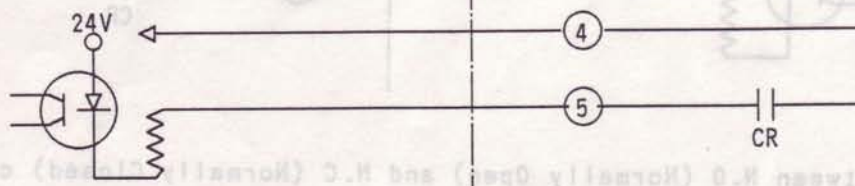
When outputting a position signal at which the table is returned after
completion of automatic cycle of an external machine by a limit switch.
(Turn off the limit switch by starting the table etc.)
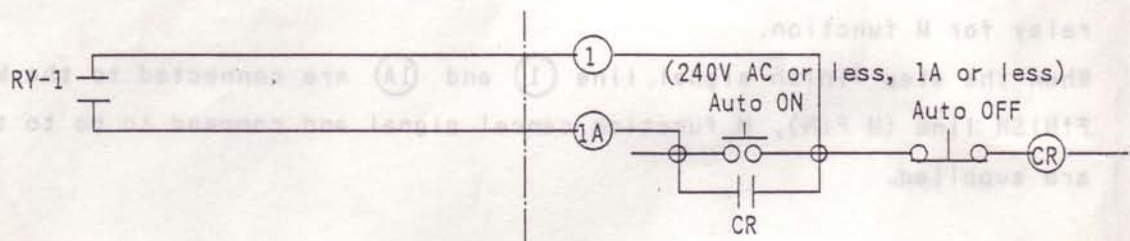
CPNC-100 Side   External Machine Side

b) Step (index) finish signal (external machine start signal)

The automatic input switch should have memory function by means of the relay.

CPNC-100 Side   External Machine Side

RY-1 ————————————————— ① (240V AC or less, 1A or less)
                       ⑴A   Auto ON   Auto OFF
                                               ————————————— (CR)
   CR

c) Emergency Stop Signal   NEVER APPLY VOLTAGE TO WIRES, ③ and ③A .

If a relay(which actuate when the Emergency stop switch of an external

machine is pushed) is furnished, utilize ③ and ③A for stopping the index

head.

After stopping the head by emergency stop switch, clear the error code by CE/ZERO

key of CPNC-100 and return the spindle to the Machine ZERO position.

(NOTE) You cannot stop external machine by pushing the Emergency Stop Switch

of CPNC-100.

CPNC-100 Side   External Machine Side
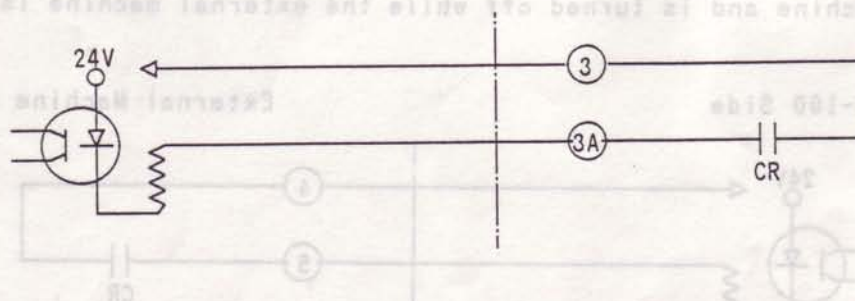
Switching between N.O (Normally Open) and N.C (Normally Closed) can be made by

setting PA18.

PA18 = 0   N.O. (Normally Open)

PA18 = 1   N.C. (Normally Closed)

FORMAT

1) STEP NO.

