

ORDER NO. MSD860304800

Service Manual

Flexible Disk Storage Drive

JU-465-5 / JU-475-2

Panasonic

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PART. 1

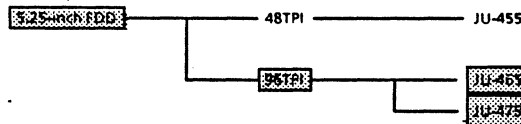
1. INTRODUCTION

This service manual consists of two parts. Part 1 covers maintenance description, adjustment procedures, and trouble analysis and Part 2 disassembly and reassembly procedures, parts list, and PCB circuits.

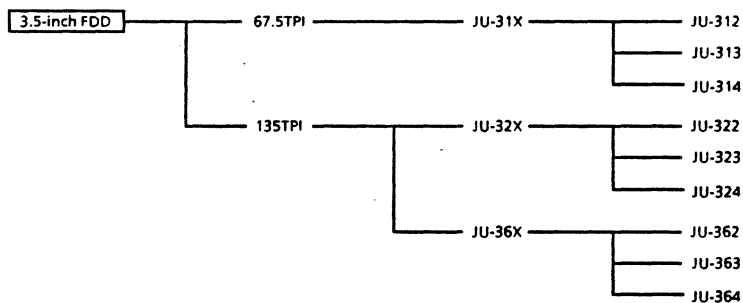
Part 1 encompasses maintenance instructions for all. Refer to the highlighted applicable items, and perform maintenance work on the Floppy Disk Drive (FDD).

2. MODELS AND MODEL NUMBERS

2.1 5.25-inch FDD



2.2 3.5-inch FDD



3. SPECIAL TOOLS

The following special tools are used for FDD maintenance.

TABLE 3.1

Tool	Part Number.			Quantity
	5.25-inch (48TPI)	5.25-inch (96TPI) JU-465/475	3.5-inch	
Exerciser	FDD-EXT-5	* ←	* ←	1
Fucry Alignment diskette	817-128	817-560/ 817-581	JU-01AA (DAD only)	1~2
Data diskette	2DD	2DD/2HD	2DD	1~2
CMOS/TTL adaptor			YTFDD-CN35	1
Limiter Adjust Tool (5.25-inch)				1
Oscilloscope (50MHz)				1
Probe (10:1)				3
Frequency counter				1

Note: * ← : Stand for the same as left.
DAD: Dynamic Alignment Diskette

4. OUTLINE OF MAINTENANCE

- The following tools are required for maintenance of a Floppy Disk Drive.

4.1 Alignment Diskette

Alignment diskette is used for head actuator alignment and index sensor adjustment. Use the right diskette as shown in Table 3.1.

4.2 Exerciser

The exerciser enables you to make all adjustments and inspections necessary for an FDD. Its functions include the following:

- (1) Seek increment or alternate tracks
- (2) Read (but no data compare)
- (3) Write 1F or 2F (All 0's or 1's)
- (4) Head load (5.25-inch FDD with optional head loader)
- (5) Recalibration to track 00

The exerciser has switches and indicators to execute a specified function.

5. DIAGNOSTIC PROCEDURES

5.1 Error Symptom Recognition

Errors that occur because of the wrong operating procedure, wrong programming, or use of a defective diskette, or soft errors due to external causes, such as contaminated air and random electrical noise, are often attributed to a drive failure.

Unless a visual inspection of the drive reveals an evident assembly fault or a defect, always confirm errors with another good diskette, and another known good drive.

5.2 Soft Error Detection and Correction

Soft errors are normally caused by the following:

- (1) Contamination between read/write heads and diskette. This kind of contamination can be easily eliminated by the liner in the diskette. Contaminated heads can be cleaned by a general purpose non-abrasive head cleaning diskette. Please follow the suitable procedure provided with the cleaning diskette.
- (2) Random electrical noise, normally a few microseconds or less.
- (3) Small defects in written data and/or track not detected during write operation may cause soft errors during read.
- (4) Faulty grounding of the drive or host system can also cause a soft error.
- (5) Wrong motor speed is another cause of soft errors.

Take the following steps on the controller side to recover from the soft errors mentioned above.

- (1) Read the track again ten times or until the data is recovered.
- (2) If Step (1) above fails to recover the data, access the adjacent track. Then return the head to the original track.
- (3) Repeat Step (1).
- (4) Any error that cannot be corrected by the above procedure is irrecoverable.

5.3 Write Error

If an error occurs during write operation, it is usually detected during the next revolution by performing a read operation called write check. To correct an error, write again and repeat a

write check operation. If the result is unsatisfactory after ten or more write operations, perform a read operation on another track to determine whether it is the diskette or the drive that is wrong. If an error persists, replace the diskette and repeat the above procedure. If the error still persists, consider the drive defective. If the error is corrected, dispose of the diskette as defective.

5.4 Read Error

Most read errors are soft errors. Data can be recovered by following the recovery procedure mentioned in 5.2.

5.5 Seek Error

- (1) Stepper motor or stepper motor drive circuit is faulty.
- (2) Faulty carriage

There are two ways of seek error recovery. One is to recalibrate to track 00, and seek back to the original track. The other is to read the ID field, check the track number on which the head is located, and move the head away from it. And read it again.

5.6 Interchangeability Error

Data which is written by one drive may not be read by another. This error is called a Interchangeability error, which can be caused mostly by the following reason, which should be checked as follows.

- (1) Head misalignment: Refer to Adjustments and Confirmation Item 9.5
- (2) Head output too low: Refer to Adjustments and Confirmation Item 9.3
- (3) Motor speed difference: Refer to Adjustments and Confirmation Item 9.1
- (4) Format difference

6. TROUBLE ANALYSIS

6.1 Trouble Analysis Procedure

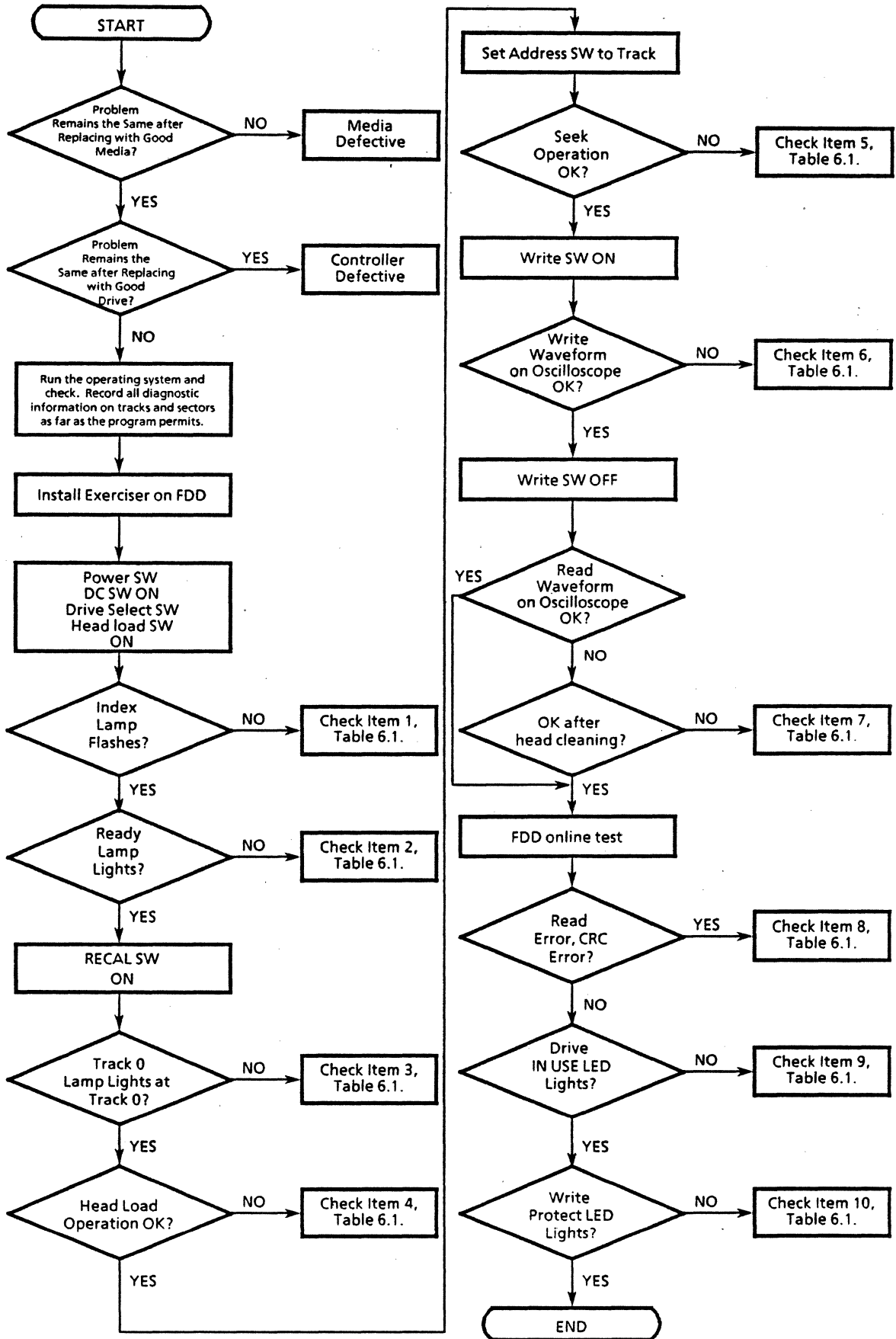
FDD trouble may occur in any of the following ten forms.

- (1) Index detection failure
- (2) Not ready
- (3) Track 0 undetectable
- (4) No seek
- (5) No write
- (6) No read
- (7) Read error
- (8) IN USE LED won't light.
- (9) Write protect undetectable
- (10) No head load (5.25-inch FDD with optional head loader)
Check with the troubleshooting flowchart in 6.2

CAUTION:

Be sure to switch power off before removing an FDD or PCB from the operating system.

