9. MAIN MOTOR DRIVE UNIT

1. Standard Specifications P-1
2. Configuration P-3
2.1 System Configuration P-3
2.2 Components of VS-626 MTII and AC Spindle Motors P-3
3. Preparation for Operation P-4
3.1 ⚠Check before Test Run P-4
3.2 Shunt Connector Setting P-4
3.3 Adjustment of Setting Switch P-5
3.4 Checking Potentiometer Setting P-7
3.5 Checking Power Supply Voltage P-7
4. ⚠Adjustment during Test Run P-8
4.1 ⚠Check of VS-626MTII Controller P-8
4.2 Adjustment P-10
4.2.1 Adjustment of Motor Speed (NADJ, NREV) P-11
4.2.2 Adjustment of Speedometer (SMADJ) P-12
4.2.3 Adjustment of Load Meter (LMADJ) P-12
4.2.4 Adjustment of Torque Limit (TLIM) P-13
4.2.5 Adjustment of Speed Coincidence Detection Level (N DET) P-14
4.2.6 Adjustment of Torque Detection Level (T DET) P-14
4.2.7 Adjustment of Loop Gain of Speed Control System (N GAIN) P-14
4.2.8 Adjustment of Accel/Decel Time (TIME) P-15
4.2.9 Offset Adjustment of Speed Control System P-15
5. ⚠Maintenance P-16
5.1 Daily Inspection Items P-16
5.2 Periodic Inspection P-17
5.2.1 Prolonged Storage P-18
5.3 ⚠Checking Power Semiconductor Elements P-18
5.3.1 Transistor Module P-18
5.3.2 Diode Module P-20
5.3.3 Thyrister Module P-20
5.4 Troubleshooting P-21

1. Standard Specifications

Table 1.1 shows the standard specifications of AC spindle motors and VS-626MTII controller.

Table 1.1 Standard Specifications

Spindle Motor [Three-phase Squirrel-cage Induction Motor]								
Mounting		Foot-mounted Type for Lathe						
Motor Type		EEA-IKM						
Frame		EE-112 MTB	EE-132 STB	EE-132 MTB	EE-160 MTB	EE-160 MTF	EE-160 LTF	EE-160 TX
Rated Power kW (HP)	30-minute Rating (50% ED*)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)	18.5 (25)	22 (30)	26 (35)
	Continuous Rating	3.5 (5)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)	18.5 (25)	22 (30)
Rated Current A	30-minute Rating (50% ED*)	40	53	74	90	95	105	112
	Continuous Rating	29	42	55	69	80	92	98
Rated Speed rpm	Base Speed	1500 (40 to 1500rpm: constant torque)						4500 (1500 to 4500rpm: constant power)
	Maximum Speed	6000 (1500 to 6000rpm: constant power)						
Torque at Base Speed kg.m (Continuous Rated Power) (lb.ft)		2.40 (17.4)	3.57 (25.8)	4.86 (35.2)	7.14 (51.7)	9.73 (70.4)	12.00 (86.8)	14.28 (103.5)
Rotor GD^2 kg.m^2 (lb.ft^2)		0.066 (1.56)	0.13 (3.08)	0.16 (3.74)	0.27 (6.40)	0.39 (9.24)	0.46 (10.9)	0.54 (12.8)
Overload Capacity		120%, 60s of 30-minute rating						
Cooling Method		Totally-enclosed externally fan-cooled type						
Power Supply for Cooling Fan Motor		Three-phase 200 VAC, 50 or 60 Hz; 220 VAC, 50 or 60 Hz; 230 VAC, 60 Hz						
Insulation		Class E				Class F		
Operating Temperature of Thermal Protector (Normally Closed Type)		120 ±5°C (239 - 257°F)				155 ±7°C (298.4 - 323.6°F)		
Ambient Temperature Humidity		-10 to +40°C (14 to 104°F), 95% RH or below (no condensation)						
Vibration†		V-10 or below						
Noise (A) Level		76 dB or below				80 dB or below		
Finish in Munsell Notation		2.5PB5/2						
Speed Detector		Multipole resolver (TDIA-72B)						

VS-626MTII (Controller)								
Type CIMR-MTII-[ ]		5.5KB	7.5KB	11KB	15KB	18.5KB	22KB	26KB
Power Supply		Three-phase, 200 VAC, 50 or 60 Hz; 220 VAC, 50 or 60 Hz; 230 VAC, 60Hz (voltage fluctuation: +10 to -15%)						
Max Required Power Supply	kVA	9	12	19	24	30	35	40
Circuit		PWM transistor inverter						
Control Method		Vector control (with automatic field-weakening control)						
Braking Method		Regenerative braking						
Speed Adjustable Range		40 to 6000rpm (1:150)						
Speed Regulation		0.2% maximum speed or below (load variation 10 to 100%)						
Overload Capacity		120%, 60s of 30-minute rating						
Speed Command Voltage		±10VDC (+, forward and -, reverse) or +10VDC (forward and reverse signals)						
Ambient Temperature	At Operation	0 to +55°C (32 to 131°F)						
	At Storage	-10 to +60°C (14 to 140°F)						
Humidity		10 to 95% RH (no condensation)						

* Duty cycle
† V5 (vibration of 5 microns or less in full-amplitude) is available on order.

Note: 1. The rated power is guaranteed where power supply is 200VAC, 50 or 60Hz; (220VAC, 50 or 60Hz; 230VAC, 60Hz).
There are some cases where the rated power cannot be obtained even if the power supply fluctuates within the allowable range.

2. Configuration

2.1 System Configuration

With the VS-626MTII, a machine tool spindle AC drive system is configured as shown in Fig. 2.1.

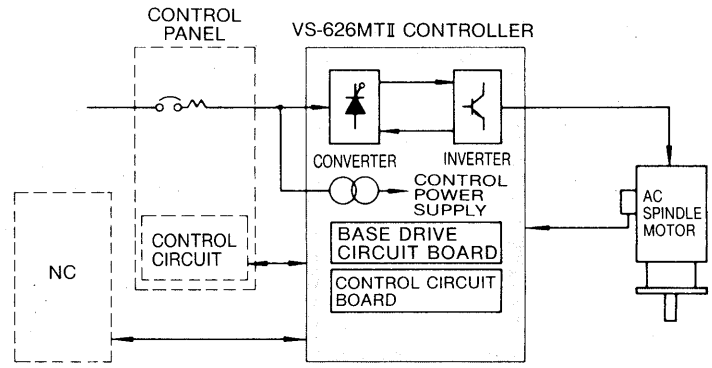


Fig. 2.1 VS-626MTII System Configuration

2.2 Components of VS-626MTII and AC Spindle Motors

The construction of VS-626MTII is shown in Fig. 2.2.

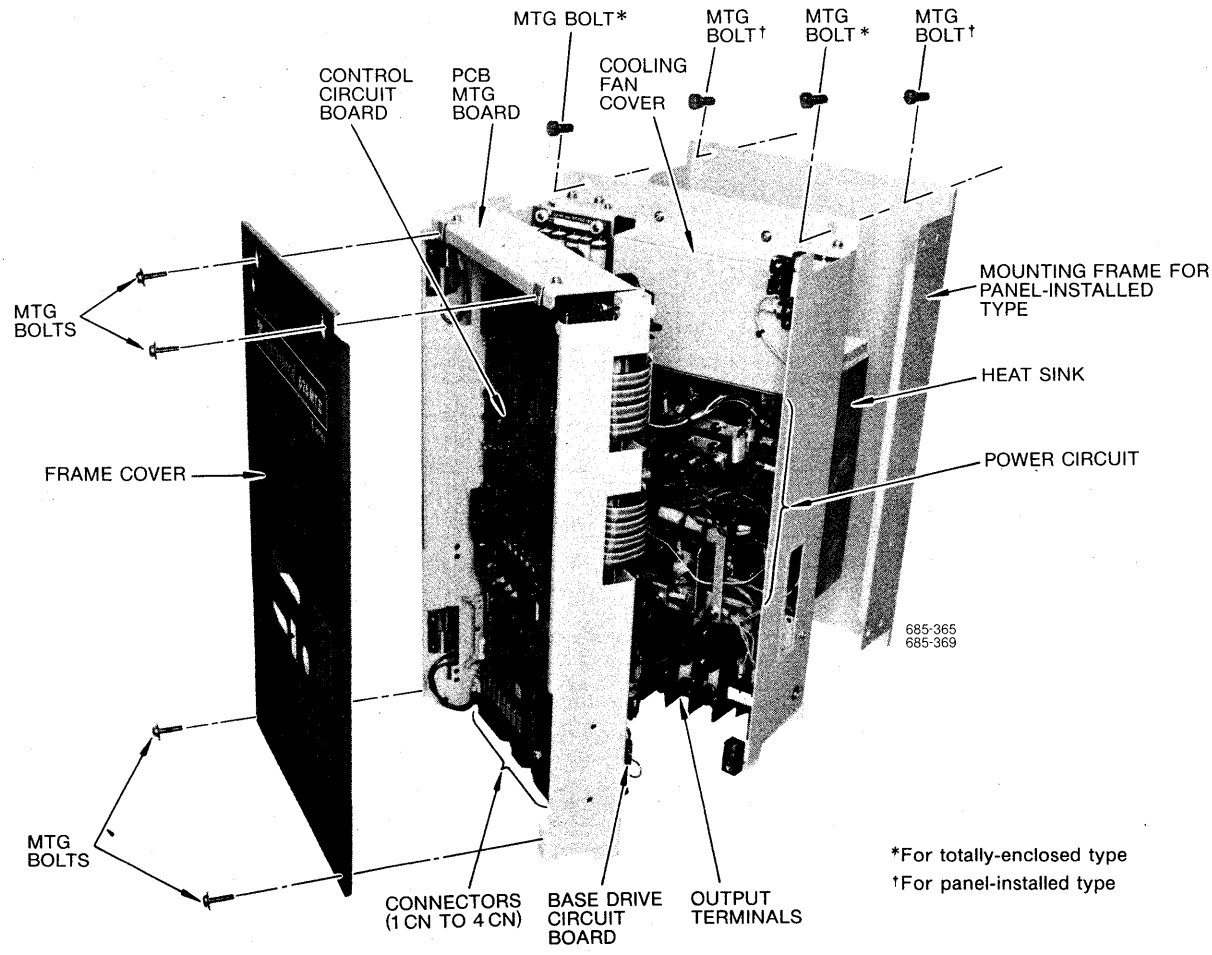


Fig. 2.2 Construction of VS-626MTII Type CIMR-MTII-7.5KB

3. Preparation for Operation

3.1 Checks before Test Run

After completing mounting and connection of units, check for:

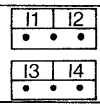
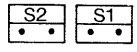
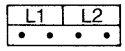
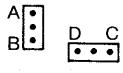
⚠ *CAUTION*

- Correct connections. Never use control circuit buzzer check.
- No loose screw terminals (Input/output terminals, fuses, parts in main circuits)
- Connectors are firmly connected to proper terminals, etc.
- No short-circuit conditions
- Operable condition of the motor, spindle and machines.

