CONAIR
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USERGUIDE

MNL-00007

EX - 30, 60, 150
EXF - 30, 60, 150

⚠ **WARNING - Reliance on this Manual Could Result in Severe Bodily Injury or Death!**

This manual is out-of-date and is provided only for its technical information, data and capacities. Portions of this manual detailing procedures or precautions in the operation, inspection, maintenance and repair of the product forming the subject matter of this manual may be inadequate, inaccurate, and/or incomplete and cannot be used, followed, or relied upon. Contact Conair at info@conairgroup.com or 1-800-654-6661 for more current information, warnings, and materials about more recent product manuals containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

INDEX

A. AUTOMATIC PICK AND PLACE MECHANISM

1. Concept

The EX/EXF robot will take the product(s) and/or sprue runner system molded by the injection molding machine, and bring out from the machine by the arm swing. This model is mounted on the fixed platen of the injection machine ranging from 25 to 150 tons.

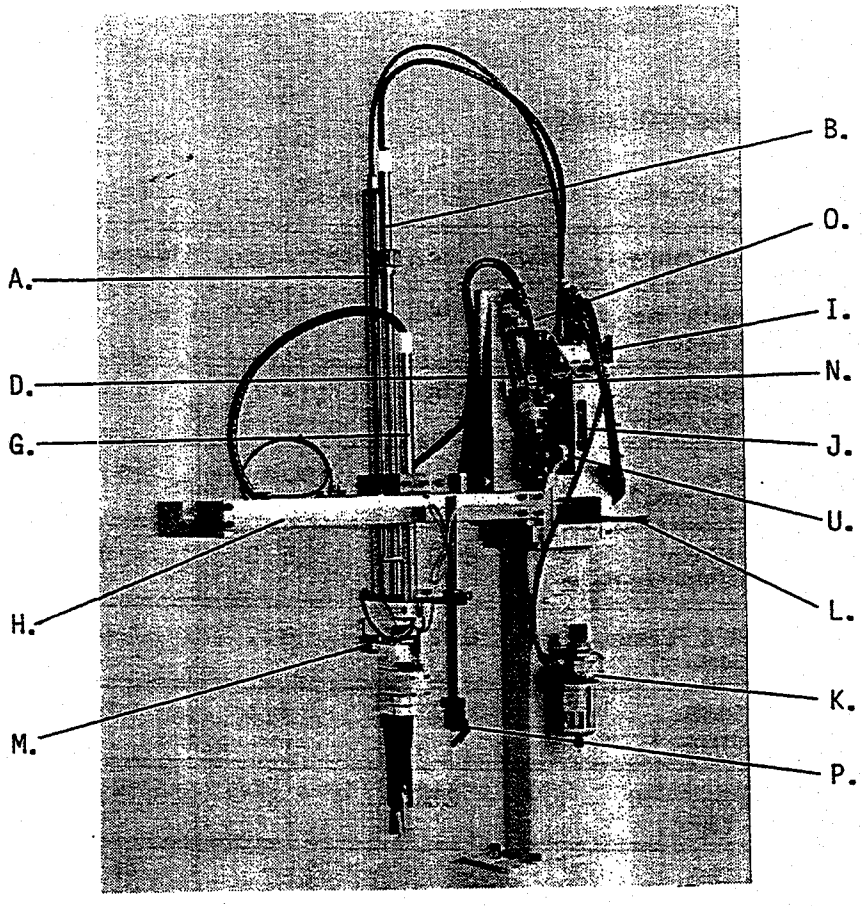
It gets possible not only to save man power but also to get high quality products because of constant cycle time (condition) by using the robot.

EXF-robot has an additional function to EX-robot with the gripper's wrist rotation by 90° to release the part(s) at horizontal position from the vertical position when it is taken out from the cavity.

In addition to the vacuum suction system for the gripping of part(s), this model is capable to adopt mini cylinders and nippers for wider range of applications.

2. External view

A. Main arm cylinder
B. Stroke bar
C. Kick cylinder
D. Swing cylinder
E. Finger
F. Gripper
G. Conduit pipe
H. Kick frame
I. Air solenoid valve
J. Connecting terminal
K. F.R unit
L. Ratchet lever
M. Main arm upward end LS
N. Swing outward end LS
O. Swing inward end LS
P. Parts verification LS
Q. Slide unit
R. Exhaust cleaner
S. Main arm lock cylinder
T. Swing arm
U. Swing angle adjusting bracket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D.
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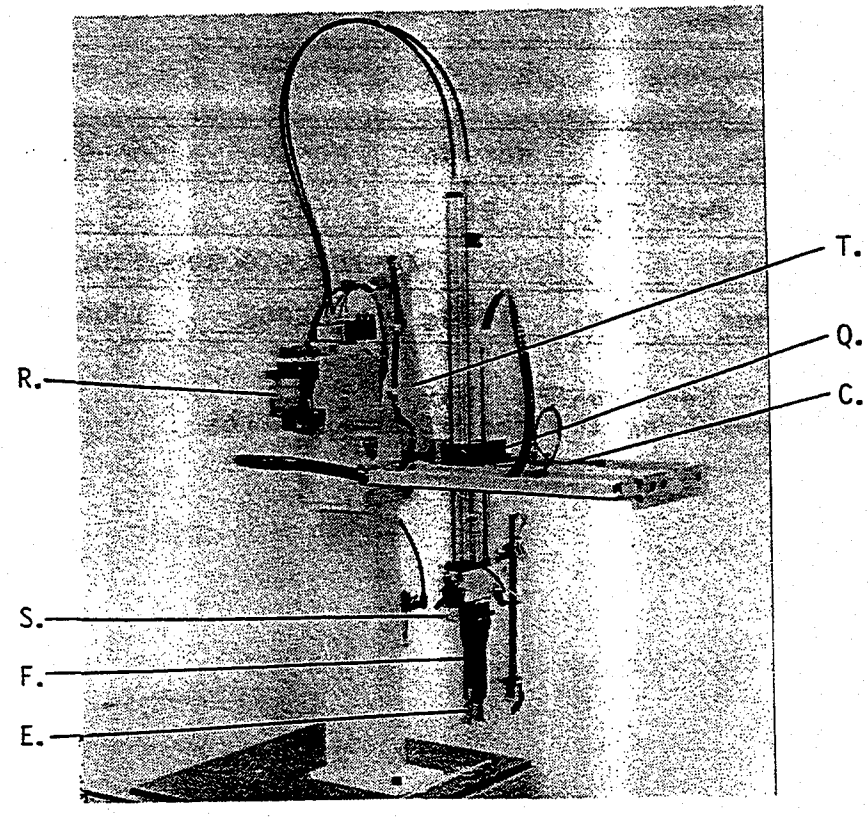

R.
S.
F.
E.
T.
Q.
C.

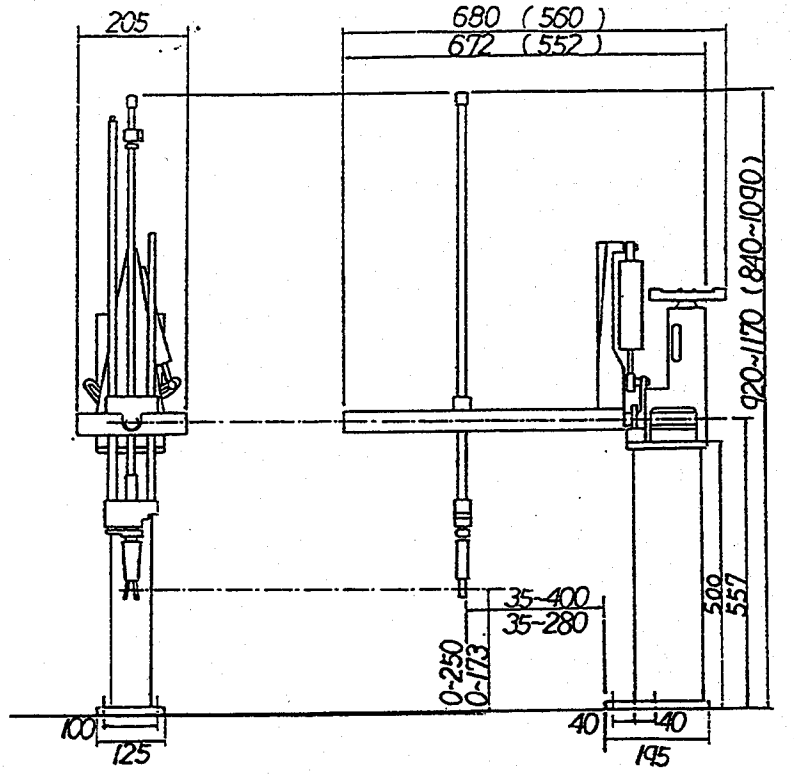
B. SPECIFICATIONS

1. Standard specifications

Description / Model	EX - 60	EXF- 60	EX -150	EXF-150
Injection machine size range (ton)	25 - 60	25 - 60	60 - 150	60 - 150
Working pressure (kg/cm^2)	4 - 6	4 - 6	4 - 6	4 - 6
Max. pressure (kg/cm^2)	9.0	9.0	9.0	9.0
Air consumption (Nℓ/cycle)	5.3	5.3	5.8	5.8
Min. take out time (sec.)	0.7	0.7	0.7	0.7
Min. cycle time (sec.)	3.0	3.0	3.0	3.0
Gripper center to top platen (mm)	0 - 250	0 - 173	0 - 250	0 - 173
Pivot point to top platen (mm)	557	557	557	557
Max. main arm stroke (mm)	0 - 450	0 - 450	0 - 550	0 - 550
Max. kick stroke (mm)	0 - 75	0 - 75	0 - 75	0 - 75
Swing angle	50°-90°	50°-90°	50°-90°	50°-90°
Weight (kg) [*]	25	25	27	27
Power supply	AC-100,110,200,220,240V			
Max. payload [**]	1000g	500g	1000g	500g

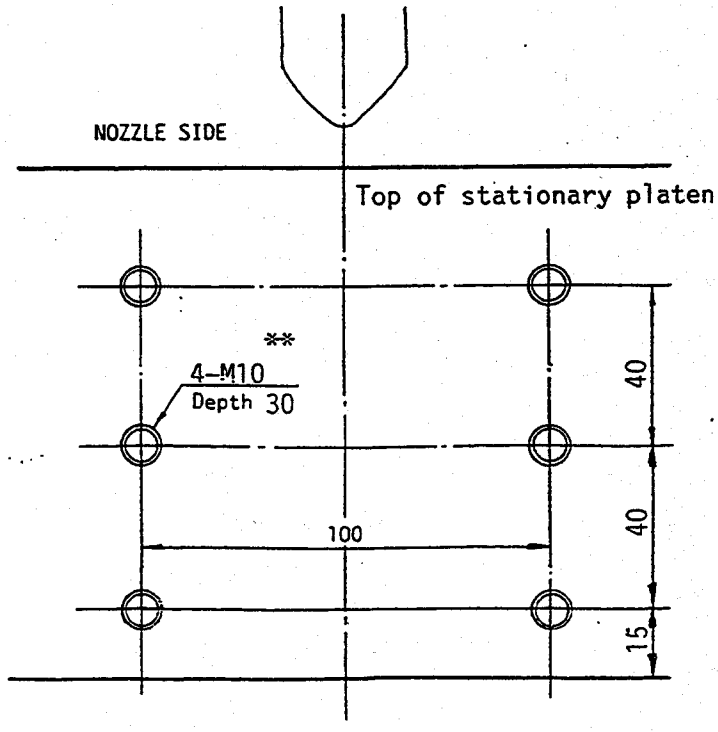
* : Less control box
** : Including the end of arm tooling

2. Dimensions



EX(F)-150,(EX(F)-60)

ROBOT MOUNTING TAP HOLES



** Make 4 tap holes as mentioned in (C - 2).

3. Standard sequence

Following motion sequences are available by selecting switch (RSW-2) on control box.

a) Release parts outside mold

A : U type motion
Pick-up molded parts from movable mold

B : U type motion
Pick-up molded parts from stationary mold

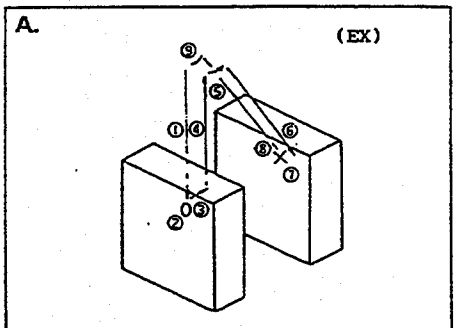
C : L type motion
Pick up molded parts from movable mold

D : L type motion
Pick-up molded parts from stationary mold

** To change parts release side whether operator side or rear side, please refer " C. FUNCTION AND ADJUSTMENT "

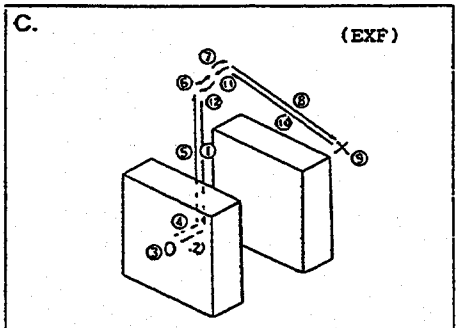
FOR 2—PLATE MOLDS

A. (EX)



① Extension downward
② Grip
③ Kick backward
④ Retraction upward
⑤ Swing outward
⑥ Extension outward
⑦ Release
⑧ Retraction inward
⑨ Swing inward to home position

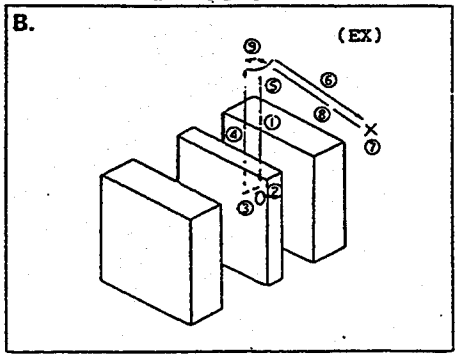
C. (EXF)



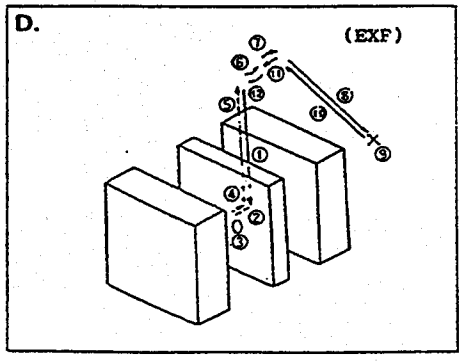
① Extension downward
② Kick forward(approach)
③ Grip
④ Kick backward(strip-off)
⑤ Retraction upward
⑥ Swing outward
⑦ Positioning
⑧ Extension outward
⑨ Release
⑩ Retraction inward
⑪ Positioning back
⑫ Swing inward to home position

FOR 3—PLATE MOLDS

B. (EX)



D. (EXF)



b) Release parts inside mold

E : U type motion
Pick-up molded parts from movable mold

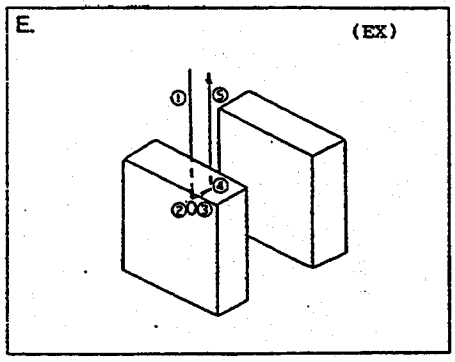
F : U type motion
Pick-up molded parts from stationary mold

G : L type motion
Pick up molded parts from movable mold

H : L type motion
Pick-up molded parts from stationary mold

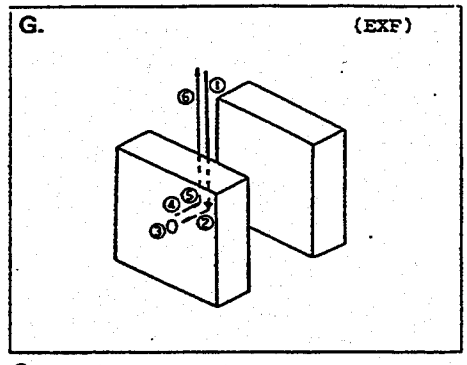
FOR 2–PLATE MOLDS

E. (EX)



① Extension downward
② Grip
③ Kick backward (strip-off)
④ Release
⑤ Retraction upward

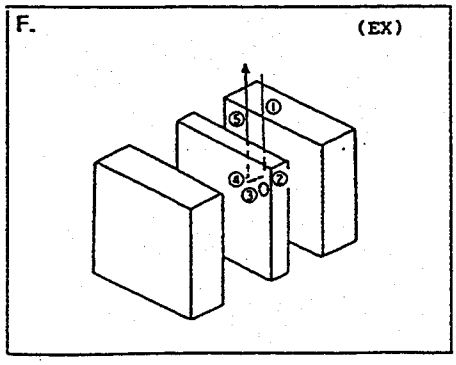
G. (EXF)



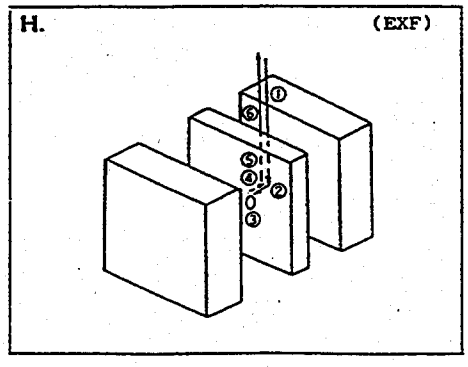
① Extension downward
② Kick forward(approach)
③ Grip
④ Kick backward(strip-off)
⑤ Release
⑥ Retraction upward

FOR 3–PLATE MOLDS

F. (EX)



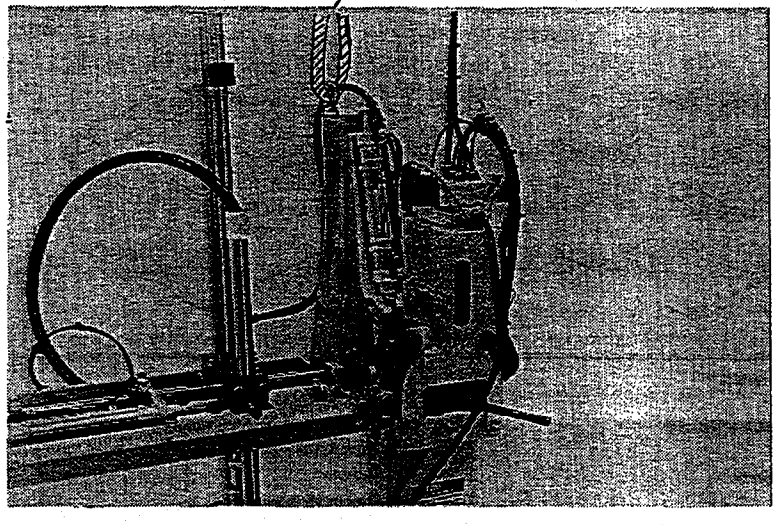
H. (EXF)



C. FUNCTION AND ADJUSTMENT

1. Lifting the robot up

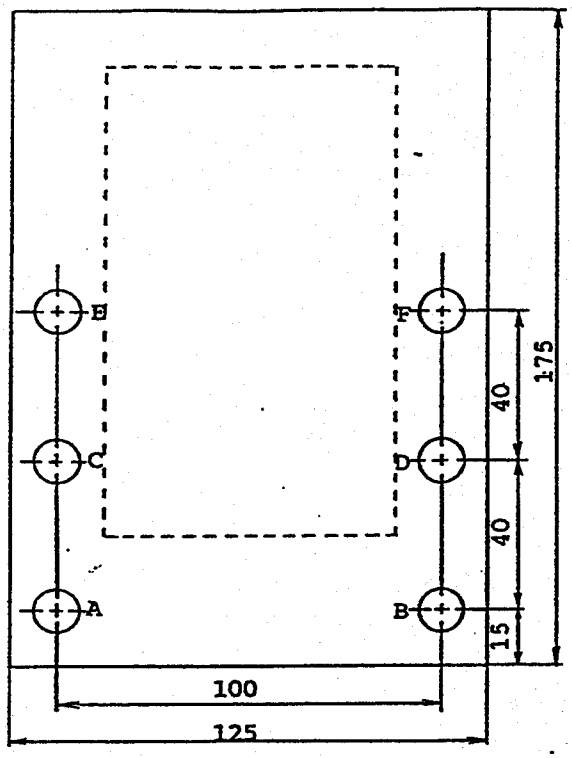
When lift the robot up, please suspend it by textile belt as the picture is shown which avoid to be damaged.
This designated way of lifting is only recommendable. If get damage lifting by the other way which would be out of our gurantee.