6.2 Trouble Shooting Flow Chart



6.3 Trouble Analysis Table

Table 6.1

Item	Trouble	No	Cause	5.25-inch	JU-3X3, 3X4	JU-3X2
1	Index detection failure	1	Collet part faulty	Replace		
		2	DD motor control PCB	Replace	Replace DD motor, Base assembly	Replace DD motor assembly
		3	DD motor faulty	Replace		
		4	Index LED faulty	Replace	Replace DD motor, Base assembly	Replace
		5	Index detector faulty	Replace		
		6	Index LED/index detector installation faulty	Adj.		
		7	PCB motor ON circuit	Repair	* ←	* ←
		8	PCB index detection circuit	Repair	* ←	* ←
2	Not ready	1	See Item 1.			
		2	PCB ready circuit	Repair	* ←	* ←
3	Track 0 detection failure	1	Track 00 assembly	Replace	* ←	* ←
		2	PCB track 0 detection failure	Repair	* ←	* ←
4	No head loading	1	See Item 1.			
		2	See Item 2.			
		3	HDL solenoid	Replace		
		4	PCB HDL circuit	Repair	* ←	* ←
5	No seek	1	Stepper motor	Replace	* ←	* ←
		2	Guide shaft contamination or damaged	Replace	* ←	* ←
		3	PCB stepper driver circuit	Repair	* ←	* ←
6	No WRITE	1	See Item 1.			
		2	See Item 4.			
		3	Head disconnected	Replace	* ←	* ←
		4	Head shorted	Replace	* ←	* ←
		5	HDL bail height wrong	Adj.		
		6	PCB write circuit	Repair	* ←	* ←
7	No READ	1	See Item 1.			
		2	See Item 4.			
		3	See Item 6.			
		4	PCB read circuit	Repair	* ←	* ←
8	READ ERROR	1	See Item 1.			
		2	See Item 4.			
		3	See Item 7.			
		4	Alignment	Adj.	* ←	* ←
		5	Azimuth	Unadjustable	* ←	* ←
		6	Burst	Adj.	Unadjustable	Unadjustable
		7	Asymmetry	Adj.	Adj.	
		8	Limiter	Unadjustable	Adj.	Adj.
		9	Flag 0	Adj.	* ←	* ←
		10	HDL time	Adj.		
		11	Index period	Adj.	Replace DD motor, Base assembly	Replace
		12	PCB read circuit	Repair	* ←	* ←
9	IN USE LED won't light.	1	LED part	Replace	* ←	* ←
		2	PCB IN USE circuit	Repair	* ←	* ←
10	Write protect failure	1	Write protect part	Replace	Replace DD motor, Base assembly	Replace
		2	Write protect circuit	Repair	* ←	* ←

Note: * ←: Stand for the same as left.

7. PREVENTIVE MAINTENANCE

No preventive maintenance is necessary for any type of FDDs under normal conditions of use. However if it is determined that adjustments are necessary, the following must be done.

- Adjustments (Refer to table 8.1)

- (1) Specify an applicable model from Table 8.1, and make a read/write head radial adjustment at a specified track.

(Sides 0,1)

- (2) Make an index timing adjustment at a specified track. (Sides 0,1)

- (3) Make an azimuth measurement at a specified track. (Sides 0,1)

CAUTION

Do not write when using alignment diskette. Check that write protect sensor is properly operating with a data diskette.

Note : Section 9 describes the adjustment procedures in detail.

8. MEASUREMENT ITEMS FOR EACH MODEL

Table 8.1

Item	Parameter	JU-32X, 36X		JU-455		JU-455-5	
		TRK	Value	TRK	Value	TRK	Value
1	Index period	40	200 ± 3ms	16	200 ± 3 ms	16	200 ± 3 ms
2	Output level	79	180 mV or more	39	140 mV	39	140 mV
3	Radial Alignment	40	50%	16	70%	16	70%
4	Azimuth	40	± 18'	34	± 18'	34	± 18'
5	Index burst	40	3 ± 1.5ms	34	200 ± 200 µs	34	200 ± 200 µs
6	Flag 0	From track 1 to track 2 and back	1:1	From track 1 to track 2 and back	1:1	From track 2 to track 3 and back	1:1
7	Limiter	-1	Recalibrate and return to 0	-0.5	Recalibrate and return to 0	-0.5	Recalibrate and return to 0
8	Asymmetry	79	<600ns	39	<600 ns	39	600 ns
9	Head load time						

Item	Parameter	JU-465-5		JU-475-2		JU-475-2CHN	
		TRK	Value	TRK	Value	TRK	Value
1	Index period	32	200 ± 3 ms	32	166.7 ± 2.5ms (High) 200 ± 3ms (Low)	32	166.7 ± 3.4 ms
2	Output level (2F)	79	140 mV	79	240 mV or more	79	240 mV or more
3	Radial Alignment	32	70%	32	70%	32	70%
4	Azimuth	68	± 18'	68	± 18'	68	± 18'
5	Index burst	68	200 ± 200 µs	68	200 ± 200 µs	68	200 ± 200 µs
6	Flag 0	From track 2 to track 3 and back	1:1	From track 2 to track 3 and back	1:1	From track 2 to track 3 and back	1:1
7	Limiter	-1	Recalibrate and return to 0	-1	Recalibrate and return to 0	-1	Recalibrate and return to 0
8	Asymmetry	79	<600 ns	79	<350 ns (High) <500 ns (Low)	79	<500 ns
9	Head load time						

9. ADJUSTMENTS AND VERIFICATIONS

9.1 Motor Speed Adjustment and Confirmation (Index Period)

- (1) Insert a diskette, run the motor, and clamp. Refer to the index period column of Table 8.1 for the applicable model.
- (2) Step to the specified track.
- (3) Connect a frequency counter to the INDEX signal.

5.25-inch: TP7
3.5-inch: IX

- (4) Check that the frequency counter readings meet the specifications in the table.
- (5) **Adjustment**

5.25-inch: Turn the speed control potentiometer on the motor control circuit board until the specifications are satisfied.
3.5-inch: No adjustment

9.2 Write Protect Verification

- (1) Check that the exerciser's write protect lamp goes on and off as a media is inserted and removed as specified in the table below.

Table 9.1

	Media with write protect hole open	Media with write protect hole closed
5.25-inch	OFF	ON
3.5-inch	ON	OFF

9.3 Head Output Verification

Use a new diskette if possible to identify head failure for this check.

- (1) Insert a good diskette.
- (2) Run the motor.
- (3) Step to the track specified in the output level column of Table 8.1.
- (4) Connect the oscilloscope probe as specified below.

Table 9.2

	CH1	CH2	EXT
5.25-inch	TP1	TP2	TP7
3.5-inch	T1	T2	IX (Index)

Invert channel 2 and select the Add mode.

Set vertical deflection to 10 mV/division and horizontal deflection to 20 ms/division.

- (5) Write 2F (all ones) on the entire circumference.
(In case of a double-sided FDD, repeat it on sides 0 and 1 using SIDE SELECT.)
- (6) Check that the average output level meets the specifications of Table 8.1. If it does not meet the specifications, refer to Item 7 of the Trouble Analysis Table.

9.4 Output Modulation Verification

Modulation: M is calculated by the following formula.

$$M(\%) = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}} \times 100$$

using the value obtained in 9.3, and check that the calculated value is 20% or less.

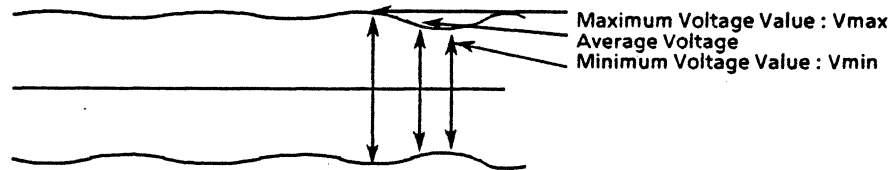


Fig. 9.1 Modulation

9.5 Radial Alignment Adjustment

Introduction

This adjustment is normally not necessary.

If the mounting screws for the stepper motor loosen, or if parts become defective, or if a compatibility error occurs, check and readjust according to the following procedure.

Steps (4) to (9) below should be performed regardless of the type, CE or DAD alignment diskette used. Use an alignment diskette suitable to the type of FDD to be adjusted according to table 3.1

- (1) Insert an alignment diskette.

CAUTION:

Be sure to leave the alignment diskette under room conditions for 20 minutes before adjustment.

- (2) Step to the track specified in the Radial alignment column of Table 8.1.
- (3) Leave the oscilloscope in the same condition as mentioned in section 9.3.

● Cats Eye System 5.25-inch

- (4) Check the output waveforms for sides 0 and 1. They should appear as in Fig. 9.3.
- (5) The two waveforms should appear in the amplitude ratio in the R/A column of Table 8.1 or better.
- (6) If the specified ratio is not satisfied, loosen the two mounting screws for the stepper motor.
- (7) Move the stepper motor along the base by hand until the two waveforms assume approximately the same amplitude, and retighten the mounting screws. (See Fig. 9.3.)
- (8) Step the head outward (track 0) and inward (track 40 or 79), and confirm that the adjustment has been completed.
- (9) After the radial adjustment, be sure to confirm track 00 sensor adjustment 9.8 and carriage limiter 9.9.

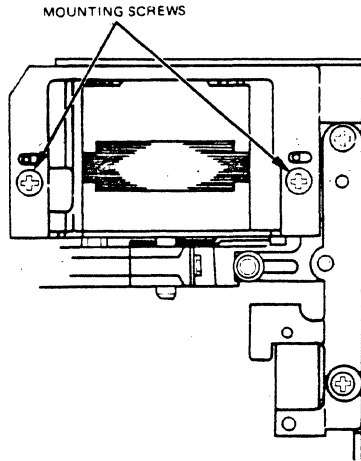


Fig. 9.2 Stepper Motor Mounting Screws

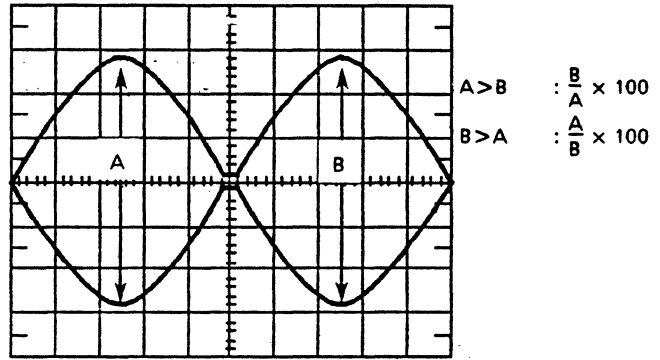


Fig. 9.3 Radial Alignment Waveforms (CATS EYE)

Note: Alignments on sides 0 and 1 are adjusted at the factory. If they are misaligned, adjust them to meet the specifications of Table 8.1.