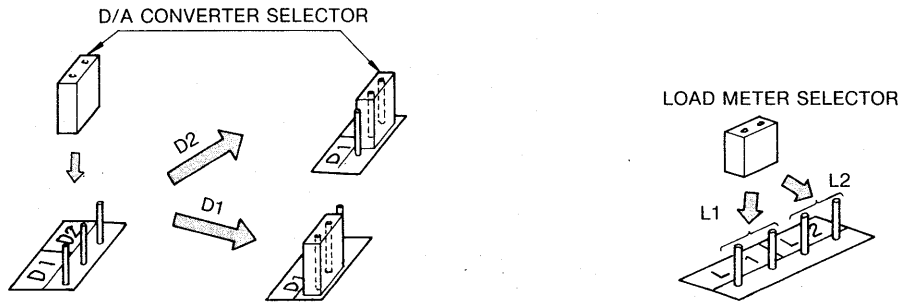
3.2 Shunt Connector Setting

Shunt connectors shown in Table 3.1 are temporarily preset at the factory, except for those marked with "*". Therefore, the connectors must be properly selected by the customer in accordance with machine specifications. Refer to Fig. 3.2 and 3.3 for the location of the shunt connectors on the printed circuit boards.

Table 3.1 Shunt Connector Setting

Function	Description	
D/A converter selection		D1: 12-bit binary specifications D2: 3-digit BCD specifications
Speed input selection		N1: Analog speed command input (+10V/100%) N2: Digital speed command input (D/A converter)
Orientation command selection		O1: Where orientation card is used. O2: Orientation by NC
*Current command phase compensation		I1, I3: Standard I2, I4: Not used
Speed coincidence detection level		A1: Within ±30% (for rated speed) A2: Within ±15% (for rated speed)
Speedometer selection		S1: Voltmeter (10V full scale) S2: Ammeter (1mA full scale)
Load meter selection		L1: Voltmeter (10V full scale) L2: Ammeter (1mA full scale)
Malfunction relay mode selection		F1: Alarm relay normally not energized. F2: Alarm relay normally energized.
*Regenerative current limit level selection		A, D: Units other than 11kW unit B, C: 11kW unit only

* Shunt connectors with * are preset at the factory.
Do not tamper with these connectors.



(a) D/A Converter Selection (b) Load Meter Selection

Fig. 3.1 Selection of Shunt Connector

3.3 Adjustment of Setting Switch

1DS on the control circuit board is a selector switch for rated speed. Set the rated speed in accordance with machine specifications. Also, 1 to 4 DRS on the control board and 1 to 3 DRS on base drive board are set according to the type and capacity of the motor and VS-626MTII controller. If these settings are incorrect, the protective circuit may not function as intended. Thus, it is necessary to confirm that the settings are the same as the standard settings shown in Tables 3.2 and 3.3. For the location of setting switch on the printed circuit boards, refer to Figs. 3.2 and 3.3.

Table 3.2 Switch Setting of Control Circuit Board

Function	Symbol	Description						
Rated Speed (rpm)	1DS	1: - 2: 4500 3: 5250 4: 6000						
Speed Controller Gain (Orientation Control)	2DS	1: - 2: P control 3: Medium 4: Low ALL OFF: High						
Slip Frequency Setting, Flange-mounted Type (Foot-mounted Type)	Capacity (kW)	5.5	7.5	11	15	18.5	22	26
	1DRS	8(1)	4(3)	9(9)	9(1)	1(1)	5(5)	0(0)
	2DRS	7(8)	6(4)	3(3)	4(2)	1(1)	1(1)	1(1)
Exciting Current Setting, Flange-mounted Type (Foot-mounted Type)	Capacity (kW)	5.5	7.5	11	15	18.5	22	26
	3DRS	E(5)	E(D)	8(8)	6(5)	7(7)	5(5)	6(6)
	4DRS	E(5)	E(D)	8(8)	6(5)	7(7)	5(5)	6(6)

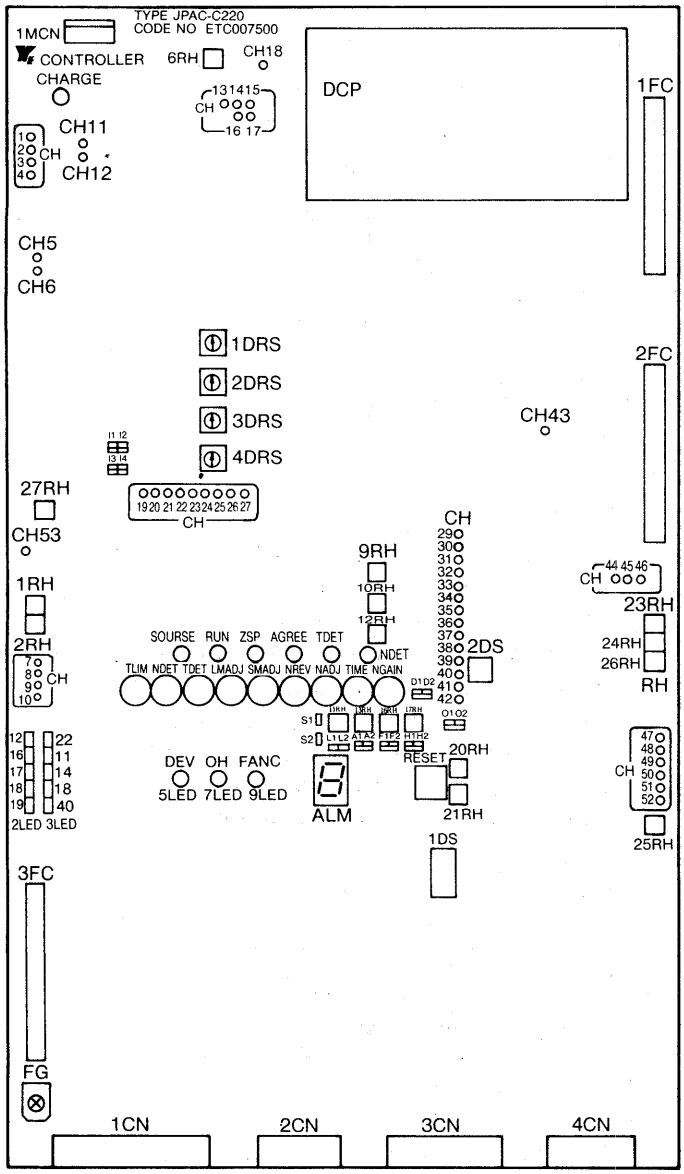


Fig. 3.2 Component Layout of Control Circuit Board

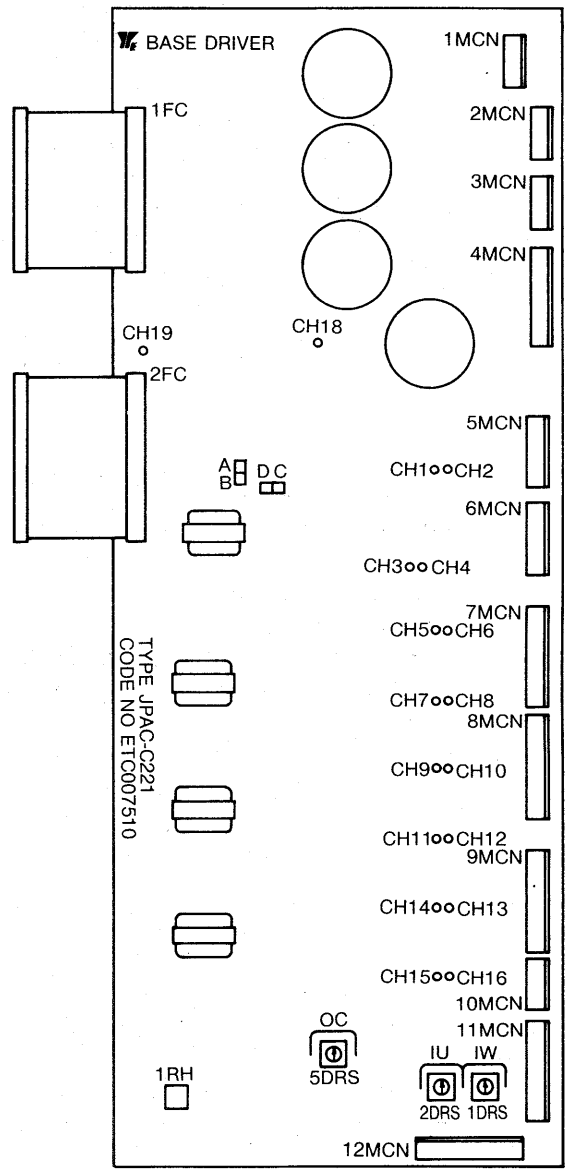


Fig. 3.3 Component Layout of Base Drive Circuit Board

Table 3.3 Switch Setting of Base Drive Circuit Board

Function	Symbol	Description						
Current Detection Gain, Flange-mounted Type (Foot-mounted Type)	Capacity (kW)	5.5	7.5	11	15	18.5	22	26
	1DRS	6(A)	A(B)	8(8)	C(B)	C(C)	D(D)	E(E)
	2DRS	6(A)	A(B)	8(8)	C(B)	C(C)	D(D)	E(E)
Overcurrent Detection Level	Capacity (kW)	5.5	7.5	11	15	18.5	22	26
	5DRS	5	5	4	5	5	4	4

An arrow is marked on the selector switch as shown in Fig. 3.4. In the example shown in Fig. 3.4, "0" setting is shown.

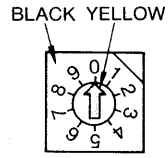


Fig. 3.4 Setting Switch

3.4 Checking Potentiometer Setting

The potentiometers have been adjusted to appropriate level at the factory. The potentiometers other than those shown below are paint-locked. Be sure that the lock positions are not slided from the paint. Refer to Figs. 3.2 and 3.3 for the position of each potentiometer on the printed circuit boards.

. Potentiometers not paint-locked

NADJ, NREV, LMADJ, SMADJ

3.5 Checking Power Supply Voltage

Confirm that the input power supply voltage is within the allowable range shown in Table 3.4.

Table 3.4 Allowable Range of Power Supply Voltage

Rated Voltage V	Frequency Hz	Allowable Range V
200	50/60	170-220
220	50/60	187-242
230	60	195.5-253

Note: Spindle drive system can normally operate within a range of 170 to 253V and has been set in such a manner that the optimum characteristics can be obtained between 200 and 240V. Therefore, if the input voltage can be changed by switching the transformer taps, operation with the most desirable characteristics can be obtained by setting the input voltage within the 200 to 240V range.

4. Adjustment During Test Run

> ⚠ *CAUTION*
> Observe the following precautions before turning on the power:
> . Check to be sure that these is no obstacle interrupting operations.
> . Before starting operation, warn the personnel hereby.
>
> Turn on the power for VS-626MTII after securing safety around the equipment.

4.1 Check of VS-626MTII Controller

After turning on the power, LEDs of "ZSPD", "SOURCE" and "NDET" in the central part of the printed circuit boards light (green), and "CHARGE" LED in the upper left corner will light dimly (red). If the Ready signal is closed, the input interface indicator lamp 2LED-12 lights (green) and "CHARGE" LED will light brightly (red).
At this time, if the malfunction indicator lamp lights or the normal indication of LEDs, as stated above, does not occur, investigate in accordance with troubleshooting procedures. (See Figs. 5.7 to 5.16)

Table 4.1 to 4.3 show the contents of LEDs on the printed circuit boards. Refer to Figs. 3.3 and 3.4 for the position on the printed circuit boards.