2. Mounting and setting home position

a) Mounting
To be set the robot on the top of stationary platen.
6 holes on the base of robot can be used for it. Select 4 holes and fix tightly with 4 setting screws.
(A,B,C & D or C.D.E & F or A,B,E & F)

MOUNTING BASE



b) Home position setting

It is available to fix a home position in the following ranges on the EX series robot.

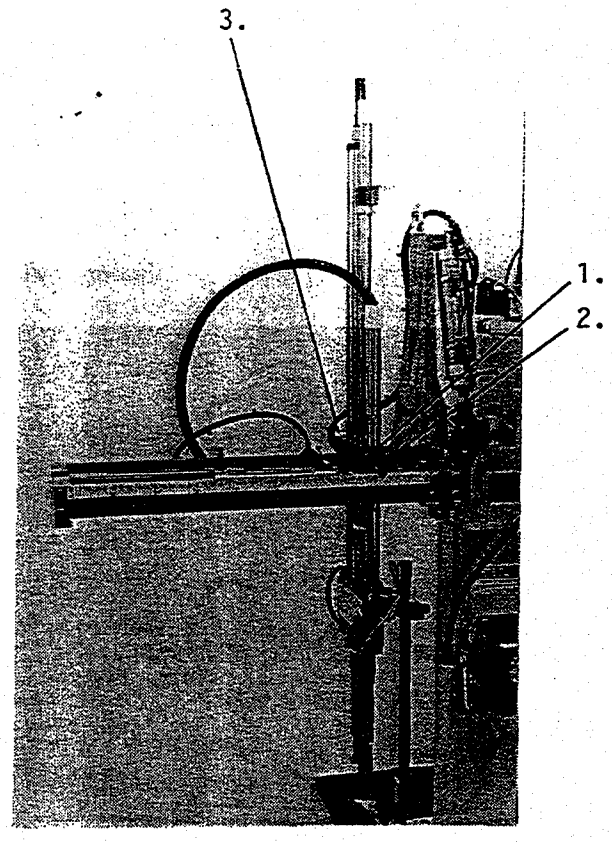
	Y axis adj.	X axis adj.
EX - 60	0 - 250 mm	35 - 280 mm
EX - 60	0 - 173 mm	35 - 280 mm
EX - 150	0 - 250 mm	35 - 400 mm
EXF - 150	0 - 173 mm	35 - 400 mm

* Y axis adjustment (Vertical)

1. Loosen the screws 1 and 2.
2. Loosen the screw 3 with holding main arm.
3. Set the gripper height to proper position by move the main arm up and down.
4. Tighten 1 and 2, then tighten 3.

* X axis adjustment (Horizontal)

1. Exhaust compressed air completely.
2. Loosen the screws 4 and 5.
3. Move the slide unit and set to the proper position. The head of shock absorber have to be pressed against the slide unit.
4. Tighten the screws 4 and 5.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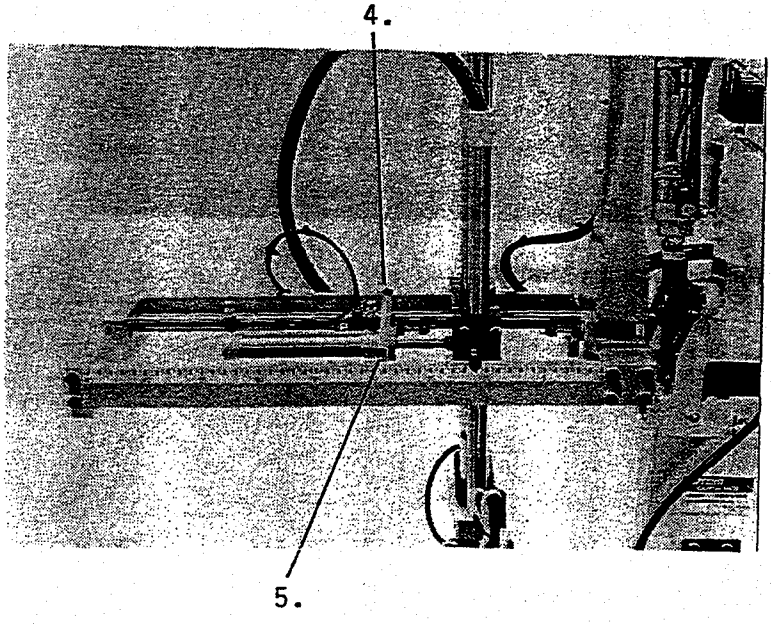
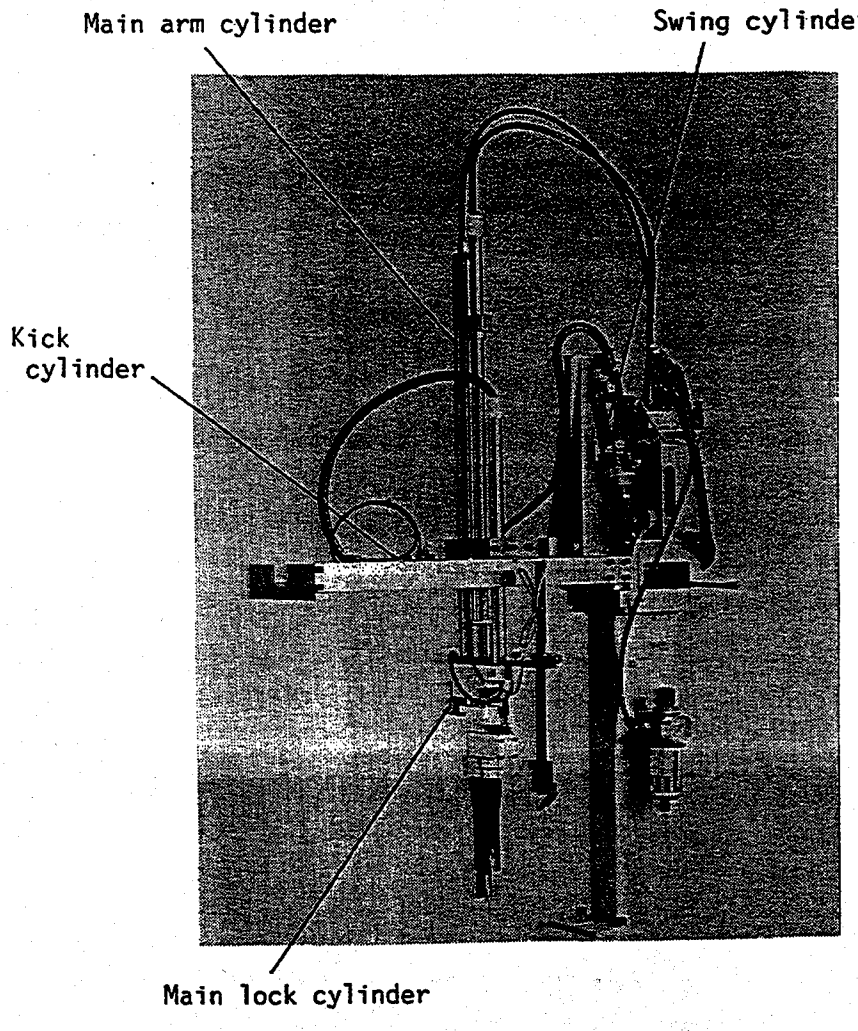

4.
5.


Main arm cylinder
Swing cylinder
Kick
cylinder
Main lock cylinder

3. Main arm stroke adjustment

   a) Exhaust compressed air completely.

   b) Pull out the main arm lock cylinder rod by hand using an M4 screw.

   c) Untighten main arm cylinder stopper and draw the main arm cylinder down so as the fingers come to the proper position to take hold the part.

   d) Keeping the proper position as set, fix the main arm cylinder stopper by tightening the set-screw with pressing down the stopper completely against the air cushion bush.

4. Kick stroke adjustment

   a) Exhaust compressed air completely.

   b) To fix the stationary mold side, set B at the proper position.

   c) To fix the movable mold side, move C to the proper position, it can be adjusted by moving shock absorber precisely.

5. Change swing out direction and angle

The robot has been set at operator side parts release position when shipped from our factory.

The swing out derection and swing angle are easily changed by following manner.

EX series

a) Exhaust compressed air completely.

b) Loosen the nut.

c) Set swing out direction and angle.

d) Tighten the nut.

e) Do not set in the area of oblique lined.

EXF series

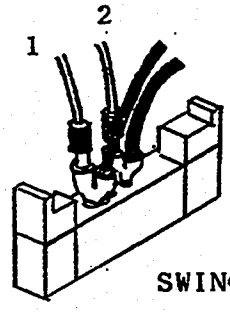
In addition to the above mentioned procedure, following change is necessary.

f) Reverse the tubing (4mm dia.) for wrist rotation mechanism as shown.

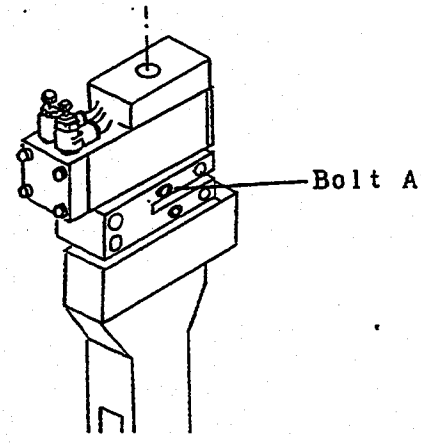
g) Supply compressed air, then gripper rotates by 90 degrees.

h) Loosen the bolt A and set the gripper to proper position (rotate 90 degrees) by hand, then tighten the bolt A.

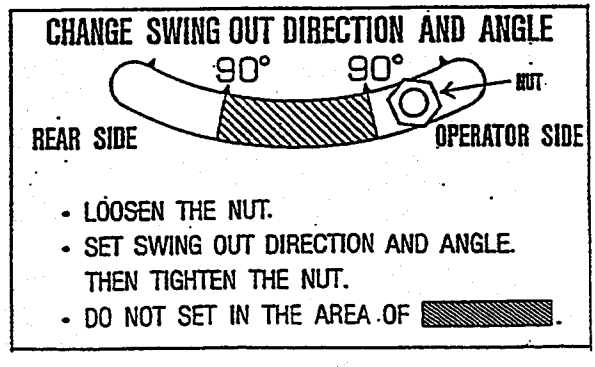
Reverse tubing
1 and 2



SWING valve



Sticker affixed on the terminal case



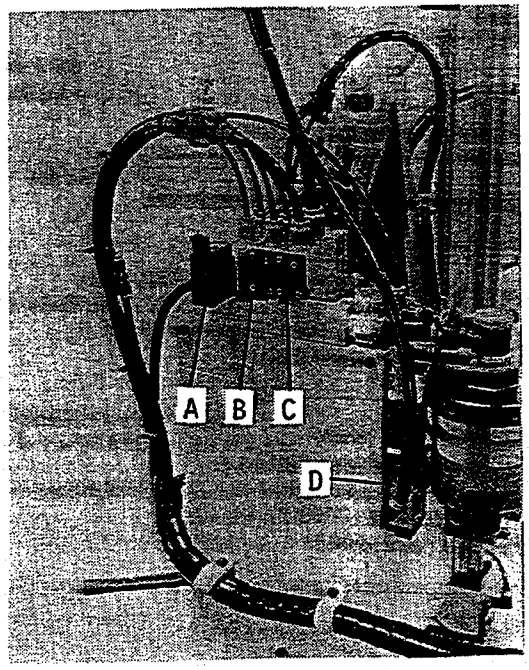
6. Air solenoid valves

Air Soloenoid Valves regulating movement of cylinders are located behind the swing cylinder in the following order. Stickers indicating function of each valves are affixed on the manifold block.

No.	FUNCTION	TYPE OF VALVE
A	SWING & WRIST ROTATION (EXF)	180 - 4E2 (24V DC) Double solenoid valve
B	KICK FORWARD / BACKWARD	180 - 4E1 (24V DC) Single solenoid vavle
C	MAIN UP/DOWN	180 - 4E1 (24V DC) Single solenoid valve
D	GRIP	181 - E1 (24V DC) Single solenoid vavle

Manufacturer : KOGANEI

For manual operation, a manual button at the top of the coil case installed in the body of valve should be pressed.



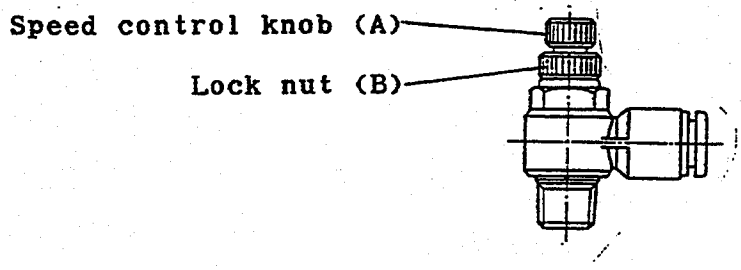
7. Air cylinder speed control

The working speed is controlled by controlling knob A and lock nut B.
The usage of those two is as follows.

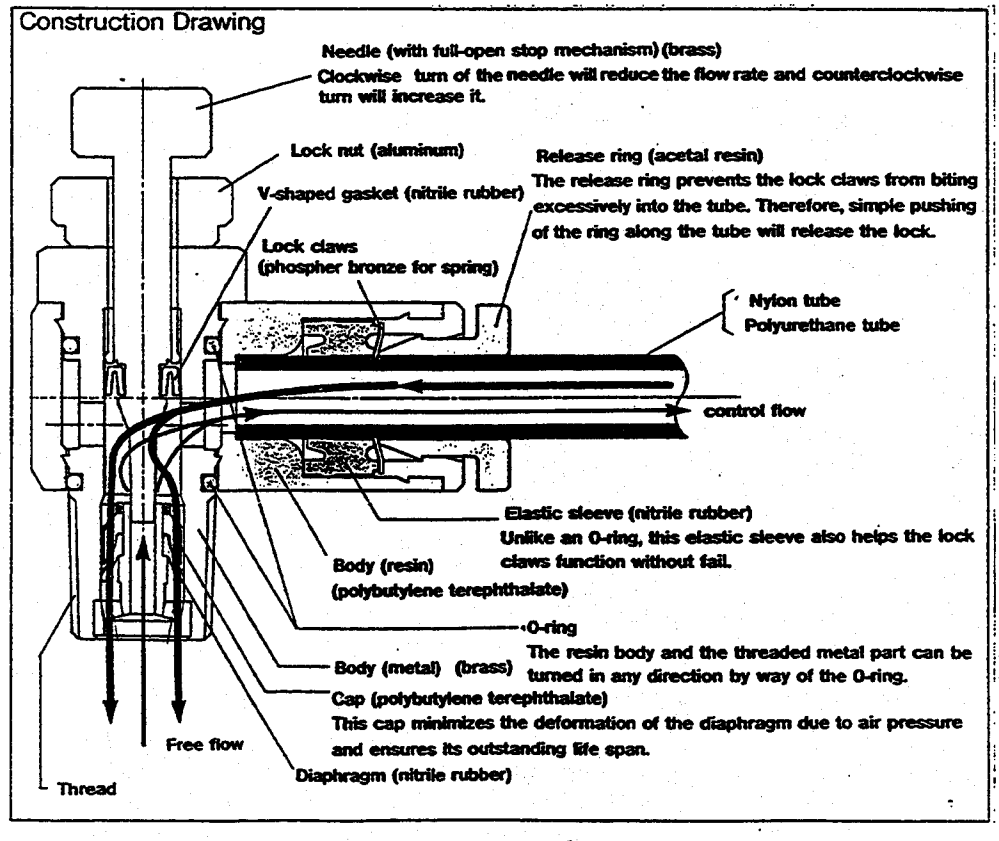
a) Loosen lock nut B.

b) Obtain the proper speed of the cylinder with rotating knob A.

c) Retighten B so as to lock A after adjustment.



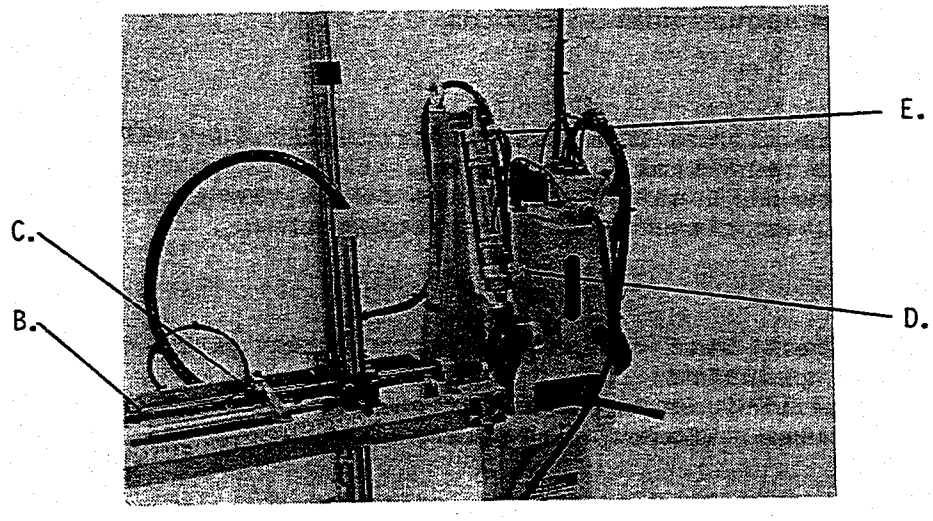
Speed controller

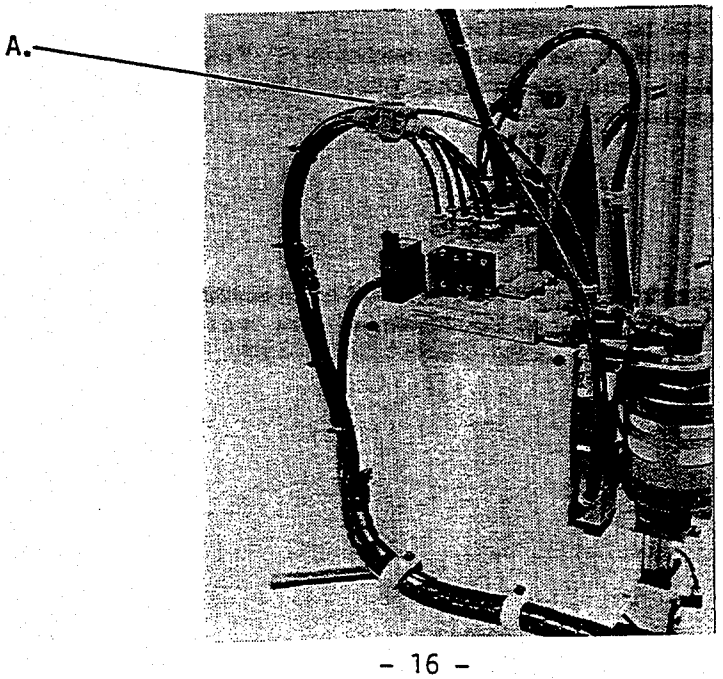


* Function of Each Speed Controller

A: Main arm descending speed
B: Kick forward speed
C: Kick backward speed
D: Swing out speed
E: Swing back speed
F: Wrist rotation speed (*)
G. Wrist return speed (*)

(*) : F & G are not indicated on the photo. These are used on the EXF series robots and equipped on their main arm end.





8. Limit switches

Magnetic induction switches (type CS7G : KOGANEI) are used on LS-1 (swing outward end LS) and LS-2 (swing inward end LS), and proximity switches (type TL-Q5MC1:OMRON) are used on LS-3 (main arm upward end LS) and LS-4 (part verification LS).

a) LS-1

To detect that the main arm cylinder reached to its swing outward end position. If LS-1 is not actuated, the main arm will not extend to outside mold to release parts and/or sprue runner system.

b) LS-2

To detect that the main arm cylinder is VERTICAL (swing inward end limit) position. If LS-2 is not actuated, the fingers will not start to go down even if cycle start signal is given from injection machine.

c) LS-3

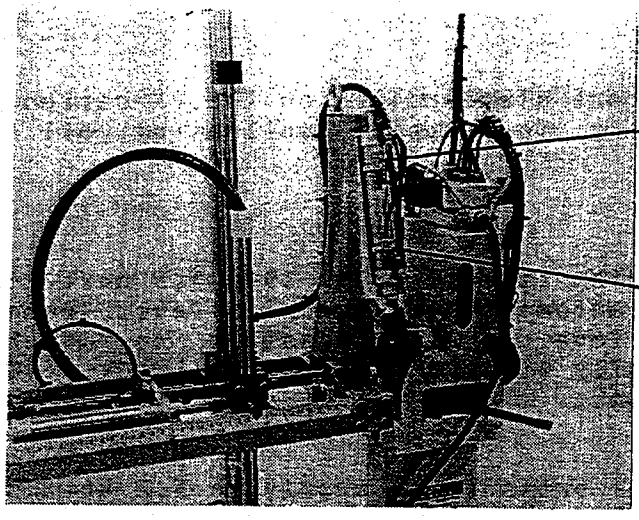
To detect that the main arm cylinder is in the upward end limit position.
Unless LS-3 is actuated, the mold clamping function is not permitted. (Safety Interlock Circuit)

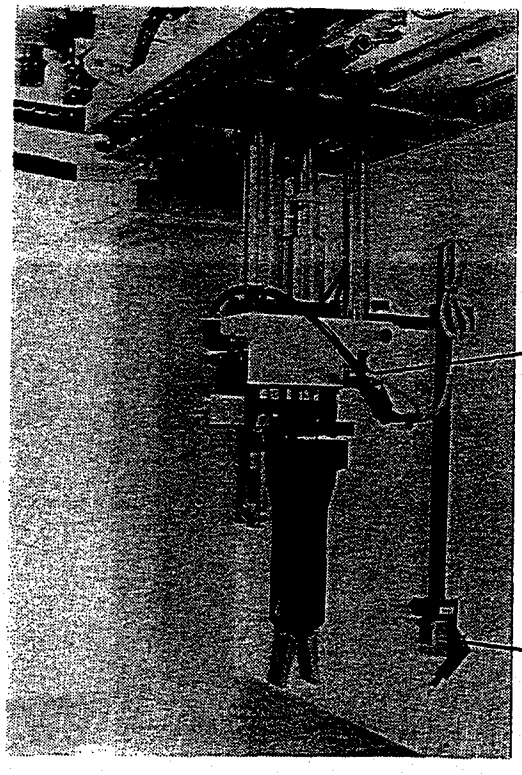
d) LS-4

To detect the pick-up failure of the part to be taken hold by the gripping fingers.
When LS-4 is not actuated before T-7 (Timer) is up, the main arm will not be swung out and the warning buzzer shall be actuated.