• DAD (Dynamic Alignment Diskette) 3.5-inch

- (4) Watch the output waveforms for sides 0 and 1. They should appear as shown in Fig. 9.4.
- (5) Measure the timing levels A1 to A4 and B1 to B4 in Fig. 9.4, and calculate the lobe ratio from the following formulas.

$$\Sigma A > \Sigma B : \frac{\Sigma B}{\Sigma A} \times 100\% \qquad \Sigma A < \Sigma B : \frac{\Sigma A}{\Sigma B} \times 100\%$$

- (6) The lobe ratio calculated by the above formulas should meet the specifications on item 3 of Table 8.1.
- (7) If the above requirement is not met, loosen the two mounting screws for the stepper motor, adjust.
- (8) Seek from track 0 to track 40 and from track 79 to track 40, and confirm that the adjustment has been completed.
- (9) After the radial adjustment, be sure to confirm track 00 sensor adjustment 9.8 and head carriage limiter 9.9.

Note: An alignment instrument for 3.5-inch FDDs permits accurate and easy adjustment because the lobe ratio is displayed on the instrument.

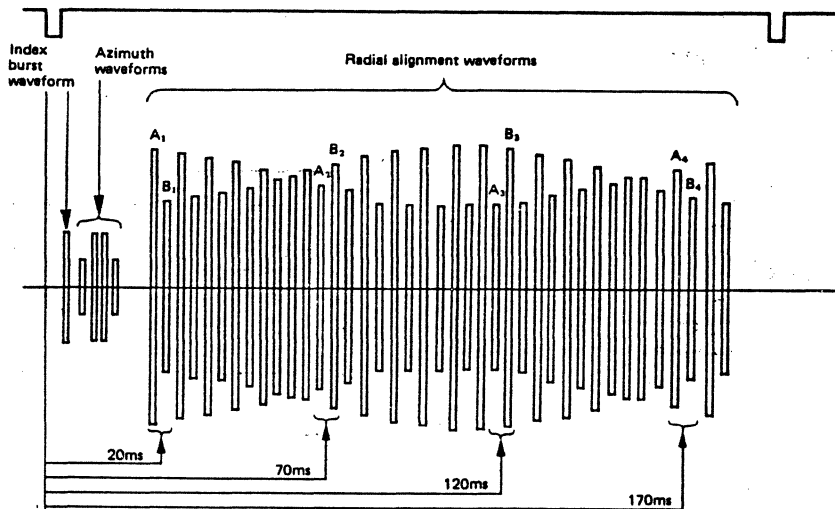


Fig. 9.4 Alignment Waveform (DAD)

9.6 Azimuth Verification

- (1) Insert an alignment diskette. Seek to the track specified in the azimuth column of Table 8.1.
- (2) Set the oscilloscope in the same conditions as in 8.3, and set horizontal deflection to 0.5 ms/division.
- (3) Measure as shown below.
- (4) Confirm that the measured value meets the specifications in the azimuth column of Table 8.1.

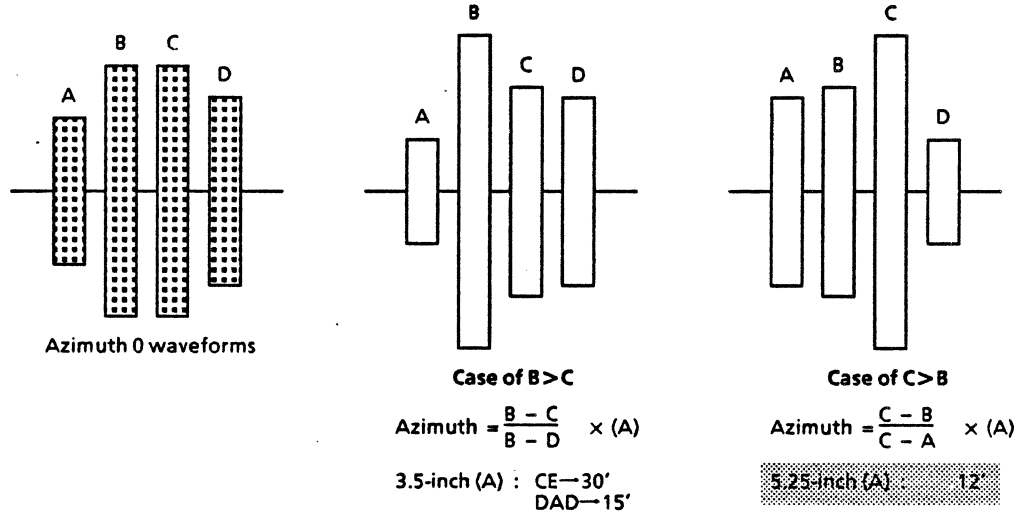


Fig. 9.5 Azimuth Waveforms

9.7 Index Burst Verification

- (1) Insert an alignment diskette. Seek to the track specified in the I/B column of Table 8.1.
- (2) Set the oscilloscope time base as follows:
 - 5.25-inch: 50 μ s/division
 - 3.5-inch: 1 ms/division
- (3) Check that the time from oscilloscope start to the first data pulse meets the I/B specifications of Table 8.1. (DAD system)
- (4) If the specifications are not met, adjust as follows. (No adjustment necessary for 3.5-inch models)
 - Loosen the index detector mounting screws enough to free the assembly.
 - Adjust the timing to $200 \pm 200 \mu$ sec.
 - Retighten the screw.
 - Check the timing again.

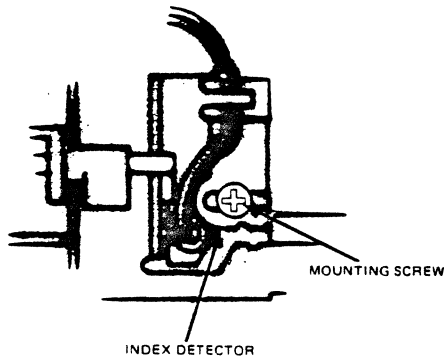


Fig. 9.6 Index Detector

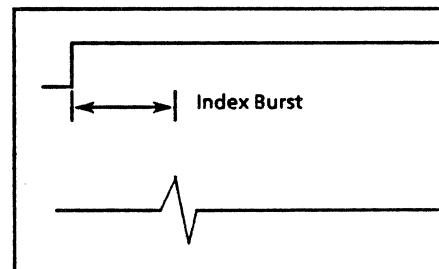


Fig. 9.7 Index Timing

9.8 Track 00 Sensor Adjustment

- (1) Set the oscilloscope as follows.
Set horizontal deflection to 1ms/division.

Table 9.3

	CH1	EXT
5.25-inch	TP-8	TP-12
3.5-inch	ZP	SP

- (1) Step between specified tracks at in the FLAG 0 item of Table 8.1 (Turn the seek delay switch on the exerciser to adjust 12 ms seek.)
- (3) Loosen the track 0 sensor screw and adjust until the waveform on the oscilloscope appears as shown in Fig. 9.9.

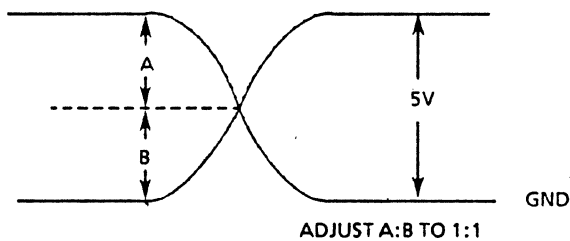


Fig. 9.8 Track 0 Waveform

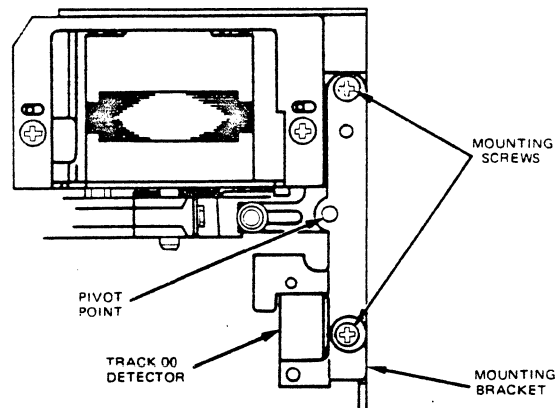


Fig. 9.9 Track 0 Adjustment

9.9 Limiter Verification (5.25-inch)

- (a) Seek to track 00.
- (b) Push the carriage outward until it contacts the limiter, and recalibrate.
Make sure that the carriage moves inward and returns to track 00.
- (c) If the carriage does not return to track 00 in Step (b), or if it contacts the limiter of the stepper motor, the stepper motor assembly must be replaced because adjustment is useless.

9.10 Limiter Adjustment (3.5-inch)

- (1) Seek to track 0.
- (2) Write 2F 00, and measure read level.
- (3) Loosen the limiter mounting screw to free the limiter.
- (4) Move the limiter until it just touches the head carriage on - 1 track, and retighten the limiter mounting screw securely.
- (5) Check that, when the RECAL switch on the exerciser is pushed ON, the head returns to track 0 and that the 2F output level is the same as that measured in Step (2).

9.11 Asymmetry Verification

- (1) Insert a data diskette.
- (2) Step to the track specified in the symmetry item of Table 8.1.
- (3) Set the oscilloscope as follows:

Table 9.4

	CH1	CH2
5.25-inch	TP-6	TP1
3.5-inch	RD	T1

- (4) Write 1F.
- (5) A read wave form is displayed on the oscilloscope as shown in Fig. 9.10.
- (6) Confirm if it satisfies the value as shown in Table 8.1.