No.01 - 99   (17 MEMORY SYSTEM)

MEMORY CAPACITY 99 Steps × 17 PROGRAMS

2) SPECIAL COMMAND CODE

Hr 00 (G00)   MACHINE ZERO RETURN

Hr 0   (G0)   WORK ZERO RETURN

END99 (G99)   PROGRAM END (Can step up by $\boxed{\text{STEP} +}$ Key)

Arc98 (G98)   (desired) Angle Division.

nop97 (G97)   Program Dwell

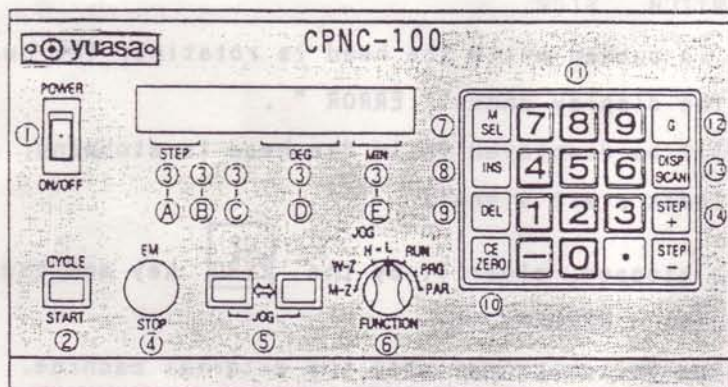JP96   (G96)   Program Jump

rJP95 (G95)   Program Return Jump

End89 (G89)   Program End (Cannot step up by $\boxed{\text{STEP} +}$ key)

3) MEMORY BACKUP BATTERY

10 year life from the Battery production Date.

Program to be memorized until " bALo " Alarm is displayed.

CONTROLLER PANEL

① POWER SWITCH		⑦ MEMORY SELECT KEY
② START SWITCH		⑧ INSERT KEY
③ DISPLAY	③-Ⓐ STEP No.	⑨ DELETE KEY
	③-Ⓑ MOTOR Z-PHASE DISPLAY	⑩ CLEAR KEY/WORK - ZERO
	③-Ⓒ FUNCTION DISPLAY	SET KEY
	③-Ⓓ DEGREE DISPLAY	⑪ DATA ENTRY KEY
	③-Ⓔ MINUTE DISPLAY	⑫ SPECIAL COMMAND CODE KEY
④ EMERGENCY STOP BUTTON		⑬ DISPLAY SCAN KEY
⑤ JOG (MANUAL) SWITCH		⑭ STEP (+),(-) KEYS
⑥ FUNCTION SWITCH		

EXPLANATIONS OF KEYS / SWITCHES

1) POWER SWITCH   ON / OFF

2) 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.

3) DISPLAY

     ③-Ⓐ   STEP No.   , 01 ~ 99

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

     ③-Ⓒ   FUNCTION DISPLAY

     ③-Ⓓ   DEGREE DISPLAY   ⎤
                              ⎥ ANGLE DISPLAY (in Sexagesimal System)
     ③-Ⓔ   MINUTE DISPLAY   ⎦

                     E. M
                     ◎
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 [CE ZERO] 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 ───┘
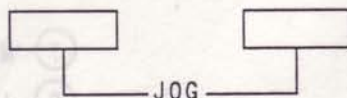
These switches can be used when the Function Switch is at JOG-H or JOG-L
position.

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 0.025°.

※ Also, this switch will be used for setting Machine - ZERO

     (See P.13 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.15 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 $\boxed{\text{DEL}}$

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 25.

* 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, 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.14)

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.14 (How to set the Work Zero) for PA19.

See P.14 (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 5°.

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 [CE ZERO] 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 [CE ZERO] 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).

    To make the Software Limit to be Non-effect (PA23=0), it can be done

    regardless of the spindle position.

    To make the Software Limit to be Effect, the spindle must be returned to the

    Work-Zero, and then make the limit effect (PA23=1).

d) "ERROR" Code Display

    When the indexer is running as per a program, the indexer will stop its

    motion before executing the step going over the software limit.

    When the indexer is jogging (JOG-H or JOG-L) and exceed the limit, "ERROR"

    will be displayed.

    Clear it with | CE ZERO | key, let the indexer jog back in the opposite direction

    and make Machine-Zero return.

    When making a Machine-Zero Return, if the indexer is going over the limit,

    the indexer will stop with "ERROR" display, therefore, reset the software

    limits to have the Machine-Zero be within the software limits.

HOW TO SELECT A PROGRAM

The Program capacity is 99 steps × 17 programs.

To select a program, set the Function Switch to PRG position, | M SEL | key is pushed,

" PRG " and present Memory No. will be blinking in the display.

