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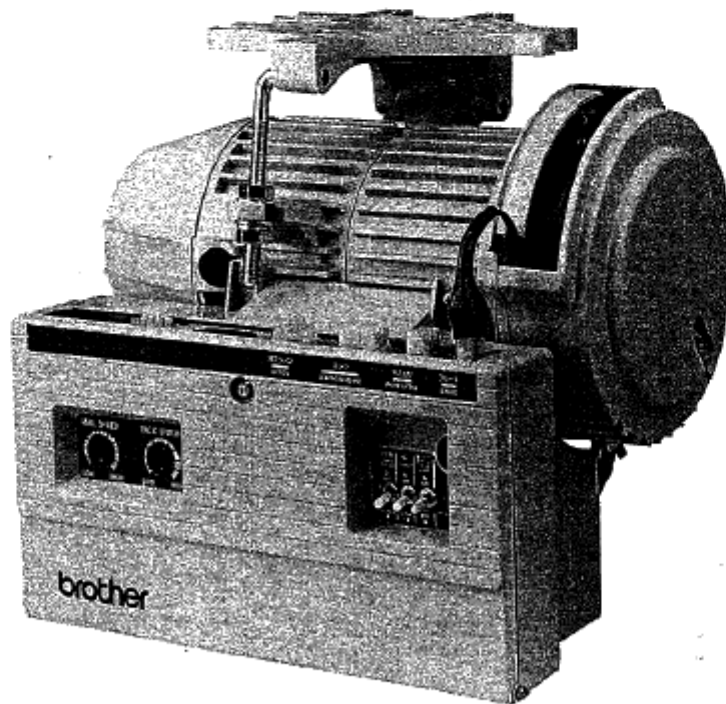
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DC SERVOMOTOR

SERVICE MANUAL

MD-806, 807 (Single-Phase Type)
MD-816, 817 (Three-Phase Type)

Mark II



INTRODUCTION

This service manual is compiled for the technical staff responsible for maintaining and inspecting the drive motor designed for the automatic thread trimming machine. The manual describes the motor and the control box and also covers adjustments. Read the service manual carefully so that you understand the right handling and adjustment.

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DESCRIPTION OF THE MOTOR

★ The Brother DC servomotor is best suited to reducing sewing labor requirements and enhancing automation; the advanced functions being provided with a total system design.

FEATURES

1. Energy Savings

Power consumption is reduced about 50% with the DC servomotor when compared with conventional Brother clutch motors; when the sewing machine is stopped, the DC servomotor is also stopped, resulting in high energy savings.

2. Quiet Operation

While the clutch motor produces a whirring sound and vibrations while idling, the DC servomotor is free of these because it does not run when the sewing machine is stopped.

3. Easy maintenance

Maintenance is as easy as adjusting the solenoid brake spacing. There is no need to ever replace the moving brake plate.

4. Reliability

High integration microcomputers and hybrid ICs are used to achieve higher reliability.

5. Smart stop

The needle movement due to inertia upon finishing sewing has been greatly reduced to make sewing more controlled.

6. Flexible function

Each respective time or parameter setting, which were previously fixed, can be changed on the operation panel to flexibly accommodate various sewing machine requirements.

7. Internal terminal cord fuse

The fuse for the lamp terminal cord can be attached to the rear of the control box.

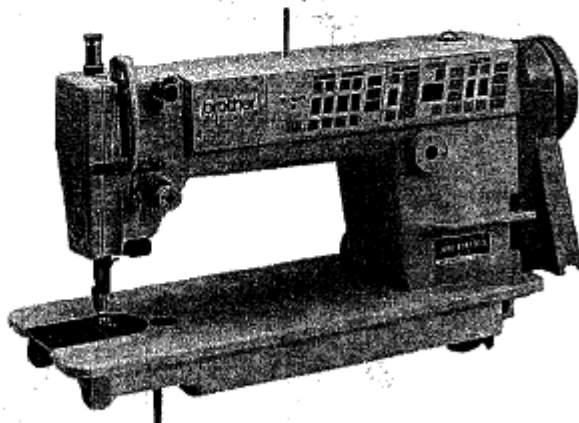
8. Standard dimension

The dimension required to attach the motor fixing bracket has been changed to a standard dimension to accommodate commercially available clutch motors.

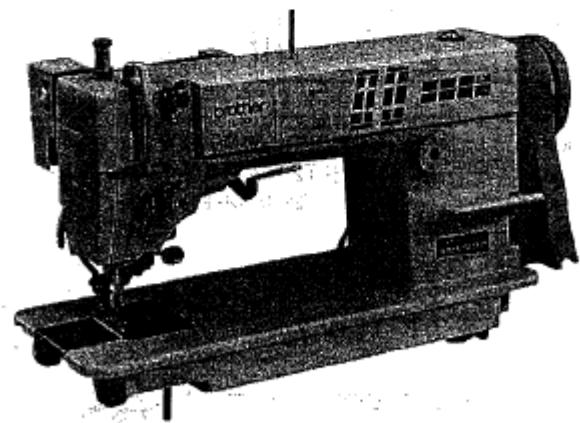
9. Standing operation and automatic sewing

Standing operation and automatic sewing can be used with the external signals (options) on the control printed circuit board.

★ Use the DC servomotor for the following sewing machines.



[DB2-B737]
Mark II

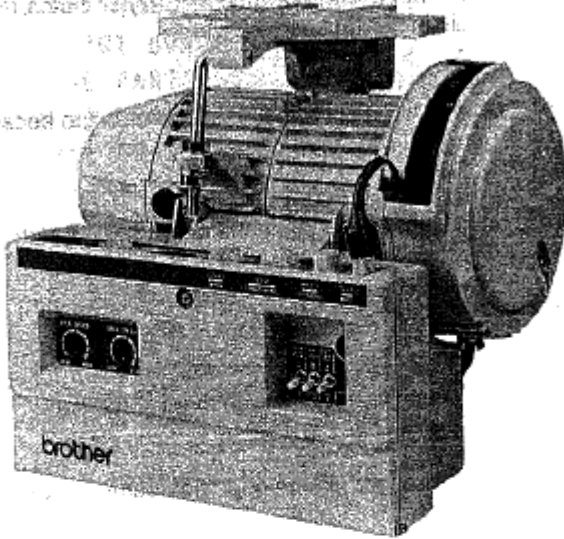


[DB2-B772]

★ The DC servomotor is also used with automatic thread trimming machines, models DB2-B748, B795, and B798.

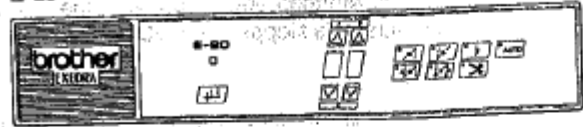
SPECIFICATIONS

※The operation panel is optionally available. Use the operation panel which is best suited to your work.

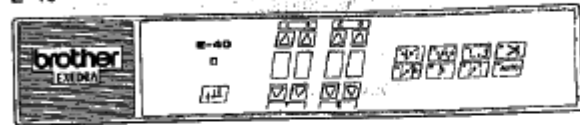


●Operation panel

E-20



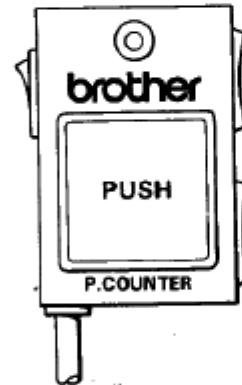
E-40



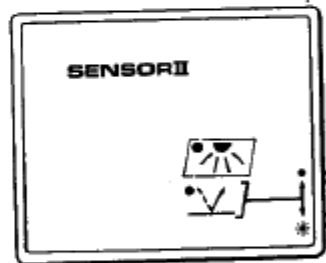
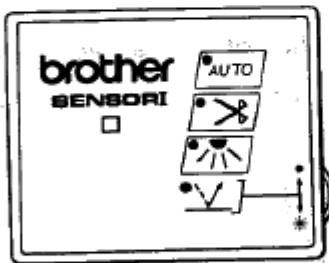
E-100



●Production quantity counter



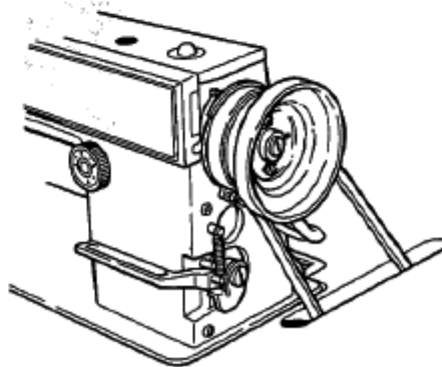
●Sensors



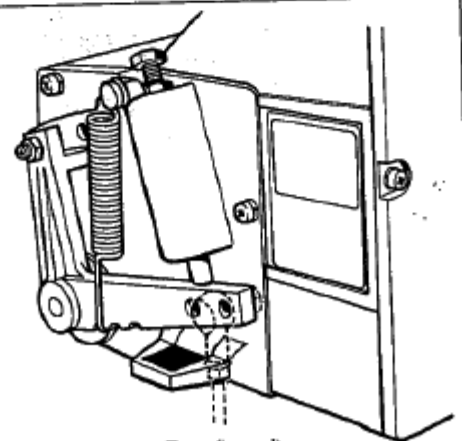
Machine Head to be Applied [DB2-B737 · B748 · B791 · B772 · B774 · B798]
 [LT2-B842 · B845 · B847 · B848 · B872 · B875]
 [LZ2-B852 · B853 · B854]



Power switch

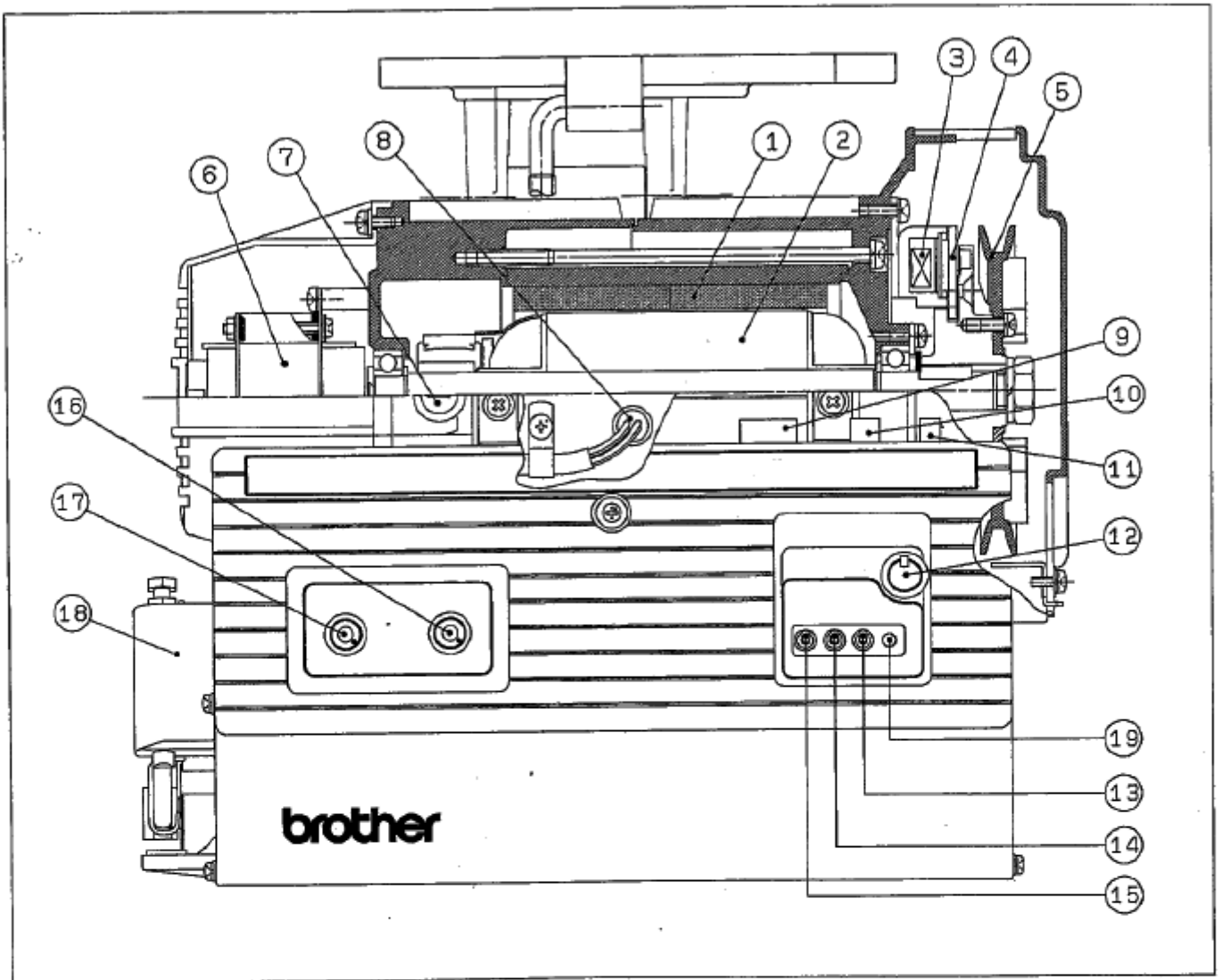


Synchronizer



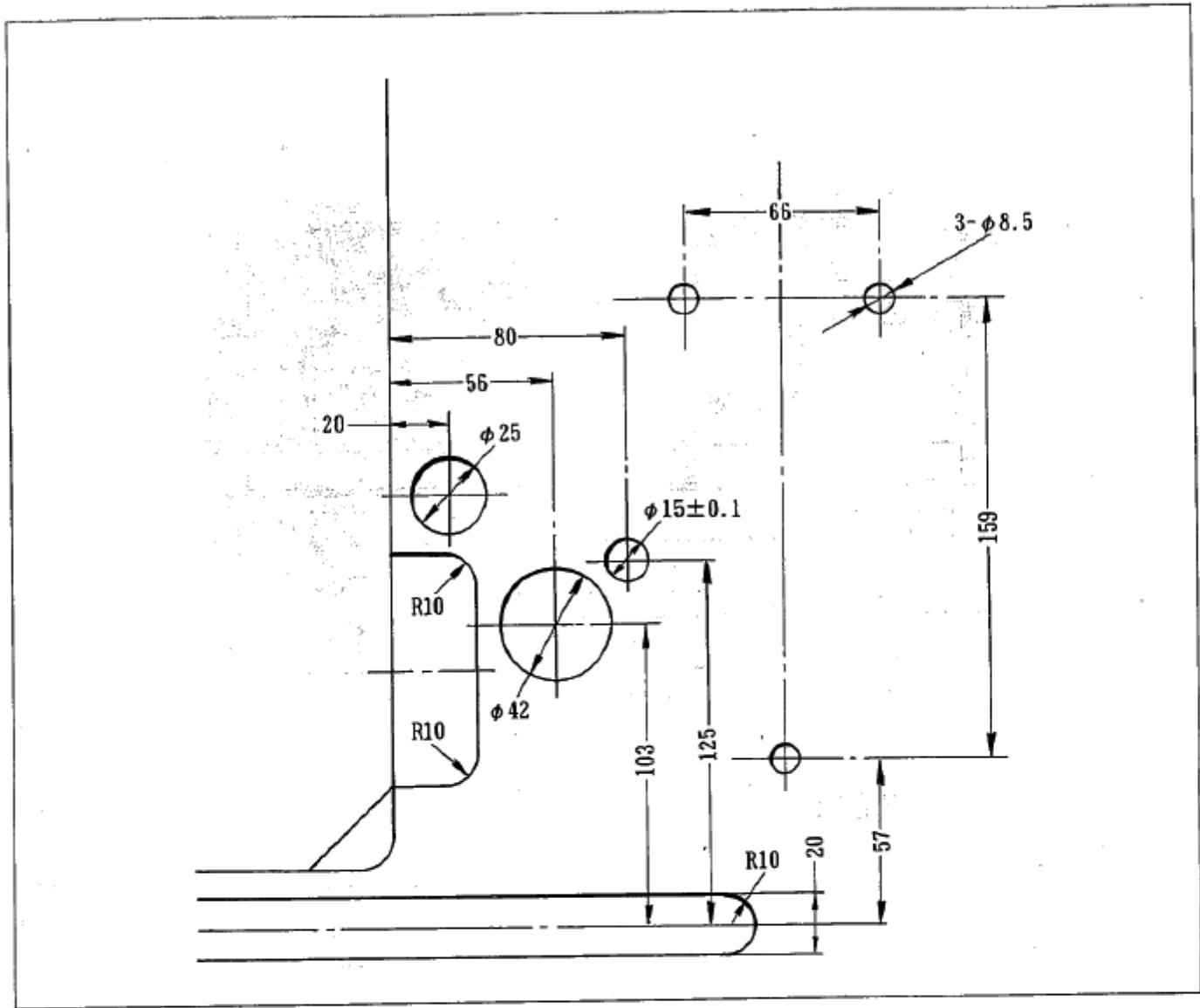
Treadle unit

NAME OF EACH PARTS

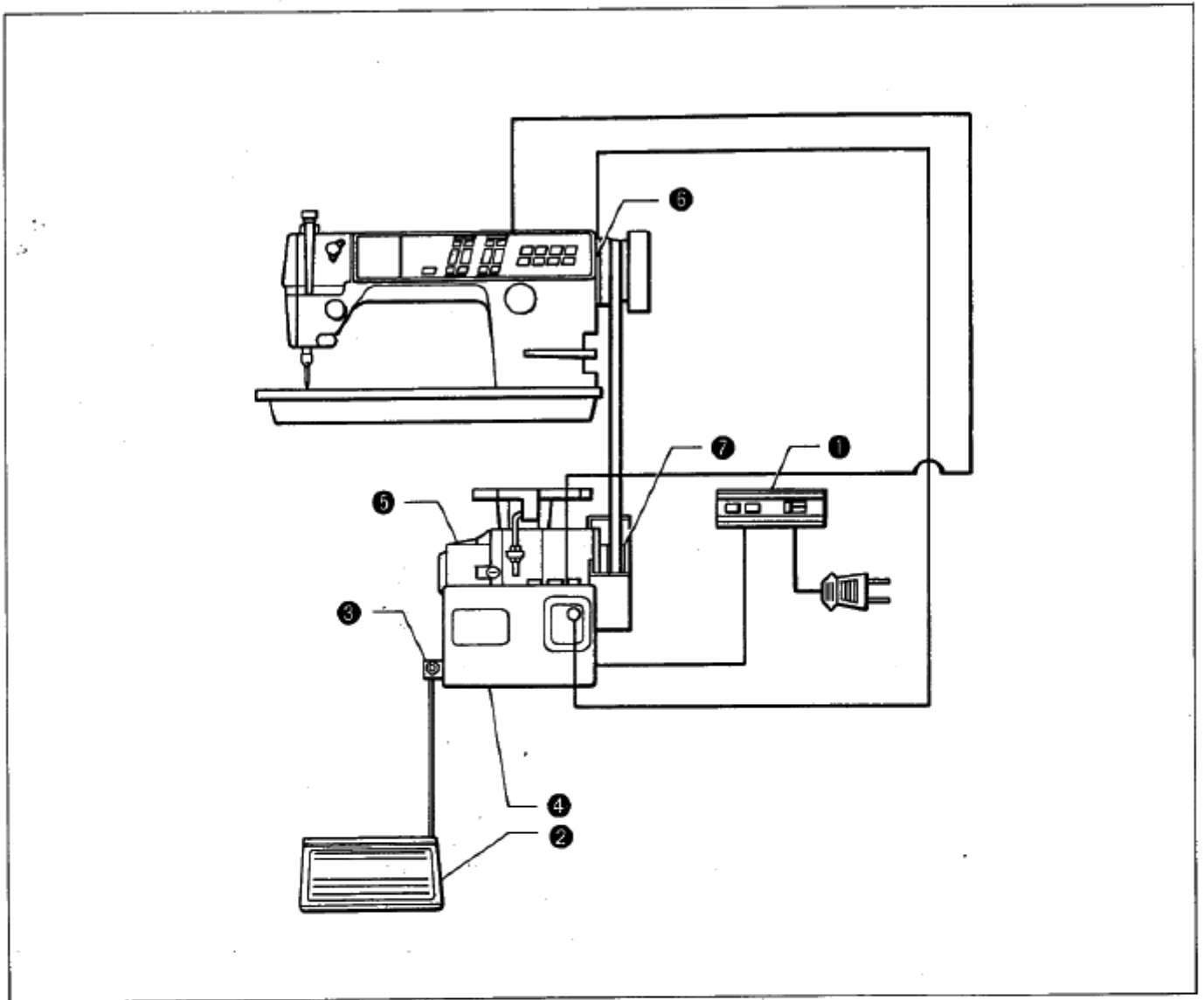


- | | |
|--|--|
| <p>① Stator (magnet)</p> <p>② Rotor</p> <p>③ Brake coil (lining)</p> <p>④ Brake armature</p> <p>⑤ Pulley</p> <p>⑥ Reactor</p> <p>⑦ Brush holder</p> <p>⑧ Thermistor</p> <p>⑨ Sewing machine plug</p> <p>⑩ Presser foot lifter plug</p> | <p>⑪ Brake plug</p> <p>⑫ Synchronizer plug</p> <p>⑬ Slow start switch</p> <p>⑭ Correction switch</p> <p>⑮ Needle position switch</p> <p>⑯ Backtack sewing speed control</p> <p>⑰ High sewing speed control</p> <p>⑱ Treadle unit</p> <p>⑲ Power lamp</p> |
|--|--|

Motor Mounting Template

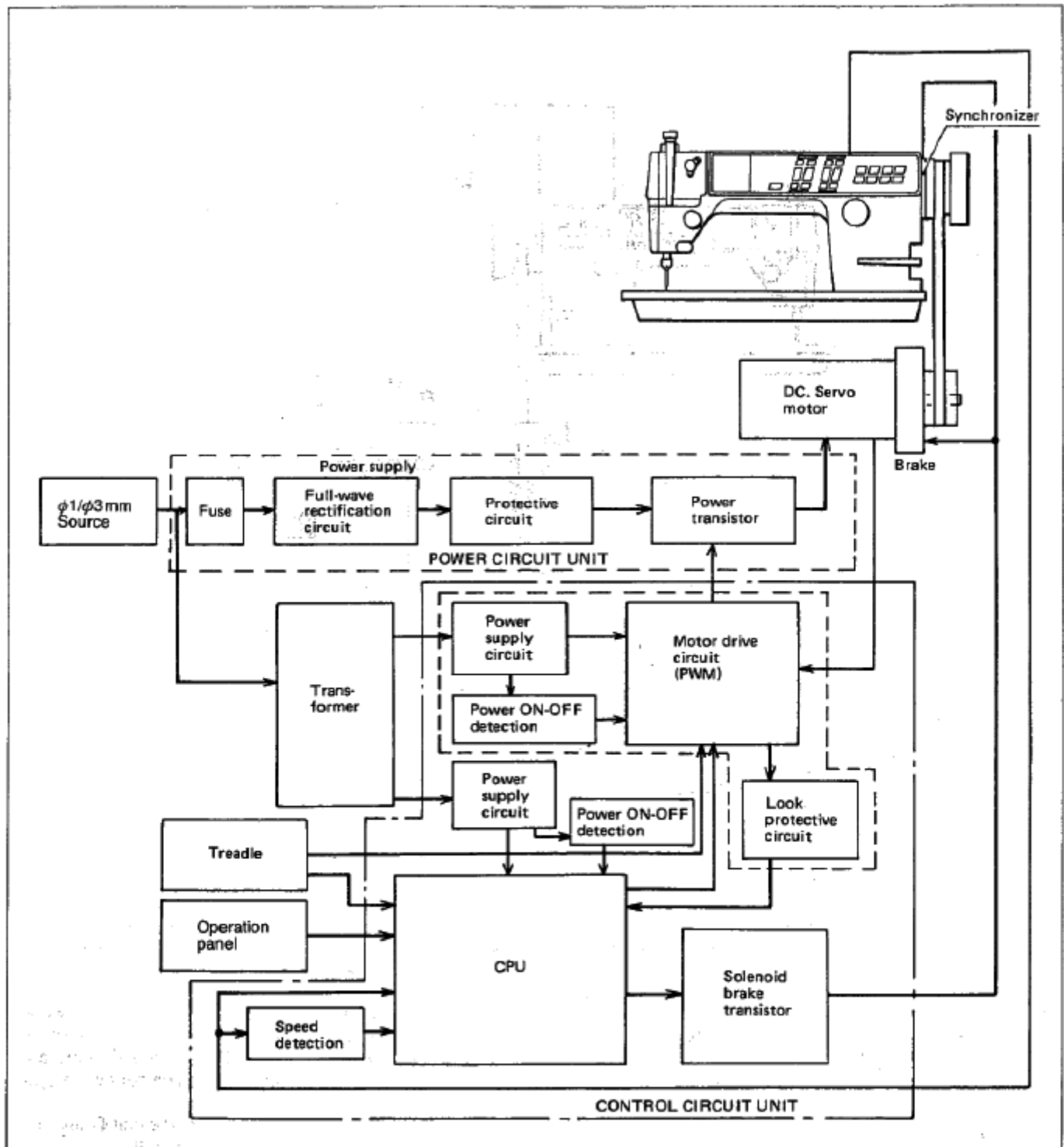


PRINCIPLE OF CONTROL SYSTEM



1. When the power switch ① is turned on and the treadle ② is depressed, the start signal and a voltage corresponding to how far the treadle is depressed, are supplied to the control box ③ by the treadle unit. The voltage is supplied to the motor ④ by the control circuit board in the control box ③ so that the motor runs in proportion to the depression of the treadle to drive the sewing machine.
2. When the treadle ② is returned to the neutral position (with foot taken off), the neutral signal is sent to the control box ③ by the treadle unit ⑤ and the brake command is given by the control circuit board to decelerate the motor ④. Then the signal from the synchronizer ⑥, mounted on the pulley of the sewing machine, is sent to the control box ③ and the brakes are applied so that the operation of the sewing machine is stopped with the needle in the down stopping position set by the synchronizer ⑥.
3. When the treadle is stepped on again, the thread trimming signal is sent to the control box ③ by the treadle unit ⑤ and the command is given by the control circuit board to run the motor ④ at the thread trimming speed (inching speed). Then the signal from the synchronizer ⑥ is sent to the control box ③ and the brakes ⑦ are applied so that the operation of the sewing machine is stopped with the needle in the up position set by the synchronizer ⑥.

CONFIGURATION



Note: The sections enclosed by the broken line indicate where high voltage is applied. Handle these sections with great care.

CAUTION:

1. When setting down the machine head or touching the needle, be sure to turn off the power switch and confirm that the pilot lamp is OFF.
2. Ground cables are provided for both single-phase and three-phase types; do not fail to ground the motor. (A ground cable is not provided for single-phase 110V types. Be sure to ground the motor frame if necessary.)
3. When adjusting the controls in the control box, be sure to turn off the power switch, remove the front cover and confirm that the pilot lamp is OFF.
*It is dangerous to handle the control box when the power is on because high voltage is applied. Handle with great care.
4. Do not use the DC servomotor near machines which generate strong high frequency electrical noise, e.g., arc welders.

MD-806, 816, 807, 817

SPARE PARTS CODE NUMBERS OF MOTORS

	phase	voltage	MD-806 -816	MD-807 -817
motor assembly	1 ϕ	110V 220V 230V 240V	J80069-001	J80022-001
	3 ϕ	220V	J80070-001	J80073-001
		380V 415V	J80071-001	J80074-001
bracket R	1, 3 ϕ	all	J00111-001	
bracket L	1 ϕ 3 ϕ	all 220V	J00109-001	
	3 ϕ	380V 415V	J00142-001	
brush	1, 3 ϕ	all	231556-001	
rotor	1 ϕ 3 ϕ	all 220V	231004-001	231006-001
	3 ϕ	380V 415V	231018-001	231007-001
Frame assembly#2	1, 3 ϕ	all	230431-001	
Brake stator	1, 3 ϕ	all	J00130-001	

Explanation of the control box's name plate

name plate

brother DC MOTOR MD-816-□ THREE PHASE 415V CONTROL BOX
TYPE G□□□□□□□ No. ①②③XXXX BROTHER INDUSTRIES., LTD. MADE IN JAPAN

- ① : month
 ② : Year
 ③ : modification No.

	②	③	④	⑤	⑥	⑦
	treadle unit	pulley outer diameter	sewing speed	use	lamp tap voltage	
MD-8X6-□	A: #10 B: #11	1: 70 2: 80 3: 90 4: 105 5: 125	0: 1000spm 1: 2000 2: 2500 3: 3000 4: 3500 5: 4000 6: 4500 7: 5000 8: 6000 9: 8000	2: Mark2 Y: ABL W: COV 3: NBN 6: BAST 4: B845-900S L: P:	A: 6V B: 12V C: null	2: LZ2-8852 etc. (zigzag) 3: B842 group
1: Mark2 (B737 etc.) 2: 3: NBN (B730) 4: BAST 5: B845-900S 6: LPW 7: ET 8: PWB 9:						
MD-8X60-□						
1: B7380 B7910 B7740 2: B8450, B8750				8: B7380 9: B7910 0: B7740 5: B8450		
MD-8X7-□						
1: OVERLOCK 2: ABL 3: COV				7: BAS-102		

ABL: Ultra high speed twin needle overlock machine with full-automatic backlatch device. (EF4-8651)
 COV: Covering stitcher with thread trimmer. (FD4-B27X group & FD3-825X group)
 NBN: Straight lock stitcher with thread trimmer with no bird nest and shorter trimmed end. (B730)
 BAST: Single needle basting lock stitcher with thread trimmer. (LS2-B883)

Spare parts list 1

-1 -4 -5

		MK II B738, B842 etc.	NBN B730	BAST LS2-8883	COV FD4 or FD4 group
control circuit board (BPD600)	1phase (1φ) 110V	S-PCB-MK2-1110B J80090-001	S-PCB-NBN-1110B J80095-001	S-PCB-BAST1110B J80100-001	S-PCB-COV-1110B J80105-001
	1phase (1φ) 220-240V	S-PCB-MK2-1240B J80091-001	S-PCB-NBN-1240B J80096-001	S-PCB-BAST1240B J80101-001	S-PCB-COV-1240B J80106-001
	3phase (3φ) 220-240V	S-PCB-MK2-3240B J80092-001	S-PCB-NBN-3240B J80097-001	S-PCB-BAST3240B J80102-001	S-PCB-COV-3240B J80107-001
	3phase (3φ) 380-415V	S-PCB-MK2-3400B J80093-001	S-PCB-NBN-3400B J80098-001	S-PCB-BAST3400B J80103-001	S-PCB-COV-3400B J80108-001
treadle unit	#11	comp.	3 photoes type PS-UNIT#11 (291790-001) [white #11-2 291790-002]		
		pcb.	PS-PCB#11 (291792-001)		
	#10	comp.	2 photoes type PS-UNIT#10 (291789-001) [white #10-2 291789-002]		
		pcb.	PS-PCB#10 (291791-001)		
operation panel		E20	N20	/	
		E40	N40		
		E100	N100		
		S I. II reference #1			
power board	1φ 110V	J80116-001			
	1φ 120V	J80115-001			
	1φ 220-240V	J80117-001			
	3φ 220-240V	J80118-001			
	3φ 380-415V	J80119-001			
trans- former	110V (6V)	229963-001			
	220v (0V)	J01166-001			
	220V (6V)	229643-001			
	220V (12V)	230660-001			
	230V (6V)	229645-001			
	240V (0V)	J01183-001			
	240V (6V)	229646-001			
	240V (12V)	231335-001			
	380V (0V)	J01197-001			
	380V (6V)	229561-001			
	380V (12V)	229623-001			
	415V (0V)	J01215-001			
	415V (6V)	230214-001			
415V (12V)	229644-001				
motor		MD-806.816			MD-807.817
synchro- nizer	inner type	#13 (291079-001) ; B737 group #14 (291670-001) ; B842 group		#14 (291670-001)	/
	outer type	#12-7 (291080-007) ; B798 etc.		#15-2 (J80350-001)	

Note: () of transformer is lamp tap voltage.

Spare parts list 2

Handwritten notes: 7-11-50

PCB name	#470C-A	#450D-	#450C-	#450D-	#438025	#438027	8PD100	8PD580	8PD500	8PD500	
sewing machine	87810	87810	88450	87810	BAS-102	BAS-102	ET, FU	8843-800S	APM	ABL-S6L	
control circuit board	87380	87740		291786-110	291434-110	291434-110	388250-110	388260-110	J80122-110	291784-110	
				291786-123	291434-123	291434-123	388250-123	388260-123	J80122-123	291784-123	
	291788-001	388255-001	388257-001	291786-323	291433-001	291434-323	388250-323	388260-323	J80122-323	291784-323	
				291786-340		291434-340	388250-340	388260-340	J80122-340	291784-340	
treadle unit	PS-UNIT#10 (291790-001) or #10-2 (291790-002)										
operation panel	PS-PCB#10 (291792-001)										
	291357-002 (white)	388586-002 (white)	388587-001 (black)					388588-002 (white)			
power board	PS-PCB#11 (291792-001)										
	1 φ 110V	291273-101									
	1 φ 220-240V	291274-101									
	3 φ 220-240V	291275-101									
	3 φ 380-415V	291276-101									
	110V (6V)	229946-001			231738-001				229963-001		
	220V (0V)	J01174-001			230890-001				J01166-001		
	220V (6V)	229218-001							229643-001		
	220V (12V)	230661-001							230668-001		
	230V (6V)	229222-001			291739-001 (0V)				229645-001		
transformer	240V (0V)	J01192-001			231740-001				J01183-001		
	240V (6V)	229223-001						229646-001			
	240V (12V)	231336-001						231335-001			
	380V (0V)	J01209-001			230891-001				J01197-001		
	380V (6V)	229219-001						229561-001			
	380V (12V)	229220-001						229623-001			
	415V (0V)	J01224-001			230892-001				J01215-001		
	415V (6V)	230435-001						230214-001			
motor	415V (12V)	229221-001						229644-001			
		MD-806, 816			MD-807, 817			MD-806, 816	MD-807, 817	MD-807, 817	
synchro-nizer	inner type	#13 (291079-001)									
	outer type	#14 (291670-001)									
					#15-2 (J80350-001)				#13	#14	
										#15-2	

Note: () of transformer is lamp tap voltage.

*1 Sensor

Sewing machine	S I (white type)	S II (white type)
B 737 MK2	SENSOR#1-1 (291655-011)	SENSOR#2-2 (291657-011)
B 748		#2-1 (291659-011)
B 842 group	#1-3 (291673-011)	#2-3 (291674-011)
B 791	#1-4 (291656-011)	#2-4 (291640-011)
B 774	#1-5 (291658-011)	#2-5 (291641-011)
B 798	#1-6 (291744-011)	#2-6 (291642-011)

CPU & ROM LIST

Sewing machine	code	marking	CPU or ROM	type
MK II	J00411-001	-120SP	mask CPU	M38002M4-
	* J01520-001	-128SP		
N B N	J00973-001	-R176	one time CPU	M38002E4-
B A S T	J00263-001	-R174		
C O V	J00270-001	-R175		
B 7 3 8 0	234032-001	A25A	EP-ROM	27128
B 7 9 1 0	234034-001	A25E		
B 7 7 4 0	235039-001	A25H		
B 8 4 5 0	235041-001	B30E		27256
E T o r F O	230904-001	-1481	mask CPU	MB8841
B 8 4 5 - 9 0 0 S	233245-001	-A99SP	one time CPU	M50747E-
A P M	235929-001	-B68SP		
A B L , S B L	J01472-001	-3A8SP		

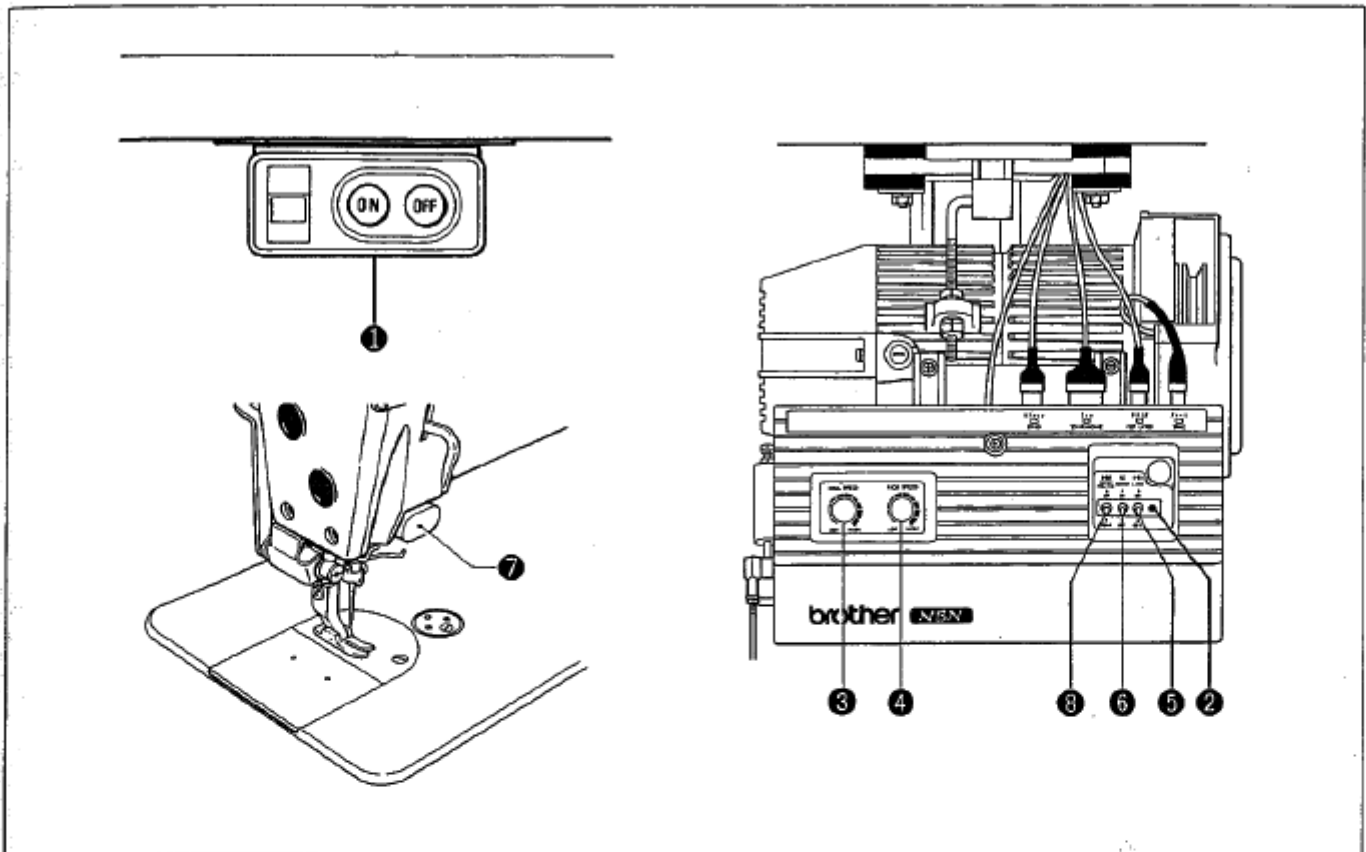
* is new CPU version.

OPERATION PANEL

Sewing machine Model	Operation panel			
	install- ation type	color type	black	white
B737Mark II	built-in	E20	137-208-911-11	137-208-711-11
		E40	137-208-912-11	137-208-712-11
		E100	137-208-913-11	137-208-713-11
Operation panel (without install plate)	attached	E20	137-208-911-20	137-208-711-20
		E40	137-208-912-20	137-208-712-20
		E100	137-208-913-20	137-208-713-20
B730 (NBN)	built-in	N20	—	J80003-001
		N40	—	J80004-001
		N100	—	J80005-001
B7380	built-in		291357-001	291357-002
B7910, B7740	attached		388586-001	388586-002
B8450, B8750	attached		388587-001	388587-002
B845, 875-900S	attached		388588-001	388588-002

OPERATION INSTRUCTIONS

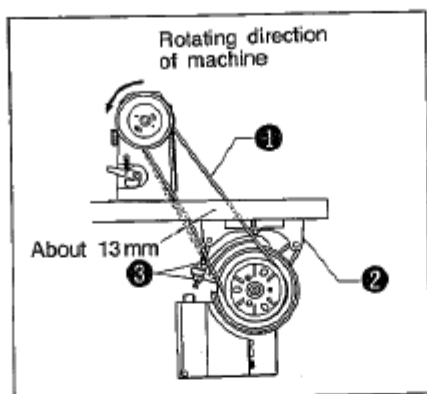
1 Motor control and control box use



- ★ The power lamp ② will light up when the power switch ① is turned on.
- ★ Sewing speed will increase as the speed control ③ is turned toward HIGH (clockwise), and will decrease as the control is turned towards LOW (counterclockwise).
The sewing speed range varies from a minimum of 215spm to an adjustable maximum speed.
- ★ Start backtack sewing speed will increase as the backtack sewing speed control ④ is turned clockwise, and will decrease as the control is turned counterclockwise.
The start backtack continuous sewing speed range is 215 to 1800spm. The end backtack sewing speed is set at 1800spm and cannot be adjusted.
- When the slow start switch ⑤ is switched to ON, the first two stitches (after thread trimming and needle stopping in the upper position) will be sewn at low speed. Sewing speed after these first two stitches is regulated by depressing the treadle.
- When the correction switch ⑥ is ON, the machine will sew in the correction stitch mode (215spm) when the actuator ⑦ is depressed while the machine is stopped. If the actuator is depressed during machine operation, the machine will enter the reverse sewing mode.
- The machine will stop with the needle in the down position if the machine is stopped after setting the needle position switch ⑧ to the needle down position. Conversely, the machine will stop in the needle up position if the needle position switch ⑧ is set to the needle up position.

ADJUSTMENT

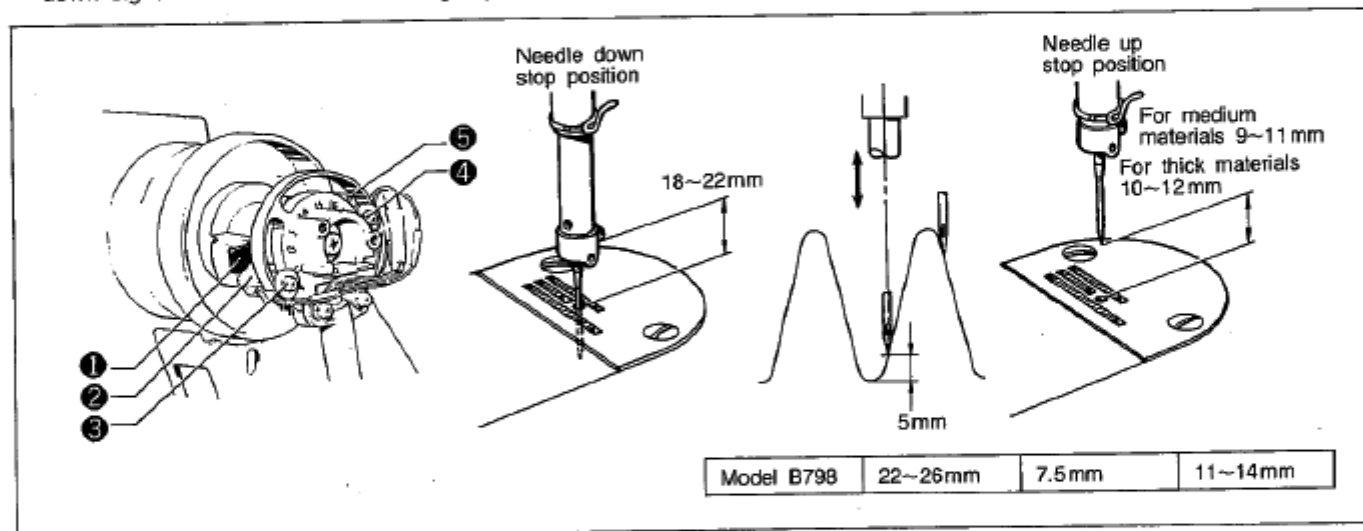
1 DC Servomotor



- ★ Lower the machine head and then mount the belt on the motor pulley and the machine pulley.
- ★ The belt fits the machine pulley and the motor pulley as shipped. However, the belt tension may loosen in time; check the belt tension.
- ★ The machine rotates counterclockwise as seen from the pulley side.
- ★ Adjust the belt ① by loosening the set screw ② and turning the nut ③ so that it gives about 13mm when pressed by hand.

2 Needle position detector (synchronizer) Model DB2-B798

- ★ Take off the synchronizer cover for adjustment. The synchronizer detects the needle with two sensors and controls the needle down signal and the thread trimming signal with one sensor.



- ★ When adjusting each sensor, do not fail to turn off the power switch.

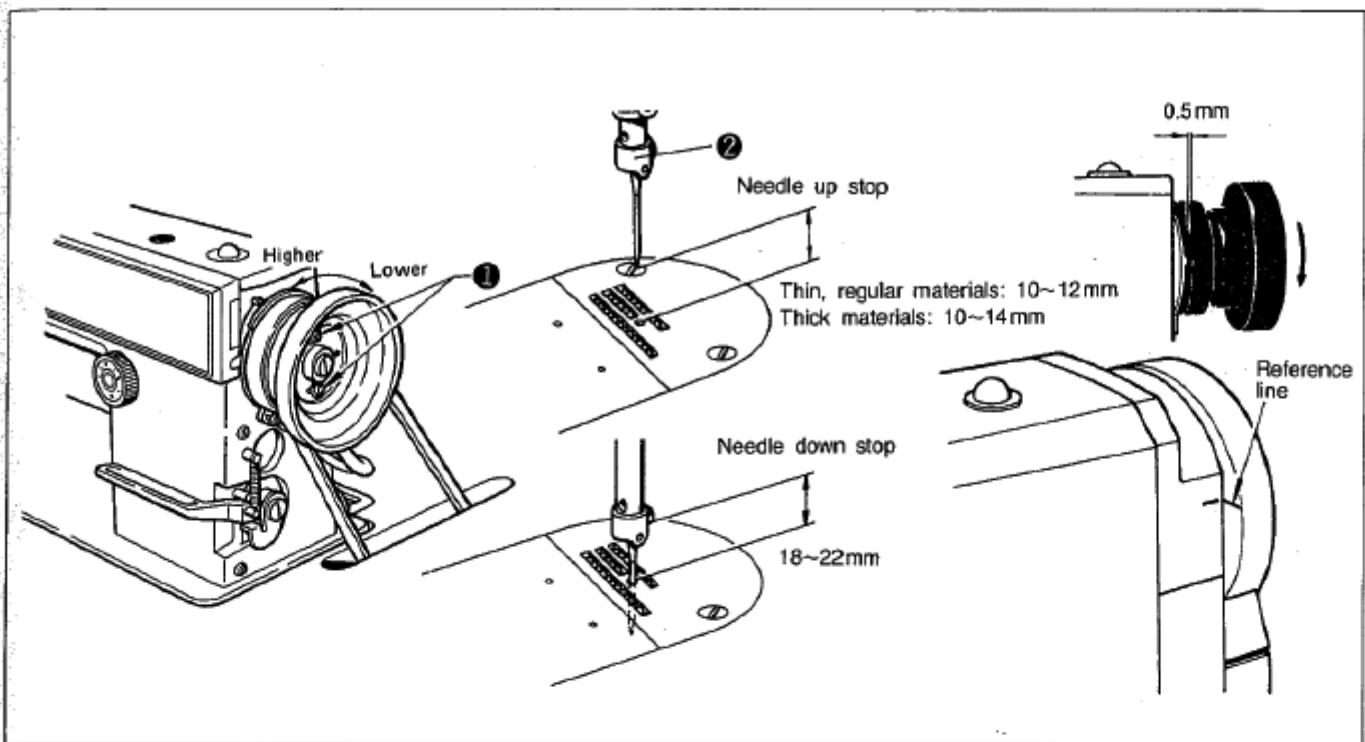
Position adjustment for needle down signal

- ★ Turn the machine pulley and set the needle 5mm up from the bottom to align the lower end of the magnet ① with the upper end of the thread trimming needle down sensor ②.
(As for the model B747 · B748, adjust the needle 7mm up from the bottom and as for the model B798, 7.5mm.)
When the lower end of the magnet ① does not coincide with the upper end of the thread trimming needle down sensor ②, loosen the screw ③ and move the thread trimming needle down sensor for adjustment.
When the thread trimming needle down sensor ② is moved in the rotating direction, the needle bar comes up. And when in the reverse direction, the needle bar comes down.
Turn on the power switch and stop the machine at the needle down stop position so that the distance between the top of the needle plate and the lower end of the needle clamp screw is 18 ~ 22mm. (As for the model B798, the distance is 22 ~ 26mm.)