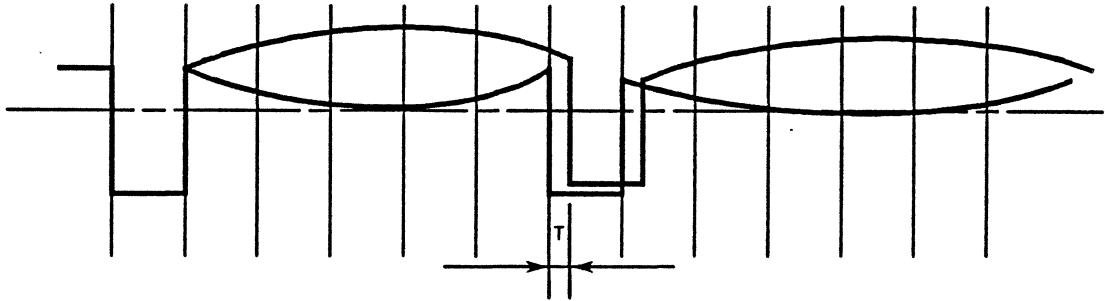


Fig. 9.10 Asymmetry Waveform

10. PANASONIC ALIGNMENT DISKETTE

5.25 inch Alignment Diskette

Table 10.1

TPI	P/N		Index Burst	Azimuth	Radial Alignment	MODEL
48	817-128		34TRK	34TRK	16TRK	JU-455
96	817-560		68TRK	68TRK	32TRK	JU-465/475
100	817-570		61TRK	61TRK	36TRK	JU-570

3.5 inch Alignment Diskette

Table 10.2

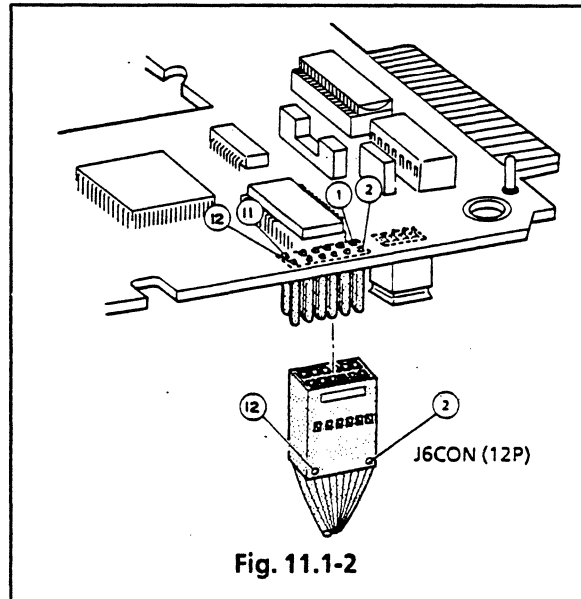
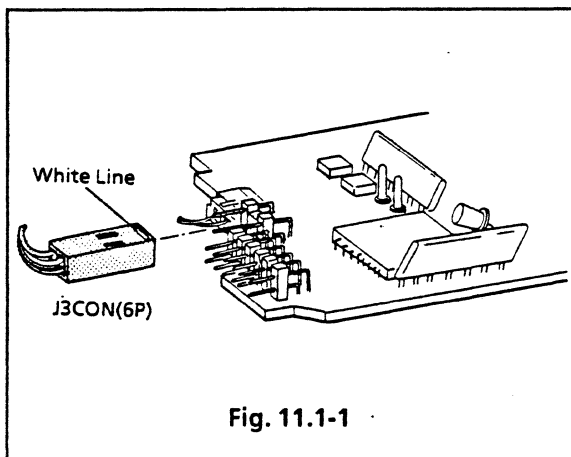
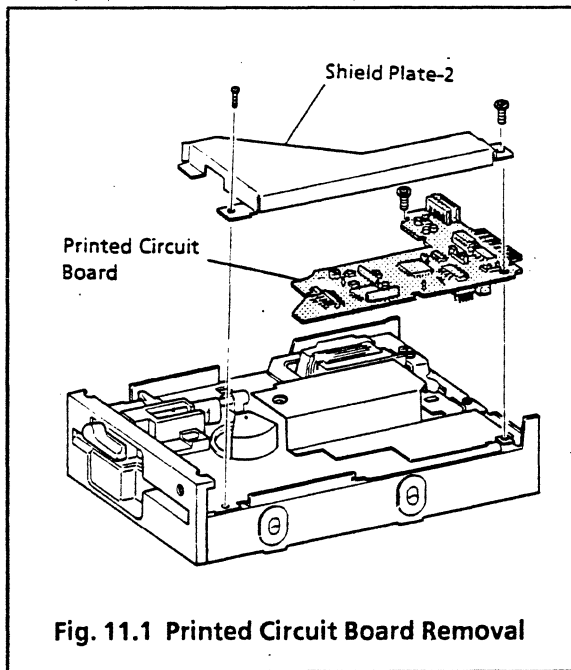
TPI	P/N		Index Burst	Azimuth	Radial Alignment	MODEL
67.5	JU-01AA		20	20	20	JU-31X
135	JU-01AA		40	40	40	JU-32X JU-36X

PART. 2

11. REMOVALS AND INSTALLATIONS

11.1 PCB Removal and Installation (See Fig. 11.1)

- (1) Remove the 2 screws and take out the shield plate-2.
- (2) Remove the remaining screw of the mounting printed circuit board.
- (3) Disconnect the connectors (J3 CON, J4 CON, J5 CON, J6 CON, J7 CON) from the printed circuit board.
- (4) Remove the printed circuit board by sliding it aslant.
- (5) To reinstall, reverse the above procedure.
- (6) Readjustment is not necessary after printed circuit board replacement.

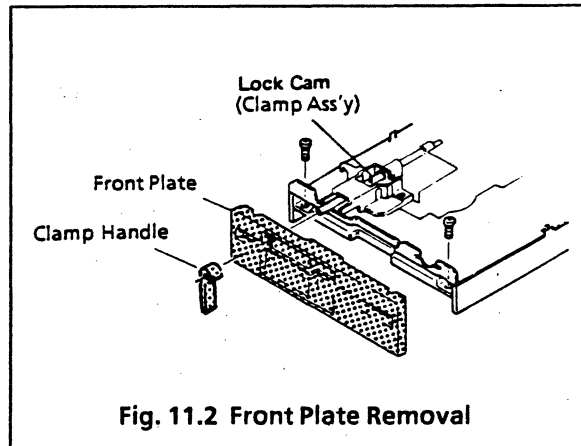


Note:

Reverse connection prevention pin is not provided in J3 and J6. When installing the P.C.B., connect them so that the white line on the J3 connector is facing upwards and J6 connector pin No. matches the P.C.B side pin No.

11.2 Front Plate Removal and Installation (See Fig.11.2)

- (1) Operate the lock cam of the clamp assembly, and turn the clamp handle in the direction of clamping.
- (2) Remove the clamp handle.
- (3) Remove the two front plate mounting screws, and take off the front plate.
- (4) Reverse the above procedure to reinstall.



11.3 Track 00 Assembly Removal and Installation
(See Fig. 11.3)

- (1) Remove the track 00 assembly mounting screw and take out the track 00 assembly.
- (2) Pull out the white, yellow, and green wires from J6 CON (12P).
- (3) Reverse the above procedure to reinstall.
- (4) After reinstallation, adjust the track 00 sensor as described in 9.8.

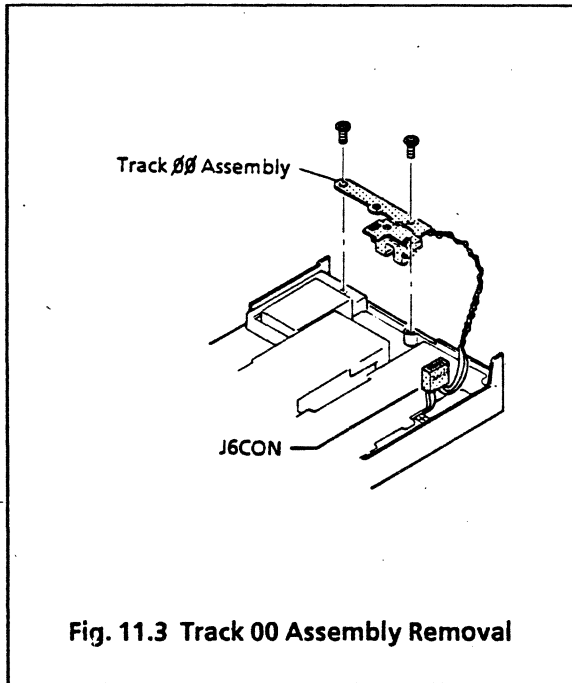


Fig. 11.3 Track 00 Assembly Removal

11.4 Collet Assembly Removal, Installation, and Adjustment (See Fig. 11.4)

- (1) Remove the Cartridge Guide Assembly as described in 11.7.
- (2) Remove the lifter spring from the lifter.
- (3) Remove the E-ring from the lifter shaft.
- (4) Remove the lifter from the Cartridge Guide.
- (5) Remove the Collet Assembly from the Guide shaft.
- (6) Reverse the above procedure to reinstall.
- (7) After reinstallation, perform collet assembly center adjustment.
- (8) Collet assembly center adjustment.
 - a) Temporarily fasten the Cartridge Guide Assembly.
 - b) Insert a diskette or dummy diskette and clamp it.
 - c) Clamp repeatedly a few times to find a good fit between the collet and the inside diameter of the DD motor.
 - d) Bind the screw of the Cartridge Guide.

- e) Check step c) again, if not good repeat steps a) through d) until the correct center adjustment is achieved.

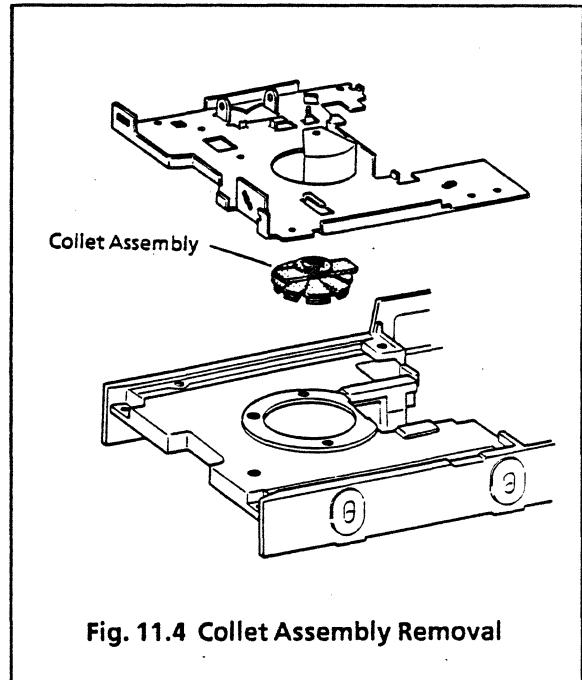


Fig. 11.4 Collet Assembly Removal

11.5 Clamp Assembly Removal and Installation (See Fig. 11.5)

- (1) Remove the front plate as described in 11.2.
- (2) Remove the two clamp assembly mounting screws.
- (3) Remove the clamp assembly.
- (4) Reverse the above procedure to reinstall.