At this time, enter a number between 1 and 17 with Data Entry key, and the Display shows entered No. If the Function Switch is set other than PRG position or $\boxed{\text{SEL} \atop \text{M}}$ key is pushed, the program (Memory) No. presently being displayed will be effective and Program Select Mode will be finished.

RETRY FUNCTION

When the pulse quantity detected by the encoder is shorter than the pulse quantity output by the Motor, you can retry only once to send short pulse quantity to the encoder by setting PA17.

PA17 = 0 ———— Retry is effective in motion error

PA17 = 1 ———— Disables retry in motion error

※ The speed of retry will be done at the F (Feed) rate programmed.

BUZZER SOUND IN ERROR CONDITION

The built — in Buzzer will sound for 0.3 seconds in error conditions.

Brake Error	(E4)
Stopped by Stop Command	(E8)
Encoder Error	(EA, Eb)
Emergency Stop	(EC, Ed)
Software Limit Over Error	(EE)

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 canc   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 25 (25 rpm).

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		F0	F1	F2	F3	F4	F5	F25
03	04							
O	O	0.5	1	2	3	4	5	25
1	O	0.25	0.5	1	1.5	2	2.5	12.5
O	1	0.125	0.25	0.5	0.75	1	1.25	6.25

L - FUNCTION

When this function is used in a program Step No., the controller repeats the program

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 executed

only once, however, when you enter a number (for repeat) between 2~999, the program

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-100 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.

Program entry can be done only when the Function Switch is at PRG position.

To enter a program, set the Function Switch to PRG, push $\boxed{\text{SEL}}^{\text{M}}$ key, enter desire

memory No. (1 ~ 17) and push $\boxed{\text{SEL}}^{\text{M}}$ key again to have the Memory No. effective.

To clear the whole program previously entered in the selected Memory, push and hold

$\boxed{\begin{array}{c}\text{CE}\\\text{ZERO}\end{array}}$ key for 5 seconds, whole the program will be cleared and the L (Loop Count),

rc (Remote Control) and F (Feed Rate) will be reset to following values;

L = 1

rc = 01

F = 25 (25 rpm)

When the whole program has been cleared (ALL CLEAR) with PA 7 =00, all steps in the

memory will contain 0° .

When ALL CLEAR is done with PA 7 =10, the Step No. 01 will be 0° and further Step No.

(No. 02 - 99) will contain END 99.

When entering a new program, always do All CLEAR to clear previous program, enter

new one according to following examples.

(NOTE) WHEN SETTING THE POWER ON, ALWAYS DO MACHINE — ZERO RETURN BEFORE STARTING
OPERATION.

Following are the programing examples after the indexer's spindle gets at the

Machine — Zero and the PA07 is set to 10.

PROGRAMMING EXAMPLE

1 Indexing

PRG		01 nnn.nn	(BLINK)
CE ZERO	Press and hold for 5 seconds		
		01 000.00	(BLINK)
Enter 90		01 90	(BLINK)
STEP +		02 End 99	(BLINK)
RUN		01 Pnnn.nn	(STEADY)
START	Run the program		
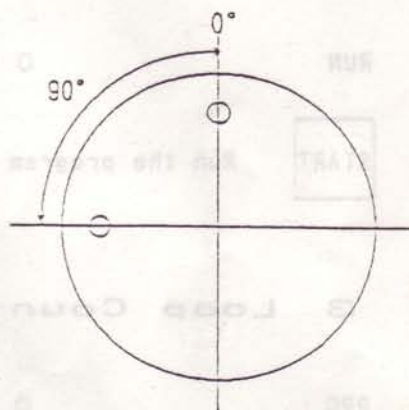
*Indexing 90°.