Position adjustment for needle up signal

- ★ Stop the machine at the needle up stop position. The needle point stops 9 ~ 11mm away from the top of the needle plate for thin and medium materials, and 10 ~ 12mm for thick materials.
(As for the model B798, the needle point stops 11 ~ 14mm away.)
When the needle point does not stop properly, loosen the screw ④ and move the needle up stop sensor ⑤ for adjustment.
When the needle up stop sensor ⑤ is moved in the rotating direction, the needle bar comes down. And when in the reverse direction, the needle bar comes up.
- * Tighten the screws ③ and ④ to a torque of 6 ~ 10kg·cm.

Synchronizer Model DB2-B737 · B748 · B774 · B791



- ★ The synchronizer detects the needle position with two sensors.
The thread trimming signal is timed to the needle down position signal and the treadle reverse signal.
- ★ When the power is turned on and the needle stopped in the down position, the distance between needle plate top and needle set screw bottom should be 18 to 22mm.
When the needle is stopped in the up position and the pulley reference line is within the belt cover reference lines, the distance between needle plate top and needle tip should be 10 to 12mm with thin and regular materials, 10 to 14mm with thick materials. (With Model B748 the needle up stop position is 10 ~ 14mm.)
Adjust as follows when necessary.
- ★ Turn the power off.

Needle up position

1. Slightly loosen the two screws ❶.
Move the set screws ❶ in the direction of normal pulley movement to raise the needle bar ❷ stop position. Turn the other way to lower the needle bar.

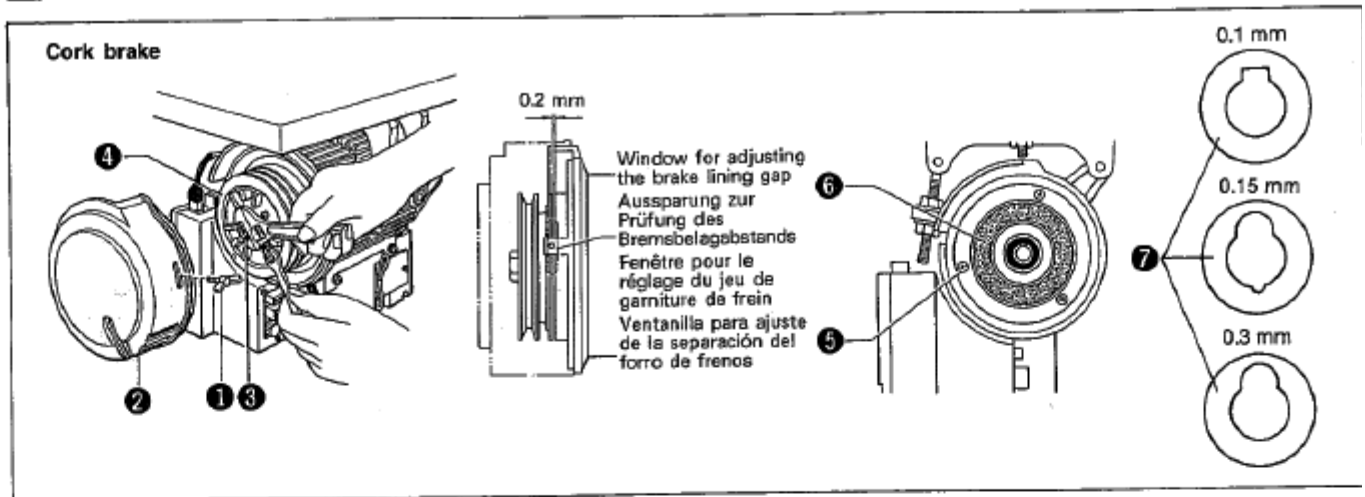
Needle down position

1. Set the treadle to reverse and then release it to neutral. (This is the needle down stop position.)
2. The distance between the needle plate top and the needle screw bottom should be 18 ~ 22mm.
3. Loosen screw ❸ and move the synchronizer ❹ to adjust.
 - * Check the needle up stop position.
 - * When the machine pulley is removed once, provide 0.5mm clearance between the pulley bottom and the synchronizer for installation.
(Improper clearance causes improper machine operation.)

When the synchronizer is out of order...

- ★ Turn off the power switch and disconnect the synchronizer cord.
Use the machine with standard function (without thread trimming) until the synchronizer is replaced.

3 Motor brake



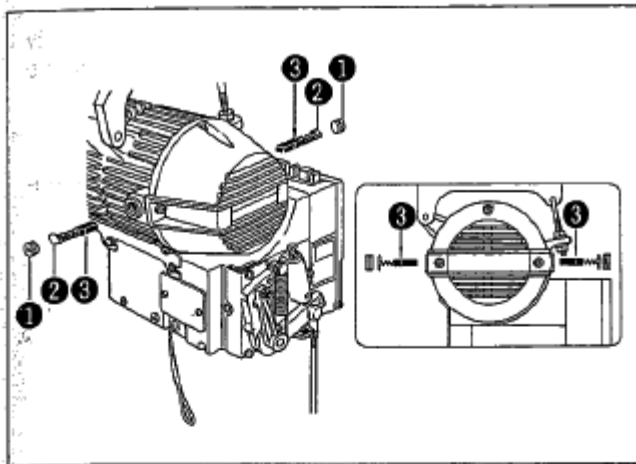
★ Check for brake lining wear (excessive gap) if the brakes become noisy or the sewing stop position fluctuates. If the lining is worn (the gap is large), replace the brake lining ⑥.

Replace the brake lining as follows.

1. The brake lining gap is factory-adjusted to approximately 0.2mm.
2. Remove the screw ①, and the pulley cover ②.
3. Remove the V-belt.
4. Remove the nut ③, and the motor pulley assembly ④.
5. Remove the three set screws ⑥, and replace the brake lining ⑤.
Use the supplied spacers ⑦ to adjust the brake lining gap to approximately 0.2mm.
There are three spacer thicknesses: 0.1mm, 0.15mm, 0.3mm.

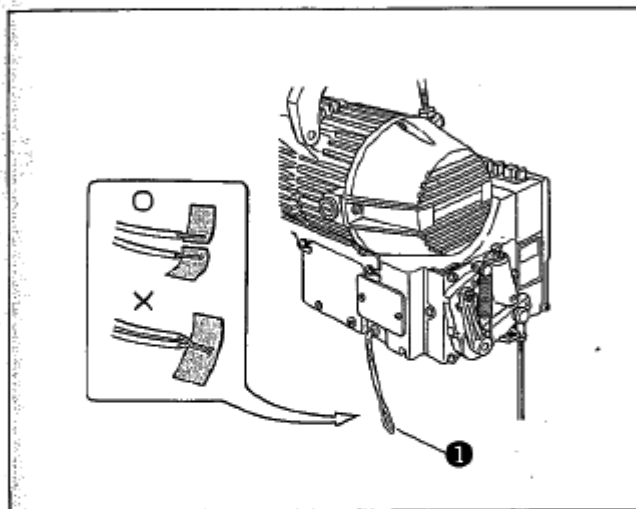
Note 1: For the cork brake, be sure to adjust so that the brake lining does not rub, because rubbing will cause excessive brake wear.

4 Brush replacement



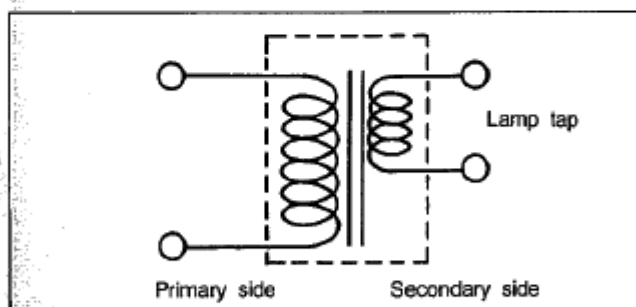
1. Be sure to turn off the power switch.
2. Disconnect the motor plug.
3. Remove the clamp screws ①.
4. Remove the brushes ②.
5. After checking the reference line of the brush ②, mount the usable brush ② so that the reference line ③ points toward the treadle unit. Replace the brushes if used up to the reference line ③ with new ones.
6. Tighten the clamp screws ① to a torque of 10 ~ 15kg-cm.
7. Connect the motor plug.

5 Checking AC low voltage output



- ★ The AC low voltage output cord ① is provided at the rear of the control box.
Getting power for the lamp from the AC low voltage output cord is prohibited by law in some places.

AC low voltage output
Black cord 6V 20W
Gray cord 12V 20W



The transformer insulates the AC low voltage output from the primary side.

CAUTION:
Be sure to wrap the end of the cord with tape after disconnecting the AC low voltage output cord.

6 Control box

Control box (Model DB2-B737)

The high speed dial, backtack stitch dial, power lamp, needle position switch, one-stitch modification switch, starting slowly switch and connector for synchronizer are arranged on the front of the control box. All these parts are already provided on the control circuit board.

The control circuit board is installed on the inside of the control box.

The power circuit board is at the back and the speed control unit is on the left side wall.

The right side wall is furnished with one 15A fuse for the 110 ~ 240V single-phase type, two 5A fuses for the 200 ~ 240V three-phase type and two 3A fuses for 380 ~ 440V three-phase type.

The control circuit board is provided with the 8A fuse for solenoid load.

* Do not fail to secure the fuse holder cap after replacing or inspecting the fuses.

* Never short-circuit the lamp terminal (AC 6V or 12V terminal) for lighting, or the transformer may be damaged.

Control circuit board

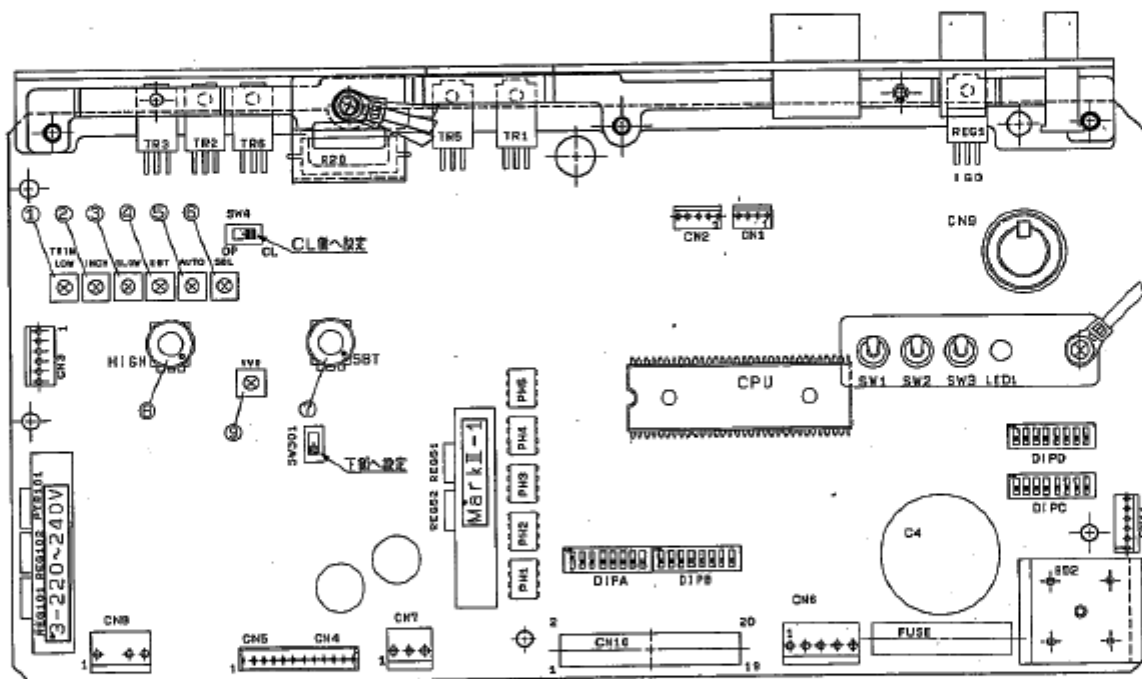
Explanation of each dial

* Do not turn the dial when not necessary.

Models B737 · B748 · B791 · B793 · B795 · B798

Each respective speed becomes higher when any of VR ① to ⑨ is turned clockwise.

1. TRIM (LOW) VR ① is for thread trimming speed.
2. INCH VR ② is for inching speed.
3. SLOW VR ③ is for starting slowly.
4. EBT VR ④ is for backtacking speed.
5. AUTO VR ⑤ is for automatic sewing speed.
6. SBL VR ⑥ is for setting the maximum start backtacking speed.
7. SBT VR ⑦ is for start backtacking speed.
8. HIGH VR ⑧ is for setting the maximum normal sewing speed.
9. VVR VR ⑨ is for limiting overvoltage and has been factory-adjusted. Never adjust it.



NOTE: When the machine is not a twin-needle sewing machine and its thread trimming speed is the same as its inching speed, the speed should be adjusted using TRIM (LOW) VR ① with the INCH VR ② turned fully counterclockwise.

CAUTION:

Other dials are factory set, so that they never require adjustment.

Note 1: It is dangerous to touch the dial because high voltage is applied. Do not fail to turn off the power switch before adjustment. To check the setting, turn it on again.

Note 2: Take care that the driver does not touch other parts but the dial for adjustment. Adjust the dial with great care. They may be broken if turned past the stop point.

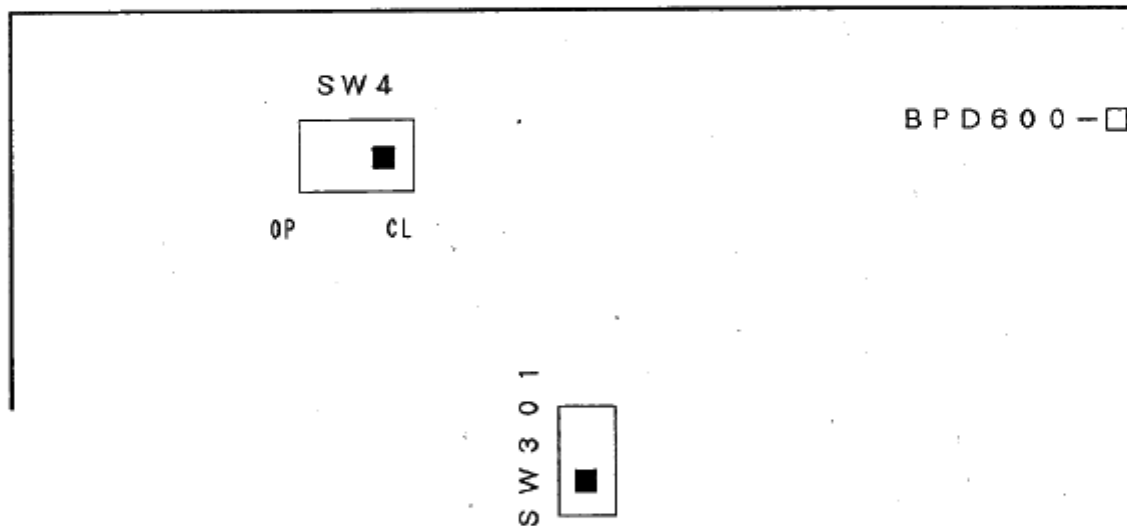
Note 3: When any dial is turned by mistake, turn it back so that the red index marks match each other.

7 Function of the toggle switches

	SW1 (left side)	SW2 (center)	SW3 (right side)
MK II	stopping position up or down	correction by actuator switch	slow start
NBN	↑	↑	thread nipper
BAST	↑	↑	slow start
COV	↑	spreader thread trimming	condensed stitch

8 Function of the slide switches

PCB



SW	side	function
SW4	CL	When solenoid or pneumatic presser foot lifter installed on the table is used
	OP	When solenoid presser foot lifter built-into the machine head is used
SW301	UP	For extra thick materials
	DOWN	For thin and medium thick materials (Standard)

9 Explanation each DIP switches of Mark II, NBN, BAST

DIPA				MK2	NBN	BAST
1	Position of presser after thread trimming	ON	Down	○	○	○
		OFF	Raised			
2	Position of presser after thread trimming with treadle in neutral position	ON	Raised	○	○	○
		OFF	Down			
3	Position of presser when machine is stopped with treadle in neutral position	ON	Raised	○	○	○
		OFF	Down			
4	Double start backtack	ON	Double start backtack (W)	○	○	-
		OFF	Single start backtack (V)			
5	Double end backtack	ON	Double end backtack (W)	○	○	-
		OFF	Single end backtack (V)			
6	AB+10 backtack	ON	10 stitches added to the displayed AB seam length	○	○	-
		OFF	Seam AB sewn as displayed			
7	CD+10 backtack	ON	10 stitches added to the displayed CD seam length	○	○	-
		OFF	Seam CD sewn as displayed			
8	Start backtack speed selection	ON	Start backtack speed is adjusted by EBT vol.	○	○	-
		OFF	Start backtack speed is adjusted by SBT vol.			

DIPB				MK2	NBN	BAST
1	Reserved		Normally OFF			
2	Start backtack selection	ON	Stops when treadle is returned to neutral position	○	○	-
		OFF	Sews to end of B when treadle is in neutral position			
3	Start and end backtack stitch number of E-20, 40	ON	Fixed 4-stitches setting becomes variable	○	○	-
		OFF	Fixed at 4 stitches			
4	Actuator switch function	ON	Thread trimming controllable with actuator switch	○	○	○
		OFF	Correction switch and reverse sewing switch			
5	Delay time at start with standing operation	ON	none	○	○	○
		OFF	There is delay time at start with standing operation			
6	Sewing direction of pleats	ON	Normally direction (fixed stitches)	○	○	-
		OFF	Reverse direction (calling pleats sewing)			
7	Delay time from presser down to start on E0	ON	ON	○	-	○
		OFF	OFF			
8		ON	100 ms	○	-	○
		OFF	OFF			

○:effectiveness
-:ineffectiveness

Explanation DIP switch DIPC & DIPD of Mark II

DIPC

1	Sewing machine specification (change on and off timing of reverse solenoid at backtack)	ON	OFF	B737 (00)	ON	OFF	B774 (02)	ON	B842 B845 B875 (03)
		OFF	ON		OFF	ON			
2		ON	OFF	B791 (01)	ON	OFF	B774 (02)	ON	
		OFF	ON		ON	OFF			
3 ☆	Delay time from presser down to start	ON	There is delay time at start						
		OFF	none						
4	Slowdown control	ON	Normally slowdown (usual slowdown)						
		OFF	Fix time of inching period on slowdown						
5	Continuous backtack selection	ON	A, B sewn repeatedly D times						
		OFF	A, B, C, D						
6	ABCD+10 continuous backtack	ON	10 stitches added to the display A, B, C, D						
		OFF	Seam A, B, C, D sewn as displayed						
7 ☆	End backtack control	ON	Don't slow down to low speed on starting end B.T.						
		OFF	Slow down to low speed on starting end B.T.						
8 ☆	Soft drop of presser foot lifter	ON	There is soft drop of presser foot lifter						
		OFF	none						

DIPD

1	Mode selection	ON	Parameter setting mode						
		OFF	Normally sewing mode						
2 ☆	Half stitch correction	ON	Forward one stitch cor. / Forward half stitch cor.						
		OFF	Forward one stitch cor. / none						
3 ☆	Backward correction	ON	Forward one stitch cor. / Backward one stitch cor.						
		OFF	Forward one stitch cor. / none						
4 ☆	Optional output (1-2 pin of sewing machine connector 12P)	ON	Dependence on DIPD-5						
		OFF	Output for tension release of standard 3 position						
5 ☆		ON	Output for puller						
		OFF	Output for needle cooler or vacuum pump						
6	Sewing direction at finished and stopped start B.T.	ON	Stopped as reverse direction at finished B						
		OFF	Stopped as normally direction at finished B						
7	B+1 start B.T. or continuous B.T.	ON	1 stitch added to the displayed B seam length						
		OFF	Seam B sewn as displayed						
8	D+1 end backtack	ON	1 stitch added to the displayed D seam length						
		OFF	Seam D sewn as displayed						

Note : DIPD-6 is activated when DIPB-2 is set to OFF.

Note : Functions indicated with a ☆ mark are activated on the new CPU version (JQ1520-B mask no. 128).

Note : A phrase on the left of " / " indicates that toggle switch SW2 should be set to ON and if a phrase is on the right then it should be set to OFF.

Explanation DIP switch DIPC & DIPD of NBN

DIPC

1	Tension release OFF setting at the start of sewing	ON	OFF	*1	ON	*1	OFF	*1	ON	*1
		OFF	OFF	0	OFF	10	OFF	20	OFF	30
2		ON	OFF		OFF		ON		ON	
		OFF	OFF							
3	Condense mode	ON	Condense mode (setting by needle number)							
		OFF	none							
4	Slowdown control	ON	Normally slowdown (usual slowdown)							
		OFF	Fix time of inching period on slowdown							
5	Continuous back- ack selection	ON	A, B sewn repeatedly D times							
		OFF	A, B, C, D							
6	ABCD+10 continuous backtack	ON	10 stitches added to the display A, B, C, D							
		OFF	Seam A, B, C, D sewn as displayed							
7	Start condense selection	ON	Stops when treadle is returned to neutral position							
		OFF	Sews to end of condensation when treadle is in neutral position							
8	Condense select at correction by actuator switch	ON	Condense by actuator							
		OFF	none							

DIPD

1	Mode selection	ON	Parameter setting mode
		OFF	Normally sewing mode
2	Reserved		Normally OFF
3	Reserved		Normally OFF
4	Reserved		Normally OFF
5	Reserved		Normally OFF
6	Sewing direction at finished and s- topped start B.T.	ON	Stopped as reverse direction at finished B
		OFF	Stopped as normaly direction at finished B
7	B+1 start B.T. or continuous B.T.	ON	1 stitch added to the displayed B seam length
		OFF	Seam B sewn as displayed
8	D+1 end backtack	ON	1 stitch added to the displayed D seam length
		OFF	Seam D sewn as displayed

*1: The described number is the pulse from the first needle down position after thread trimming. (24pulse/round) -22-

Explanation DIP switch DIPC & DIPD of BAST

DIPC

4	Slowdown control	ON	Normally slowdown (usual slowdown)
		OFF	Fix time of inching period on slowdown

DIPD

1	Mode selection	ON	Parameter setting mode
		OFF	Normally sewing mode

:Other DIP switches of DIPC.D are all unused.

Explanation DIP switch of COV

DIPA

1	Position of presser after thread trimming	ON	Down
		OFF	Raised
2	Position of presser after thread trimming with treadle in neutral position	ON	Raised
		OFF	Down
3	Position of presser when machine is stopped with treadle at neutral	ON	Raised
		OFF	Down
4	Automatically power off presser foot lifter	ON	none
		OFF	The power turns off automatically after 3 minutes
5	Delay time from presser off to start	ON	250 msec
		OFF	350 msec
6	Slow start mode	ON	Slow start mode (2 stitches)
		OFF	none
7	Select folder movement	ON	Alternate movement
		OFF	Momentary movement
8	Under thread trim timing	ON	80 msec on
		OFF	80 msec on, next 50 msec off, next 10 msec on

DIPB

1	Reserved		Normally OFF
2	Number of condense stitches	ON	10 stitches
		OFF	5 stitches
3	Correction number of condense stitches	ON	Subtract 2 stitches from setting number (3 or 8)
		OFF	5 or 10 stitches
4	On timing of condense solenoid	ON	First needle up position signal after depressing the treadle backward.
		OFF	First needle down position signal after depressing the treadle backward.
5	Delay time at start with standing operation	ON	none
		OFF	There is delay time at start with standing op.

6	Function of half depressing the treadle backward	ON	Presser foot lifter rise by half depressing the treadle backward
		OFF	none
7	Reserved		Normally OFF
8	Reserved		Normally OFF

DIPC

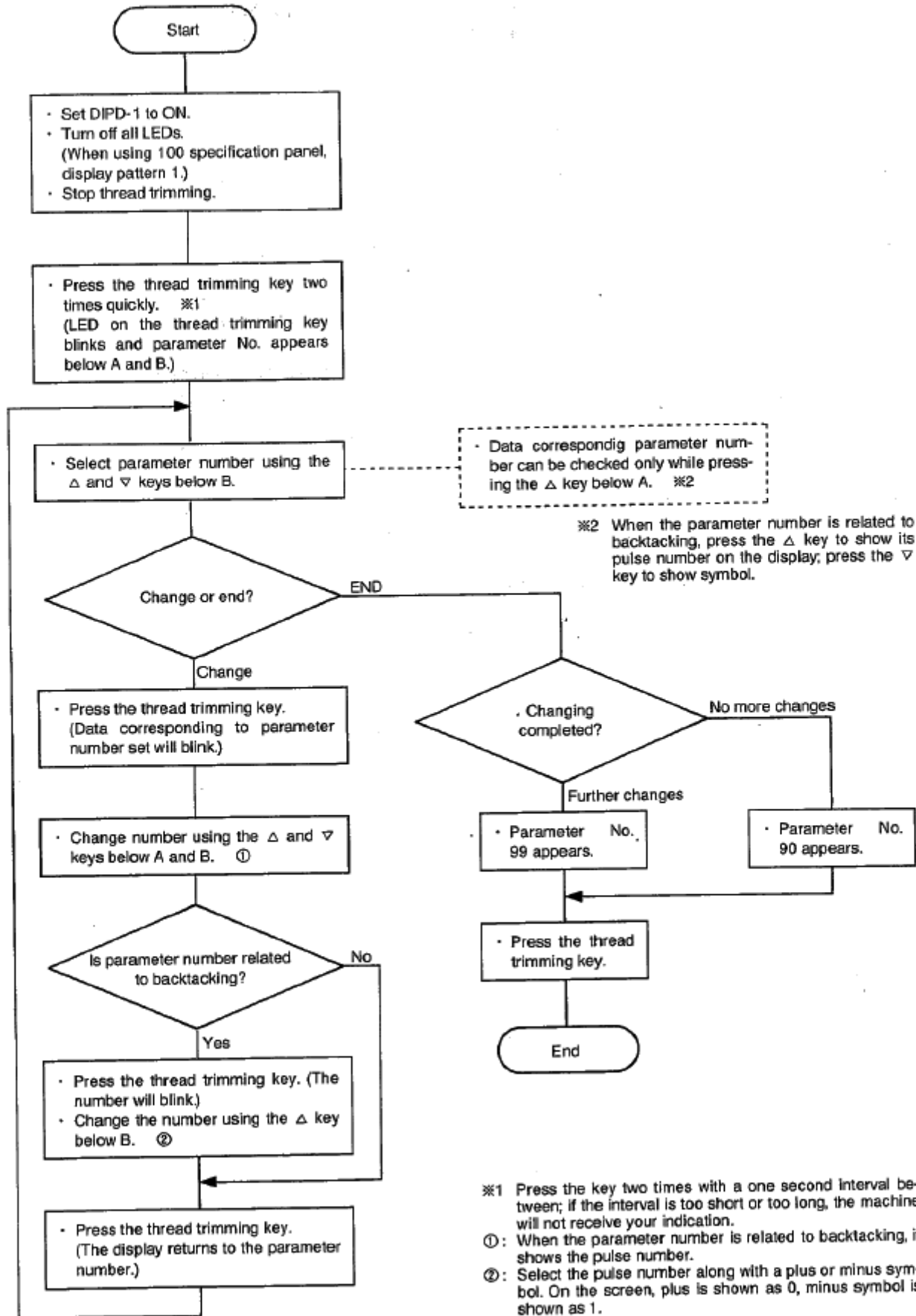
4	Slowdown control	ON	Normally slowdown (usual slowdown)
		OFF	Fix time of inching period on slowdown

DIPD

1	Mode selection	ON	Parameter setting mode
		OFF	Normally sewing mode

:Other DIP switches of DIPC and D are all unused.

10 Parameter setting



※1 Press the key two times with a one second interval between; if the interval is too short or too long, the machine will not receive your indication.
 ①: When the parameter number is related to backtacking, it shows the pulse number.
 ②: Select the pulse number along with a plus or minus symbol. On the screen, plus is shown as 0, minus symbol is shown as 1.

11 Parameter and timing list

1. MK II specification

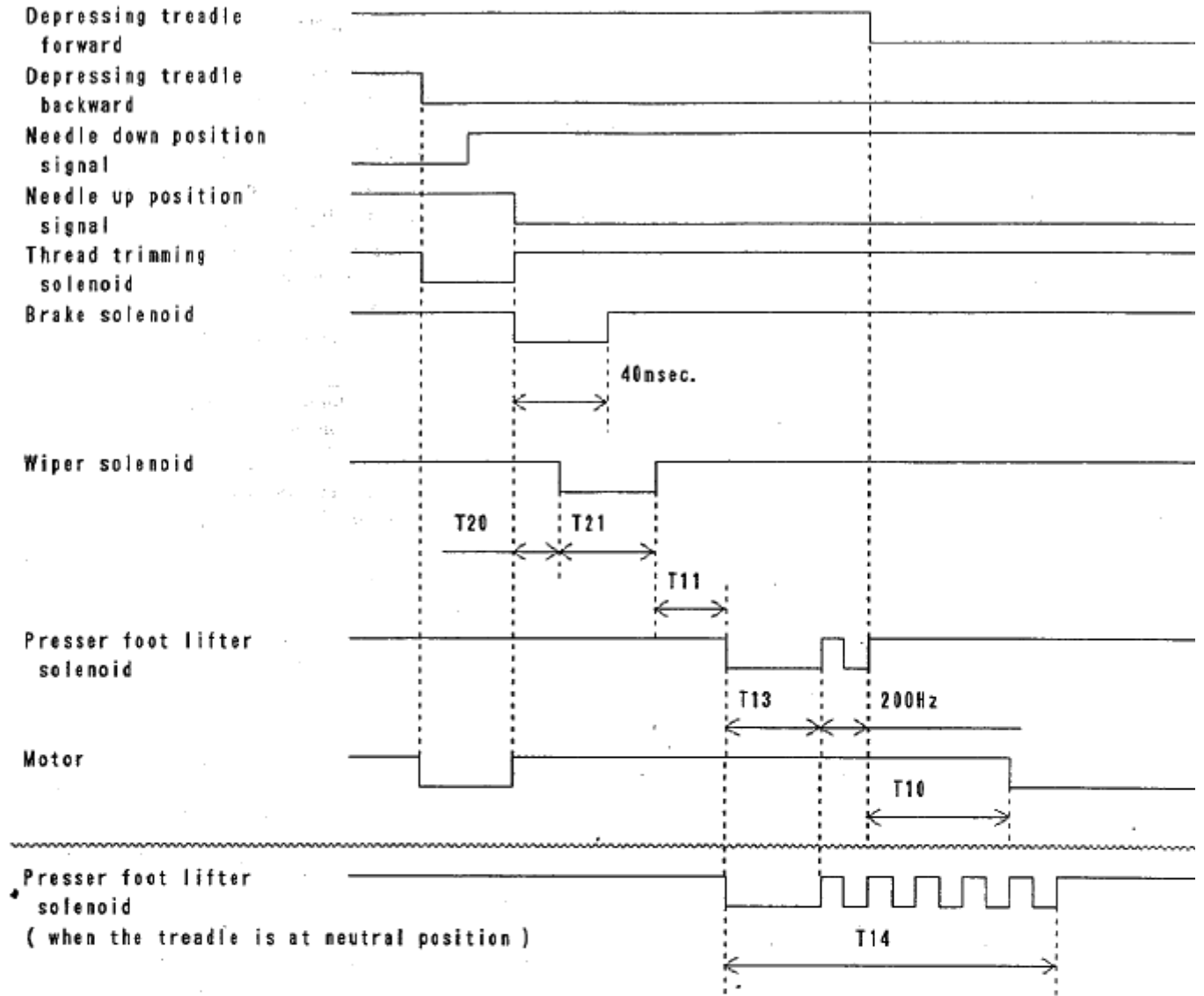
Parameter No.	Default	Data setting range	Function
00	00	00 ~ 03	The specifications of the machine head can be only temporarily changed. (Restoration to original state is made by DIPC 1 and 2.) 00: B737 etc. 01: B791 02: B774 03: B842 group
10 (T10)	15 (150 msec.)	00 ~ 25 (×10) (0 ~ 250 msec.)	The motor can be delayed when the machine is started with the automatic presser foot lifter raised.
11 (T11)	04 (40 msec.)	03 ~ 10 (×10) (30 ~ 100 msec.)	There is a delay from the time the thread wiper is turned OFF to the time the automatic presser foot lifter is turned ON after thread trimming.
13 (T13)	30 (300 msec.)	10 ~ 90 (×10) (100 ~ 900 msec.)	The automatic presser foot lifter is turned ON.
14 (T14)	36 (3 minutes)	00 ~ 60 (×5) (5 seconds ~ 5 minutes)	The presser foot will be automatically turned OFF after the set time passes. When the data is set to 00, the presser foot is not automatically turned OFF.
15 ☆ (T15)	12 (30 msec.)	00 ~ 40 (×2.5) (0 ~ 100 msec.)	There is a delay from presser foot lifter is turned OFF to presser foot lifter is turned ON for moment. (Soft drop function)
16 ☆ (T16)	06 (15 msec.)	00 ~ 40 (×2.5). (0 ~ 100 msec.)	ON time of presser foot lifter after above delay T15. (Soft drop function)
20 (T20)	02 (20 msec.)	01 ~ 07 (×10) (10 ~ 70 msec.)	There is a delay from the time the thread trimmer stops to the time the thread wiper is turned OFF.
21 (T21)	05 (50 msec.)	04 ~ 10 (×10) (40 ~ 100 msec.)	ON time of thread wiper
30	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	Turning ON time of quick reverse device upon start and end backtacking.
31	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	Turning OFF time of quick reverse device upon start and end backtacking.
32	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	Turning OFF time of quick reverse device upon end backtacking
33	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	The second turning ON time of quick reverse device for end backtacking when DIPA5 is set to ON.

The parameter numbers appear on the panel.

() shows the number in the timing chart.

Note: Functions indicated with a ☆ mark are activated on the new CPU version (J01520-B mask no. 128).

MKII and BAST Timing chart when the thread is trimmed



《 All signals are activated when they are in the low position. 》

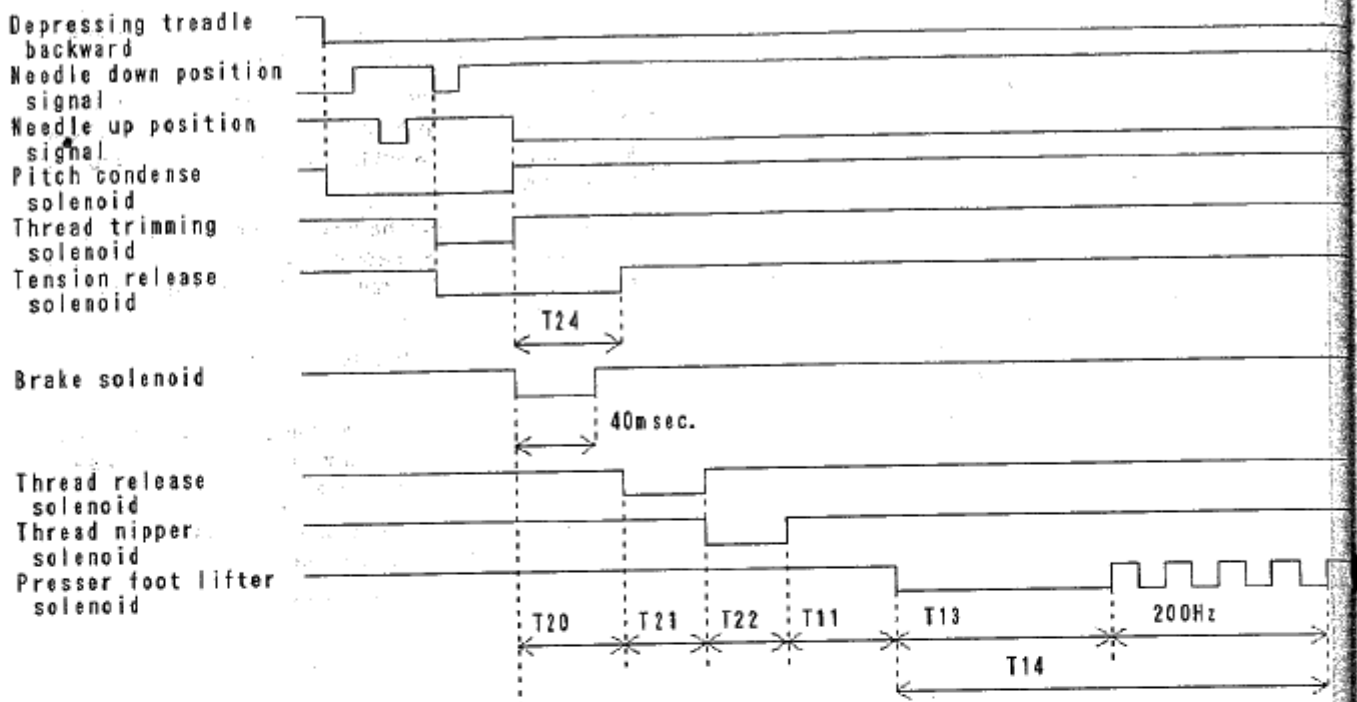
2. NBN specification

Parameter No.	Default	Data setting range	Function	
10 (T10)	15 (150 msec.)	00 ~ 25 (×10) (0 ~ 250 msec.)	The motor can be delayed when the machine is started with the automatic presser foot lifter raised.	
11 (T11)	10 (100 msec.)	05 ~ 25 (×10) (50 ~ 250 msec.)	There is a delay from the time the thread nipper is turned OFF to the time the presser foot lifter is turned ON when toggle switch SW3 is set to ON and the thread nipper function is activated.	
12 (T12)	06 (60 msec.)	05 ~ 25 (×10) (50 ~ 250 msec.)	There is a delay from the time the thread trimmer is turned OFF to the time the presser foot lifter is turned ON when toggle switch SW3 is set to OFF and the thread nipper function is deactivated.	
13 (T13)	30 (300 msec.)	10 ~ 90 (×10) (100 ~ 900 msec.)	ON time of automatic presser foot lifter	
14 (T14)	36 (3 minutes)	00 ~ 60 (×5) (5 seconds ~ 5 minutes)	The presser foot will be automatically turned OFF after the set time passes. When the data is set to 00, the presser foot is not automatically turned OFF.	
20 (T20)	04 (40 msec.)	00 ~ 15 (×10) (0 ~ 150 msec.)	There is a delay from the time the thread trimmer stops to the time the thread wiper is turned ON.	
21 (T21)	06 (60 msec.)	04 ~ 15 (×10) (40 ~ 150 msec.)	ON time of thread release solenoid	
22 (T22)	06 (60 msec.)	04 ~ 15 (×10) (40 ~ 150 msec.)	ON time of thread nipper solenoid	
23 (T23)	15 (150 msec.)	04 ~ 20 (×10) (40 ~ 200 msec.)	ON time of thread release solenoid at sewing start after thread trimming	
24 (T24)	04 (40 msec.)	00 ~ 15 (×10) (0 ~ 150 msec.)	Time of thread release solenoid from the time thread trimming is completed to the time the thread release solenoid is turned OFF.	
30	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	Turning ON time of quick reverse device upon start and continuous backtackings.	+ symbol delays the timing corresponding to the pulse number you previously set. - symbol advances the timing corresponding to the pulse number you previously set.
31	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	Turning OFF time of quick reverse device upon start and continuous backtackings.	
32	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	Turning OFF time of quick reverse device upon end backtacking	
33	00 (0 pulses)	-23 ~ +23 (1 pulse unit) (1: minus, 0: plus)	Turning ON time of quick reverse device upon end backtacking	

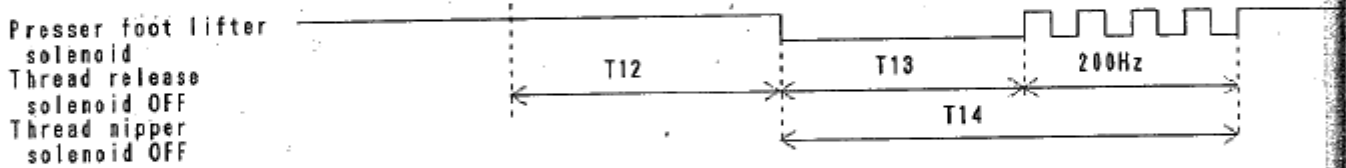
The parameter numbers appear on the panel.
() shows the number in the timing chart.

NBN timing chart

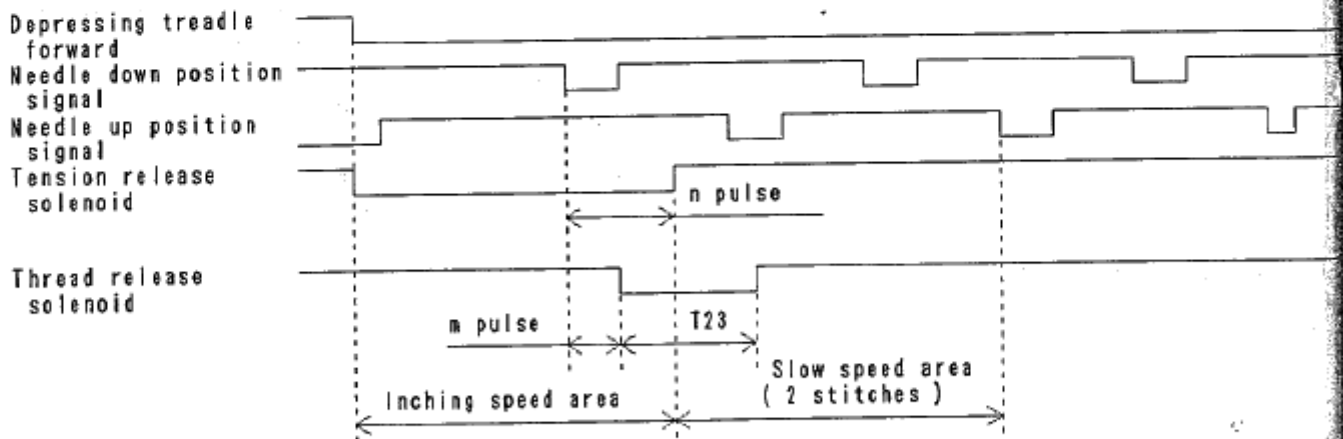
A. Thread trimming timing when SW 3 is set to ON (when thread nipper function is activated)



B. Thread trimming timing when SW 3 is set to OFF (when thread nipper function is deactivated)



C. Sewing start timing after thread trimming



n pulse : This is set by DIPC1 and 2. There are 4 kinds of numbers. (0, 10, 20, 30)

m pulse : This is set on the operation panel. Zero to nine pulses can be set; the default is 2.

Slow speed area : This is set to on the operation panel. Zero to nine stitches can be set; the default is 3.

《 All signals are activated when they are in the low position. 》

3. BAST specification

Parameter No.	Default	Data setting range	Function
11 (T11)	04 (40 msec.)	03 ~ 10 (×10) (30 ~ 100 msec.)	There is a delay from the time the thread wiper is turned OFF to the time the automatic presser foot lifter is turned ON after thread trimming.
13 (T13)	30 (300 msec.)	10 ~ 90 (×10) (100 ~ 900 msec.)	ON time of automatic presser foot lifter
14 (T14)	36 (3 minutes)	00 ~ 60 (×5) (5 seconds ~ 5 minutes)	The presser foot will be automatically turned OFF after the set time elapses. When the data is set to 00, the presser foot is not automatically turned OFF.
20 (T20)	02 (20 msec.)	01 ~ 07 (×10) (10 ~ 70 msec.)	There is a delay from the time the thread trimmer stops to the time the thread wiper is turned ON.
21 (T21)	05 (50 msec.)	04 ~ 10 (×10) (40 ~ 100 msec.)	ON time of thread wiper

The parameter numbers appear on the panel.
() shows the number in the timing chart.

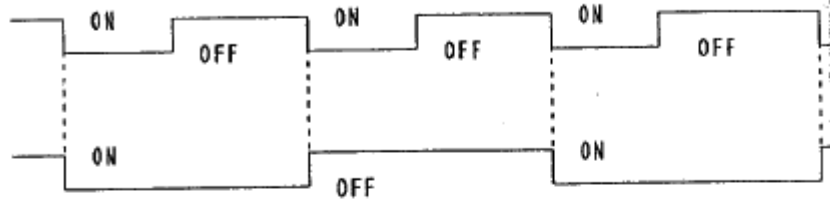
4. COV specification timing chart

A. Time that folder opens and closes

A. 1 Alternate motion (when DIPA-7 is set to ON)

Folder switch for opening and closing folder

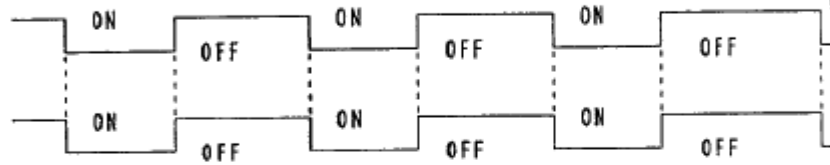
Folder opening and closing solenoid



A. 2 Momentary motion (when DIPA-7 is set to OFF)

Folder switch for opening and closing folder

Folder opening and closing solenoid



B. Thread trimming timing

Depressing treadle backward
Needle up position signal

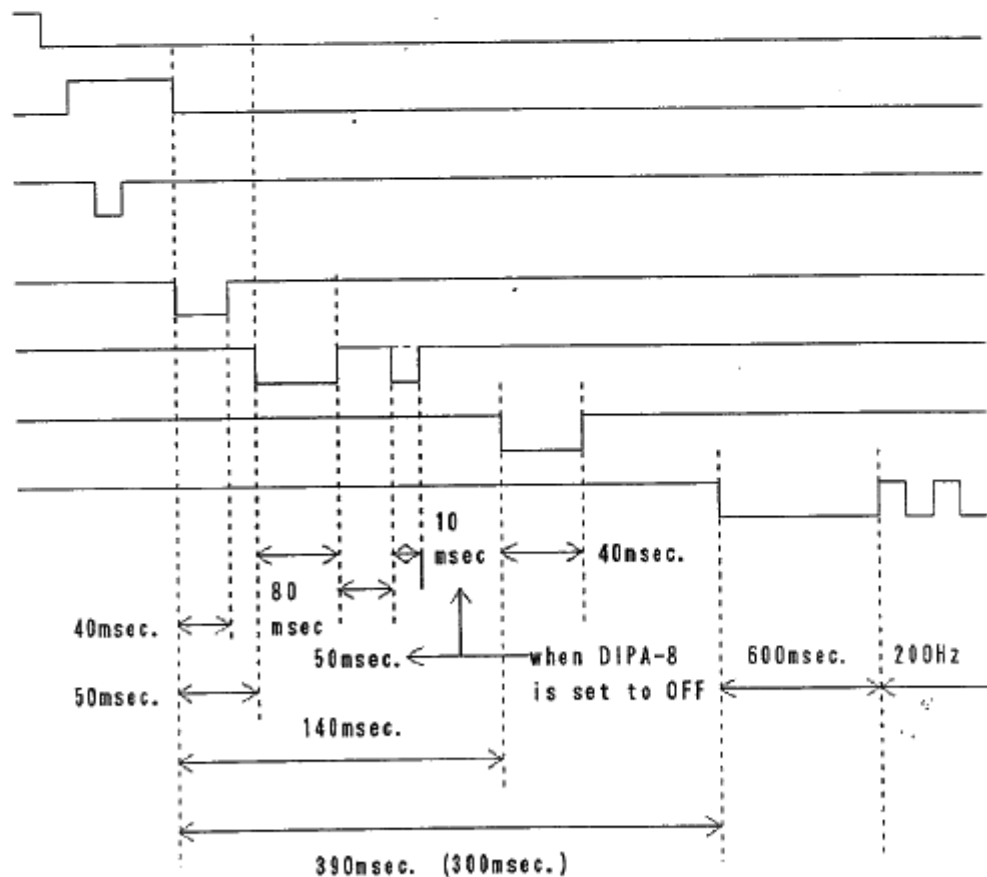
Needle down position signal

Brake solenoid

Bobbin thread trimming solenoid

Spreader thread trimming solenoid

Presser foot lifter solenoid



() shows the number without spreader thread trimming.