Remarks :

When the venturi-air ejector kit is used for suction pad (cup) to grip the part, change the verification method by selection switch (By LS-4 or By vacuum differencial switch).


LS - 2
LS - 1


LS - 3
LS - 4

9. F.R unit

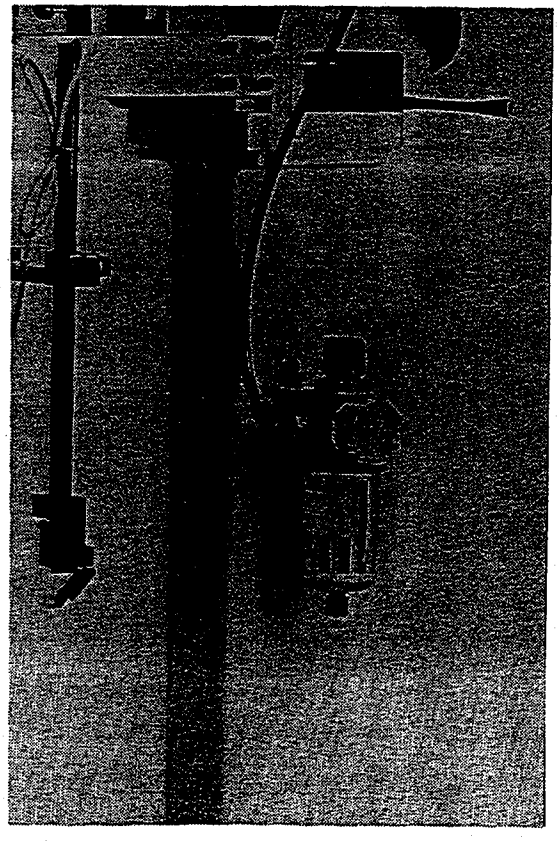
Oilless cylinders are standardized on the EX series robots. It is not necessary to supply lublicating oil to these robots.

* Drain Maintenance

(1) Auto drain system is applied to this F.R unit. Drainage is discharged automatically when its level comes up to the certain level. Also possible to discharge the drainage manually with rotating drain cock. CHECK THE LEVEL ONCE A DAY.

* Pressure Control

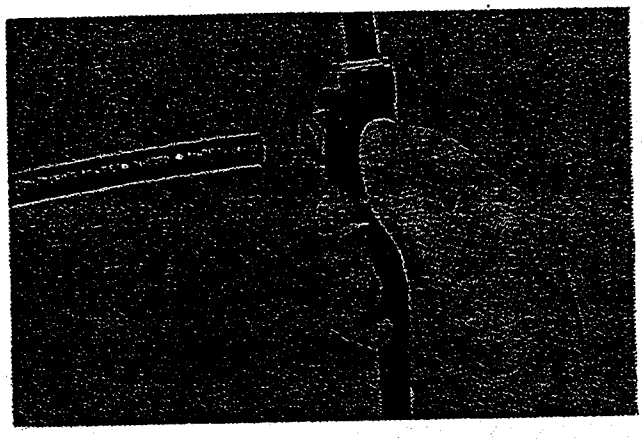
(1) The primary air pressure to supply to F.R unit should be less than 9.0 kg/cm^2 and the secondary working pressure should be 4.0 to 6.0 kg/cm^2.
(2) Clockwise rotation of the control knob permits the secondary pressure to increase and anti-clockwise rotation to decrease.
(3) Push down the adjusting knob after air-pressure adjustment.



10. Quick fitting for air tube

(a) Connecting

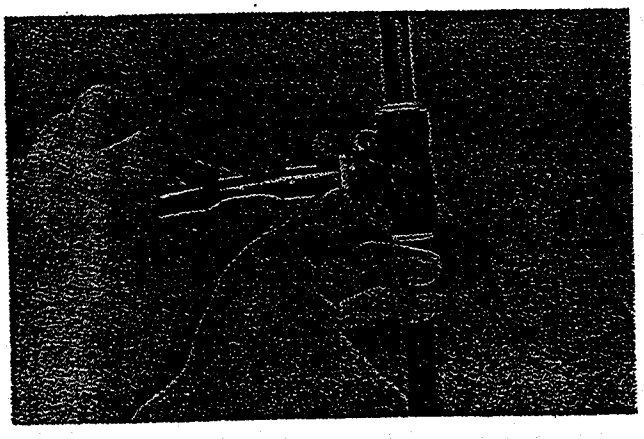
Push the tube into the joint.



(b) Disconnecting

1) Push the releasing bush in.

2) Pull out the tube with the bush pushed in.



D. SEQUENCE CONTROLLER, TYPE PC-EIID

1. External switches

1) POWER (SW-0) : Power ON / OFF switch

2) ROBOT ON/OFF (KSW-1)

a) OFF : Stop all movement for auto and manual operation except the followings;

1. Mold close/open interlock signal

Mold close and open on the injection machine is availavle only in the position of main arm cylinder upward end or swing outward end.

2. Injection machine cycle start signal

Injection machine cycle start signal keeps always valid (ON).

3. Ejector timing control signal

Hydlaulic knock out ejector interlock to injection machine keeps always valid (ON).

b) ON : Turn "ON" when operate robot

3) START (PSW-1) : Automatic operation switch

ROBOT ON/OFF switch (KSW-1) must be at "ON" position when press this button. Alarm buzzer will sound if ROBOT ON/OFF switch is not turned to "ON" or the robot is not at home position when press START switch. In such case, press STOP switch and turn ROBOT ON/OFF switch to "ON" and/or set the robot to home position.

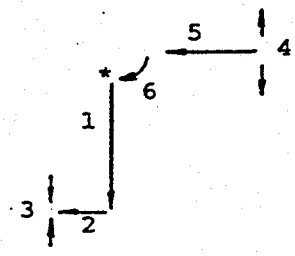
4) STOP (PSW-2) : Automatic operation stop switch

Main arm cylinder and kick cylinder returns to their home position (except swing motion).

5) MANUAL 1 (PSW-3), 2 (PSW-4) : Manual operation switch

This switch is available only when ROBOT ON/OFF switch is "ON" position. When the mold open signal is valid, all the manual operation is available. And when the mold open signal is not valid all the manual operation except main arm first extension is available. The following motions are available step by step whenever push the each button.

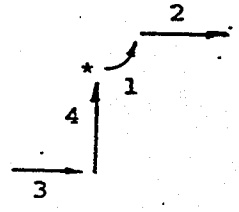
a) Manual 1 (PSW-3)



* Home position
1 Main arm first extension
2 Kick forward
3 Grip
4 Release
5 Main arm second retraction
6 Swing inward

In the mold area, it is available to grip and release repeatedly by pressing this button.

b) Manual 2 (PSW-4)



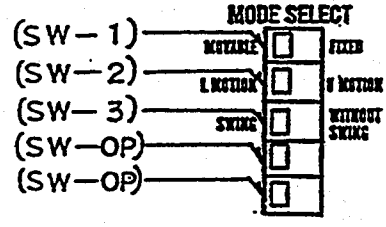
* Home position
1 Swing outward
2 Main arm second extension
3 Kick backward
4 Main arm first retraction

6) RESET (PSW-5) : Reset switch

In case that molded parts and/or sprue runner system are not recognized by part verificat- ion switch or vacuumm differencial switch, the alarm comes on when CYCLE MONITOR timer (VR-8) elapses. Press this button after checking no molded parts and/or sprue runner system in the mold area. Then injection machine will start mold closing and the robot starts swing out motion.
In case that molded parts and/or sprue runner system is dropped suring swing outward motion and parts verification gets OFF, mold closing of injection machine is interrupted and robot stops at swing outward end position in order to prevent the molds from damage. In such case, by pressing this switch, robot and injection machine operation will be continued.

7) MODE SELECT (SW-1, SW-2, SW-3, SW-OP)

Availavle to select several motion sequence by these switches. Mode change during auto operation is not valid. Set these swithes when the robot is under manual operation mode.



a) MOVABLE / FIXED (SW-1)

MOVABLE : Pick up parts from movable mold
FIXED : Pick up parts from stationary mold

b) L MOTION / U MOTION (SW-2)

L MOTION : Arm extend ... Kick forward (approach) ... Grip ... Kick backward (strip off) ... Arm retract ... Home position

U MOTION : Arm extend ... Grip ... Kick backward (strip off) ... Arm retract ... kick forward ... Home position

c) SWING / WITHOUT SWING (SW-3)

SWING : Molded part is released outside mold area.
WITHOUT SWING : Molded part is released inside mold area.

* Remark;
In the "WITHOUT SWING" mode, parts verification is not available.

d) SW-OP : For option

8) EMERGENCY STOP (PB-1)

a) When press the button on auto operation, all power source for solenoid valves are shut off. To cancell this mode, pull up the button, then, the robot become manual operation mode.

b) When press the button on manual operation, all power source for solenoild valves are shut off and manual sequence is cleared.

Mold close/open interlock signal, injection machine cycle start signal, and ejector timing control signal are all shut off, when press the button.

To release this mode, pull up the button.

2. Internal switch

EJECTOR CONTROL (RSW-1)

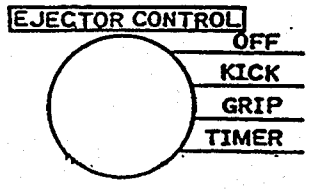
Ejector forward timing of injection machine can be controlled by this selector switch.

OFF .... Ejection of injection mahcine is not controlled by robot. (Interlock signal contact keeps ON)

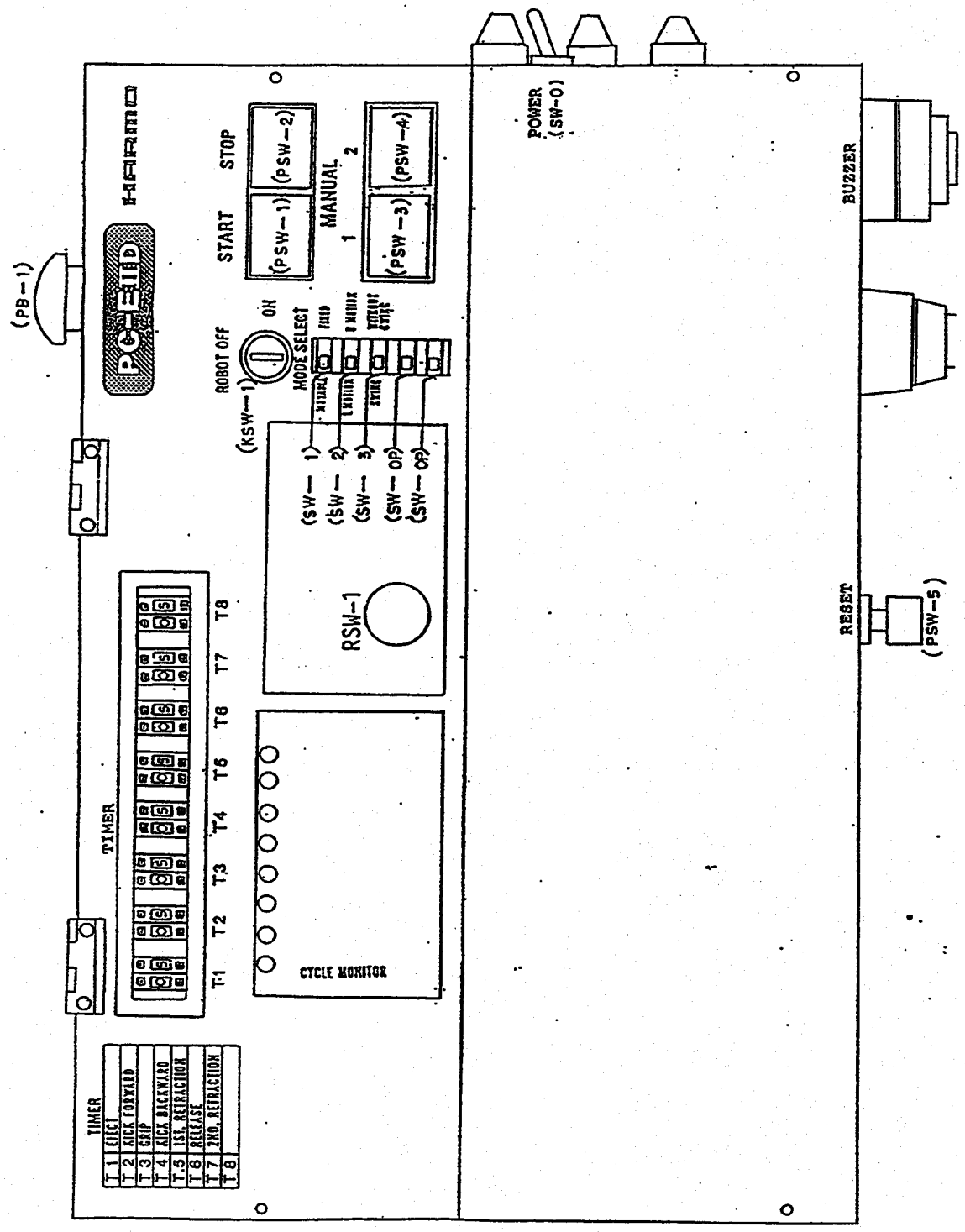
KICK .... Eject when robot kicks forward.

GRIP .... Eject when robot grips molded part and/or sprue runner system.

TIMER ... Ejection timing can be controlled by timer VR-1.



External view

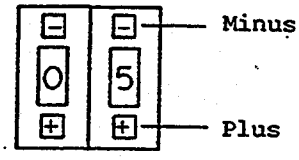


3. TIMERS

Adjust timers in order to get fast and smooth robot moton.

Digital timers (T-1 to T-8)

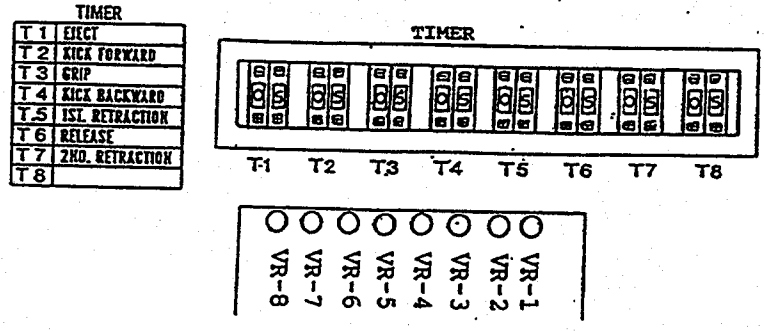
It can set up 0.1 second each for the range of 0.1 to 9.9 seconds.



Set each delay time by pressing small push button on digital timers.

Analog timers (VR-1 to VR-8)

It can set by attached screw driver.



a) EJECT (T-1)

Hydlaulic ejection timing of injection machine is controlled by this timer. This timer starts counting at the same time of arm extension. When T-1 elapses, eject interlock is released.

b) KICK FORWARD (T-2)

This timer starts counting at the same time of arm extension. When T-2 elapses, gripper approaches (kick forward) to the molded part and/or sprue runner system.

When the mode selector switch is set to "U MOTION", this timer is not valid.

c) GRIP (T-3)

This timer starts counting at the same time of kick forward on L motion or arm extension on U motion. When VR-3 elapses, finger and/or suction pads grips the molded part and/or sprue runner system.

d) KICK BACKWARD (T-4)

This timer starts counting at the same time of grip. And when T-4 elapses, gripper strips off the molded parts and/or sprue runner system.

e) 1ST RETRACTION (T-5)

This timer starts counting at the same time of strip off action. When T-5 elapses, main arm retracts.

f) RELEASE (T-6)

This timer starts counting at the same time of arm second extension. When T-6 elapses, robot releases molded part and/or sprue runner system.

g) 2ND RETRACTION (T-7)

This timer starts counting at the same time of grip release. When T-7 elapses, main arm retracts.

h) CYCLE MONITOR (VR-8)

This timer checks the time from mold fully open to verify the molded parts and/or sprue runner system. If molded parts and/or sprue runner system is verified at arm upward end position, arm swings out and injection machine starts mold closing. At the same time, this timer is reset and again starts counting and check the time from swing out to return to home position.

i) OPTIONAL TIMERS (T-8, VR-1 to VR-7)

These timers can be used when additional timer is needed. It is necessary to modify program stored in EPROM IC in the control box.

4. LED DISPLAY

LEDs on PCB-E005F

a) MOLD OPEN (L-1)

Light when mold open complete signal is given to robot.

b) OPEN·CLOSE SAFETY (L-2)

Light when mold open and close interlock signal are released.

c) MOLD CLOSE (L-3)

Light then mold closing start signal is given to injection machine.

d) EJECTOR (L-4)

Light when eject interlock signal is released.

e) HOME POSITION (L-5)

Light when robot is at the following condition.

* Main arm is at upward end position (LS-3 : ON)
* Main arm is at vertical (swing inward end) position (LS-2 : ON and LS-1 : OFF)
* Part verification switch and RESET switch are OFF

f) SWING OUTWARD END (L-6)

Light when swing outward end limit switch (LS-1) is ON.

g) SWING INWARD END (L-7)

Light when swing inward end limit switch (LS-2) is ON.

h) ARM UPWARD END (L-8)

Light when main arm upward end limit switch (LS-3) is ON.

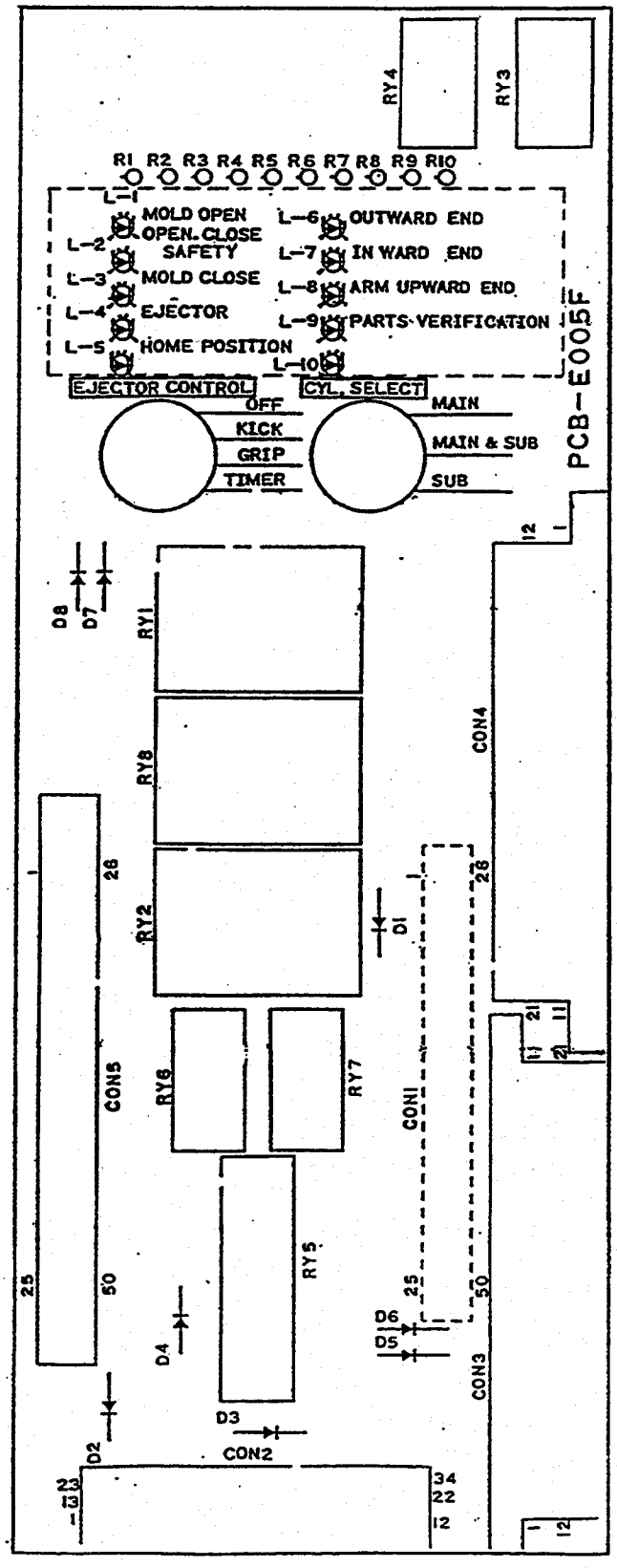
i) PART VERIFICATION (L-9)

Light when part verification switch or reset switch is ON.

j) AUTO OPERATION (L-10)

Light when START button (PSW-1) is ON.