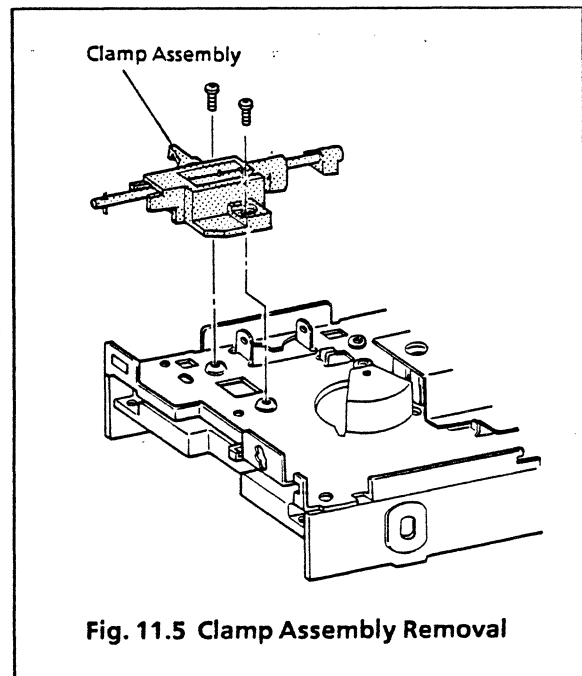


Fig. 11.5 Clamp Assembly Removal

11.6 Write Protect Sensor/Index Detector Assembly Removal and Installation (See Fig. 11.6)

- (1) Remove the front plate as described in 11.2.
- (2) Remove the write protect sensor mounting screw and index detector mounting screw respectively.
- (3) Remove the write protect sensor/index detector assembly.
- (4) Reverse the above procedure to reinstall.
- (5) When reinstalling the write protect sensor, exercise care so that the leads and write protect sensor will not project from the side of the base.
- (6) After index detector installation, adjust the index timing as described in 9.7.

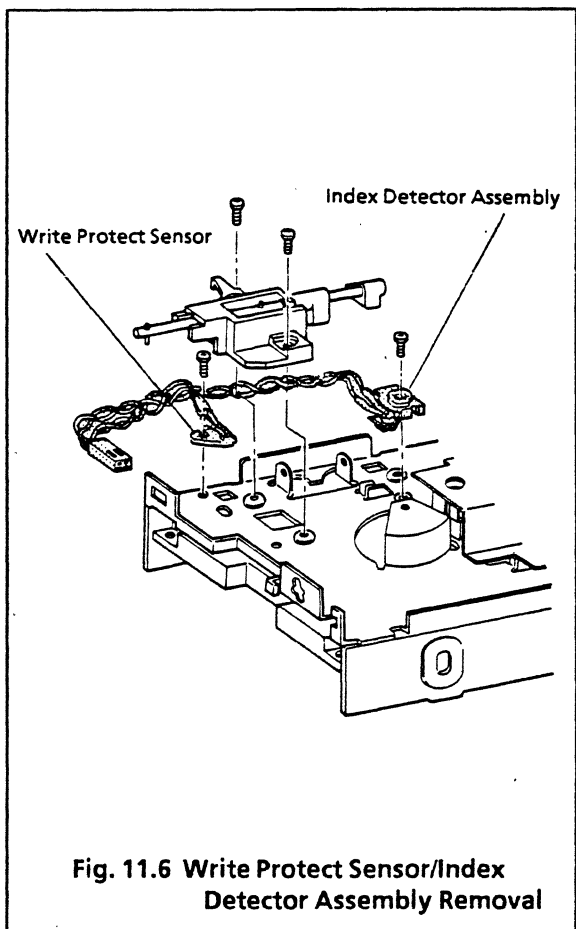


Fig. 11.6 Write Protect Sensor/Index Detector Assembly Removal

11.7 Cartridge Guide Assembly Removal and Installation (See Fig. 11.7)

- (1) Remove the printed circuit board as described in 11.1.
- (2) Remove the front plate as described in 11.2.
- (3) Remove the insulating paper and the remaining screw and take off the shield plate.
- (4) Remove the write protect sensor as described in 11.6. It is not necessary to remove the index detector.
- (5) Remove the remaining 2 screws of the mounting cartridge guide and take out the cartridge guide assembly.
- (6) After reinstallation, adjust the collet assembly as in 11.4 step (8) and adjust the index timing as in 9.7.
- (7) When removing or reinstalling, be careful not to damage the carriage arm with the lifter.

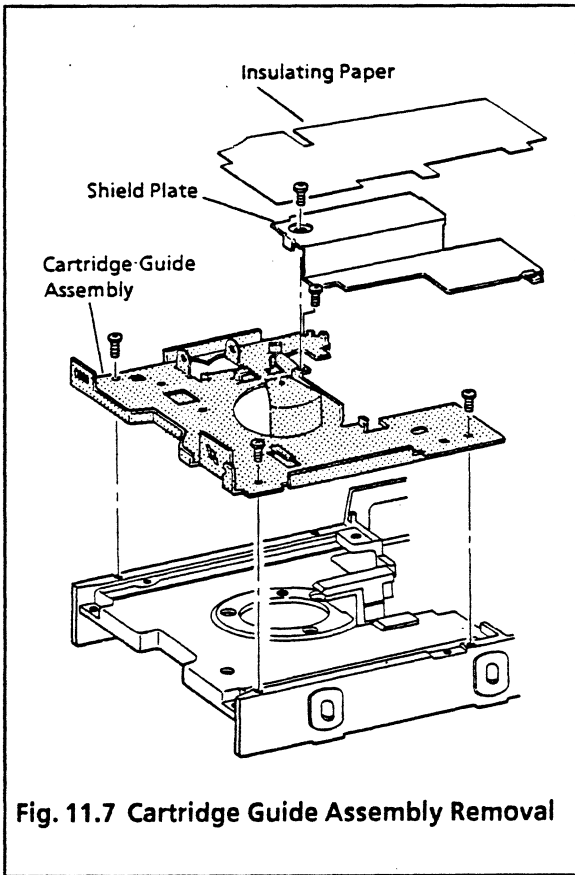
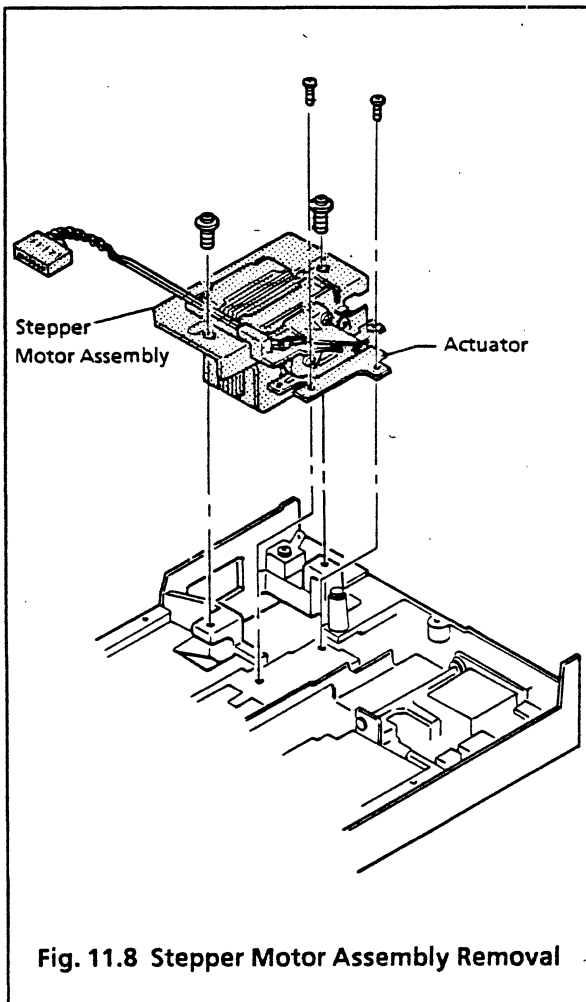


Fig. 11.7 Cartridge Guide Assembly Removal

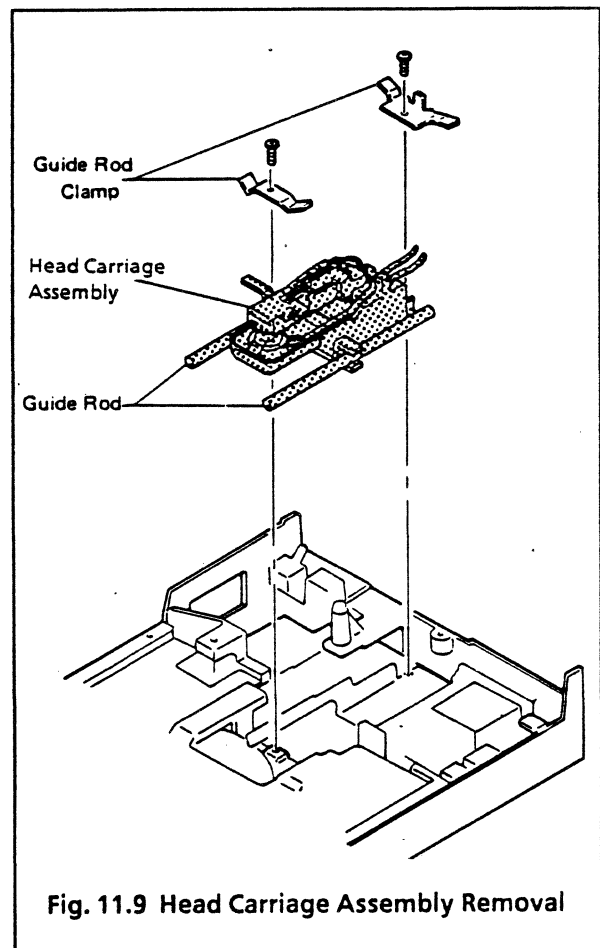
11.8 Stepper Motor Assembly Removal and Installation (See Fig. 11.8)

- (1) Remove the insulating paper and shield plate.
- (2) Remove the track 00 sensor as described in 11.3.
- (3) Remove the two (M2 x 4) actuator screws that fasten the actuator to the carriage arm assembly.
- (4) Remove the two (M3 x 6) stepper motor assembly mounting screws and then the stepper motor.
- (5) Reverse the above procedure to reinstall.
- (6) After reinstallation, perform limiter check as in 9.9 and radial alignment adjustment as in 9.5.
- (7) Adjust the track 00 sensor according to the instruction in 9.8.