TROUBLESHOOTING

- When troubleshooting is required, separately inspect such main parts as the control box, motor, operation panel box, motor, operation panel box, synchronizer, power switch, machine solenoid and presser foot lifter.
- When the control box is found to be out of order, inspect the control circuit board, power board, treadle unit, and transformer separately.
- Whatever trouble you encounter, check that the connectors are secure.
- Pay extra attention to the maintenance of the power and control circuit boards because a high voltage is applied.
- Refer to the circuit drawings separately provided to check the quality of the detailed parts (semiconductors) for maintenance.

Trouble	Check Point	Parts to Be Replaced	Ref. Page
1. The machine will not run even when stepping on the treadle while the power switch is ON. (1) Power indicator lamp (red LED) does not go ON. (2) Power indicator lamp (red LED) is ON.	Check the power source voltage. (Try to plug into another outlet.)		
	Fuse blown: 3-phase 3A or 5A fuse (2 pcs.) Single-phase 15A fuse (1 pc.) (Replace with new ones.)	Fuse Control box	
	Check whether the connections are secured. (Check especially the 6P connector of the motor.)	Control box	
2. The machine stops during operation. (1) Power indicator lamp (red LED) flickers. (2) Power indicator lamp (red LED) does not flicker.	The machine pulley is too stiff to turn manually. [The machine or the motor (brake lining) is locked. Remove the cause and turn on the power. The machine should run normally.]		
	Power source voltage drop. (The motor is not out of order.)		
3. The machine starts running just by turning on the power switch even with the treadle set in the neutral position.		Control box	
4. The machine does not run at high speed.	Check whether the high speed volume is set to "Low". (The range of the high speed control is from 215spm to the maximum.)	Control box	
5. The machine does not stop even if the treadle is returned to the neutral position.	If the machine stops after turning off the power switch, removing the synchronizer switch, then turning it on again, the synchronizer is out of order. (Use as a clutch motor for a while.)	Synchronizer Control box	
6. Abnormal motor running (variation in rpm)		Motor	P.35
7. The brake produces abnormal noises during operation.	Adjustment of brake clearance	Remove washer.	P.16
8. The operations related to the machine solenoid do not work. (thread trimming, reverse rotation, thread wiper, and presser)	Check the 8-A fuse provided on the control circuit board.	8-A fuse Control box	
9. Abnormality related to automatic backtacking, etc.		Control box Operation panel	P.36

Error Indication List

Indication	Error content
The power LED blinks at a cycle of approx. 0.25 second. The buzzer sounds at a cycle of approx. 0.25 second.	Machine motor lock.
	Higher voltage than usual is applied to the power.
	Needle up signal or needle down signal is not detected for three seconds while the machine is running.
The power LED blinks at a cycle of approx. 0.1 second.	The power voltage drops when the machine is stopped during sewing with DIPB 3 set to ON.
The stitch number display blinks on the panel.	Can not write to memory (EEPROM). Can not store.
"0" blinks on part A of the stitch number display. For panel E100 or N 100, "1" also blinks on the pattern display.	Keys other than half stitch key on the operation panel are not normal. (Short-circuited.) ^{*1}
"0" blinks on part B of the stitch number display. For panel E100 or N 100, "1" also blinks on the pattern display. ^{*3}	The half stitch key on the operation panel is not normal. ^{*2}
The buzzer sounds at a cycle of approx. 0.5 second.	When the power first is turned on, or backup data is wiped.

*1: For the NBN specification, keys other than the half stitch key and the mode key are not normal.

*2: When all memory is cleared using the half stitch key, the display shows the same indication. For the NBN specification, when only mode data is initialized using the mode key, the display shows the same indication.

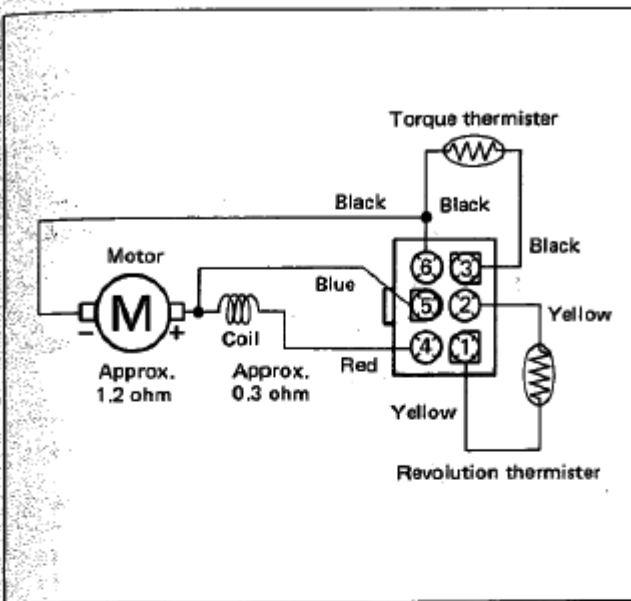
*3: For the NBN specification, when the mode key is not normal, "32" appears below A and B on the stitch number display, and the LED on the mode key blinks.

Memory all clear operation: To clear all backup data from the memory, turn on the power while pressing the half stitch key.

Mode data initialization: To set the mode data (which contains the stitch number at a slow start and the thread release timing) to the default, turn on the power while pressing the mode key.

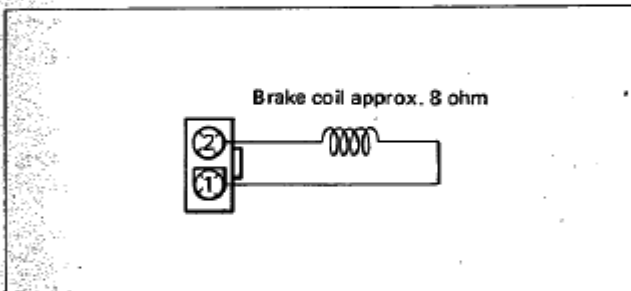
CHECKING THE MOTOR

1 Motor



1. Remove the motor cord (6P connector) from the connector part of the control box.
2. Measure with a tester set in the resistance range as follows.
 - If the tester reads approx. 2-3ohms in any position between 4 (red) and 6 (black) with the resistance range $\times 1$, it is normal. It should read approx. 2-3ohms in each position while turning the motor pulley slowly. If it reads approx. 10ohms or more in some positions, it is out of order. However, if the pointer swings to much while turning the motor pulley, be sure to measure after stopping the pulley.
 - If the tester reads approx. 5K-40Kohms when measured at any position between 3 (black) and 6 (black) with the resistance range $\times 1$, it is normal.
 - If the tester reads approx. 5K-40Kohms when measured at any position between 1 (yellow) and 2 (yellow) with the resistance range $\times 1$, it is normal.

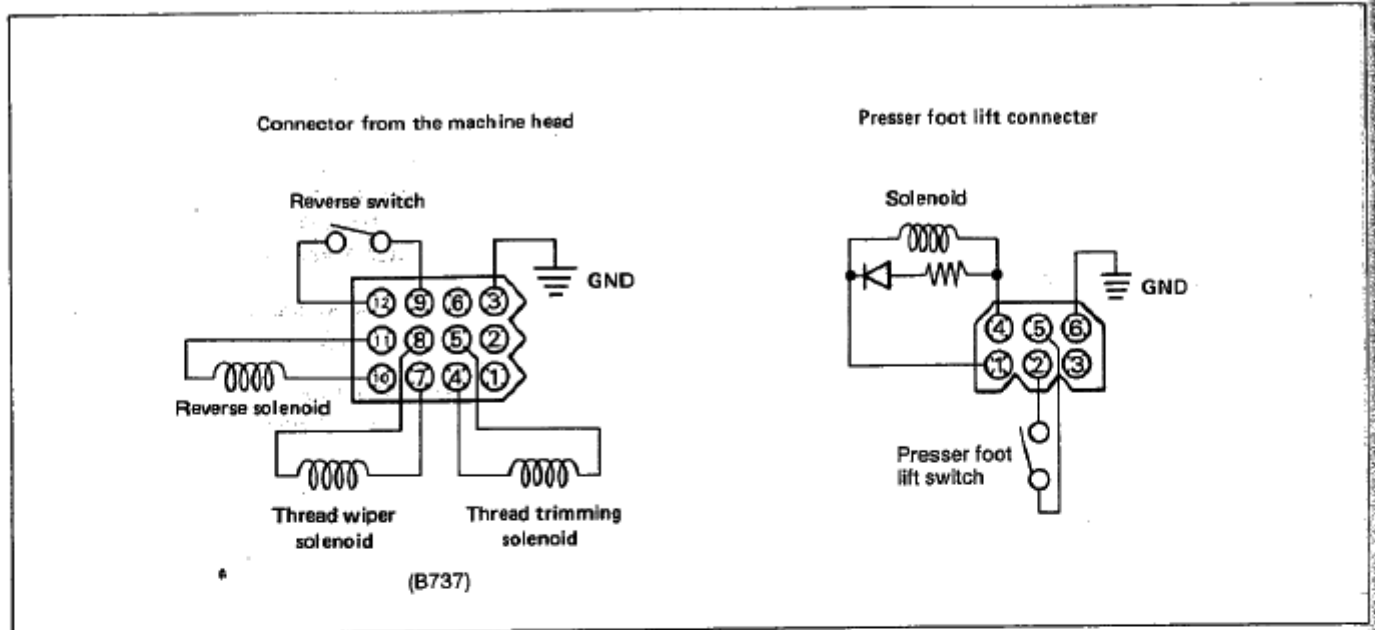
2 Brake



1. Remove the brake cord (2P connector) from the connector part of the control box.
2. Measure with the tester set in the resistance range as follows.
 - If the tester reads approx. 7-9ohms when measured at any position between 1 (black) and 2 (black) with the resistance range $\times 1$, it is normal.

CHECKING THE MACHINE SOLENOIDS

1 Solenoid load of the machine



1. Remove the load connector (12P connector) of the machine from the connector part of the control box.
2. Measure with the tester set in the resistance range $\times 1$ as follows.
 - <Machine Head>
 - The thread trimming solenoid at pins 4 and 5 is normal if the tester reads approx. 7ohms.
 - The thread wiper solenoid at pins 7 and 8 is normal if the tester reads approx. 5ohms.
 - The actuator at pins 9 and 12 is normal if the tester reads 0ohms when pressed, and ∞ ohms when released.
 - <Presser Lift>
 - The presser lift solenoid at pins 1 and 4 is normal if the tester reads approx. 5ohms.
 - The presser lift switch at pins 2 and 5 is normal if the tester reads 0ohms when pressed, and ∞ ohms when released.

2 Solenoids Table

(driving transistor No. & Ω)

control PCB spec.		MK II	NBN	BAST	COV
brake solenoid	transistor No.	TR1			
	resistance of sol. (Ω)	5.3			
trimmer solenoid	transistor No.	TR2			TR3
	resistance of sol. (Ω)	6.7			6.0
wiper solenoid	transistor No.	TR3	—	—	TR2
	resistance of sol. (Ω)	5.0	—	—	8.0 *1
reverse solenoid (backtack)	transistor No.	TR5		—	—
	resistance of sol. (Ω)	7.4		—	—
presser foot lifter solenoid	transistor No.	TR6		—	TR6
	resistance of sol. (Ω)	9.5		—	10.0
tension release solenoid	transistor No.	(TR4)	TR4	—	—
	resistance of sol. (Ω)	—	17.0	—	—
nipper solenoid	transistor No.	—	TR9	TR3	—
	resistance of sol. (Ω)	—	17.0	8.0	—
condense solenoid	transistor No.	—	TR3	—	TR4
	resistance of sol. (Ω)	—	7.7	—	200
thread release solenoid	transistor No.	—	TR7, 8, 9	—	—
	resistance of sol. (Ω)	—	8.5, 8.5	—	—
spreader thread trimmer solenoid	transistor No.	—	—	—	TR2
	resistance of sol. (Ω)	—	—	—	5.7 *2
folder control solenoid	transistor No.	—	—	—	TR5
	resistance of sol. (Ω)	—	—	—	500

() is not mounted.

MK II : Straight lock stitcher with thread trimmer. (B737 etc.)

NBN : Straight lock stitcher with thread trimmer with no bird nest and shorter trimmed end.
(B730)

BAST : Single needle basting lock stitcher with thread trimmer. (LS2-B883)

COV : Covering stitcher with thread trimmer. (FD4-B27X group and FD3-B25X group)

*1 : FD4-B276, FD3-B256

*2 : FD4-B277, FD3-B257

SPEED ADJUSTMENT FOR EACH MACHINE

1 Selection of motor pulley and method of replacement

1) Selection of motor pulley

Select the correct motor pulley for the machine according to the separate list.

(Remark): The figures described for motor pulley are outer diameters of V groove.

2) Replacement of pulley

a) Take off pulley cover.

b) Remove V belt.

c) Unfasten pulley set screw, M5 × 12 screw (3 pcs.) and then exchange the pulley.

d) Reassemble them in the reverse procedure.

(Remark): In the case the pulley is exchanged, the high backtacking and low speeds will all change.

2 Adjustment of each speed

1) Adjustment of high speed

a) Set up the machine and motor.

b) Turn the high sewing speed dial in front of the control box fully clockwise.

c) Remove the rubber plug from the rear of the control box and turn the inside dial ①.

When it is turned to the right, the machine speeds up.

(Remark): Turn VR first to the left and then make speed adjustment from a lower speed, thereby avoiding troubles due to abnormal speed.

d) Turn the power switch on and keep the treadle fully down when adjusting the speed.

2) Adjustment of end backtacking speed

a) Open the cover of the control box.

b) Turn the power switch on.

c) Set operation panel and turn only end backtacking switch on (even in the case of E0, make necessary adjustment using E20, E40 or E100 operation panel).

d) Depress the treadle forward to put the machine back in neutral before stopping the machine with the needle in the down position.

e) Remove the synchronizer plug from the control box.

f) Depress the treadle backward and the machine will keep running at the backtacking speed; make adjustment using VR EBT.

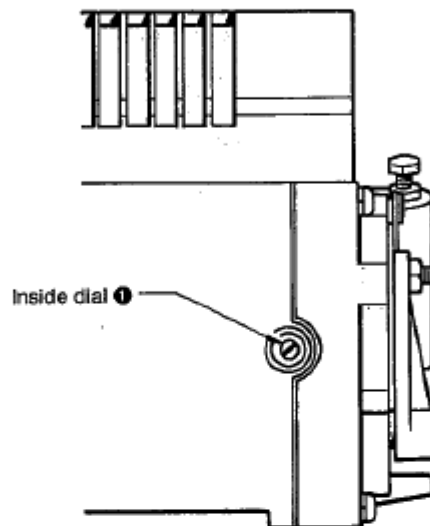
3) Adjustment of thread trimming speed

a) Open the cover of the control box.

b) Depress the treadle forward lightly to put the machine back in neutral before stopping the machine with the needle in the down position.

c) Remove the synchronizer plug from the control box and depress the treadle forward to put the machine back in neutral and the machine will keep running at low speed; make adjustment using VR TRIM (LOW).

d) After adjustment, turn the power switch off, close the cover, then reinsert synchronizer plug.



In the case the torque is insufficient for some specific sewing, use the next smaller pulley to increase the torque but make sure to select such pulleys that speed of DC servomotor will not be required to rotate at more than 3,000RPM for the maximum sewing speed of machine. Machine pulley speed must be calculated based on an effective diameter of approx. 70mm.

* Refer to ⑥ Control box in ADJUSTMENT.

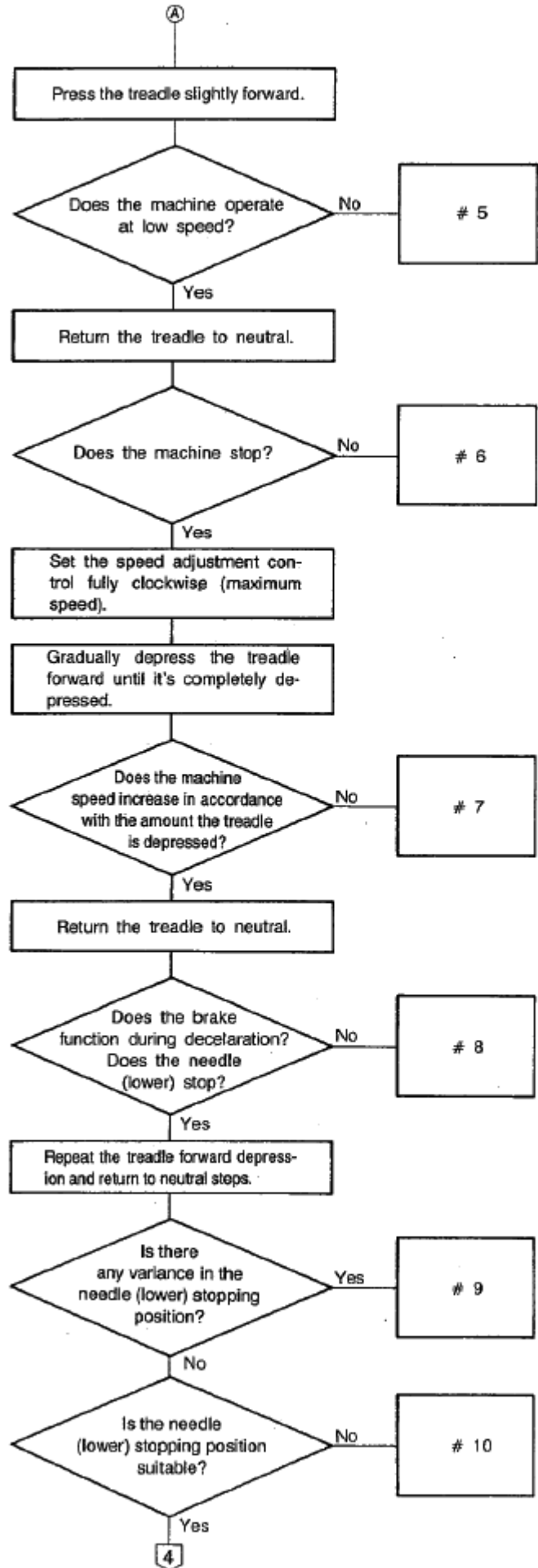
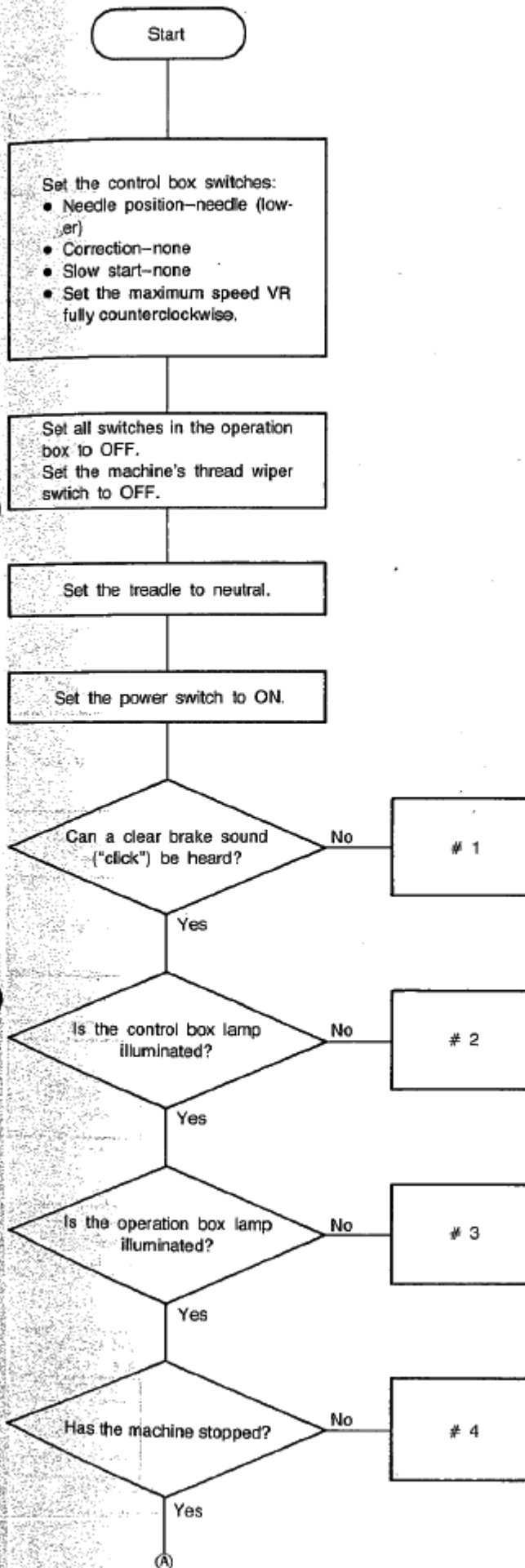
3 Sewing speed of each machine

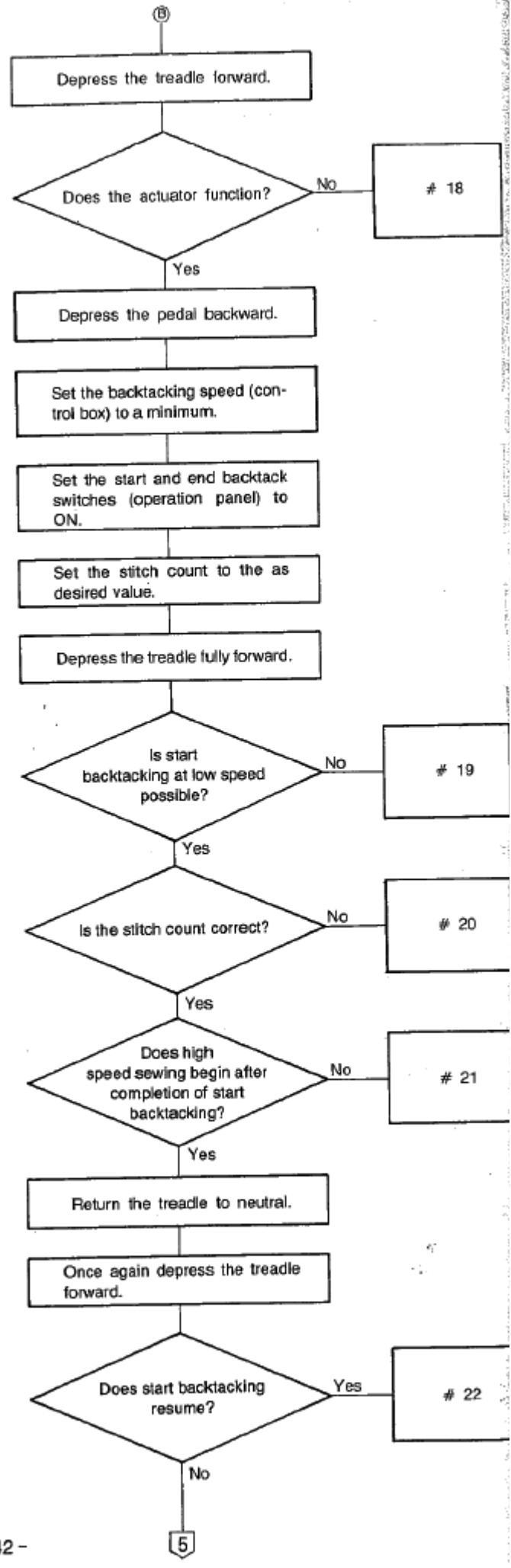
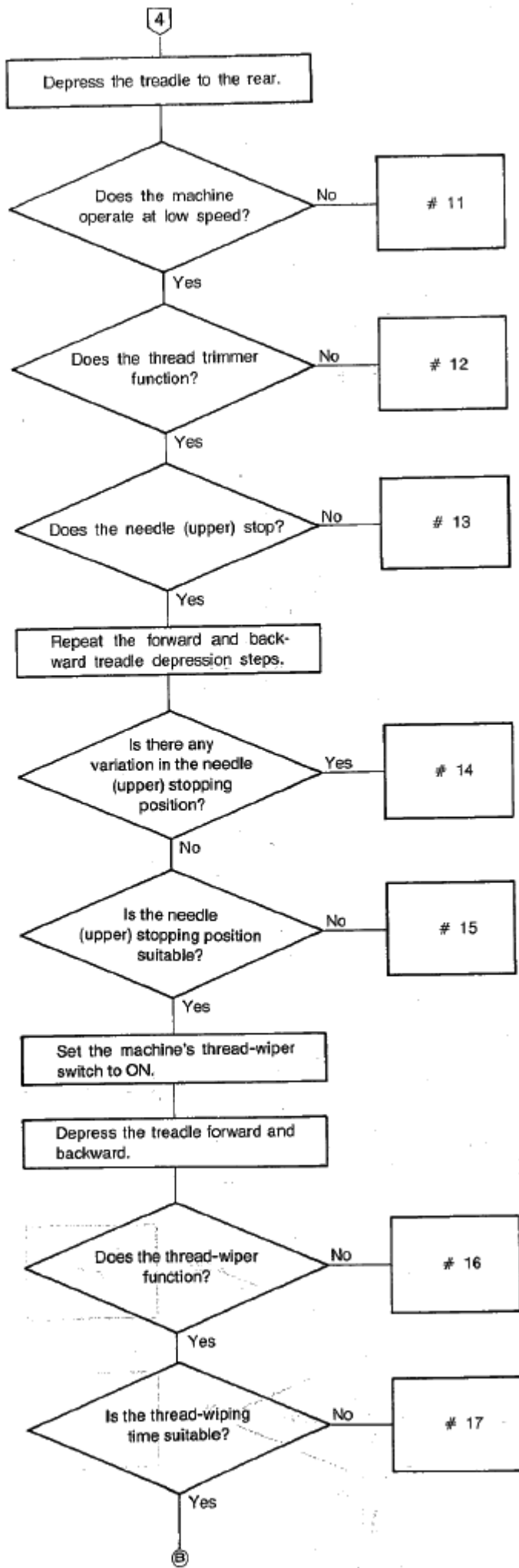
Model No. & Spec	Each Sewing Speed			Motor pulley (outer diameter)
	High Speed	Backtacking Speed	Thread trimming speed	
B737-1	4,000	1,800	215	105
-3	5,000	1,800	215	125
-5	3,500	1,800	215	90
B747-5	3,500	1,800	215	90
B748-7	2,500	1,800	215	90
B798	2,000	900	215	80
B852	4,500	1,800	185	105
B853	4,500	1,800	185	105
B854	4,500	1,800	185	105
B791-3	4,500	1,800	215	105
-5	3,500	1,800	215	90
B774	4,500	1,800	215	105
B842-3	4,000	1,000	185	105
-5	3,500	1,000	185	90
B845	3,000	1,000	185	90
B847	4,000	1,000	185	90
B848	3,000	1,000	185	90
B730-1	4,000	1,800	215	105
-3	5,000	1,800	215	125
LS2-B883	1,000	-	185	80
FD4-B27X	6,000	-	215	125
FD3-B25X	6,000	-	215	125

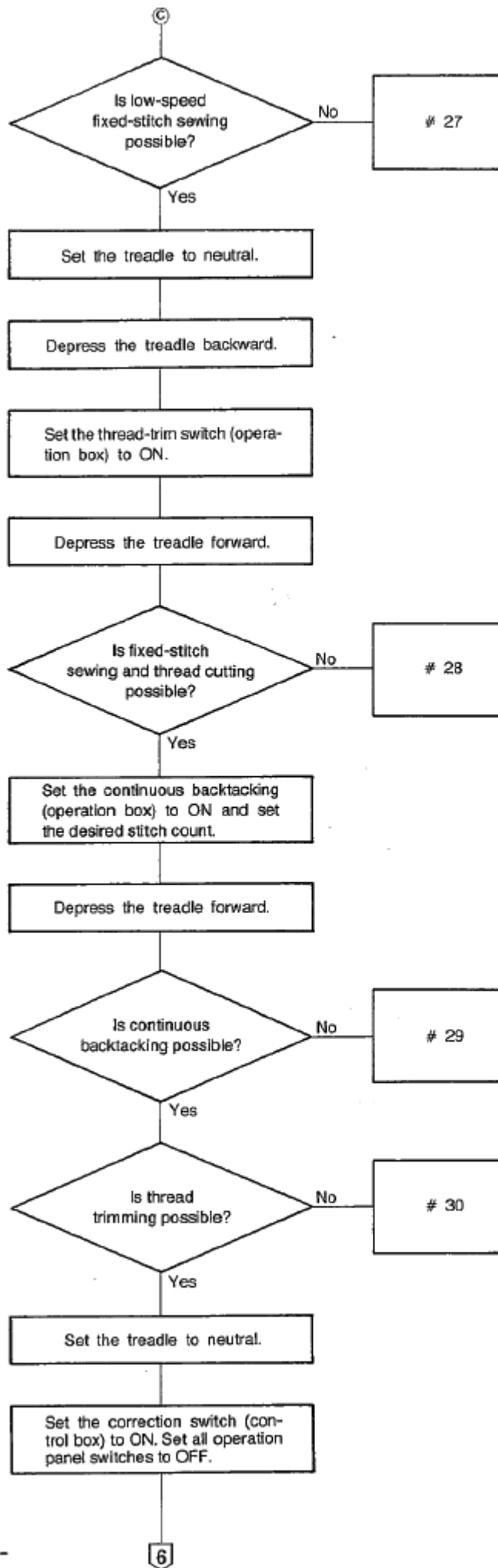
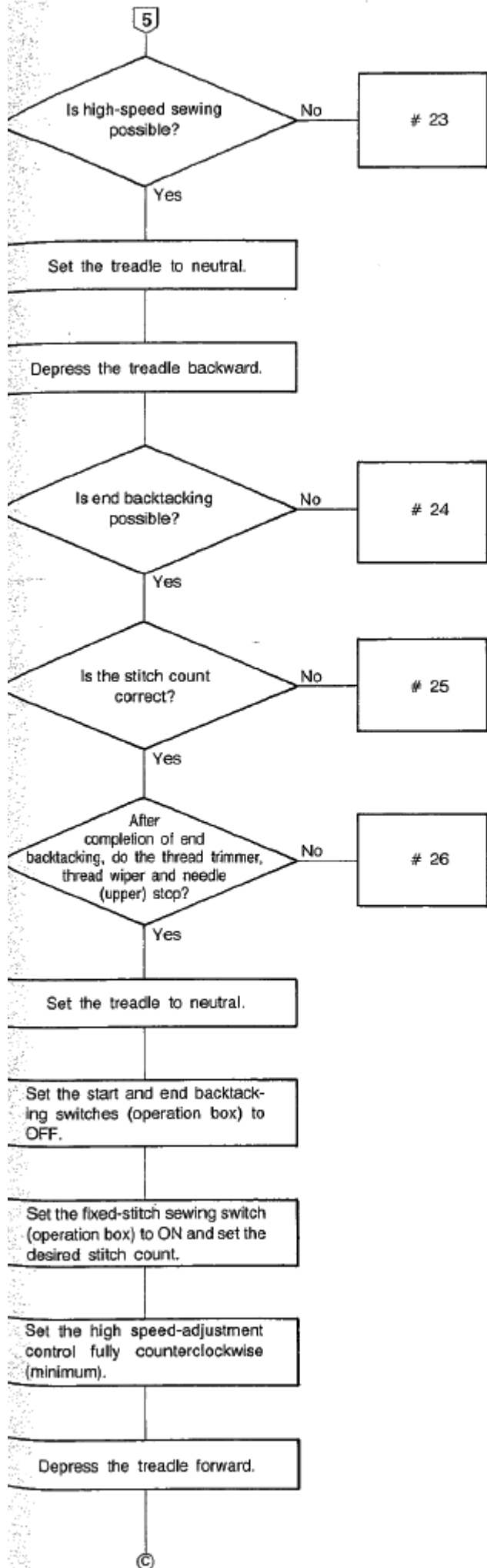
NOTES REGARDING DC MOTOR INSTALLATION

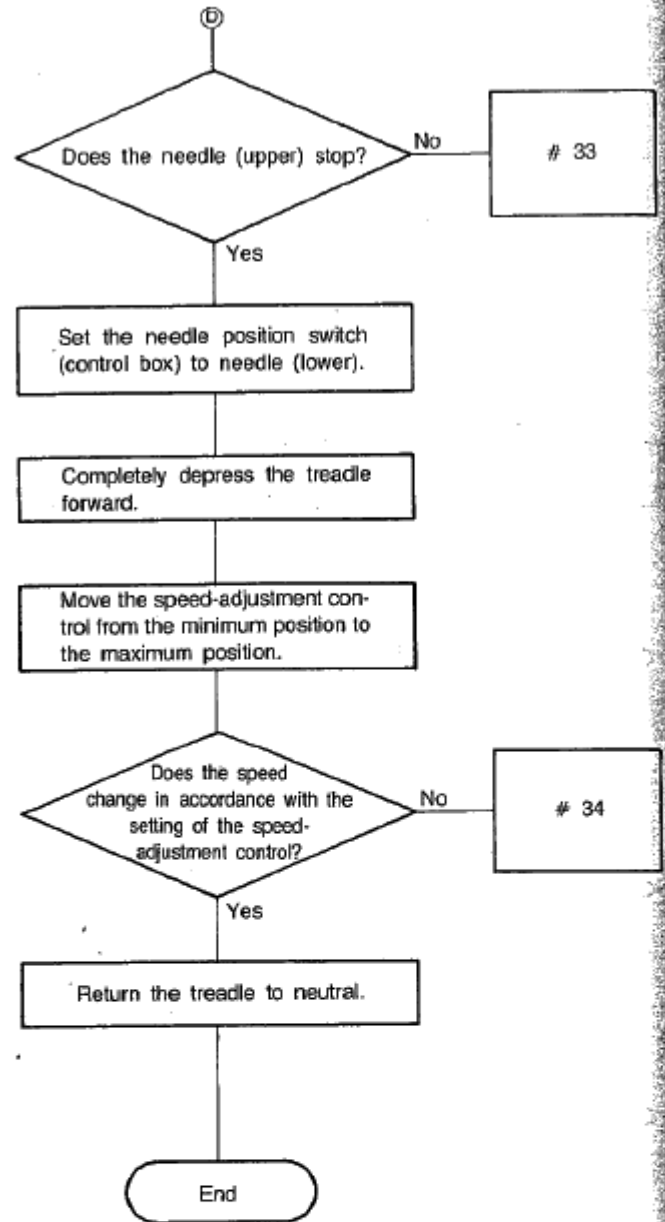
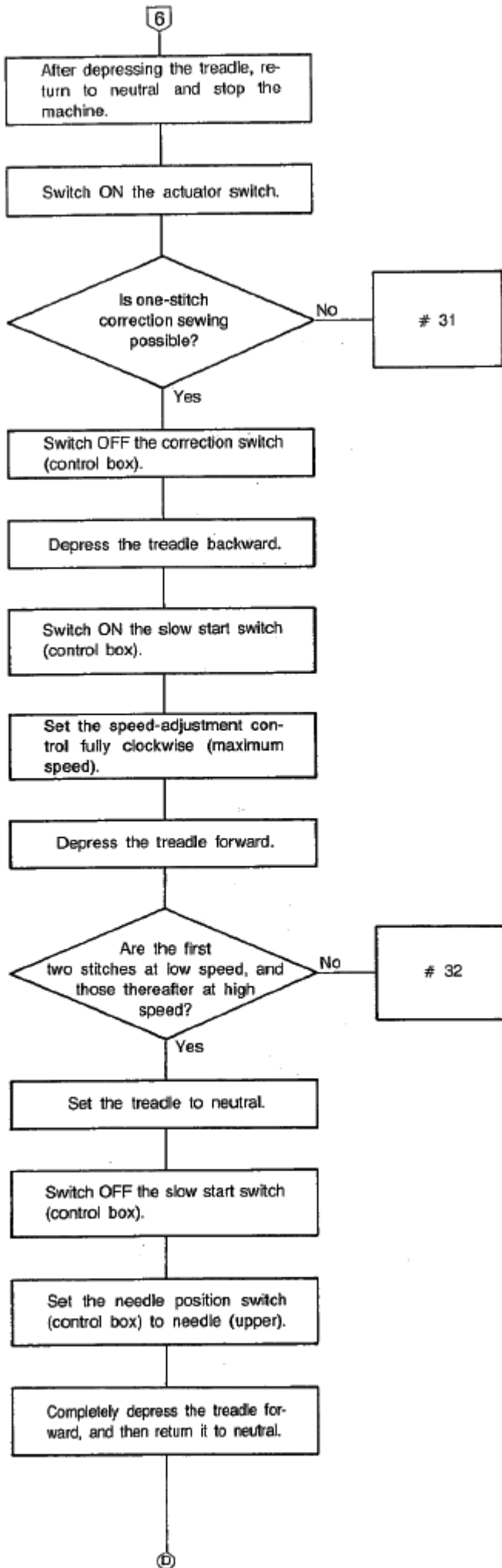
- (1) Be sure, when using a three-phase power supply, to check the connection of the power plug. Be careful not to use a single-phase power supply. Even if a single-phase is used, there may be no abnormal condition. Note, however, that quick repeated starting and stopping will cause the fuse to fail.
(The fuse interior will not become black.)
- (2) The power supply voltage should be $\pm 10\%$ of the rating.
- (3) Securely connect each connector. The 6-pin connector from the motor is, in particular, very important.
- (4) If single-phase 110V is used, all functions will stop if there is even a momentary drop of the voltage to 75% or below. For that reason, indoor wiring capacity should be 20A or higher, and the use of extension cords should be avoided.
- (5) For cold regions, care should be taken to avoid condensation.
In particular, needle (lower) stop position will be abnormal if condensation occurs on the reflector plate of the synchronizer.
- (6) Needle (lower) stop position will be abnormal if there is oil or grease on the reflector plate of the synchronizer, so if there is any it should be carefully wiped off.
- (7) Avoid use near any equipment, such as a high-frequency welder, etc., that emits high-pitched noise, because such equipment will cause operational errors and/or damage to the D printed-circuit board (fuse failure).
- (8) For a three-phase power supply, if a voltage 130% or higher than the rating is applied, the fuse will melt (fuse interior becomes black), thus protecting the control circuitry.

DC MOTOR TROUBLESHOOTING GUIDE









ITEM	PROBLEM	CHECK	PROBABLE CAUSE	REMEDY
#1 and #2	No "click" sound from brake when power is switched ON. Control box lamp doesn't illuminate.	<ul style="list-style-type: none"> Is the connection of the 4-pin or 3-pin power plug correct? The fuse has blown. (For 3-phase, fuse on the outside of control box has failed. For single-phase, 15A fuse on the power board has failed.) * Fuse fails again after replacement. The fuse (8A fuse inside the control box) has blown. Other than that above. 	<p>Power plug is incorrectly connected.</p> <p>Fuse has blown.</p> <p>Malfunction of 8A fuse, the control printed-circuit board. Malfunction of the control printed-circuit board.</p>	<p>Connect the power plug correctly.</p> <p>Replace the fuse.</p> <p>Replace the motor and control box. Replace the fuse and control box. Replace the control box.</p>
#3	No operation box lamp is illuminated.	<ul style="list-style-type: none"> Does the operation box function correctly? (YES) (NO) Other than that above. 	<p>Bulb failure—no functional problem.</p> <p>Malfunction of the operation box.</p> <p>Malfunction of the control printed-circuit board.</p>	<p>Replace the operation box.</p> <p>Replace the control box.</p>
#4	Machine starts when power is switched ON.		<p>Malfunction of the control printed-circuit board.</p> <p>Malfunction of the D printed-circuit board. (single phase 110V or higher)</p>	<p>Replace the control box.</p> <p>Replace the control box motor.</p>
#5	Machine doesn't operate. Machine operates in reverse. Unsuitable low-speed operation. Machine operates at high speed.	<ul style="list-style-type: none"> Does the control box lamp flash? (YES) Is there a motor noise? (YES) Other than the above. 	<p>Large torque (head). Malfunction of control printed-circuit board Malfunction of treadle unit.</p> <p>Large torque (head). Malfunction of treadle unit. Malfunction of treadle unit. Malfunction of treadle unit.</p> <p>Malfunction of treadle unit.</p>	<p>Reduce the torque. Replace the control box.</p> <p>Replace the control box.</p> <p>Reduce the torque. Replace the control box. Replace the control box. Replace the control box. Adjust VR TRIM (LOW).</p> <p>Replace the control box.</p>
#6	Machine doesn't stop when treadle is set at neutral.		<p>Synchronizer installation position is not suitable.</p> <p>Synchronizer malfunction.</p> <p>Control printed-circuit board malfunction.</p>	<p>Position adjustment: 0.5mm</p> <p>Replace the synchronizer. Replace the control box.</p>
#7	Operation speed doesn't correspond to amount of treadle depression.	<ul style="list-style-type: none"> Uneven operation at treadle maximum. Initial operation speed is fast (no low-speed range). 	<p>Malfunction of treadle unit. Malfunction of control box. Malfunction of treadle unit.</p>	<p>Replace the control box. Replace the control box. Replace the control box.</p>

ITEM	PROBLEM	CHECK	PROBABLE CAUSE	REMEDY
#8	Needle (lower) doesn't stop.	<ul style="list-style-type: none"> Is the synchronizer OK? (NO) (YES) 	<ul style="list-style-type: none"> Synchronizer installation position is not suitable. Synchronizer malfunction. Control printed-circuit board malfunction. 	<ul style="list-style-type: none"> Position adjustment 0.5mm Replace the synchronizer. Replace the control box.
#9	Needle (lower) stops at different places.	<ul style="list-style-type: none"> Is the V-belt loose? (YES) Is there oil, grease, dirt scratches, etc. on the synchronizer's reflecting surface? (YES) (NO) Is the motor's braking noise loud? (YES) (NO) 	<ul style="list-style-type: none"> Insufficient V-belt tension. Dirt of the synchronizer's reflecting surface. Malfunction of the synchronizer. Malfunction of the control printed-circuit board. Reduced motor braking force. Malfunction of the synchronizer. Malfunction of the control printed-circuit board. 	<ul style="list-style-type: none"> Adjust the V-belt tension. Clean the reflecting surface. Replace the synchronizer. Replace the control box. Replace the motor brake clearance. Replace the synchronizer. Replace the control box.
#10	Poor position of needle stop.	<ul style="list-style-type: none"> Is adjustment at synchronizer possible? (YES) (NO) 	<ul style="list-style-type: none"> Poor position of needle (lower) stop. Reduced motor braking force. 	<ul style="list-style-type: none"> Adjust needle (lower) stop between 18 ~ 22mm. Replace the motor.
#11	After treadle return, machine won't operate at low speed.	<ul style="list-style-type: none"> Is thread trimming speed suitable? (NO) (YES) 	<ul style="list-style-type: none"> Low speed is too fast. Malfunction of control printed-circuit board. 	<ul style="list-style-type: none"> Adjust VR TRIM (LOW). Replace the control box.
#12	Thread trimmer doesn't function.	<ul style="list-style-type: none"> Is the 1-pin plug (of the 12 pins) in the control box connected? (NO) Switch OFF the power and measure the resistance of the thread trimmer solenoid. Is there about 7ohms between ④ and ⑤ of the 12 pins? (NO) Does the 8A fuse (at the top of the control printed-circuit board) appear normal? (NO) 	<ul style="list-style-type: none"> Improper connection of the 1-pin plug. Malfunction of the thread trimmer solenoid. 8A fuse failure. 	<ul style="list-style-type: none"> Connect the 1-pin plug correctly. Replace the thread trimmer solenoid. Replace the 8A fuse.
#13	Needle (upper) doesn't stop.	<ul style="list-style-type: none"> Is the speed at low speed OK? (NO) Is the synchronizer OK? (NO) (YES) 	<ul style="list-style-type: none"> Low speed is too fast. Improper installation of the synchronizer. Malfunction of the control printed-circuit board. 	<ul style="list-style-type: none"> Adjust VR TRIM (LOW). Replace the synchronizer. Replace the control box.

ITEM	PROBLEM	CHECK	PROBABLE CAUSE	REMEDY
#14	Needle (upper) stops at different places.	<ul style="list-style-type: none"> • Is the V-belt loose? (YES) • Is there oil, grease, dirt scratches, etc. on the synchronizer's reflecting surface? (YES) <li style="text-align: right;">(NO) • Are the speed and torque at low speed OK? (NO) <li style="text-align: right;">(YES) 	<ul style="list-style-type: none"> Insufficient V-belt tension. Dirt of the synchronizer's reflecting surface. Malfunction of the synchronizer. Malfunction of the control printed-circuit board. Speed at low speed is too slow. Operational malfunction related to head thread trimming. 	<ul style="list-style-type: none"> Adjust the V-belt tension. Clean the reflecting surface. Replace the synchronizer. Replace the control box. Adjust the VR TRIM (LOW). Adjust.
#15	The stop position of the needle (upper) is not correct.	<ul style="list-style-type: none"> • Can adjustment be made at the synchronizer? (YES) <li style="text-align: right;">(NO) 	<ul style="list-style-type: none"> Improper needle (upper) stopping position. Reduction of motor brake force. 	<ul style="list-style-type: none"> Adjust the needle (upper) stop position by 10 ~ 12mm. Replace the motor.
#16	Thread wiper doesn't function.	<ul style="list-style-type: none"> • Switch OFF the power switch and then measure the resistance of the thread wiper solenoid. • Is there 5ohms between pins ⑦ and ⑧ of the 12-pin plug? (NO) <li style="text-align: right;">(YES) • Other than above. 	<ul style="list-style-type: none"> Malfunction of the thread wiper solenoid. Improper installation of the thread wiper solenoid. Malfunction of the control printed-circuit board. 	<ul style="list-style-type: none"> Replace the thread wiper solenoid. Adjust the installation. Replace the control box.
#17	Thread wiper operation time is too short.		<ul style="list-style-type: none"> Improper installation of the thread wiper solenoid. 	<ul style="list-style-type: none"> Correct the installation.
#18	Reverser doesn't function. (when treadle is depressed and actuator is switched ON)	<ul style="list-style-type: none"> • Can the reverser be operated by the reverse lever? (NO) <li style="text-align: right;">(YES) • Switch OFF the power switch and then measure the resistance of the reverse solenoid. • Is there about 7ohms between pins ⑩ and ⑪ of the 12-pin plug? (YES) <li style="text-align: right;">(NO) • Measure the resistance of the actuator. Is there 0ohms between pins ④ and ⑫ of the 12-pin plug with the actuator switch ON, and ∞ohms with the actuator switch OFF? (NO) <li style="text-align: right;">(YES) 	<ul style="list-style-type: none"> Operational malfunction related to head reverse. Malfunction of the reverse solenoid. Malfunction of the actuator. Malfunction of the control printed-circuit board. 	<ul style="list-style-type: none"> Adjust. Replace the reverse solenoid. Replace the actuator. Replace the control box.

