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USERGUIDE

MNL-00010

PC-1 Programmable Controller

⚠ **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This manual is out-of-date and is provided only for its technical information, data and capacities.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containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

INSTRUCTIONS for use of HARMO programmable controller, type PC-1

1. Operating Switch Board

a) Key Selector Switch (Type No.ASW3K3S-243)

3 position selector permits to select - 1. MODE SETTING
2. ROBOT - ON
3. LOCK for automatic operation

(Main supply switch is located inside of control box cabinet on back-side wall.)

1. MODE SETTING	MODE SELECTION switches can be operated.
2. ROBOT - ON	When AUTOMATIC OPERATION STOP switch is ON, MANUAL OPERATION switches can be used. AUTOMATIC OPERATION **START** switch is available to press for starting automatic operation of ROBOT interlocking to the injection molding machine when **MOLD OPEN** indication lamp of STATUS OF INJECTION MACHINE stays OFF.
3. LOCK	The switching **KEY** can be removed off at this position for security so that any push button switch on the operating switch board can not be operated.

b) Emergency Stop (Type No. AVW302-R)

2NC contacts Push-lock Turn Reset push-button switch interrupts immediately all the movements of not only the robot but also the injection molding machine depending on its control system.

This emergency stop operation can be released by turning the knob to clockwise (arrow mark), but the main cylinder arm assembly should be returned to its home position or starting position by means of manual operation so that the automatic operation cycle start is allowed.

c) Releasing interlocking circuit with injection machine

When the injection molding machine is to be operated without robot, turn the Key Selector Switch onto ROBOT-ON position and press STOP button switch of AUTOMATIC OPERATION. Then turn the Key Selector Switch on to LOCK position. Now, injection molding machine can be operated free from interlocking circuit of ROBOT.

d) Mode Selection

Turn the Key Selector Switch on to MODE SETTING position so that all the switches of MODE SELECTION group are available to operate to select any alternative standard program already stored in memory.

Press any of the push button switch, except MODE SET, first. A number for pre-set on delivery will be displayed on MODE INDICATOR. For an example, press the illuminating push button switch for CYLINDER so that a number, i.e. 1, will be displayed on MODE INDICATOR to show the pre-selected program is for the use of MAIN cylinder arm only.

If the illuminating push button switch flashes when it is pressed, it means there is no pre-set program stored in RAM memory. - Normally, standard operation program is stored and the standard operation mode is pre-selected on delivery.

REMARK : If any of push button switch, except those for option, flashes, it means all the memories in RAM have lost due to the back-up battery problem. Replace the back-up battery and set the operation mode again.

For MODE SELECTION, press any of illuminating push button switch and then press the push button switch for MODE SET so that a number will be displayed on MODE INDICATOR. Keep pressing MODE SET push button switch until any of number required for mode selection will come on the display.

The standard operation program with the different operation modes is ready stored in P-ROM IC and the selected operation mode is to be stored in a RAM memory.

e) Standard operation program stored in P-ROM IC.

(1) CYLINDER — Three (3) different modes can be selected for use.
1. **MAIN** cylinder arm only.
2. Both of **MAIN & SUB** cylinder arms together.
3. **SUB** cylinder arm only.

(2) PICK UP VERIFICATION — For security purpose, molding(s) being taken out and picked up should be detected by any means of PICK UP VERIFICATION switches to be selected from the followings.

1. LS-4, standard pick-up varification switch.
2. AUXiliary switch(es) at option.
3. Both of VACUUM differential switch and AUXiliary switch together.
4. VACUUM differntial switch(option) only.

(3) MAIN CYL. SPRUE RELEASING POSITION

The sprue or any molding part being taken hold by gripper on chuck of main cylinder arm can be released to drop

1. ON THE WAY OUTWARD of traverse at the point being set by LS-9.
2. at TRAVERSE END stop position.
3. ON THE WAY INWARD of traverse at the point being set by LS-9.
4. OFF (Not in use)

(4) SUB CYL. SPRUE RELEASING POSITION

The sprue being taken hold by gripping fingers of sub cylinder arm can be released to drop

1. ON THE WAY OUTWARD of traverse at the point being set by LS-9.
2. at TRAVERSE END stop position.
3. ON THE WAY INWARD of traverse at the position being set by LS-9.

(5) HOME POSITION

The home position where the robot starts the automatic operation cycle can be selected alternatively,

1. ABOVE MOLD (on the fixed platen), or
2. at the outward TRAVERSE END stop position.
3. at any point on MIDWAY of TRAVERSE, to order.

(6) WRIST HORIZONTAL

Gripping chuck unit can be tilted to horizontal position

1. ABOVE MOLD, before traverse outward.
2. at the TRAVERSE END position before the descent.

(7) WRIST RETURN VERTICAL

Gripping chuck unit can be tilted to return vertical position

1. ABOVE MOLD after traverse inward.
2. at the TRAVERSE END before traverse inward.

(8) INJECTION MACHINE EJECTION TIMING

Knock-out ejector of injection molding machine can be actuated

1. ON ROBOT GRIPs the moldings.
2. ON KICK FORWARD (as gripper is approaching)

(9) SECOND DESCENT

1. ON (required).
2. OFF (Not required).

(10) NIPPER CUT TIMING

Gate cutting nippers being equipped on the chuck can be operated.

0. OFF (Not required)
1. At POSITIONING HORIZONTAL position
2. At SECOND DESCENT END position

(11) OPTIONS

Special programs can be stored upon request.

f) Manual Operaton

Key Selector Switch is to be set on to ROBOT ON position and, when MOLD OPEN lamp at STATUS OF INJECTION MACHINE is illuminated, any of manual operation switch can be used.

g) AUTOMATIC OPERATION

Now, when you finished operation MODE SELECTION, mechanical stroke setting and fine adjustment of parts gripping point, you can start mold closing of injection molding machine. As the mold being closed, press the START push button switch for AUTOMATIC OPERATION so that ROBOT will start automatically when the mold open is completed.

When the main arm cylinder assembly is not at the proper home position to start, ROBOT will not start its operation cycle and any of the following Alarm Number will be displayed on TROUBLE INDICATOR.

Alarm Number	Description
001	The main arm cylinder assembly is not above the mold area, or not at the traverse inward end position, (LS-2 stays OFF)
002	The gripping unit mounting plate is not at the vertical position. (LS-8 stays OFF)
003	The main arm cylinder assembly is not at the upward end position. (LS-3 stays OFF)
004	The main arm cylinder assembly is not at kick-backward end position. (LS-6 stays OFF)
005	Any of verification switch stays ON.
006	Traverse mid point limit switch (LS-9) stays ON.
007	Traverse outward end limit switch stays ON.
010	Main arm cylinder downward end limit switch (LS-11) stays ON.
011	The gripping unit mounting plate is at the horizontal position. (LS-10 stays ON)
012	SAFETY GATE OPEN
013	PRESS NOT IN AUTO

If it happens as one of the above, operate the robot manually to set at the proper position and press RESET push button switch of TROUBLE INDICATOR.

h) TROUBLE INDICATING ALARM NUMBERS

100 ... Main arm cylinder upward end limit switch (LS-3) stays OFF.

101 ... Main arm cylinder upward end limit switch (LS-3) stays ON.

102 ... Main arm cylinder downward end limit switch (LS-11) stays OFF.

103 ... Kick backward end limit switch (LS-6) stays OFF.

104 ... Kick backward end limit switch (LS-6) stays ON.

105 ... Wrist return end limit switch (LS-8) stays OFF.

106 ... Wrist return end limit switch (LS-8) stays ON.

107 ... Wrist flip end limit switch (LS-10) stays OFF.

110 ... Traverse outward end limit switch (LS-1) stays OFF.

111 ... Traverse inward end limit switch (LS-2) stays OFF.

112 ... Traverse inward end limit switch (LS-2) stays ON.

113 ... LS-9 stays ON on the traverse outward movement.

114 ... LS-9 stays OFF on the traverse inward movement.

115 ... Molded parts are not verified by LS-4, 5, Vacuum differencial switch, LS-14 or etc.

116 ... Slide downward end limit switch for slide type external degating unit stays OFF, when it is in use.

117 ... Slide upward end limit switch for slide type external degating unit stays OFF, when it is in use.

555 ... External equipment (injection machine etc.) emergency stop switch is pressed.

666 ... Robot emergency stop switch is pressed.

777 ... Robot malfunction other than above 100-117.

When automatic cycle operation stops unexpectedly and the delay time set by T17 is up, the alarm number will be displayed on TROUBLE INDICATOR. Press RESET push button switch nearby the TROUBLE INDICATOR when the repairing work is finished.

2. Delay Timer Arrangements

Sixteen points on-delay type analogue timers are built in the 'sequencer' which is located on the back of front door and can be set to (0.1 to 1 sec) x magnification by volume. (Setting time is large by turning to the right.)

The change-over setting of magnification is made by changing over two switches per each timer as following table.

Change-Over Switch		Magnification	Time of timer (sec)	
SW1	SW2			
OFF	OFF	1	0.1	1
ON	OFF	10	1	10
OFF	ON	60	6	60
ON	ON	600	60	600

Functions of each timer

T00 - To set the time delay after releasing traverse lock cylinder up to start the motor driving for the traverse movement. (approx. 0.5 sec.)

T01 - To set the time delay after MOLD OPEN complete up to start the first descent (downward movement) of main (& sub) cylinder arm.

TO2 - To set the time delay after main (& sub) cylinder reaching the downward end (LS-11 is turned ON) up to start KICK forward.

T03 - To set the time delay after main (& sub) cylinder reaching the downward end (LS-11 is turned ON) up to start gripping.

T04 - To set the time delay after gripping the molding(s) up to start KICK backward.

T05 - To set the time delay after main cyl. KICK backward to the end (LS-6 is turned ON) up to start the first ascent (upward movement).

T06 - To set the time delay after detecting traverse outward end position and chuck positioning horizontal up to start second descent of main cyl.

T07 - To set the time delay after detecting the downward end position of main cyl. arm up to actuate grip release.

T10 - To set the time delay after actuating grip release up to start the second ascent of main cyl. arm. (upward movement)

T11 - Aux. for option

T12 - Aux. for option

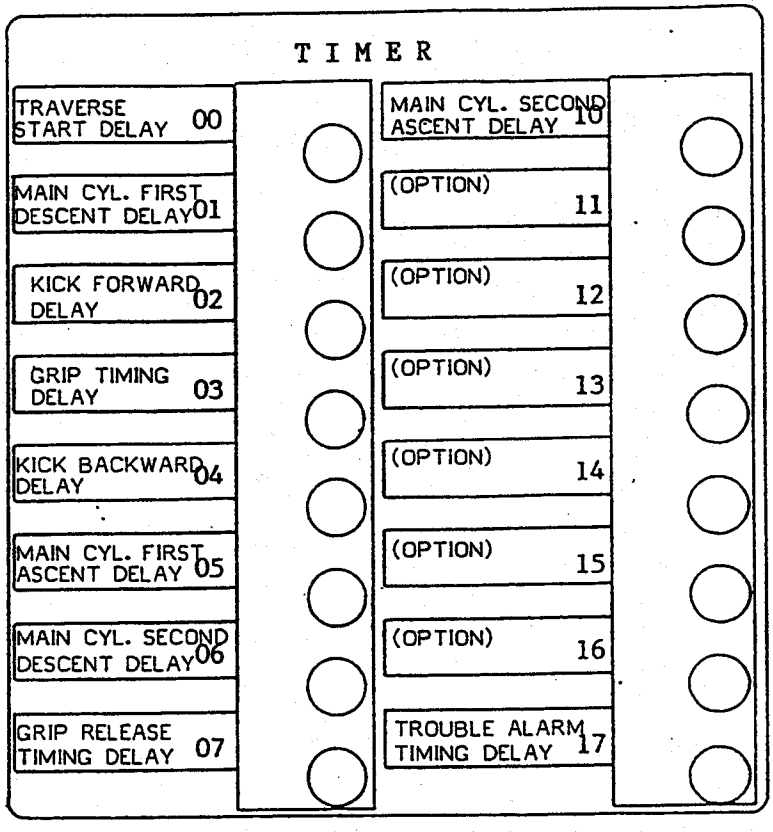
T13 - Aux. for option

T14 - Aux. for option

T15 - Aux. for option

T16 - Aux. for option

T17 - Total time delay for one cycle operation.