2 Feed Rate

PRG		01 nnn.nn	(BLINK)
CE ZERO	Press and hold for 5 seconds		
		01 000.00	(BLINK)
Enter 45		01 45	(BLINK)
STEP +		02 End 99	(BLINK)
Enter 180		02 180	(BLINK)
DISP SCAN		02 F 25	(BLINK)
Enter 1		02 F 1	(BLINK)
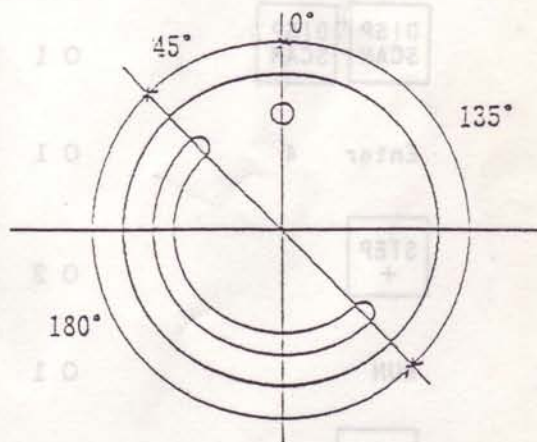
*After moved to 45° making
180° cutting feed and then
indexes 135°.

STEP +	0 3 End 99	(BLINK)
Enter 135	0 3 135	(BLINK)
STEP +	0 4 End 99	(BLINK)
RUN	0 1 P n n n . n n	(STEADY)
START Run the program		

3 Loop Counts

PRG	0 1 n n n . n n	(BLINK)
CE ZERO Press and hold for 5 seconds		
	0 1 000.00	(BLINK)
Enter 90	0 1 90	(BLINK)
DISP SCAN DISP SCAN	0 1 L 001	(BLINK)
Enter 4	0 1 L 4	(BLINK)
STEP +	0 2 End 99	(BLINK)
RUN	0 1 P n n n . n n	(STEADY)
START Run the program		
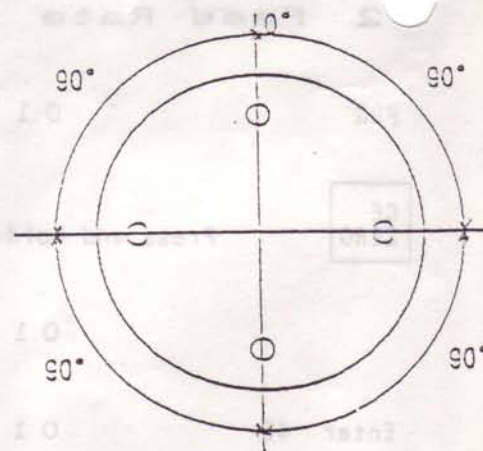
*90° Indexing x 4.

4 Equal Circle Division

PRG	0 1	nnn.nn	(BLINK)
CE ZERO Press and hold for 5 seconds			
	0 1	000.00	(BLINK)
Enter **G** 98	0 1	G 98	(BLINK)
DISP SCAN **DISP SCAN** **DISP SCAN**	0 1	L 001	(BLINK)
Enter 23	0 1	L 23	(BLINK)
STEP +	0 2	End 99	(BLINK)
RUN	0 1	Pnnn.nn	(STEADY)
START Run the program			

*Dividing 360° into 23 equal parts.
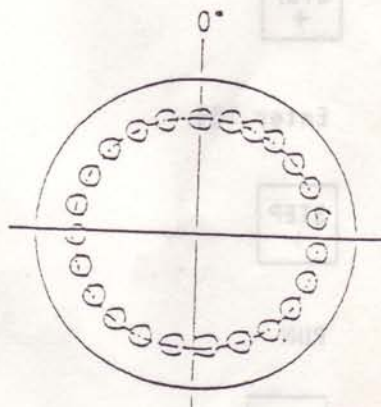
5 (any)Arc Angle Division

PRG	0 1	nnn.nn	(BLINK)
CE ZERO Press and hold for 5 seconds			
	0 1	000.00	(BLINK)
Enter **G** 98	0 1	G 98	(BLINK)
DISP SCAN	0 1	360.00	(BLINK)
Enter 90	0 1	90	(BLINK)
DISP SCAN **DISP SCAN**	0 1	L 001	(BLINK)
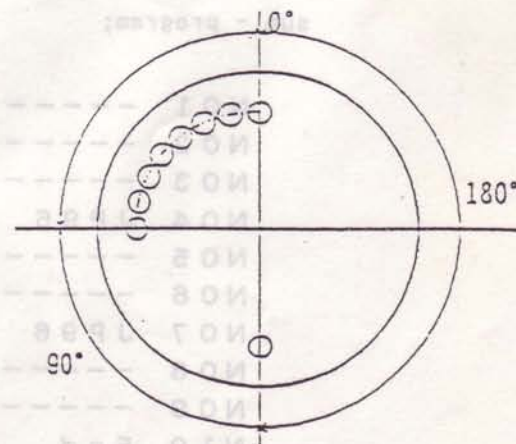
*Dividing 90° into 7 equal parts, and indexing 90° and 180°.