ITEM	PROBLEM	CHECK	PROBABLE CAUSE	REMEDY
#19	Start backtacking is impossible.		Malfunction of the control printed-circuit board.	Replace the control box.
#20	Will not perform start backtacking the set number of stitches.	<ul style="list-style-type: none"> Is it correct when the backtack stitch count is changed and you try again? (YES) (NO) 	<ul style="list-style-type: none"> Malfunction of the operation box. Malfunction of the control printed-circuit board. 	<ul style="list-style-type: none"> Replace the operation box. Replace the control box.
(Note that care must be taken because there is a difference in stitch length depending on whether the stitch pitch is forward or reverse.)				
#21	Will not operate at high speed after start backtacking.		Malfunction of the control printed-circuit board.	Replace the control box.
#22	Start backtacking resumes.		Malfunction of the control printed-circuit board.	Replace the control box.
#23	Will not sew at high speed after start backtacking.		Malfunction of the control printed-circuit board.	Replace the control box.
#24	Will not perform end backtack.	Same as #19.	Same as #19.	Same as #19.
#25	Will not perform end backtack set stitch count.	Same as #20.	Same as #20.	Same as #20.
#26	Needle (upper), thread trimmer and thread wiper will not stop after end backtacking.		Malfunction of the control printed-circuit board.	Replace the operation box.
#27	Will not perform fixed-stitching at low speed.	<ul style="list-style-type: none"> Is it possible when the fixed-stitch count is changed and you try again? (YES) (NO) 	<ul style="list-style-type: none"> Malfunction of the operation box. Malfunction of the control printed-circuit board. 	<ul style="list-style-type: none"> Replace the operation box. Replace the control printed-circuit board.
#28	Will not trim thread after fixed-stitch sewing.		Malfunction of the operation box.	<ul style="list-style-type: none"> Replace the operation box. Replace the control printed-circuit board.
#29	Will not perform continuous backtacking.		Malfunction of the control printed-circuit board.	Replace the control box.
#30	Will not trim thread after continuous backtacking.		Malfunction of the control printed-circuit board.	Replace the control box.
#31	Will not perform one-stitch correction.		Malfunction of the control printed-circuit board.	Replace the control box.
#32	Will not start slowly.		Malfunction of the control printed-circuit board.	Replace the control box.

ITEM	PROBLEM	CHECK	PROBABLE CAUSE	REMEDY
#33	Needle (upper) will not stop (control box).		Malfunction of the control printed-circuit board.	Replace the control box.
#34	Speed is not in accordance with the setting of the speed adjustment control.		Malfunction of the control printed-circuit board.	Replace the control box.

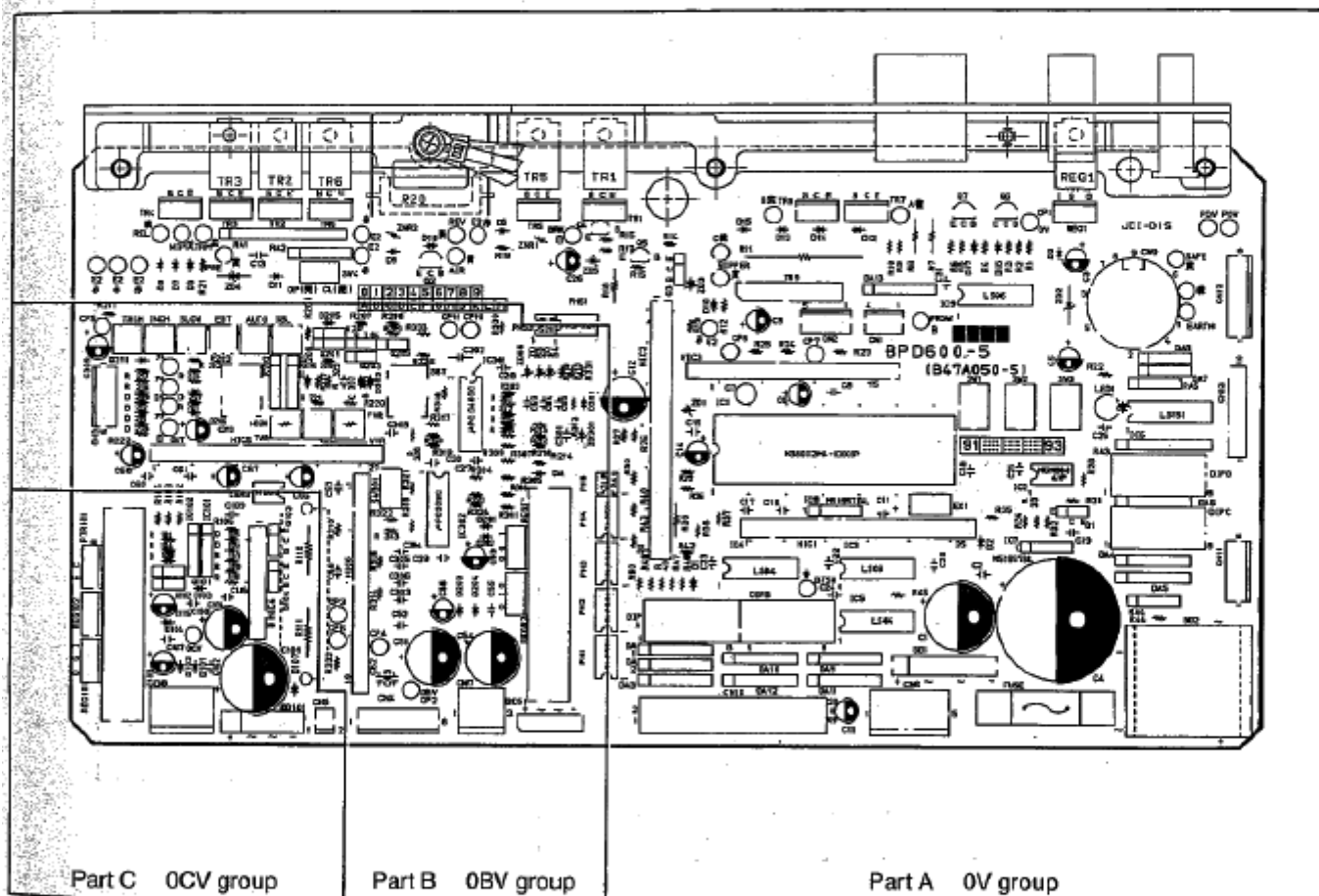
Note: Resistance of each solenoid is for B737.

CONTROL BOX TROUBLESHOOTING GUIDE OUTLINE

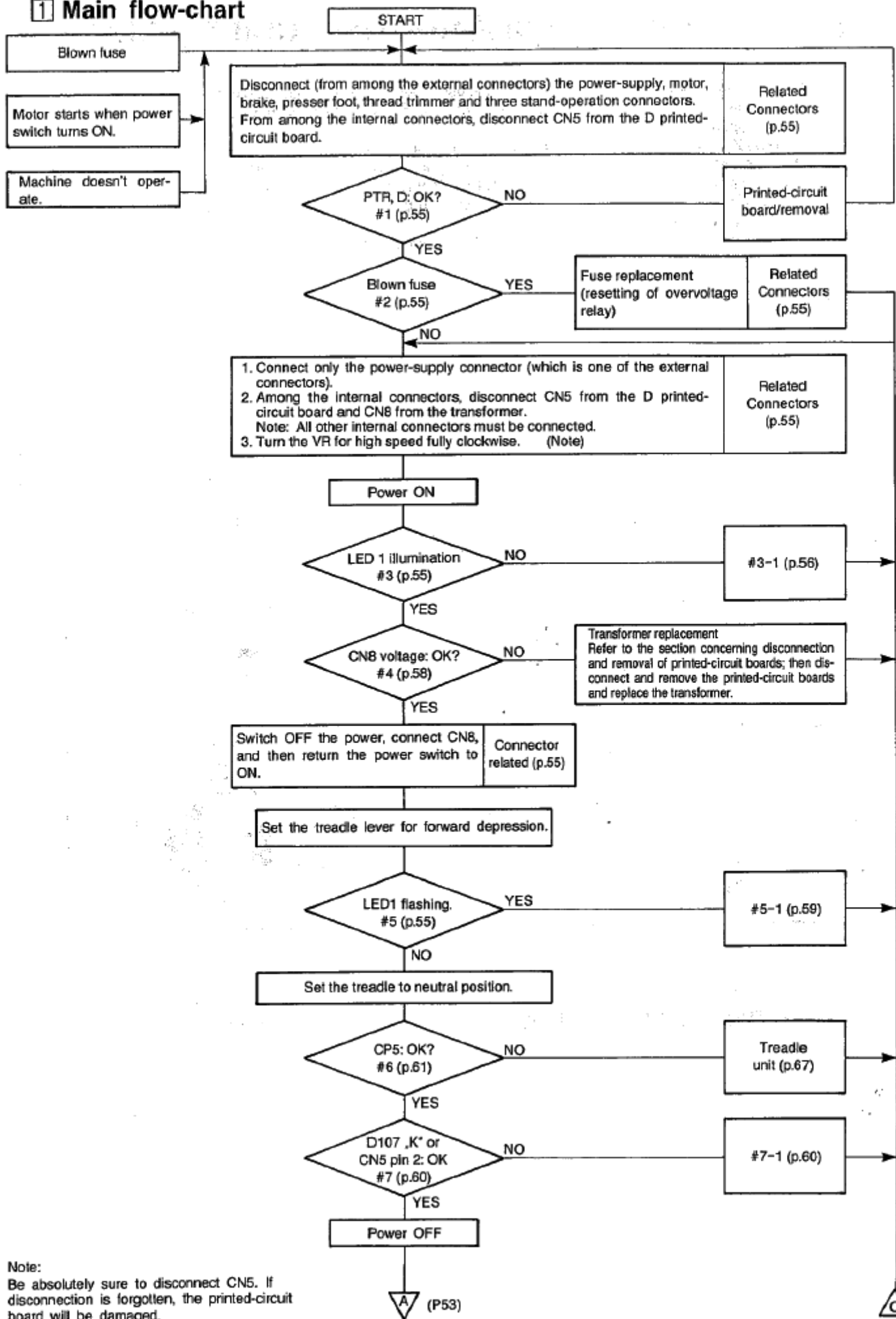
PROBLEM	CHECK METHOD	REPLACEMENT PART
1. Motor won't operate. Lamp does not illuminate when power is ON. (Fuse has blown.)	(1) Fuse is replaced and fails again.	D printed-circuit board PTR, D (if PTR is broken then motor frame assembly.)
	(2) Operation possible after fuse replacement.	Due to operation of overvoltage protection circuit; no abnormal condition.
2. Motor won't operate. Lamp illuminates when power is ON.	(1) LED flashes during forward back-tack.	Treadle printed-circuit board tantalum C1, HIC5
	(2) Motor roars or hums.	CPU, brake TR 1
	(3) Others	HIC1, HIC2, HIC6
3. Machine abnormal high-speed rotation when power is ON.		HIC4, HIC5, HIC6 D printed-circuit board PTR (single-phase 110V)
4. When power is ON: Thread trimmer continues. Reverse continues. Brake remains ON. All continue.		Thread trimmer TR2 Reverse TR5 Brake TR1 CPU HIC2
5. With treadle forward, excessive high speed; will not stop.		HIC6
6. With treadle depressed to maximum, high-speed rotation changes. (High-speed rotational irregularity)		Poor soldering of treadle printed-circuit board. HIC6
7. During speed reduction from high speed, brake doesn't function, or great deviation of needle (lower) stopping position.		HIC3

CONTROL BOX TROUBLESHOOTING GUIDE DETAILS

- (1) For other than the control box, it is particularly important to use products of confirmed good quality.
- (2) Do not use an extension cord for the motor's 6-pin cord. Extension cords can be used, however, for other cords.
- (3) About the power supply of the PCB BPD600.
 - The PCB BPD600 is divided into three power-supply groups (part A, part B and part C).
 - Although part A (0V group) is insulated at the transformer, part B (0BV group) and part C (0CV group) are high-voltage circuits (primary side voltage) due to the CN5 and CN4 connections, and so are dangerous.
 - For that reason, it is extremely important, before checking part B (0BV group) and part C (0CV group), to be absolutely sure to first disconnect CN5 and CN4.Also disconnect the motor connector (which is among the external connectors).



1 Main flow-chart



Note:
Be absolutely sure to disconnect CN5. If disconnection is forgotten, the printed-circuit board will be damaged.

A

Caution (p.63)

- | | |
|---|---------------------------|
| 1. Connect all connectors except the operation box.
2. Three printed-circuit board switches: needle position switch: lower; correction switch: OFF; slow-start switch: OFF.
3. Turn the high-speed VR fully counterclockwise. | Related Connectors (p.55) |
|---|---------------------------|

Power ON.

Motor starts.

YES

Return to "START" (p.52)

NO

Wiper operates. #100

YES

#100-1 (p.64)

NO

Thread trimmer operates. #101

YES

#101-1 (p.64)

NO

Reverse operates. #102

YES

#102-1 (p.65)

NO

Brake sound #103

NO

#103-1 (p.65)

YES

Machine pulley is light. #103

NO

YES

Treadle lever depressed forward.

LED 1 blinks?

YES

Return to "START" (p.52)

NO

Operation at high speed. #104

YES

#104-1 (p.66)

NO

Operation at low speed.

NO

Return to "START" (p.52)

YES

Have #3-#7 adjustments been made?

NO

Return to "START" (p.52)

YES

D printed-circuit board check (p.58)

Low-speed torque: OK #106 (p.66)

NO

YES

Turn high-speed VR fully clockwise.

#106-1 (p.66)

B (P54)

D

Wiper operation with power ON.

Thread trimmer operation with power ON.

Reverser operation with power ON.

Brake ON with power ON.

Motor roars or hums during forward backtack.

LED blinking during forward backtack.

Abnormal high speed while depressed forward.

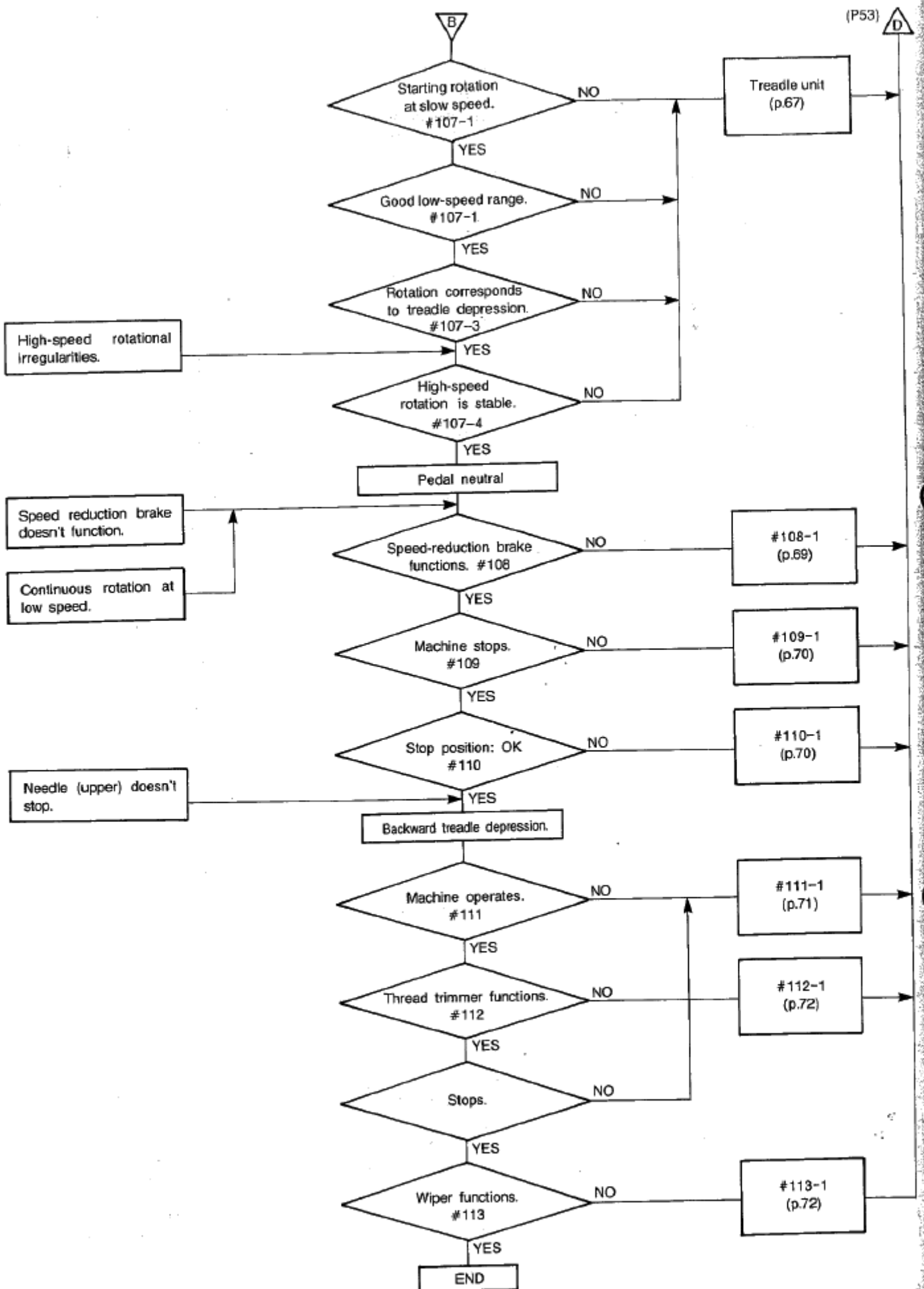
Pedal one-stitch sewing difficult.

Sometimes not thread trimming.

Deviation of needle (lower) and needle (upper) stopping.

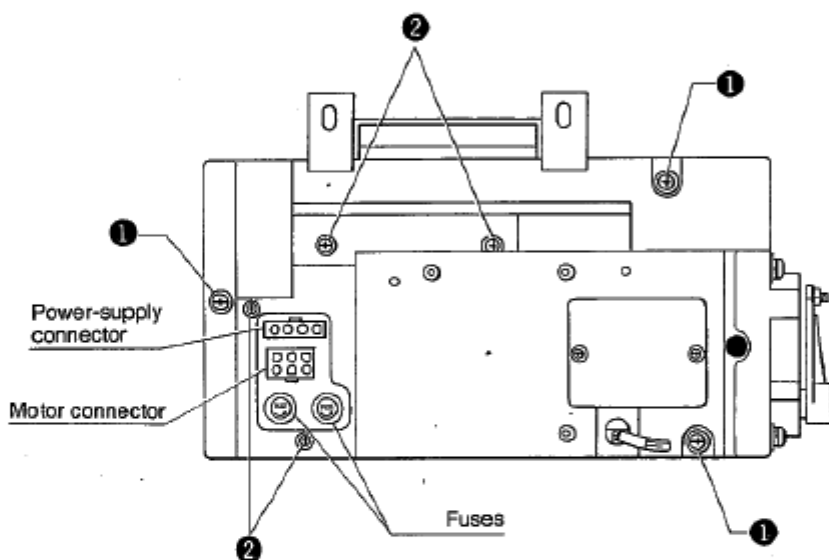
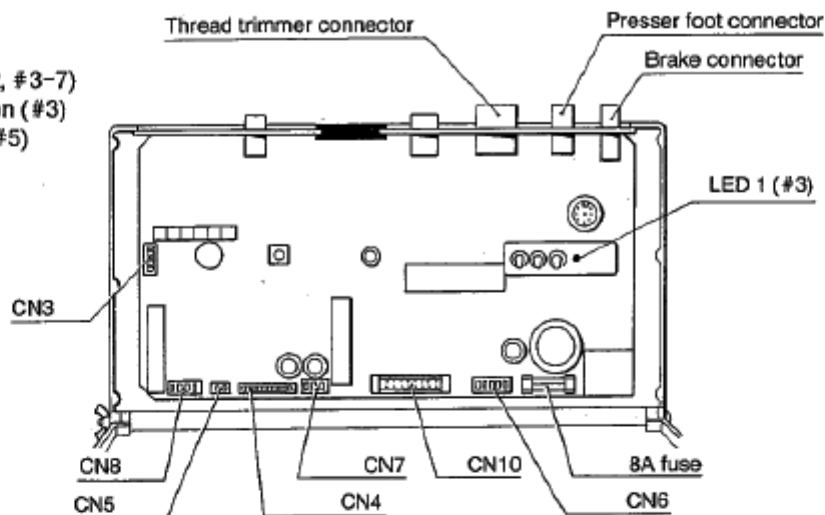
High speed OK, but no low speed.

Pedal low-speed range is limited.



2 Connector related

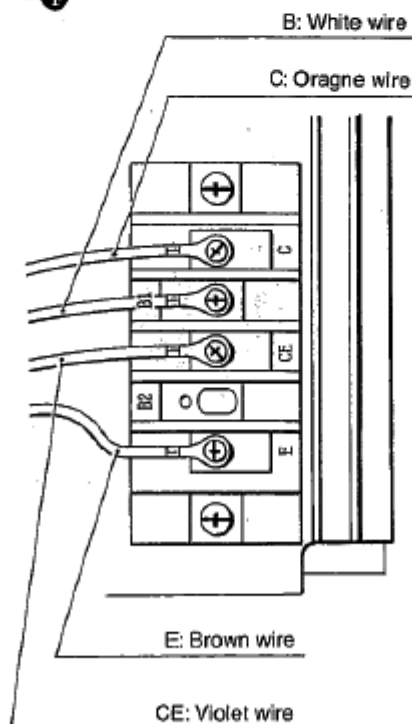
- Fuse failure (#2, #3-7)
- LED 1 illumination (#3)
- LED 1 flashing (#5)



PTR, D: OK #1

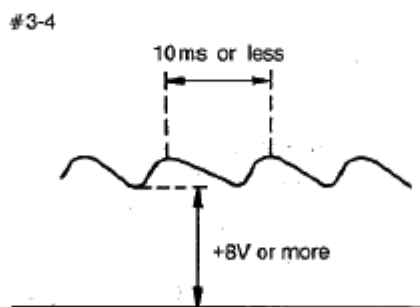
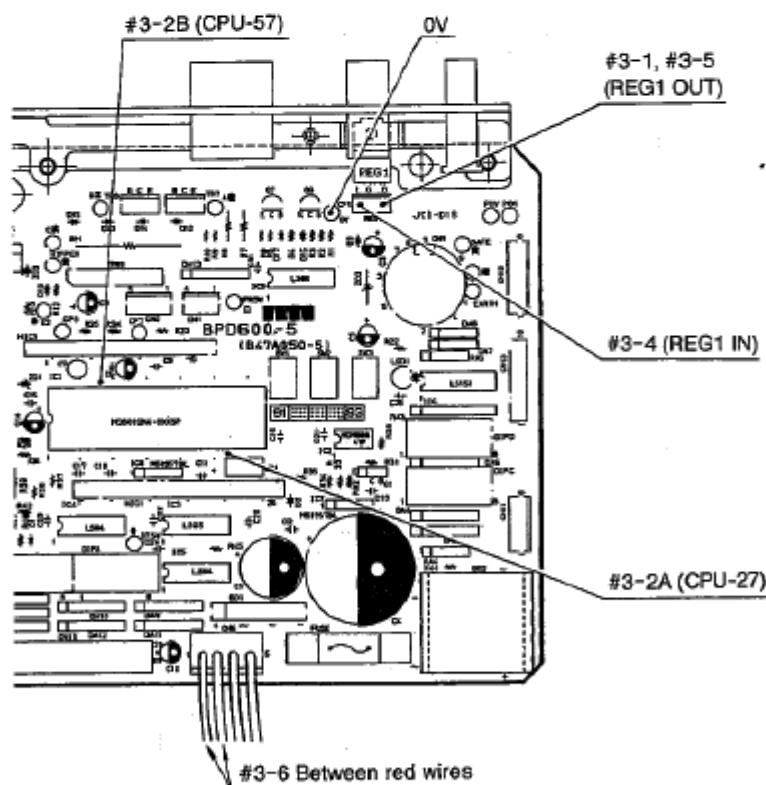
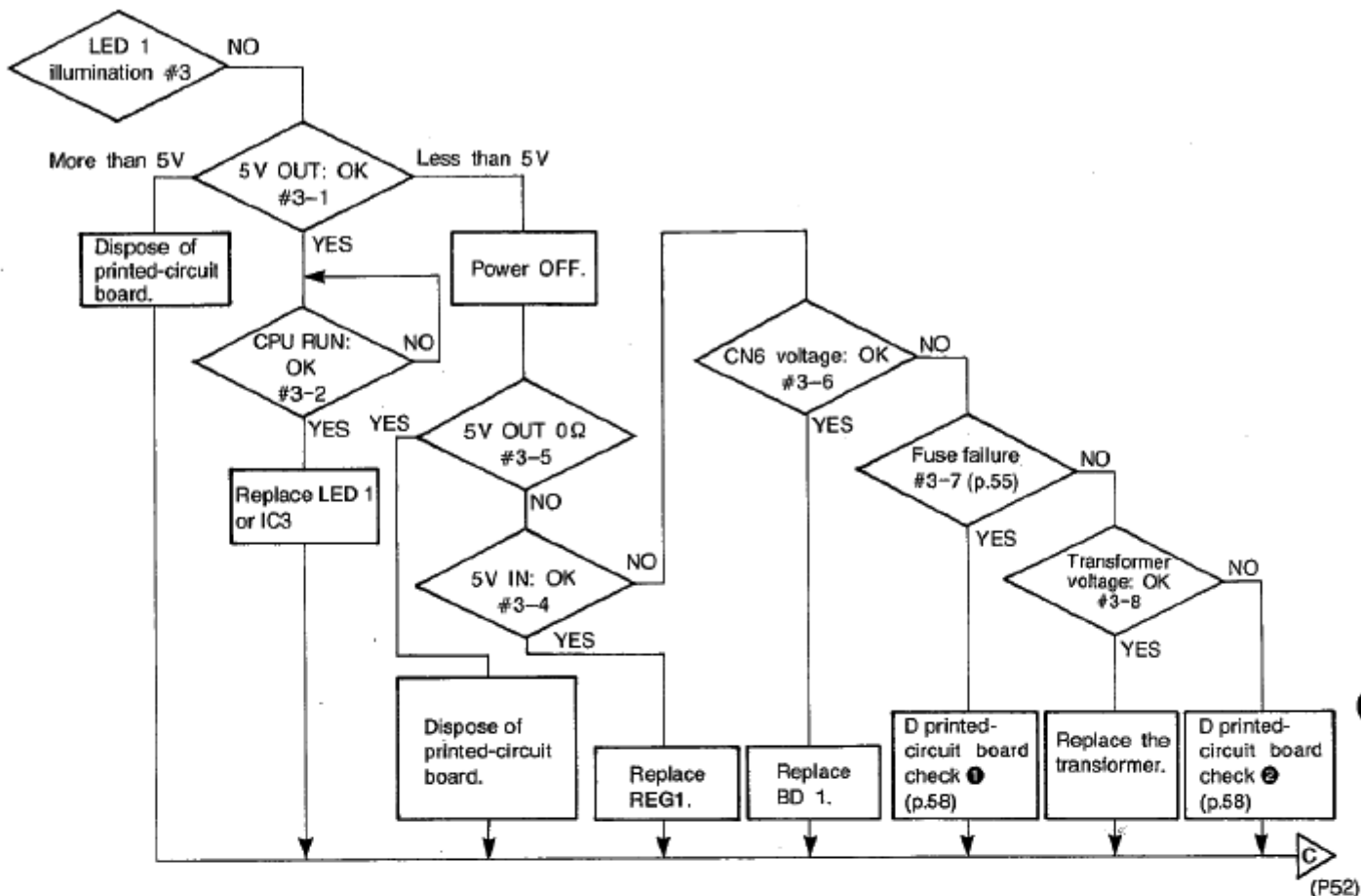
TRM check methods

1. Remove the three M5 screws ① and four M4 screws ②.
2. Set the tester to the X 1Ω range (0 ohm adjustment).
3. PTR continuity test
Between TRM C (orange wire) and CE (violet wire).
Should not be 0 ohms in both directions.
4. D continuity test
Between CE (violet wire) and E (brown wire).
Should not be 0 ohms in both directions.



Note:

If the TRM is damaged, replace the frame assembly of the motor used together with the control box. (The motor torque becomes weak and all rotation speeds become higher.)

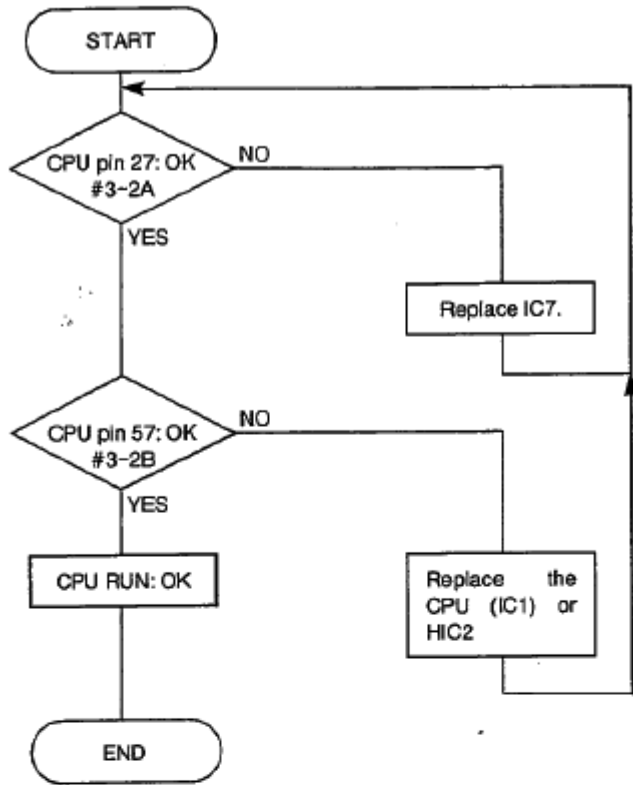


#3 related

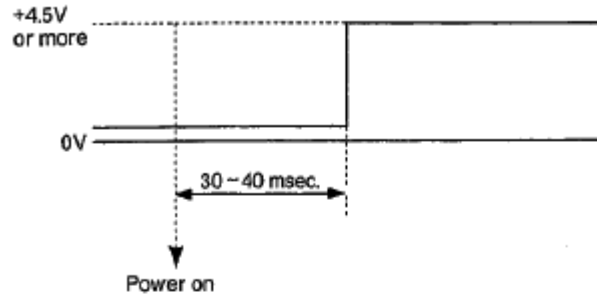
0V: Check pin 0V

5V OUT: OK #3-1	CPU RUN: OK CPU pin 27 #3-2A	CPU RUN: OK CPU pin 57 #3-2B	5V IN: OK #3-4	5V OUT: 0Ω #3-5	CN6 voltage: OK #3-6	Transformer primary voltage: OK #3-8
REG1 OUT +5±0.5V	Refer to figure P57.	Refer to figure P57.	REG1 IN Refer to figure above.	REG1 OUT 0 ohms using X1 range	AC 8V or more between red wires	Rating 10%

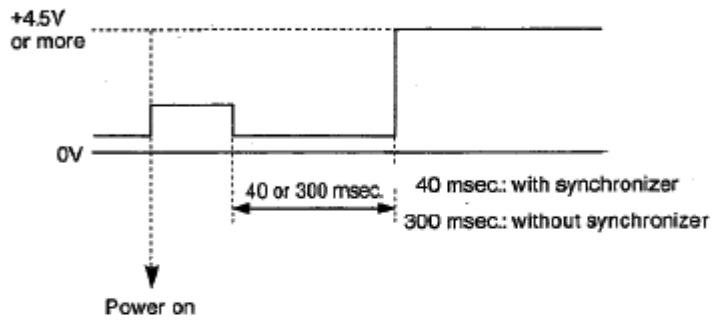
#3-2 CPU RUN: OK



#3-2A CPU pin 27 (reset)

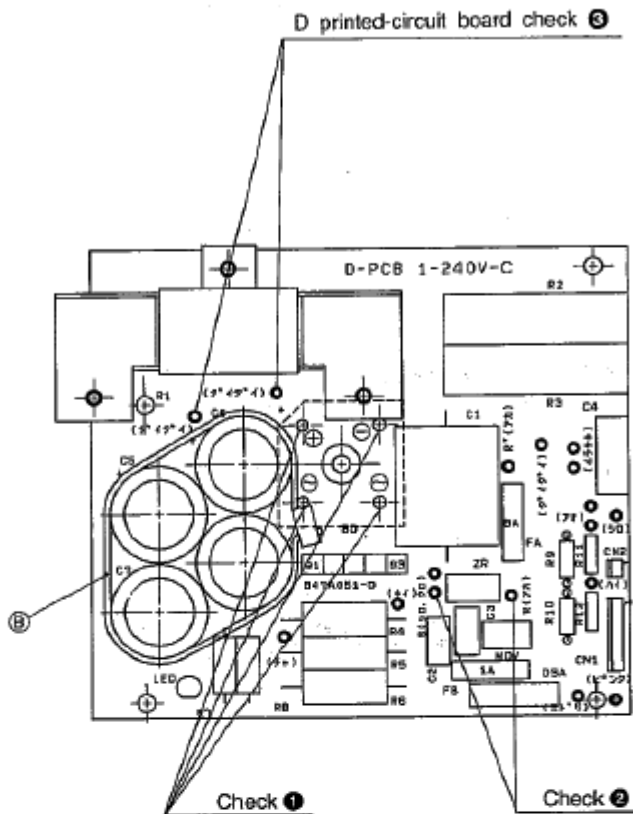


#3-2B CPU pin 57 (brake out)



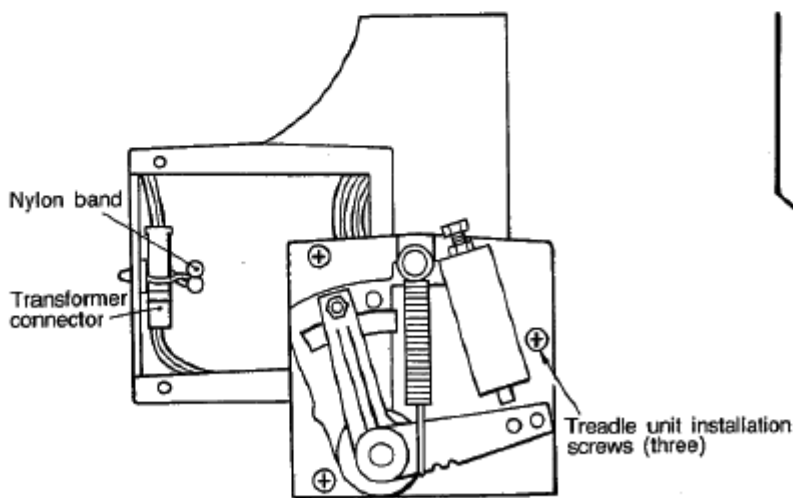
3 D printed-circuit board (Don't touch PCB while LED is illuminated.)

D printed-circuit board 1-110V assembly
1-240V assembly



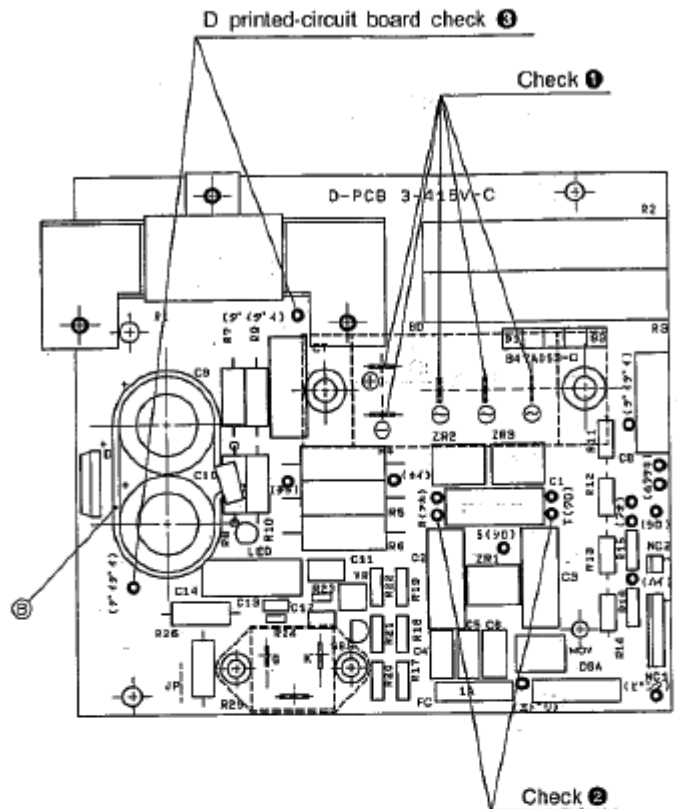
- D printed-circuit board check 1**
BD ⊕ and each ⊖, ⊖ and each ⊖ both directions: must be 0Ω.
- D printed-circuit board check 2**
Is solder of connector lead wiring OK?
- D printed-circuit board check 3**
Between orange wires: must be 0-5Ω

Transformer primary voltage: OK #3-8



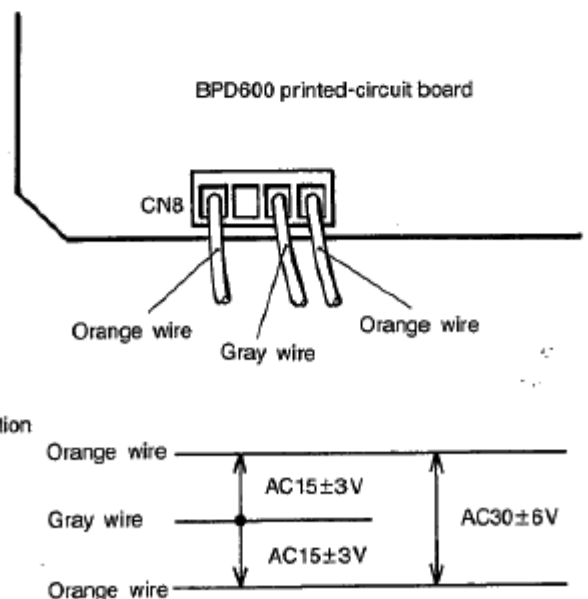
- (1) Remove the three treadle unit installation screws.
- (2) Disconnect the transformer connector from the nylon band.
- (3) Check the AC voltage of the transformer connector.

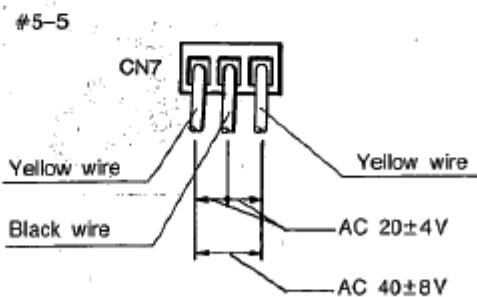
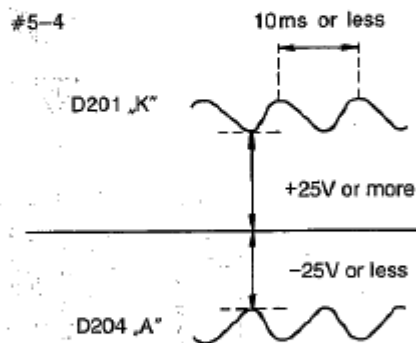
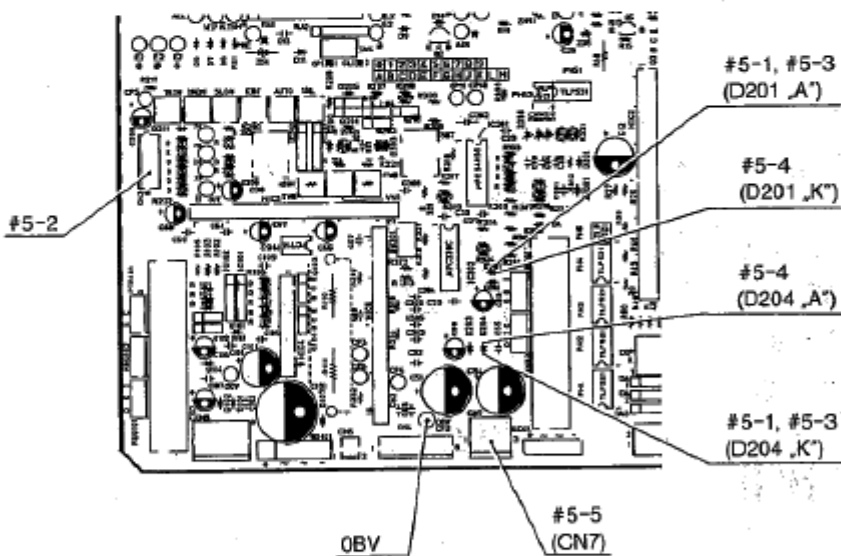
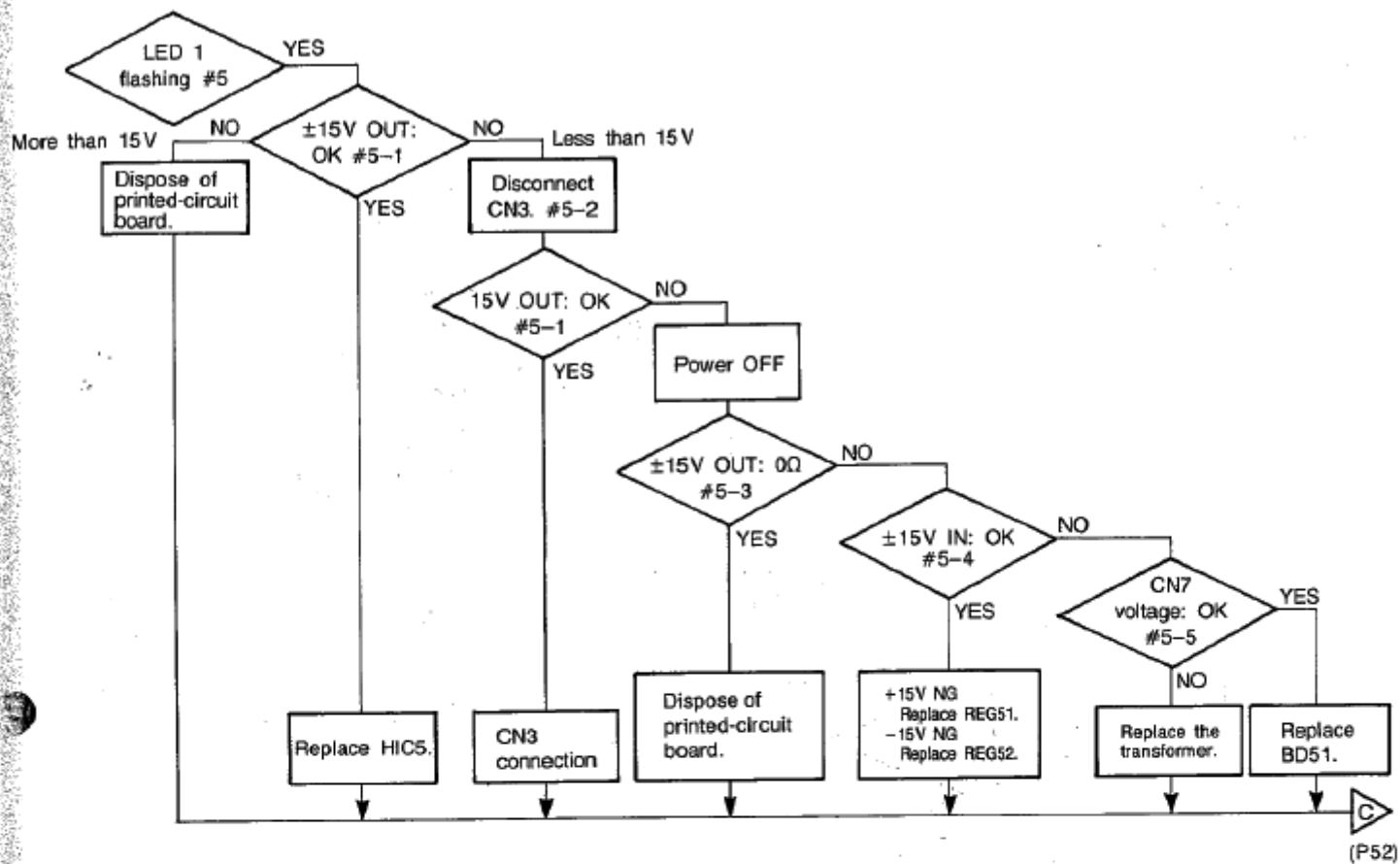
D printed-circuit board 3-240V assembly
3-415V assembly



- D printed-circuit board check 1**
BD ⊕ and each ⊖, ⊖ and each ⊖ both directions: must be 0Ω.
- D printed-circuit board check 2**
Is solder of connector lead wiring OK?
- D printed-circuit board check 3**
Between orange wires: must be 0-5Ω

CN8 voltage: OK #4

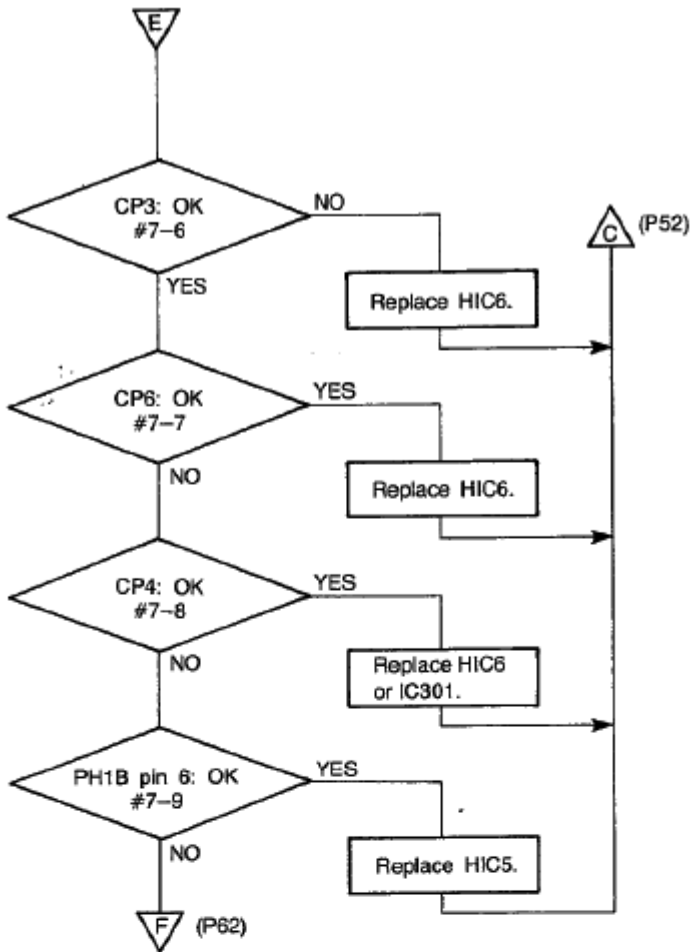




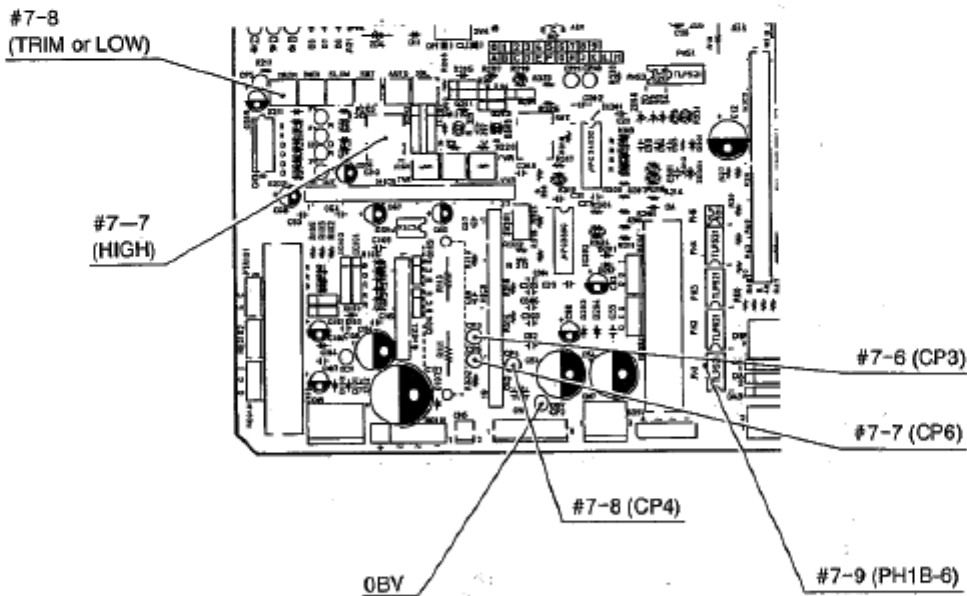
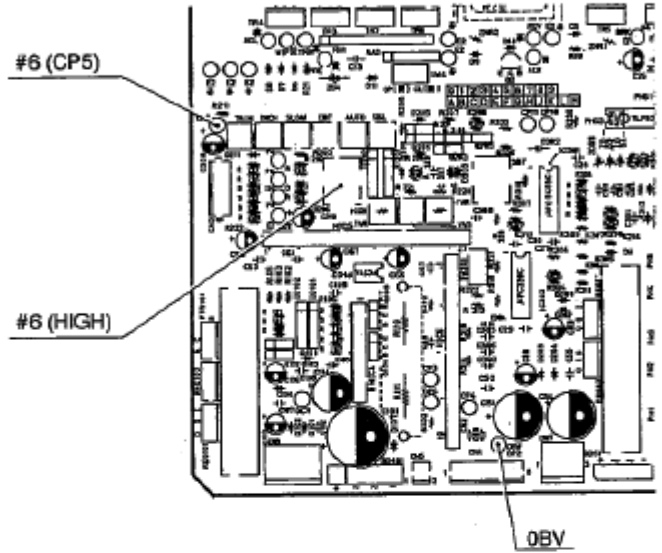
#5 related

0BV: Check pin 0BV (CP2)

±15V OUT: OK #5-1	±15V OUT: 0Ω #5-3	±15V IN: OK #5-4	CN7 voltage: OK #5-5
D201, A' +15±0.5V D204, K' -15±0.5V	D201, A' 0Ω D204, K' 0Ω	Refer to the figure above.	Refer to the figure above.