TIMER
TRAVERSE START DELAY 00
MAIN CYL. FIRST DESCENT DELAY 01
KICK FORWARD DELAY 02
GRIP TIMING DELAY 03
KICK BACKWARD DELAY 04
MAIN CYL. FIRST ASCENT DELAY 05
MAIN CYL. SECOND DESCENT DELAY 06
GRIP RELEASE TIMING DELAY 07
MAIN CYL. SECOND ASCENT DELAY 10
(OPTION) 11
(OPTION) 12
(OPTION) 13
(OPTION) 14
(OPTION) 15
(OPTION) 16
TROUBLE ALARM TIMING DELAY 17

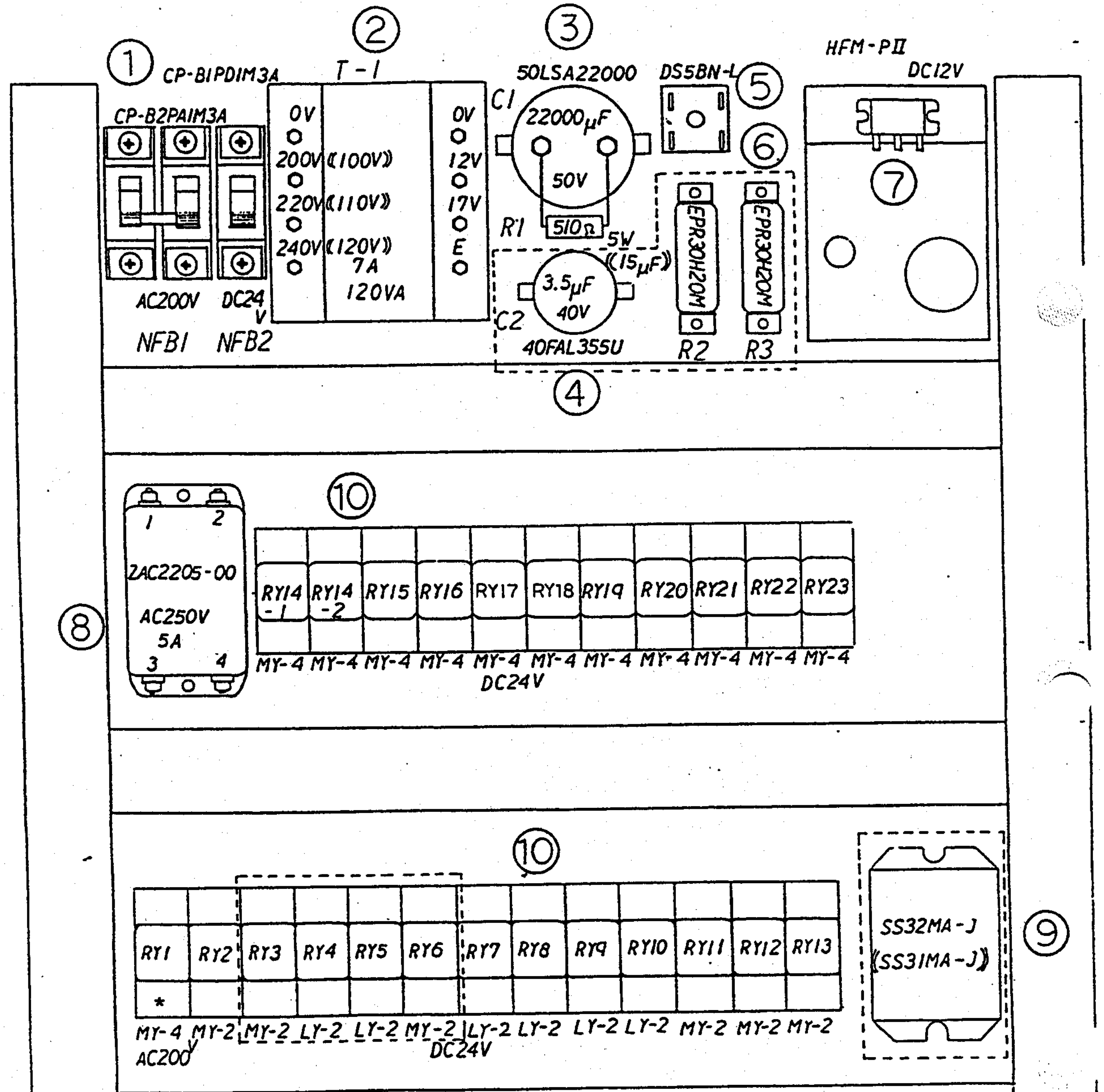
Hard Wired Circuit Panel Designation of Components

1. Circuit Protector (Interruptor)
2. Power Transformer
3. Capacitor for 24V DC circuit
4. Capacitor for motor
5. Rectifier for Sequencer (24V DC)
6. Resistors (10 ohm, 20 watt)
7. Rectifier & Stabilizer for displays (Miniture Lamps & LEDs)
8. Noise Filter
9. Motor control pack.
10. Relays for Interface & Safety Circuit

RY1	Mold Open complete	RY2	Alarm output
RY3	Traverse speed slow-down	RY4	Traverse motor normal rotation
RY5	Traverse motor reverse	RY6	Traverse motor RUN/STOP
RY7	Robot emergency stop	RY8	Mold Close START
RY9	Mold OPEN/CLOSE Interlock	RY10	Knock-out Ejector START
RY11	I/M emergency stop	RY12	AUX. for option
RY13	AUX. for option		
RY14-1/2	Main (& Sub) arm cyl. upward end position		
RY15	Traverse outward end position	RY16	Traverse inward end position
RY17	AUX. for option	RY18	AUX. for option
RY19	AUX. for option		
RY20	Main (& Sub) arm cyl. Descent Safety		
RY21	AUX. for option	RY22	AUX. for option
RY23	AUX. for option		

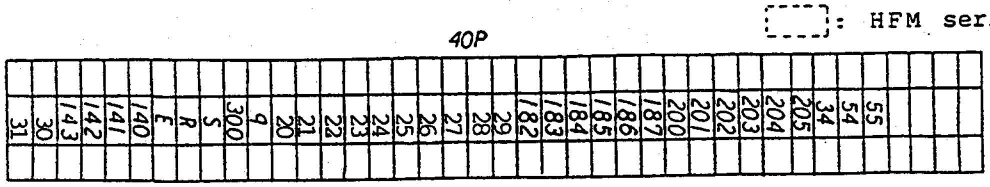
Remarks :

1. Put a relay having the corresponding coil voltage to the signal for Mold Open complete.
2. RY11 to TY13 are auxiliary relays for input from external coil voltage.
3. TY14 to RY20 are the relays of fixed safety circuit.
4. RY21 to RY23 are auxiliary relays for output of dry(zero-voltage) and A-contact signal.

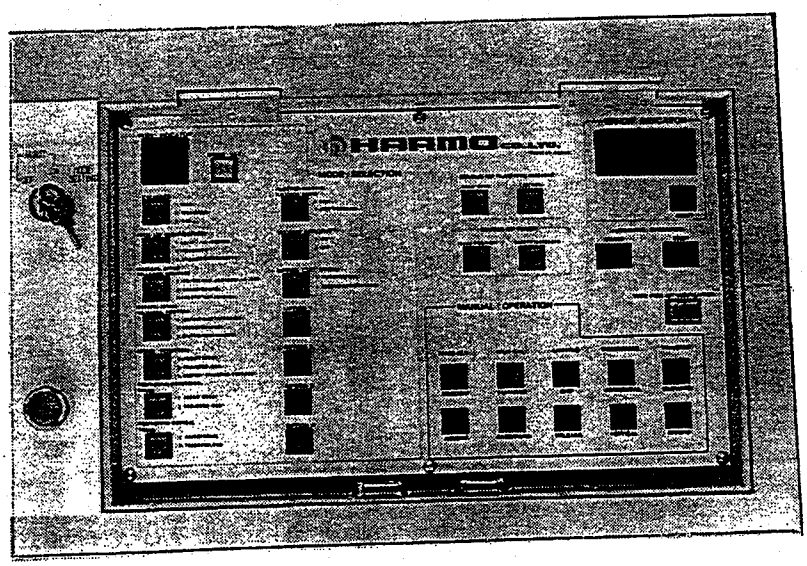


* RY-1 : Coil voltage should be corresponding to mold open limit signal

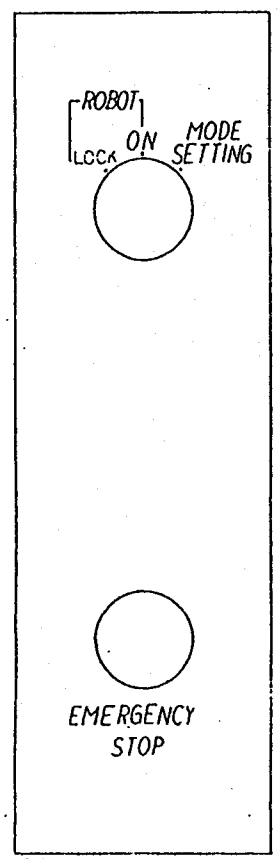
[- - -]: HFM series



CONTROL PANEL



CONTROL PANEL



MODE INDICATOR

MODE SET

MODE SELECTION

CYLINDER
1. MAIN
2. MAIN & SUB
3. SUB

PICK UP VERIFICATION
1. LS-4
2. AUX.
3. VACUUM & AUX.
4. VACUUM

MAIN CYL. SPRUE RELEASING POSITION
1. ON THE WAY OUTWARD
2. TRAVERSE END
3. ON THE WAY INWARD
4. OFF

SUB CYL. SPRUE RELEASING POSITION
1. ON THE WAY OUTWARD
2. TRAVERSE END
3. ON THE WAY INWARD

HOME POSITION
1. ABOVE MOLD
2. TRAVERSE END
3. MIDWAY TRAVERSE (OPTION)