LEDs on PCB-E005F



LEDs on sequence controller PM-911C

POWER	Light when power is ON.	
CPU	Light when "Sequence error". Shut off all output signal from sequencer.	
Y00 - HOME PSTN/ALARM .	Home position and alarm	
Y01 - MOLD SAFETY	Mold open/close safety interlock	(RY2 & 3)
Y02 - EJECTOR FWD	Ejector forward signal	(RY4)
Y03 - MAIN CYL. SOL. ..	Main arm extend	(SOL-3)
Y04 - SWING OUT SOL. ..	Swing outward	(SOL-1)
Y05 - SWING SIN SOL. ..	Swing inward	(SOL-2)
Y06 - KICK CYL. SOL. ..	Kick forward	(SOL-4)
Y07 - GRIP SOL.	Grip, vacuum	(SOL-5 & 6)
X00 - MOLD OPEN	Mold open completion signal	(RY-1)
X01 - ROBOT OFF	Without robot operation	(KSW-1)
X02 - AUTO START	Auto operation start	(PSW-1)
X03 - MANUAL 1	Manual operation 1	(PSW-3)
X04 - MANUAL 2	Manual operation 2	(PSW-4)
X05 - MODE SELECT 1 ...	Take out from fixed mold	(SW-1)
X06 - MODE SELECT 2 ...	U motion	(SW-2)
X07 - MODE SELECT 3 ...	Without swing	(SW-3)
X08 - LS-1	Swing outward end limit	(LS-1)
X09 - LS-2	Swing inward end limit	(LS-2)
X0A - LS-3	Arm upward end limit	(LS-3)
X0B - LS-4,VS,AUX.	Part verification (LS-4,vacuum switch,Aux. switch)	

We're Here to Help

Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

How to Contact Customer Service

To contact Customer Service personnel, call:

From outside the United States, call: 814-437-6861

You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

Before You Call ...

If you do have a problem, please complete the following checklist before calling Conair:

- ❒ Make sure you have all model, serial and parts list numbers for your particular equipment. Service personnel will need this information to assist you.
- ❒ Make sure power is supplied to the equipment.
- ❒ Make sure that all connectors and wires within and between loading control and related components have been installed correctly.
- ❒ Check the troubleshooting guide of this manual for a solution.
- ❒ Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.
- ❒ Check that the equipment has been operated as described in this manual.
- ❒ Check accompanying schematic drawings for information on special considerations.

Additional manuals and prints for your Conair equipment may be ordered through the Customer Service or Parts Departments for a nominal fee.

EQUIPMENT GUARANTEE

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair's guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

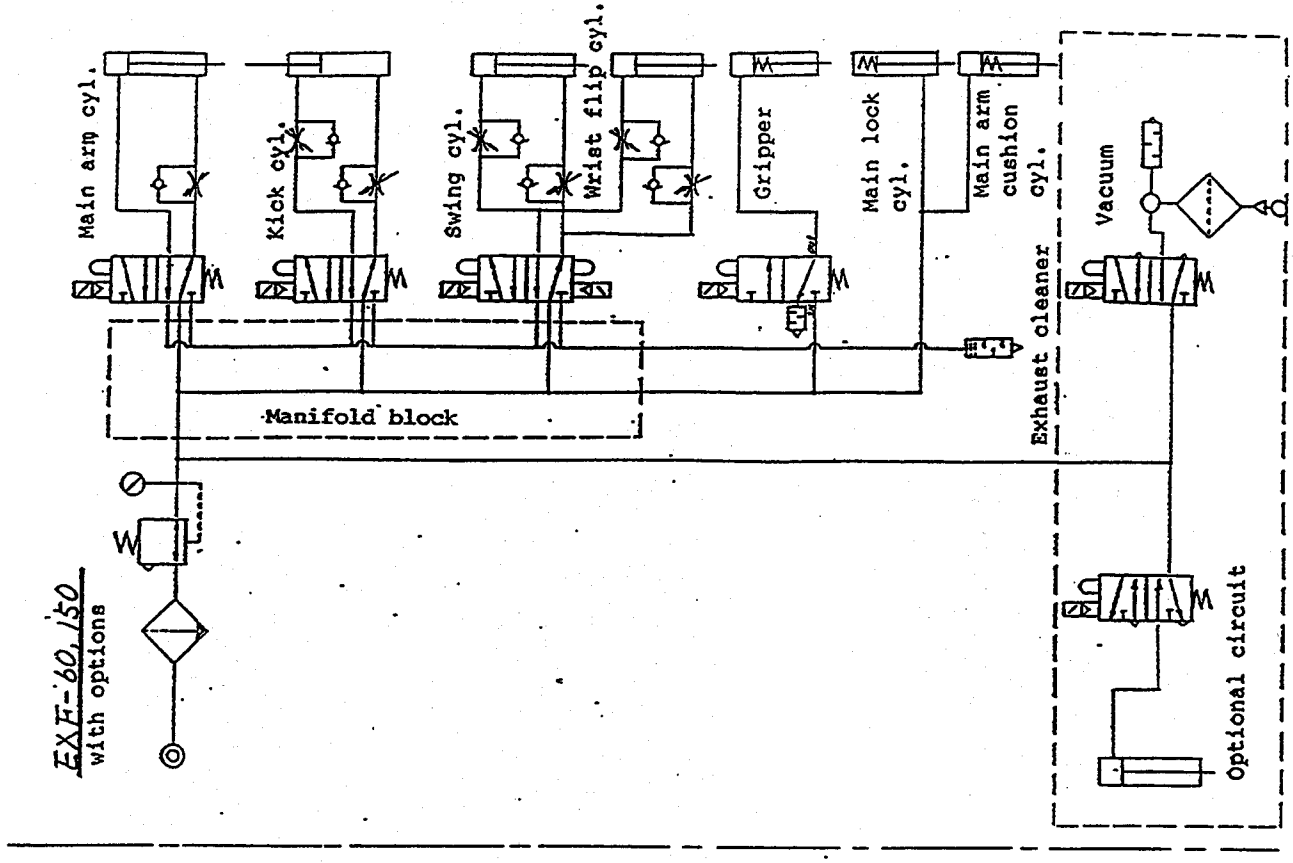
- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.
- Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair's Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

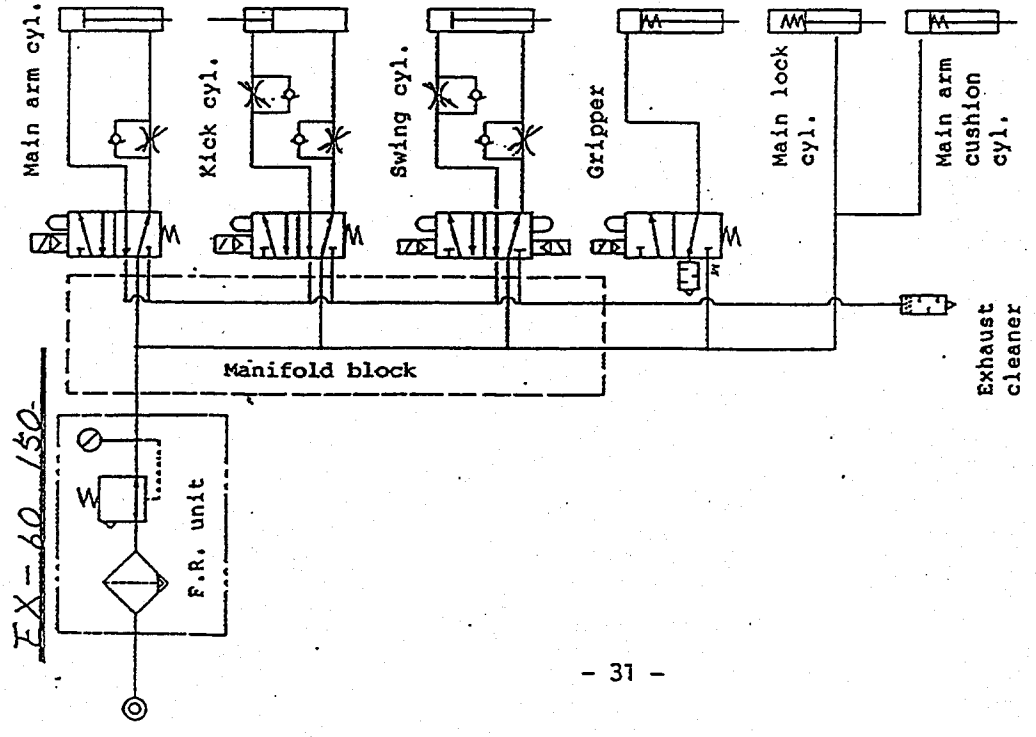
Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

WARRANTY LIMITATIONS

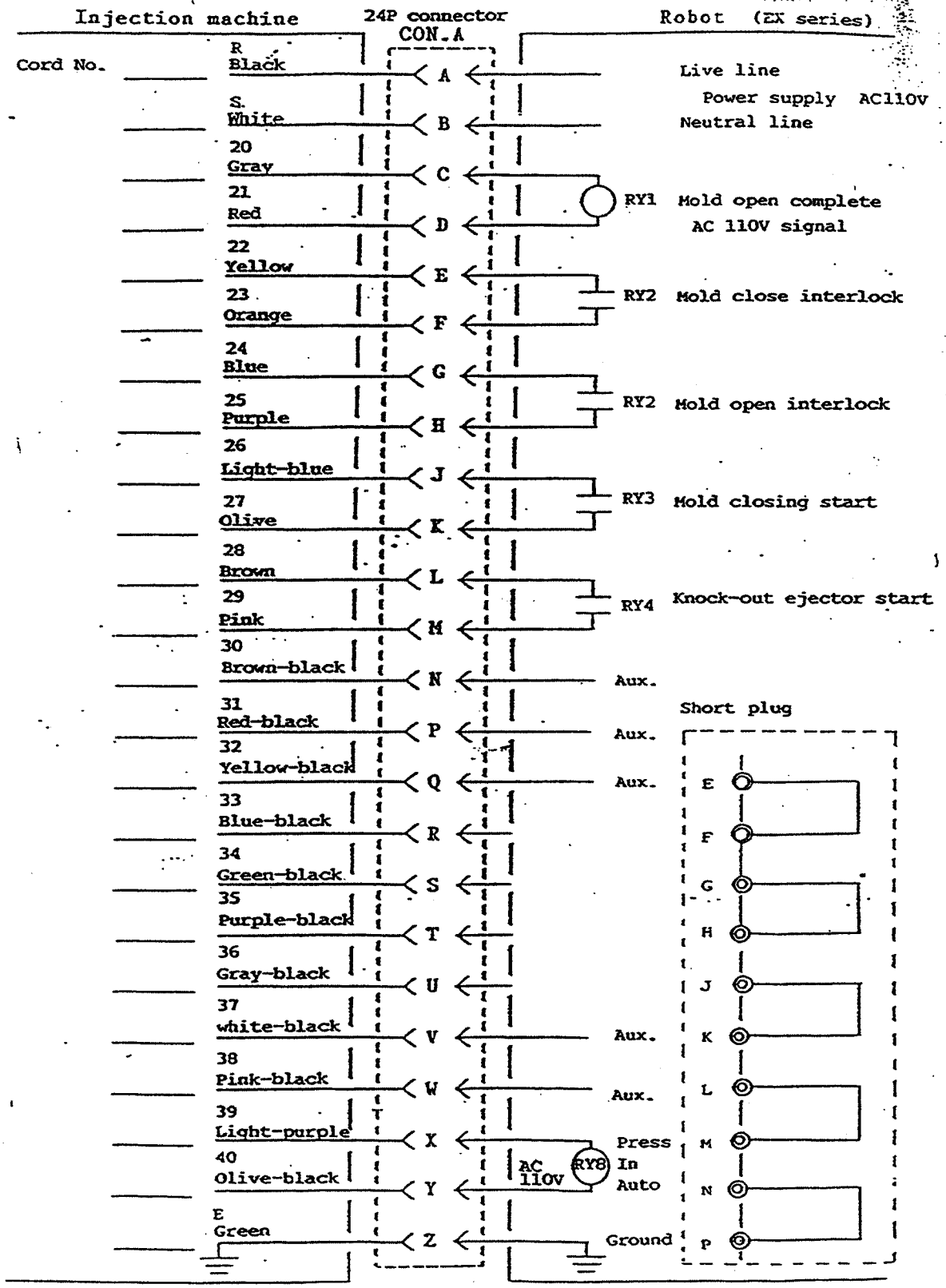
Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