Table 4.1 Input Interface Indications

2LED	Signal	3LED	Signal
12	Ready signal (RUN SB)	22	Orientation (ORICM)
16	Forward run (FOR RN)	11	Malfunction reset (RESET)
17	Reverse run (REVRN)	14	Override cancel (ORCAN)
13	Emergency stop (EM STP)	18	Torque limit (H)
19	Soft start cancel (S SCAN)	40	Torque limit (L)

Table 4.2 Status Indications

LED Code	Color	Indication	Status Description
CHARGE	Red	Power charge	Voltage applied to or remains in main capacitor
SOURCE	Green	Power supply	Power supplied to main circuit and ready to operate
RUN	Green	Motor running	Power supplied to spindle motor
ZSPD	Green	Zero speed	Spindle motor stopped or idling (below 30 rpm)
AGREE	Green	Speed coincidence	Motor speed coincides with command value (±15%).
TDET	Green	Torque detection	Torque command value exceeds set value.
NDET	Green	Speed detection	Motor speed lower than set value
DEV	Red	Excessive speed deviation	Motor speed drops below 50% of command value.

. Protective Functions for VS-626MTII

If trouble occurs, the base signals to the main transistor are interrupted and the alarm signal is output as a contact signal. The alarm status is indicated by the numerical symbol on the control board, as shown in Table 4.3.

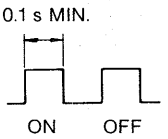
Table 4.3 Protective Functions for VS-626MTII

Alarm			Situation
No.	Item	Symbol	
1	DC Fuse blown	FU	DC circuit fuse blown
2	Overcurrent Protection	OC	Detection of main transistor instantaneous overcurrent
3	MCCB* tripped	MCCB	Detection of main circuit input overcurrent
4	Overvoltage Protection	OV	Detection of DC bus overvoltage
5	Overspeed Protection	OS	Detection of motor overspeed
6	Undervoltage Protection	UV	Detection of input power supply undervoltage
7	Overload Protection	OL	Detection of motor overload current
	Overheat*	OH, FAN C	Motor or controller thermostat activates.

* Molded-case circuit breaker
† If OH or FAN C activates, alarm 7 is displayed and OH or FAN C lamp blinks every 1 second. However, it is a normal condition for the OH lamp to be ON during acceleration or deceleration.

⚠ *CAUTION*

. Start the motor after confirming that the motor is completely stopped. If the motor is started during coasting, overvoltage (OV) or overcurrent (OC) may occur.
. Do not turn on MCCB in the VS-626MTII controller after turning on the power.
Tripping may occur due to the charging current to capacitors. (Power supply OFF - MCCB ON - Power supply ON)
. Inching operation should be made at intervals of longer than 0.1 s since there is an interlock with the zero speed signal.



An overrun may occur if the speed command is high and inching is performed with the time shorter than 0.1 s.

4.2 Adjustment

Potentiometers on the printed circuit boards are preadjusted at the factory, so normally, readjustment is not required. However, the following potentiometers can be adjusted when needed. Table 4.4 shows the potentiometers for which the set value can be changed, depending on operation specifications. Table 4.5 shows the potentiometers for making fine adjustments for offset. Do not tamper with any potentiometers other than those stated above.

Table 4.4 Adjustable Potentiometers

Symbol	Function	Factory Setting* (graduation)
N ADJ	Speed adjustment	5
N REV	Reverse speed compensation	4
SM ADJ	Speedometer adjustment	6
LM ADJ	Load meter adjustment	7
T LIM	Torque limit level setting	0
T DET	Torque detection level	0
N DET	Speed detection level	0
N GAIN	Speed loop gain adjustment	5
TIME	Accel/Decel Time Setting	0

* Indicates approximate value,

Protentiometer is set at 5th graduation.

Table 4.5 Potentiometers for Offset Adjustment

Code	Function	Factory Setting (graduation)
16RH	Speed reference (orientation control)	4 - 6
17RH	Speed reference	4 - 6
21RH	Speed controller	5 - 7
24RH	Speed detection	3 - 5

Potentiometer is set at 5th graduation.

4.2.1 Adjustment of Motor Speed (NADJ, NREV)

Readjust as instructed in the following when a fine adjustment of the absolute value of the spindle speed (motor speed) is required.

1. Rotate the motor in the forward direction, measure the speed command voltage by a voltmeter and set it to the command voltage of the desired speed.
2. Measure the speed by a tachometer after the command voltage is adjusted.
3. Rotate NADJ clockwise if the speed does not reach the rating. Adjust NADJ until the desired speed is obtained.
4. Rotate NADJ counterclockwise if the speed exceeds the rating.
5. Run the motor in reverse direction and adjust NREV so that the rated motor speed is obtained. Turning NREV clockwise increases motor speed. The characteristics of speed-setting scale is shown in Fig. 4.1.

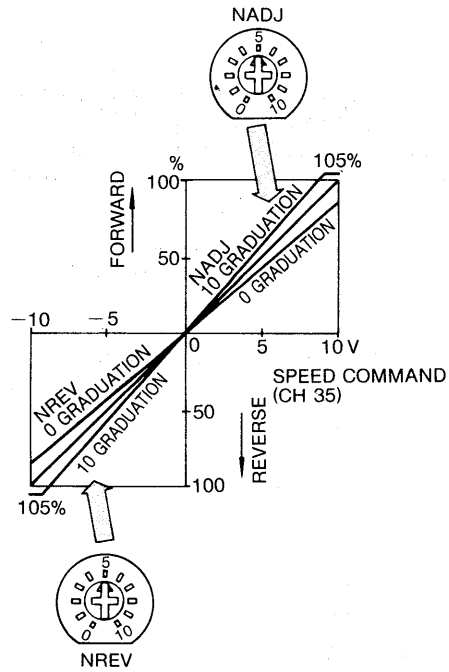


Fig. 4.1 Speed-Setting Scale Characteristics

4.2.2 Adjustment of Speedometer (SMADJ)

This is for fine adjustments of the speedometer. The potentiometer is set to output 1 mA at the rated speed at the factory. Adjust as instructed in the following if the output deviates.

1. Set SMADJ to graduation 0.

2. Set the speed command to the rated speed and make adjustments so that the speedometer shows the command value. When using a voltmeter (internal impedance of 10 KΩ) as a speedometer, select shunt connector S1 of the speedometer and make adjustments as stated above.

4.2.3 Adjustment of Load Meter (LMADJ)

This is for fine adjustments of the load meter. The potentiometer is set to output 1 mA at 120% of the rating for 30 minutes at the factory. Adjust as instructed in the following if the output deviates.

1. Set LMADJ to graduation 0.

2. Set TIME to graduation 0.

3. Set the speed command to the rated speed, and accelerate and decelerate exactly by switching on and off the forward running signal.

4. Adjust the load meter so that its needle indicates the setting scale during rapid acceleration. When using a voltmeter (internal impedance of 10 kΩ) as a load meter, select shunt connector L1 of the load meter and make adjustments by the procedures stated above. Specifications of the load meter setting scale are shown in Fig. 4.2.

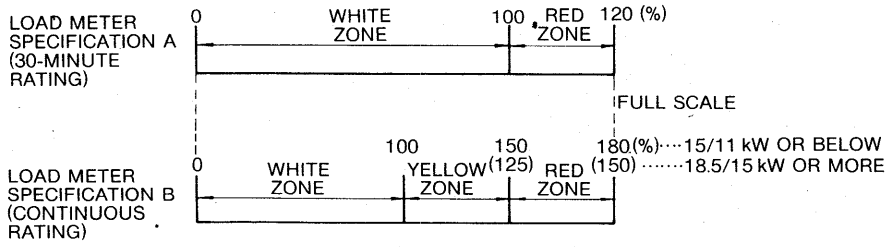


Fig. 4.2 Specifications of Load Meter Scale

Table 4.6 Load Meter Setting

Motor Capacity kW	Continuous Rating %	30-minute Rating %
5.5/3.7	178	120
7.5/5.5	164	120
11/7.5	176	120
15/11	164	120
18.5/15	148	120
22/18.5	143	120
26/22	142	120

4.2.4 Adjustment of Torque Limit (TLIM)

This is for adjusting the limit level for the torque generated by the motor. Normally, the torque limit level is set at 120% of the rating for 30 minutes. The torque limit level can be adjusted externally by TLIMH (1CN-18) or TLIML (1CN-40) and potentiometer TLIM.

1. Close the torque limit signal TLIMH or TLIML. If TLIMH and TLIML signals are closed simultaneously, TLIML signal is sent ahead prior to TLIMH signal.

2. Set TLIM to graduation 0.

3. Set the speed command to the rated speed and accelerate and decelerate exactly by switching on and off the forward running signal.

4. Adjust the load meter so that its needle indicates the desired scale during rapid acceleration.

Fig. 4.3 shows torque limit-setting characteristics.

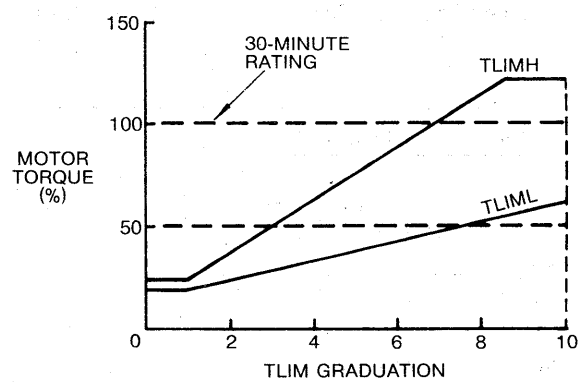


Fig. 4.3 Torque Limit-Setting Characteristics

4.2.5 Adjustment of Speed Coincidence Detection Level (N DET)

This is used for adjustment of speed coincidence detection level. While motor speed is adjusted with speed commands, NDET lights at a preset speed which is selected with the N DET. Fig. 4.4 shows characteristics of speed coincidence detection level and setting.

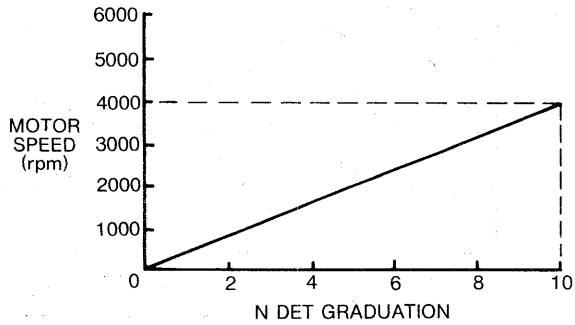


Fig. 4.4 Characteristics of Speed Coincidence Detection Level-Setting

4.2.6 Adjustment of Torque Detection Level (T DET)

This is used for adjustment of torque detection level. Adjust the T LIM by the method described in Par. 4.2.4, Adjustment of Torque Limit (T LIM) to the torque detection level. Then, while accelerating the motor, adjust the T DET so that the T DET LED lights at the required level. Fig. 4.5 shows characteristics of torque detection level and setting.

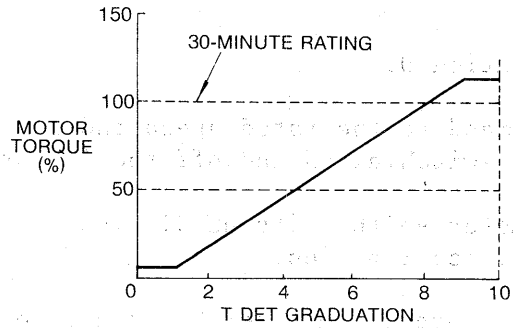


Fig. 4.5 Characteristics of Torque Detection Level-Setting

4.2.7 Adjustment of Loop Gain of Speed Control System (N GAIN)

This is used for adjustment of loop gain of speed control system. The closer the setting is brought to the graduation 0, the lower and more stable the gain becomes, but the slower becomes the response. The nearer the setting is adjusted, the quicker becomes the response, but the larger becomes the speed overshooting. Adjust it to the optimum gain, taking into consideration the load conditions.