WRIST HORIZONTAL
1. ABOVE MOLD
2. TRAVERSE END

WRIST RETURN VERTICAL
1. ABOVE MOLD
2. TRAVERSE END

INJECTION MACHINE EJECTION TIMING
1. EJECT ON ROBOT GRIP
2. EJECT ON KICK FORWARD

SECOND DESCENT
1. ON
2. OFF

NIPPER CUT TIMING
1. POSITIONING HORIZONTAL
2. SECOND DESCENT END

OPTION 1

OPTION 2

OPTION 3

OPTION 4

HARMO CO.,LTD.
Made in Japan

STATUS OF INJECTION MACHINE

MOLD OPEN

EJECTION

STATUS OF ROBOT

HOME POSITION

SAFETY INTERLOCK

TROUBLE INDICATOR

RESET

AUTOMATIC OPERATION

START

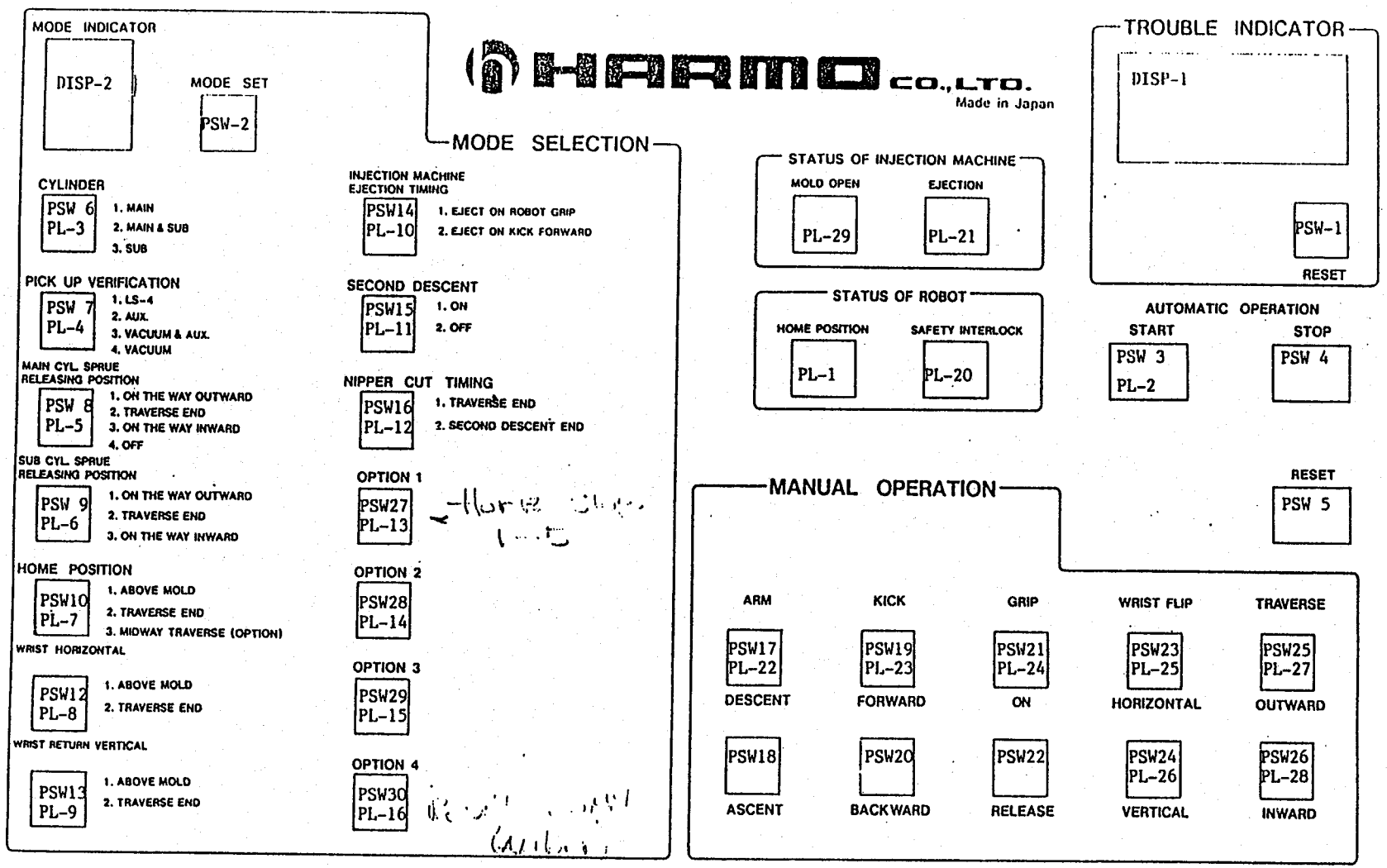
STOP

MANUAL OPERATION

RESET

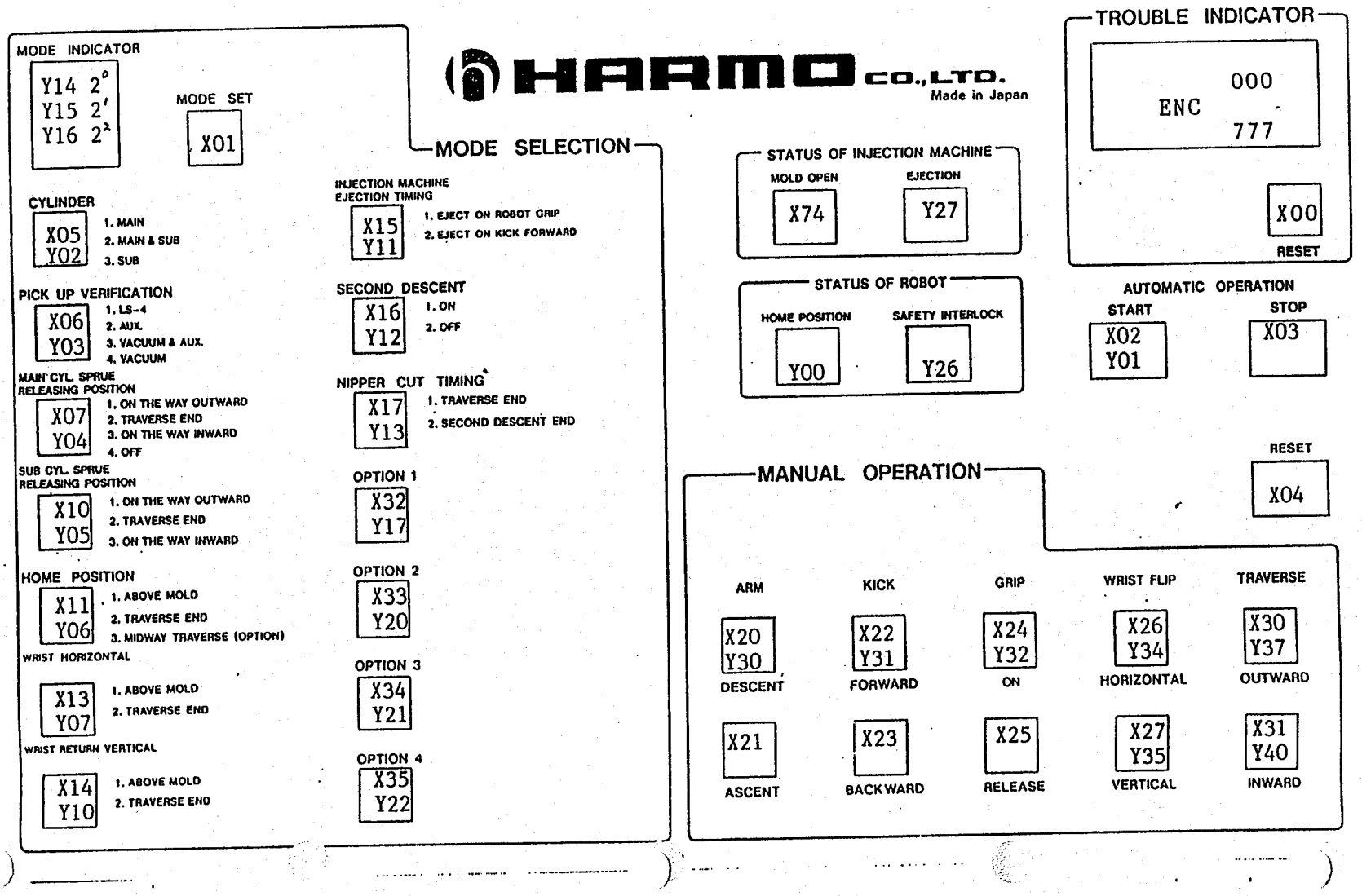
ARM	KICK	GRIP	WRIST FLIP	TRAVERSE
DESCENT	FORWARD	ON	HORIZONTAL	OUTWARD
ASCENT	BACKWARD	RELEASE	VERTICAL	INWARD

SWITCHES AND PILOT LAMP ARRANGEMENT

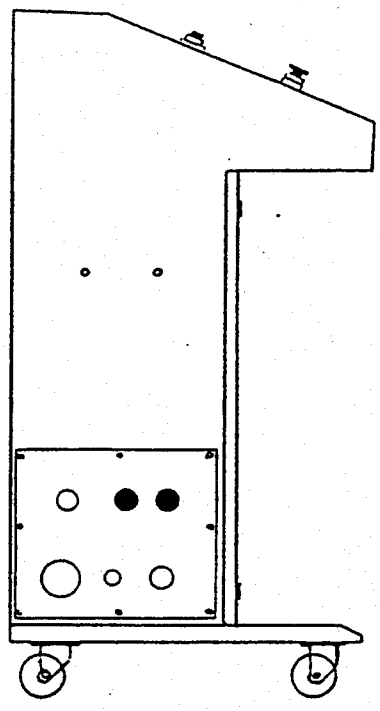


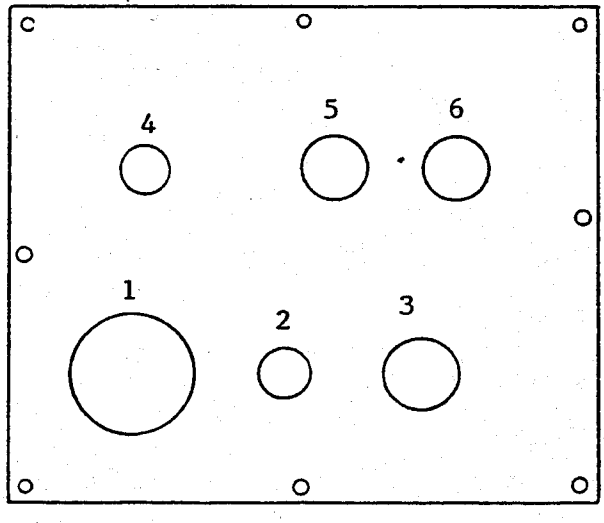
CIRCUIT CONTROL ARRANGEMENT

X:Input
Y:Output



CONNECTORS





1 48P connector (Input and Output for robot) CON.3

2 3 core cable for power supply

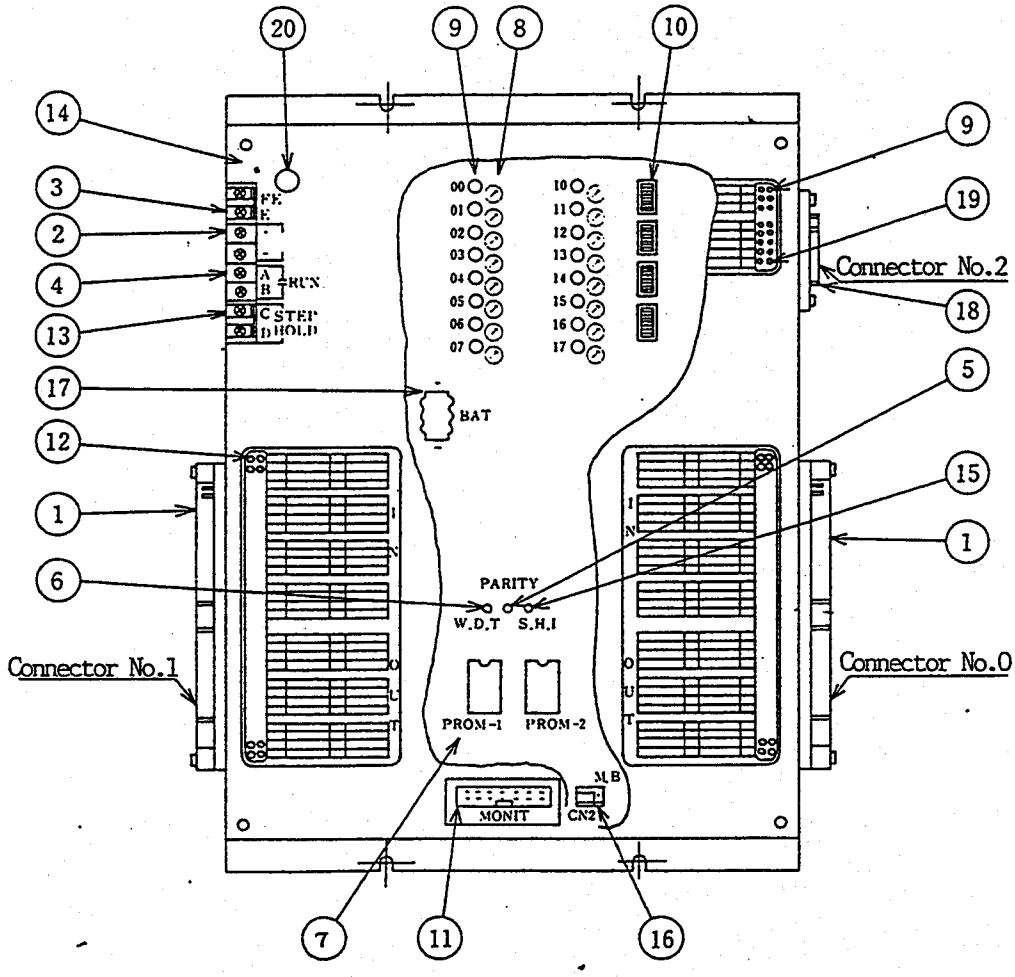
3 16 core interface cable between injection machine and robot

4 5P connector for motor (HFM series robot) CON.4

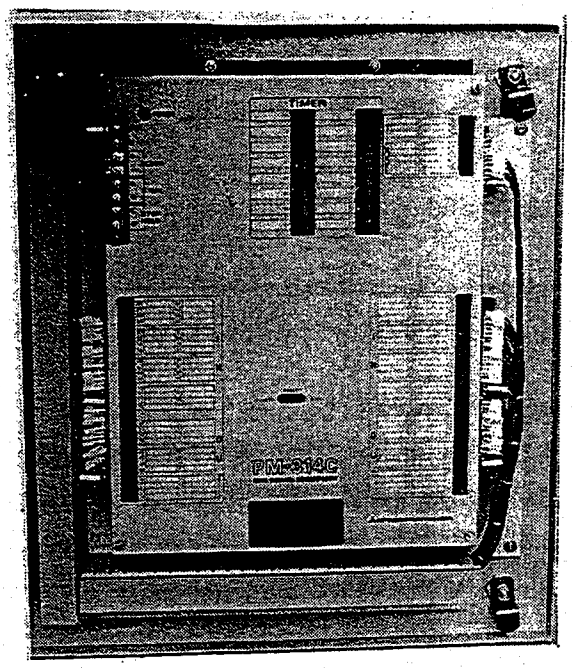
5 Option

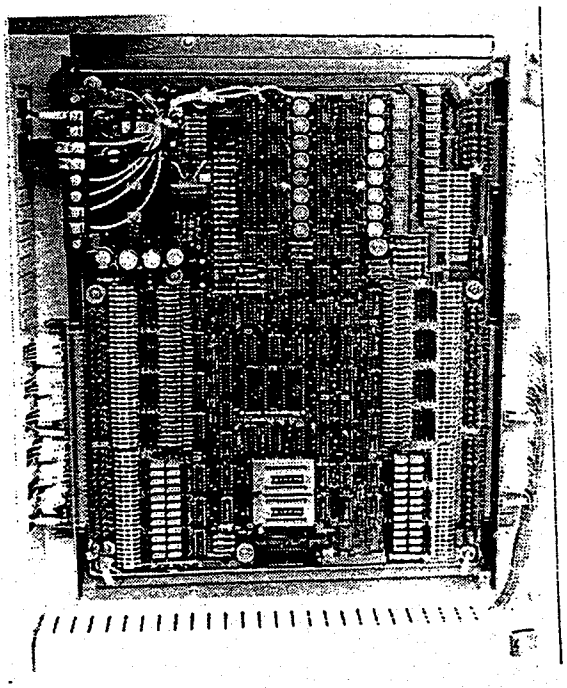
6 Option

A. DESIGNATION OF EACH PART



1 External input-output joining connector
2 D.C.24V power supply terminal
3 Earth terminal
4 RUN contact output terminal
5 Parity error indicating lamp
6 Watch dog timer error indicating lamp
7 PROM-IC socket
8 Timer time setting volume
9 Timer indicating lamp
10 Timer magnification change-over switch
11 Monitor joining connector
12 Input-output indicating lamp
13 Step-hold signal input terminal
14 Cover
15 Step hold signal input indicating lamp
16 Battery back-up change-over connector
17 Battery
18 Connection for timer output or digital code output
19 Digital code output indicating lamp
20 D.C. 24V power supply indicating lamp


TIMER
PM-314C



B. DESCRIPTION FOR EACH PART

1) External input-output joining connector
External 32 input wires, 24 output wires and common wires to input-output are connected by a connector with 72 poles. Refer to the item 11 for the arrangement of terminals. 0.3 to 0.75mm^2 diameter of electric wire is suitable for connecting with pole of connector by soldering.

2) DC24V power supply terminal
This is the power supplying terminal of the sequencer.

3) Earth terminal
Where grounding is made, make the grounding works of the third kind (less than 100 ohm, grounding resistance) and wire to the earthing terminal, E.A thunder surge remedy circuit is connected to the FE terminal, so the grouding is recommended (Connect short bar between E and EF.)

4) Terminal for RUN contact output
This is a contact signal which informs consumers whether or not the sequencer is normally operated. The contact makes during nomall operation. When abnormality is arisen at the sequencer or when supply voltage is lowered (DC12V) or when the power of the sequencer is turned off, the contact is broken.

Contact capacity .... AC125V, 3A (Resistance load),
1.5A (Inductive load cosϕ= 0.4)
DC24V, 3A (Resistance load),
1.5A (Inductive load L R=7ms)

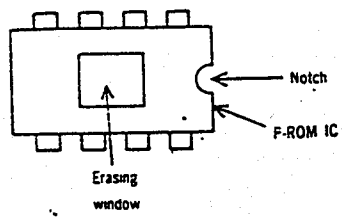
5) Parity error indicating lamp
When error is derived at the data in a PROM (trouble and others of PROM), the indicating lamp is lighted. In this case, a RUN contact is broken.

6) Watch dog timer indicating lamp
Where the operation of the sequencer is stopped, the indicating lamp is lighted. Also in this case, the RUN contact is broken.

7) P-ROM IC socket

This is a socket where P-ROM IC is inserted. The P-ROM IC must loaded and unloaded after shutting off the power and raising the lever of the socket to the vertical position, but in this case, use care not to bend the pin of IC and use care to the direction of the notch of IC. IC is damaged at the closing of the power supply when the P-ROM IC is inserted in the opposite way. In addition, bond a light interrupting tape to the erasing window of P-ROM IC.

Having two sockets, insert P-ROM IC to P-ROM-1, P-ROM-2 sockets in order to the program.



8) Timer time setting volume

Sixteen points on-delay type analogue timers built in the sequencer can be set (Setting time is large by turning to the right) to (0.1 to 1sec) x magnification by volume.

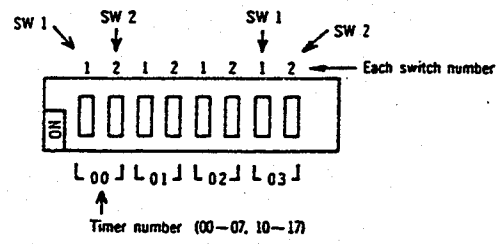
9) Timer indicating lamp

The indicating lamp is lighted, when time is up.