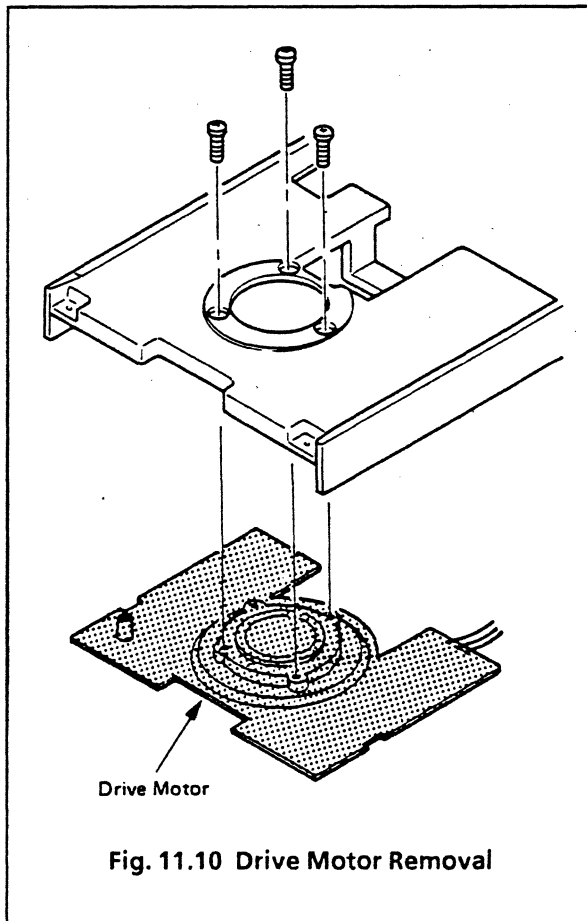
11.9 Head Carriage Assembly Removal and Installation (See Fig. 11.9)

- (1) Remove the printed circuit board as described in 11.1.
- (2) Remove the insulating paper and shield plate.
- (3) Remove the track 00 assembly as described in 11.3.
- (4) Remove the stepper motor assembly as described in 11.8.
- (5) Remove the two guide rod clamp mounting screws.
- (6) Remove the Head carriage assembly, guide rod clamp, and guide rod.
- (7) Pull out the guide rod from the Head carriage assembly.
- (8) Reverse the above procedure to reinstall.
- (9) After replacement, perform limiter check as described in 9.9, track 00 sensor adjustment as described in 9.8, and radial alignment adjustment as described in 9.5.



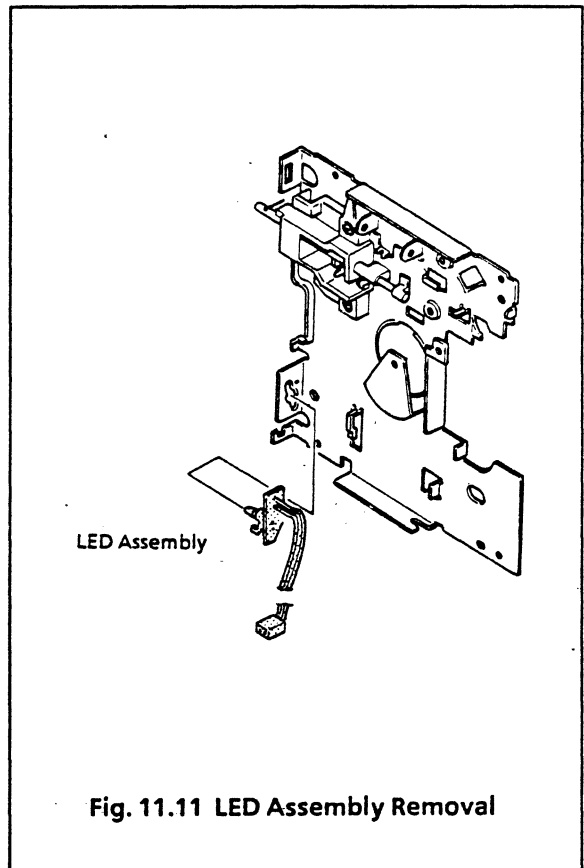
11.10 Drive Motor Removal and Installation (See Fig. 11.10)

- (1) Remove the printed circuit board as described in 11.1.
- (2) Remove the insulating paper and shield plate.
- (3) Remove the front plate as described in 11.2.
- (4) Remove the write protect sensor as described in 11.6.
- (5) Remove the cartridge guide assembly as described in 11.7.
- (6) Remove the three drive motor mounting screws and take off the drive motor from the base.
- (7) Disconnect the drive motor connector pins from the connector.
- (8) Reverse the above procedure to reinstall.
- (9) When reinstalling, make sure that the drive motor connector is connected in the correct direction.
- (10) After reinstallation, perform motor speed adjustment as described in 9.1 and also the adjustments necessary upon reinstallation of the cartridge guide as described in 11.7.



11.11 LED Assembly Removal and Installation (See Fig. 11.11)

- (1) Remove the clamp handle and front plate.
- (2) Take out the shield plate-2.
- (3) Disconnect the connectors J7 CON from the printed circuit board.
- (4) Remove the LED Assembly by sliding it aslant from the Cartridge Guide Assembly.
- (5) Reverse the above procedure to reinstall.



11.12 Door Switch Assembly Removal and Installation (See Fig. 11.12)

- (1) Remove the 2 screws and take out the shield plate-2.
- (2) Remove the connector pins (5 pin and 6 pin) of the door switch from J3 CON (6P).
- (3) Remove the door switch set screw and take off the door switch assembly.
- (4) Reverse the above procedure to reinstall.

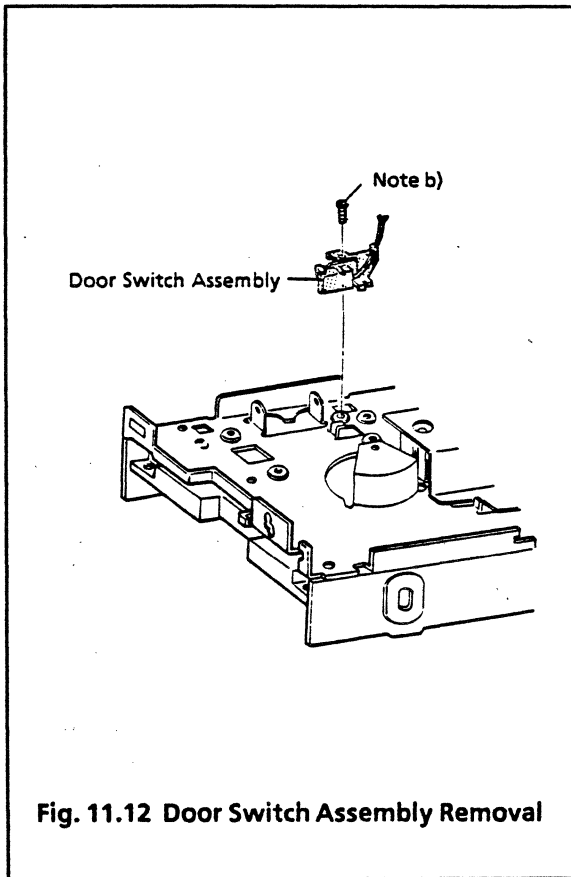


Fig. 11.12 Door Switch Assembly Removal

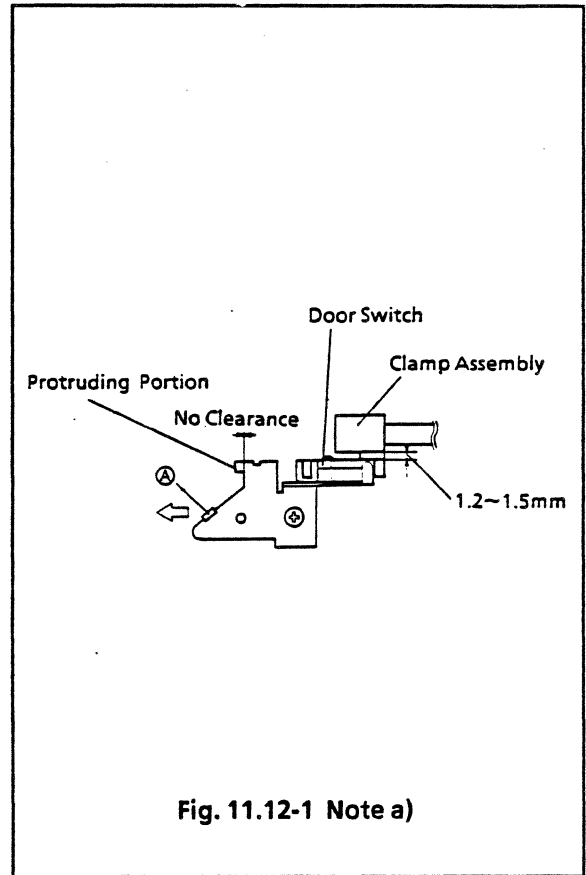


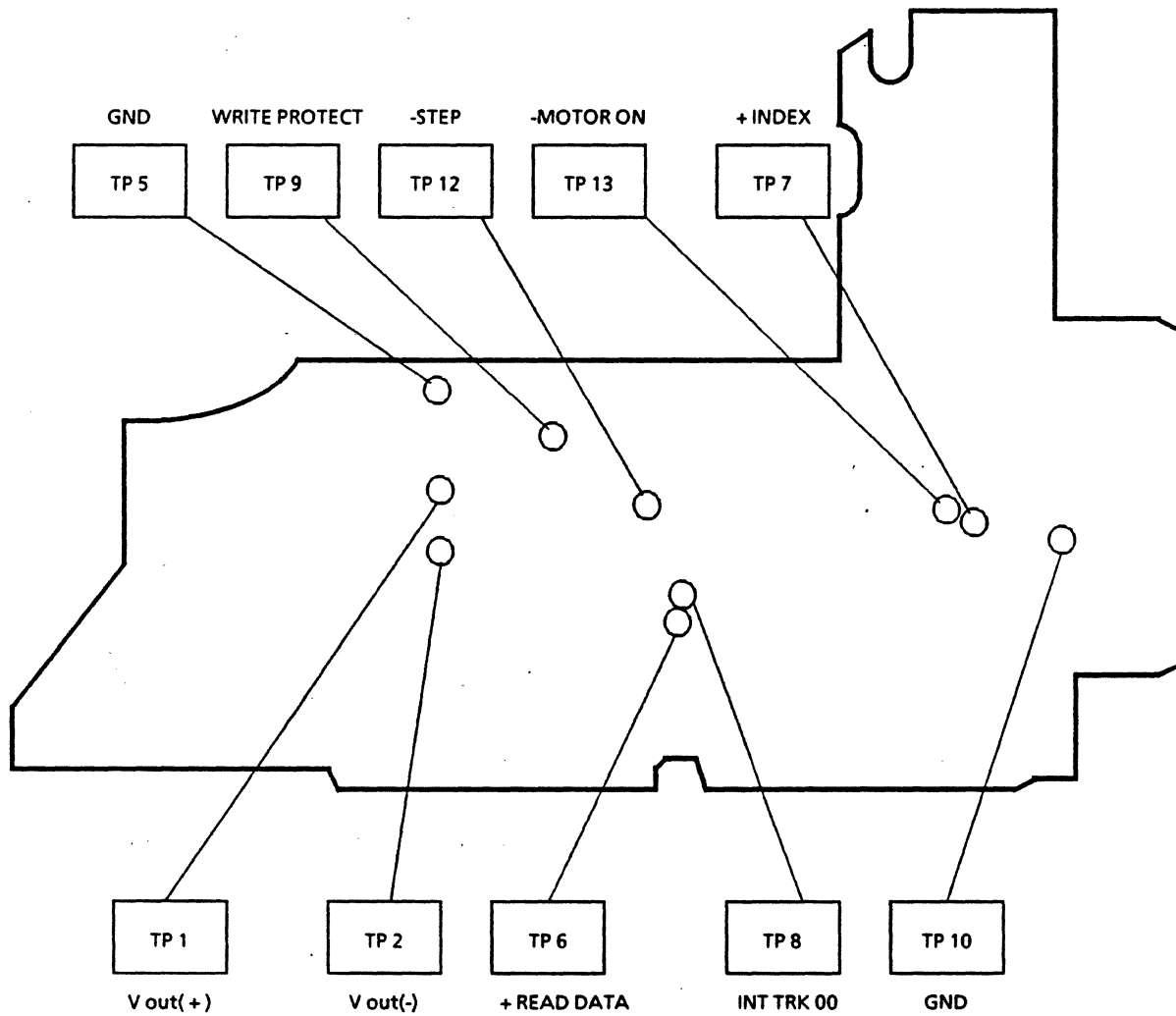
Fig. 11.12-1 Note a)