. Adjustment before shipment: Graduation 5

4.2.8 Adjustment of Accel/Decel Time (TIME)

This is for adjusting the soft start time. Adjust the soft start time in accordance with the soft start characteristics shown in Fig. 4.6.

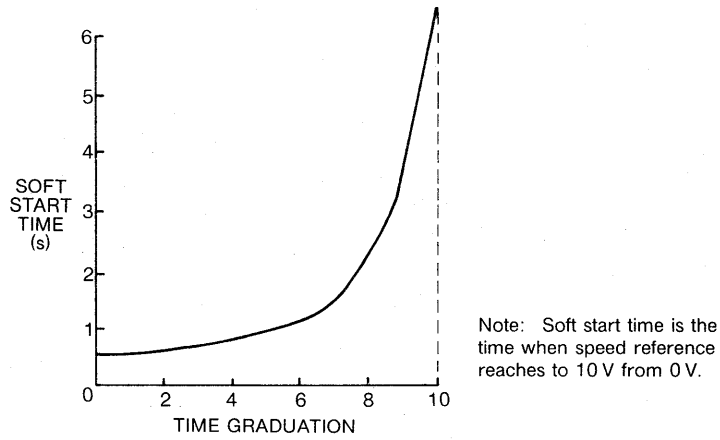


Fig. 4.6 Soft Start Time-Setting Characteristics

4.2.9 Offset Adjustment of Speed Control System

Offset adjustment of the speed control system during orientation should be performed using the following procedures:

Table 4.7 Offset Adjustment of Speed Control System

Item	Speed Command	Speed Detection Signal
Check Terminals	CH40-CH43 (0V)	CH45-CH43 (0V)
Potentiometers	16RH	23RH
Allowable Value	±5mV max	±5mV max
Condition	Adjust when speed command (CH35) is 0V.	Adjust when the motor is completely stopped.

Note: After adjustment, perform the orientation operation and, if the position has deviated, make an offset adjustment (21RH) for the speed controller.

5. Maintenance

VS-626MTII requires almost no routine checks, but regular periodical maintenance is necessary to maintain normal and smooth operating conditions. Formulate a maintenance schedule after studying the maintenance items shown below.

> ⚠ *CAUTION*
>
> Do not touch the inside components of VS-626MTII for 5 minutes after turning off the power supply. Before servicing inspection, check that the smoothing capacitors have been completely discharged. This can be verified by the "CHARGE" lamp on the panel being off.

5.1 Daily Inspection Items

For the spindle motor, daily inspection of the following items should be performed:

- Rated speed is correct.
- Cooling fan rotates smoothly.
- Cooling air circulates normally.
- Any abnormal vibration.
- Any abnormal sound.
- Any abnormal odor

VS-626MTII requires almost no routine checks since it has been designed with highly reliable circuit technology and is comprised mostly of semiconductors, such as ICs and power transistors.

5.2 Periodic Inspection

To maintain the AC spindle motor and VS-626MTII in good operating order, perform periodical inspection and maintenance referring to Table 5.1.

Table 5.1 Periodic Inspection Items and Description

Item		Check	Corrective Action
AC Spindle Motor	Cooling Fan	. Any abnormal sound or vibration . Cumulative operating time exceeds 20,000 hours.	Replace cooling fan.
	Motor Bearing	. Any abnormal sound . High temperature	Contact Yaskawa representative.
	Cooling Air, Inlet Port, Exhaust Port Air Passage	. Coating of dust or cutting oil.	Clean approximately once every 6 months or more frequently, depending on operation conditions. (Coating of dust or cutting oil in air passage may decrease cooling efficiency and cause malfunctions.)
VS-626MTII Controller	External Terminals, Unit MTG Bolts, Connectors, etc.	Loosened screws	Tighten.
	Cooling Fan	. Any abnormal sound or vibration. . Cumulative operating time exceeds 20,000 hours.	Replace cooling fan.
	Printed Circuit Board	Discoloration to brown	Replace the board.
	Smoothing Capacitor	Discoloration or odor	Replace the capacitor or inverter unit.
	Air Filter (Control panel)	Coating of dust	Clean once a month.
	Electronic Parts	Coating of dust	Remove dust periodically.
	Regenerative Resistors, Heat Sink (on the Rear of VS-626MTII Controller)	Coating of dust	Remove dust with air blower or a dry cloth once every 6 months or more frequently, depending on operation conditions. (Dust accumulated on regenerative resistors or heat sink may decrease radiating efficiency and cause malfunctions.)

5.2.1 Prolonged Storage

If VS-626MTII is installed as a standby unit, etc., and left out of operation for a long period of time, check its operation at least once every six months by turning on the power supply.

Reformation is necessary for electrolytic capacitors if they have not been used for a long time (more than 1 year). Reformation can be accomplished in the following way:

1. Turn off the Ready signal, then turn on the power. ("CHARGE" lamp (red) lights dimly.)
2. After 5 minutes, turn on the Ready signal. ("CHARGE" lamp (red) lights brightly.)
3. Let the controller stand (as stated above) for 30 minutes.

5.3 Checking Power Semiconductor Elements

> ⚠ *CAUTION*
> Do not touch the inside components of VS-626MTII for 5 minutes after turning off the power supply. Before servicing inspection, check that the smoothing capacitors have been fully discharged. This can be verified by the "CHARGE" lamp on the panel being off.

When checking or replacing parts, observe the following:

- When disconnecting leads from parts, mark them to avoid wrong connection.
- When reconnecting leads to the parts, tighten them with the specified screws firmly. If only one screw is loose, or not present, the VS-626MTII system will not operate properly.

5.3.1 Transistor Module

Checking Method

1. Unplug the nine emitter-base-collector connectors (1 to 9 MCN) from base drive board. See Fig. 5.1.
2. Check the resistance value at the terminals shown in Table 5.2.

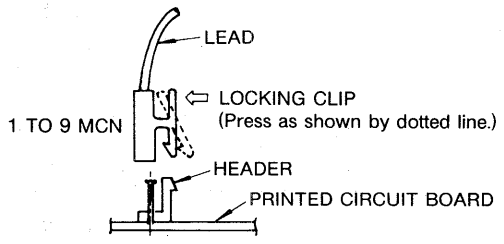
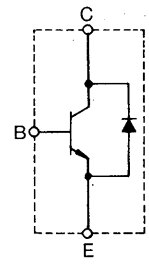
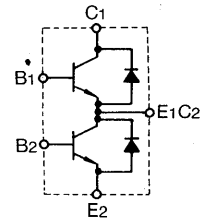


Fig. 5.1 Removal of Connectors

Table 5.2 Resistance of Transistor Modules

VS-626MTII Type CIMR-MTII-□	Transistor Module Terminals: Ohmmeter Terminal ⊖	Transistor Module Terminals: Ohmmeter Terminal ⊕	Reference Resistance	Abnormal Resistance	Transistor Module
5.5KB 7.5KB	E	B	*	0Ω or ∞	
	E	C	†	0Ω or ∞	
	B	E	†	Aprrox multiple of 10kΩ or above	
	C	E	‡	0Ω	
	B	C	—	—	
	C	B	—	—	
11KB 15KB 18.5KB 22KB 26KB	E1 C2	C1	†	0Ω	
	C1	E1 C2	‡	0Ω	
	B1	E1 C2	†	Approx multiple of 10kΩ	
	E1 C2	B1	*	0Ω or ∞	
	E2	E1 C2	†	0Ω	
	E1 C2	E2	‡	0Ω	
	B2	E2	†	Approx multiple of 10kΩ	
	E2	B2	*	0Ω or ∞	

* Several hundred Ω to several kΩ
† Approximate multiple of 10Ω
‡ Several hundred of 1kΩ

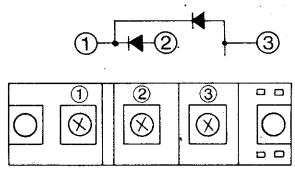
Note:
1. Use the ohmmeter set at × 1Ω range.
2. With type CIMR-MTII-7.5KB, measurement of the resistances across B-C and C-B are not required.

5.3.2 Diode Module

Checking Method

Measure the resistance at the points listed in Table 5.3, with an ohmmeter.

Table 5.3 Resistance of Diode Module

Tester Terminals	⊖	⊕	Reference Resistance	Abnormal Resistance
Diode Module Terminals 	①	②	∞	Approximate multiple of 10Ω or below
	①	③		
	②	①	Approximate multiple of 10Ω or below	∞ or 0Ω
	③	①		

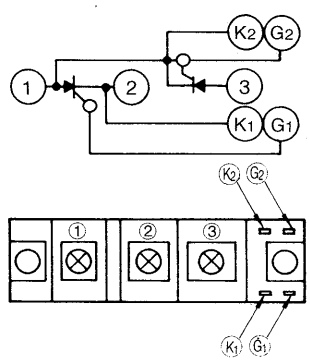
Note: Use the ohmmeter set at × 1Ω range to measure the resistance value.

5.3.3 Thyristor Module

Checking Method

Measure the resistance at the points listed in Table 5.4.

Table 5.4 Resistance of Thyristor Module

Tester Terminals	⊖	⊕	Reference Resistance	Abnormal Resistance
Thyristor Module Terminals 	①	②	∞	Approximate multiple of 10Ω or below
	③	①		
	②	①		
	①	③		
	②	G1	*	Other than *
	①	G2		
	G1	②	†	Other than †
	G2	①		

* Approximate multiple of 10Ω to several hundred Ω
† Several Ω to two hundred Ω

Note: Use the tester set at × 1Ω range.

5.4 Troubleshooting

If the VS-626MTII malfunctions, fine the cause and take the corrective action by following the flowcharts given in Table 5.5, 5.6 and Figs. 5.7 to 5.16. If any other problem occurs, contact Yaskawa representative.