10) Timer magnification change-over switch

This is switch for setting the magnification (1.10.60.600) of a timer. The change-over setting of magnification is made by changing over two switches per each timer. The change-over setting of magnification should be in accordance with the following table.

Change-over switch		Magnification	Time of timer (sec)
SW1	SW2		
OFF	OFF	1	0.1 ~ 1
ON	OFF	10	1 ~ 10
OFF	ON	60	6 ~ 60
ON	ON	600	60 ~ 600



11) Monitor connecting connector

This is a connector for connecting on-line monitor PM-305M. It is no use under normally operation.

12) Input-output indicating lamp

This is a light emitting diode indicating the state of an input-output signal and is lighted when the input-output signal is turned ON.

13) Step-hold signal input terminal

These terminals are utilized in the case of a control unit which requires make an automatic continuous operation withstanding instantaneous or continuous power failure.

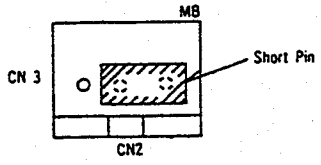
14) Cover

This is the cover of a sequencer. This indicating part forms a window produced by acrylic resin so that a display lamp can be seen. The number of an input-output timer and digital cor are silk screened on the side of the acrylic window. Removed the cover during the loading and unloading of P-ROM.

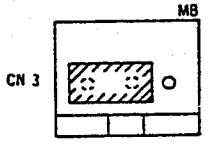
15) Step hold signal input indicating lamp

This lamp is lighted up, when the space between C and D of step hold signal terminals is OFF (continuity is interrupted).

16) Battery back-up change-over connector
Shift a short pin to the side of M.B (memory back-up) only when the battery back-up (holding of temporary storage at power failure) is needed. A number of temporary storage (memory) where battery back-up is available has 128 items from 600 to 777.



Where battery back-up is made.
(PM-314C-BAT)



Where battery back-up is not made.
(PM-314C)

17) Battery (GB350 made by GS)
The battery is required in the battery back-up of a memory. It holds the contens of the memory (M600 to M777) for about 100 days even during the without power. Where the battery is left as it is for more than 100 days, it can be fully charged when the power of the sequencer is turned on for about one day at the state where an input-output connector is removed. In addition, where the battery back-up becomes unnecessary, shift the short pin to the non-M.B. side with the battery loaded.

18) Connection for timer output or digital code output
This is a connector for external output of 6 items of timers (T00 to T05) or 10 items of digital codes.
It is unnecessary to use this connector where the timers or the digital codes are not output to the exterior.

19) Digital code output indicating lamp
This lamp is lighted up, when digital code output is ON.

20) D.C. 24V power supply display lamp
This lamp is lighted up when the power is supplied to the sequencer.

(10) NIPPER CUT TIMING

0. OFF

1. POSITIONING HORIZONTAL (Nipper on chuck)

2. SECOND DESCENT (")

3. WITHOUT SLIDING (External degating unit)

4. SLIDING (")

OPTIONAL TIMER

T11 - To set the time delay after traverse outward end limit switch is pressed up to external nipper ON.

T12 - To set the time delay after external nipper ON up to nipper OFF

T13 - To set the time delay after external nipper OFF up to main cylinder arm kick backward

T14 - To set the time delay after detecting position of external degating unit downward end up to external nipper ON

T15 - To set the time daly after external nipper ON up to nipper OFF

T16 - To set the time delay after external nipper OFF up to main cylinder arm kick beckward

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:

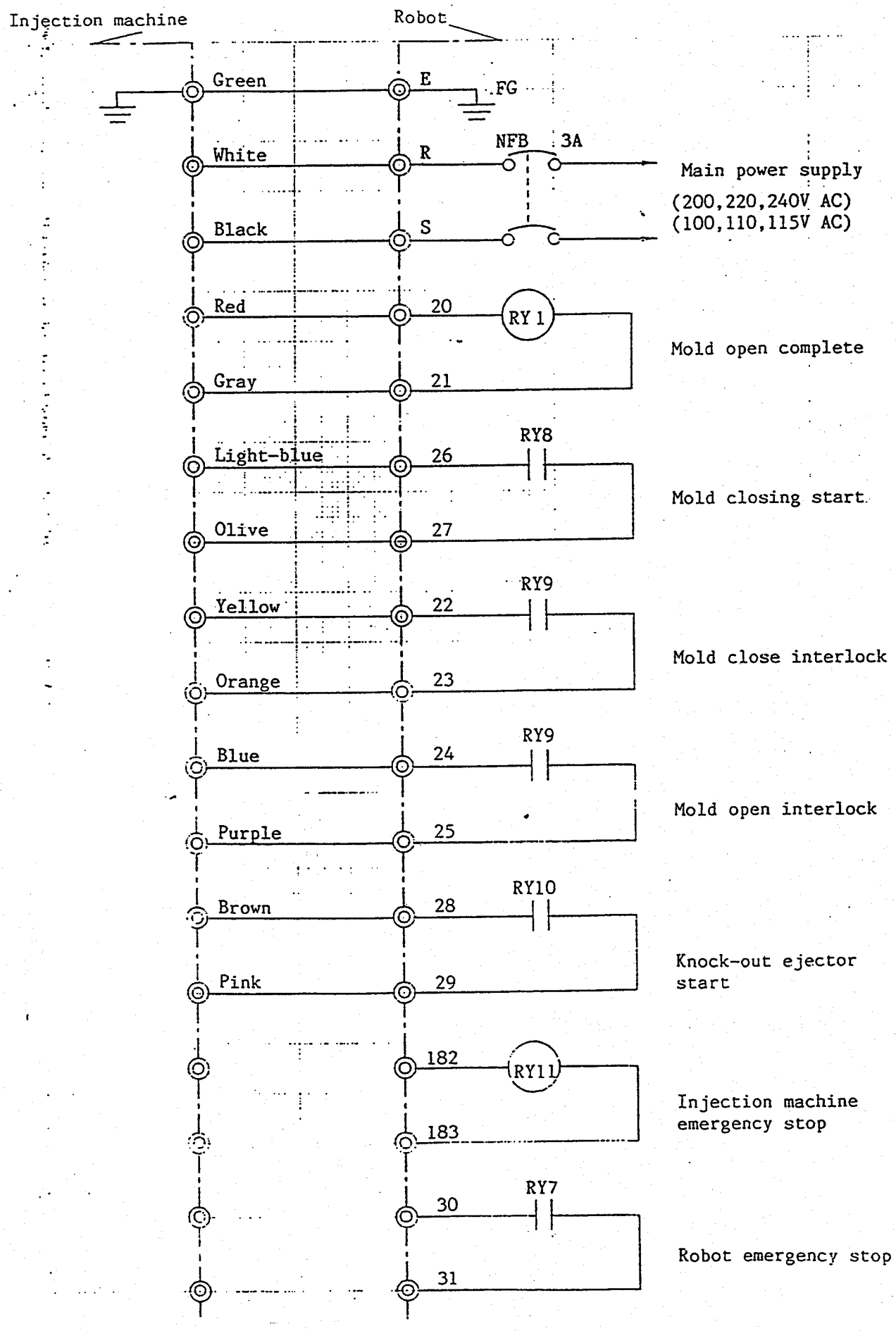
- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- Replace the 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.

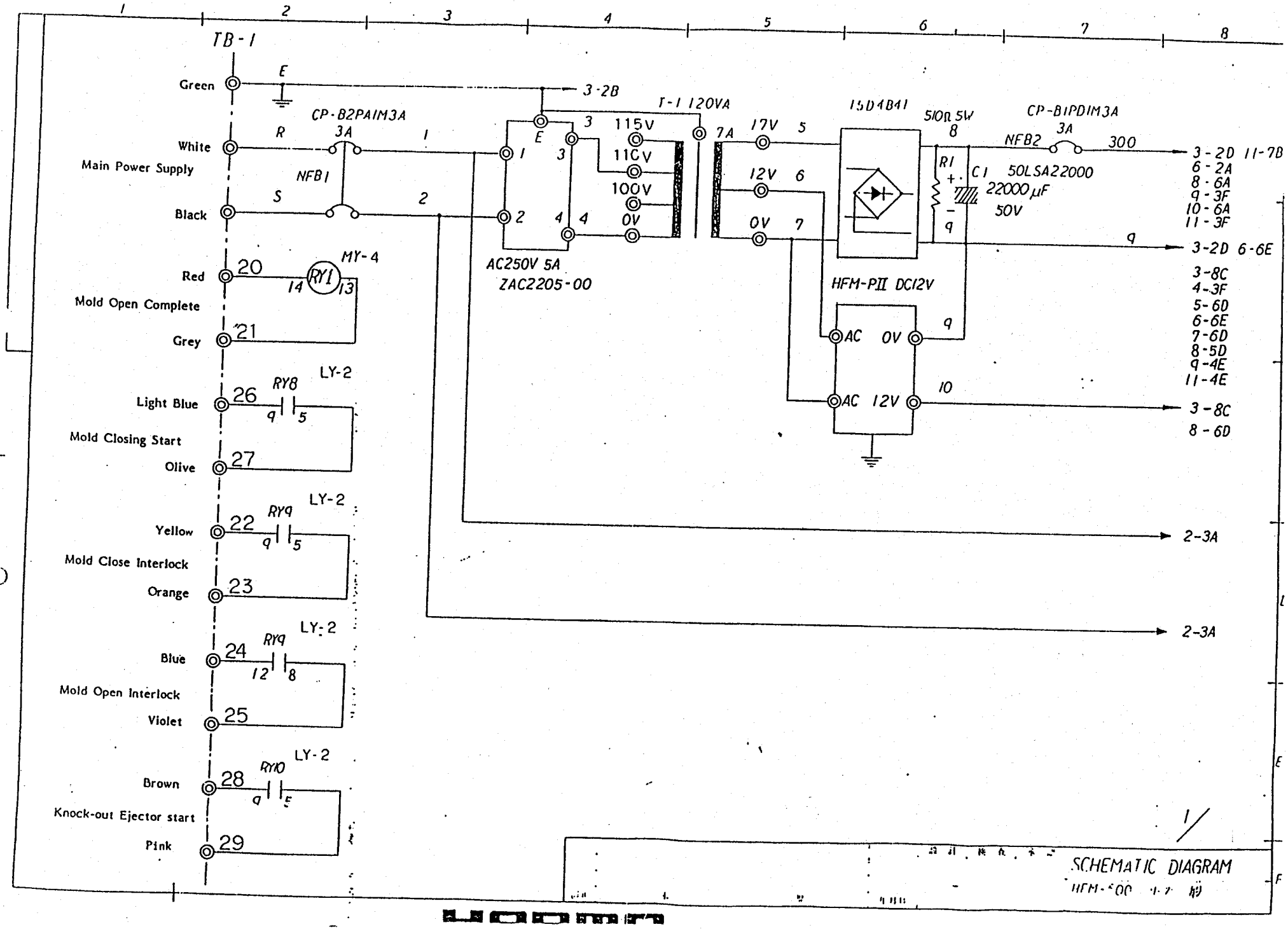
Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

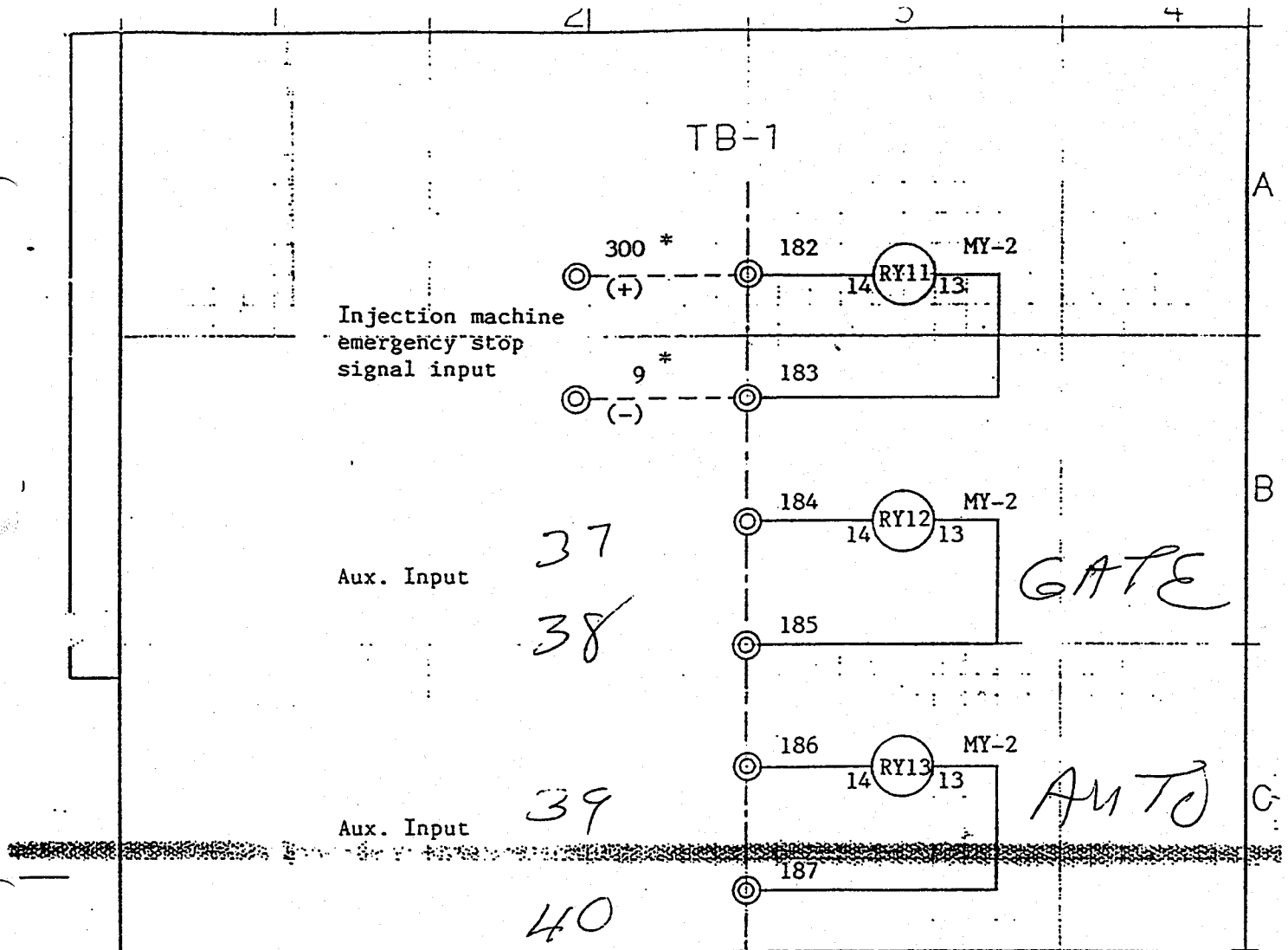
WARRANTY LIMITATIONS

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.