Enter 7	0 1	L	7	(BLINK)

[STEP +]	0 2	End	99	(BLINK)

Enter 90	0 2	90		(BLINK)

[STEP +]	0 3	End	99	(BLINK)

Enter 180	0 3	180		(BLINK)

[STEP +]	0 4	End	99	(BLINK)

RUN	0 1	Pnnn.nn		(STEADY)

[START]	Run the program

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.

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

```
N O 1  -------- ⎫
N O 2  -------- ⎬
N O 3  -------- ⎭
N O 4  JP96  L11 ⎬
N O 5  -------- ⎫
N O 6  -------- ⎬
N O 7  JP96  L11 ⎬
N O 8  -------- ⎫
N O 9  -------- ⎬
N 10  End      99
```

SUB-PROGRAM
```
N 1 1  --------
N 1 2  --------
N 1 3  --------
N 1 4  --------
N 1 5  --------
N 1 6  rJP      95
N 1 7  End      99
```
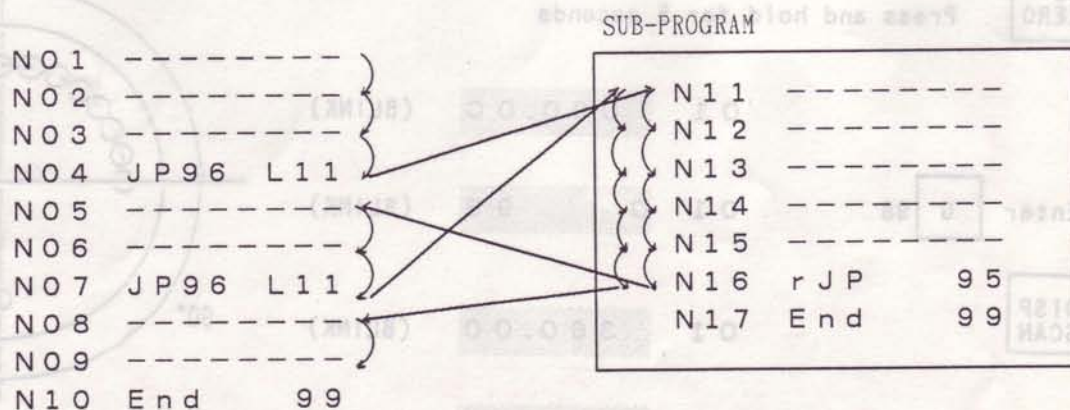
Program Jump Function (2)

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    -----------
                              Program for B - Product
N  26    -----------
- - - - - - - - - -
N  44    JP96    L 2
N  45    -----------
N  46    -----------
- - - - - - - - - -            Program for C - Product
N  68    -----------
N  69    JP96    L 3
N  70    -----------
N  71    -----------
                              Program for D - Product
N  98    JP96----L 4
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 $\boxed{\text{STEP} +}$ 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 $\boxed{\text{STEP} +}$ or $\boxed{\text{STEP} -}$ key.

3) Get the data to be changed by $\boxed{\text{DISP SCAN}}$ Key.

4) Clear the data by [CE ZERO] key and enter a new data there.

   * As this Arc 98 (G98) cannot be cleared by [CE ZERO] key, to change Arc 98 (G98) to other data, delete the program step No. contains Arc 98 by using [DEL] key and enter a new data after pushing [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 [STEP +] or [STEP -] key.

3) Change the value of the Parameter to 0 or 1.
   (Pushing [-] key will cause the value change to opposite one.)

   * Special setting methods are required for PA19, PA24, and PA25.
   See P.14 (How to set the Work - Zero) for PA19.
   See P.14 (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 (CPDX-4 = 0)
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 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)

rc	OUTPUT	For Automatic Machine ⟨1⟩	For NC Machine	For Automatic Machine ⟨2⟩	For External Machine Control
PA01		O	1	O	1
PA02		O	O	1	1
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.18 for the relations between Feed rates and Parameters.