Table 5.5 VS-626MTII Check Terminals and Their Signals

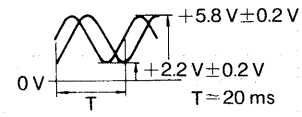
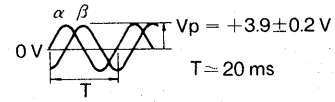
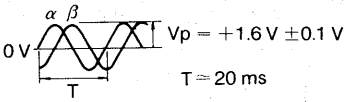
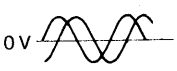
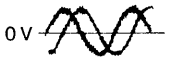
Check Terminal	Content	Signal	Remarks
1	Control power supply (+15V)	±15 ±0.1V	—
2	Speed pulse	 3.6kHz	fCH2(kHz)=0.6 × N (rpm), at 6000rpm
4	0V	0V	—
5	Primary frequency command (α)		At 1500rpm, 30-minute operation rating
6	Primary frequency command (β)		
8	Speed controller output	+4V/100%	For 30-minute rating
10	Torque command	+4V/100%, 4.8V max	For 30-minute rating
11	Control power supply (-15V)	-15V ±0.25V	—
12	Control power supply (+5V)	+5V ±0.25V	—
15	Speed monitor	+10V ±0.2V	At 6000rpm, forward and reverse running
18	0V	0V	—
19	0V		
20	Exciting current command (β)		At 1500rpm, 30-minute operation rating
24	Exciting current command (α)		
23	Field control signal	+8.7V ±0.2V	At 0 to 1500rpm, 50 to 100% load
25	Secondary current command (α)		At 1500rpm, 30-minute operation rating
28	Secondary current command (β)		
26	Primary current command (β)		—
27	Primary current command (α)		
22	Current detection signal (α)		—
30	Current detection signal (β)		
29	Speed reference	+10V/6000rpm (forward running)	—

Table 5.5 VS-626MTII Check Terminals and Their Signals (Cont'd)

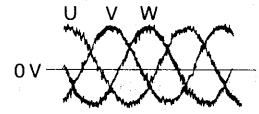
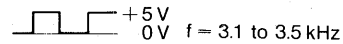
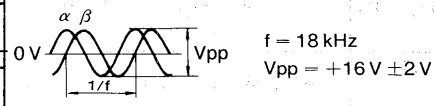
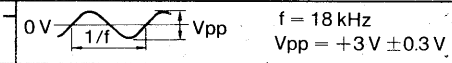
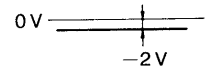
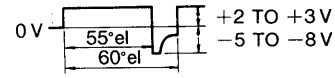
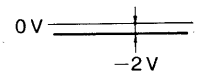
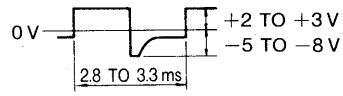
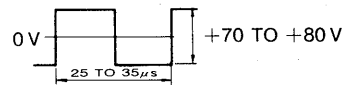
Check Terminal	Content	Signal	Remarks
31	PWM command (U)		—
33	PWM command (V)		
34	PWM command (W)		
32	PWM carrier frequency		At 0 to 1500rpm
35	Speed command	+10V/100%	—
40	Speed reference (orientation control)	+8V/600rpm (forward running)	—
41	Load meter signal	+4V	At 30-minute operation rating
42	Speedometer signal	+5V	At 6000rpm
43	0V	0V	—
44	DC voltage detection	+1V	For change of main circuit DC voltage, 10V
45	Speed detection signal	At normal operation, -10V/6000rpm (reverse running) At orientation, -8V/600rpm (reverse running)	—
46	0V	0V	—
47	Control power supply (+12V)	+12V ±0.05V	—
48	Control power supply (-12V)	-12V ±0.25V	—
49	0V	0V	—
50	Resolver excitation signal (β)		—
51	Resolver excitation signal (α)		
52	Resolver detection signal		At stop
53	Control power supply (-7V)	-6.5V ±0.5V	—

Table 5.6 Check Terminals of Base Drive Board and Their Signals

Check Terminal	Content		Signal
1	Regeneration transistor base signal	1	. Motor Mode 
2			
3		2	. Regeneration Mode 
4			
5	Main transistor base signal	Mp	. At base block 
6			
7		Wn	
8			
9		Vp	
10			
11		Vn	. In operation 
12			
13		Up	
14			
15		Un	
16			
18	Base drive board power supply output waveform		
19			

(1) Alarm "1" (FU) lights.

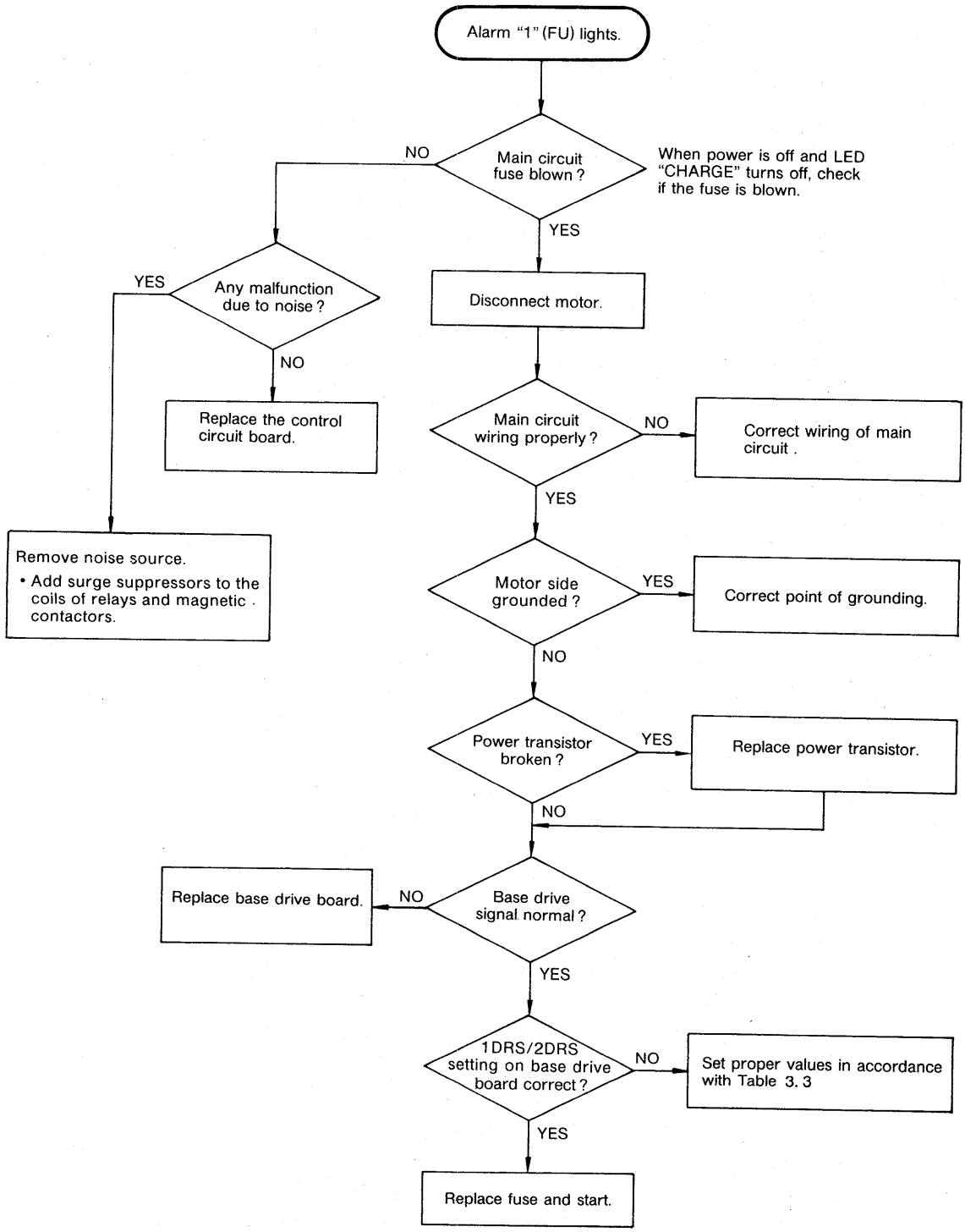


Fig. 5.7 Alarm "1" (FU)

(2) Alarm "2" (OC) lights.

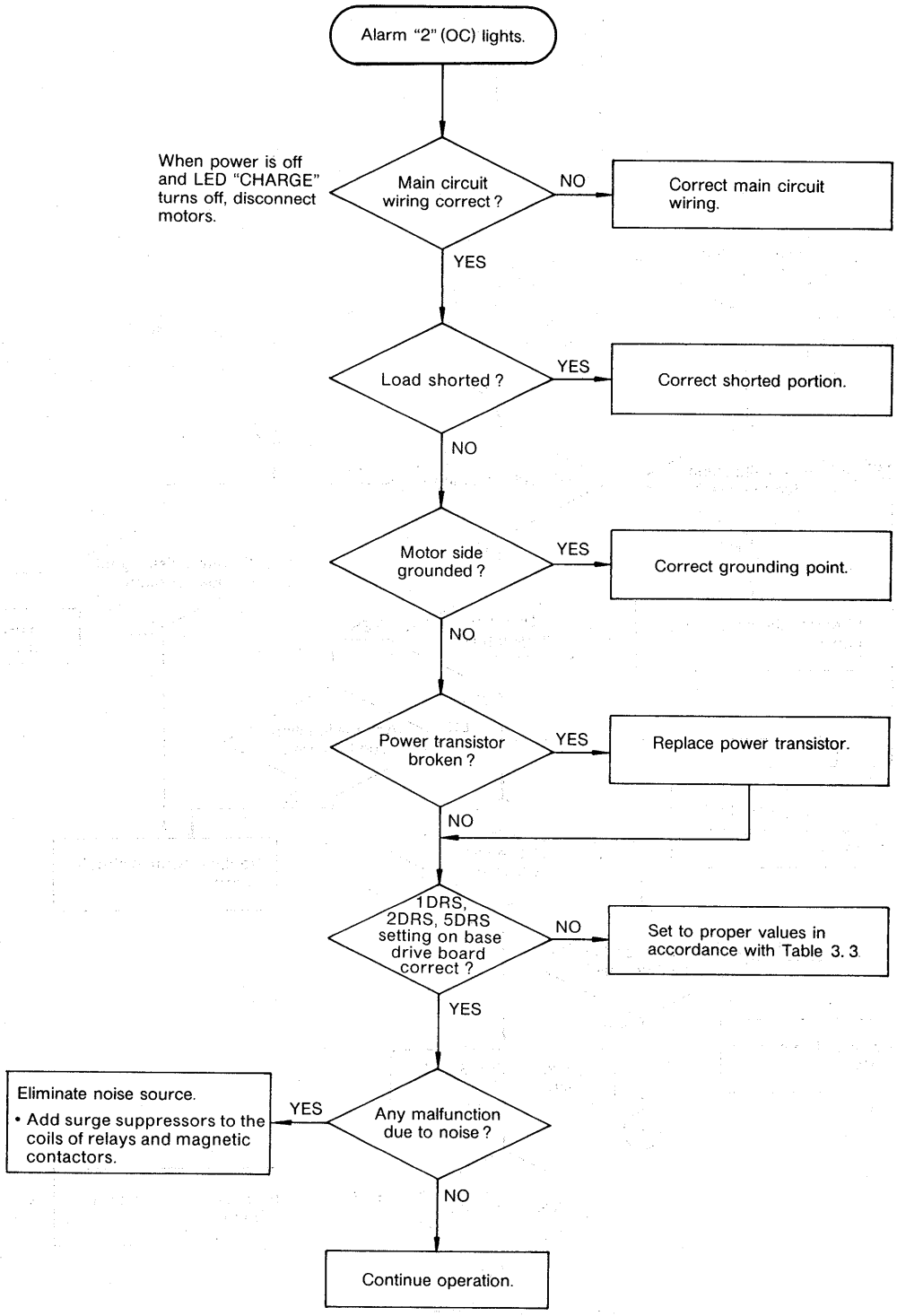


Fig. 5.8 Alarm "2" (OC)

(3) Alarm "3" (MCCB) lights.