CABLE CONNECTION BETWEEN ROBOT & INJECTION MACHINE




TB-1
Green
White
Main Power Supply
Black
Red
Mold Open Complete
Grey
Light Blue
Mold Closing Start
Olive
Yellow
Mold Close Interlock
Orange
Blue
Mold Open Interlock
Violet
Brown
Knock-out Ejector start
Pink
CP-B2PAIM3A
NFB1
MY-4
RY1
LY-2
RY8
RY9
RY10
T-1 120VA
AC250V 5A
ZAC2205-00
115V
110V
100V
0V
17V
12V
15D4B41
HFM-PII DC12V
AC 0V
AC 12V
510Ω 5W
CP-B1PDIM3A
NFB2
C1 50LSA22000
22000μF
50V
3-2B
3-2D 11-7B
6-2A
8-6A
9-3F
10-6A
11-3F
3-2D 6-6E
3-8C
4-3F
5-6D
6-6E
7-6D
8-5D
9-4E
11-4E
3-8C
8-6D
2-3A
2-3A
SCHEMATIC DIAGRAM

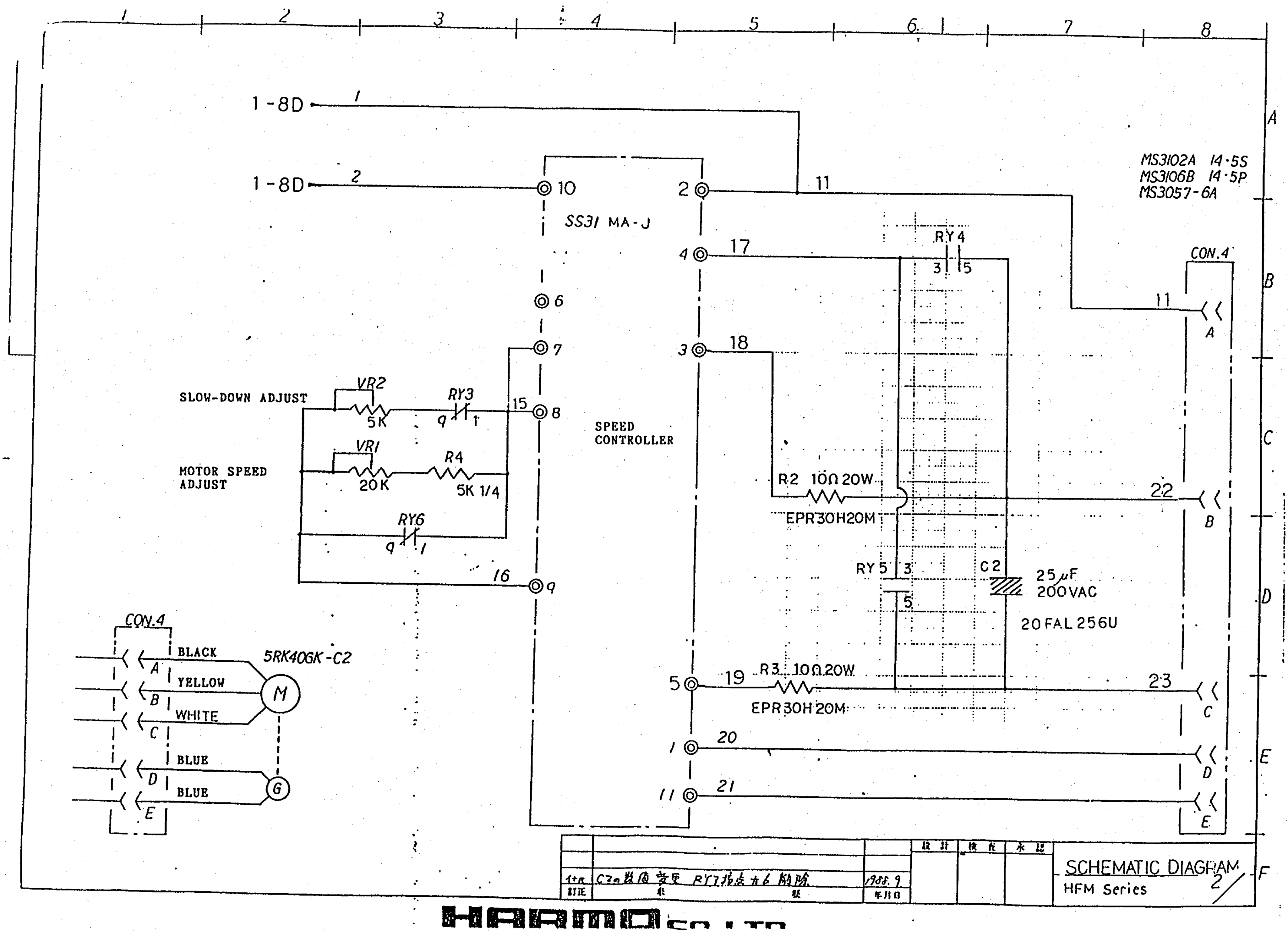


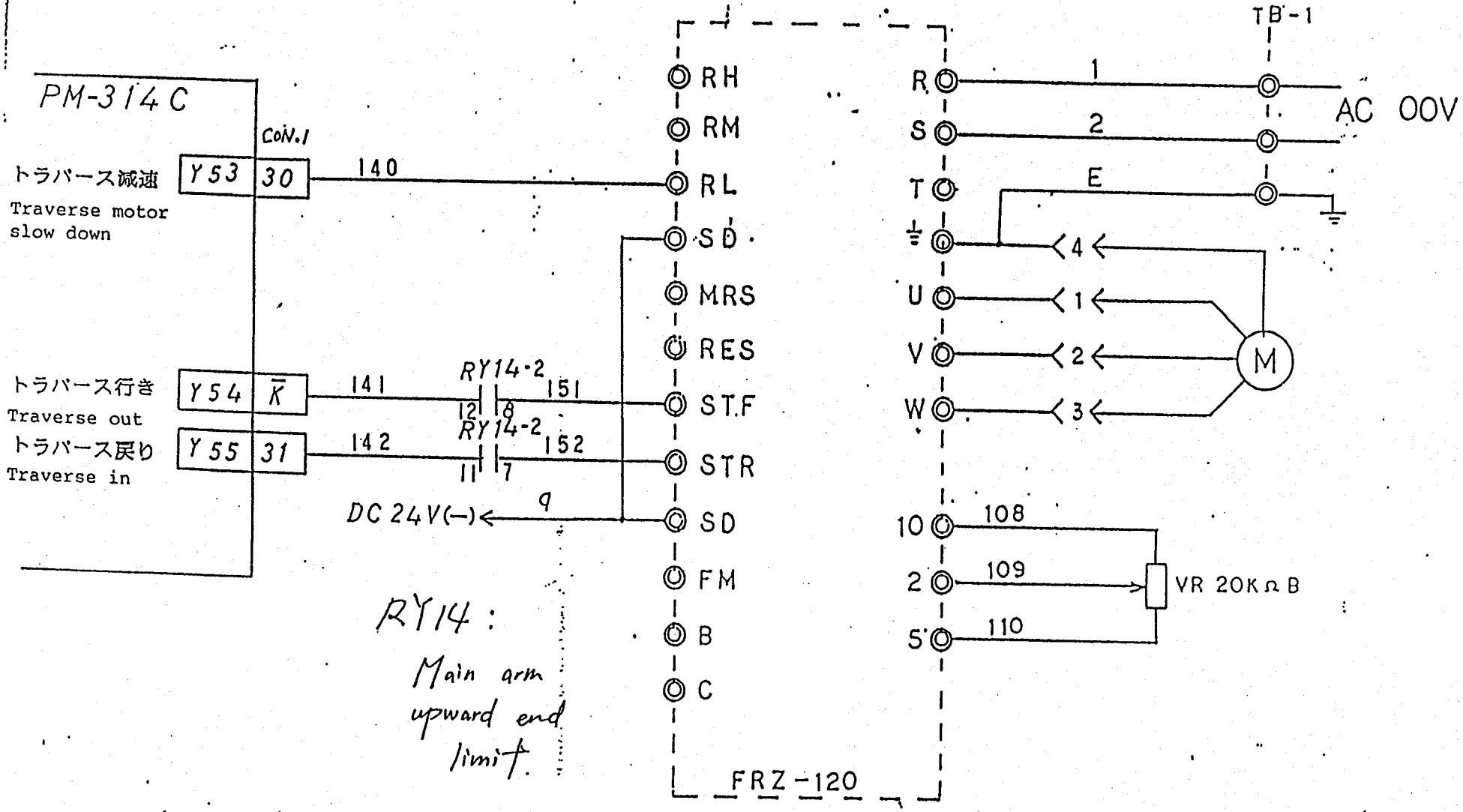
* When the injection machine emergency stop signal is applied to control box, please disconnect these wires (cord No. 300 & 9).

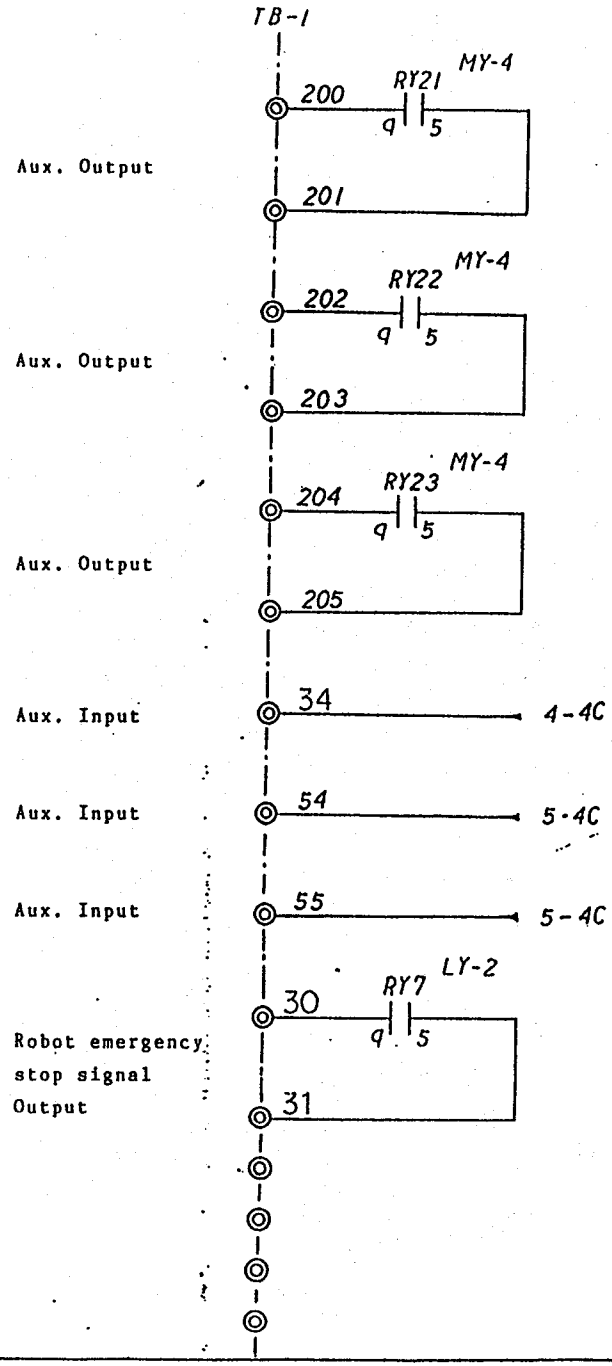
			設計	検査	承認	
訂正	来歴	年月日				

1/

HARMO CO.,LTD.