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 :   Setting gear Ratio

    PA 09 = 0 This Parameter must be set to 0. (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 17 :   RETRY ON POSITIONING ERROR

    PA 17 = 0 OK to Retry only once at Programmed Feed rate.

PA 17 = 1   Disables RETRY.

16) PA 18 :   CHANGING EMERGENCY STOP INPUTS

PA 18 = 0   N.O   (Normally Open)

PA 18 = 1   N.C   (Normally Closed)

*   Changing N.O / N.C of remote control cable wires (③ , ③A) for Emergency
   Stop Inputs.

17) PA 19 :   WORK - ZERO SETTING DATA
   See P.14 for how to set Work Zero.

18) PA 22 :   0 / 1 MACHINE ZERO (M-Z) SEARCH   (INVALID / VALID)

19) PA 23 :   SOFTWARE LIMIT DATA CONTROL

PA 23 = 0   INVALID LIMIT DATA

PA 23 = 1   VALID LIMIT DATA

   See P.14 for details.

20) PA 24 :   SOFT LIMIT DATA SETTING IN (+) DIRECTION
   Setting Range : 0° ~ +179°

21) PA 25 :   SOFT LIMIT DATA SETTING IN (-) DIRECTION
   Setting Range : 0° ~ -179°

MAINTENANCE & ADJUSTMENT

The unit has been fully inspected and adjusted before shipment, however,
following maintenance and adjustment are required after long use.

1) WORM GEAR BACKLASH

The backlash has been adjusted within ±1' at the factory, however, you are
requested to adjust it after long use.

a) How to measure the backlash

Fix the unit in Horizontal position to a machine table, shut off the air
and remove the air brake hose. Apply a dial indicator to a chuck jaw near
to the outside of the chuck, and turn the chuck to the right and to the
left, and read the dial for the backlash on the worm gear part.

The measurement must be taken at 3 points and if the minimum measurement
is more than the tolerance shown in following chart, the backlash
adjustment is required.

mm (inch)

MODEL No.	TOLERANCE
CPDX- 4	0.03 (0.0012)

b) How to adjust the Worm Gear Backlash.

1. Remove the Bolts ⑦⑧ .

   Rotate the motor until you can see the coupling set sscrew ⑥⓪ b⃥ ⃥he
   jog feed, and loosen the set screw with a wrench handle.

Two coupling set screws are located at 90° apart each other.
Loosen both of them.

2. After removing 4 Bolts ⑦② fixing the Motor Cooling Fin Cover ⑦③ ,
   pull out the motor cables (being loosely laying inside of the Cooling
   Fin ⑥⑧) very carefully.

3. Remove the 2 Bolts ⑦⓪ fixing the Motor Cooling Fin ⑥⑧ ,pull out the
   Cooling Fin very carefully.

4. Remove the 4 Bolts ⑥⑥ fixing the Motor ⑥④ , and remove the motor
   from the main body.
   The motor will come off with the coupling.

5. Loosen the Bolt ⑥③ fixing the Motor Flange ⑥② slightly.

6. Also loosen the 2 bolts ⑧ fixing the Metal Thrust Plate ⑨ slightly.

7. When you have removed 2 bolts ⑧⓪ , you can see 2 set Screws ⑤⑥
   inside of the tapped holes.
   To decrease the backlash, loosen
   the Ⓐ set screw slightly and then
   tighten Ⓑ set screw to that extent.
   Oppoite procedure will cause
   increasing the backlash.
   After tightening the Ⓐ and B set
   screws slightly and finihing the backlash
   adjustment, tighten the bolts ⑧ fixing
   the Metal Thrust Plate ⑨ .
   After tightening the ⑧ bolts tighen the
   Ⓐ , Ⓑ set screws with even force again.
   Then, tighten the Bolts ⑧⓪ coming with the Seal Washers ⑦⑨ .