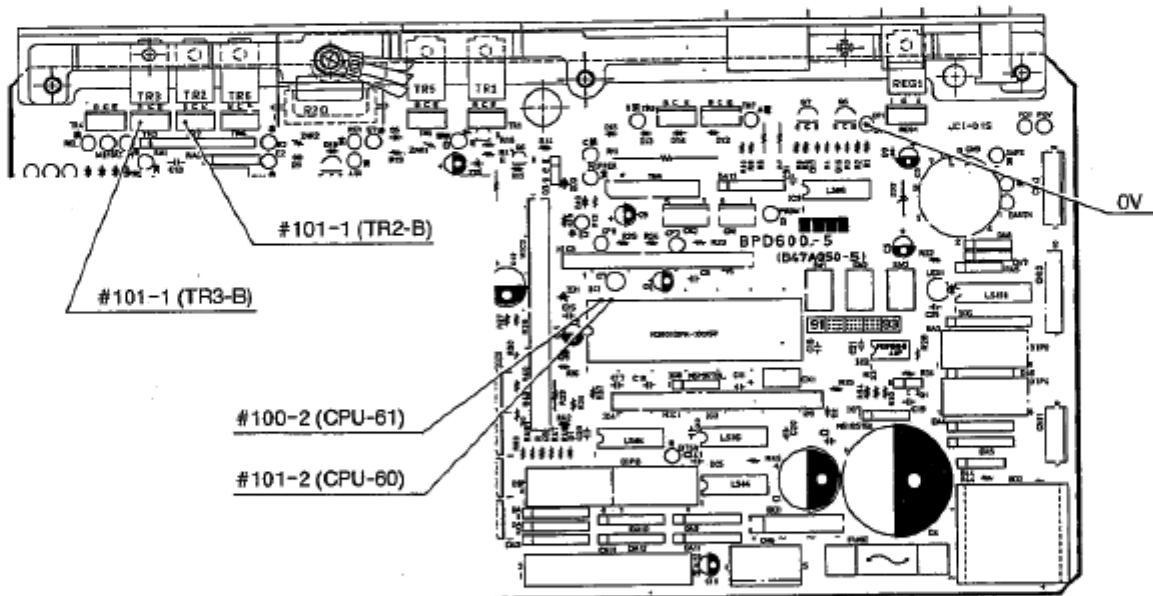
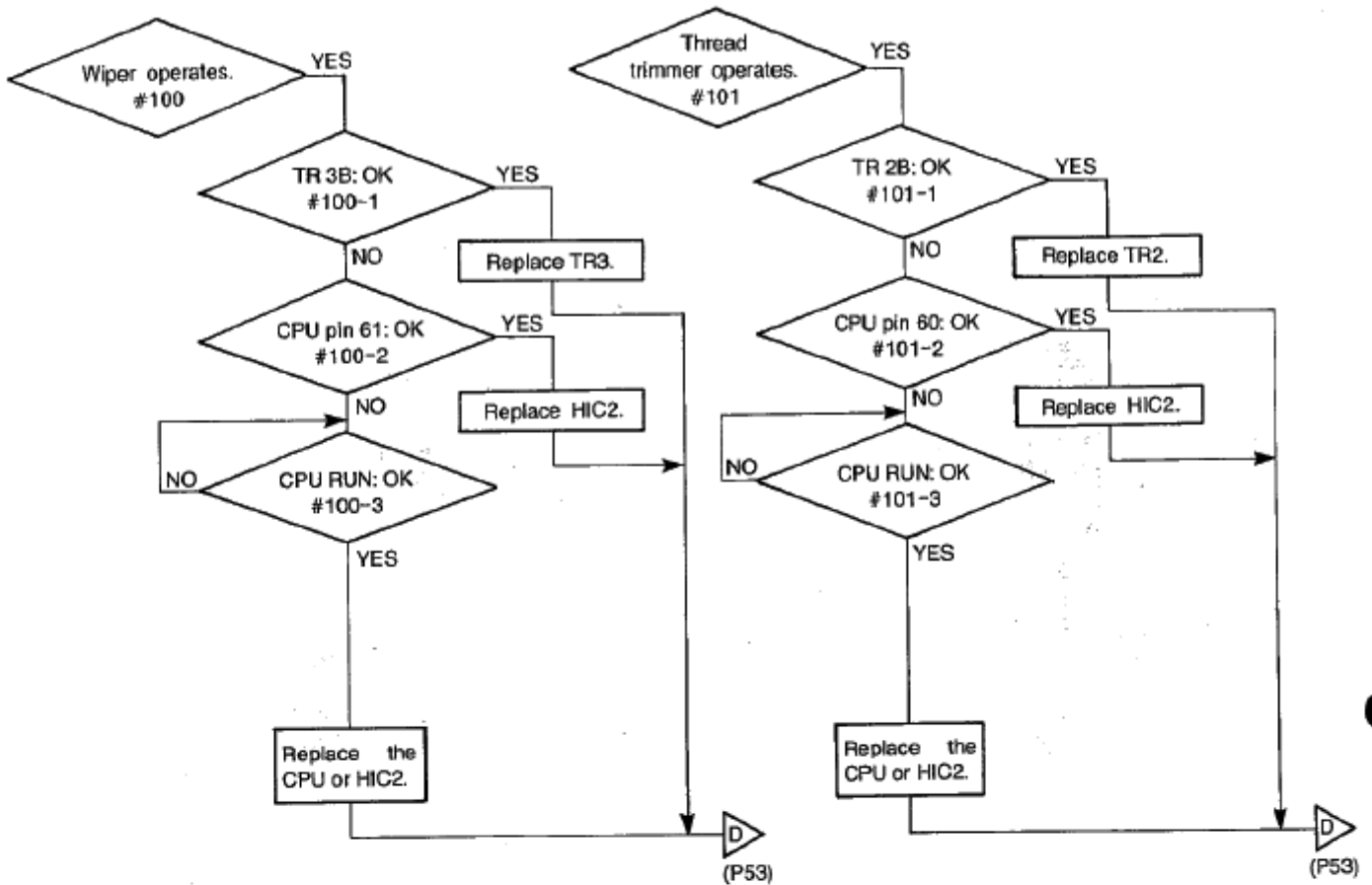


#6 CP5: OK
 0BV: Check pin 0BV (CP2)
 With HIGH VR fully clockwise:
 Treadle neutral: 0V
 Treadle fully forward: 9.0V or more



#7-6—#7-9 related
 0BV: Check pin 0BV (CP2)

	CP3:OK #7-6	CP6: OK #7-7	CP4: OK #7-8	PH1B-pin #7-9
Treadle neutral		HIGH VR must be fully clockwise. +6.5±0.5V	TRIM or LOW VR: at 12:00 position 0~+0.1V	0~+0.1V
Treadle forward		-8±2V	+1.0V or more	+1.0V or more



#100 related

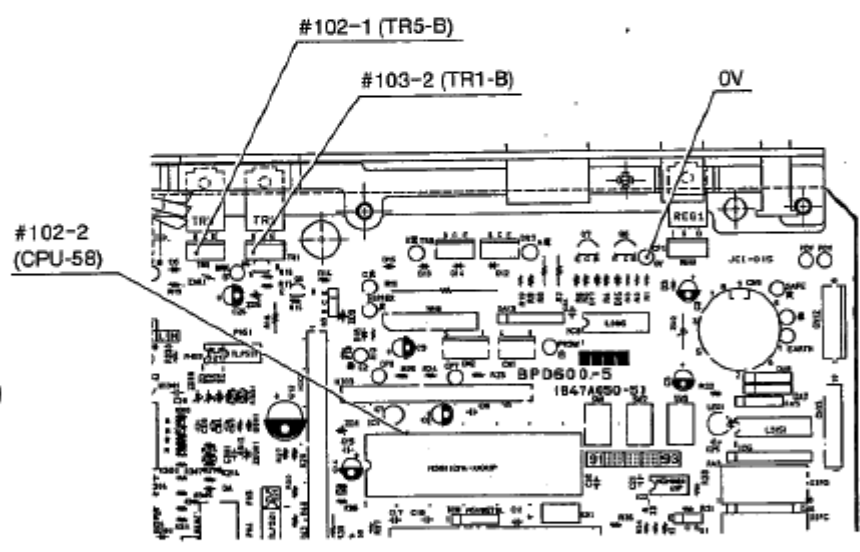
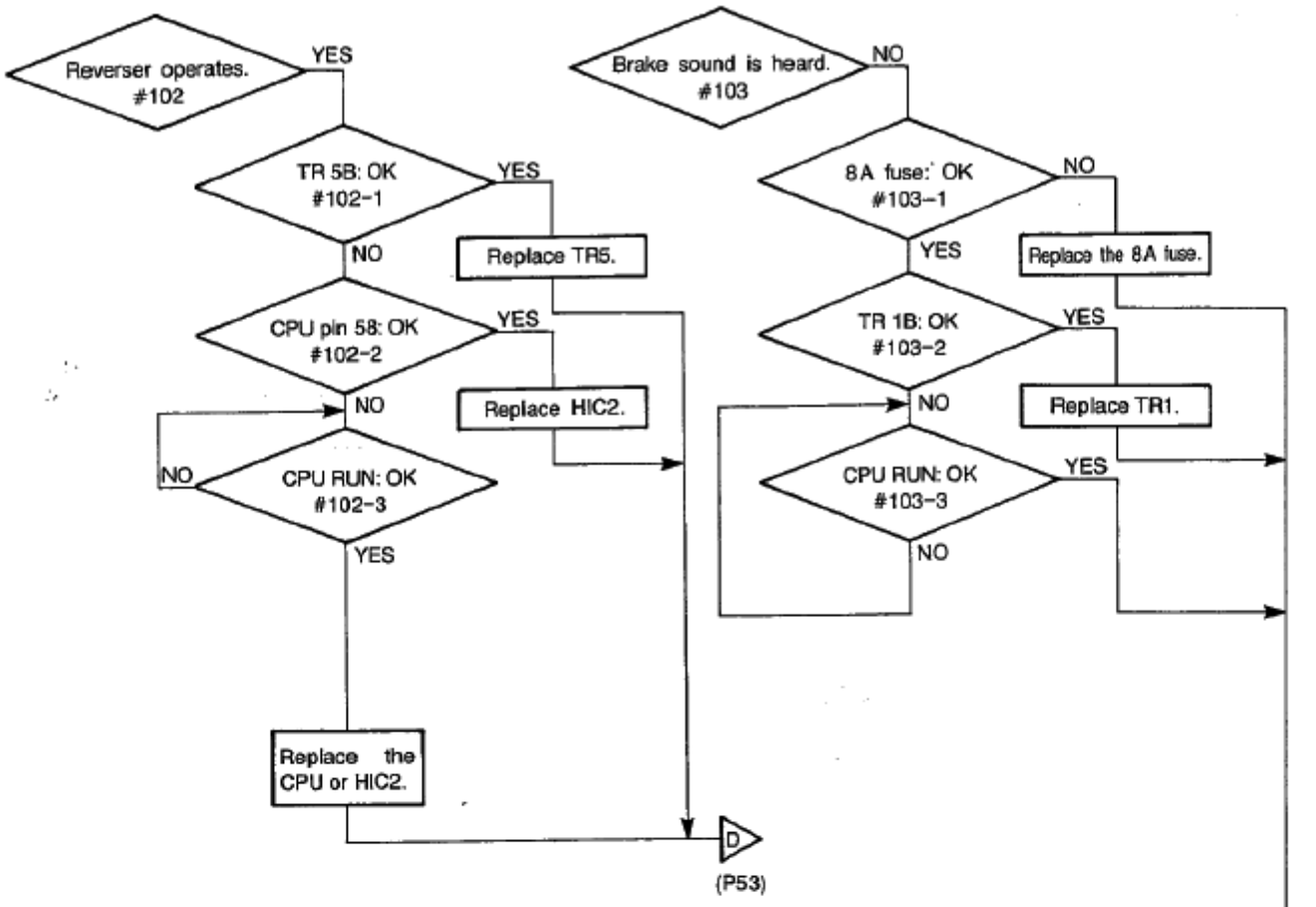
0V: Check pin 0V

TR 3B: OK #100-1	CPU pin 61: OK #100-2	CPU RUN: OK #100-3
Base 1V or less	4.5V or more	Refer to #3-2

#101 related

0V: Check pin 0V

TR 2B: OK #101-1	CPU pin 60: OK #101-2	CPU RUN: OK #101-3
Base 1V or less	4.5V or more	Refer to #3-2



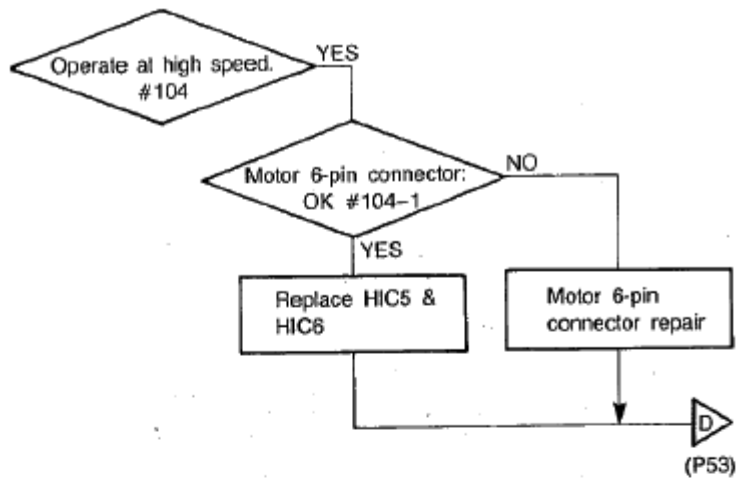
#103-2 When power is ON.
 1V or less — 1.5 ± 0.5V
 Approx. 40ms
 If synchronizer is not connected 300ms.

#102 related
 0V: Check pin 0V

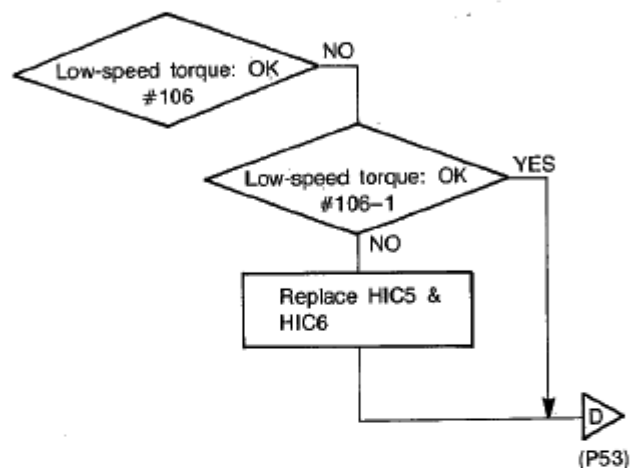
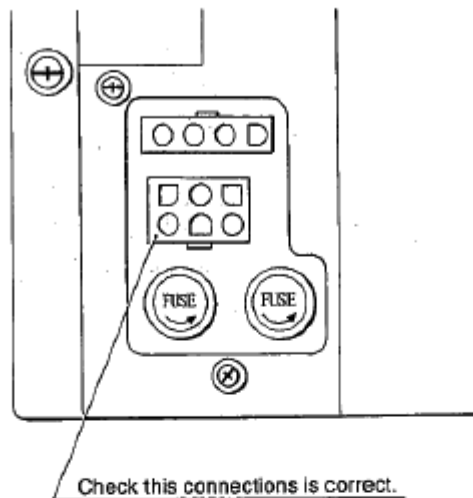
TR 5B: OK #102-1	CPU pin 58: OK #102-2	CPU RUN: OK #102-4
Base 1V or less	4.5V or more	Refer to #3-2

#103 related
 0V: Check pin 0V

TR 1B: OK #103-2	CPU RUN: OK #103-3
Refer to upper right figure.	Refer to #3-2



#104-1 related

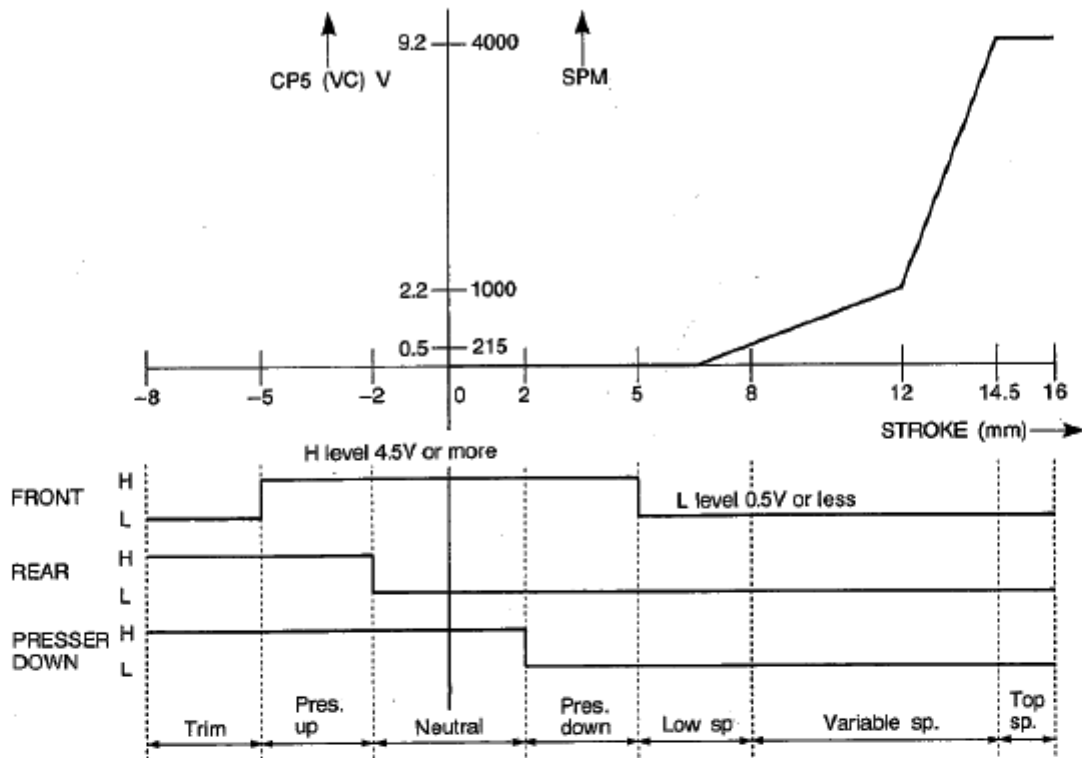


#106, #106-1 related

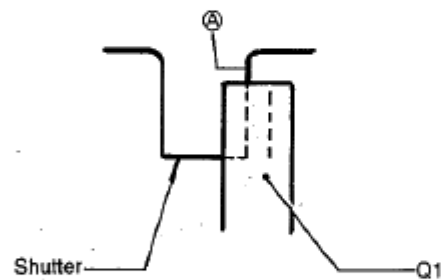
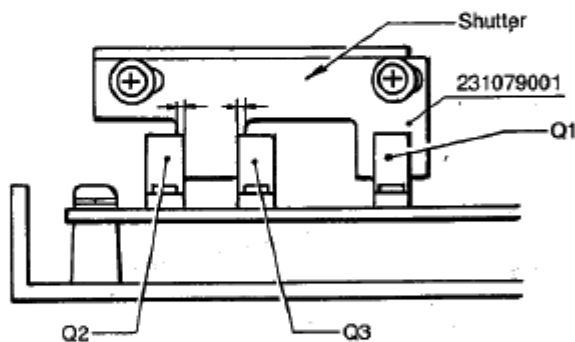
Operate the machine at low speed. Hold the machine pulley and, without "hunting".

Treadle unit

Phot Int & VC chart



Adjustments



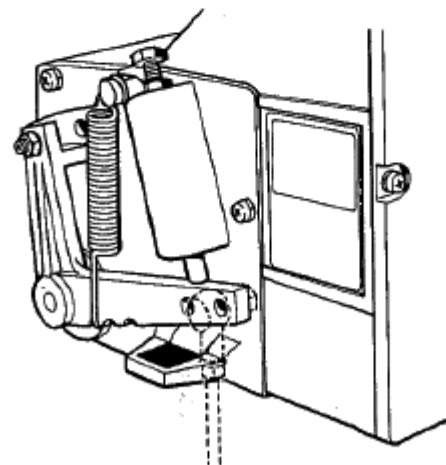
Adjust the shutter position so that it uniformly makes contact with both Q2 and Q3 at neutral.

Note:

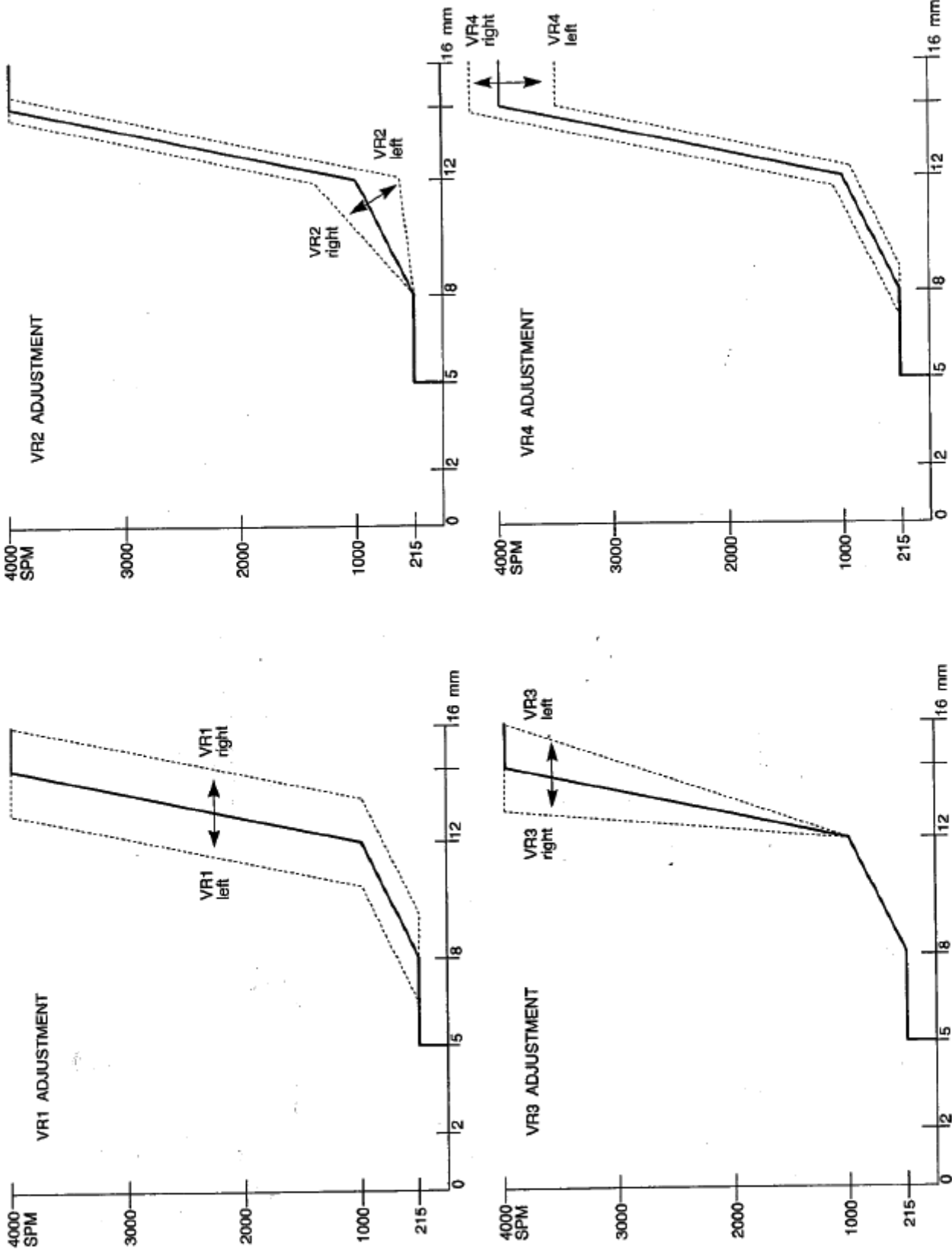
When the treadle is fully depressed, the edge A of the shutter must be within the left 1/3 of Q1.

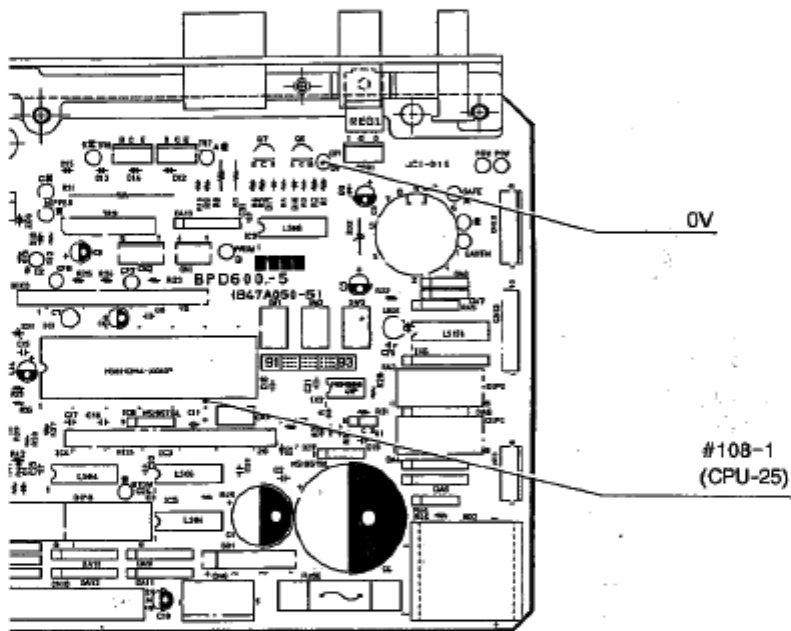
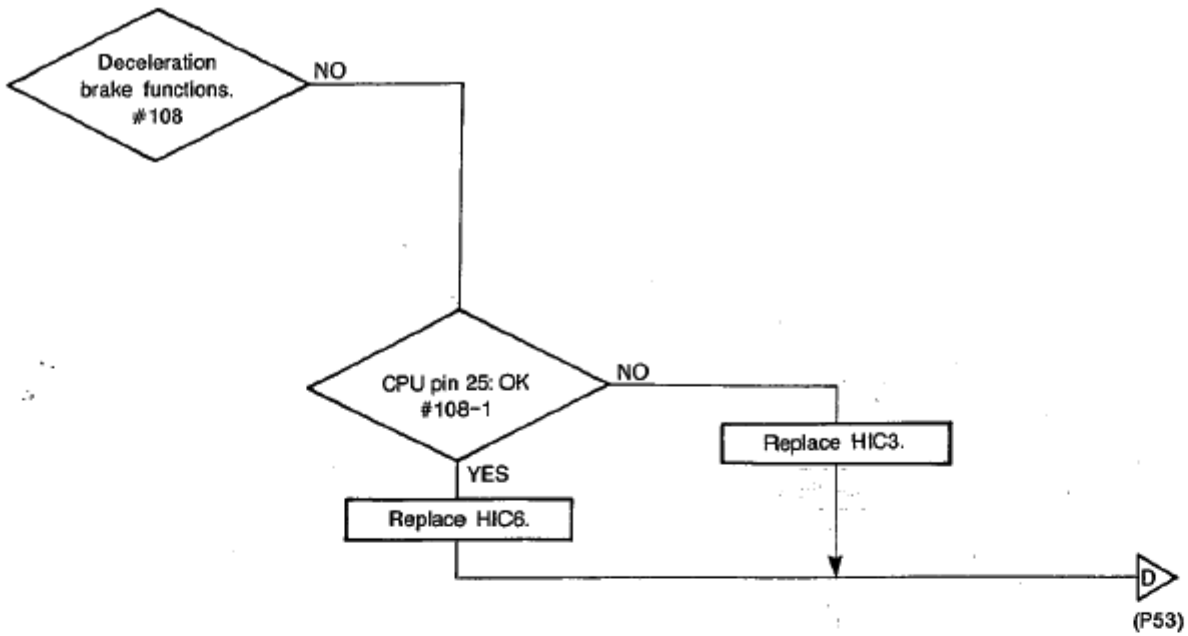
Connector related

- 1) Connect only the power-supply connector of the external connectors.
- 2) For the internal connectors, remove only CN5 from the D printed-circuit board.
- 3) Making the above adjustments will set the machine speed to approximately 4000spm (105 pulley), so, in the condition after the adjustments are completed, use VR3 to set to maximum speed.



VR Adjustment





#108 related
0V: Check pin. 0V

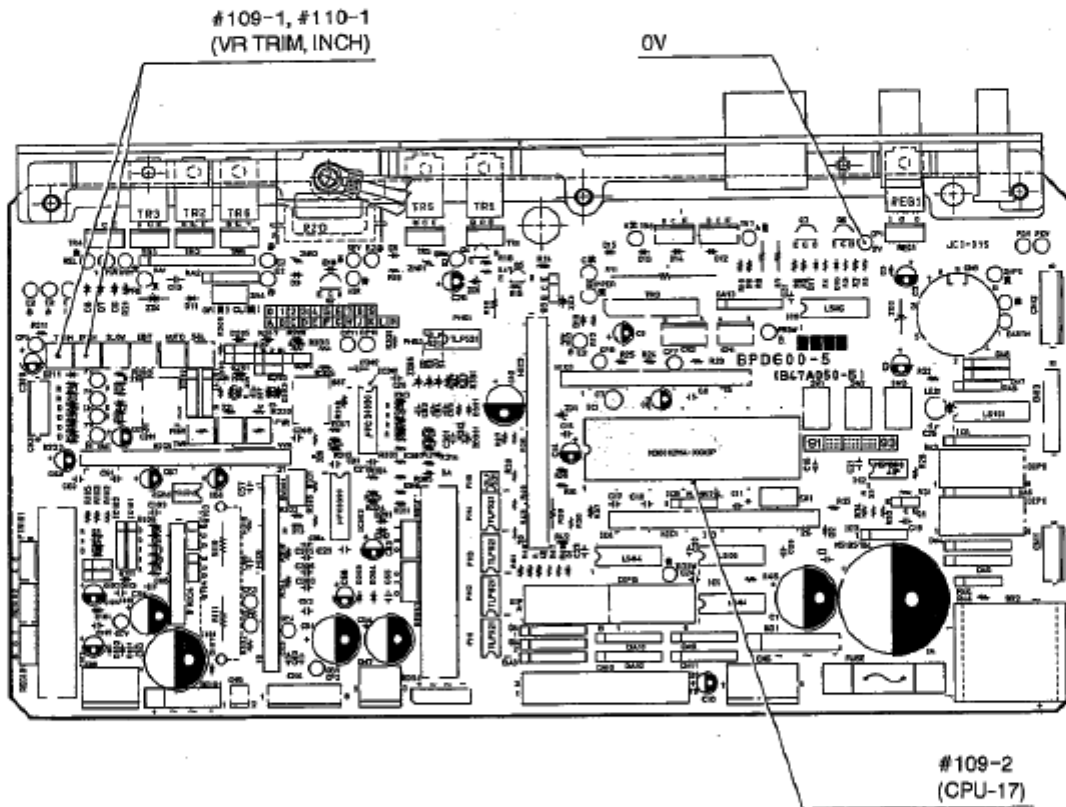
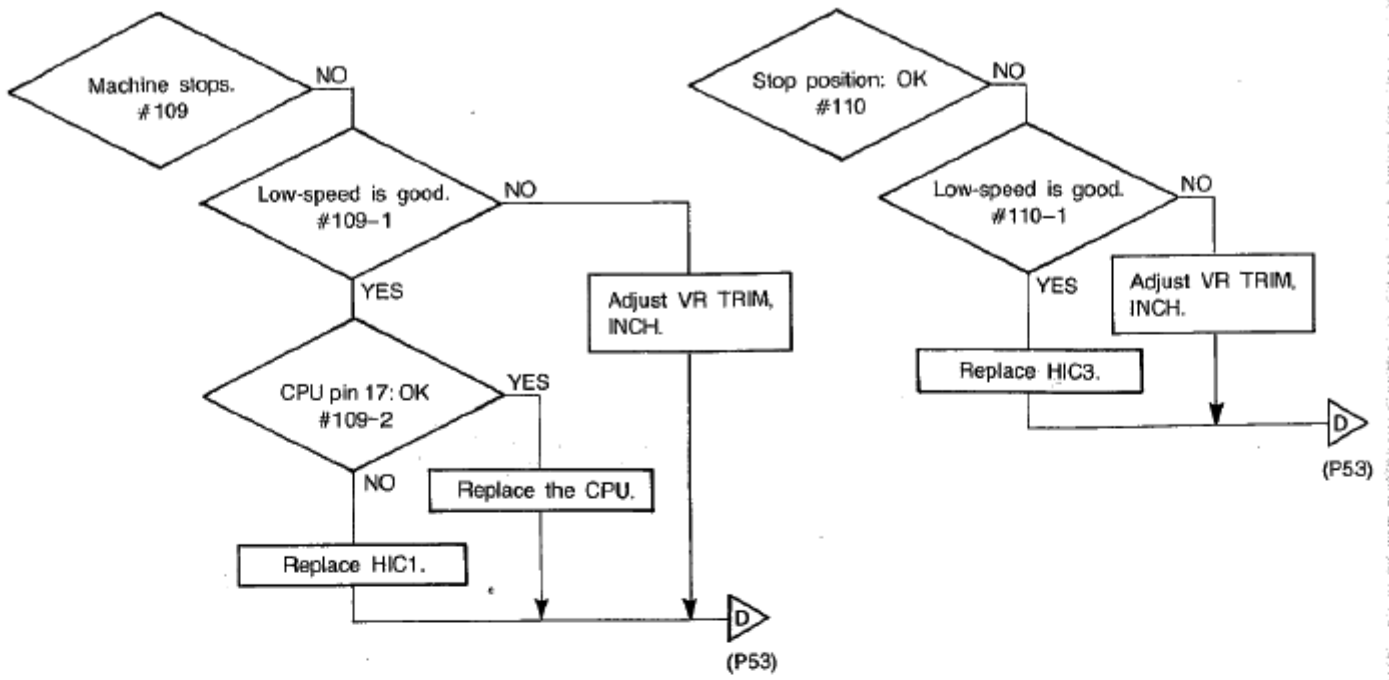
CPU pin 25: OK
#108-1

During high speed



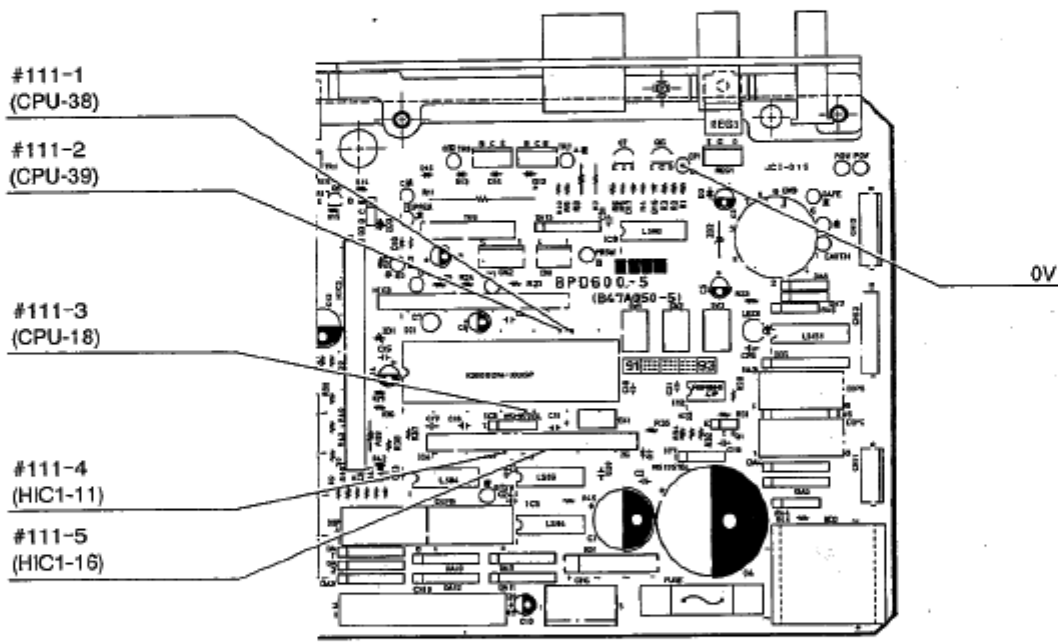
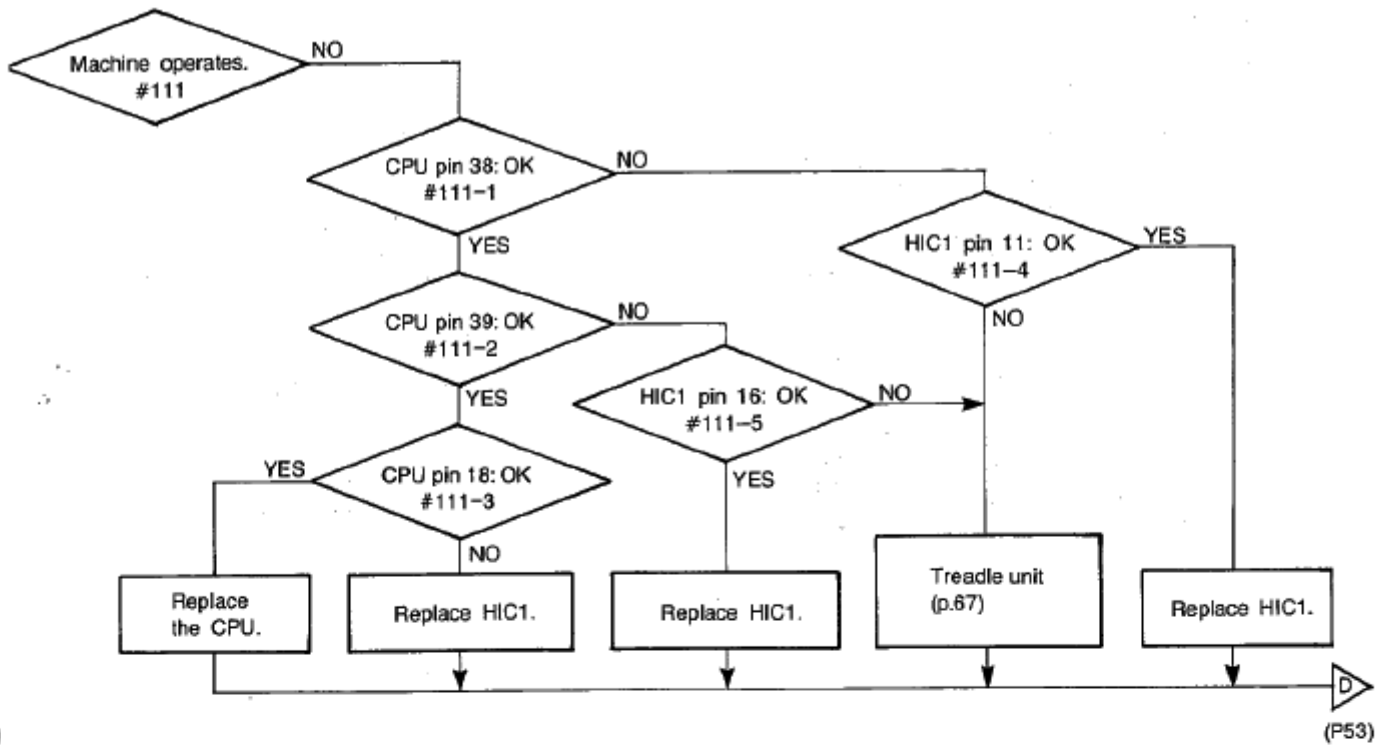
During low speed





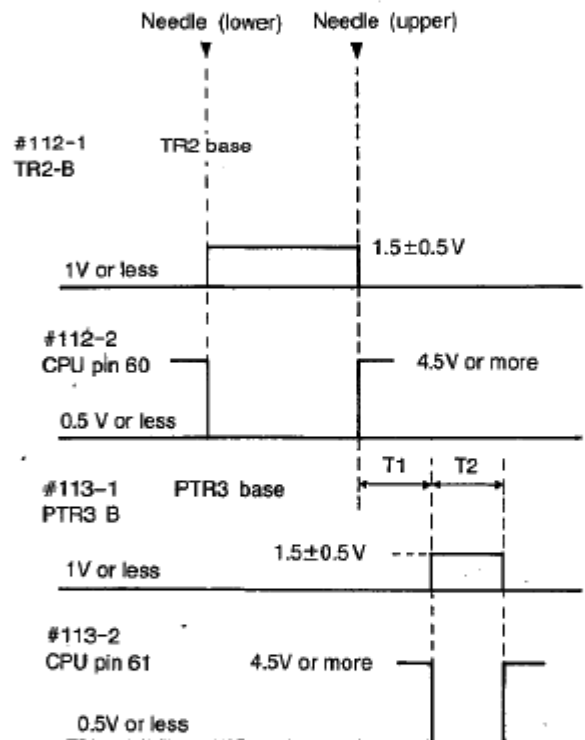
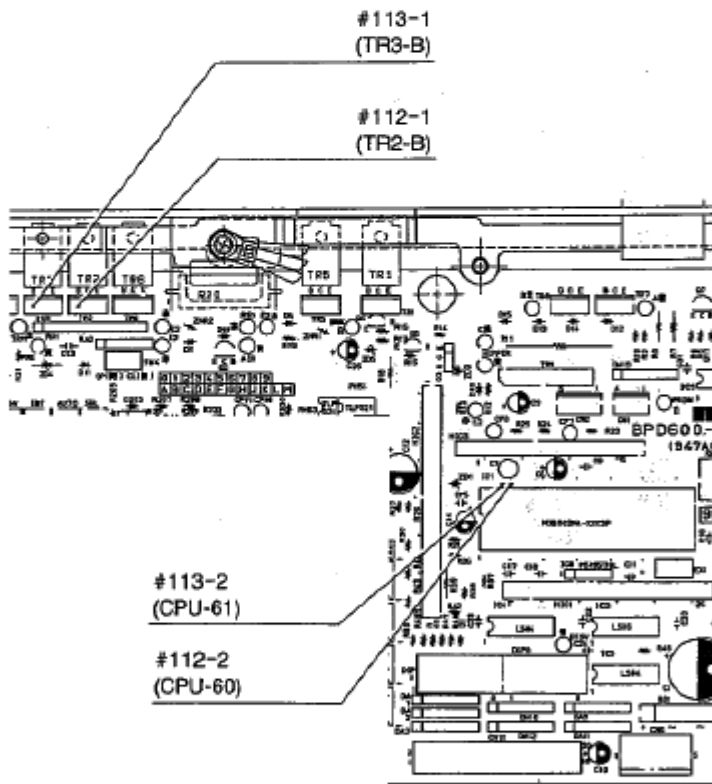
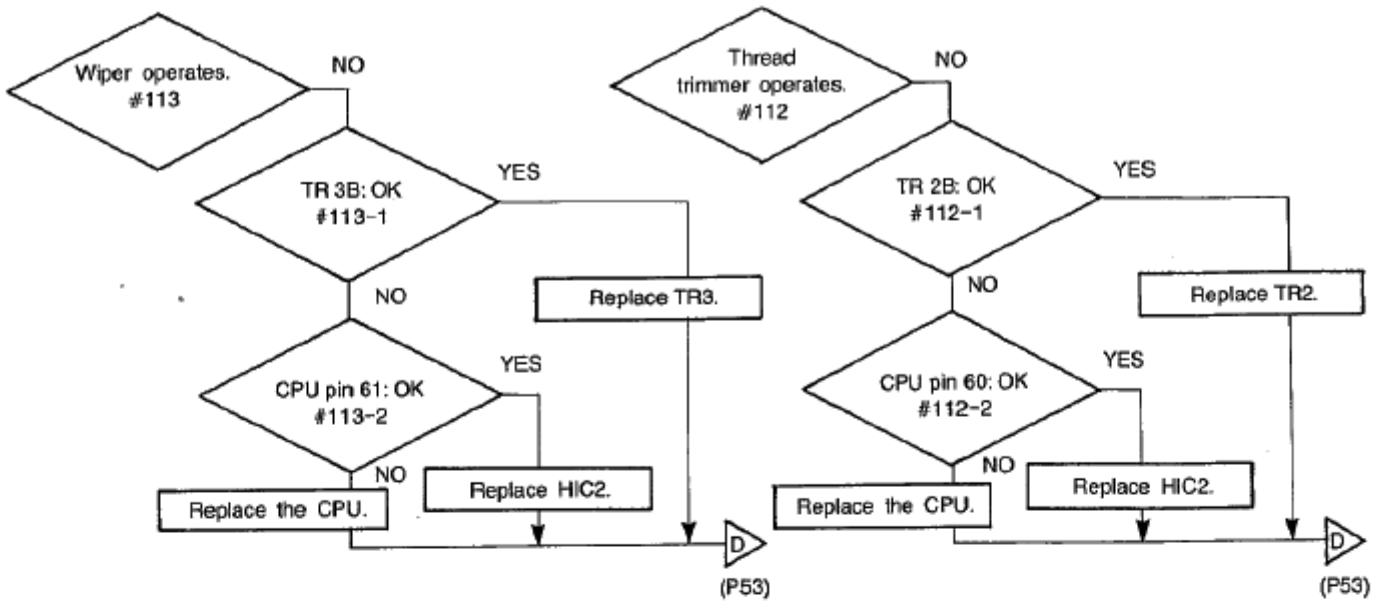
#109, #110 related
0V: Check pin 0V