1-8D
1
2
10
2
11
SS31 MA-J
17
4
RY4
6
7
3
18
SLOW-DOWN ADJUST
VR2
5K
RY3
15
8
SPEED CONTROLLER
MOTOR SPEED ADJUST
VR1
20K
R4
5K 1/4
RY6
16
9
R2 10Ω 20W
EPR30H20M
RY5
C2
25μF 200VAC
20FAL256U
5
19
R3 10Ω 20W
EPR30H20M
23
22
20
21
CON.4
MS3102A 14-5S
MS3106B 14-5P
MS3057-6A
BLACK
YELLOW
WHITE
BLUE
BLUE
5RK40GK-C2
M
G
SCHEMATIC DIAGRAM
HFM Series
2/
1988.9
HARMO CO. LTD

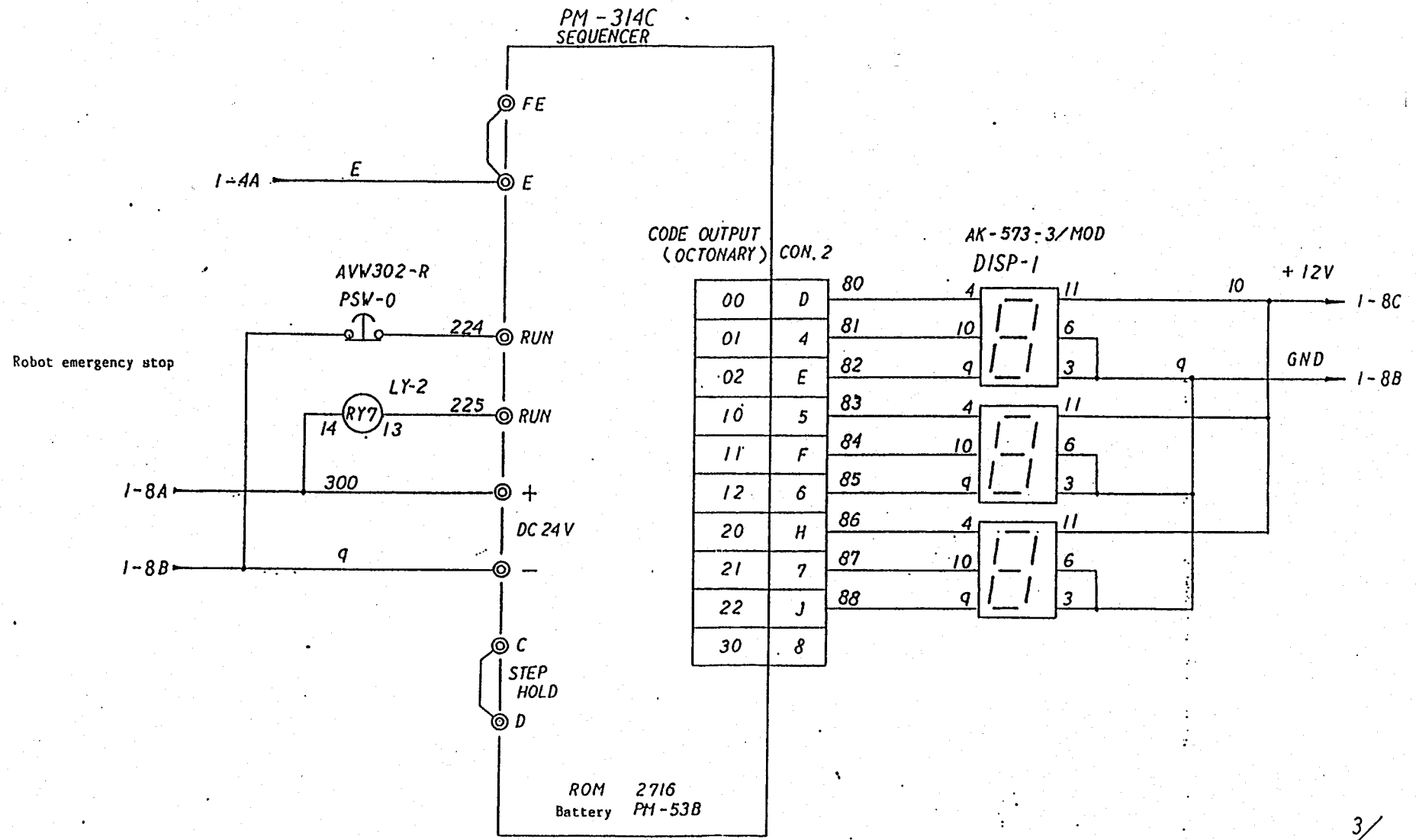

PM-314C
CON.1
トラバース減速
Y53
30
Traverse motor slow down
140
トラバース行き
Y54
K
Traverse out
141
RY14-2
12
8
151
トラバース戻り
Y55
31
Traverse in
142
RY14-2
11
7
152
DC 24V(−)
9
RH
RM
RL
SD
MRS
RES
ST.F
STR
SD
FM
B
C
FRZ-120
TB-1
R
S
T
U
V
W
10
2
5
1
2
E
4
1
2
3
M
108
109
110
VR 20KΩ B
RY14 :
Main arm upward end limit.
Inverter control unit
2/
PC-1
モーター回路図
株式会社ハーモ



2'

			設計	検査	承認
訂正	来歴	年月日	-		

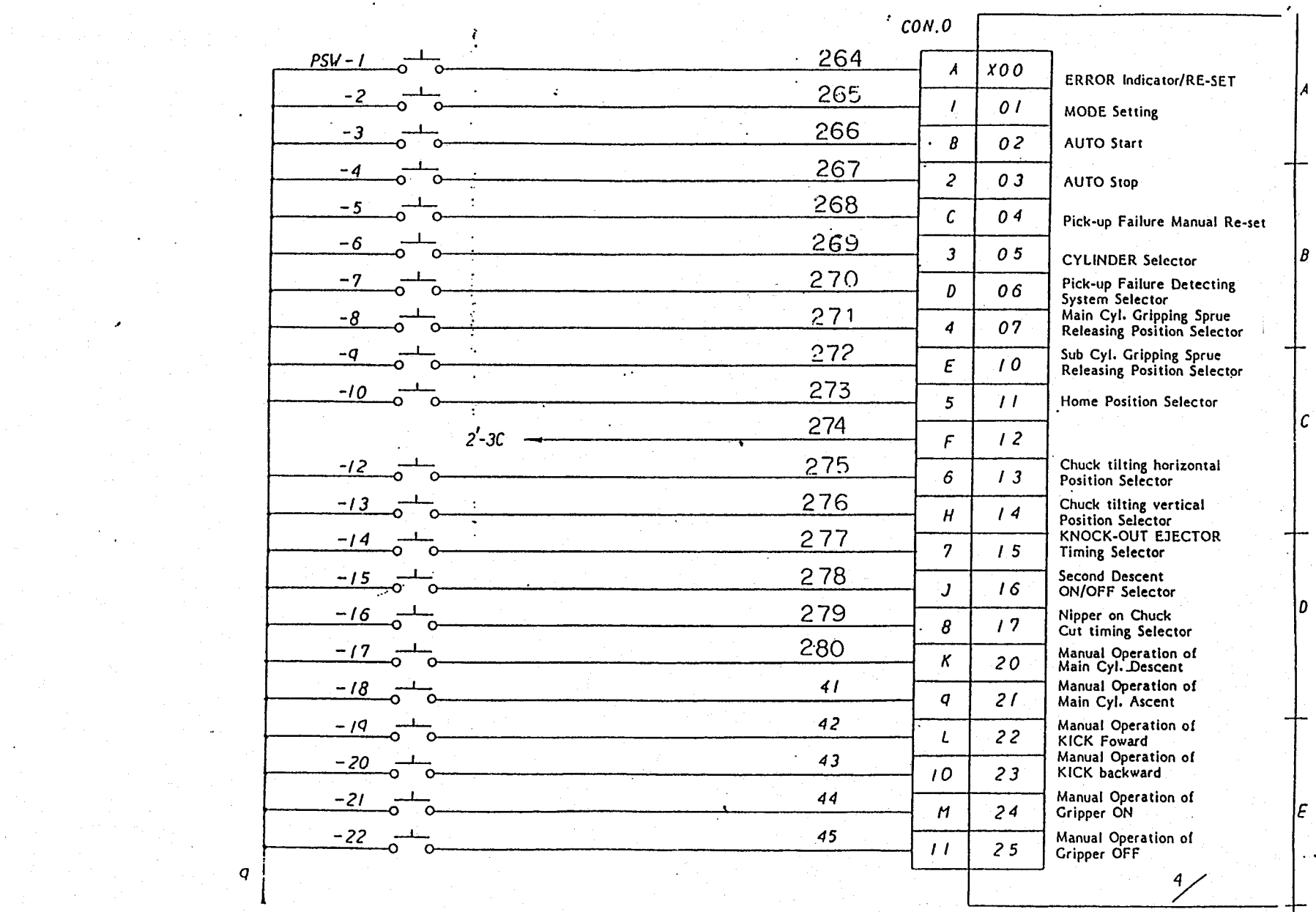
HARMO CO.,LTD.