8. Tighten the 2 Bolts ⑥③ fixing the Motor Flange ⑥② to the indexer
   main body.

9. The Worm Shaft ⑤② has keyway-like plain cut positioning coupling set
   screw, therfore, align the plain cut with the hole for the Bolt ⑦⑧ ,
   then insert the Bolt ⑦⑧ into the hole after aligning the coupling set
   screw with the bolt ⑦⑧ hole.
   Fix the motor with 4 Bolts ⑥⑥ .

＊When doing this, apply silicone etc., to both faces of motor Cooling Fin
   Packing ⑥⑦ , then put it back between the motor flange and the motor.

10. Insert a wrench into the Bolt ⑦⑧ hole, and tighten up the 2 coupling
    set screws.

11. Cover the motor with the Motor Cooling Fin ⑥⑧ and fix the Fin with 2
    Bolts ⑦⓪ .
    When doing this, always apply silicone, etc., to the mounting face of
    the Fin.
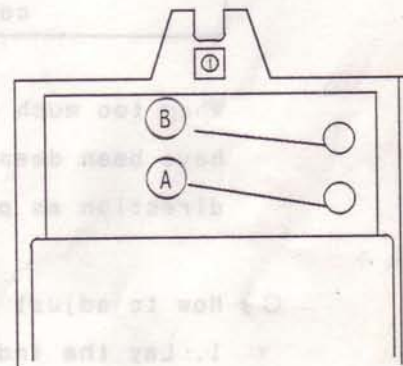
12. Put back the motor cables into the clearance of the Motor Cooling Fin
    ⑥⑧ so that the wire connector part can stay inside of the Motor
    Cooring Fin Cover ㉛ .
    Apply silicone, etc,. to the Packing ㉔ and put it on the motor
    cooling fin, then fix the Cover ㉛ with 4 Bolts ㉒ .

When too much backlash is still measured even if the worm and worm shaft
have been deeply engaged, adjust the backlash adjustment in thrust
direction as per following procedures.

C) How to adjust the backlash in thrust direction.
1. Lay the indexer to have the chuck face up, remove the Bolts ⑧ , and
   then remove the Metal Thrust Plate ⑨ .
2. When you have removed the Bolt ㉗⑥ , you will find the ㊹⑧-② lock
   screw for the thrust screw, loosen it slightly.
3. Tighten the Thrust Screw ㊸ through the hole (from where you have
   removed the thrust plate) to decrease the backlash in thrust direction.
4. After finishing the backlash adjustment, tighten the Lock Screw ㊹⑧-②