Low-speed is good. #109-1	CPU pin 17: OK #109-2	Low-speed is good. #110-1
VR TRIM, INCH: 215 ± 10 spm	Needle (lower) position: 0.5V or less Other than needle (lower) position: 4.5V or more	VR TRIM, INCH: 215 ± 10 spm



#111 related
0V: Check pin 0V

CPU pin 38: OK #111-1	CPU pin 39: OK #111-2	CPU pin 18: OK #111-3	HIC1 pin 11: OK #111-4	HIC1 pin 16: OK #111-5
4.5V or more for backward depression	0.5V or less for backward depression	Needle (upper) position: 0.5V or less Other than needle (upper) position: 4.5V or more	4.5V or more for backward depression	0.5V or less for backward depression

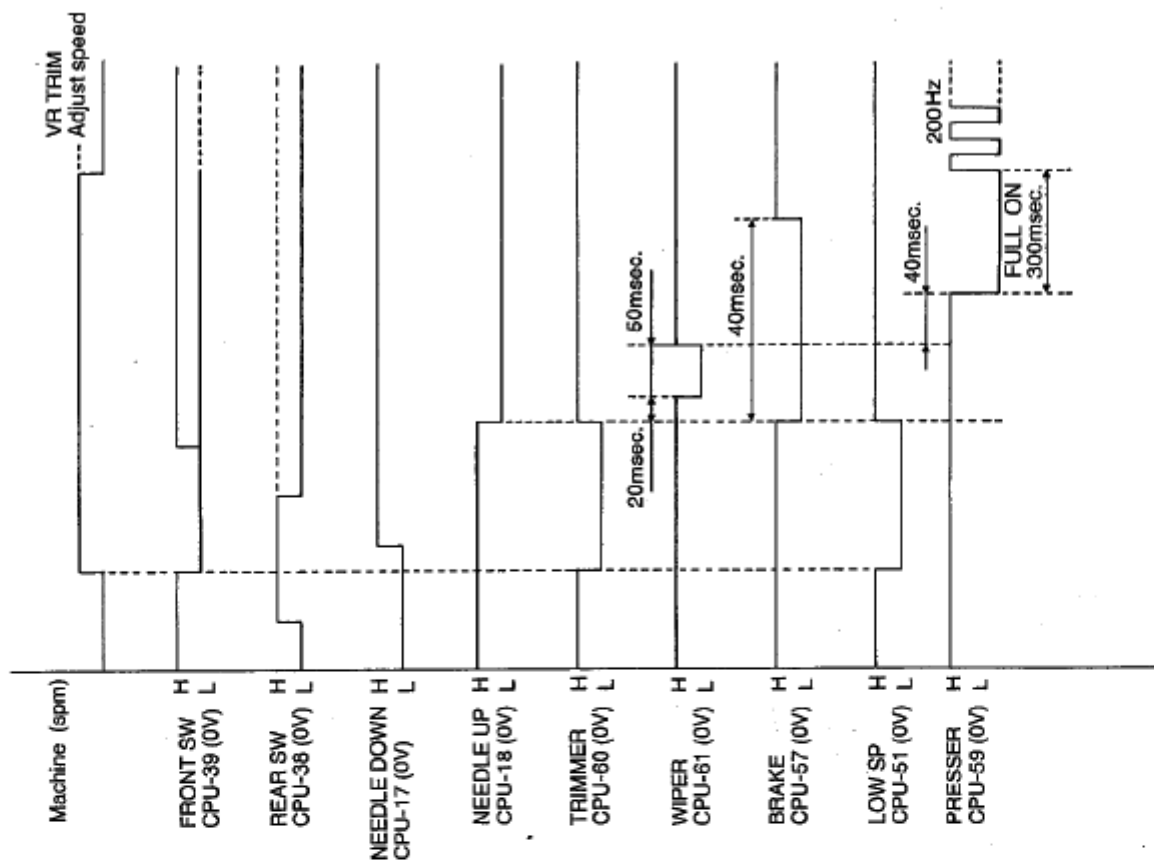


#112, #113 related
0V: Check pin 0V

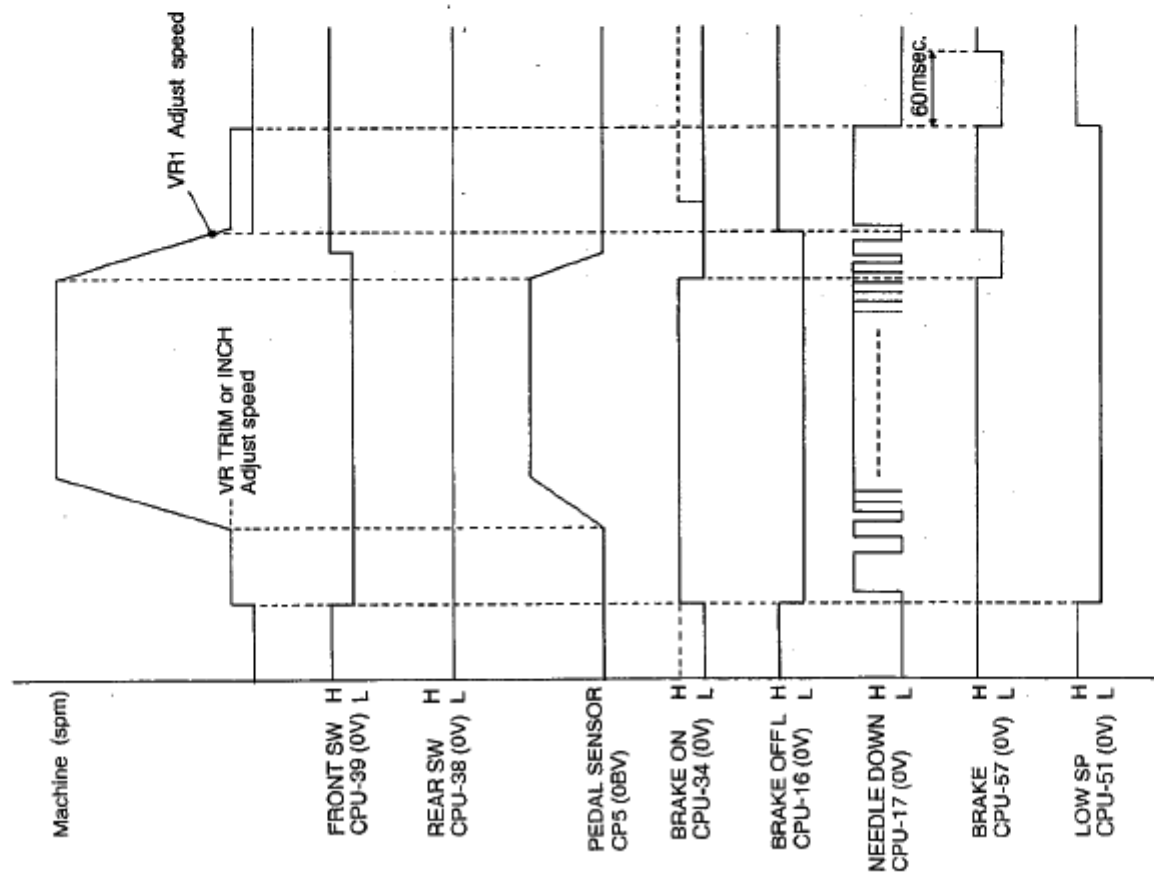
TR 2B: OK #112-1	CPU pin 60: OK #112-2	TR 3B: OK #113-1	CPU pin 61: OK #113-2
Refer to figure above.	Refer to figure above.	Refer to figure above.	Refer to figure above.

TIMING CHART

2 Needle (upper) stop

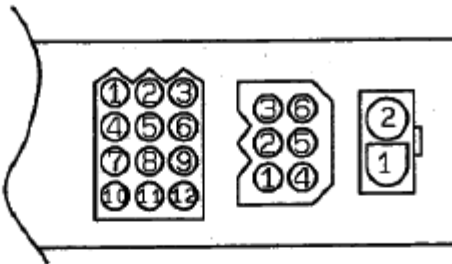


1 Needle (lower) stop



DETAILS OF CONNECTOR PANEL

Model DB2-B737etc.



No	Machine head 12P connector	Presser foot lifter 6P connector	Brake 2P connector
1	Release power	Presser power	Brake power
2	Release output	Presser input	Brake output
3	GND	Option	
4	Thread trimming power	Presser output	
5	Thread trimming output	0V	
6	Not used	GND	
7	Thread wiper power		
8	Thread wiper output		
9	Reverse input		
10	Reverse power		
11	Reverse output		
12	0V		

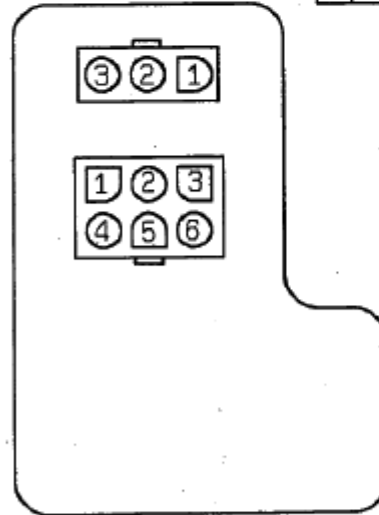
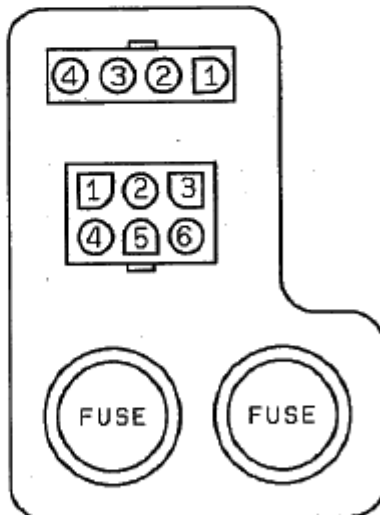
Front face of control box
synchronizer



No	Synchronizer
1	GND
2	DC+5V
3	Needle down pos.
4	0V
5	NO. sync.
6	GND
7	Needle up pos.
8	Encoder pulse

Three phase

Single phase



Fuse
AC200-240V 5A
AC380-415V 3A

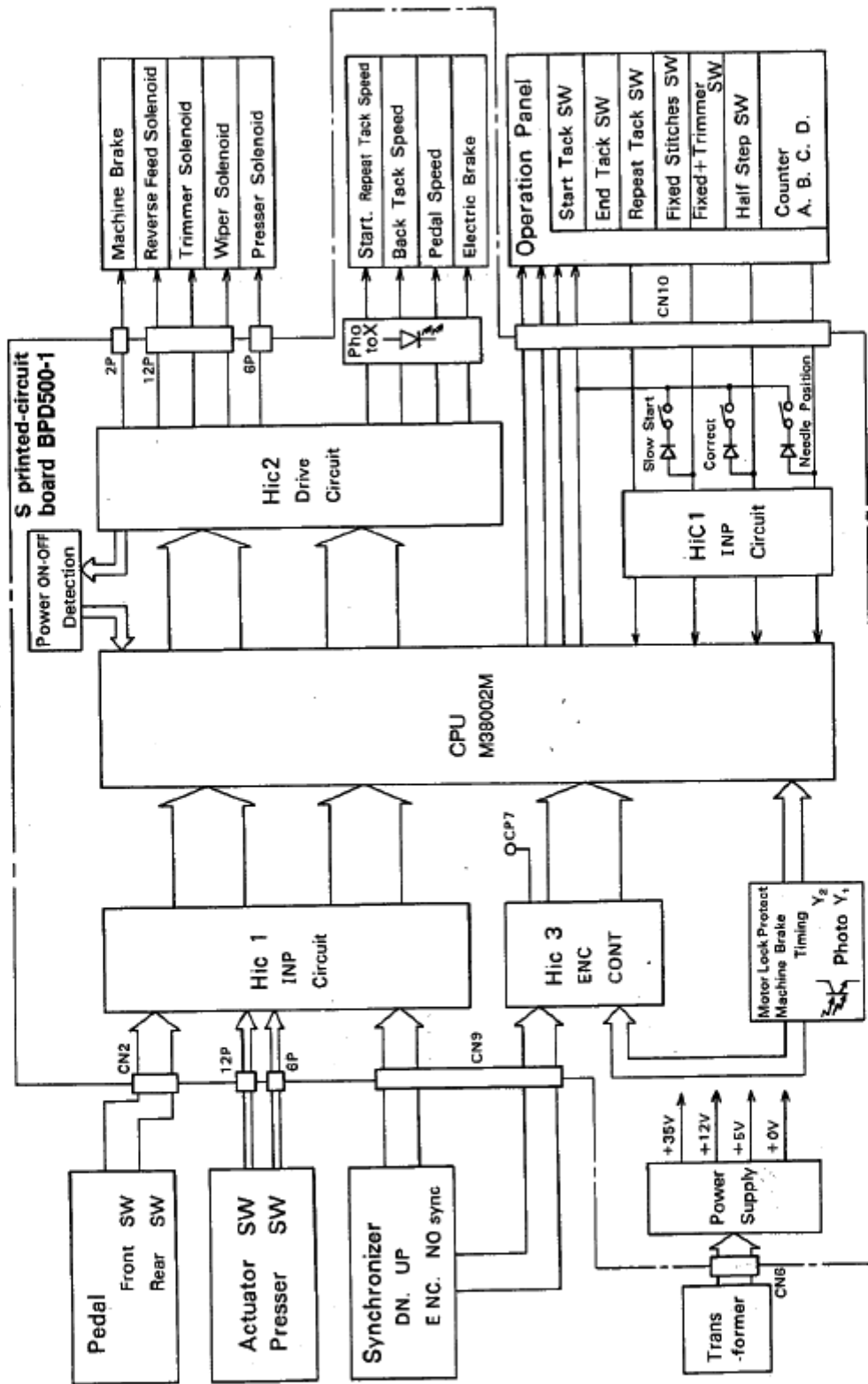
No	Power (3 ϕ) 4P connector
1	GND
2	AC XXX V
3	AC XXX V
4	AC XXX V

No	Power (1 ϕ) 3P connector
1	GND
2	AC XXX V
3	AC XXX V

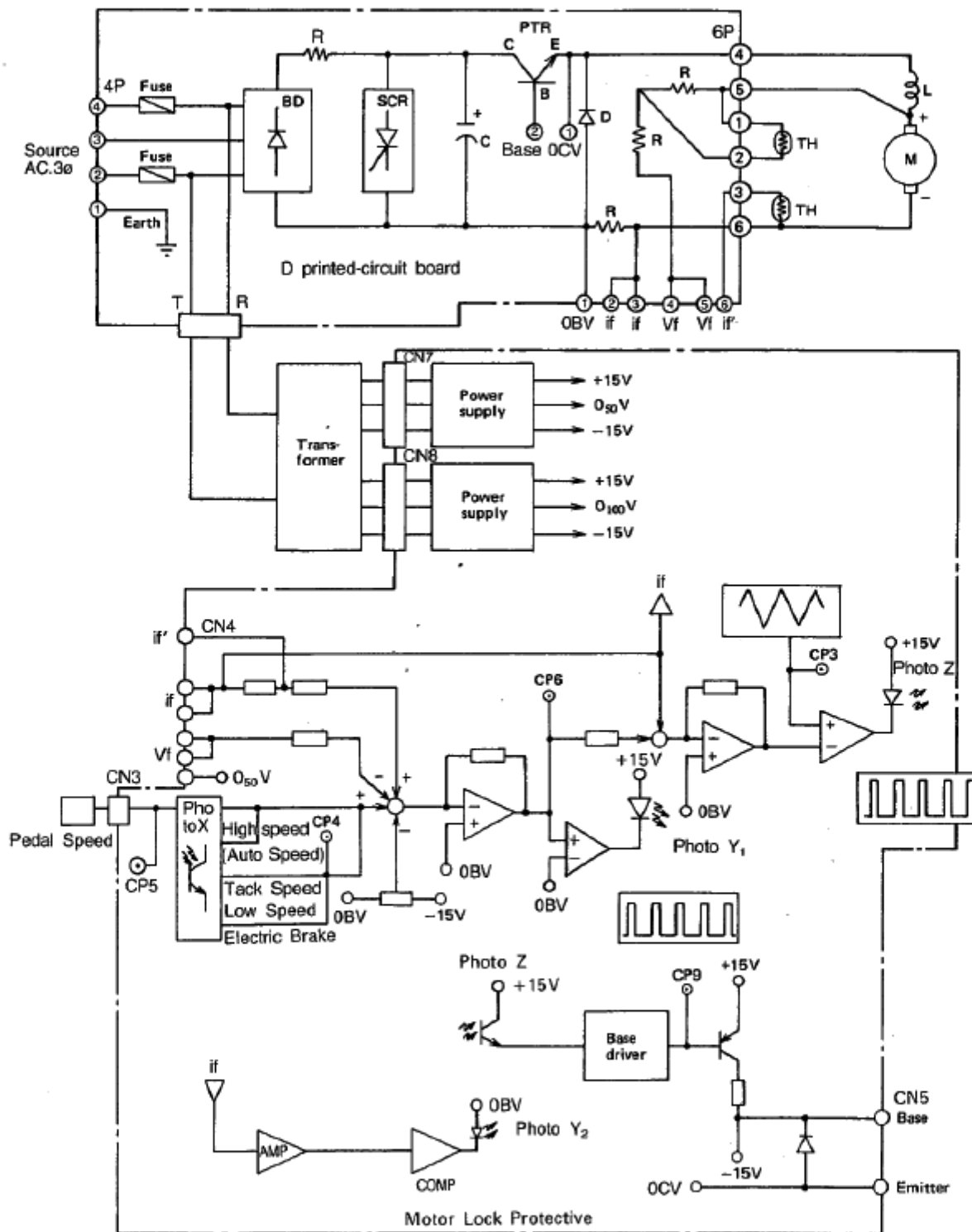
No	Motor 6P connector
1	Vf. TH
2	Vf. TH
3	lf. TH
4	Motor+
5	Vf
6	Motor-

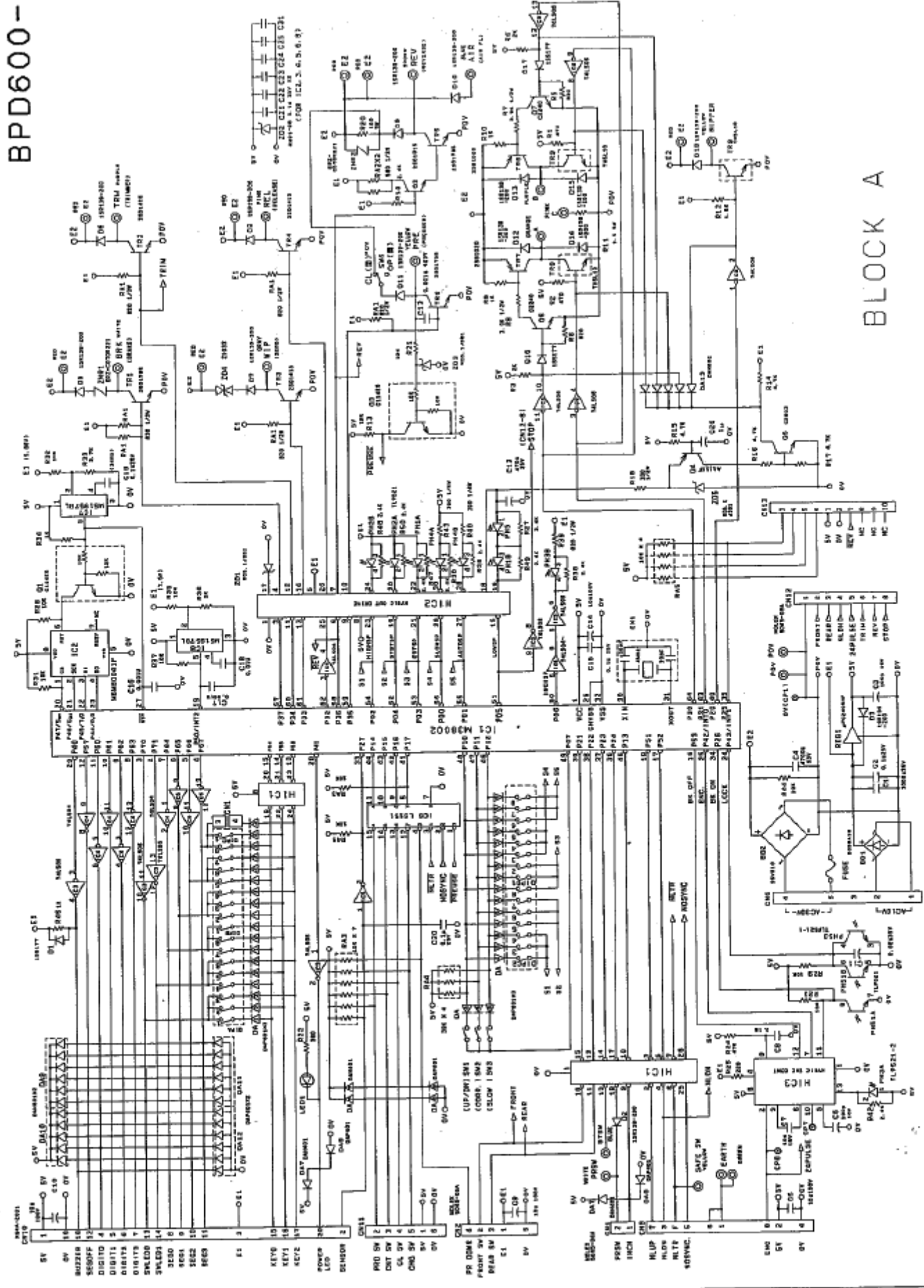
SEWING MACHINE CONTROL SYSTEM BLOCK DIAGRAM

MD-806, 816



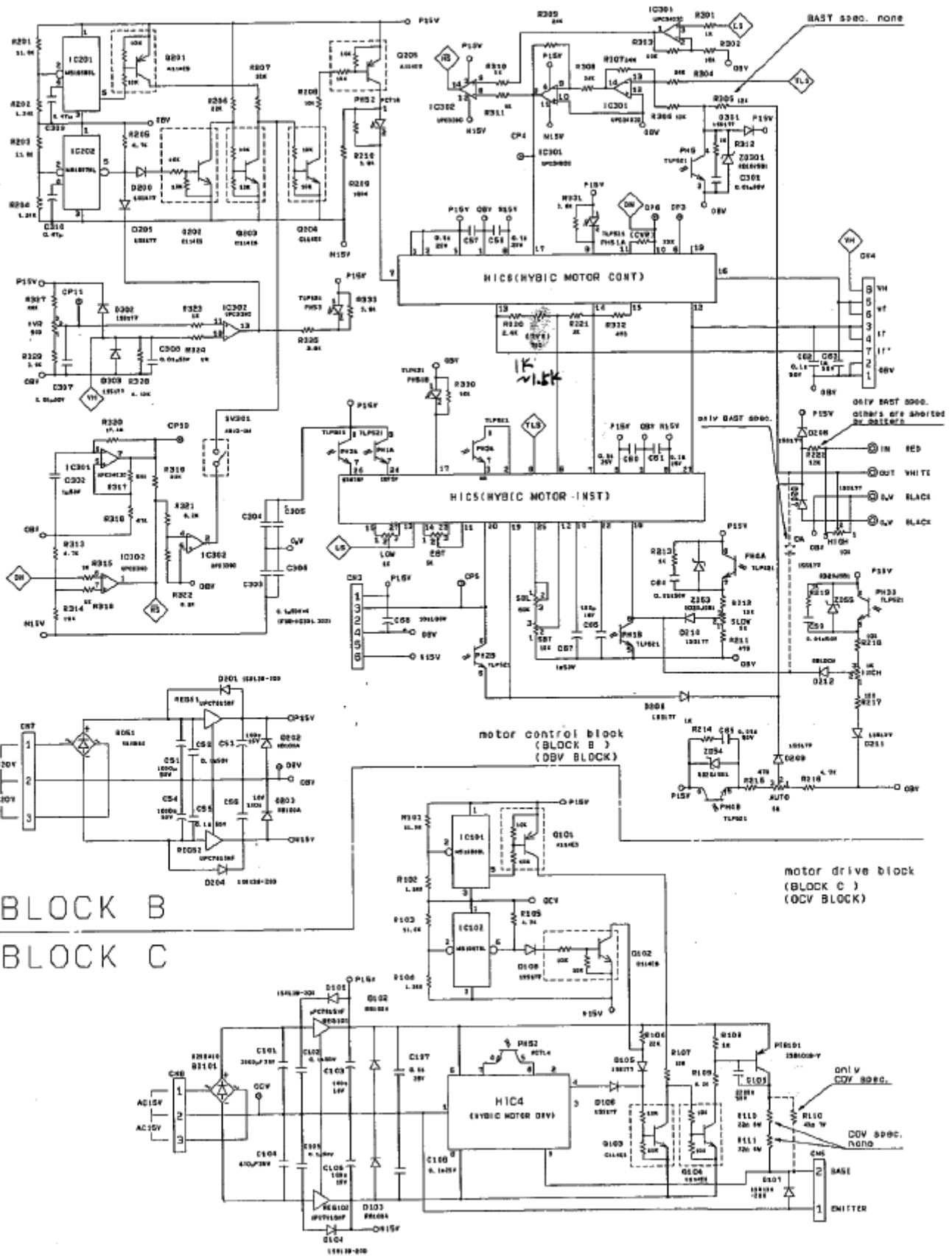
MOTOR CONTROL SYSTEM BLOCK DIAGRAM





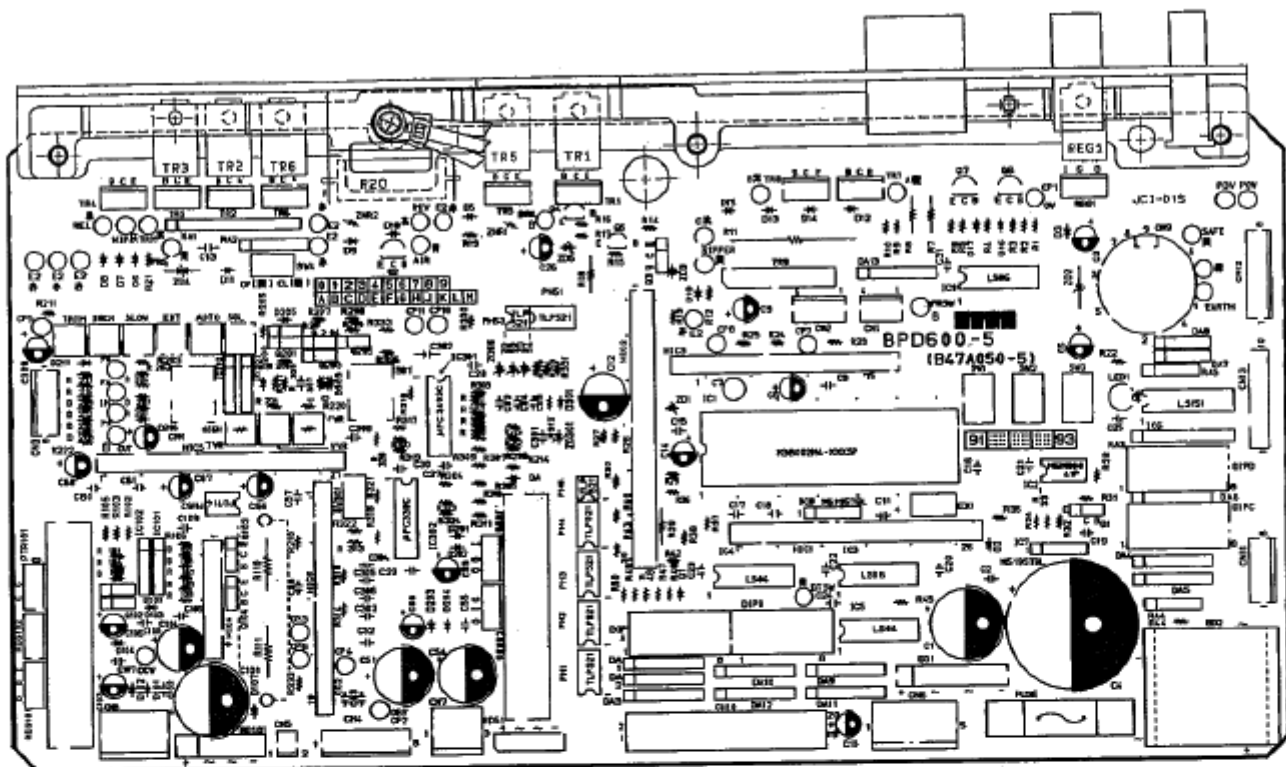
BLOCK A

BPD600-



From the library of: Diamond Needle Corp

MD-806, 816 spare parts code number of PCB



Spec.	Sewing machine	PCB spare parts code no. of each phase & voltage				#1 IC1	#5 R110, 111
		1 φ 110~120V	3 φ 220~240V	1 φ 220~240V	3 φ 380~415V		
Mark II	B737-MK2 B842 etc.	J80090-001 S-PCB-MK2-1110B	J80092-001 S-PCB-MK2-3240B	J80091-001 S-PCB-MK2-1240B	J80093-001 S-PCB-MK2-3400B	J00411001 ☆ LS138002M4-XXX	
NBN	only B730-NBN	J80095-001 S-PCB-NBN-1110B	J80097-001 S-PCB-NBN-3240B	J80096-001 S-PCB-NBN-1240B	J80098-001 S-PCB-NBN-3400B	J00973001 LS138002-OTPA7	J00252001 GR-A5AJ220
BAST	only LS2-8883	J80100-001 S-PCB-BAST1110B	J80102-001 S-PCB-BAST3240B	J80101-001 S-PCB-BAST1240B	J80103-001 S-PCB-BAST3400B	J00263001 LS138002-OTPA2	
COV	FD4-B27* FD3-B25*	J80105-001 S-PCB-COV-1110B	J80107-001 S-PCB-COV-3240B	J80106-001 S-PCB-COV-1240B	J80108-001 S-PCB-COV-3400B	J00276001 LS138002-OTPA3	J00271001 MR-A7AJ430
spare parts							
#2	CN4	J00338001 CONNECTOR B12 (10) BXHA		732218001 CONNECTOR B8P-W 129006001 CONNECTOR B2P-W	233287001 CONNECTOR 5045-DBA 831515000 CONNECTOR 5045-02A		
#3	CN5						
#4	R327	090103620 DR-A14AJ103S (10K 1/4W)			090123620 DR-A14AJ123S (12K 1/4W)		
#6	CVR	090912620 DR-A14AJ912S (9.1K 1/4W)		090123620 DR-A14AJ123S (12K 1/4W)	090203620 DR-A14AJ203S (20K 1/4W)		

Note: ☆ The code number of new version CPU is "J01520-001", mask number is "128".

MD-806, 816 spare parts code number of PCB (BPD600-X)

code numbers of common parts

SYMBOL	CODE	NAME	NOTE	SPEC.			
				Mark II	NBN	BAST	COV
IC1	#1	#1		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC2	J00246001	LS1M6M80041P		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC3	091100006	BIPIC74LS06		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC4, 5	091100004	BIPIC74LS04		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC6	091100151	BIPIC74LS151		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC7, 8, 102, 202	U33544000	BIPICM51957BL		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC9	091100006	BIPIC74LS06		none	<input type="radio"/>	none	none
IC101, 201	J00247001	BIPICM51958BL		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC301	J00248001	BIPICUPC3403C		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IC302	837198001	BIPICUPC339C		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HIC1	228307001	HYBIC INCIRCUIT		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HIC2	228308001	HYBIC OUT DRIVE		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HIC3	228309001	HYBIC ENC CONT		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HIC4	228310001	HYBIC MOTOR DRV		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HIC5	228311001	HYBIC MOTOR INST		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HIC6	228312001	HYBIC MOTOR CONT		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Q1, 3, 102, 103, 104 202, 203, 204	J00326001	SITRDT114ES		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Q2	U51208000	SITR2SC1815		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Q4	U15090000	SITR2SA1115		none	<input type="radio"/>	none	none
Q5	U72674000	SITR2SC2603F		none	<input type="radio"/>	none	none
Q6, 7	J00327001	SITR2SC2240		none	<input type="radio"/>	none	none
Q101, 201, 205	J00335001	SITRDTA114ES		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TR1, 5, 6	233139001	SITR2SD1795		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TR2, 3	233276001	SITR2SD1415		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TR4	233276001	SITR2SD1415		none	<input type="radio"/>	none	<input type="radio"/>
TR7, 8	J00328001	SITR2SB1020		none	<input type="radio"/>	none	none
TR9	J00329001	SITRTH5L10		none	<input type="radio"/>	none	none
PTR101	233277001	SITR2SB1019Y		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
REG1	417118001	VLTRREGUPC2405HF		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
REG51, 101	J00249001	VLTRREGUPC7815HF		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
REG52, 102	J00250001	VLTRREGUPC7915HF		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BD1	U17798000	SIBRD3SBA10		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BD2	532346000	SIBRDS5VB		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BD51	226170000	SIDS1VB10		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BD101	J00251001	SIDD2SBA10		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D1, 105, 106 108, 200, 205, 206, 207 208, 209, 210, 211, 301 302, 303	132999001	SID1SS177		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DA	132999001	SID1SS177		none	none	<input type="radio"/>	none
D16, 17	132999001	SID1SS177		none	<input type="radio"/>	none	none
D2, 3, 5, 6, 7, 9, 10 11, 101, 104, 107, 201 204	U36684085	SID1SR139-200T		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D8	U36684085	SID1SR139-200T		none	<input type="radio"/>	none	<input type="radio"/>
D12, 13, 14, 15, 18	U36684085	SID1SR139-200T		none	<input type="radio"/>	none	none
D102, 103, 202, 203 212	W01655001	SIDRB100A		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DA1, 2, 3, 4, 5, 6, 11, 12	230979001	SIDADAP601		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DA7	532315000	SIDADAN401		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DA8	538235000	SIDADAP401		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DA9, 10	U33181000	SIDADAN601		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DA13	U33181000	SIDADAN601		none	<input type="radio"/>	none	none
ZD1, 3	U32725000	ZDRD5.1JSB1		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

MD-806, 816 spare parts code number of PCB (BPD600-X)

code numbers of common parts

SYMBOL	CODE	NAME	NOTE	SPEC.			
				Mark II	NBN	RAST	COV
ZD5	U32725000	ZDRD5.1JSB1		none	○	none	none
ZD2	233280001	ZDAU01-08		○	○	○	○
ZD4	230814001	ZDZ1033		○	○	○	○
ZD53, 54, 55, 301	U32269000	ZDRD20JSB1		○	○	○	○
PH1, 2, 3, 4, 51	U82917000	PHOTOC.P.TLP521-2		○	○	○	○
PH5, 53	U82859000	PHOTOC.P.TLP521-1		○	○	○	○
PH52	230934001	PHOTOC.P.C714		○	○	○	○
LED1	233279001	LEDLN21RPH		○	○	○	○
ZNR1, 2	230967001	ERZ-C07DK221		○	○	○	○
EX1	236441001	CERA.CST4.00MGW		○	○	○	○
CHECK PIN	752246001	1.3PIN		○	○	○	○
FUSE1	230975001	FUSEHOLDERF-711		○	○	○	○
FUSE	219225000	FUSE8A-125V		○	○	○	○
SW1, 2, 3	233282001	TGSWE-2012P		○	○	○	○
SW4, 301	J00330001	SWAS1D-2M		○	○	○	○
DIPA, B, C, D	235031001	DIPSWA6D-8103		○	○	○	○
CN1	631517000	CONNECTOR5045-04A		○	○	○	○
CN2	631518000	CONNECTOR5045-05A		○	○	○	○
CN3	233283001	CONNECTOR5045-06A		○	○	○	○
CN4	*2	*2		○	○	○	○
CN5	*3	*3		○	○	○	○
CN6	233284001	CONNECTOR5273-05A		○	○	○	○
CN7	631210001	CONNECTOR5273-03A		○	○	○	○
CN8	631881000	CONNECTOR5277-03A		○	○	○	○
CN9	233285001	CONNECTORS-13364		○	○	○	○
CN10	233286001	CONNECTORXG4A-2031		○	○	○	○
CN11	233283001	CONNECTOR5045-06A		○	○	none	none
SBL	J00972001	GVR-1RLB503		○	○	none	none
TRIM (LOW), INCH	230968001	GVR-1RLB102		○	○	○	○
VVR	J00442001	GVR-1RLB501		○	○	○	○
E.BT. SLOW	230818001	GVR-1RLB502		○	○	○	○
AUTO	230818001	GVR-1RLB502		○	○	none	none
SBT	J00336001	DVR-1RLB103L30		○	○	none	none
HIGH	J00336001	DVR-1RLB103L30		○	○	○	○
Knob for SBT	J00337001	KNOB K-8075		○	○	none	none
Knob for HIGH	J00337001	KNOB K-8075		○	○	○	○
RA1	233288001	RARREY821Y6J		○	○	○	○
RA2	233289001	RARREY561Y3J		○	○	○	○
RA3	J00331001	RARREY103Y8J		○	○	○	○
RA4	J00332001	RARREY393Y4J		○	○	○	○
RA5	J00333001	RARREY103Y4J		○	○	○	○
R217	090101620	DR-A14AJ101S	100 1/4W	○	○	○	○
R25	090221620	DR-A14AJ221S	220 1/4W	○	○	○	○
R22, 40, 43	090391620	DR-A14AJ391S	390 1/4W	○	○	○	○
R1, 2	090471620	DR-A14AJ471S	470 1/4W	none	○	none	none
R211, 215, 332	090471620	DR-A14AJ471S	470 1/4W	○	○	○	○
TVR	090751620	DR-A14AJ751	750 1/4W	○	○	○	○
R5, 6	090821620	DR-A14AJ821	820 1/4W	none	○	none	none
R9, 10	090102620	DR-A14AJ102S	1K 1/4W	none	○	none	none
R34, 46, 108, 213 214, 219, 301, 310, 311 312, 315, 316, 323, 324	090102620	DR-A14AJ102S	1K 1/4W	○	○	○	○
R12	090152620	DR-A14AJ152S	1.5K 1/4W	none	○	none	none
R3, 4	090202620	DR-A14AJ202S	2K 1/4W	none	○	none	none
R36, 221	090202620	DR-A14AJ202S	2K 1/4W	○	○	○	○

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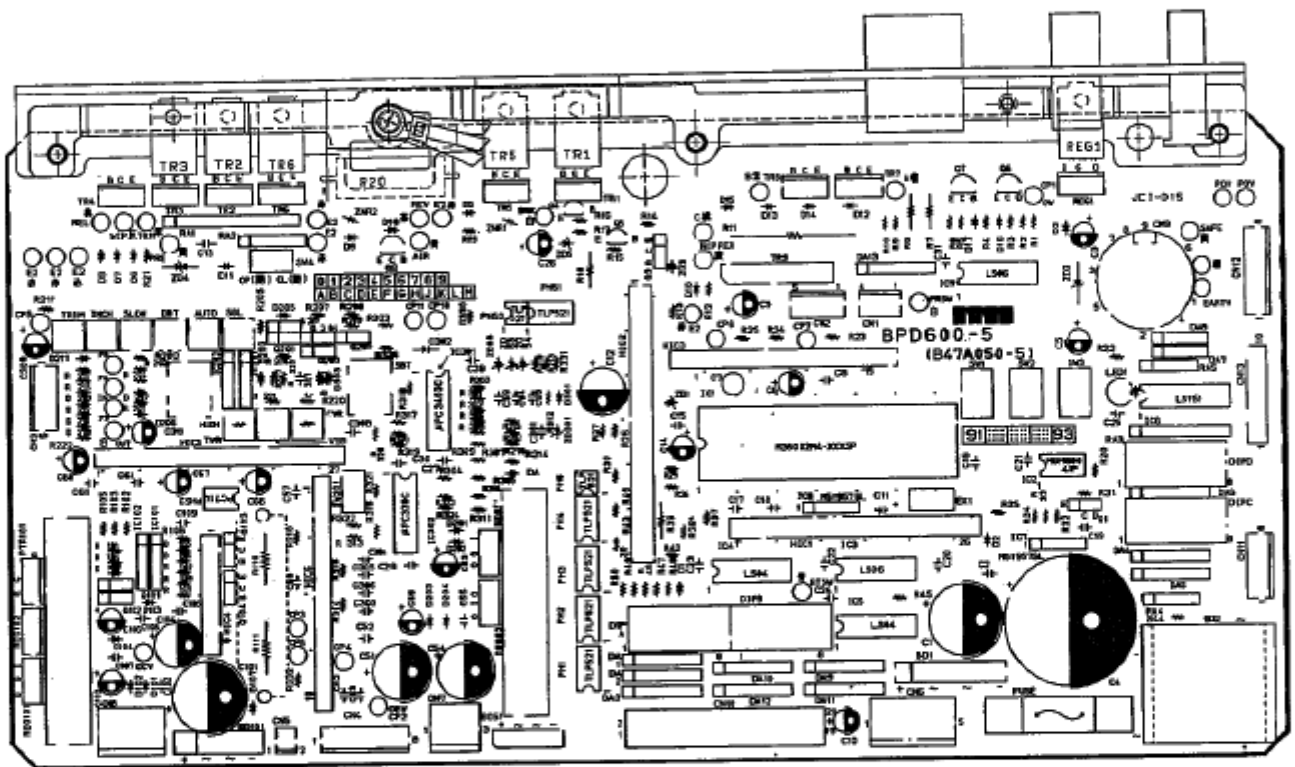
code numbers of common parts

SYMBOL	CODE	NAME	NOTE	SPEC.			
				Mark II	NBM	BAST	COV
R19, 26, 27, 30, 38, 42 47, 48, 49, 50, 220	090242620	DR-A14AJ242S	2.4K 1/4W	○	○	○	○
R33	090272620	DR-A14AJ272S	2.7K 1/4W	○	○	○	○
R210, 326, 329, 331 333	090392620	DR-A14AJ392S	3.9K 1/4W	○	○	○	○
R14, 15, 16, 17	090472620	DR-A14AJ472S	4.7K 1/4W	none	○	none	none
R105, 205, 216, 313	090472620	DR-A14AJ472S	4.7K 1/4W	○	○	○	○
R109, 321, 322	090622620	DR-A14AJ622S	6.2K 1/4W	○	○	○	○
R13, 23, 28, 29, 31, 32 35, 37, 44, 45, 107, 208 212, 218, 302, 303, 314 330	090103620	DR-A14AJ103S	10K 1/4W	○	○	○	○
R327	*4	*4		○	○	○	○
R110, 111	*5	*5		○	○	○	○
CVR	*6	*6		○	○	○	○
R222	090123620	DR-A14AJ123S	12K 1/4W	none	none	○	none
R305	090123620	DR-A14AJ123S	12K 1/4W	○	○	none	○
R306	090123620	DR-A14AJ123S	12K 1/4W	○	○	○	○
R21, 106, 206, 207, 319	090223620	DR-A14AJ223S	22K 1/4W	○	○	○	○
R304, 307, 308, 309	090243620	DR-A14AJ243S	24K 1/4W	○	○	○	○
R24, 318	090473620	DR-A14AJ473S	47K 1/4W	○	○	○	○
R317	090563620	DR-A14J563S	56K 1/4W	○	○	○	○
R209	090104620	DR-A14AJ104S	100K 1/4W	○	○	○	○
R18	090331320	DR-A12AJ331S	330 1/2W	none	○	none	none
R7, 8	090392320	DR-A12AJ392S	3.9K 1/2W	none	○	none	none
R39	090821320	DR-A12AJ821S	820 1/2W	○	○	○	○
R101, 103, 201, 203	Y01102376	GR-A14KF1102	11.0K 1/4W	○	○	○	○
R102, 104, 202, 204	Y01241376	GR-A14KF1241	1.24K 1/4W	○	○	○	○
R320	Y01742376	GR-A14KF1742	17.4K 1/4W	○	○	○	○
R328	Y04121376	GR-A14KF4121	4.12K 1/4W	○	○	○	○
R11	J00334001	GR-85YJ1R5	1.5 5W	none	○	none	none
R20	U34229000	GR-85YJ101	100 5W	○	○	○	○
C309, 310	Y44785001	A-CAPCITOR50B47-20	0.47u 50V	○	○	○	○
C26	Y41095001	A-CAPCITOR50B109	1u 50V	none	○	none	none
C67	Y41095001	A-CAPCITOR50B109	1u 50V	○	○	○	○
C7	233290001	A-CAPCITOR16B100S	10u 16V	○	○	○	○
C5, 9, 10, 14, 68	Y41007001	A-CAPCITOR100B100	10u 100V	○	○	○	○
C3, 6, 53, 56, 66, 103 106	Y41012001	A-CAPCITOR16B101	100u 16V	○	○	○	○
C12	Y44713001	A-CAPCITOR25B471	470u 25V	○	○	○	○
C104	Y44714001	A-CAPCITOR35B471	470u 35V	○	○	○	○
C51, 54	Y41025001	A-CAPCITOR50B102	1000u 50V	○	○	○	○
C1, 101	Y43324001	A-CAPCITOR35B332	3300u 35V	○	○	○	○
C4	J00341001	A-CAPCITOR63B472	4700u 63V	○	○	○	○
C16, 17	Y31021005	C-CAPCITOR25B102	0.001u 25V	○	○	○	○
C18	Y31031005	C-CAPCITOR25B103	0.01u 25V	○	○	○	○
C59, 64, 65, 301, 307 308	Y81032415	C-CAPCITOR50B103	0.01u 50V	○	○	○	○
C2, 15, 19, 20, 21, 22 23, 24, 25, 57, 58 60, 61, 107, 108	Y31042105	C-CAPCITOR25B104	0.1u 25V	○	○	○	○
C31	Y31042105	C-CAPCITOR25B104	0.1u 25V	none	○	none	none
C52, 55, 62, 102, 105 303, 304, 305, 306	Y31041005	C-CAPCITOR50B104	0.1u 50V	○	○	○	○
C63	Y21052420	C-CAPCITOR50B105	1u 50V	○	○	○	○
C11	230825001	T-CAPCITOR35B68-20	68u 35V	○	○	○	○

MD-806, 816 spare parts code number of PCB (BPD600-X)

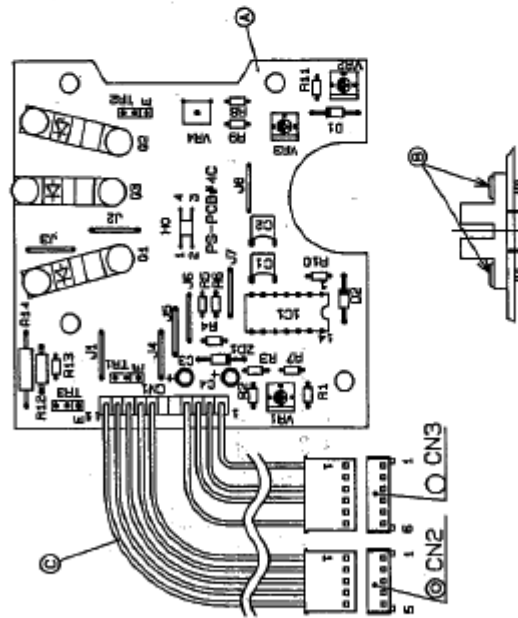
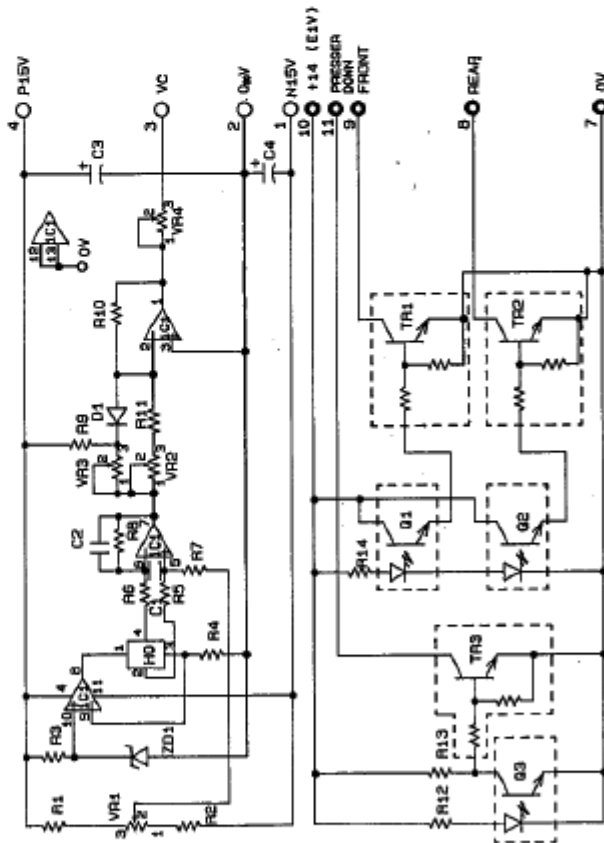
code numbers of common parts

SYMBOL	CODE	NAME	NOTE	SPEC.			
				Mark II	NBM	BAST	COV
C13	Y51024200	P-CAPCITOR400B102	0.001u 400V	○	○	○	○
C8	Y51040040	P-CAPCITOR50B104	0.1u 50V	○	○	○	○
C109	Y52220010	P-CAPCITOR50B222	0.0022u 50V	○	○	○	○
C302	Y51050040	P-CAPCITOR50B104	1u 50V	○	○	○	○
FIN3	J00255001	HEAT BOARD#18		○	○	○	○
FIN1.2	J00256001	HEATED FIN#19		○	○	○	○



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MD-806, 816 TREADLE UNIT (PS-PCB#11 ASSM.)