Notes:

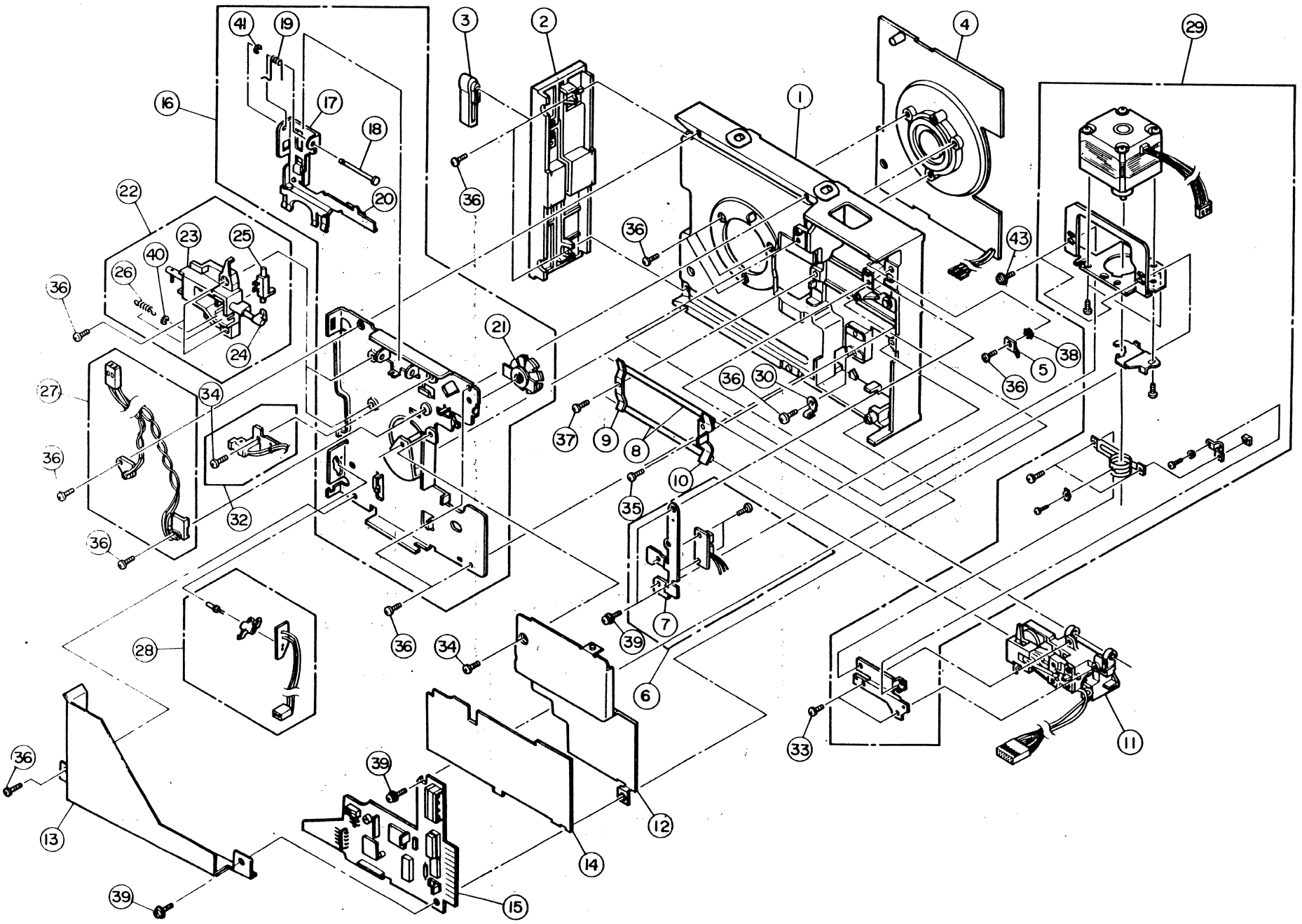
- a) When installing the door switch, set the clamp handle in clamped condition, remove the clearance between the protruding part of the cartridge guide by pushing the Ⓐ portion of the door switch in direction of the arrow mark (⇐), open a gap of 1.2 mm to 1.5 mm between the clamp cam and the door switch and secure with screws.
- b) Be careful as the diskette will be marred and damaged if the door switch set screw is not the correct one.

12 TEST POINTS

Print Circuit Board
(Top view)



13. EXPLODED VIEW



14. REPLACEMENT PARTS LIST

MODEL: JU-465-5 AAG

Ref. No.	Part No.	Description	Per Set (pcs.)	Recommend Service Parts per 1,000 units
1	YTF3L01901B1	Base	1	
2	YTF5W00152B2	Front Panel	1	3
3	YTF6A01090B3	Clamp Handle	1	3
4	YTFMD01040B4	Drive Motor	1	2
5	YJ617612	Faston	1	
6	YTUF45TR	Sensor Assembly (For TRKø)	1	2
7	YTF2T01560B4	Bracket (For TRKø)	1	
8	YTF2E02561B4	Guide Rod	2	
9	333D46331360	Clamp (For Guide Rod Head)	1	
10	YJF2E00581B4	Clamp (For Guide Rod End)	1	
11	YTUF46HD5AAG	Head Carriage Assembly	1	2
12	YTF2H03582B3	Shield Plate (Carriage Shield)	1	
13	YTF2H03990B3	Shield Plate-2 (PCB Shield)	1	
14	YTF2P03960B4	Insulating Paper	1	
15	YTUF46PK5AAG	Print Circuit Board Assembly	1	2
16	YTUF47CG2AAG	Cartridge Guide Assembly	1	
17	YTF3C02732B3	Lifter	1	
18	YTF4H01360B4	Lift Shaft	1	
19	YTF4J01901B4	Lift Spring	1	
20	333D46817500	Pad	1	
21	YTUF55CLT-5	Collet Assembly	1	2
22	UF47CLP1BBG	Clamp Assembly	1	2
23	YJF4F00342B2	Clamp Bearing	1	
24	YTF4H02020B3	Clamp Cam Assembly	1	
25	333D36817693	Lock Cam	1	
26	333D46624770	Lock Spring	1	2
27	YTUF47WP	Write Protect/Index Assembly	1	
28	YTUF47LED	LED Assembly	1	2
29	YTUF47SM2AAG	Stepper Motor Assembly	1	2
30	YTF1G00500B4	Cord Clamp	1	
32		Door Switch Assembly	0	
33	XSB2 + 4V	Screw (M2x4 Bind)	2	
34	XSB3 + 4FX	Screw (M3x4 Bind)	1	
35	XSB3 + 4V	Screw (M3x4 Bind)	1	
36	XSB3 + 6FX	Screw (M3x6 Bind)	14	
37	XSB3 + 6V	Screw (M3x6 Bind)	1	
38	XWC3B	Toothed Lock Washer	1	
39	XYN3 + F6	Screw (M3x6 Sems)	4	
40	XUC3	Retaining Ring	1	
41	XUC2	Retaining Ring	1	
43	XYN3 + F8FX	Screw (M3x8 Sems)	2	

- Caution:
1. PCB Assembly is produced to order during the production period only.
 2. When you order the aforementioned parts, be sure to specify "Part No." of the parts ordered.

MODEL: JU-475-2 AGG

Ref. No.	Part No.	Description	Per Set (pcs.)	Recommend Service Parts per 1,000 units
1	YTF3L01901B1	Base	1	
2	YTF5W00152B2	Front Panel	1	3
3	YTF6A01090B3	Clamp Handle	1	3
4	YTFMD00740B4	Drive Motor	1	2
5	YJ617612	Faston	1	
6	YTUF45TR	Sensor Assembly (For TRK \emptyset)	1	2
7	YTF2T01560B4	Bracket (For TRK \emptyset)	1	
8	YTF2E02561B4	Guide Rod	2	
9	333D46331360	Clamp (For Guide Rod Head)	1	
10	YJF2E00581B4	Clamp (For Guide Rod End)	1	
11	YTUF47HD2AAG	Head Carriage Assembly	1	2
12	YTF2H03582B3	Shield Plate (Carriage Shield)	1	
13	YTF2H03990B3	Shield Plate-2 (PCB Shield)	1	
14	YTF2P03961B4	Insulating Paper	1	
15	UF47PK2AGGE	Print Circuit Board Assembly	1	2
16	YTUF47CG2AAG	Cartridge Guide Assembly	1	
17	YTF3C02732B3	Lifter	1	
18	YTF4H01360B4	Lift Shaft	1	
19	YTF4J01901B4	Lift Spring	1	
20	333D46817500	Pad	1	
21	YTUF56CLT2AN	Collet Assembly	1	2
22	UF47CLP1BBG	Clamp Assembly	1	2
23	YJF4F00342B2	Clamp Bearing	1	
24	YTF4H02020B3	Clamp Cam Assembly	1	
25	333D36817693	Lock Cam	1	
26	333D46624770	Lock Spring	1	2
27	YTUF47WP	Write Protect/Index Assembly	1	2
28	YTUF47LED	LED Assembly	1	2
29	YTUF47SM2AAG	Stepper Motor Assembly	1	2
30	YTF1G00500B4	Cord Clamp	1	
32	UF47DSW2AAG	Door Switch Assembly	1	2
33	XSB2 + 4V	Screw (M2x4 Bind)	2	
34	XSB3 + 4FX	Screw (M3x4 Bind)	2	
35	XSB3 + 4V	Screw (M3x4 Bind)	1	
36	XSB3 + 6FX	Screw (M3x6 Bind)	14	
37	XSB3 + 6V	Screw (M3x6 Bind)	1	
38	XWC3B	Toothed Lock Washer	1	
39	XYN3 + F6	Screw (M3x6 Sems)	4	
40	XUC3	Retaining Ring	1	
41	XUC2	Retaining Ring	1	
43	XYN3 + F8FX	Screw (M3x8 Sems)	2	

- Caution:
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 2. When you order the aforementioned parts, be sure to specify "Part No." of the parts ordered.