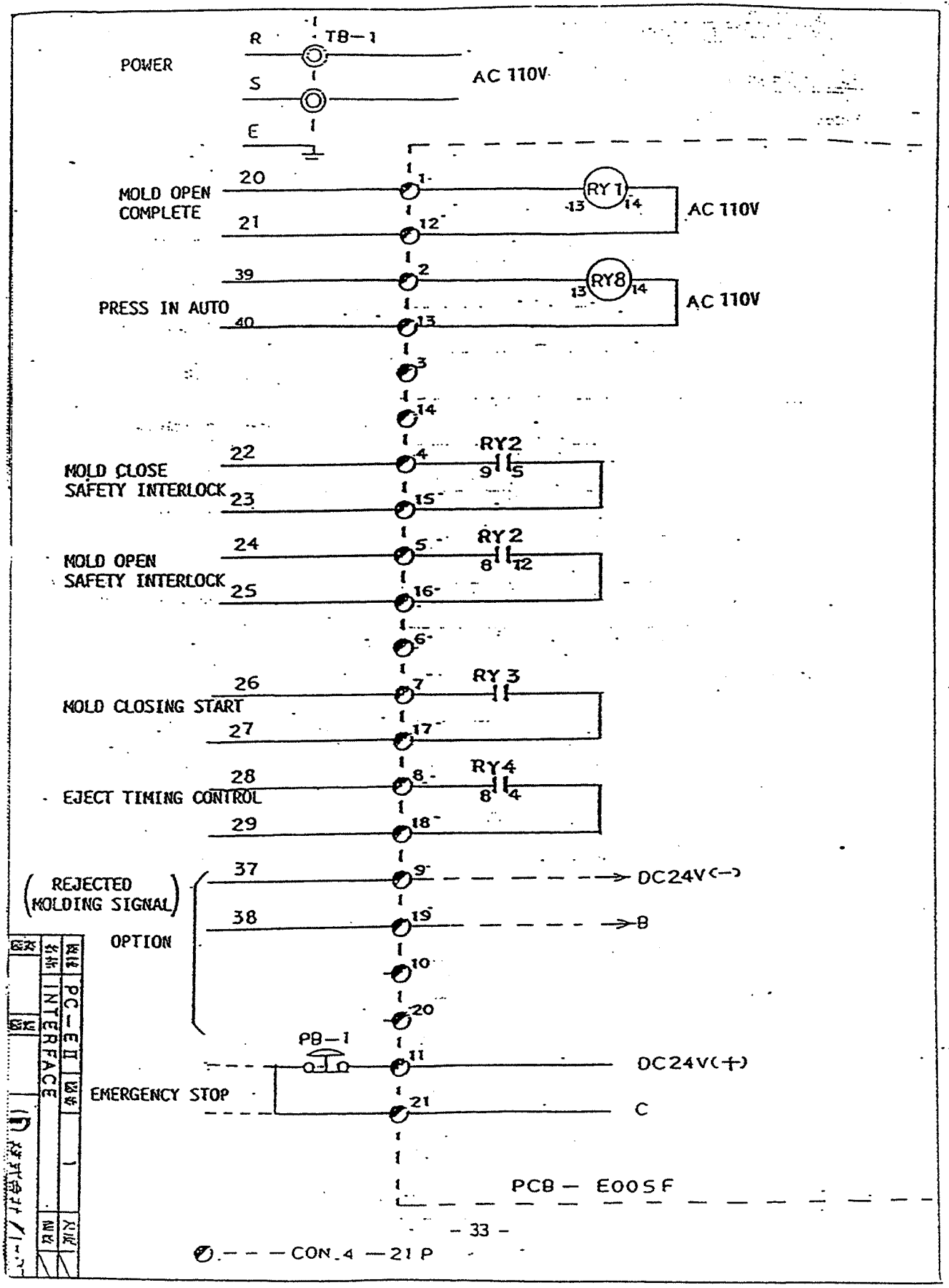
E. AIR SCHEMATIC

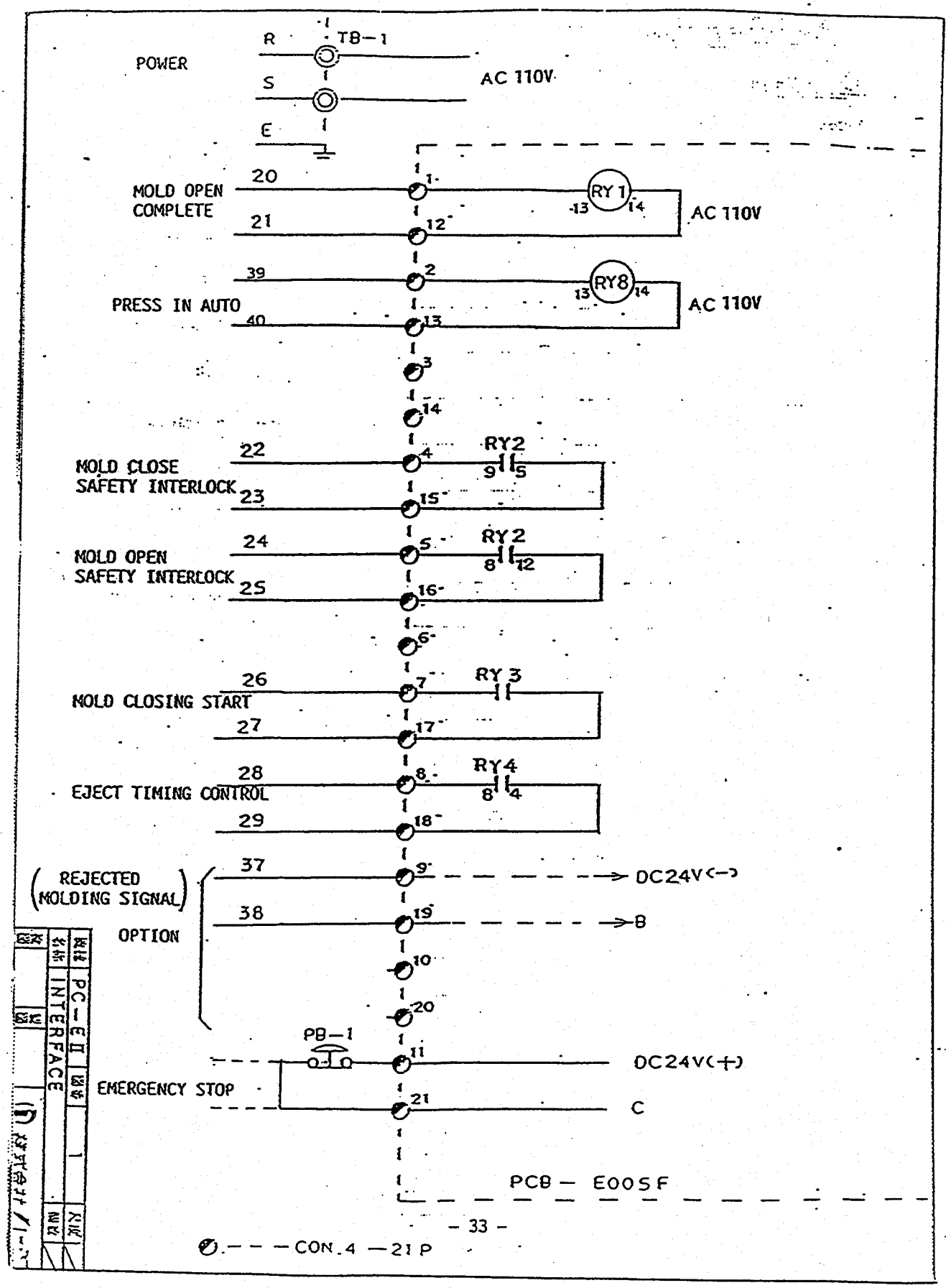


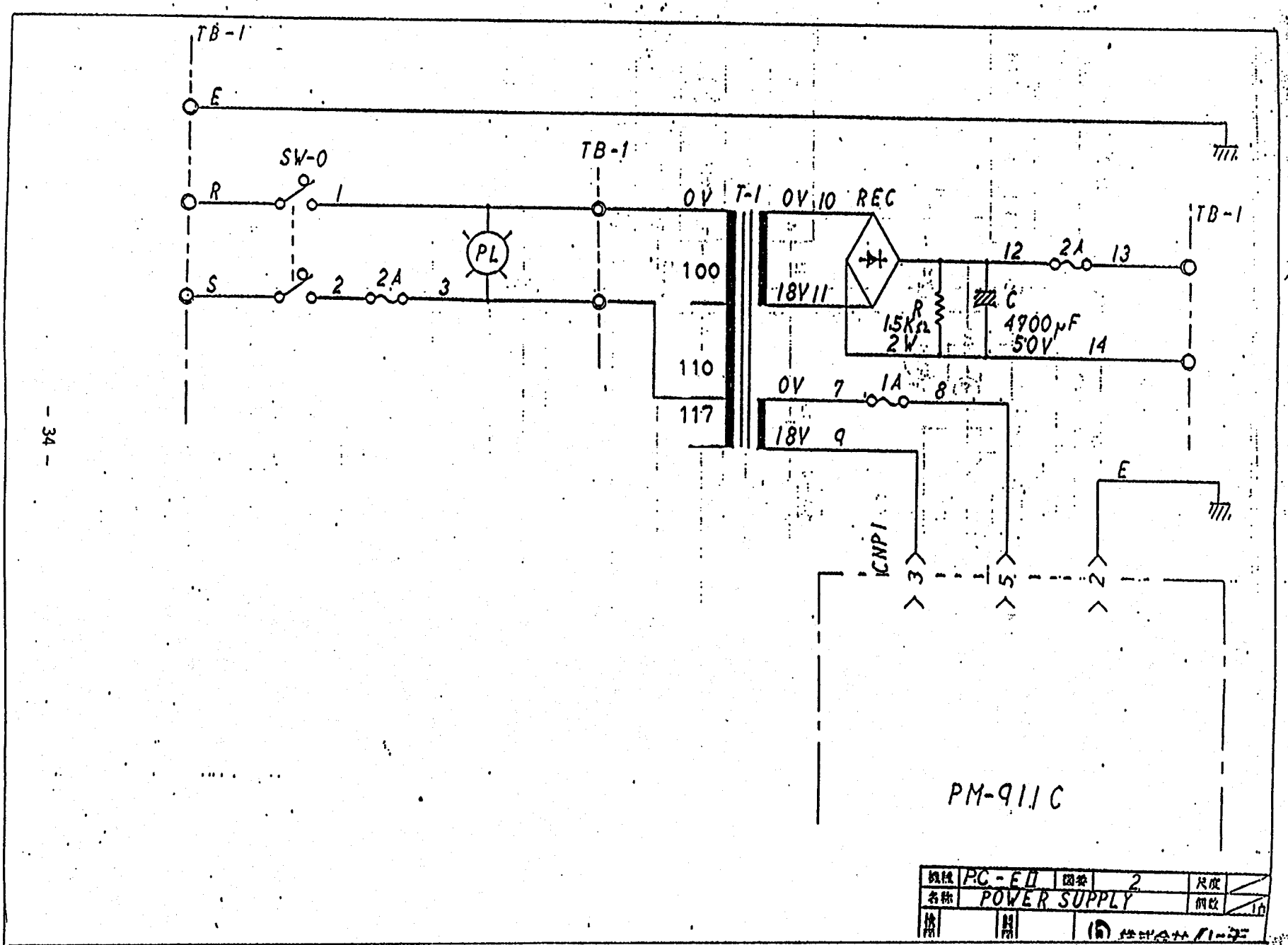


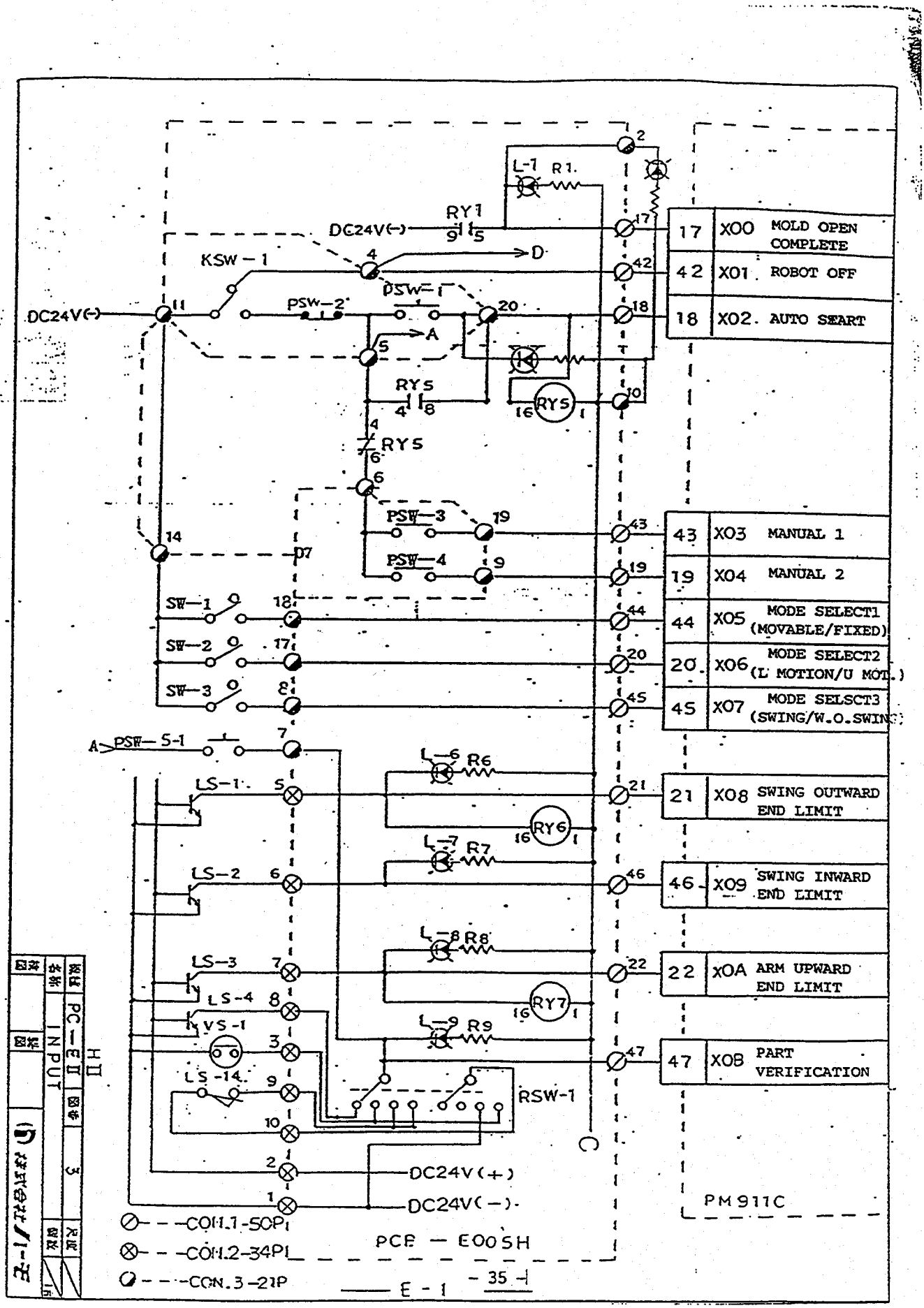
F. CONNECTION BETWEEN ROBOT & INJECTION MACHINE

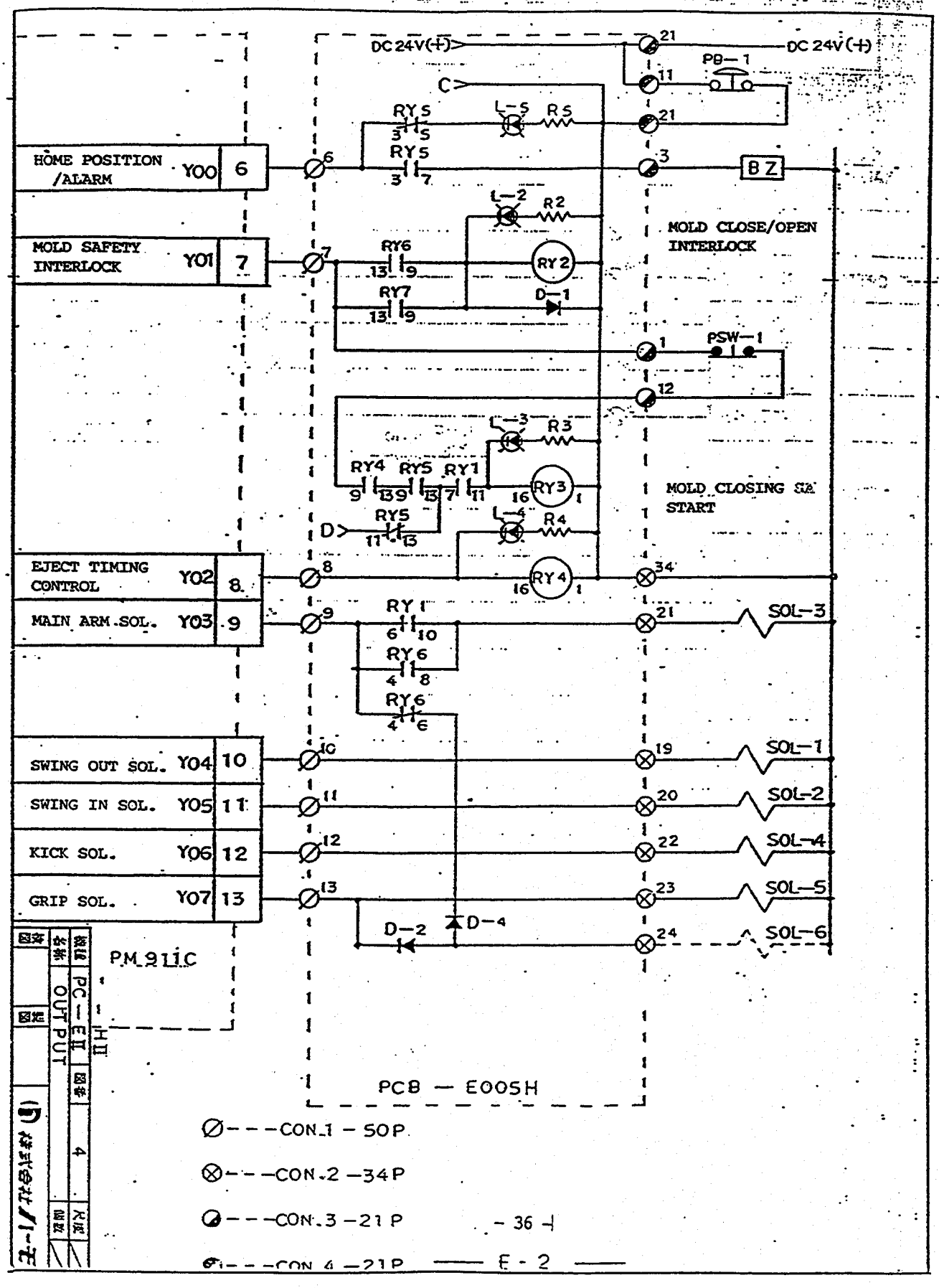


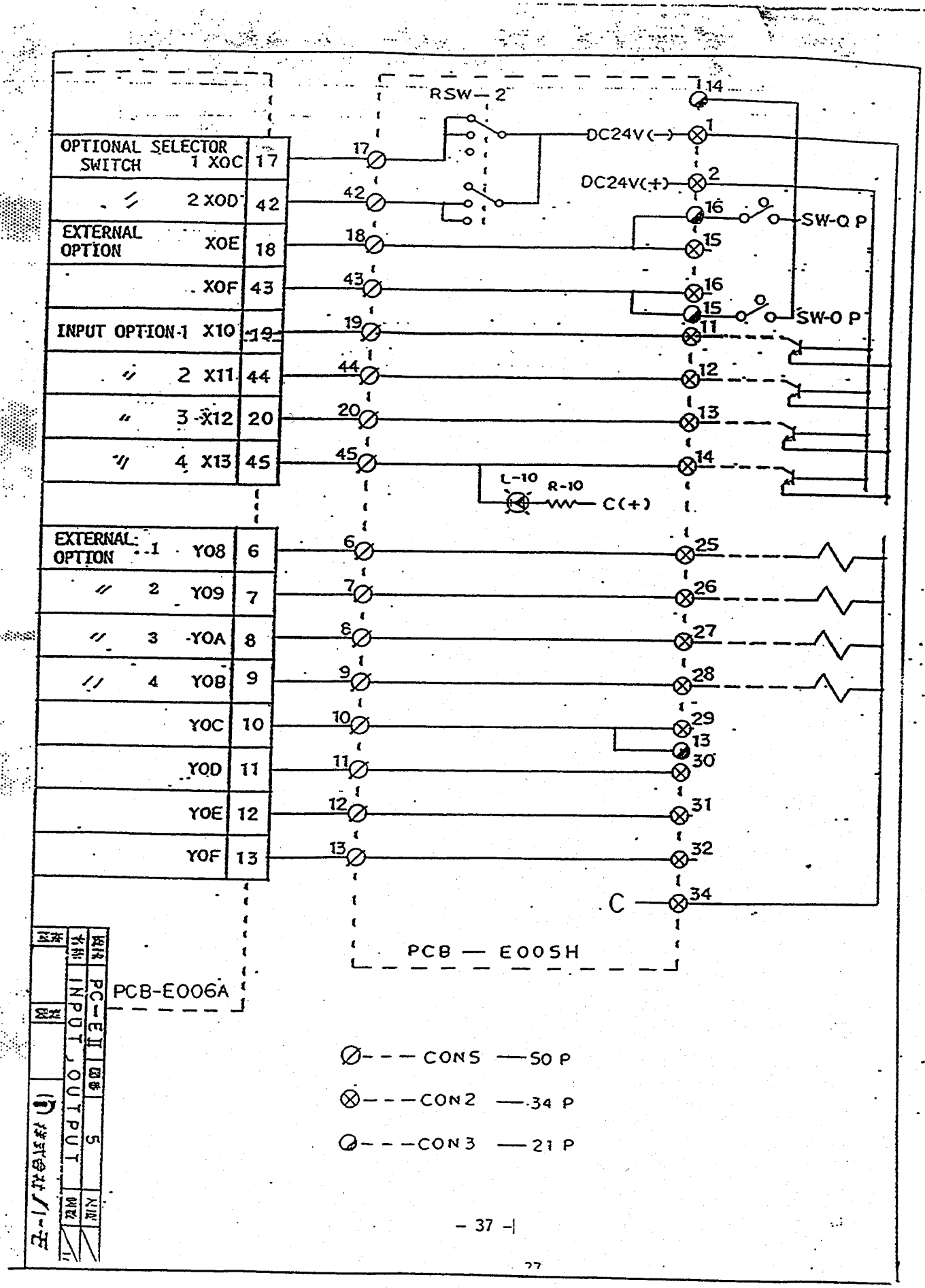

R
TB-1
POWER
S
AC 110V
E
20
MOLD OPEN COMPLETE
21
RY1
13
14
AC 110V
39
RY8
PRESS IN AUTO
40
AC 110V
22
RY2
MOLD CLOSE SAFETY INTERLOCK
23
24
RY2
MOLD OPEN SAFETY INTERLOCK
25
26
RY3
MOLD CLOSING START
27
28
RY4
EJECT TIMING CONTROL
29
(REJECTED MOLDING SIGNAL)
37
DC24V(-)
38
B
OPTION
PB-1
EMERGENCY STOP
DC24V(+)
C
PC8-E005F
- 33 -
CON-4-21P
INTERFACE
PC-E II

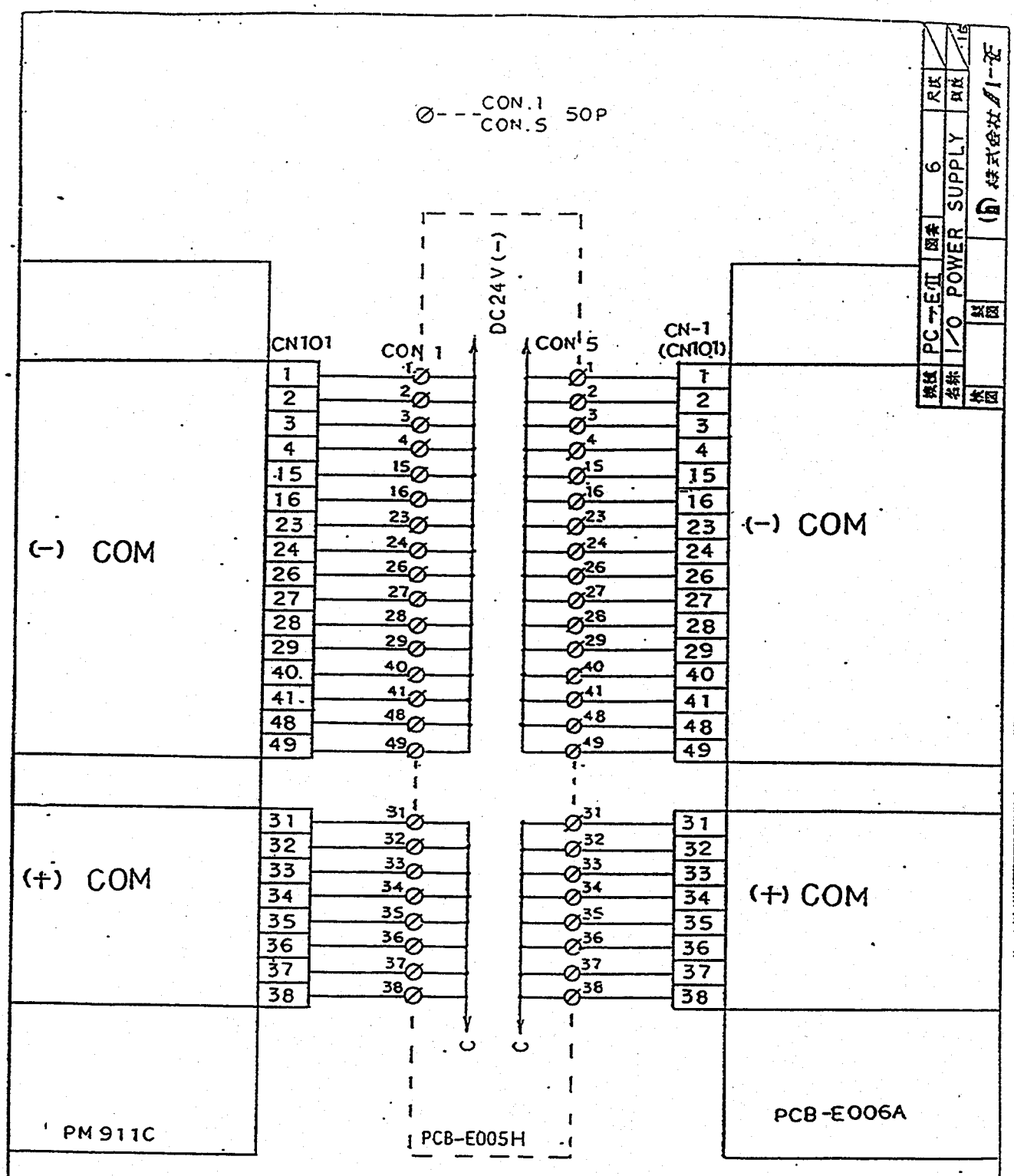

POWER
R
S
E
TB-1
AC 110V
MOLD OPEN COMPLETE
20
21
RY 1
AC 110V
PRESS IN AUTO
39
40
RY8
AC 110V
MOLD CLOSE SAFETY INTERLOCK
22
23
RY2
MOLD OPEN SAFETY INTERLOCK
24
25
RY2
MOLD CLOSING START
26
27
RY 3
EJECT TIMING CONTROL
28
29
RY4
REJECTED MOLDING SIGNAL
OPTION
37
38
DC24V(-)
B
PB-1
EMERGENCY STOP
DC24V(+)
C
PC8-E005F
INTERFACE
PC-E II
CON.4 -21P