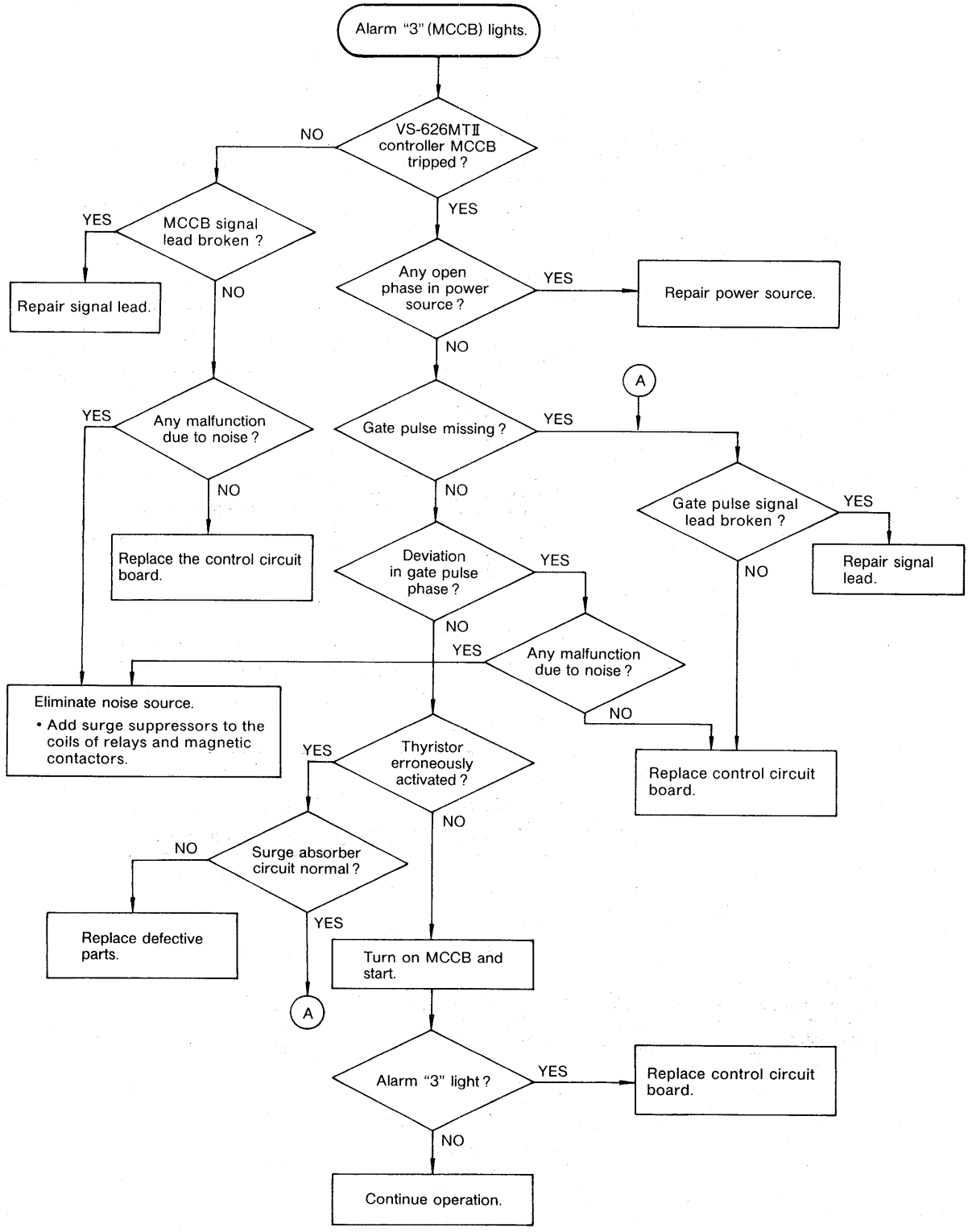


Fig. 5.9 Alarm "3" (MCCB)

(4) Alarm "4" (OV) lights.

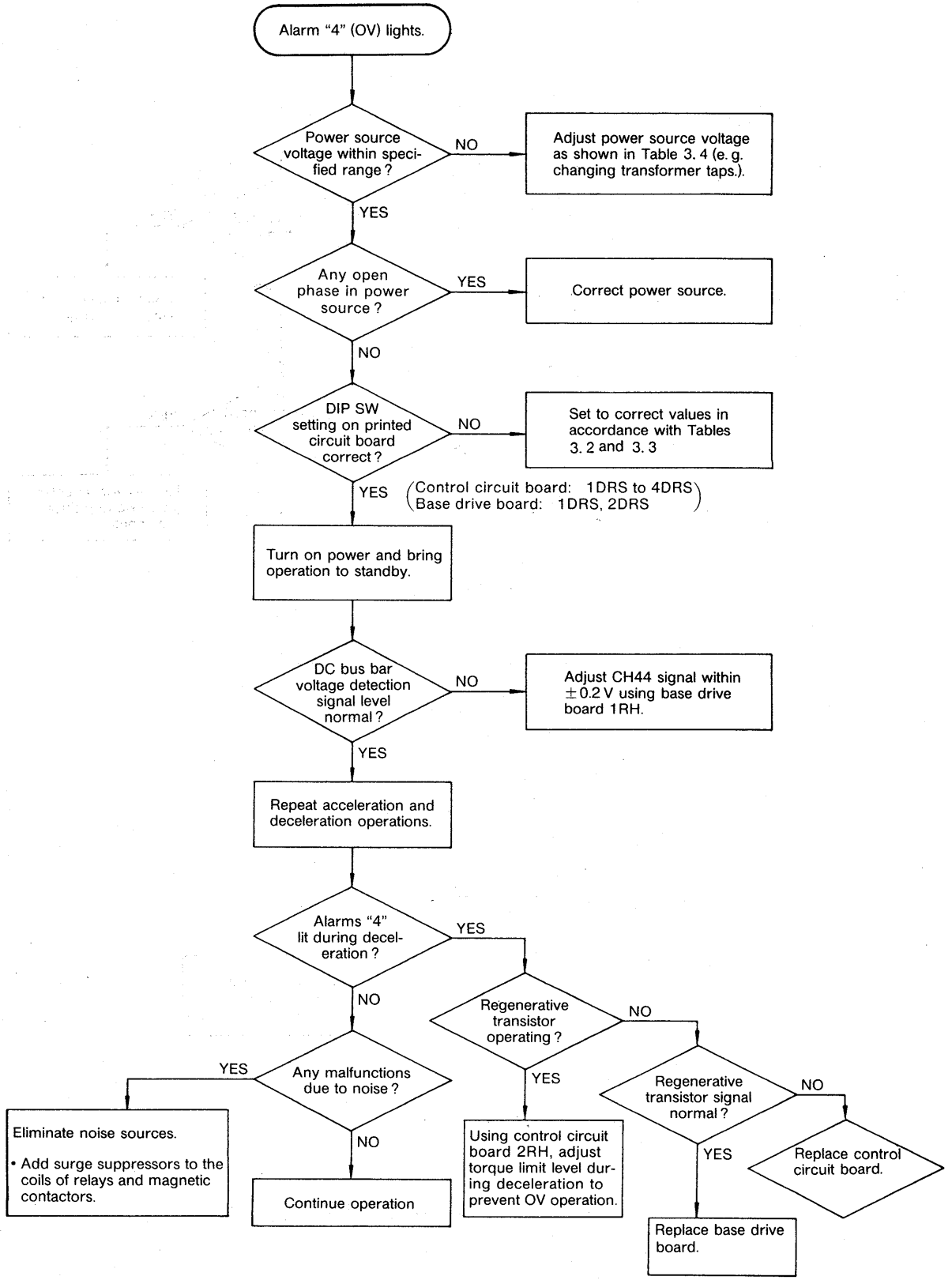


Fig. 5.10 Alarm "4" (OV)

(5) Alarm "5" (OS) lights.

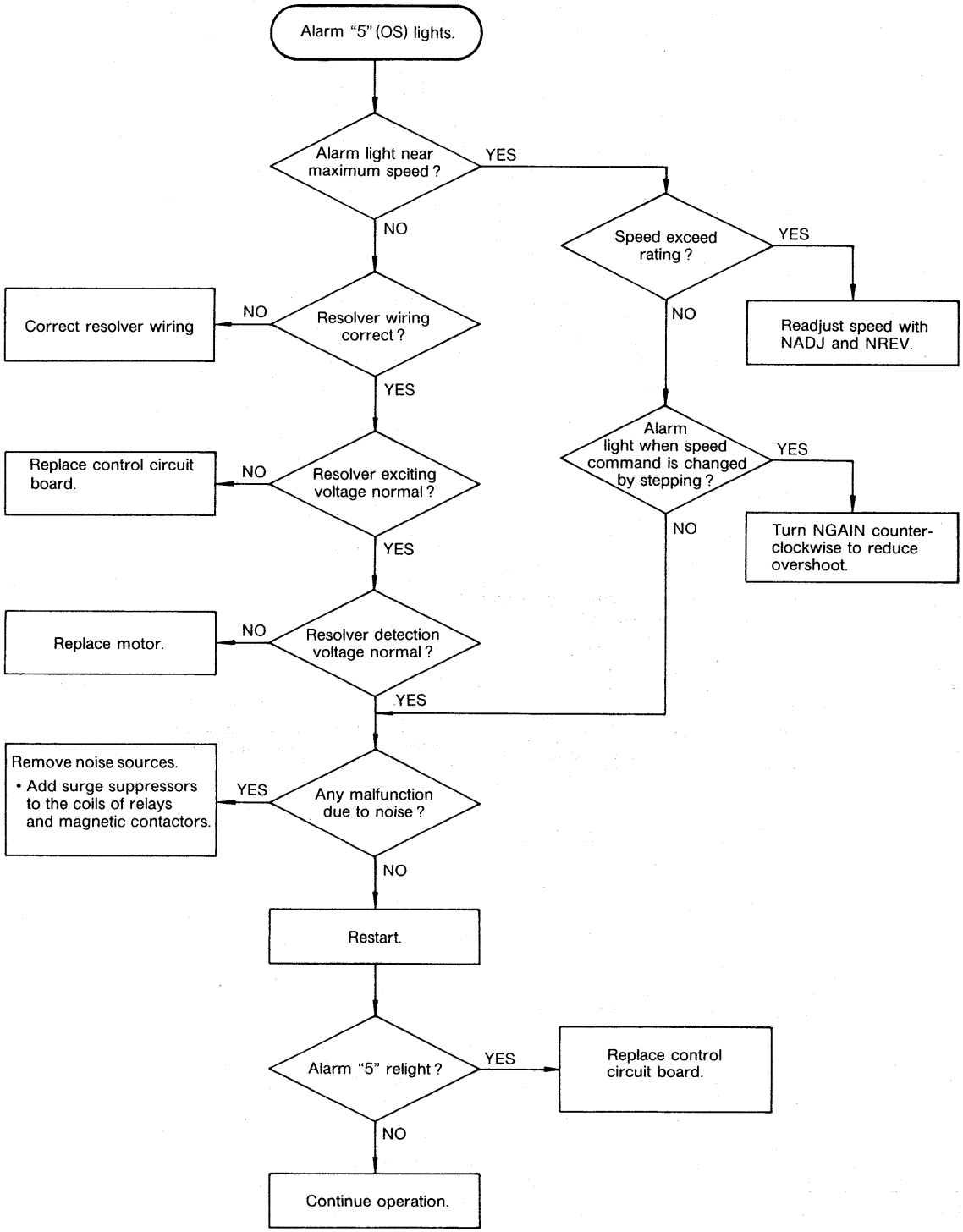


Fig. 5.11 Alarm "5" (OS)

(6) Alarm "6" (UV) lights.