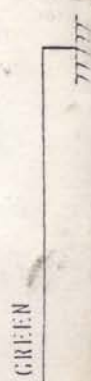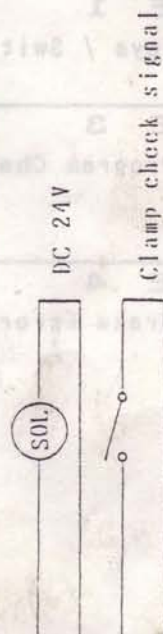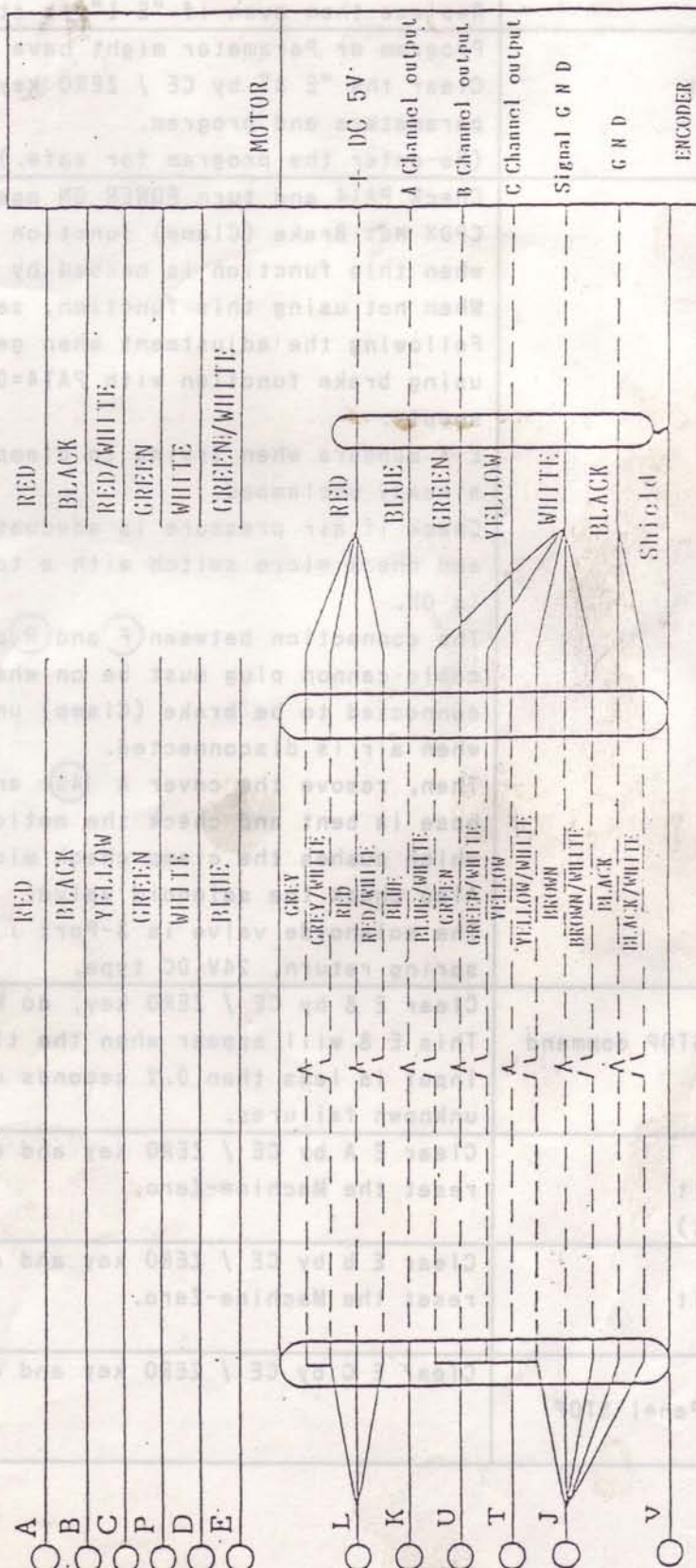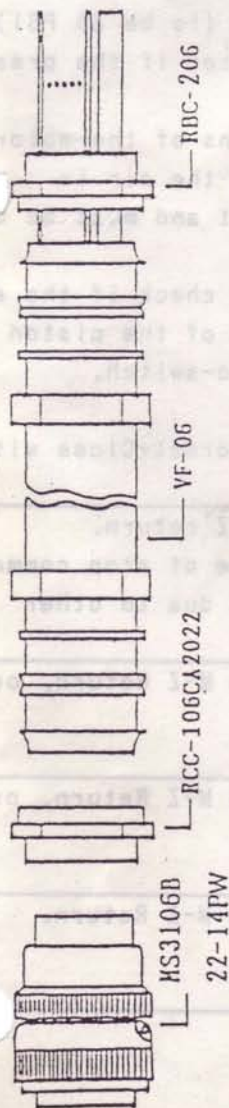To reassemble it, do above procadures in the reversed order.

MOTOR WIRING DIAGRAM

MOTOR
- RED
- BLACK
- RED/WHITE
- GREEN
- WHITE
- GREEN/WHITE

— DC 5V — RED
A Channel output — BLUE
B Channel output — GREEN
C Channel output — YELLOW
Signal G N D — WHITE
G N D — BLACK
ENCODER — Shield

DC 24V — BROWN, WHITE
Clamp check signal — GREY, GREY   (SOL.)
GREEN

RBC-206
VF-06
RCC-106CA2022
HS3106B
22-14PW

RED, BLACK, YELLOW, GREEN, WHITE, BLUE, GREY/WHITE, RED/WHITE, BLUE/WHITE, GREEN/WHITE, YELLOW/WHITE, BROWN/WHITE, BLACK/WHITE, BROWN, WHITE, GREY, GREY, GREEN

A B C P D E L K U T J V H S R F P M N G

SELF 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 on when air is disconnected. Then, remove the cover A (40) 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 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 switch	Clear E C by CE / ZERO key and do M-Z Return.

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.