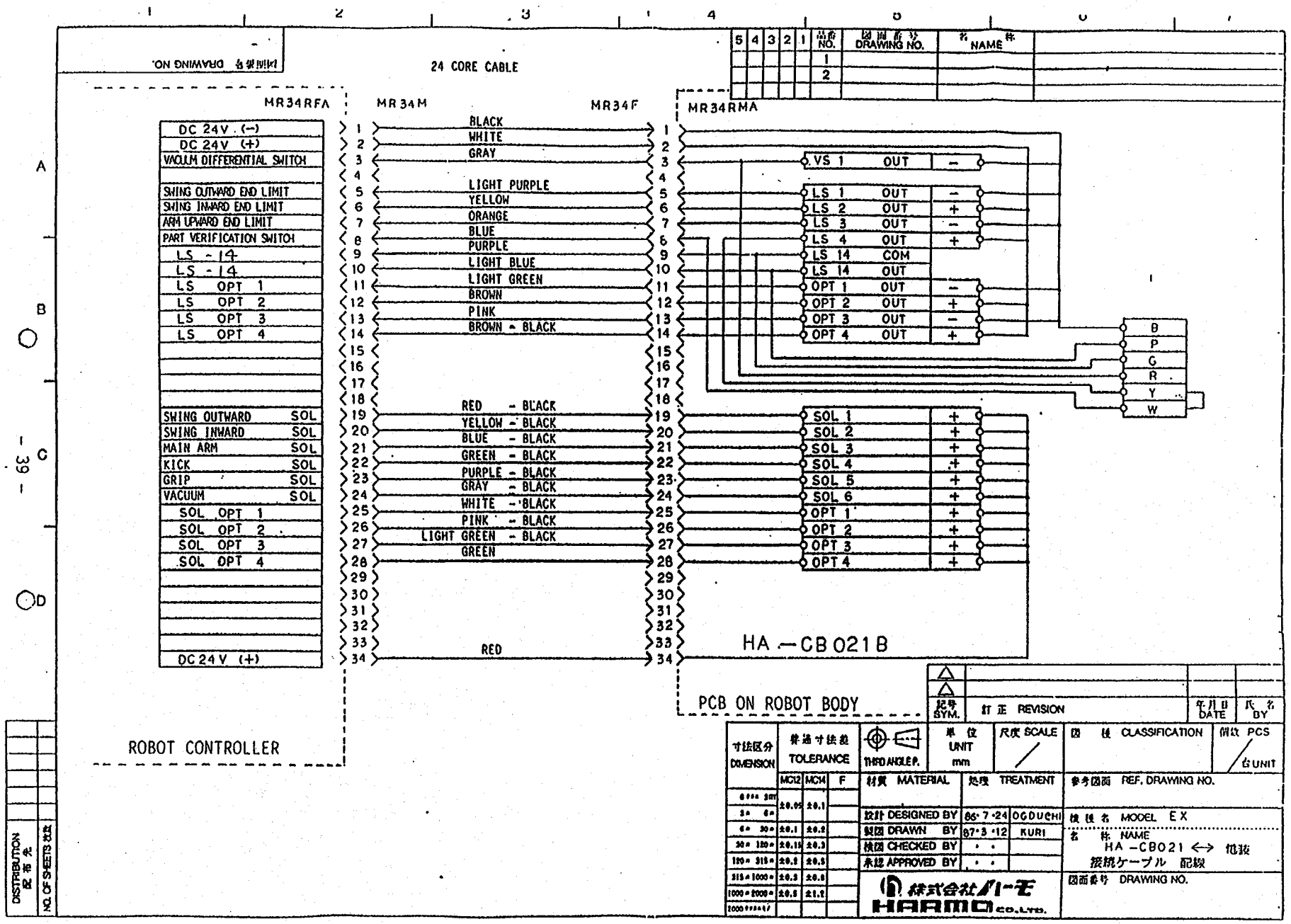

TB-1
E
SW-0
R
1
S
2
2A
3
PL
TB-1
0V
T-1
0V
10
REC
100
110
117
18V
11
12
2A
13
R
1.5KΩ
2W
C
4900μF
50V
14
TB-1
0V
7
1A
8
18V
9
E
CNP1
3
1
5
2
PM-911C
機種 PC-E II
図番 2
尺度
名称 POWER SUPPLY
個数 1台


DC24V(-)
KSW-1
PSW-1
PSW-2
PSW-3
PSW-4
PSW-5-1
SW-1
SW-2
SW-3
RY1
RY5
RY6
RY7
L-1
R1
L-6
R6
L-7
R7
L-8
R8
L-9
R9
LS-1
LS-2
LS-3
LS-4
LS-14
VS-1
RSW-1
A
D
17 X00 MOLD OPEN COMPLETE
42 X01 ROBOT OFF
18 X02 AUTO SEART
43 X03 MANUAL 1
19 X04 MANUAL 2
44 X05 MODE SELECT1 (MOVABLE/FIXED)
20 X06 MODE SELECT2 (L MOTION/U MOT.)
45 X07 MODE SELSCT3 (SWING/W.O.SWING)
21 X08 SWING OUTWARD END LIMIT
46 X09 SWING INWARD END LIMIT
22 X0A ARM UPWARD END LIMIT
47 X0B PART VERIFICATION
DC24V(+)
DC24V(-)
PM911C
PCB — E005H
COM.1-50P
COM.2-34P
COM.3-21P
E-1
- 35 -


DC 24V(+)
DC 24V(+)
PB—1
C
RY5
L—5
R5
HOME POSITION /ALARM
Y00
6
BZ
L—2
R2
MOLD SAFETY INTERLOCK
Y01
7
RY6
RY2
RY7
D—1
MOLD CLOSE/OPEN INTERLOCK
PSW—1
L—3
R3
RY4
RY5
RY1
RY3
MOLD CLOSING SW START
D
L—4
R4
EJECT TIMING CONTROL
Y02
8
RY4
MAIN ARM SOL.
Y03
9
RY1
RY6
SOL—3
SWING OUT SOL.
Y04
10
SOL—1
SWING IN SOL.
Y05
11
SOL—2
KICK SOL.
Y06
12
SOL—4
GRIP SOL.
Y07
13
SOL—5
D—2
D—4
SOL—6
PM 91C
PC—E11H
OUT PUT
PC8 — E005H
⊘---CON.1 — 50P
⊗---CON.2 —34P
---CON.3 —21P
---CON.4 —21P


RSW—2
OPTIONAL SELECTOR SWITCH 1 XOC 17
2 XOD 42
EXTERNAL OPTION XOE 18
XOF 43
INPUT OPTION-1 X10 19
2 X11 44
3 X12 20
4 X13 45
EXTERNAL OPTION 1 Y08 6
2 Y09 7
3 YOA 8
4 YOB 9
YOC 10
YOD 11
YOE 12
YOF 13
DC24V(—)
DC24V(+)
SW-Q P
SW-O P
L-10
R-10
C(+)
C
PCB — E005H
PCB-E006A
CON5 —50 P
CON2 —34 P
CON3 —21 P
PC-E II
INPUT, OUTPUT
5


CON.1
CON.5 50P
DC24V(-)
CN101
CON 1
CON 5
CN-1
(CN101)
(-) COM
(+) COM
(-) COM
(+) COM
PM 911C
PCB-E005H
PCB-E006A
PC-E00 6
I/O POWER SUPPLY

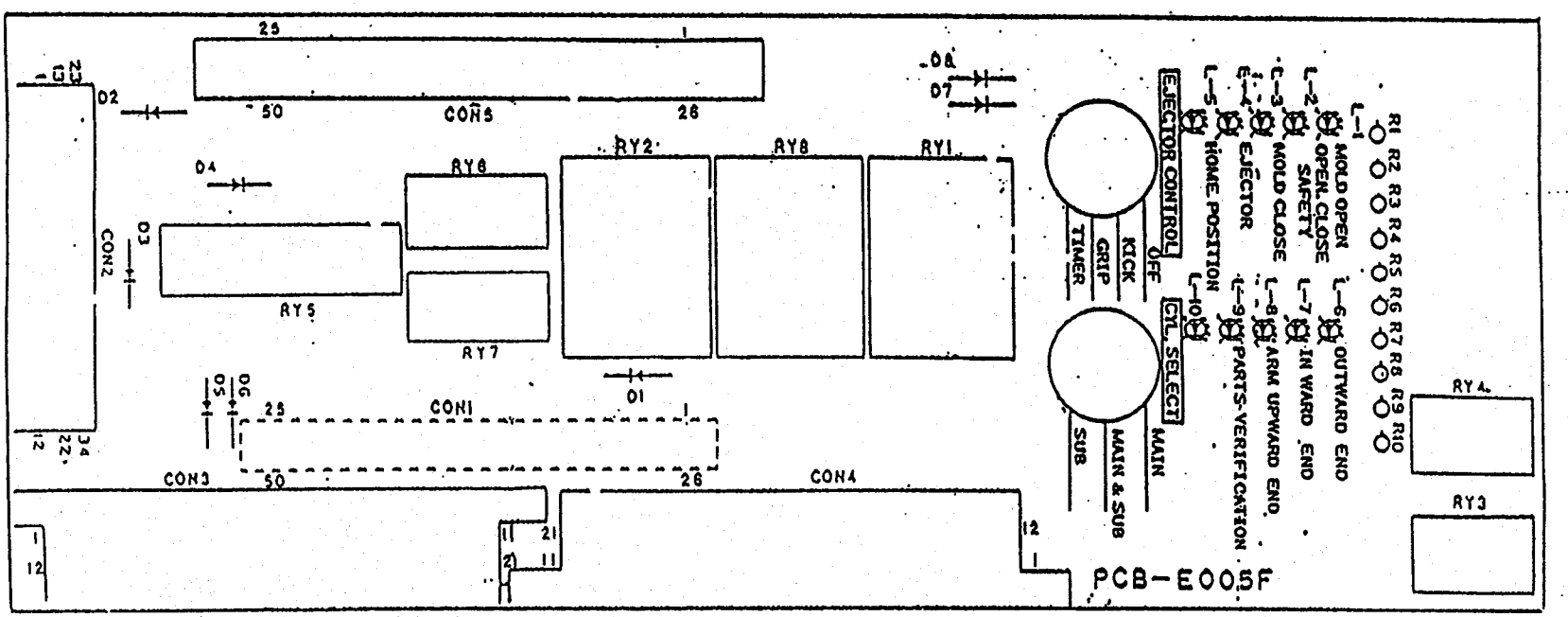

24 CORE CABLE
MR34RFA
MR34M
MR34F
MR34RMA
DC 24V (−)
DC 24V (+)
VACUUM DIFFERENTIAL SWITCH
SWING OUTWARD END LIMIT
SWING INWARD END LIMIT
ARM UPWARD END LIMIT
PART VERIFICATION SWITCH
LS - 14
LS - 14
LS OPT 1
LS OPT 2
LS OPT 3
LS OPT 4
SWING OUTWARD SOL
SWING INWARD SOL
MAIN ARM SOL
KICK SOL
GRIP SOL
VACUUM SOL
SOL OPT 1
SOL OPT 2
SOL OPT 3
SOL OPT 4
DC 24V (+)
BLACK
WHITE
GRAY
LIGHT PURPLE
YELLOW
ORANGE
BLUE
PURPLE
LIGHT BLUE
LIGHT GREEN
BROWN
PINK
BROWN - BLACK
RED - BLACK
YELLOW - BLACK
BLUE - BLACK
GREEN - BLACK
PURPLE - BLACK
GRAY - BLACK
WHITE - BLACK
PINK - BLACK
LIGHT GREEN - BLACK
GREEN
RED
VS 1 OUT −
LS 1 OUT −
LS 2 OUT +
LS 3 OUT −
LS 4 OUT +
LS 14 COM
LS 14 OUT
OPT 1 OUT −
OPT 2 OUT +
OPT 3 OUT −
OPT 4 OUT +
SOL 1 +
SOL 2 +
SOL 3 +
SOL 4 +
SOL 5 +
SOL 6 +
OPT 1 +
OPT 2 +
OPT 3 +
OPT 4 +
B
P
G
R
Y
W
HA −CB021B
ROBOT CONTROLLER
PCB ON ROBOT BODY
DRAWING NO. 図面番号
NAME 名称
DISTRIBUTION 配布先
NO. OF SHEETS 枚数
記号 SYM.
訂正 REVISION
年月日 DATE
氏名 BY
寸法区分 DIMENSION
普通寸法差 TOLERANCE
MC12 MC14 F
THIRD ANGLE P.
単位 UNIT mm
尺度 SCALE
図種 CLASSIFICATION
個数 PCS
台 UNIT
材質 MATERIAL
処理 TREATMENT
参考図面 REF. DRAWING NO.
設計 DESIGNED BY 86・7・24 OGDUCHI
製図 DRAWN BY 87・3・12 KURI
検図 CHECKED BY
承認 APPROVED BY
機種名 MODEL EX
名称 NAME
HA −CB021 ⟷ 他装
接続ケーブル 配線
図面番号 DRAWING NO.
株式会社ハーモ
HARMO CO.,LTD.
- 39 -

PC-EIID INTERFACE BOARD

RY-1 :	MOLD OPEN COMPLETE RELAY	(OMRON MY-4 AC110V*)
RY-2 :	MOLD OPEN/CLOSE SAFETY INTERLOCK RELAY	(OMRON MY-2 DC24V)
RY-3 :	MOLD CLOSING START RELAY	(MATSUSHITA AG2024)
RY-4 :	EJECT INTERLOCK RELAY	(MATSUSHITA AG2024)
RY-5 :	AUTO OPERATION RELAY	(MATSUSHITA AG2044)
RY-6 :	SWING OUTWARD END RELAY	(MATSUSHITA AG2024)
RY-7 :	ARM UPWARD END RELAY	(MATSUSHITA AG2024)
RY-8 :	PRESS IN AUTO RELAY	(OMRON MY-2 DC24V *)

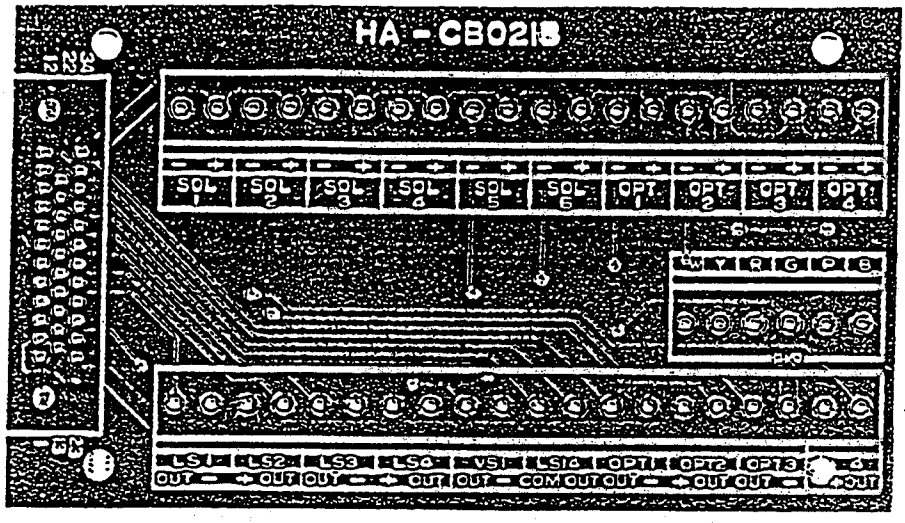
CON1 : I/O CABLE CONNECTOR FOR PM911C BOARD
CON2 : I/O CABLE CONNECTOR FOR ROBOT
CON3 : I/O CABLE CONNECTOR FOR EXTERNAL SWITCHES
CON4 : CONNECTOR FOR INTERFACE CABLE FOR PRESS
CON5 : I/O CABLE CONNECTOR FOR ADDITIONAL BOARD PCB-E006A

* Depends on the voltage of signal



PCB, HA-CB021B

Cables for solenoid valves and switches are connected to the PCB HA-CB021B. This PCB is located under the solenoid valves on main body of EX series robot.



Assignment for each LS and SOL. is as follows;

SOL 1 ... Swing ourward solenoid valve
SOL 2 ... Swing inward solenoid valve
SOL 3 ... Main arm cylinder solenoid valve
SOL 4 ... Kick cylinder solenoid valve
SOL 5 ... Main arm grip solenoid valve
SOL 6 ... Vacuum solenoid valve
*SOL OPT1. Sub arm cylinder solenoid valve
*SOL OPT2. Sub arm grip solenoid valve
OPT 3 to 4 ...Optional output

LS 1 ... Swing outward end proximity switch
LS 2 ... Swing inward end proximity switch
LS 3 ... Main arm upward end proximity switch
LS 7 ... Sub arm upward end proximity switch
LS 4 ... Part verification, Main arm
*LS 5 ... Part verification, Sub arm
LS 14 ... Aux. part verification switch
VS 1 ... Vacuum differencial switch
OPT 1 to 4 ... Optional input

* Applied for EXF-60,150G

EXPLODED VIWS

DESCRIPTION

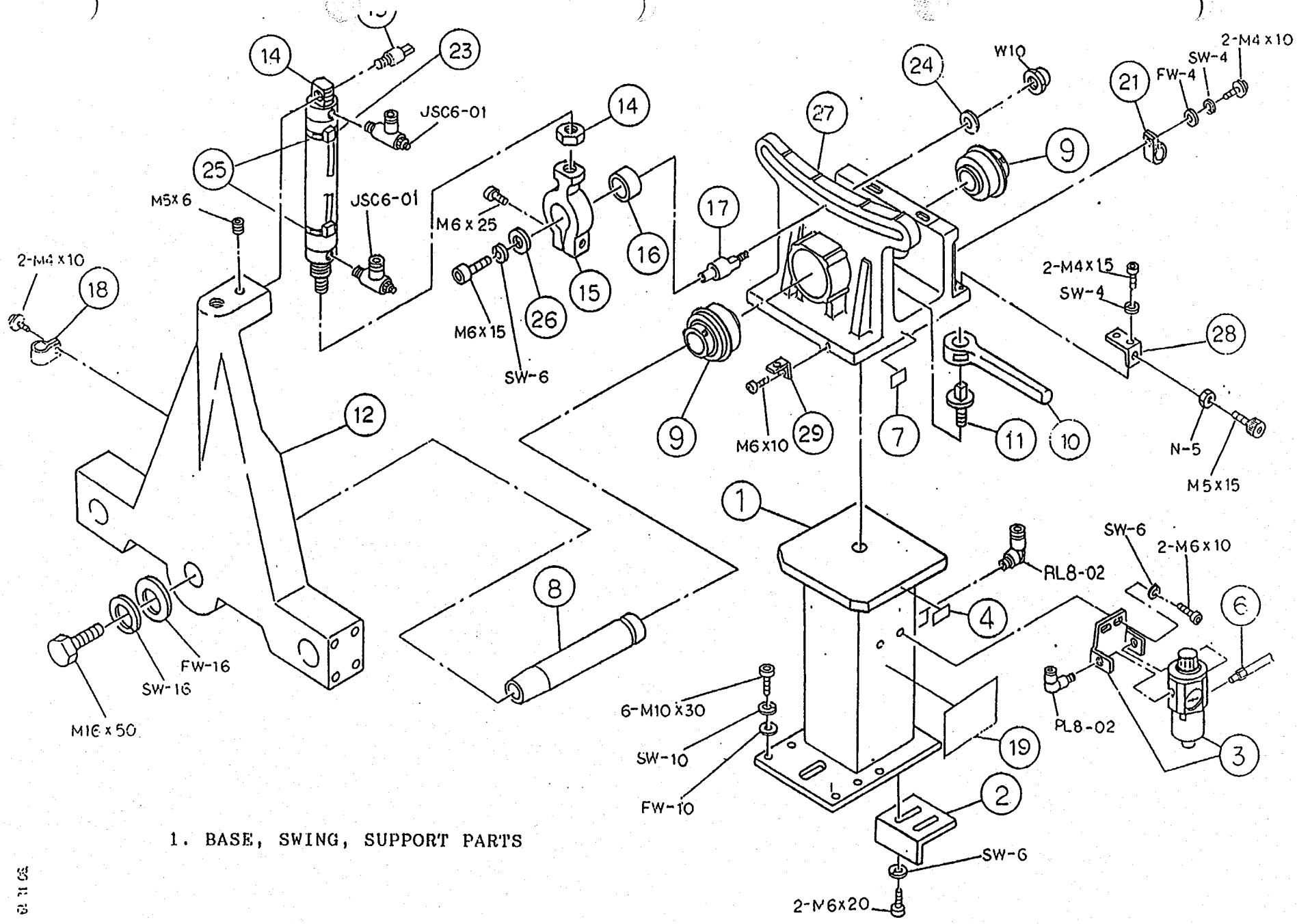
1. BASE, SWING, SUPPORT PARTS
2. VALVE PARTS
3. KICK FRAME PARTS
4. MAIN ARM ASSY
5. MAIN ARM PARTS
6. WRIST UNIT PARTS
7. GRIPPER ASSY
8. GRIPPER PARTS
9. EX SRS. OPTION
   VACUUM EJECTOR SYSTEM
10. EX SRS. OPTION
    NIPPER CIRCUIT
11. EX SRS. OPTION
    NIPPER CIRCUIT - PRIMARY/SECONDARY PRESSURE
12. LABELS
13. WRIST CYL. PARTS

Note :