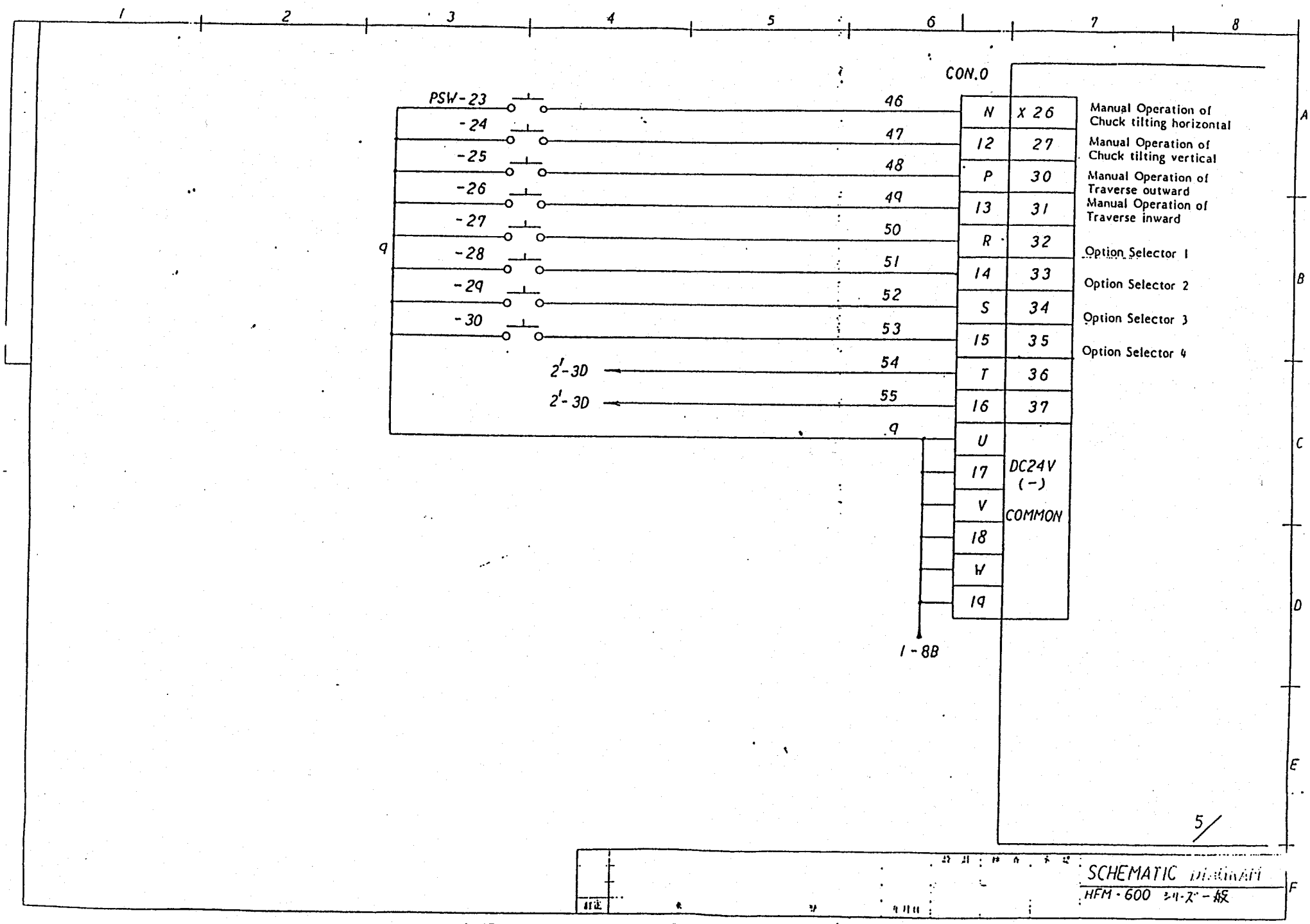


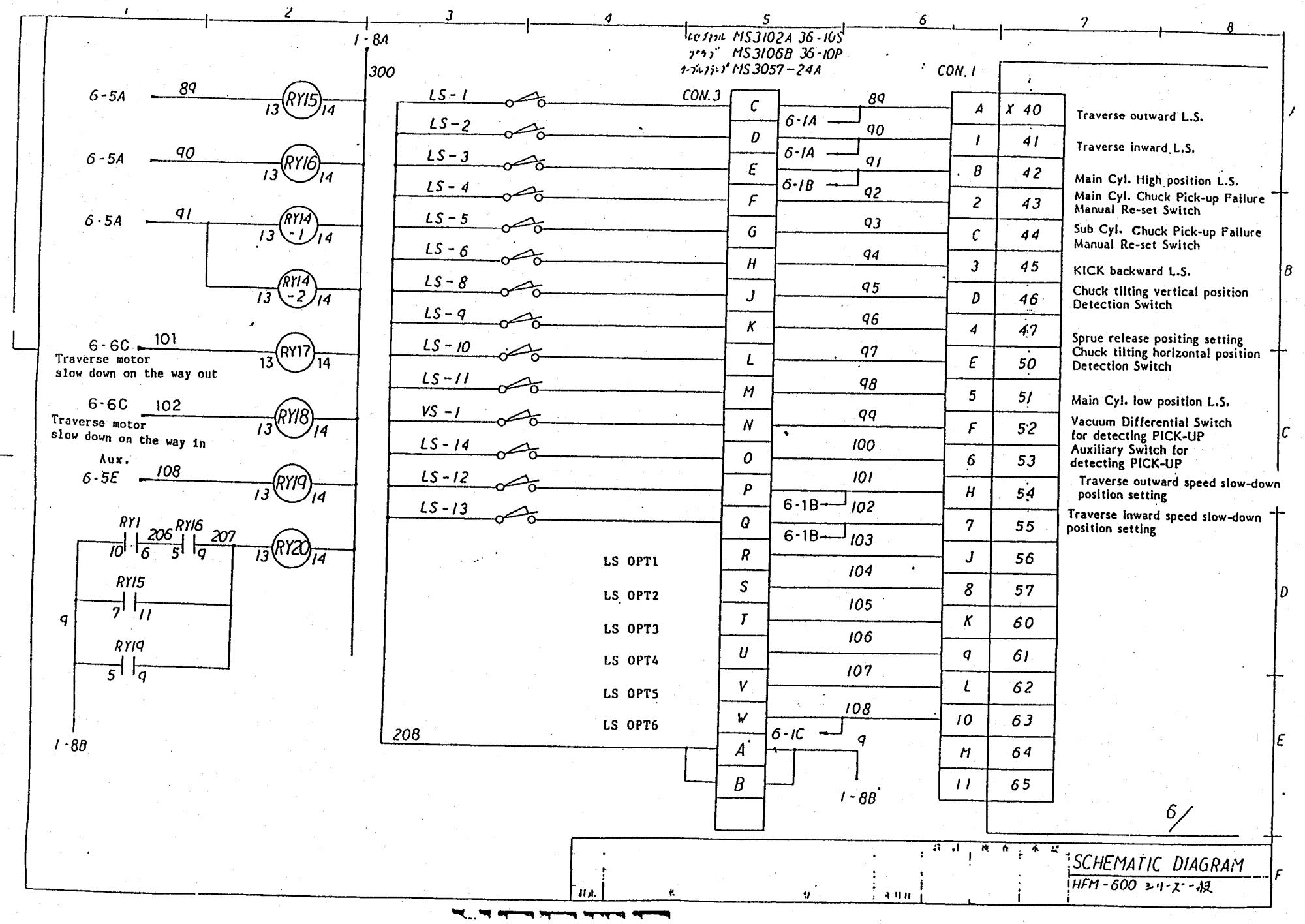
3/

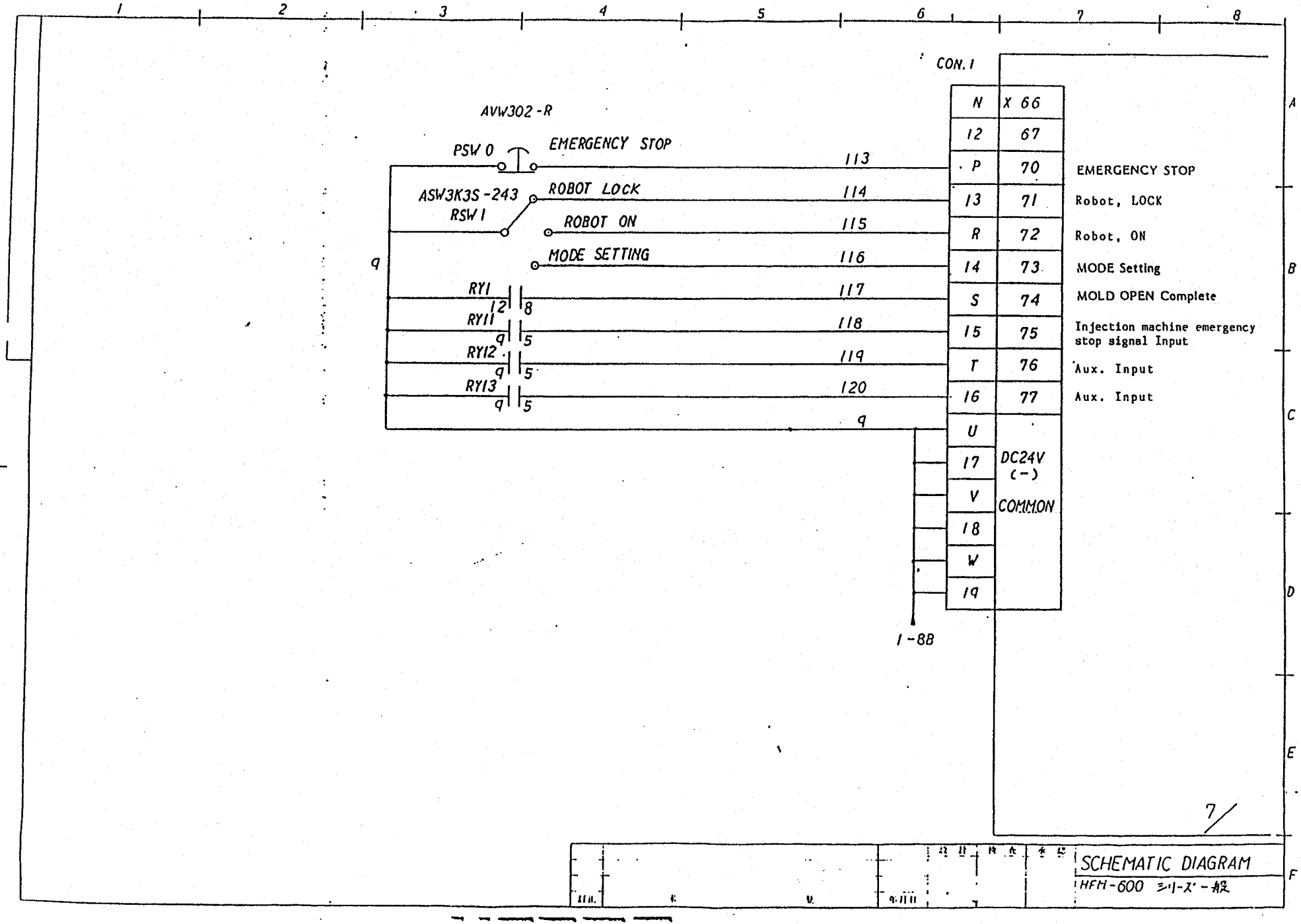
SCHEMATIC DIAGRAM

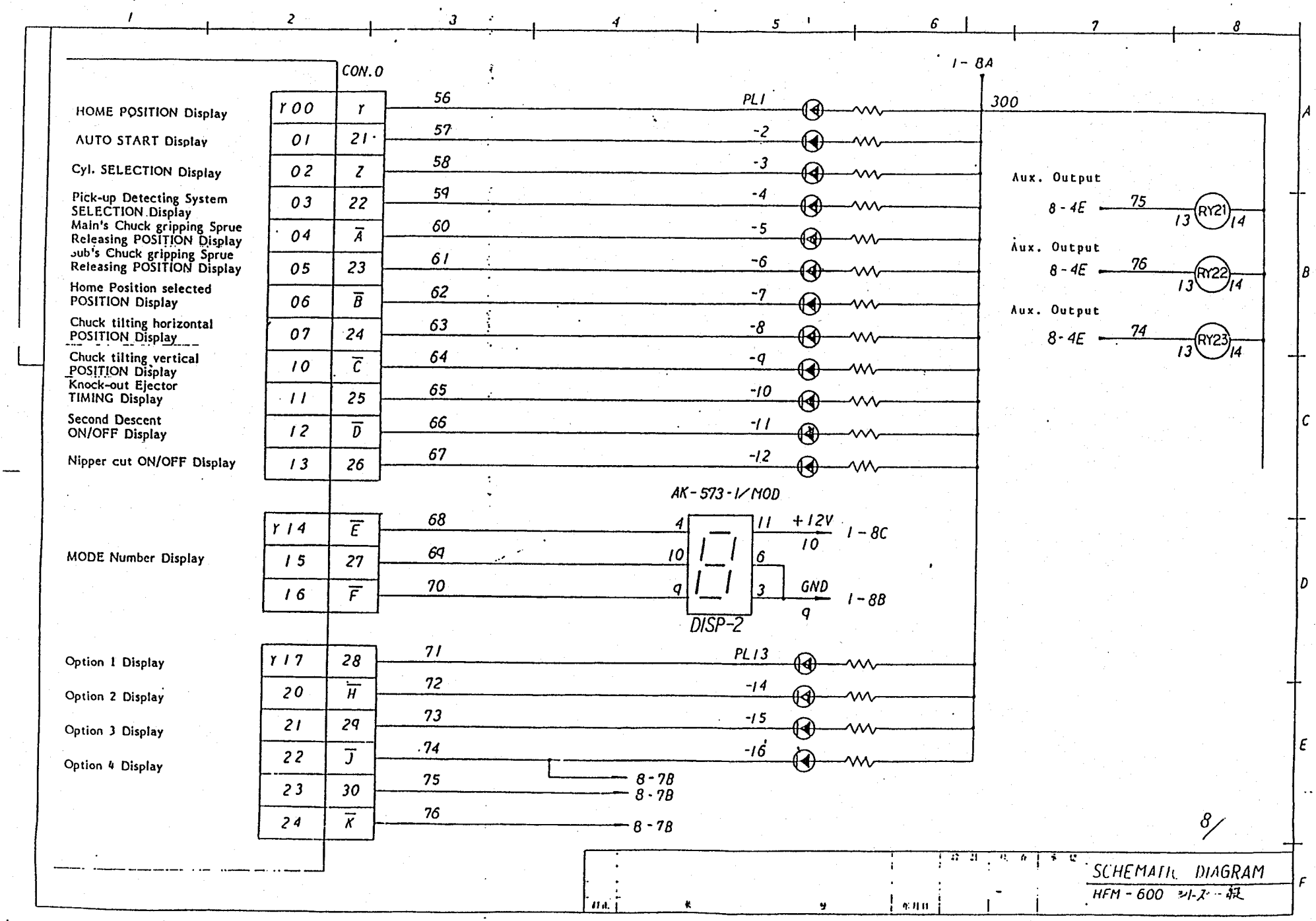
HFM-600 ﾐﾘｰｽﾞ-#2

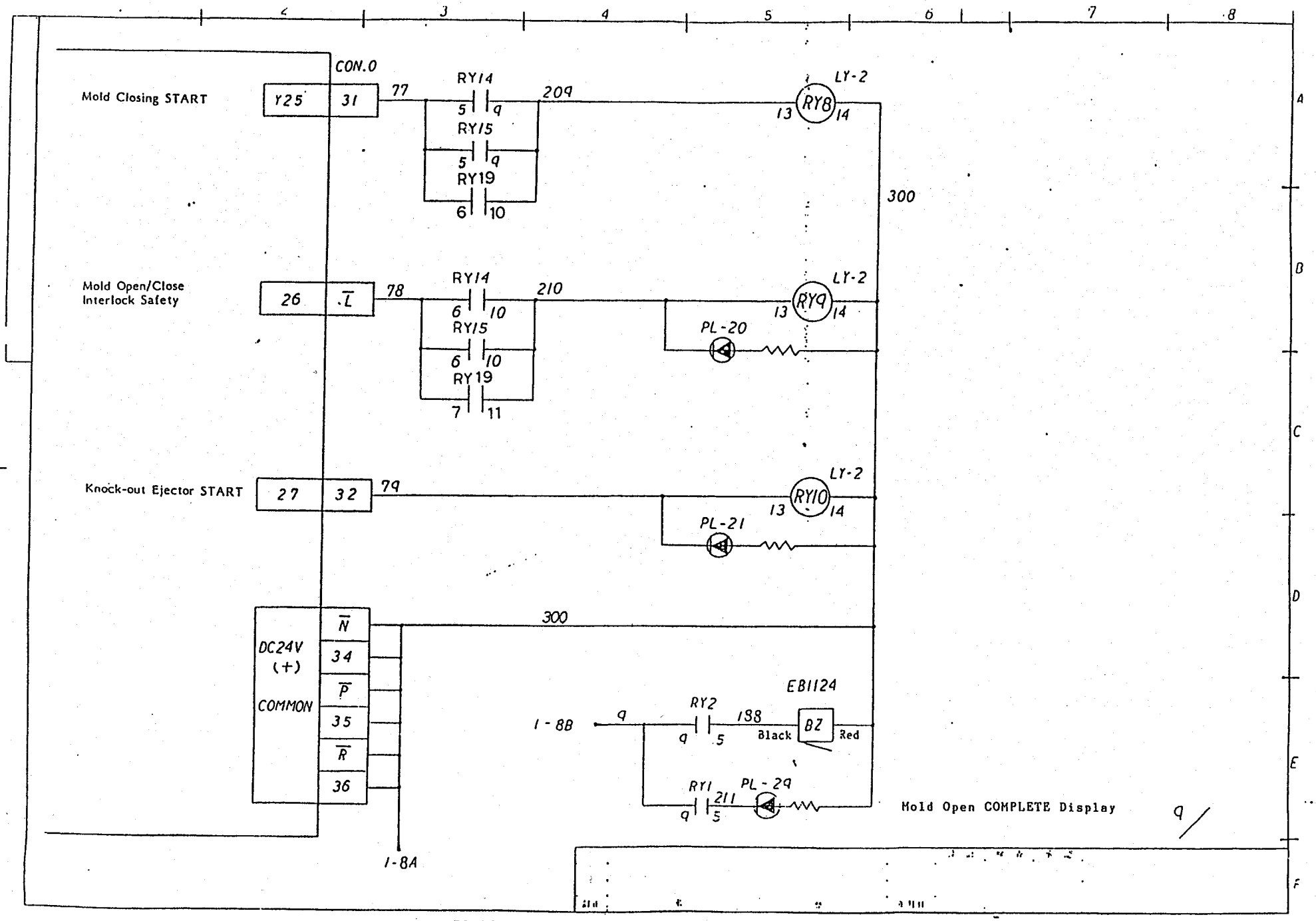

CON.0
PSW-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
2'-3C
-12
-13
-14
-15
-16
-17
-18
-19
-20
-21
-22
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
41
42
43
44
45
A X00 ERROR Indicator/RE-SET
1 01 MODE Setting
B 02 AUTO Start
2 03 AUTO Stop
C 04 Pick-up Failure Manual Re-set
3 05 CYLINDER Selector
D 06 Pick-up Failure Detecting System Selector
4 07 Main Cyl. Gripping Sprue Releasing Position Selector
E 10 Sub Cyl. Gripping Sprue Releasing Position Selector
5 11 Home Position Selector
F 12
6 13 Chuck tilting horizontal Position Selector
H 14 Chuck tilting vertical Position Selector
7 15 KNOCK-OUT EJECTOR Timing Selector
J 16 Second Descent ON/OFF Selector
8 17 Nipper on Chuck Cut timing Selector
K 20 Manual Operation of Main Cyl. Descent
9 21 Manual Operation of Main Cyl. Ascent
L 22 Manual Operation of KICK Foward
10 23 Manual Operation of KICK backward
M 24 Manual Operation of Gripper ON
11 25 Manual Operation of Gripper OFF
4
1 - 33
SCHEMATIC DIAGRAM
HFM-600