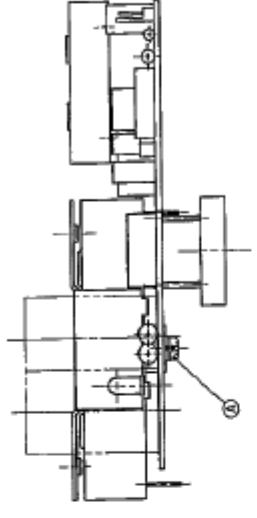
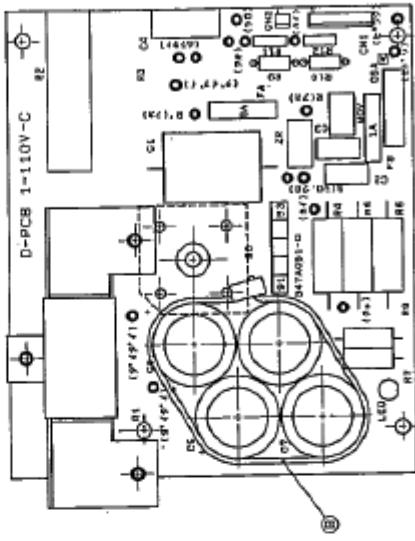
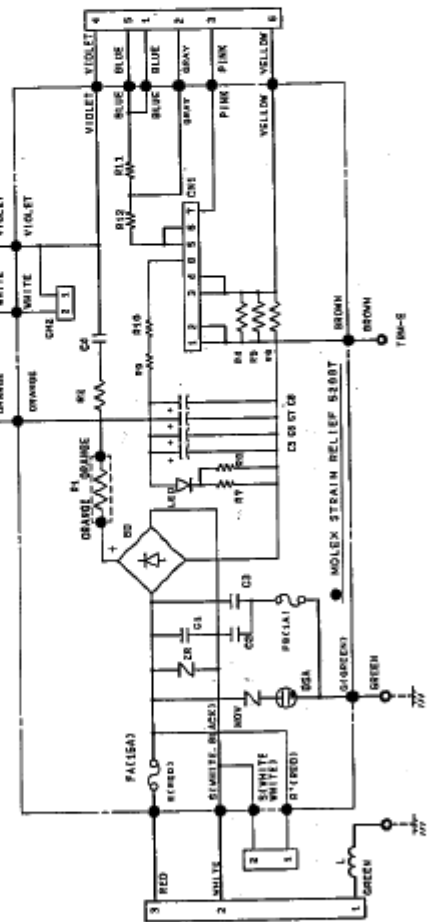


Symbol	Code	Name	QTY	NOTE
Q1, Q2, Q3	228246000	PHOT INT GP-1902	3	
TR1, TR2, TR3	228246000	SITR UM1213	3	
IC1	228247000	81PIC ups451C	1	
ZD1	233133001	ZD R04 7J5B1	1	1500mV 4.7V
C1	Y61020010	EC081H10R2J	1	150V 0.001uF
C2	Y61730040	EC0V1H473JZ	1	150V 0.047uF
C3, C4	Y42285301	EC0EA1HK5R2R2	2	250V 2.2uF
HO	231897001	THS102A	1	
VR1	233154001	PS502H103HO	1	10K
VR2	233154001	103HO	1	10K
VR3	233155001	502HO	1	5K
VR4	233156001	103V2	1	10K
D1	224291000	S1D 1S15B8	1	
R14	Y03910811	ERR-1S1J91	1	1M 350
R12	090561320	ERD-S1TJ561	1	10.5M 560
R3	090821620	52TJ821	1	10.25M 820
R4	090102620	102	1	10.25M 1K
R1	090153620	153	1	10.25M 15K
R2	090472620	472	1	10.25M 4.7K
RS, R6	090222620	222	2	10.25M 2.2K
R7, R8	090684620	684	2	10.25M 680K
R10	090103620	ERD-S2TJ103	1	10.25M 10K
R13	090333020	333	1	10.25M 33K
R9	090462620	562	1	10.25M 5.6K
R11	090752620	752	1	10.25M 7.5K
A	233153001	PS board#4	1	
B	224378001	NRP-365	6	
C	233157001	PS connector ASSM.#3	1	
U1-U3				

NAME	CODE	NOTE
PS-PCB#11 ASSM.	291792001	

D printed-circuit board 1-110V-C assembly

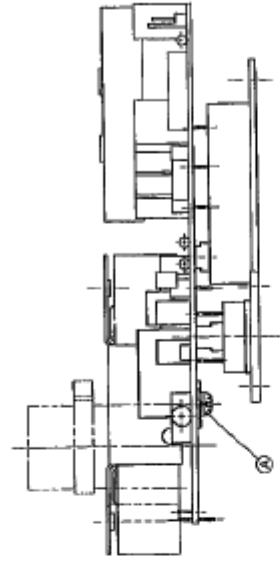
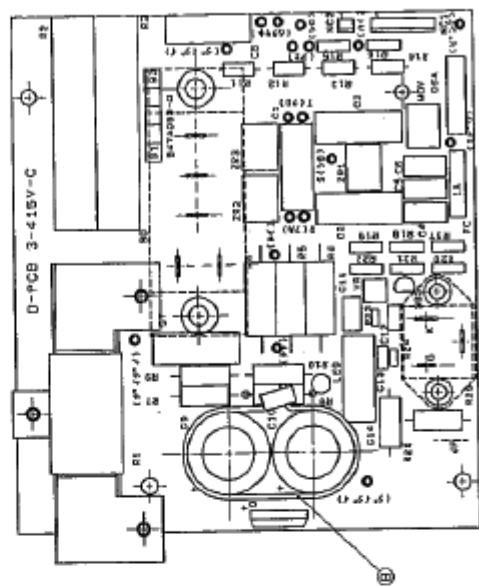
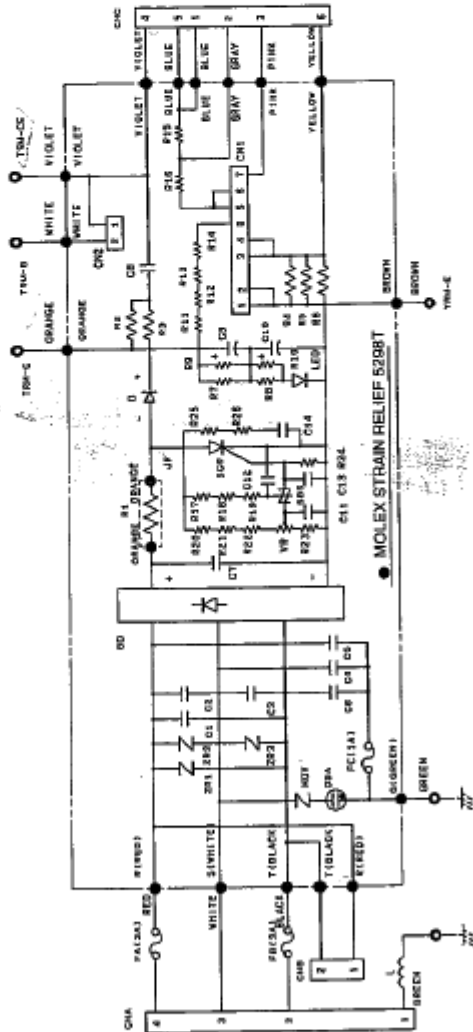
TRM-C TRM-B TRM-CE



SYMBOL	NAME	CODE	Q'TY	NOTE
C1	CAPACITOR, POLYESTER 400V 1UF	28274001	1	
C2	CAPACITOR, POLYESTER 500V 0.1UF	28256401	1	
C3, C4, C5	CAPACITOR, ALUM-ELC 100V 0.001	233641001	4	100V, 0.001UF
C6, C7	CAPACITOR, CERAMIC 50V 0.002	102091001	2	50V, 2E20FF
D1	DIODE, RECTIFIER, 1N4001	820374001	1	40V, 0.20A
D2	DIODE, RECTIFIER, 1N4002	10201001	1	50V, 0.10A
D3, D4	DIODE, RECTIFIER, 1N4004	28288001	2	50V, 0.10A
D5, D6	DIODE, RECTIFIER, 1N4007	28272001	2	100V, 0.10A
D7, D8	DIODE, RECTIFIER, 1N4009	101052470	2	0.5A, 100V
D9, D10	DIODE, RECTIFIER, 1N4013	09103332	1	0.5A, 25V
D11	DIODE, RECTIFIER, 1N4017	09103332	1	0.5A, 25V
D12	DIODE, RECTIFIER, 1N4024	09103332	1	0.5A, 25V
D13	DIODE, RECTIFIER, 1N4027	09103332	1	0.5A, 25V
D14	DIODE, RECTIFIER, 1N4034	09103332	1	0.5A, 25V
D15	DIODE, RECTIFIER, 1N4037	09103332	1	0.5A, 25V
D16	DIODE, RECTIFIER, 1N4040	09103332	1	0.5A, 25V
D17	DIODE, RECTIFIER, 1N4045	09103332	1	0.5A, 25V
D18	DIODE, RECTIFIER, 1N4052	09103332	1	0.5A, 25V
D19	DIODE, RECTIFIER, 1N4057	09103332	1	0.5A, 25V
D20	DIODE, RECTIFIER, 1N4061	09103332	1	0.5A, 25V
D21	DIODE, RECTIFIER, 1N4064	09103332	1	0.5A, 25V
D22	DIODE, RECTIFIER, 1N4067	09103332	1	0.5A, 25V
D23	DIODE, RECTIFIER, 1N4070	09103332	1	0.5A, 25V
D24	DIODE, RECTIFIER, 1N4073	09103332	1	0.5A, 25V
D25	DIODE, RECTIFIER, 1N4076	09103332	1	0.5A, 25V
D26	DIODE, RECTIFIER, 1N4079	09103332	1	0.5A, 25V
D27	DIODE, RECTIFIER, 1N4082	09103332	1	0.5A, 25V
D28	DIODE, RECTIFIER, 1N4085	09103332	1	0.5A, 25V
D29	DIODE, RECTIFIER, 1N4088	09103332	1	0.5A, 25V
D30	DIODE, RECTIFIER, 1N4091	09103332	1	0.5A, 25V
D31	DIODE, RECTIFIER, 1N4094	09103332	1	0.5A, 25V
D32	DIODE, RECTIFIER, 1N4097	09103332	1	0.5A, 25V
D33	DIODE, RECTIFIER, 1N4100	09103332	1	0.5A, 25V
D34	DIODE, RECTIFIER, 1N4103	09103332	1	0.5A, 25V
D35	DIODE, RECTIFIER, 1N4106	09103332	1	0.5A, 25V
D36	DIODE, RECTIFIER, 1N4109	09103332	1	0.5A, 25V
D37	DIODE, RECTIFIER, 1N4112	09103332	1	0.5A, 25V
D38	DIODE, RECTIFIER, 1N4115	09103332	1	0.5A, 25V
D39	DIODE, RECTIFIER, 1N4118	09103332	1	0.5A, 25V
D40	DIODE, RECTIFIER, 1N4121	09103332	1	0.5A, 25V
D41	DIODE, RECTIFIER, 1N4124	09103332	1	0.5A, 25V
D42	DIODE, RECTIFIER, 1N4127	09103332	1	0.5A, 25V
D43	DIODE, RECTIFIER, 1N4130	09103332	1	0.5A, 25V
D44	DIODE, RECTIFIER, 1N4133	09103332	1	0.5A, 25V
D45	DIODE, RECTIFIER, 1N4136	09103332	1	0.5A, 25V
D46	DIODE, RECTIFIER, 1N4139	09103332	1	0.5A, 25V
D47	DIODE, RECTIFIER, 1N4142	09103332	1	0.5A, 25V
D48	DIODE, RECTIFIER, 1N4145	09103332	1	0.5A, 25V
D49	DIODE, RECTIFIER, 1N4148	09103332	1	0.5A, 25V
D50	DIODE, RECTIFIER, 1N4151	09103332	1	0.5A, 25V
D51	DIODE, RECTIFIER, 1N4154	09103332	1	0.5A, 25V
D52	DIODE, RECTIFIER, 1N4157	09103332	1	0.5A, 25V
D53	DIODE, RECTIFIER, 1N4160	09103332	1	0.5A, 25V
D54	DIODE, RECTIFIER, 1N4163	09103332	1	0.5A, 25V
D55	DIODE, RECTIFIER, 1N4166	09103332	1	0.5A, 25V
D56	DIODE, RECTIFIER, 1N4169	09103332	1	0.5A, 25V
D57	DIODE, RECTIFIER, 1N4172	09103332	1	0.5A, 25V
D58	DIODE, RECTIFIER, 1N4175	09103332	1	0.5A, 25V
D59	DIODE, RECTIFIER, 1N4178	09103332	1	0.5A, 25V
D60	DIODE, RECTIFIER, 1N4181	09103332	1	0.5A, 25V
D61	DIODE, RECTIFIER, 1N4184	09103332	1	0.5A, 25V
D62	DIODE, RECTIFIER, 1N4187	09103332	1	0.5A, 25V
D63	DIODE, RECTIFIER, 1N4190	09103332	1	0.5A, 25V
D64	DIODE, RECTIFIER, 1N4193	09103332	1	0.5A, 25V
D65	DIODE, RECTIFIER, 1N4196	09103332	1	0.5A, 25V
D66	DIODE, RECTIFIER, 1N4199	09103332	1	0.5A, 25V
D67	DIODE, RECTIFIER, 1N4202	09103332	1	0.5A, 25V
D68	DIODE, RECTIFIER, 1N4205	09103332	1	0.5A, 25V
D69	DIODE, RECTIFIER, 1N4208	09103332	1	0.5A, 25V
D70	DIODE, RECTIFIER, 1N4211	09103332	1	0.5A, 25V
D71	DIODE, RECTIFIER, 1N4214	09103332	1	0.5A, 25V
D72	DIODE, RECTIFIER, 1N4217	09103332	1	0.5A, 25V
D73	DIODE, RECTIFIER, 1N4220	09103332	1	0.5A, 25V
D74	DIODE, RECTIFIER, 1N4223	09103332	1	0.5A, 25V
D75	DIODE, RECTIFIER, 1N4226	09103332	1	0.5A, 25V
D76	DIODE, RECTIFIER, 1N4229	09103332	1	0.5A, 25V
D77	DIODE, RECTIFIER, 1N4232	09103332	1	0.5A, 25V
D78	DIODE, RECTIFIER, 1N4235	09103332	1	0.5A, 25V
D79	DIODE, RECTIFIER, 1N4238	09103332	1	0.5A, 25V
D80	DIODE, RECTIFIER, 1N4241	09103332	1	0.5A, 25V
D81	DIODE, RECTIFIER, 1N4244	09103332	1	0.5A, 25V
D82	DIODE, RECTIFIER, 1N4247	09103332	1	0.5A, 25V
D83	DIODE, RECTIFIER, 1N4250	09103332	1	0.5A, 25V
D84	DIODE, RECTIFIER, 1N4253	09103332	1	0.5A, 25V
D85	DIODE, RECTIFIER, 1N4256	09103332	1	0.5A, 25V
D86	DIODE, RECTIFIER, 1N4259	09103332	1	0.5A, 25V
D87	DIODE, RECTIFIER, 1N4262	09103332	1	0.5A, 25V
D88	DIODE, RECTIFIER, 1N4265	09103332	1	0.5A, 25V
D89	DIODE, RECTIFIER, 1N4268	09103332	1	0.5A, 25V
D90	DIODE, RECTIFIER, 1N4271	09103332	1	0.5A, 25V
D91	DIODE, RECTIFIER, 1N4274	09103332	1	0.5A, 25V
D92	DIODE, RECTIFIER, 1N4277	09103332	1	0.5A, 25V
D93	DIODE, RECTIFIER, 1N4280	09103332	1	0.5A, 25V
D94	DIODE, RECTIFIER, 1N4283	09103332	1	0.5A, 25V
D95	DIODE, RECTIFIER, 1N4286	09103332	1	0.5A, 25V
D96	DIODE, RECTIFIER, 1N4289	09103332	1	0.5A, 25V
D97	DIODE, RECTIFIER, 1N4292	09103332	1	0.5A, 25V
D98	DIODE, RECTIFIER, 1N4295	09103332	1	0.5A, 25V
D99	DIODE, RECTIFIER, 1N4298	09103332	1	0.5A, 25V
D100	DIODE, RECTIFIER, 1N4301	09103332	1	0.5A, 25V

NAME	CODE	NOTE
D-PCB1-110V-C	J80116-001	10PhaseAC110V

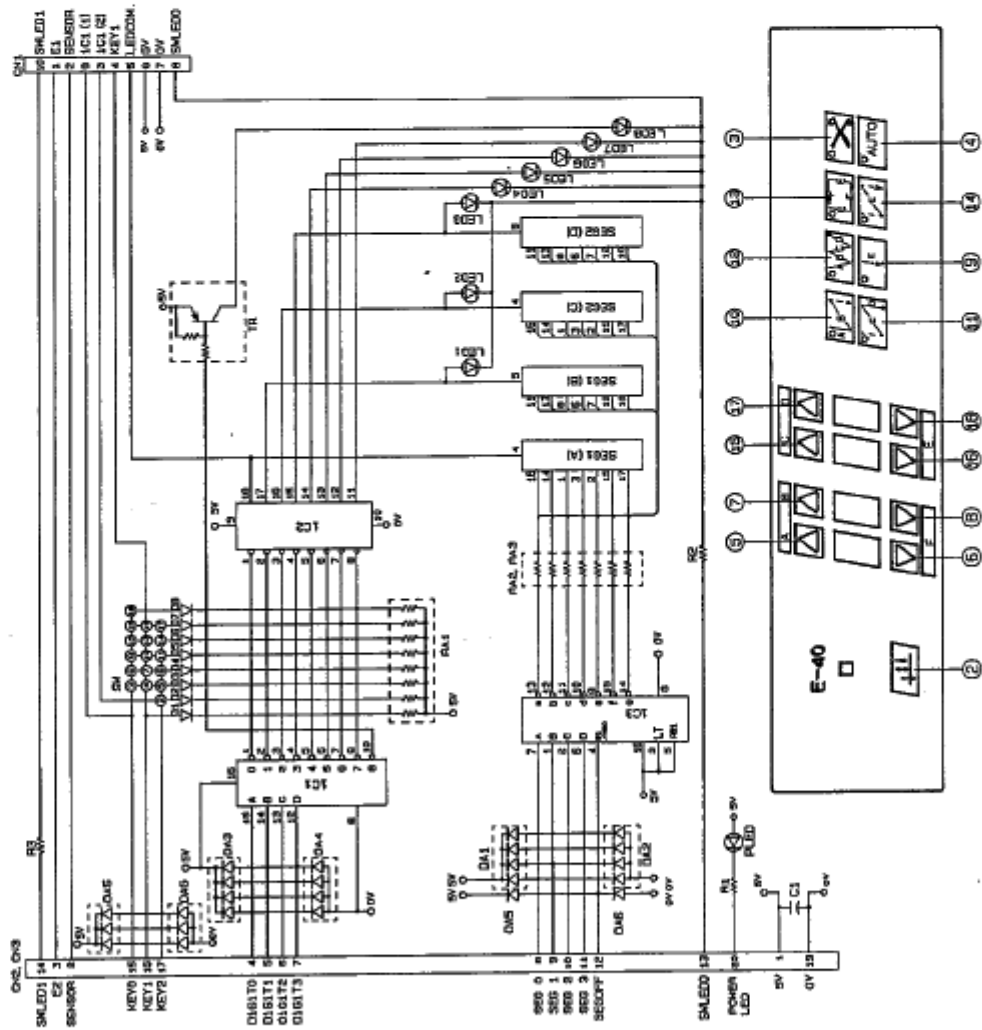
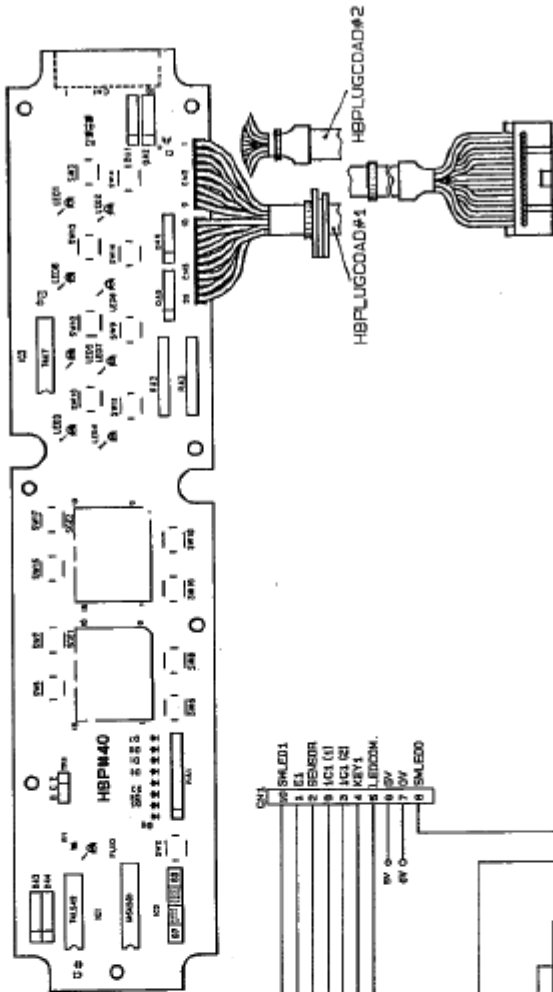
D printed-circuit board 3-415V-C assembly



SYMBOL	NAME	CODE	QTY	NOTE
C1, C2, C3, C4	CAPACITOR, POLYESTER 0.0010	234199001	6	1000V, 5, 10F
C5, C6, C7	CAPACITOR, CERAMIC 0.0022	400209001	3	50V, 2200P
C8, C9, C10	CAPACITOR, POLYESTER 0.0010	234199001	5	50V, 5, 10F
C11	CAPACITOR, POLYESTER 0.0010	234199001	1	50V, 5, 10F
C12	CAPACITOR, POLYESTER 0.0010	234199001	1	50V, 5, 10F
C13	CAPACITOR, POLYESTER 0.0010	234199001	1	50V, 5, 10F
C14	CAPACITOR, ALUMINUM ELECTROLYTIC	234199001	2	400V, 800UF
C15	CAPACITOR, FILLED 0.0010	400209001	1	400V, 800UF
C16	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C17	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C18	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C19	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C20	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C21	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C22	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C23	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C24	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C25	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C26	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C27	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C28	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C29	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C30	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C31	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C32	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C33	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C34	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C35	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C36	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C37	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C38	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C39	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C40	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C41	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C42	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C43	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C44	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C45	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C46	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C47	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C48	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C49	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C50	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C51	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
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C61	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C62	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C63	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C64	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C65	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C66	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C67	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C68	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C69	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C70	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C71	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C72	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C73	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C74	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C75	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C76	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C77	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C78	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C79	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C80	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C81	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C82	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C83	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C84	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C85	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C86	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C87	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C88	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C89	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C90	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C91	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C92	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C93	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C94	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C95	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C96	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C97	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C98	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C99	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A
C100	DIODE, RECTIFIER 1N4001	234199001	2	200V, 3.0A

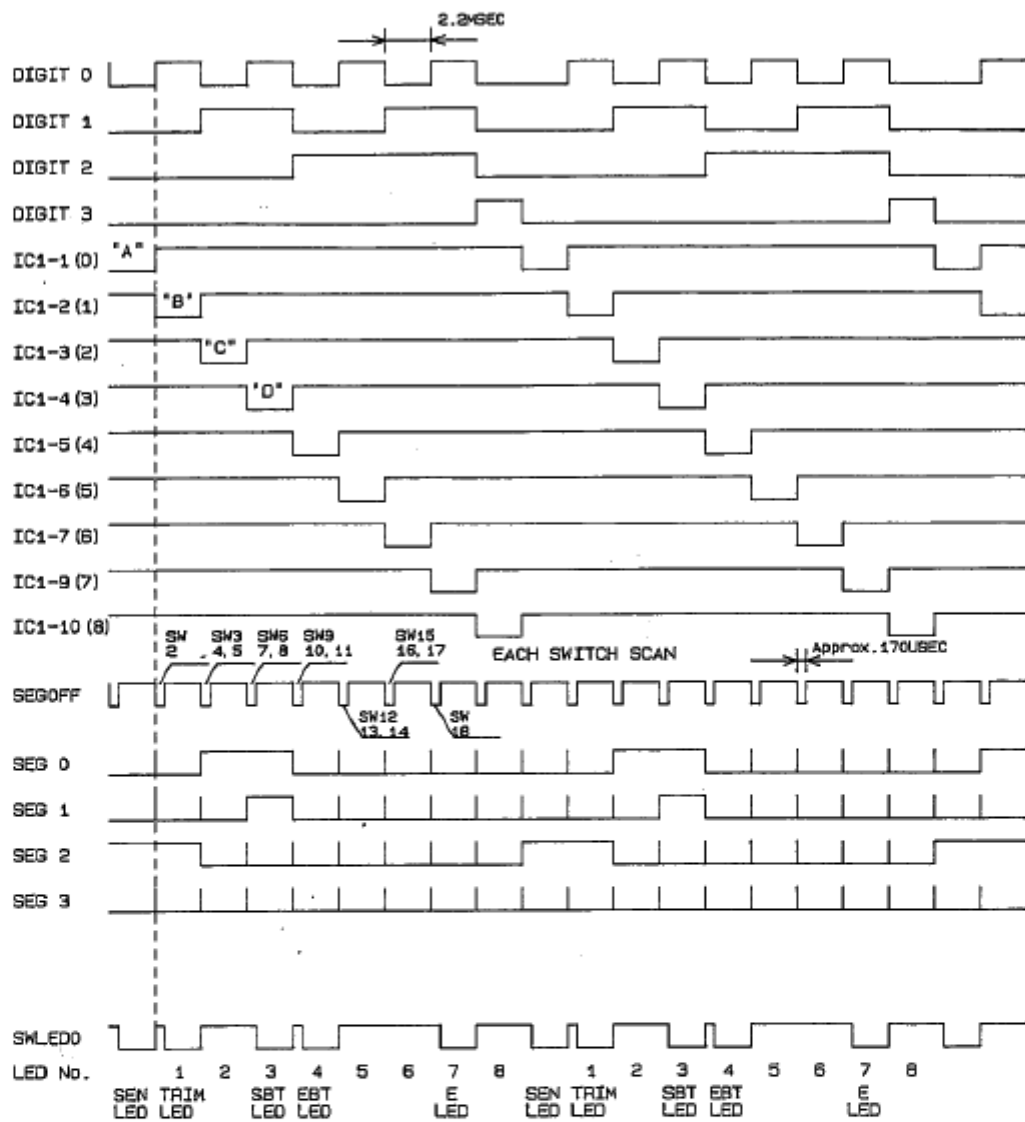
NAME	CODE	NOTE
D-PCB3-415V-C	JB0119-001	3phaseAC380~415V

OP Printed-circuit board E40

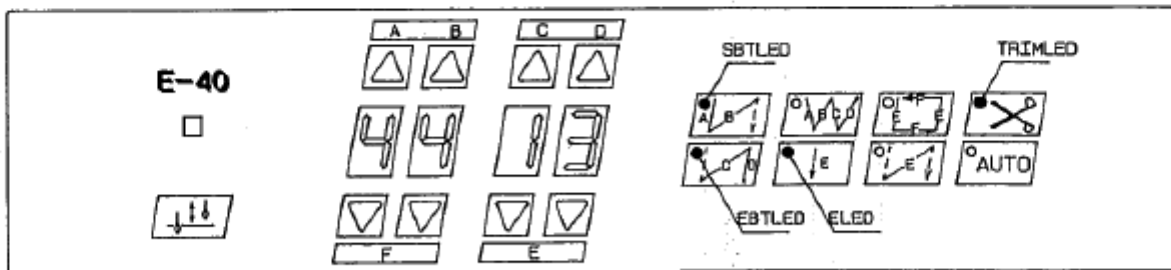


Symbol	Code	Name	Q'ty	Notes
DA1, DA3, DA6	532315000	DAPREYDA-N4	3	
DA2, DA4, DA5	532235000	DAPREYDA-P4	3	
DI, 2, 3, 4, 5, 6, 7, 8	132220001	S10185177	8	
LED1, 2, 3, 4, 5, 6, 7, 8	U52015001	LED6L-SH22	8	
SEG1, 2	233061001	LEDTLR25	2	
SM2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	233083001	83F-1020	17	
RA1	Y63386041	RAPREY3336J	1	1/BW, 33KΩ
RA2, RA3	Y62204441	RAPREY220Y4J	2	1/4W, 22Ω
R1	090391620	DR-A14AL3915	1	1/4W, 390Ω
R2, R3	090101620	DR-A14AJ1015	2	1/4W, 100Ω
IC1	051100042	81P1C74LS42	1	
IC2	233059001	81P1C64561	1	
IC3	051000047	81P1C7447	1	
C1	Y41002301	A-CAPAC10R168100	1	10R, 16V
TR	233035001	S1TRNH124	1	
CM1	233084001	S108-X1-A	1	
CM2, CM3 *	233055001	HBPUGCCAD#1	1	* Outside
	233086001	HBPUGCCAD#2	1	* Built-in
PLED	233082001	LED6L-SH24	1	

TIMING CHART OF OPERATION PANEL E-40

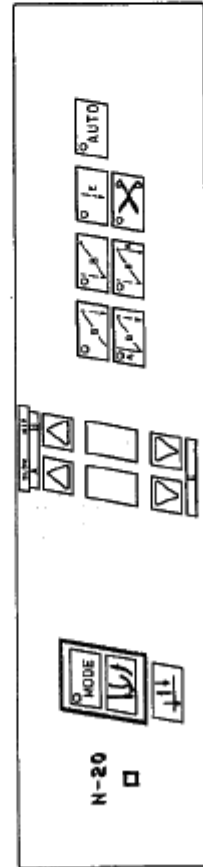
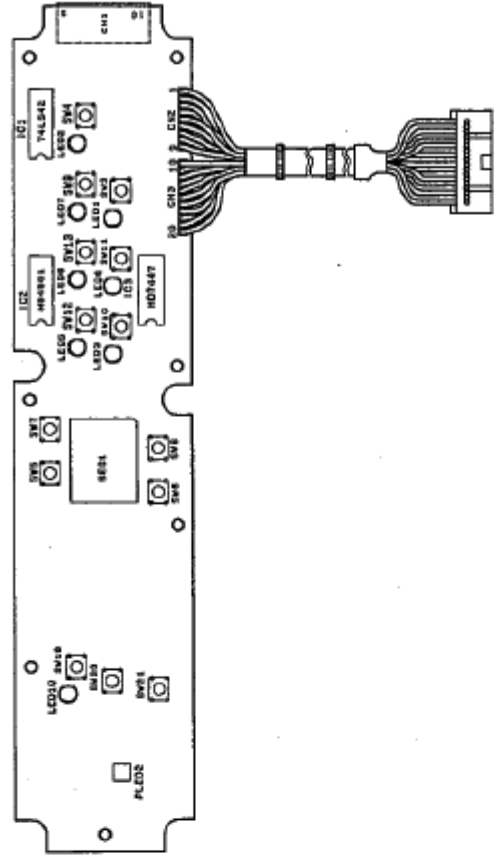
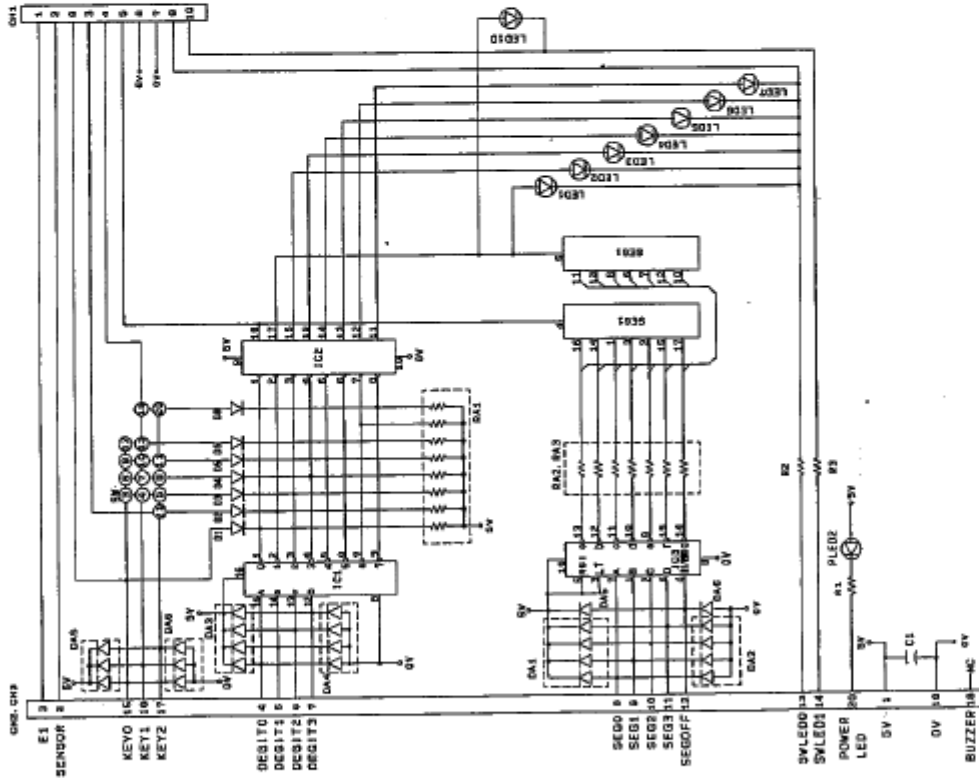


Remark: High level of signal, except (SWLED0), is more than +3V, and low level is less than +0.5V.



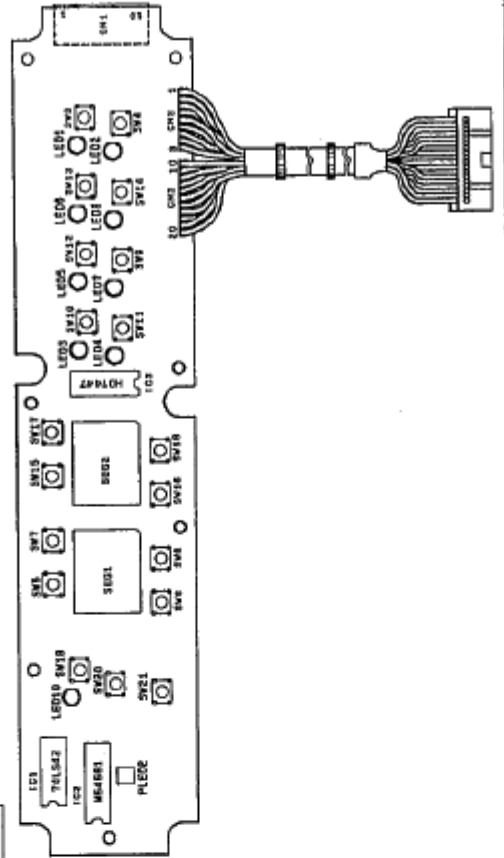
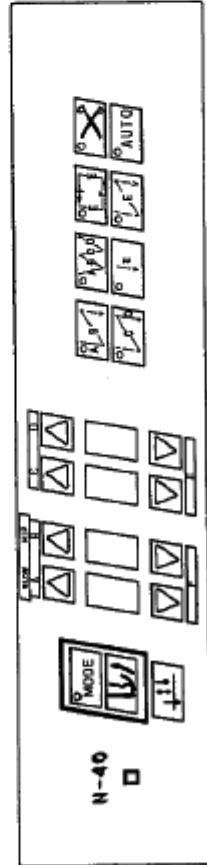
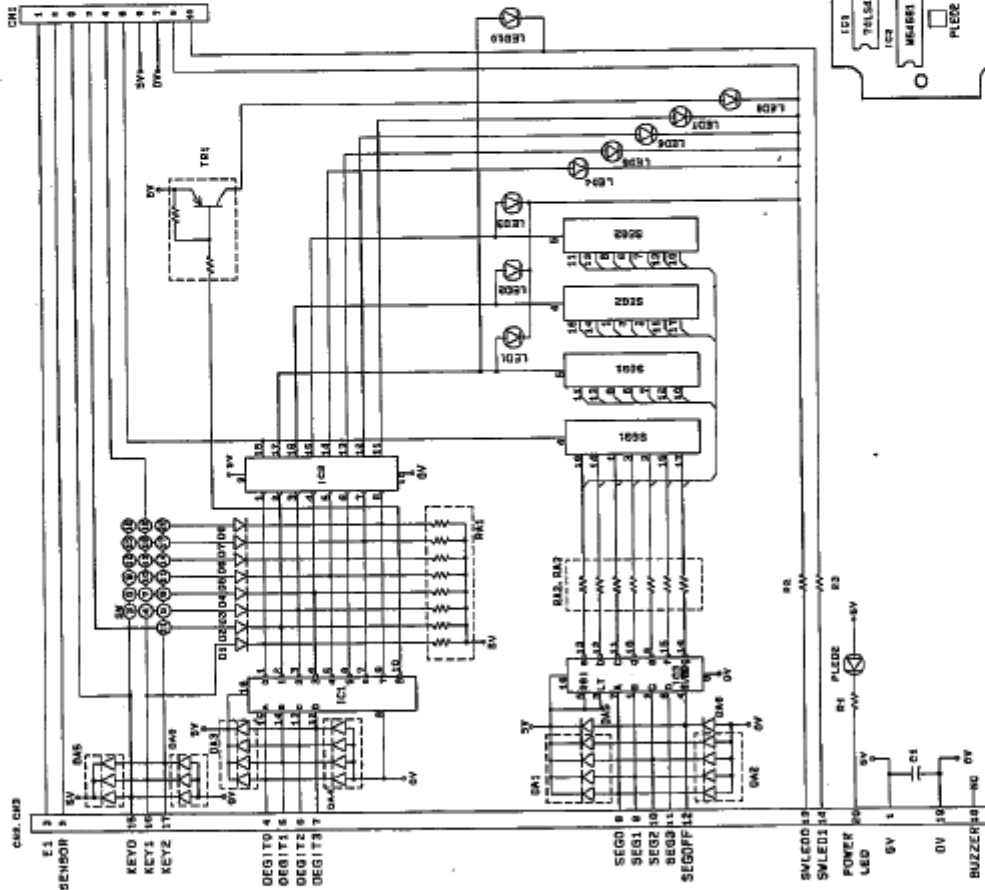
OP Printed-circuit board N20

SYMBOL	NAME	QTY	CODE
DA1, DA3, DAG	DAN601	3	532315000
DA2, DA4, DAG	DAN601	3	532235000
D1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	158177	13	132999001
LED1, 2, 3, 4, 5, 6, 7, 8, 9, 10	QL-EHQ22	10	U64015001
SEG1, 2, 4, 5	TLR225	4	233061001
SEG3	TLR253	1	233062001
RA1	R690K33J 33K. 1/8W	1	V63380041
RA2	R690V220J 220. 1/4W	1	J00084001
RA3	R690V220J 220. 1/4W	1	Y62204441
RA4	ERD-S2TJ471 4700. 1/4W	1	090471820
RA5	ERD-S2TJ101 1000. 1/4W	2	080101820
IC1	HD74154	1	091000184
IC2	MS4405P	1	233069001
IC3	MS4405P	1	233060001
IC4	T06230A4P	1	233665001
C1	ECEA1CA100 100. 18V	1	Y61002301
TR1	UM1124	1	233635001
TR2	UM1221	1	230935001
BU2	MEB-12B-12	1	J00082001
CM1	S109-XH-A	1	233068001
CM2, 3	HEPLUSCODER2	1	233096001
CM4	5138-03APB	1	234336001
CM5	HLB11R-1J	1	J00083001
PCB	947A047-2	1	J00081001



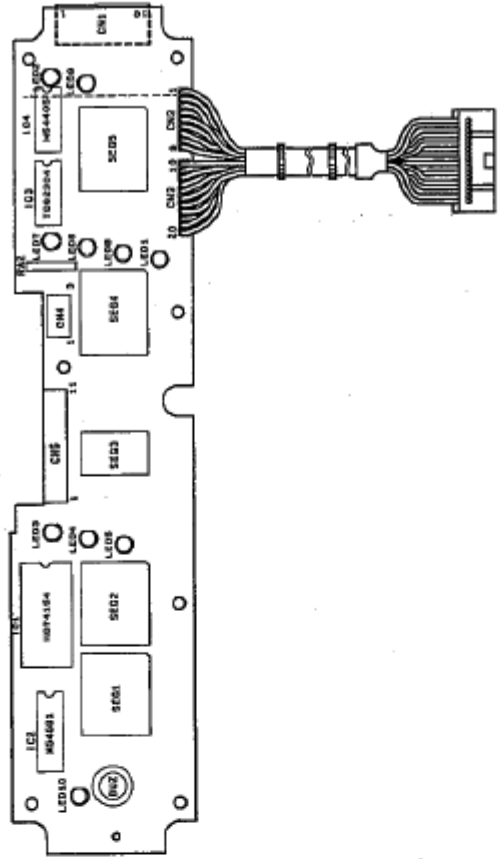
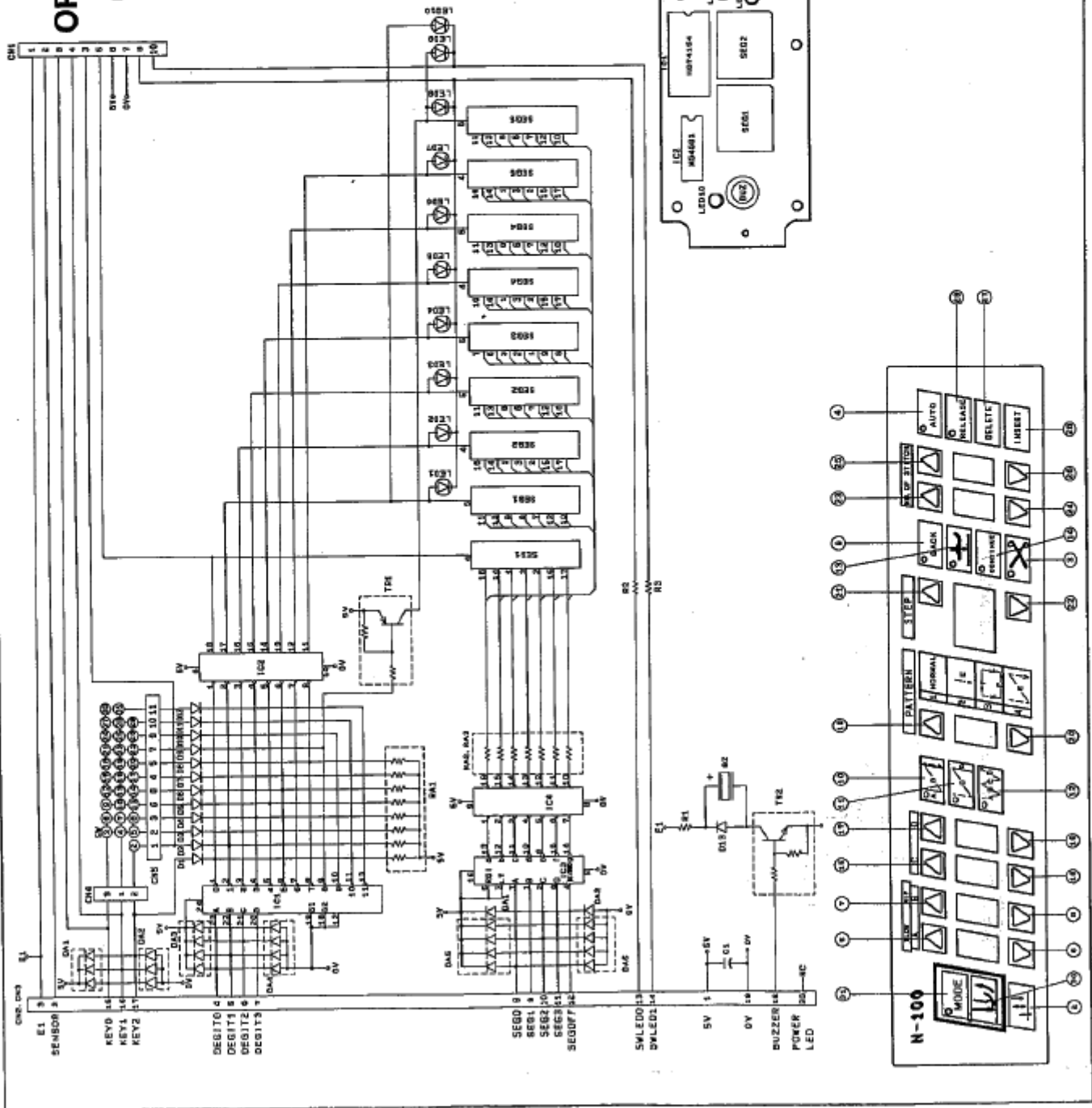
OP Printed-circuit board N40