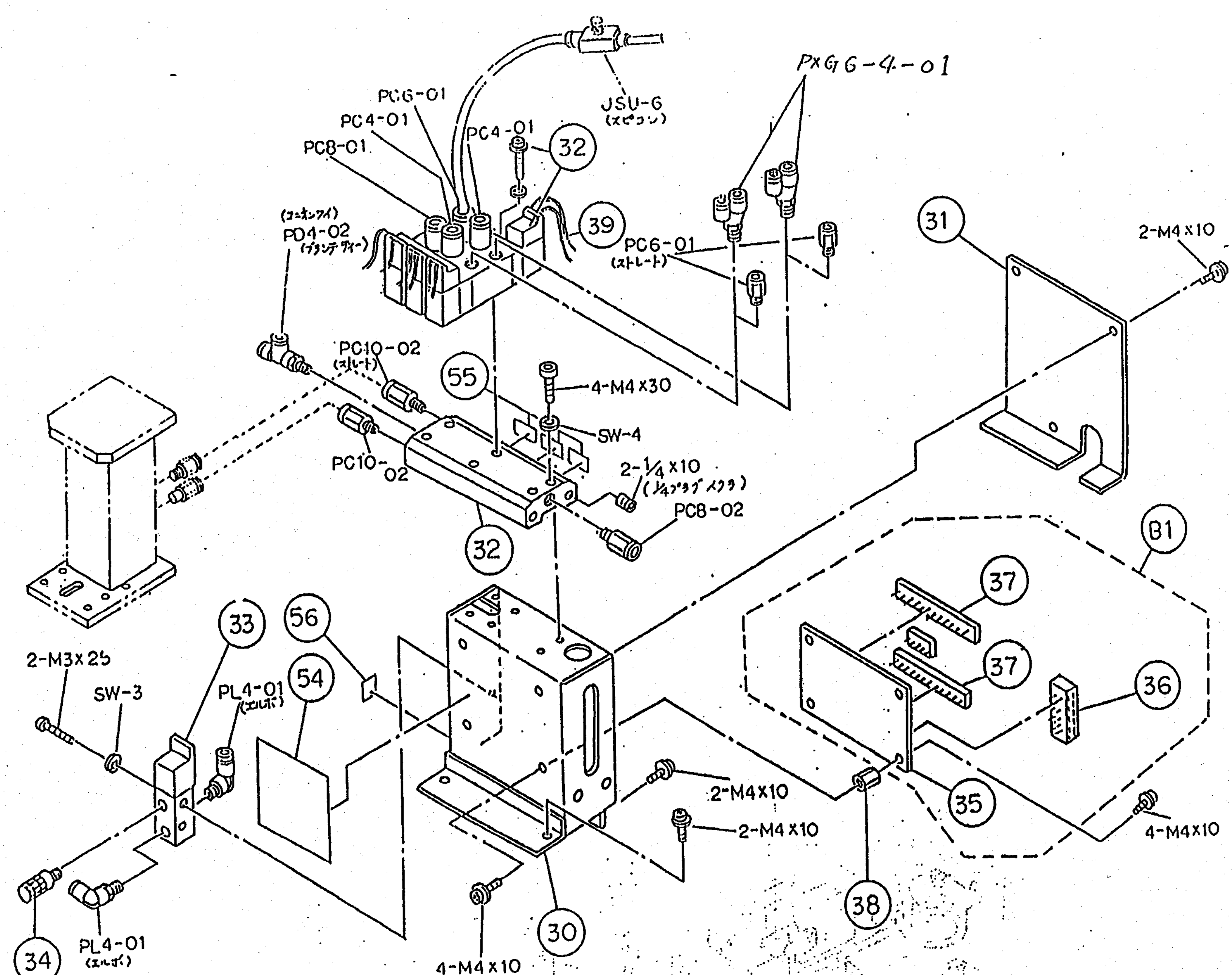
when you place order spare parts, state clearly Part Number, robot Model and Quantity as shown below.

Example :

Model	Part No .	Quantity
EX-60	# 9	1 pcs .
	# 33	1 pcs .
EXF-150	# 550	1 pcs .
	JSC4-M5	3 pcs .
	Nylon tube 6mm dia.	5 m



1. BASE, SWING, SUPPORT PARTS



2. VALVE PARTS

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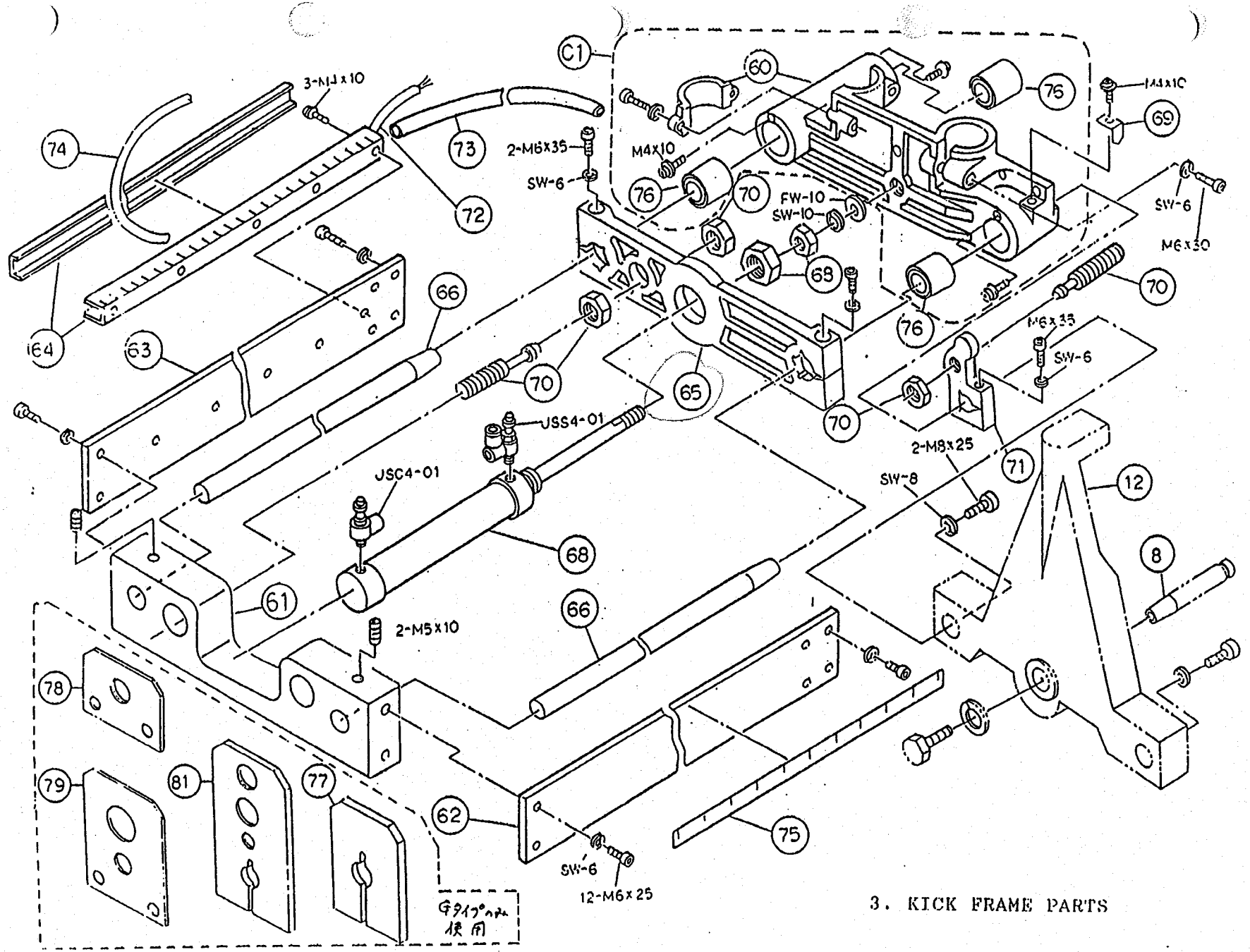
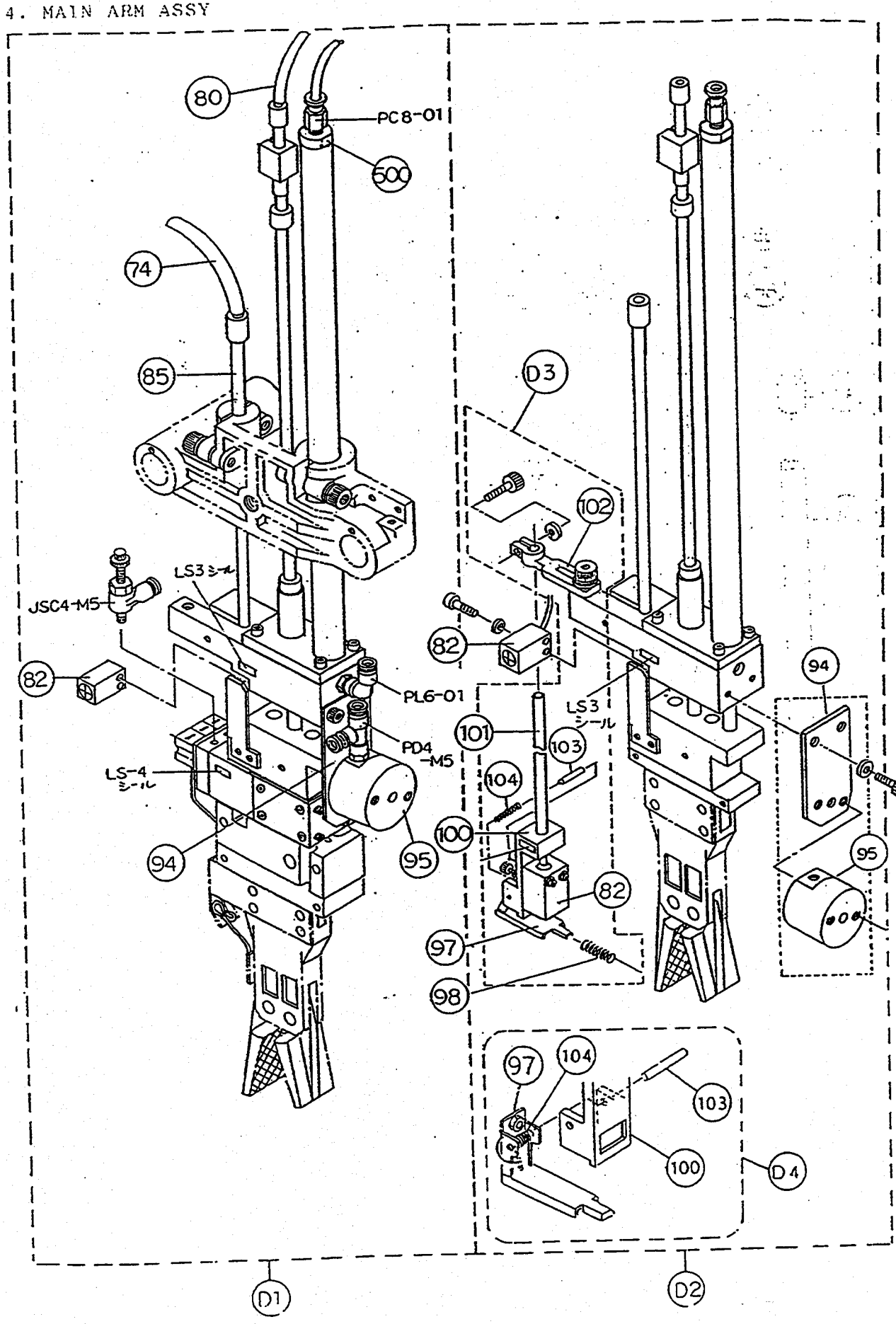
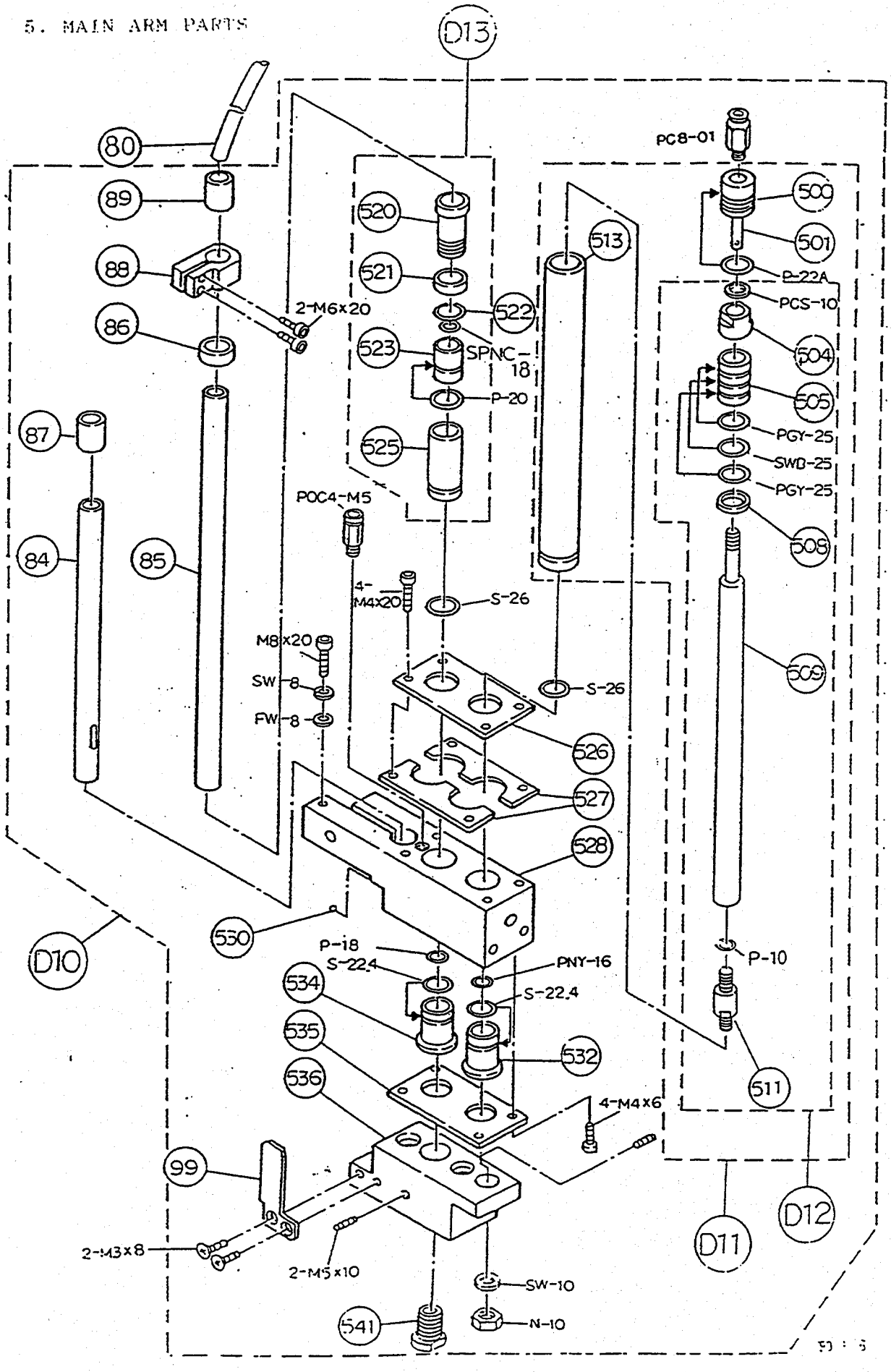
製NO. 4000~
(63-6)



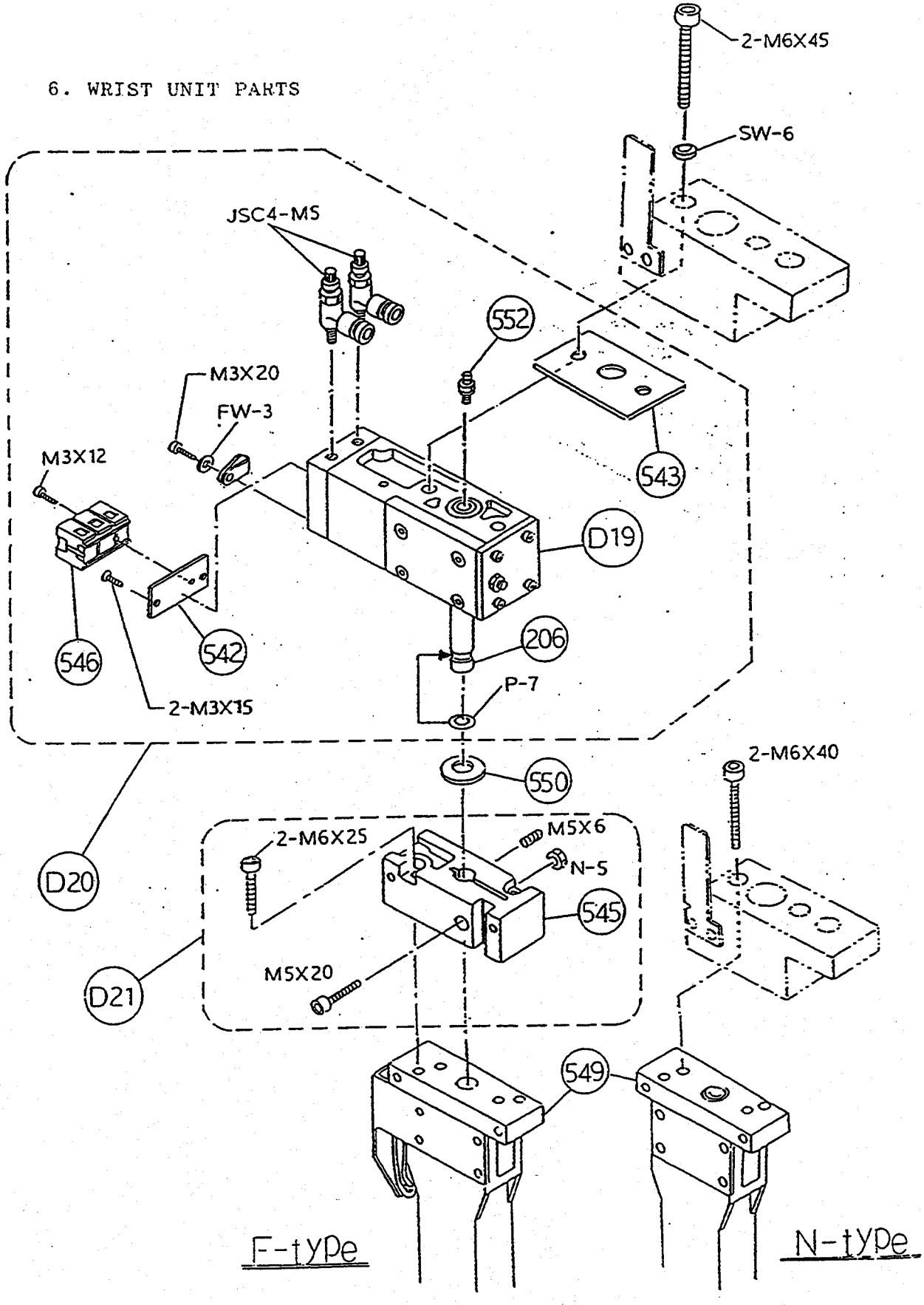
3. KICK FRAME PARTS

4. MAIN ARM ASSY



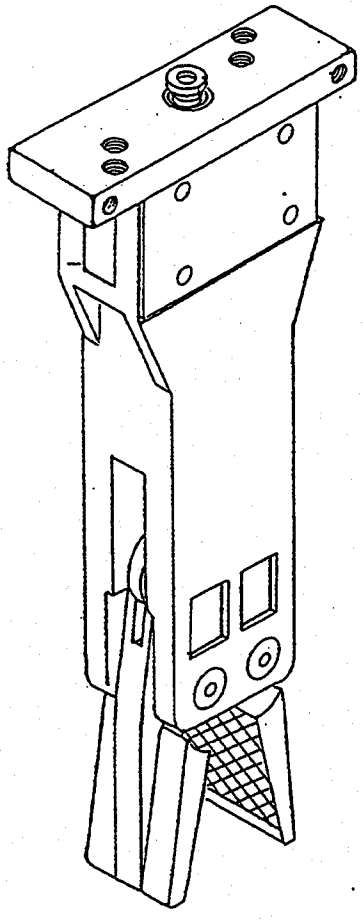

D13
80
89
88
86
87
84
85
2-M6x20
520
521
522
523
SPNC-18
P-20
525
POC4-M5
4-M4x20
S-26
M8x20
SW-8
FW-8
513
S-26
526
527
528
530
D10
P-18
S-22.4
534
535
536
532
PNY-16
S-22.4
4-M4x6
99
2-M3x8
2-M5x10
SW-10
N-10
541
PC8-01
509
501
P-22A
PCS-10
504
505
PGY-25
SWB-25
PGY-25
508
509
P-10
511
D11
D12