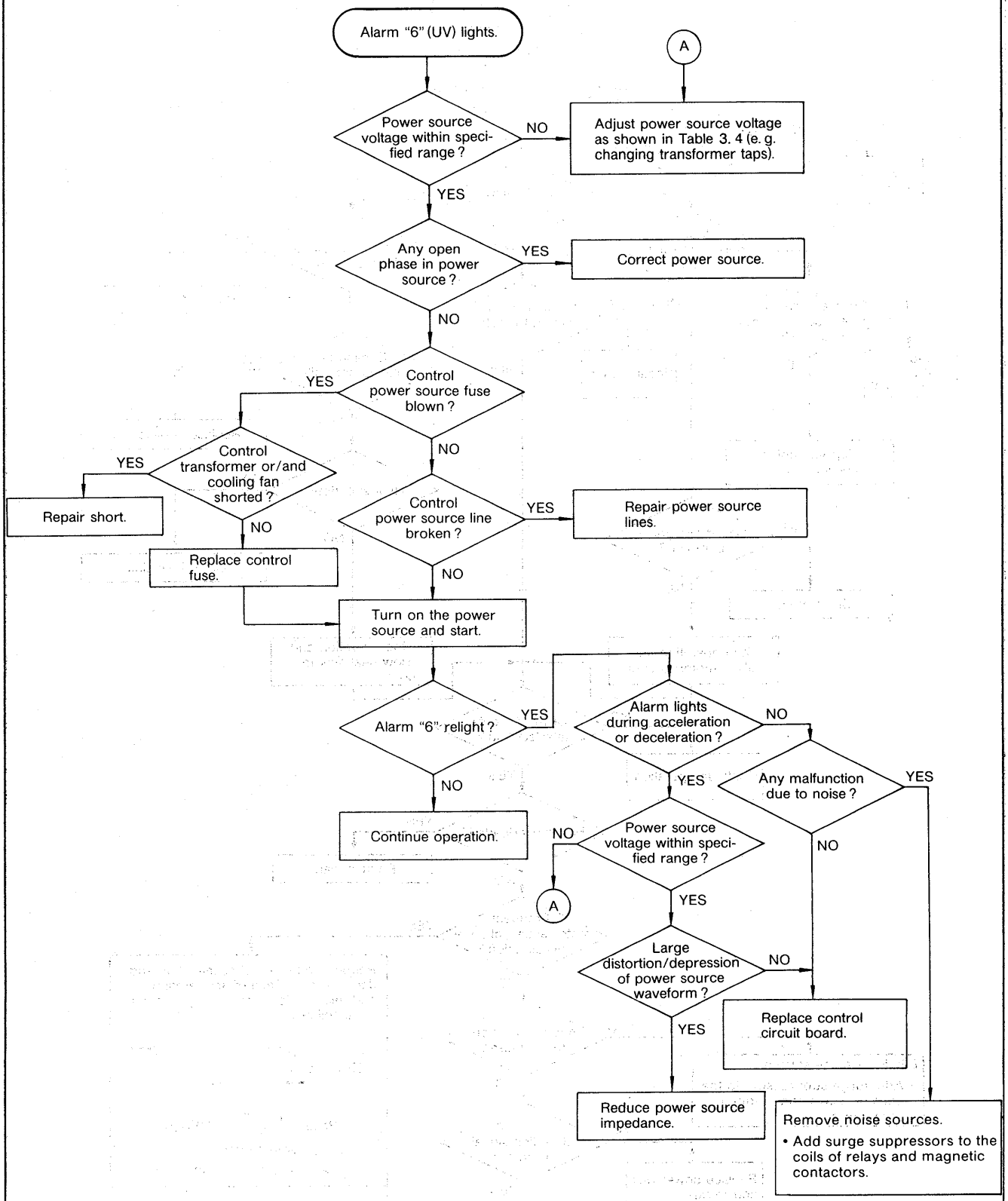


Fig. 5.12 Alarm "6" (UV)

(7) Alarm "7" (OL) lights.

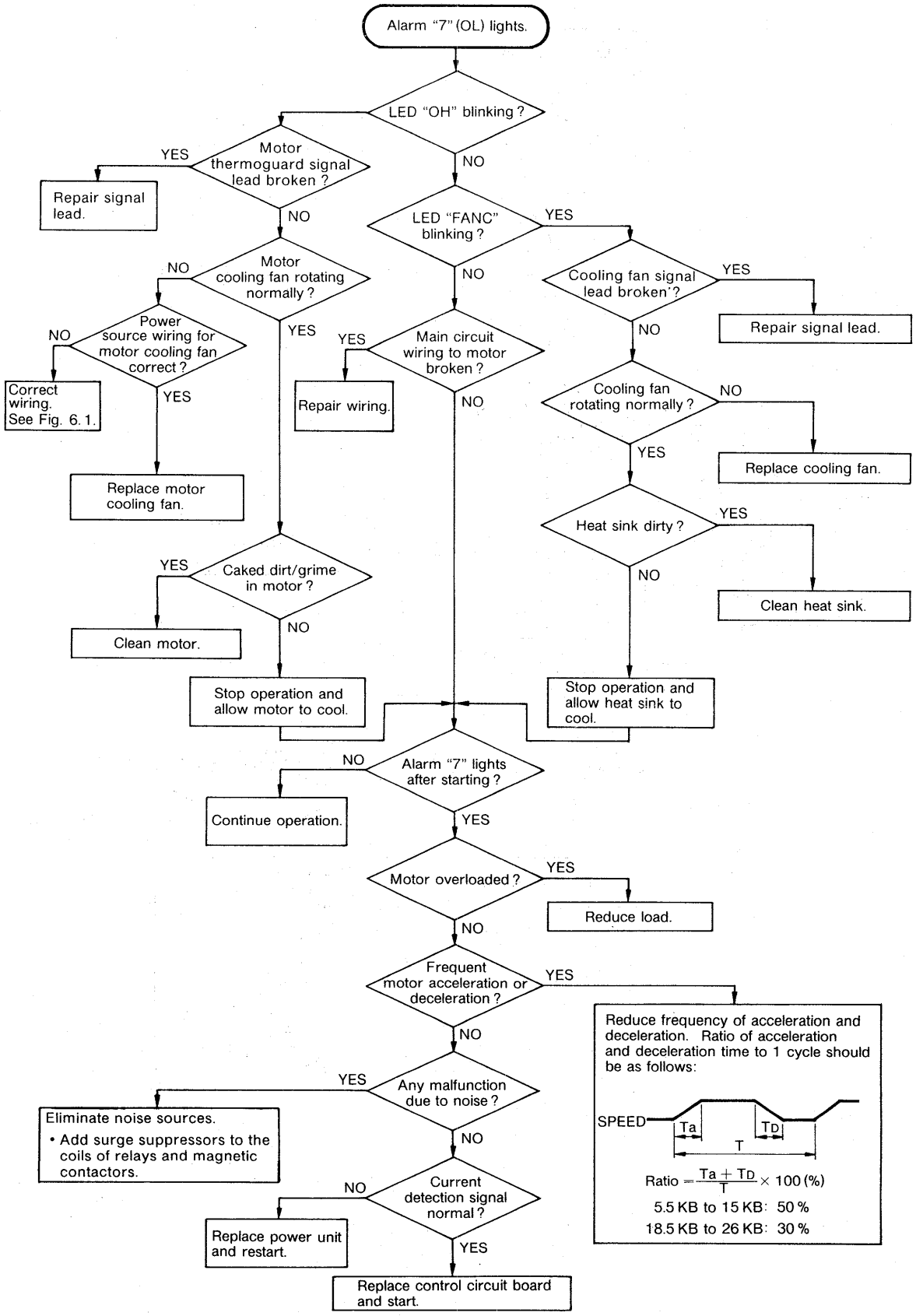


Fig. 5.13 Alarm "7" (OL)

(8) Motor will not rotate.

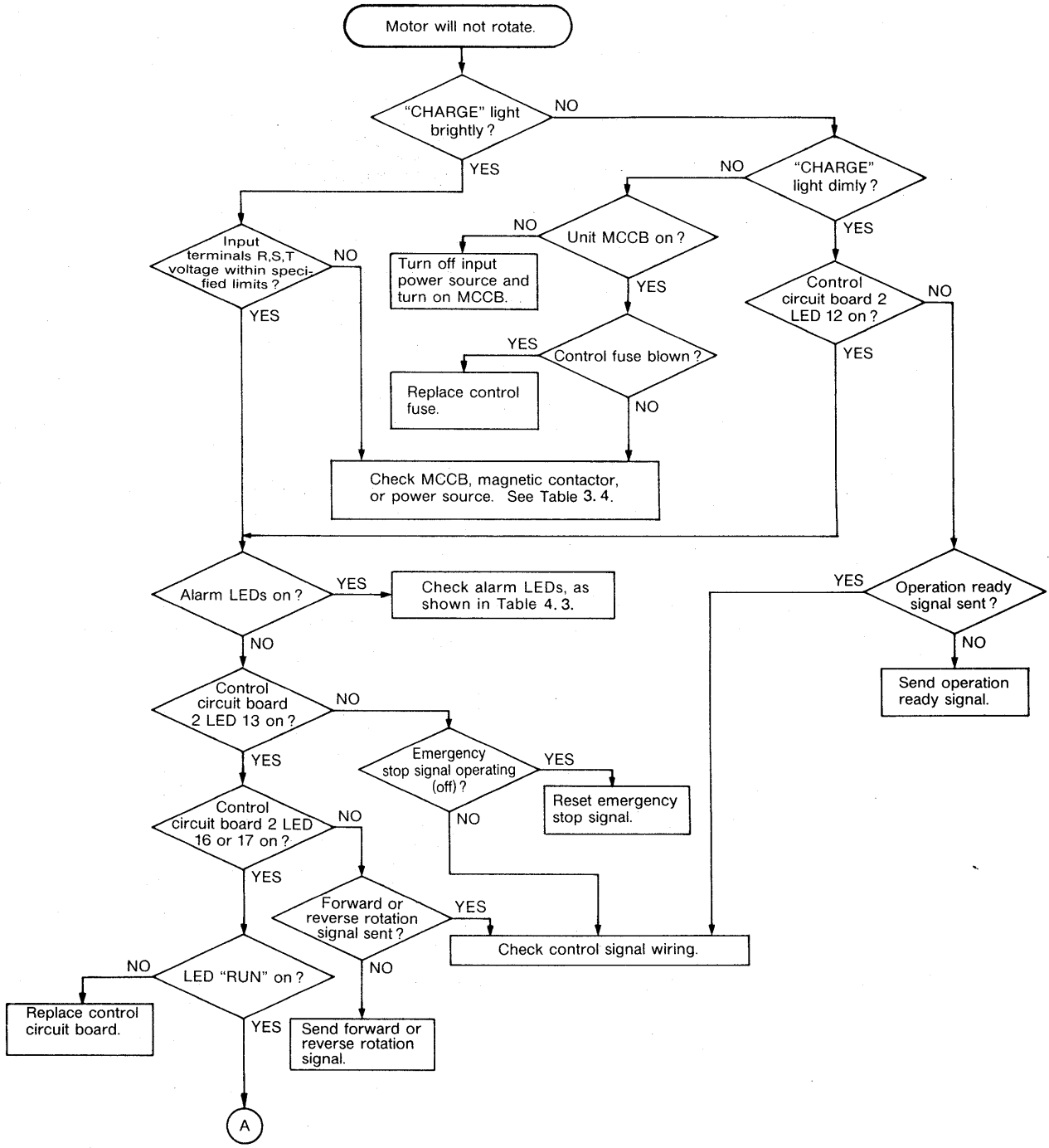


Fig. 5.14 Motor Rotation

(8) Motor will not rotate. (Cont'd)