SYMBOL	NAME	G*LY CODE
DA1, DA3, DA5	DAN401	3 523315000
DA2, DA4, DA6	DAF401	3 528235000
D1, 2, 3, 4, 5, 6, 7, 8	195177	8 132999001
LED1, 2, 3, 4, 5, 6, 7, 8, 10	GL-5HD22	9 U62015001
SEG1, 2	TLR326	2 233061001
SW3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21	B9F-1020	19 233089001
RA1	R6508X333J 33K, 1/8W	1 V63338041
RA2, RA3	R6504Y220J 22Ω, 1/4W	2 Y62204441
R1	ERD-S2TJ391 390Ω, 1/4W	1 090391820
R2, R3	ERD-S2TJ101 100Ω, 1/4W	2 090101820
IC1	HO74LS42	1 091100042
IC2	M645B1	1 233059001
IC3	HDT447	1 091000047
C1	ECEA1CKA100 10μ, 16V	1 Y41002301
TR1	UN1124	1 233895001
CH1	S108-XH-A	1 283054001
CH2, 3	HBPLUGCODE#2	1 233098001
PLED2	GL-9HD4	1 233082001
PCB	B67A046-1	1 J00089001

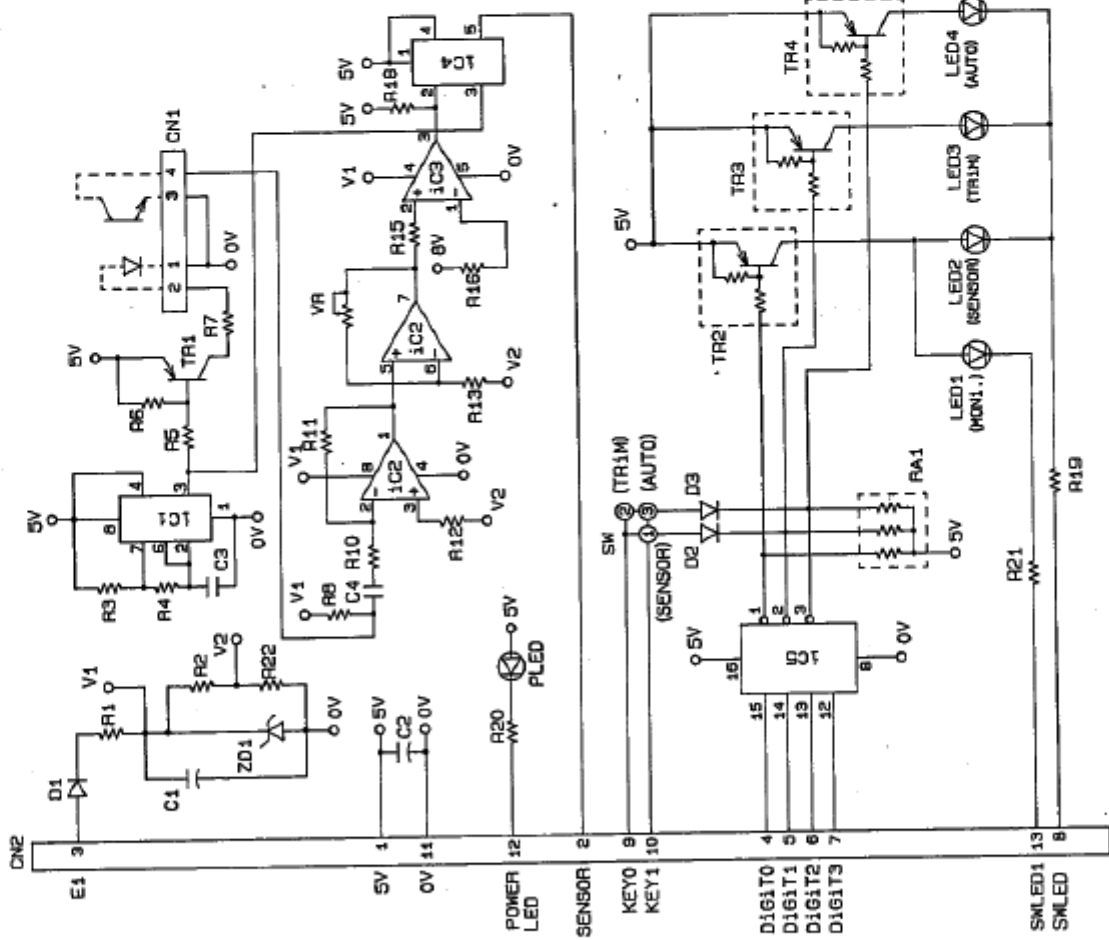


OP Printed-circuit board N100

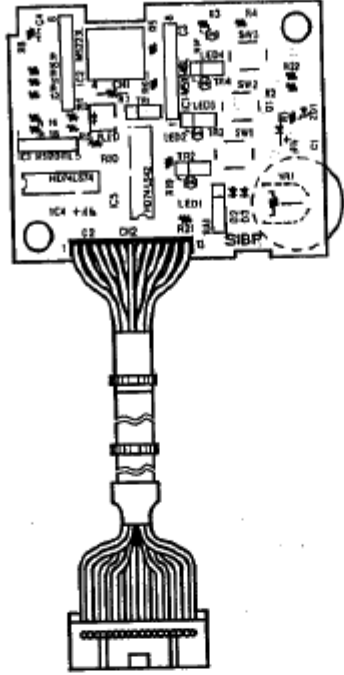
SYMBOL	NAME	QTY	CODE
DAL, DA3, DAS	DAL401	9	532315000
DA2, DA4, DAE	DAP401	3	838236000
DA1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	198177	13	132989001
LED1, 2, 3, 4, 5, 6, 7, 8, 9, 10	GL-6H022	10	U52015001
SEB1, 2, 4, 5	TLR325	4	233081001
SEB3	TLR355	1	233062001
RA1	RG8DX33J 33K 1/8W	1	Y63338041
RA2	RG8DY220J 220 1/8W	1	J00084001
RA3	RG8DY220J 220 1/4W	1	Y62504441
RA	ERD-S2TAA71 4700 1/4W	1	090471820
RA2, RA3	ERD-S2TJ101 1000 1/4W	2	091001020
IC1	H074154	1	031000134
IC2	M64601	1	233088001
IC3	M64605P	1	233060001
IC4	TD82304AP	1	233088001
C1	ECEA1CA100 10µ, 16V	1	Y41002301
TR1	UN1124	1	233855001
TR2	UN1221	1	230959001
BZ	MEB-12B-12	1	J00082001
CH1	510B-XH-A	1	233084001
CH2, 3	HBPLUGCODEH2	1	233088001
CH4	513B-03APB	1	234396001
CH5	HBL11R-1J	1	J00083001
PCB	547A04Y-2	1	J00081001



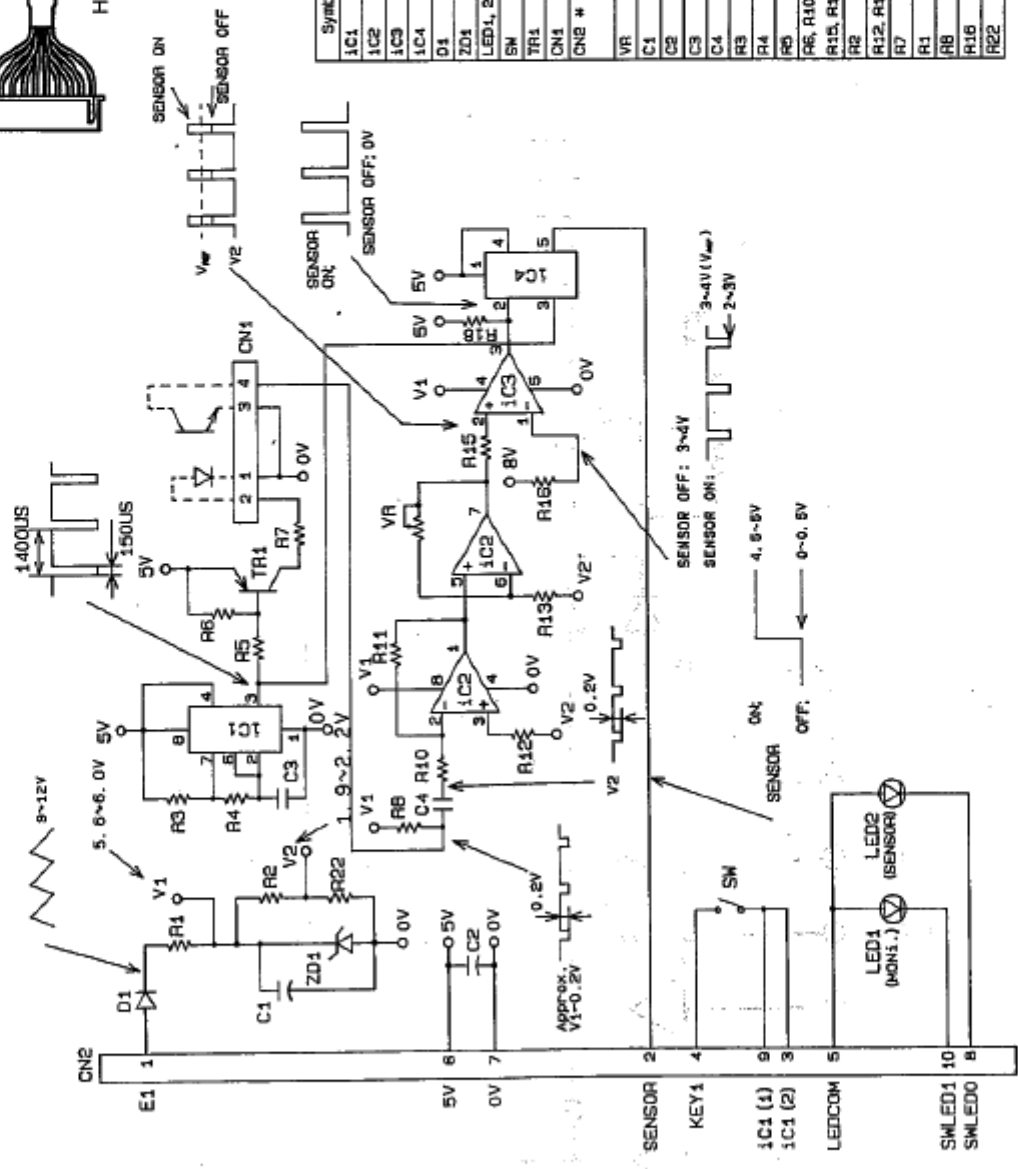
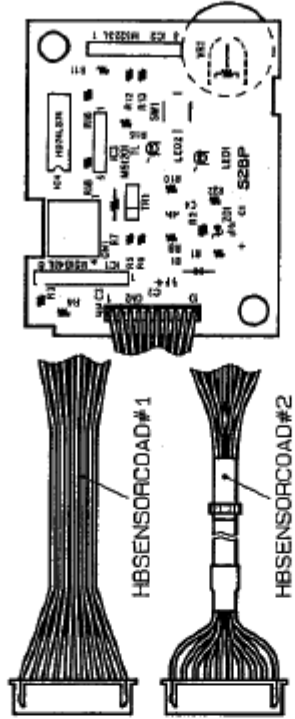
SENSOR Printed-circuit board S1



Symbol	Code	Name	Q'ty	Note
IC1	234340001	81P1CH5104BL	1	
IC2	U74631000	81P1CH522L	1	
IC3	234341001	81P1CH51201TL	1	
IC4	091100074	81P1C74LS74	1	
IC5	091100042	81P1C74LS42	1	
D1	230938001	S1D1SR38-100	1	
D2, D3	132999001	S1D1SR177	2	
ZD1	234338001	S1DR05.6USB3	1	
VR	233082001	LED0L-SF04	1	
LED1, 2, 3, 4	US2015001	LED0L-SF022	4	
SM1, 2, 3	233083001	SM83F-1020	3	
TR1	U15080000	S1TR25A1115	1	
TR2, 3, 4	233835001	S1TRJ1124	3	
CN1	136476001	CNS48-XH-A	1	
CN2	233262001	CBSENCOD ASSY.	1	
VR	233261001	VRV08L-8104	1	100K
C1	Y41012301	A-CAPAC10R16B101	1	100UF 16V
C2	Y41002301	A-CAPAC10R16B100	1	105F 16V
C3	Y21032420	C-CAPAC10F50B103	1	0.011F
C4	Y21042420	C-CAPAC10F50B104	1	0.11F
R1	090391520	DR-A14AJ3915	1	3900
R19, R21	090101620	DR-A14AJ1015	2	1000
R3	090124620	DR-A14AJ1246	1	120K
R4	090153620	DR-A14AJ1536	1	151K
R5, R20	090391520	DR-A14AJ3915	2	3900
R6, R10, R11	090103620	DR-A14AJ1036	3	101K
R2	090392620	DR-A14AJ3926	1	3.9K
R12, R13	090472020	DR-A14AJ4726	2	4.7K
R7	090200320	DR-A12AJ2003	1	1/3W, 200
RA1	Y51033041	PARREY103XB1	1	101K
R8	090221620	DR-A14AJ2216	1	2200
R16	090825920	DR-A14AJ8259	1	8.2K
R22	090222620	DR-A14AJ2226	1	2.2K



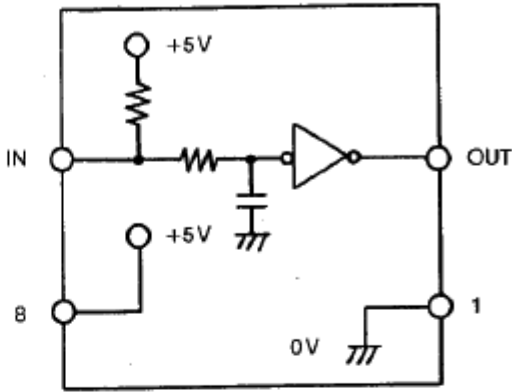
SENSOR Printed-circuit board S2



Symbol	Code	Name	Qty	Notes
IC1	234340001	BIPICH61848L	1	
IC2	U74631000	BIPICH6223L	1	
IC3	234341001	BIPICH61201TL	1	
IC4	091100074	BIPICH74LS74	1	
D1	230938001	S1D18R6-100	1	
ZD1	234338001	S1DR05.6LS83	1	
LED1, 2	U62015001	LED8L-S-082	2	
SM	233083001	SM83F-1020	1	
TR1	U16090000	S1TR28A1115	1	
CN1	136476001	CNS48-XH-A	1	
CNE #	233271001	HBSENSORC0AD#1	1	* Outside
	233274001	HBSENSORC0AD#2	1	* Built-in
VR	233261001	VRVORL-8104	1	100kΩ
C1	Y41012301	A-CAPAC10R168104	1	100μF 16V
C2	Y41002301	A-CAPAC10R168100	1	10μF 16V
C3	Y21032420	C-CAPAC10R508103	1	0.01μF
C4	Y21042420	C-CAPAC10R508104	1	0.1μF
R3	090124620	DR-A14AJ245	1	120Ω
R4	090153620	DR-A14AJ1536	1	15kΩ
R5	090381620	DR-A14AJ3815	1	380Ω
R6, R10, R11	090103620	DR-A14AJ1036	5	10kΩ
R12, R13	090992620	DR-A14AJ926	1	3.0kΩ
R14, R15	090472620	DR-A14AJ4726	2	4.7kΩ
R7	090200320	DR-A12AJ2005	1	1/2W, 200Ω
R1	090391620	DR-A14AJ3915	1	390Ω
R8	090221620	DR-A14AJ2215	1	220Ω
R16	090622620	DR-A14AJ6225	1	6.2kΩ
R22	090222620	DR-A14AJ2225	1	2.2kΩ

HIC CIRCUIT DIAGRAM

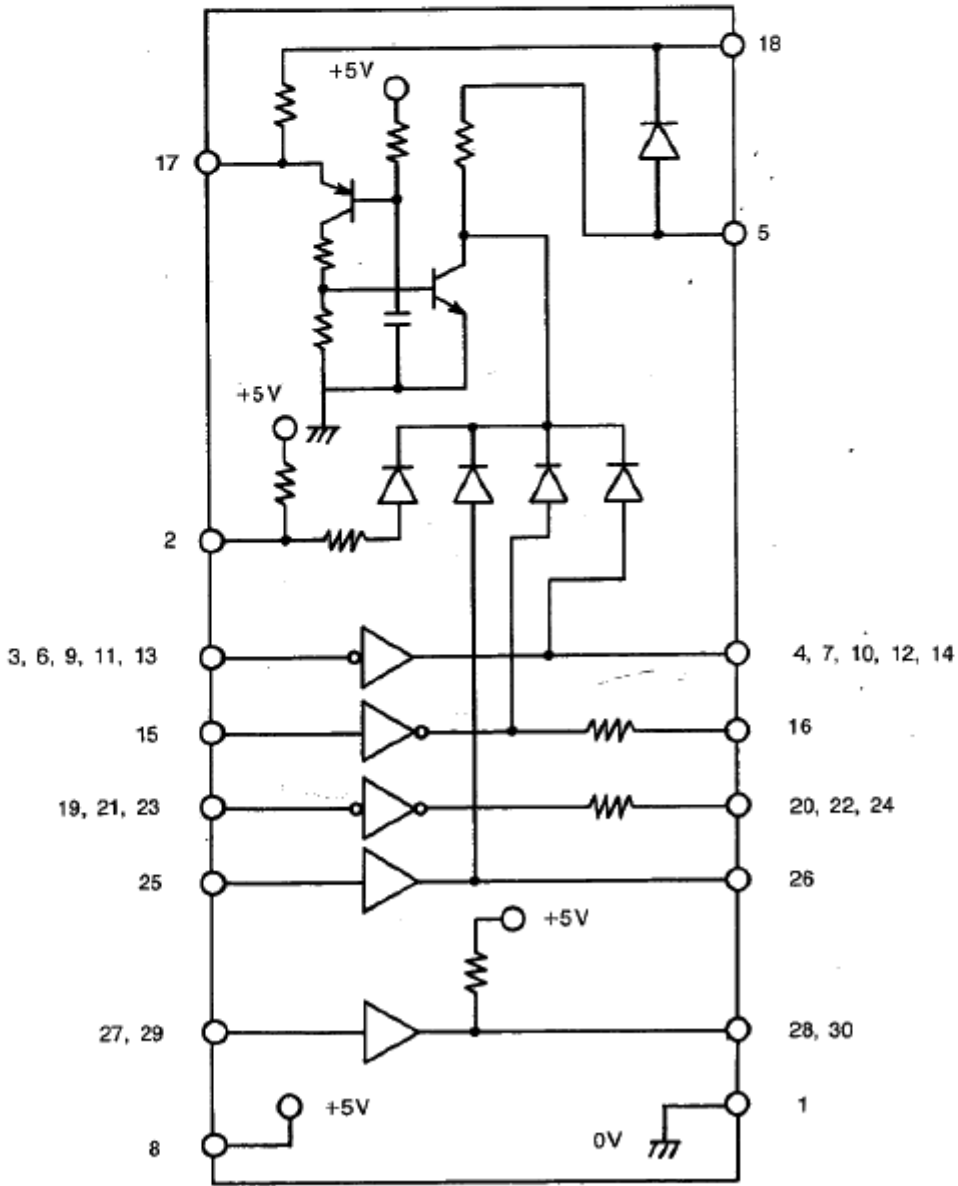
1 INP CIRCUIT (228307001)



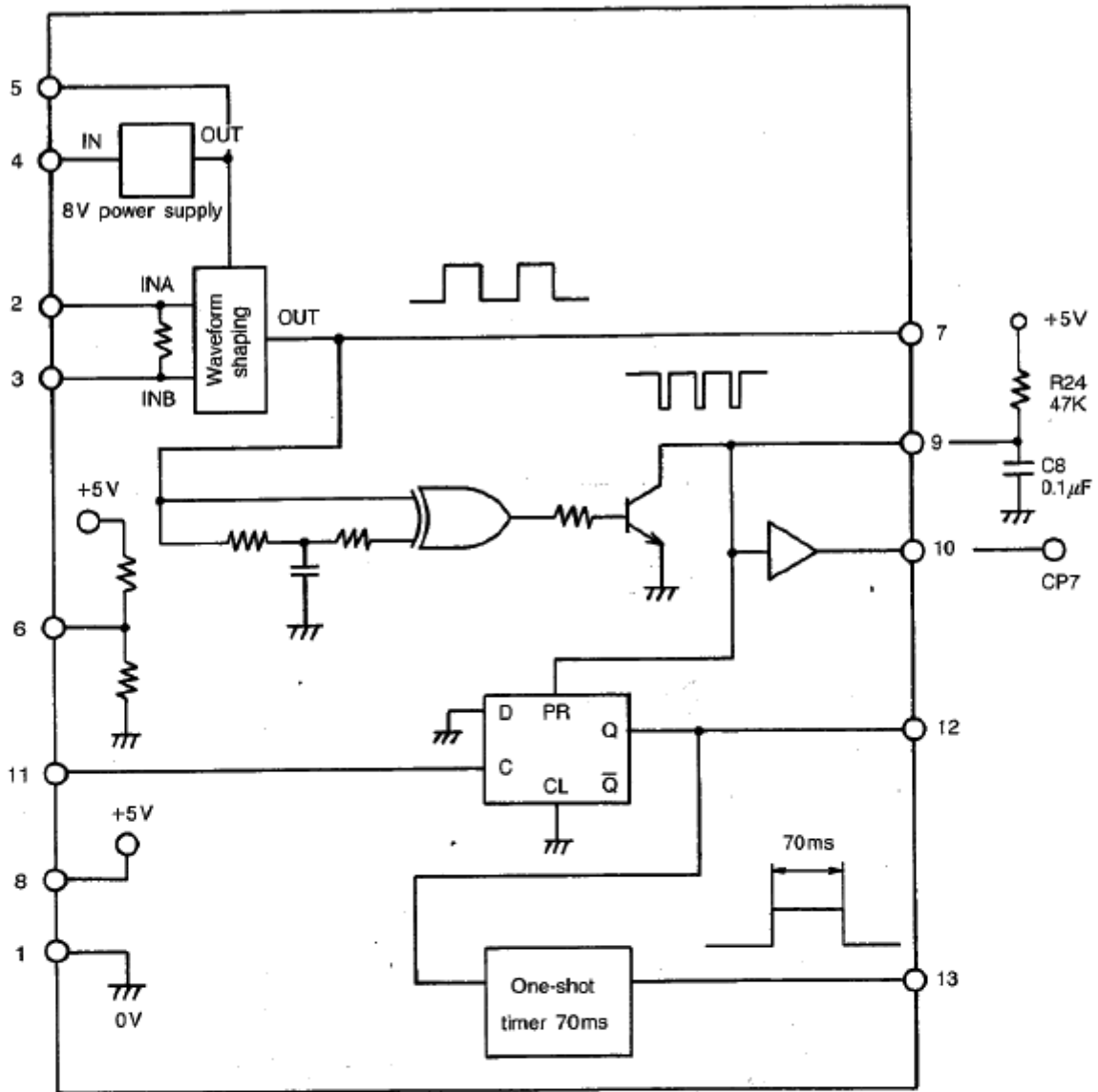
Pin No (IN-OUT)

IN	OUT	IN	OUT	IN	OUT
2	3	11	12	19	20
4	5	13	14	22	21
6	7	16	15	24	23
9	10	18	17	25	26

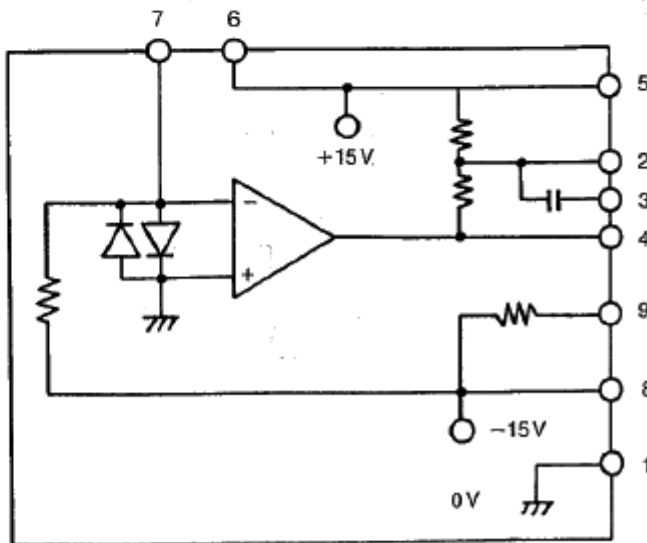
2 OUT DRIVE (228308001)



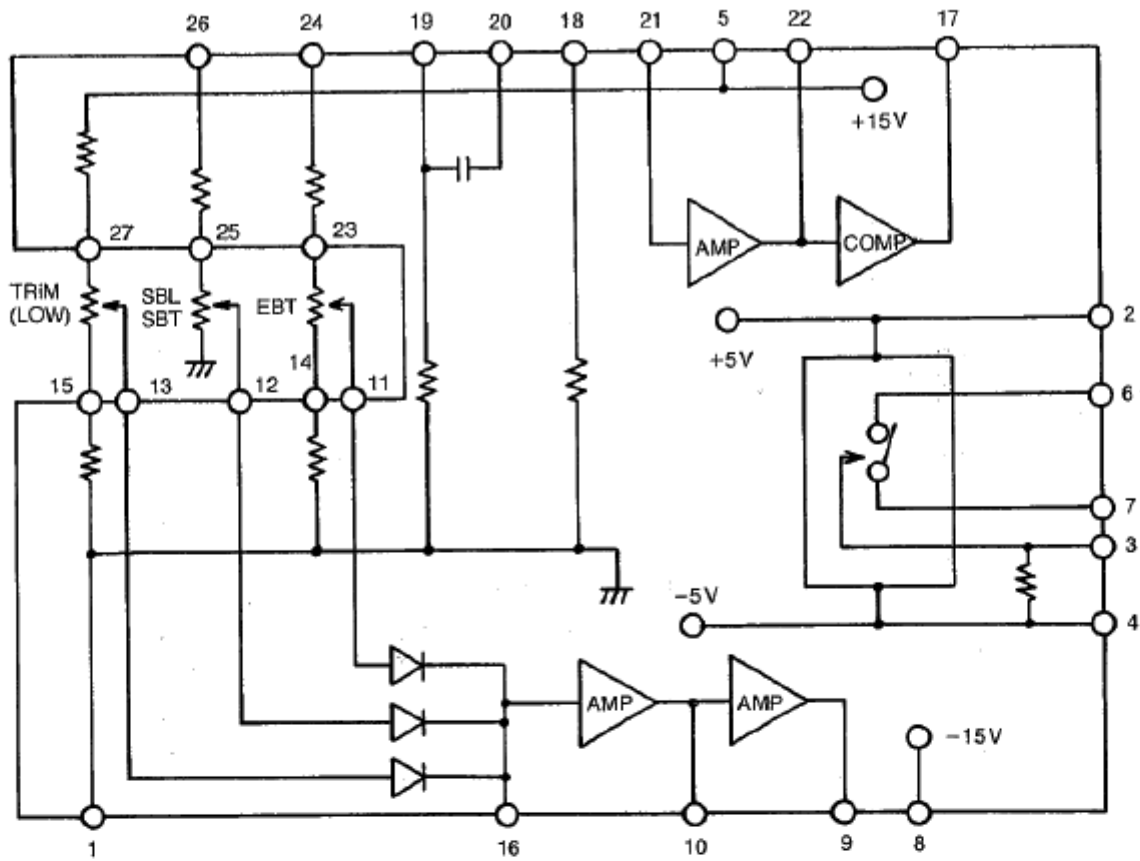
3 ENC CONT (228309001)



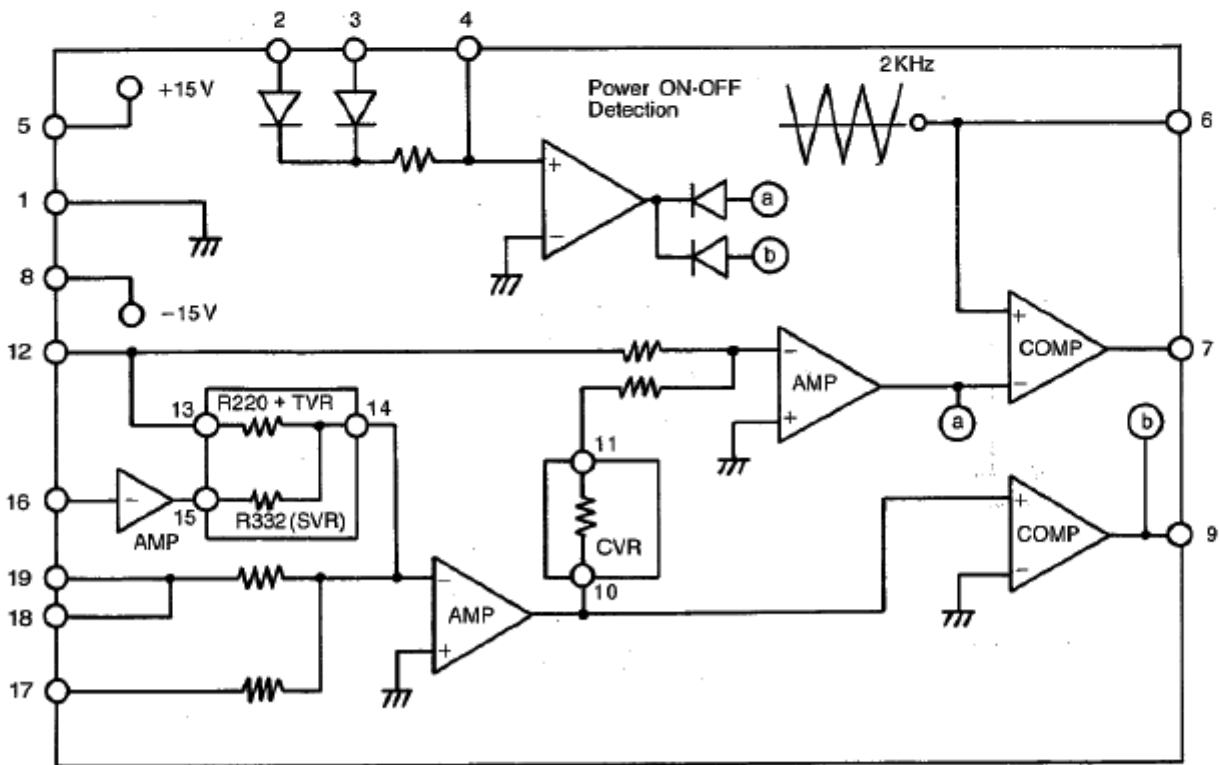
4 MOTOR DRV (228310001)



5 MOTOR INST (228311001)



6 MOTOR CONT (228312001)



FRAME ASSEMBLY #2 REPLACEMENT

Refer to the motor disassembly diagram (Fig. 1).

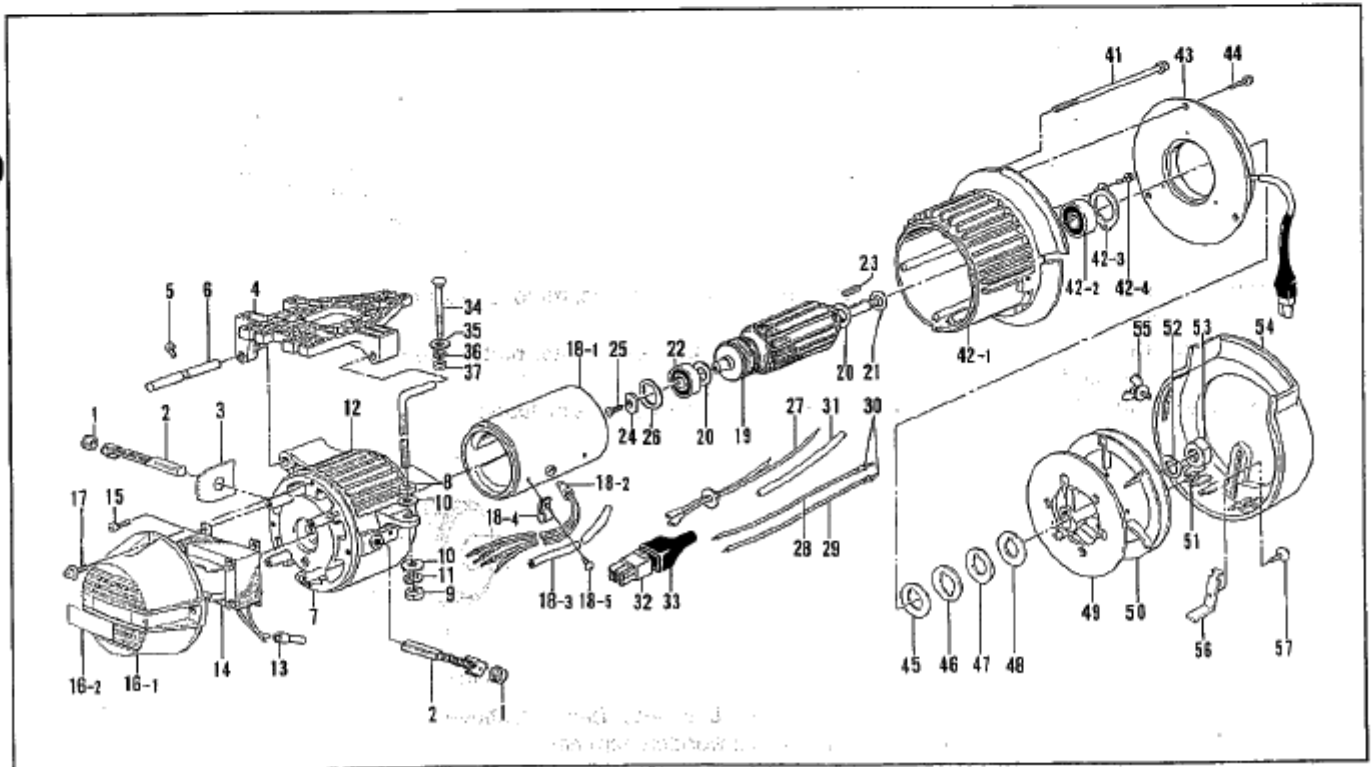
Disassembly

- (1) Remove the two MD carbon brushes 1.
Note: The position of each carbon brush should be noted.
- (2) Remove the screw 55 and the belt cover 54.
- (3) Remove the nut 53, and then remove the pulley 50 and the brake armature assembly 49 from the rotor shaft.
- (4) Remove the sunk key 23 and the washers 45~48.
- (5) Remove the screw 44 and the brake stator assembly 43.
Note: If the stator is difficult to remove, strike it gently to loosen it.
- (6) Remove the screw 41, the separate bracket R 42-1 and bracket assembly L 12. A slight knock may help.
- (7) Take out the rotor 19 from the frame assembly 18-1. **(Note)**
Because the rotor is held in the frame assembly 18-1 by magnetic force, the rotor should be grasped tightly and care should be taken so that the commutator part (see Fig. 3) of the rotor does not touch the magnet inside the frame.
Be careful not to lose the motor shaft's spring washer 20 and collar 21.
- (8) Using the molex pin remover (J5800-03), take out all pins from the 6-pin plug 32.
- (9) Pull out the plug cover 33 and the tube 31 from the cord assembly.
- (10) Cut at the crimped part of the two black cords, as close to the end of the cord as possible, and then separate.
- (11) The frame assembly 18-1 can then be removed from bracket assembly L 12. A slight knock may be necessary to facilitate removal.

(Note)

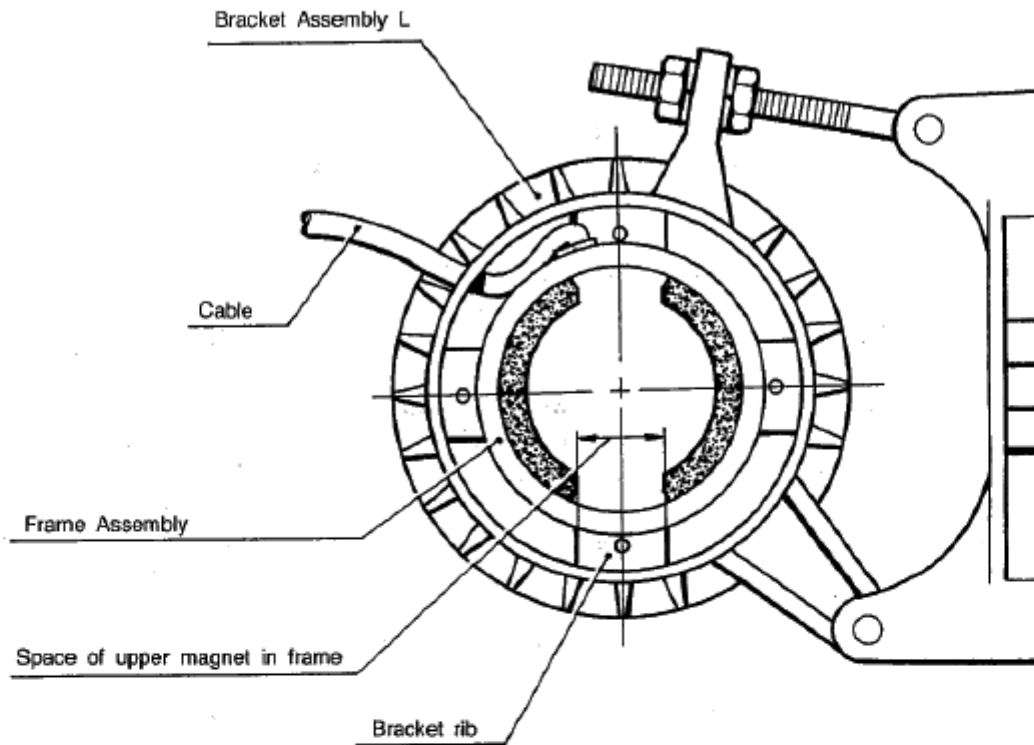
Perform steps 1-3 below before removing the rotor from the motor.

1. Remove the screw 17 and reactor cover 16-1.
2. Remove the screw 15 and reactor 14.
3. Remove the screw 25.



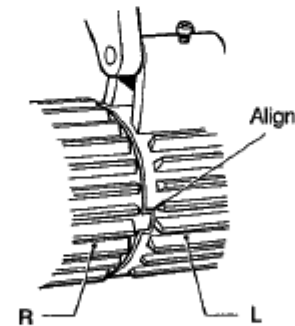
2 Assembly

- (1) Pass the cable of the new frame assembly through bracket assembly L.
When doing so, note the following.
 - 1) Be careful that the cable is not caught in the frame.
 - 2) Be sure to align the bracket's rib with the space of the upper magnet in the frame.

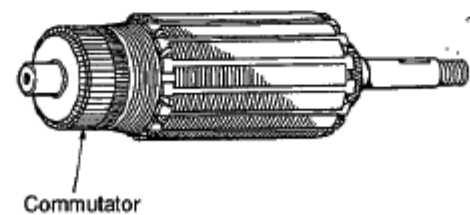


(Fig. 2)

- (2) Align the projection of bracket R with the groove of bracket L, and then try insertion.
Note that insertion cannot be completed unless the rib within bracket R is aligned with the clearance of the upper magnet within the frame.
For alignment, move the position of the frame assembly.



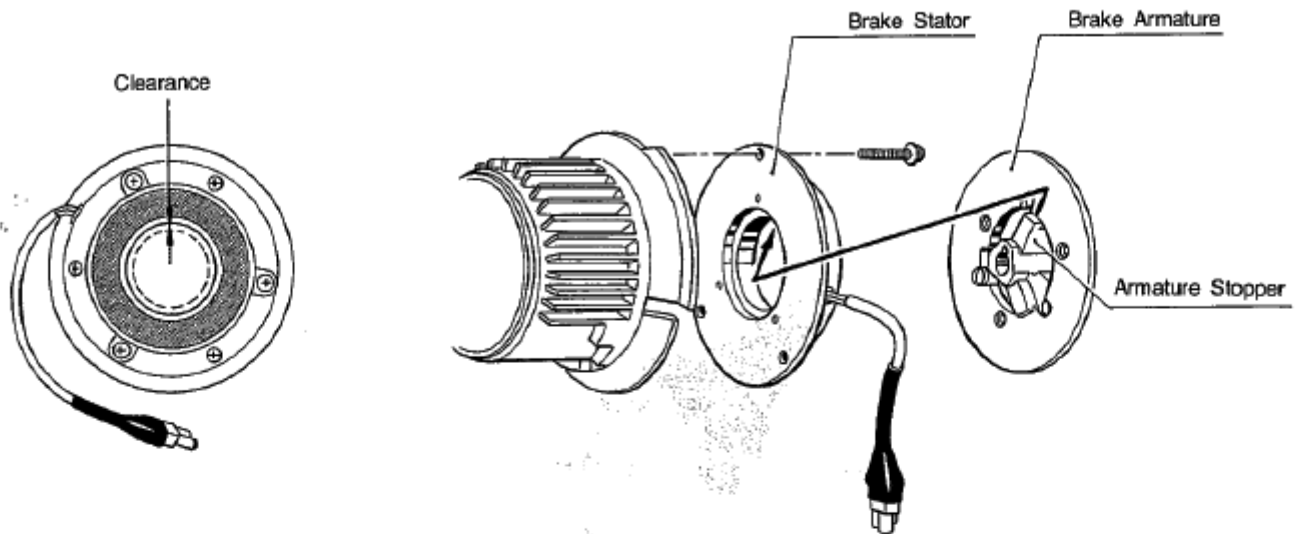
- (3) When the installation position of the frame assembly is adjusted, remove bracket R once again and push the rotor all the way into bracket L.
At this time the rotor must be grasped tightly so that the commutator part of the rotor does not make contact with the magnet inside the frame.
Be sure not to forget to check whether or not the spring washer is included.



(Fig. 3)

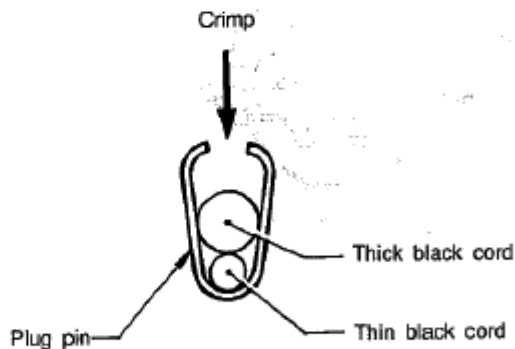
- (4) Install bracket R so that it is positioned with bracket L as described in 2. above.
When the position is correct, gently tap it in using a wooden hammer.
- (5) Insert and tighten the four screws in the screw holes in bracket L.

- (6) Temporarily secure the brake stator assembly to bracket R using a screw.
- (7) Insert the washer and sunk key on the rotor shaft, and then insert the brake armature assembly.
- (8) Align of the brake stator.



Adjust the position of the brake stator so that, as shown in the figure at the right, the clearance opens between the brake armature's armature stopper and the inner side of the brake stator when the brake armature is rotated. A noise will be heard if there is contact, so the position is OK if no noise is heard. After the correct position has been determined, fully tighten the screw that was previously temporarily tightened. If the brake armature interferes, remove the brake armature after tightening to a certain extent, and then tighten further.

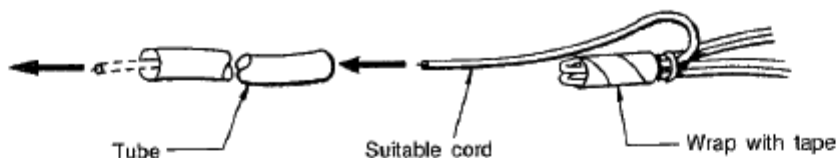
- (9) After installing the pulley and securing it with the three screws, tighten the 14 lock nut to the rotor shaft.
- (10) Install the belt cover and tighten the screw.
- (11) Simultaneously crimp together, as described below, the black cord divided at the time of disassembly and the new frame's black cord.



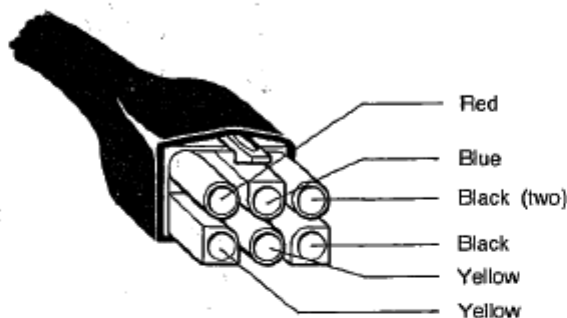
Plug pin = Part No. 217133-001
 Pin remover = molex J5800-03
 Crimper = JHTR 1031C

(12) Pass all through the new tube.

If, rather than a new tube, the plate tube used before is used as is, the following method is easy.

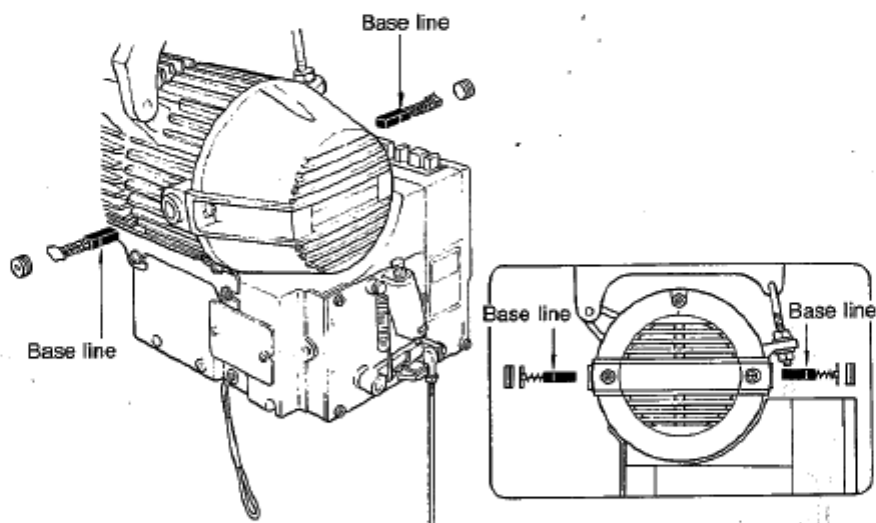


(13) Pass all plug pins through the plug cover and insert at the 6-pin plug's designated position.



(14) Secure the installation plate using a screw, and then affix two lead clamps to the holes at the upper part of the plate and secure the cable.

(15) Insert the carbon brushes at their designated positions and in the correct direction.



3 Megger test

After assembly is completed, check (using a megger) to be sure that there is 100 mega-ohms or more resistance.

4 Needed for replacement

(1) Parts

Name	Code
1. Frame assembly #2	230431-001
2. Plug pin	217133-001

(2) Tools

1. Pin remover	Molex J5800-03
2. Crimper	Molex JHTR1031C