6. WRIST UNIT PARTS



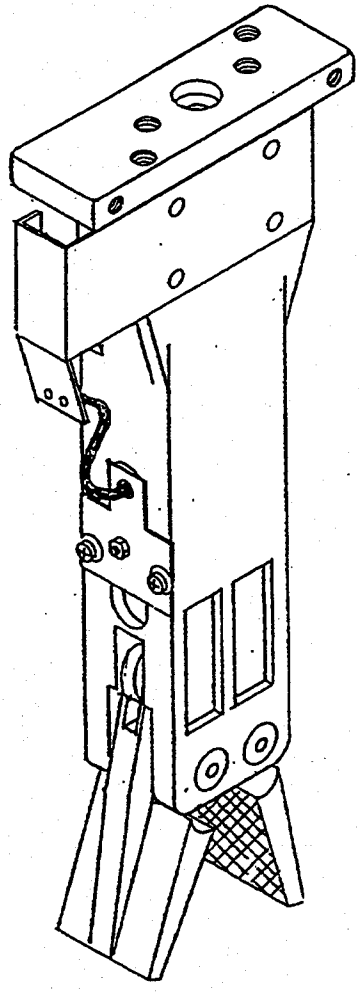
7. GRIPPER ASSY

Without part verification switch



'88-3 3U

With part verification switch



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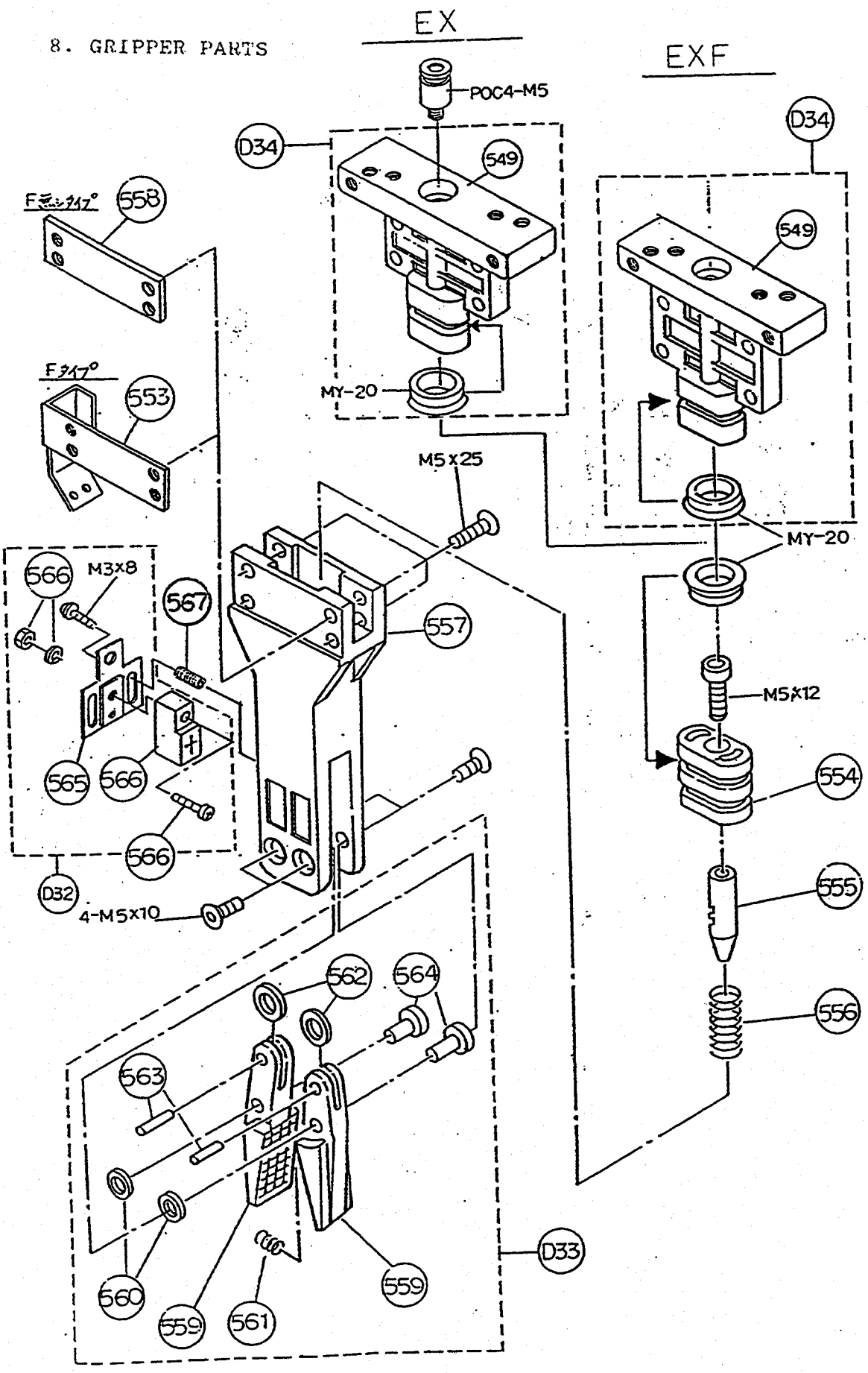
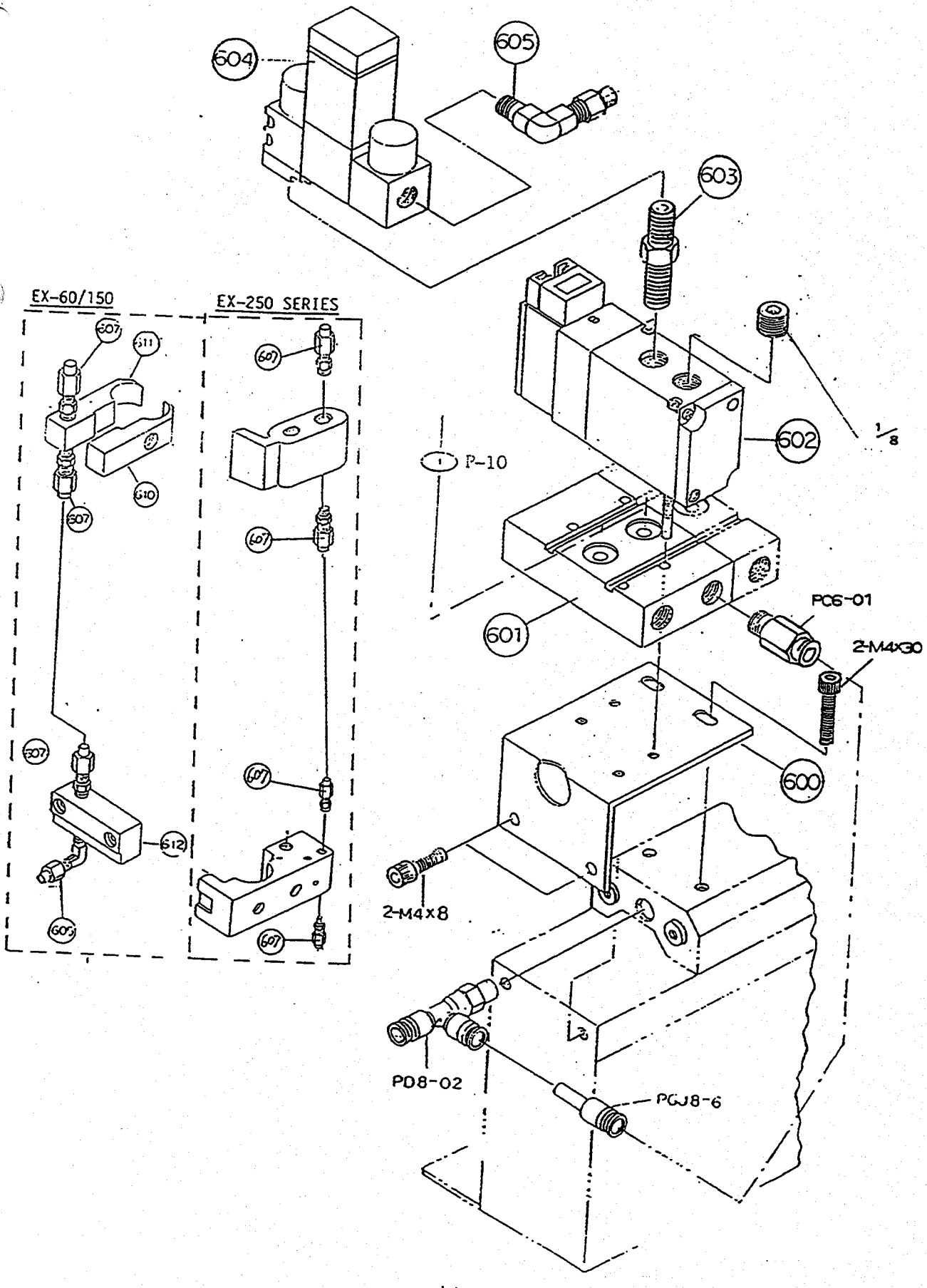
D30

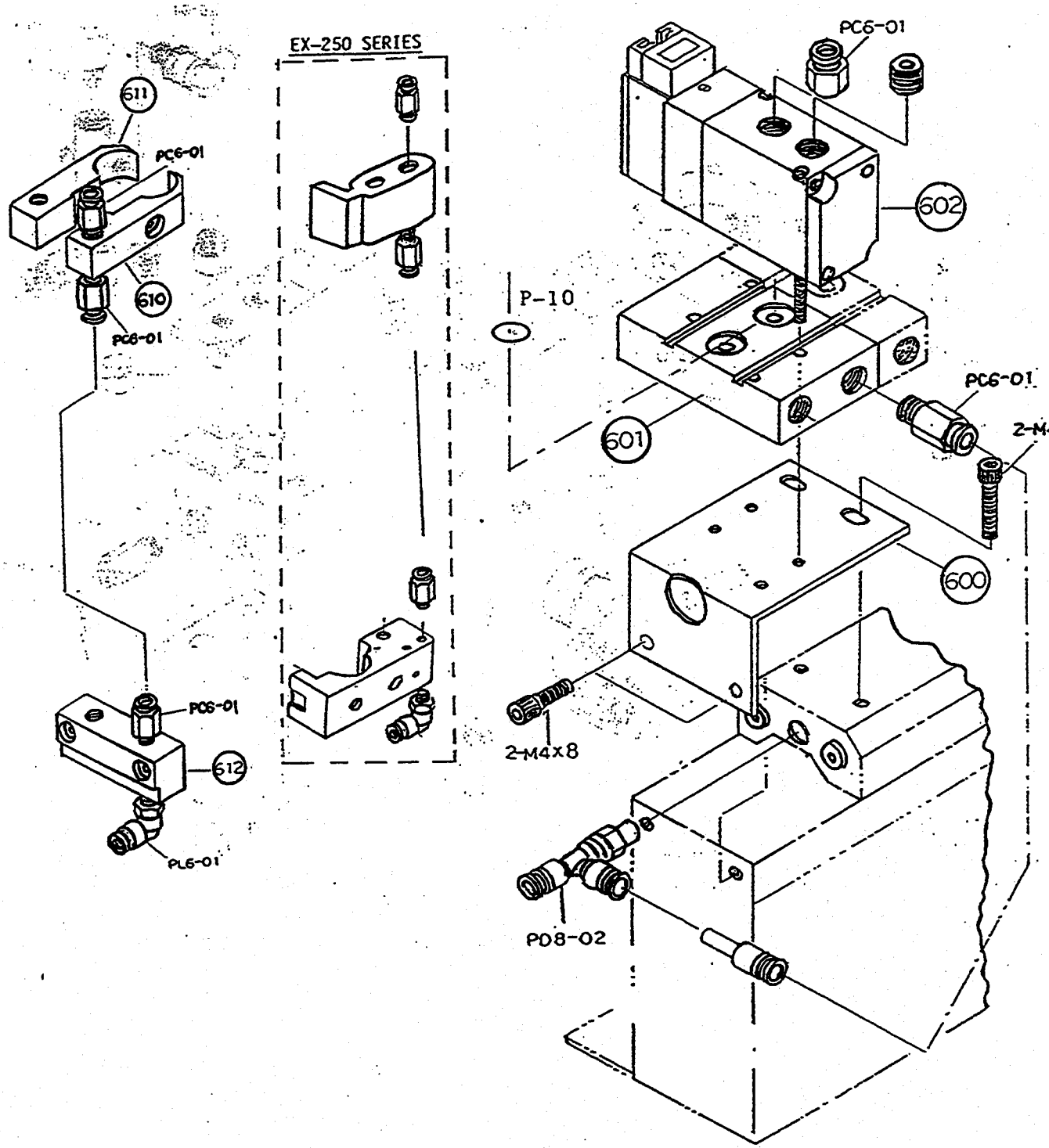
8. GRIPPER PARTS



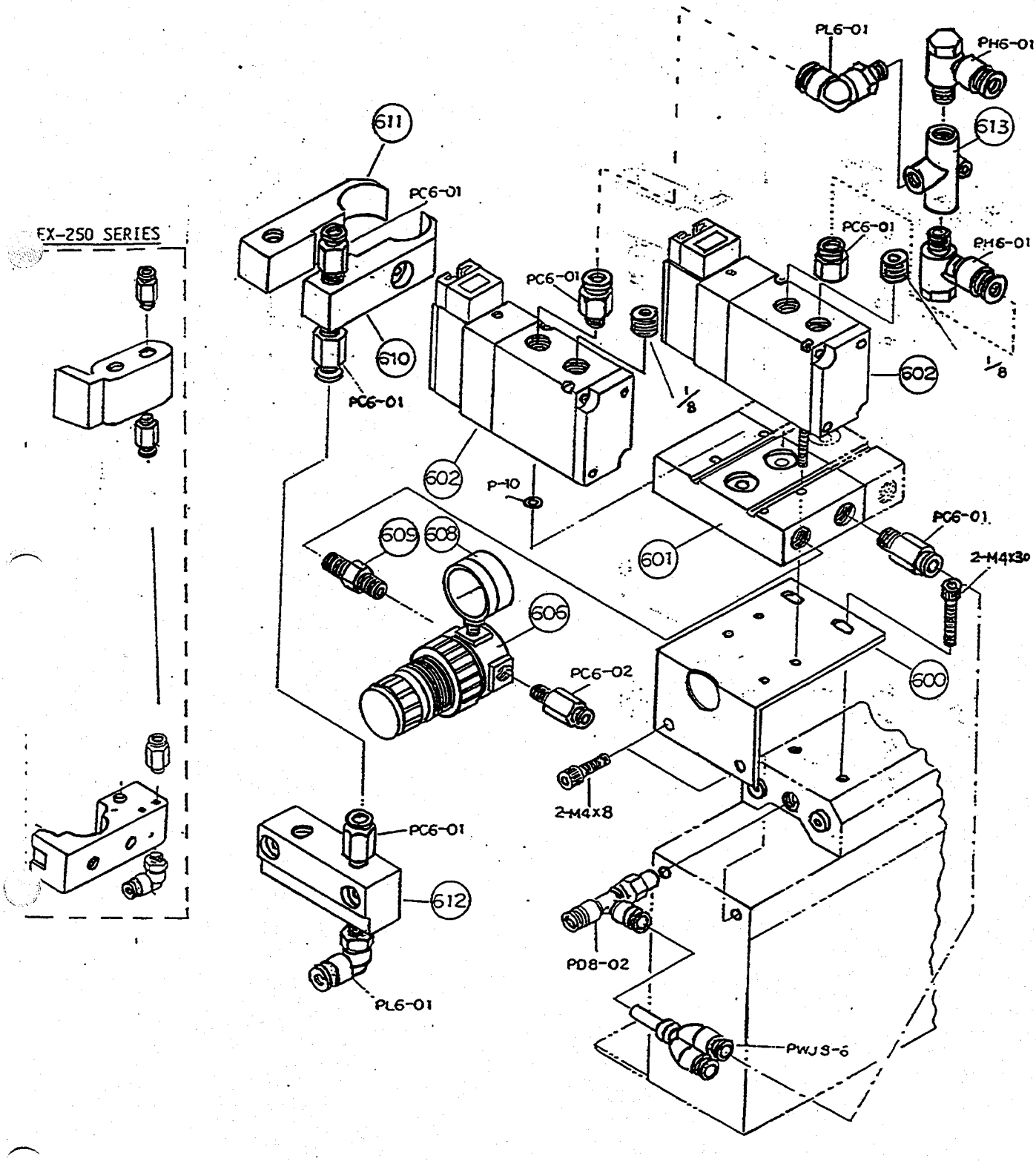
9. EX SRS. OPTION
VACUUM EJECTOR SYSTEM

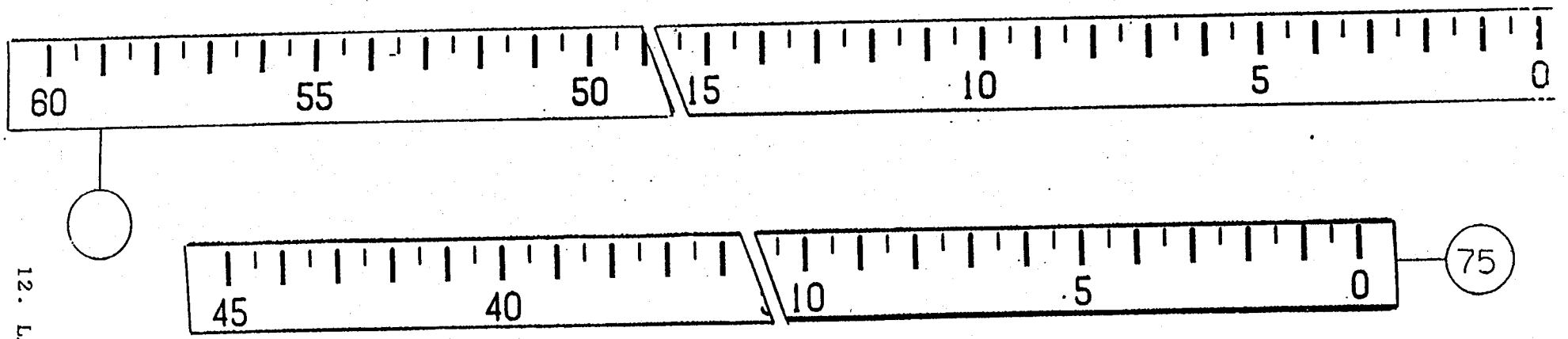


10. EX SRS. OPTION
NIPPER CIRCUIT



11. EX SRS. OPTION
NIPPER CIRCUIT - PRIMARY/SECONDARY PRESSURE





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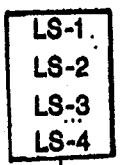

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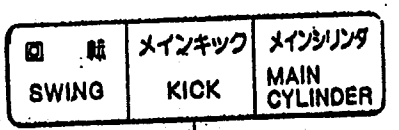

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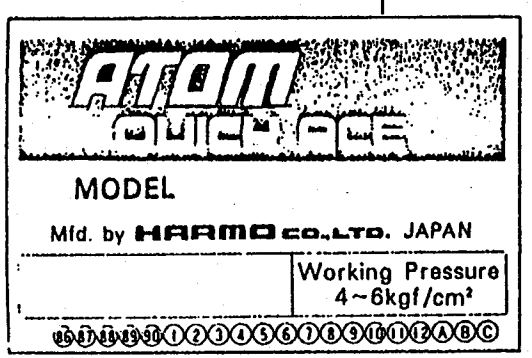

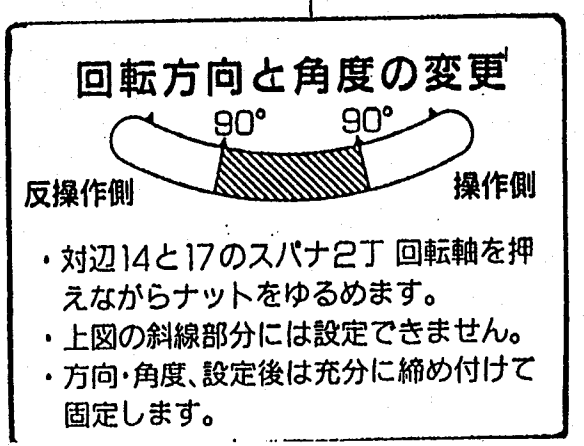

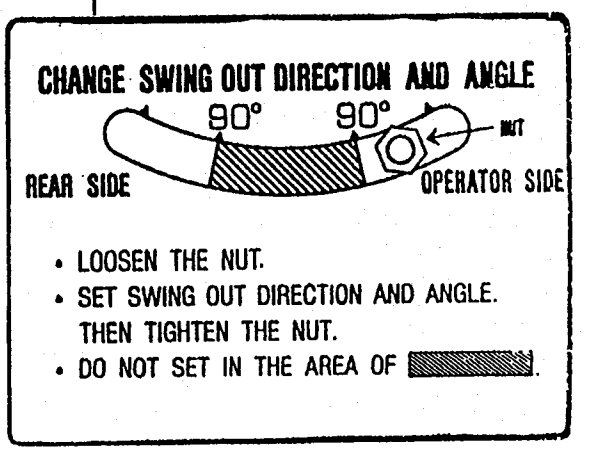

13. WRIST CYL. PARTS