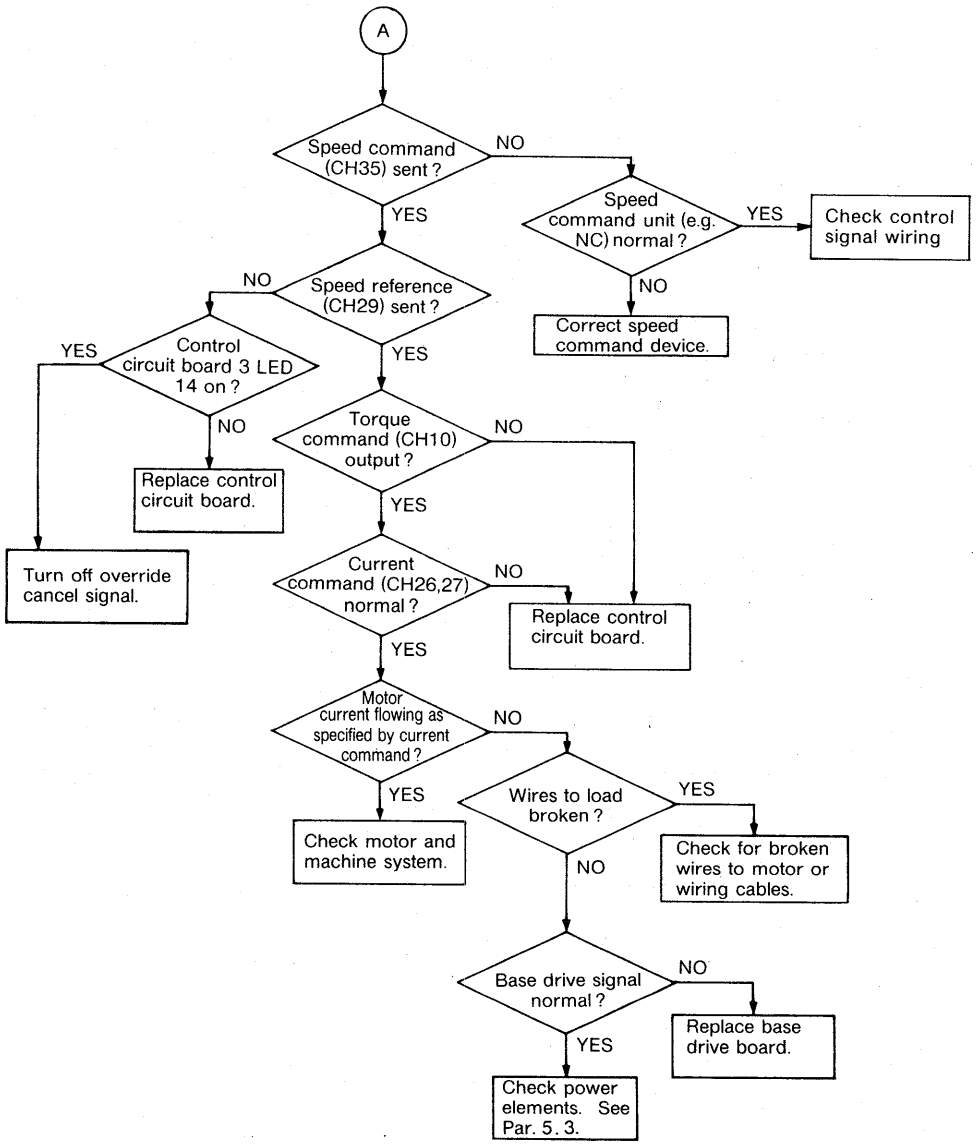


Fig. 5.14 Motor Rotation (Cont'd)

(9) Excessive vibration or noise while motor running.

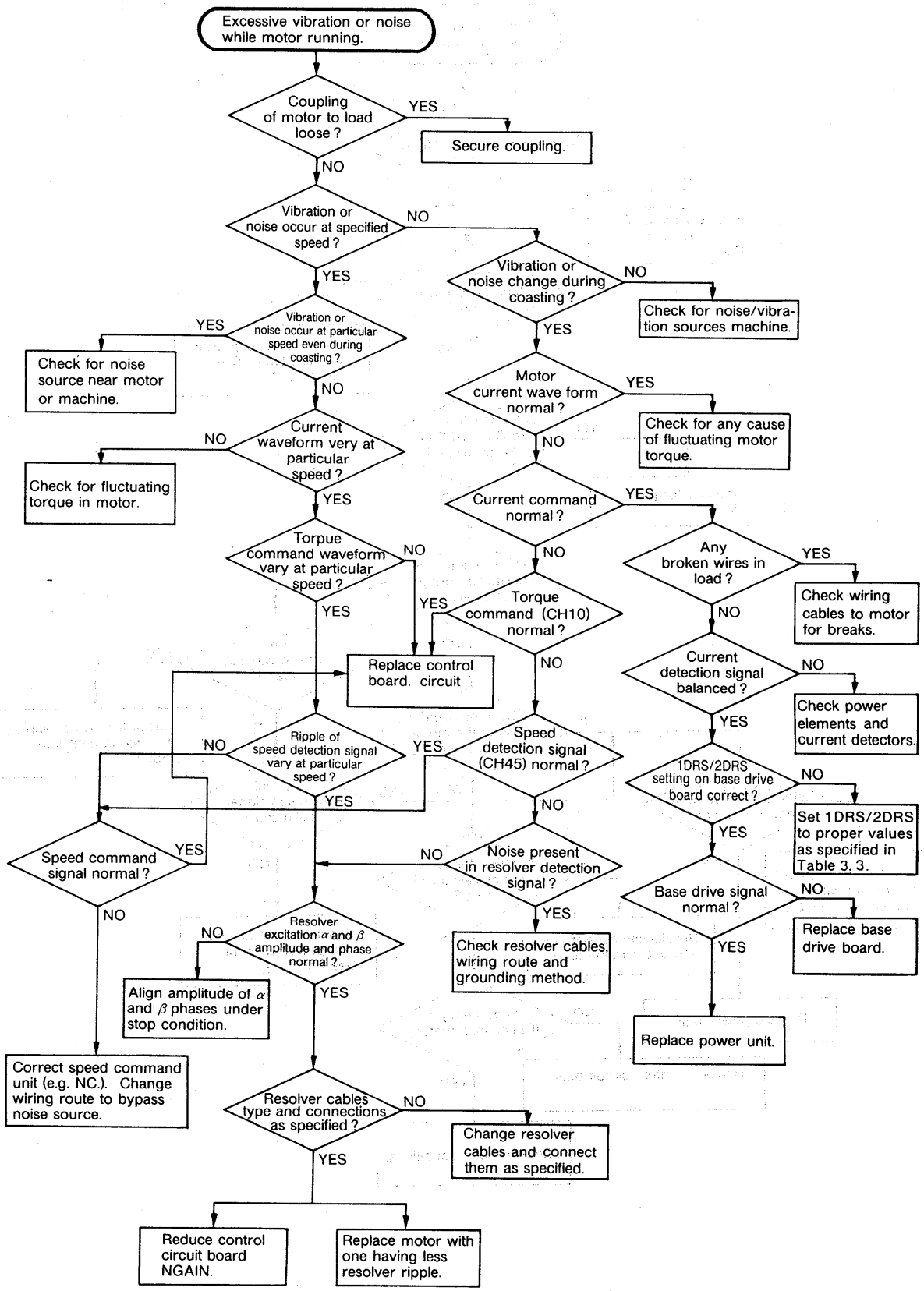


Fig. 5.15 Excessive Vibration or Noise

(10) Acceleration or deceleration time is too long.

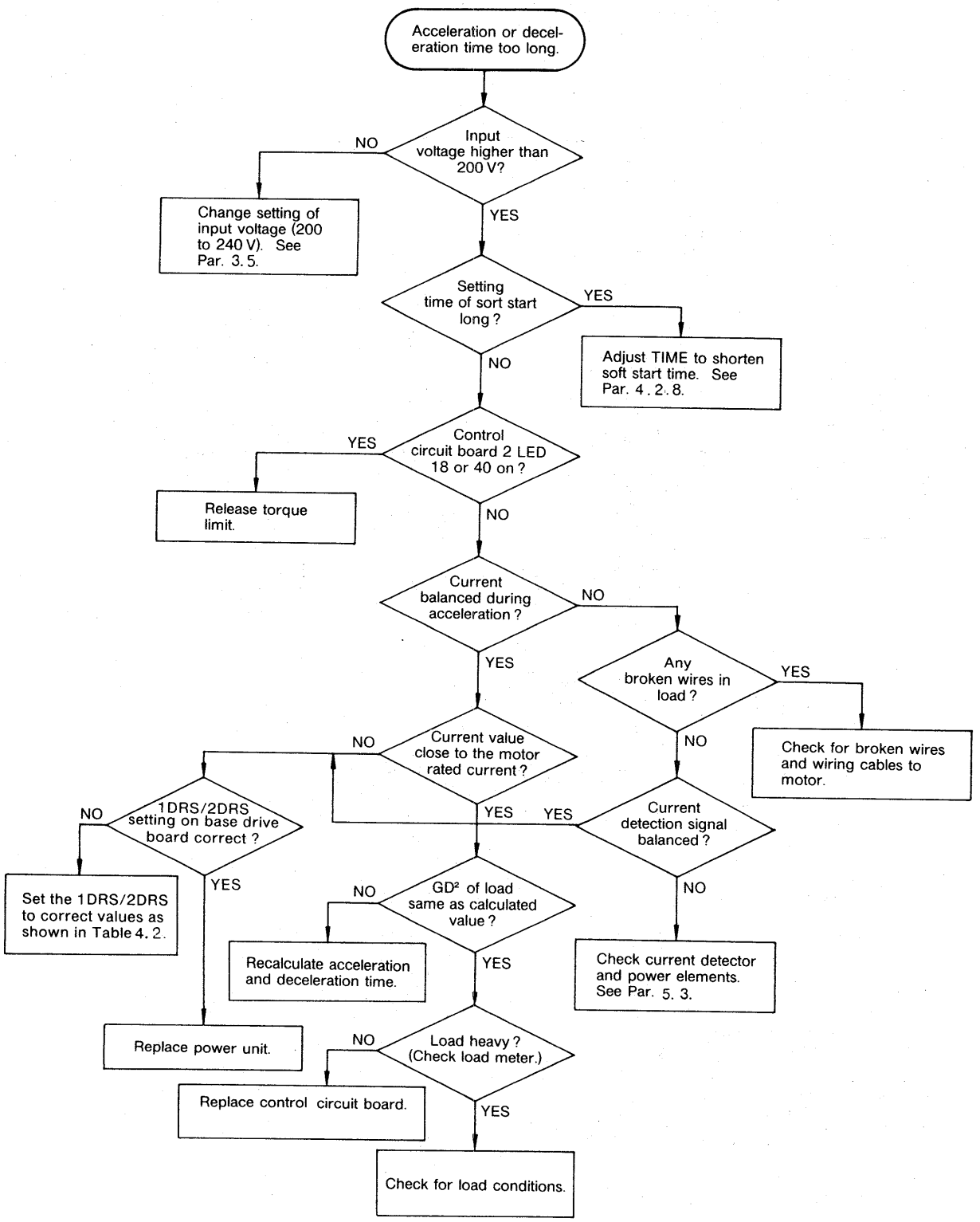


Fig. 5.16 Too Long Acceleration or Deceleration Time