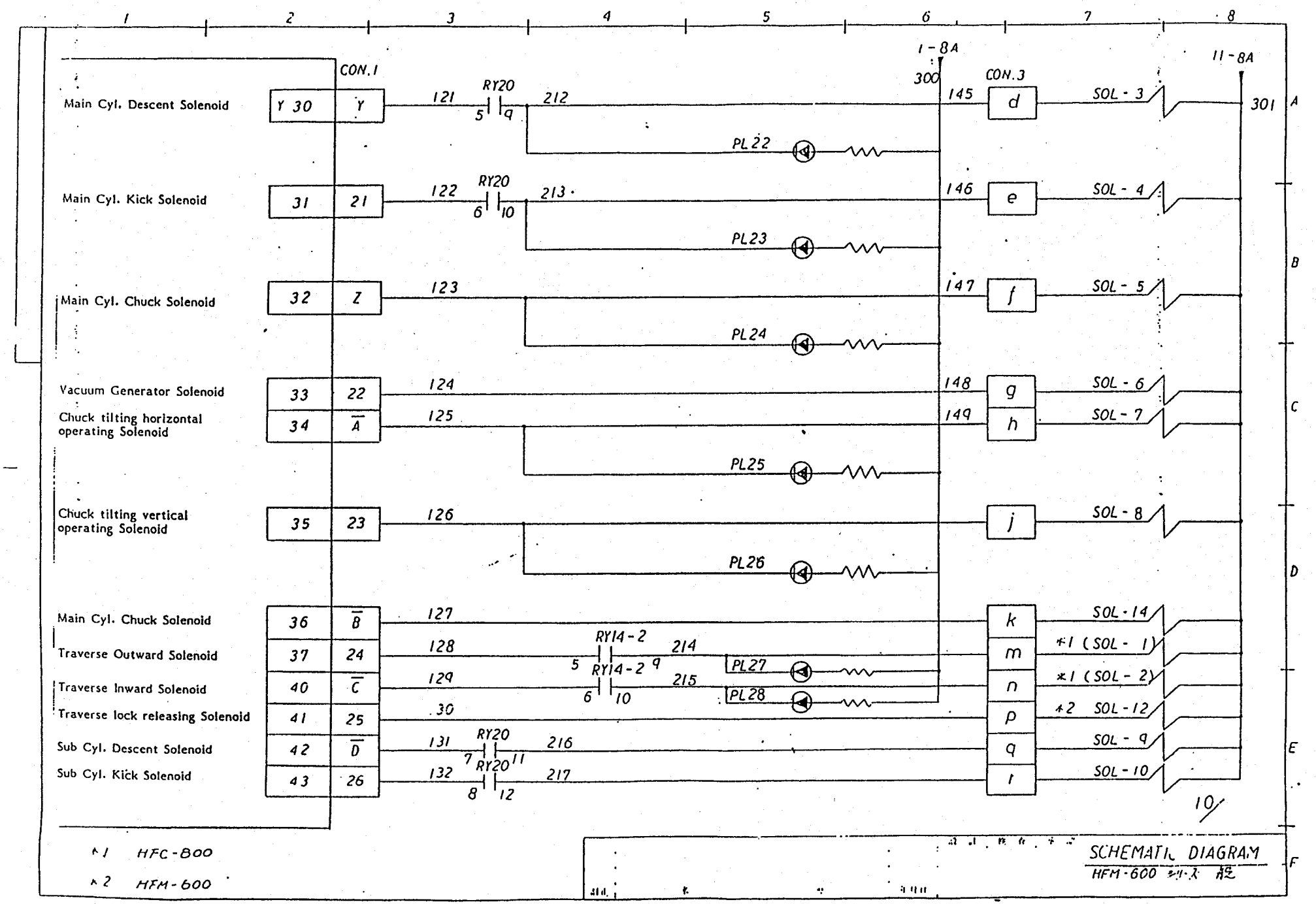

CON.0
PSW-23
-24
-25
-26
-27
-28
-29
-30
9
2'-3D
2'-3D
46
47
48
49
50
51
52
53
54
55
9
1-8B
N X26 Manual Operation of Chuck tilting horizontal
12 27 Manual Operation of Chuck tilting vertical
P 30 Manual Operation of Traverse outward
13 31 Manual Operation of Traverse inward
R 32 Option Selector 1
14 33 Option Selector 2
S 34 Option Selector 3
15 35 Option Selector 4
T 36
16 37
U
17 DC24V (-)
V COMMON
18
W
19
5/
SCHEMATIC DIAGRAM
HFM-600 シリーズ一般

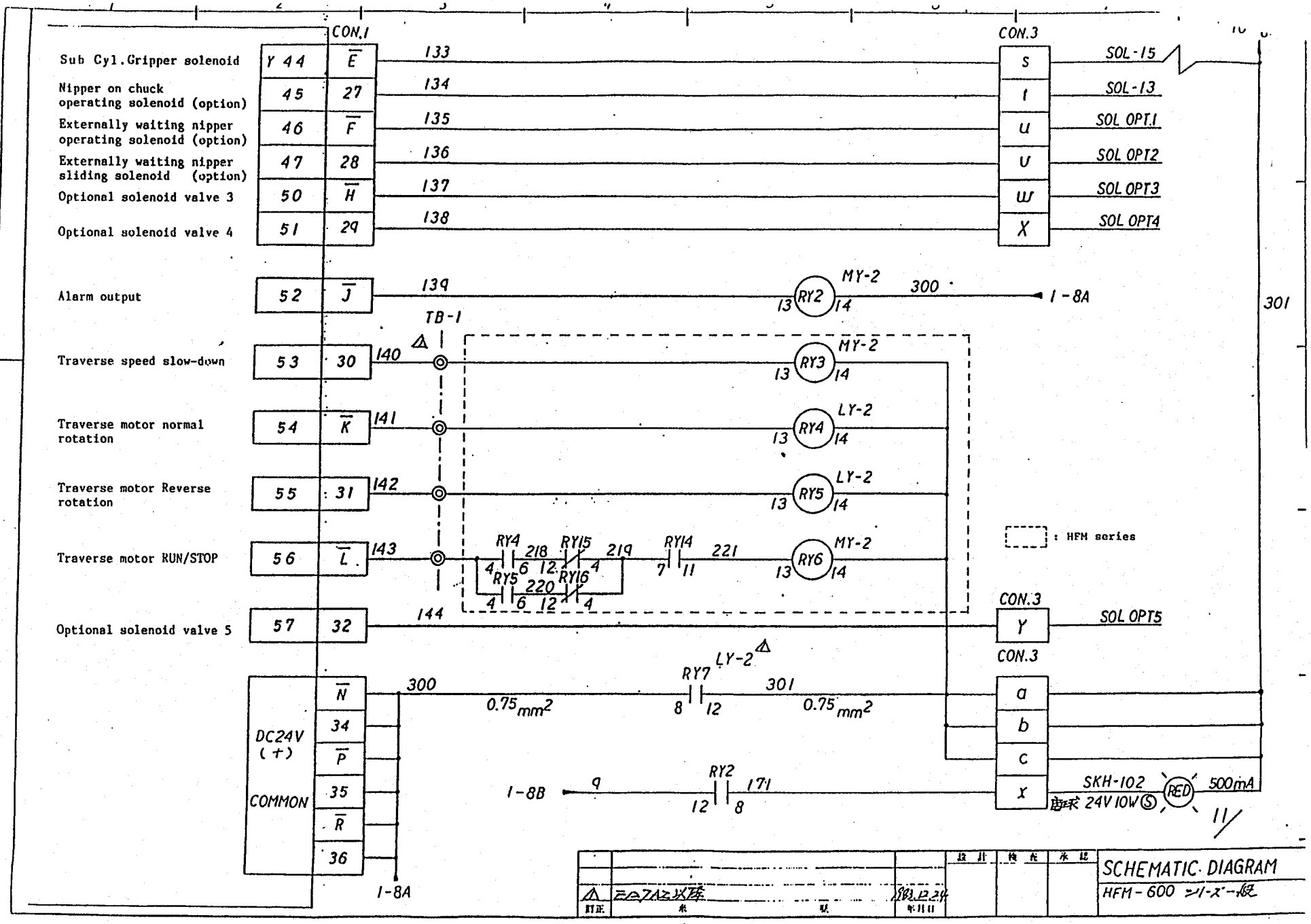

1 - 8A
300
6-5A 89 RY15 13 14
6-5A 90 RY16 13 14
6-5A 91 RY14-1 13 14
RY14-2 13 14
6-6C 101 RY17 13 14
Traverse motor slow down on the way out
6-6C 102 RY18 13 14
Traverse motor slow down on the way in
Aux.
6-5E 108 RY19 13 14
RY1 10 206 RY16 6 5 207 q RY20 13 14
RY15 7 11
RY19 5 q
1-8B
LS-1
LS-2
LS-3
LS-4
LS-5
LS-6
LS-8
LS-9
LS-10
LS-11
VS-1
LS-14
LS-12
LS-13
208
LS OPT1
LS OPT2
LS OPT3
LS OPT4
LS OPT5
LS OPT6
CON.3
C D E F G H J K L M N O P Q R S T U V W A B
6-1A 89
6-1A 90
6-1B 91
92
93
94
95
96
97
98
99
100
101
6-1B 102
6-1B 103
104
105
106
107
108
6-1C q
1-8B
CON. 1
A X 40 Traverse outward L.S.
1 41 Traverse inward L.S.
B 42 Main Cyl. High position L.S.
2 43 Main Cyl. Chuck Pick-up Failure Manual Re-set Switch
C 44 Sub Cyl. Chuck Pick-up Failure Manual Re-set Switch
3 45 KICK backward L.S.
D 46 Chuck tilting vertical position Detection Switch
4 47 Sprue release positing setting
E 50 Chuck tilting horizontal position Detection Switch
5 51 Main Cyl. low position L.S.
F 52 Vacuum Differential Switch for detecting PICK-UP Auxiliary Switch for detecting PICK-UP
6 53 Traverse outward speed slow-down position setting
H 54 Traverse inward speed slow-down position setting
7 55
J 56
8 57
K 60
q 61
L 62
10 63
M 64
11 65
6/
SCHEMATIC DIAGRAM
HFM-600 シリーズ用


CON.1
AVW302-R
PSW 0
EMERGENCY STOP
ASW3K3S-243
RSW 1
ROBOT LOCK
ROBOT ON
MODE SETTING
RY1
RY11
RY12
RY13
113
114
115
116
117
118
119
120
N X 66
12 67
P 70
13 71
R 72
14 73
S 74
15 75
T 76
16 77
U
17
V
18
W
19
DC24V (-)
COMMON
EMERGENCY STOP
Robot, LOCK
Robot, ON
MODE Setting
MOLD OPEN Complete
Injection machine emergency stop signal Input
Aux. Input
Aux. Input
1-8B
SCHEMATIC DIAGRAM
HFM-600 シリーズ一般


CON.0
HOME POSITION Display
AUTO START Display
Cyl. SELECTION Display
Pick-up Detecting System SELECTION Display
Main's Chuck gripping Sprue Releasing POSITION Display
Sub's Chuck gripping Sprue Releasing POSITION Display
Home Position selected POSITION Display
Chuck tilting horizontal POSITION Display
Chuck tilting vertical POSITION Display
Knock-out Ejector TIMING Display
Second Descent ON/OFF Display
Nipper cut ON/OFF Display
MODE Number Display
Option 1 Display
Option 2 Display
Option 3 Display
Option 4 Display
Y00
01
02
03
04
05
06
07
10
11
12
13
Y14
15
16
Y17
20
21
22
23
24
Y
Z
A
B
C
D
E
F
G
H
J
K
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
PL1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
PL13
-14
-15
-16
1-8A
300
Aux. Output
8-4E
75
RY21
13
14
Aux. Output
8-4E
76
RY22
13
14
Aux. Output
8-4E
74
RY23
13
14
AK-573-1/MOD
DISP-2
+12V
GND
1-8C
1-8B
8-7B
8-7B
8-7B
SCHEMATIC DIAGRAM
HFM-600


CON.0
Mold Closing START
Y25
31
77
RY14
5
q
RY15
5
q
RY19
6
10
209
LY-2
RY8
13
14
300
Mold Open/Close Interlock Safety
26
.L
78
RY14
6
10
RY15
6
10
RY19
7
11
210
LY-2
RY9
13
14
PL-20
Knock-out Ejector START
27
32
79
LY-2
RY10
13
14
PL-21
DC24V (+)
COMMON
N
34
P
35
R
36
300
1-8A
EB1124
1-8B
q
RY2
q
5
188
Black
BZ
Red
RY1
q
5
211
PL-29
Mold Open COMPLETE Display
q


1 2 3 4 5 6 7 8
CON.1
CON.3
1-8A
11-8A
300
301
Main Cyl. Descent Solenoid
Y 30
Y
121
RY20
5
9
212
PL22
145
d
SOL-3
Main Cyl. Kick Solenoid
31
21
122
RY20
6
10
213
PL23
146
e
SOL-4
Main Cyl. Chuck Solenoid
32
Z
123
PL24
147
f
SOL-5
Vacuum Generator Solenoid
33
22
124
148
g
SOL-6
Chuck tilting horizontal operating Solenoid
34
A
125
PL25
149
h
SOL-7
Chuck tilting vertical operating Solenoid
35
23
126
PL26
j
SOL-8
Main Cyl. Chuck Solenoid
36
B
127
k
SOL-14
Traverse Outward Solenoid
37
24
128
RY14-2
5
RY14-2
9
214
PL27
m
*1 (SOL-1)
Traverse Inward Solenoid
40
C
129
6
10
215
PL28
n
*1 (SOL-2)
Traverse lock releasing Solenoid
41
25
30
p
*2 SOL-12
Sub Cyl. Descent Solenoid
42
D
131
RY20
7
11
216
q
SOL-9
Sub Cyl. Kick Solenoid
43
26
132
RY20
8
12
217
r
SOL-10
10
*1 HFC-800
*2 HFM-600
SCHEMATIC DIAGRAM
HFM-600
A
B
C
D
E
F


CON.1
CON.3
Sub Cyl.Gripper solenoid
Nipper on chuck operating solenoid (option)
Externally waiting nipper operating solenoid (option)
Externally waiting nipper sliding solenoid (option)
Optional solenoid valve 3
Optional solenoid valve 4
Alarm output
Traverse speed slow-down
Traverse motor normal rotation
Traverse motor Reverse rotation
Traverse motor RUN/STOP
Optional solenoid valve 5
DC24V (+)
COMMON
SOL-15
SOL-13
SOL OPT.1
SOL OPT2
SOL OPT3
SOL OPT4
SOL OPT5
MY-2
LY-2
RY2
RY3
RY4
RY5
RY6
RY7
RY14
RY15
RY16
TB-1
1-8A
1-8B
SKH-102
RED
500mA
24V 10W
0.75mm²
: HFM series
SCHEMATIC DIAGRAM
HFM-600 シリーズ用

HARMO CO.,LTD.