MODEL: JU-475-2 AAG

Ref. No.	Part No.	Description	Per Set (pcs.)	Recommend Service Parts per 1,000 units
1	YTF3L01901B1	Base	1	
2	YTF5W00152B2	Front Panel	1	3
3	YTF6A01090B3	Clamp Handle	1	3
4	YTFMD00740B4	Drive Motor	1	2
5	YJ617612	Faston	1	
6	YTUF45TR	Sensor Assembly (For TRKØ)	1	2
7	YTF2T01560B4	Bracket (For TRKØ)	1	
8	YTF2E02561B4	Guide Rod	2	
9	333D46331360	Clamp (For Guide Rod Head)	1	
10	YJF2E00581B4	Clamp (For Guide Rod End)	1	
11	YTUF47HD2AAG	Head Carriage Assembly	1	2
12	YTF2H03582B3	Shield Plate (Carriage Shield)	1	
13	YTF2H03990B3	Shield Plate-2 (PCB Shield)	1	
14	YTF2P03961B4	Insulating Paper	1	
15	YTUF47PK2AAG	Print Circuit Board Assembly	1	2
16	YTUF47CG2AAG	Cartridge Guide Assembly	1	
17	YTF3C02732B3	Lifter	1	
18	YTF4H01360B4	Lift Shaft	1	
19	YTF4J01901B4	Lift Spring	1	
20	333D46817500	Pad	1	
21	YTUF56CLT2AN	Collet Assembly	1	2
22	UF47CLP1BBG	Clamp Assembly	1	2
23	YJF4F00342B2	Clamp Bearing	1	
24	YTF4H02020B3	Clamp Cam Assembly	1	
25	333D36817693	Lock Cam	1	
26	333D46624770	Lock Spring	1	2
27	YTUF47WP	Write Protect/Index Assembly	1	2
28	YTUF47LED	LED Assembly	1	2
29	YTUF47SM2AAG	Stepper Motor Assembly	1	2
30	YTF1G00500B4	Cord Clamp	1	
32	UF47DSW2AAG	Door Switch Assembly	1	2
33	XSB2 + 4V	Screw (M2x4 Bind)	2	
34	XSB3 + 4FX	Screw (M3x4 Bind)	2	
35	XSB3 + 4V	Screw (M3x4 Bind)	1	
36	XSB3 + 6FX	Screw (M3x6 Bind)	14	
37	XSB3 + 6V	Screw (M3x6 Bind)	1	
38	XWC3B	Toothed Lock Washer	1	
39	XYN3 + F6	Screw (M3x6 Sems)	4	
40	XUC3	Retaining Ring	1	
41	XUC2	Retaining Ring	1	
43	XYN3 + F8FX	Screw (M3x8 Sems)	2	

- Caution:
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 2. When you order the aforementioned parts, be sure to specify "Part No." of the parts ordered.

15. REPLACEMENT PARTS LIST OF PCB

MODEL: JU-465-5AAG Component Side (Top)

Ref. No.	Part No.	Description	PerSet (pcs.)	Recommend Service Parts Per 1,000 Units
R22	ERG15J241	Metal Oxide Film Resistor	1	
C1,10,23	FCJ00080B400	Ceramic Capacitor	3	
C2,24	ECEA1HKS100E	Electrolyte Capacitor	2	
C8	ECEA1HKS010E	Electrolyte Capacitor	1	
CN	FJC00080B400	Connector	1	
CN	FJC00080B401	Connector	1	
CN	FJC00090B401	Connector	1	
CN	FJC00090B402	Connector	2	
CN	FJC00090B404	Connector	1	
CN2	YJ172294-1	Connector	1	
CN2	YJ172296-1	Connector Clamp	1	
CN3	FFC6TLBW1B	Connector	1	
CN4	FJC00030B4	Connector	1	
CN7	FJC00180B400	Connector	1	
IR1	EXBR88151JW	Block Resistor	1	2
IR2,5	RGLD4X152J	Block Resistor	2	
IR3	RGLD6X822J	Block Resistor	1	
IR4	RGLD6X392J	Block Resistor	1	
IC1	HA16651MP	R/W LSI	1	3
IC2	FQL00081B4	LSI	1	2
IC3	DN74LS145	IC	1	2
IC4,8	DN74LS74AS	IC	2	2
IC5	DN74LS16-1S	IC	1	2
IC6	DN74LS38-1	IC	1	2
IC7	DN74LS08S	IC	1	2
IC10	DN74LS02S	IC	1	2
IC11	HA13421	LSI	1	3
L1,2	ZBF503D-03	Choke Coil	2	2
L3	LAL03KH101K	Choke Coil	1	2
L4	ELEPG330KA	Choke Coil	1	2
L5,6	FNC00030B433	Choke Coil	2	
L7,8	FNC00030B435	Choke Coil	2	2
L9	FNC00030B423	Choke Coil	1	
VR1	3321P1-203	Variable Resistor	1	
X1	CSA4-00MG	Resonator	1	
P	FJP00280B400	Plug	6	

Solder Side (Bottom)

Ref. No.	Part No.	Description	PerSet (pcs.)	Recommend Service Parts Per 1,000 Units
R1,30	FRA00040B496	Chip Resistor	2	
R2,3,34,40	FRA00040B428	Chip Resistor	4	
R4,5	FRA00040B444	Chip Resistor	2	
R6,7	FRA00040B448	Chip Resistor	2	
R8,9	FRA00040B462	Chip Resistor	2	
R10	FRA00040B440	Chip Resistor	1	
R11	FRA00040B472	Chip Resistor	1	
R12,29,31,33	FRA00040B488	Chip Resistor	4	
R15	FRA00040B432	Chip Resistor	1	
R17	FRA00040B478	Chip Resistor	1	
R18,37,38	FRA00040B464	Chip Resistor	3	
R19	FRA00040B476	Chip Resistor	1	
R21	ERJ8GEYG682V	Chip Resistor	1	
R24	FRA00040B477	Chip Resistor	1	
R25,28,32	FRA00010B428	Chip Resistor	3	
R35	FRA00050B420	Chip Resistor	1	
R	MCR18EZHG682	Chip Resistor	1	
C5,6	FCC00060B408	Chip Capacitor	2	
C9,14,15,22	FCC00060B420	Chip Capacitor	4	
C11,12	FCC00040B430	Chip Capacitor	2	
C13	FCC00010B445	Chip Capacitor	1	
C16	FCC00010B462	Chip Capacitor	1	
C18	FCC00040B431	Chip Capacitor	1	
C19	FCC00040B426	Chip Capacitor	1	
C20,21	FCC00040B420	Chip Capacitor	2	
CN5	YTB4B-PH	Connector	1	
CN6	FJC00220B404	Connector	1	
D	MA151WA-TW	Diode	1	2
D	MA151WK-TW	Diode	1	2
Q	UN2211-TW	Digital Transistor	1	2
Q	UN2216-TW	Digital Transistor	1	2
Q	2SB709-TW	Chip Transistor	2	2
Q	2SB709-TX	Chip Transistor	2	2

MODEL: JU-475-2AGG
Component Side (Top)

Ref. No.	Part No.	Description	PerSet (pcs.)	Recommend Service Parts Per 1,000 Units
R22	ERG1SJ241	Metal Oxide Film Resistor	1	
R23	ERG1SJ131	Metal Oxide Film Resistor	1	
C1,10,23	FCJ00080B400	Ceramic Capacitor	3	
C2,24	ECEA1HKS100E	Electrolyte Capacitor	2	
C8	ECEA1HKS010E	Electrolyte Capacitor	1	
CN	FJC00080B400	Connector	1	
CN	FJC00080B401	Connector	3	
CN	FJC00090B401	Connector	1	
CN	FJC00090B402	Connector	2	
CN	FJC00090B404	Connector	1	
CN2	172294-1	Connector	1	
CN2	172296-1	Connector Clamp	1	
CN3	FFC6TLBW1B	Connector	1	
CN4	FJC00030B4	Connector	1	
CN7	FJC00180B400	Connector	1	
IR1	EXBR88151JW	Block Resistor	1	2
IR2,5	RGLD4X152J	Block Resistor	2	
IR3	RGLD6X822J	Block Resistor	1	
IR4	RGLD6X392J	Block Resistor	1	
IC1	HA16651MP	R/W LSI	1	3
IC2	FQL00081B4	LSI	1	2
IC3	DN74LS14S	IC	1	2
IC4,8	DN74LS74AS	IC	2	2
IC5	DN74LS16-1S	IC	1	2
IC6	DN74LS38-1	IC	1	2
IC7	DN74LS08S	IC	1	2
IC10	DN74LS02S	IC	1	2
IC11	HA13421	LSI	1	3
L1,2	ZBF503D-03	Choke Coil	2	2
L3	LAL03KH101K	Choke Coil	1	2
L4	ELEPG330KA	Choke Coil	1	2
L5,6,7,8	FNC00030B434	Low-Frequency Coil	4	2
L9	FNC00030B426	Low-Frequency Coil	1	2
VR1	3321P1-203	Variable Resistor	1	
X1	CSA4-00MG	Resonator	1	
P	FJP00280B400	Plug	8	
XV	DILB16P8J	IC Socket (without cap)	1	
Q5	3SK73-GR	Transistor	1	2
TP	RT01T1.3B	Terminal (pin)	10	

Solder Side (Bottom)

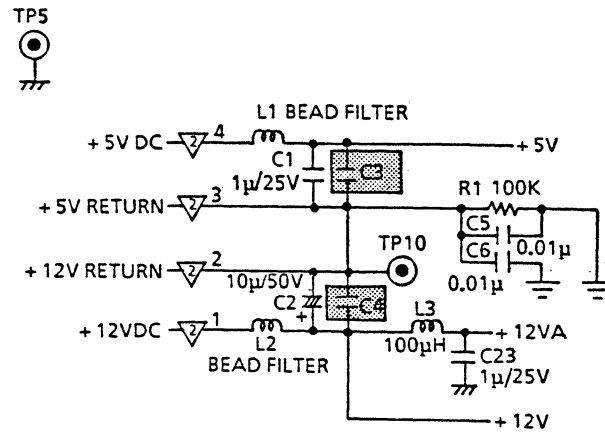
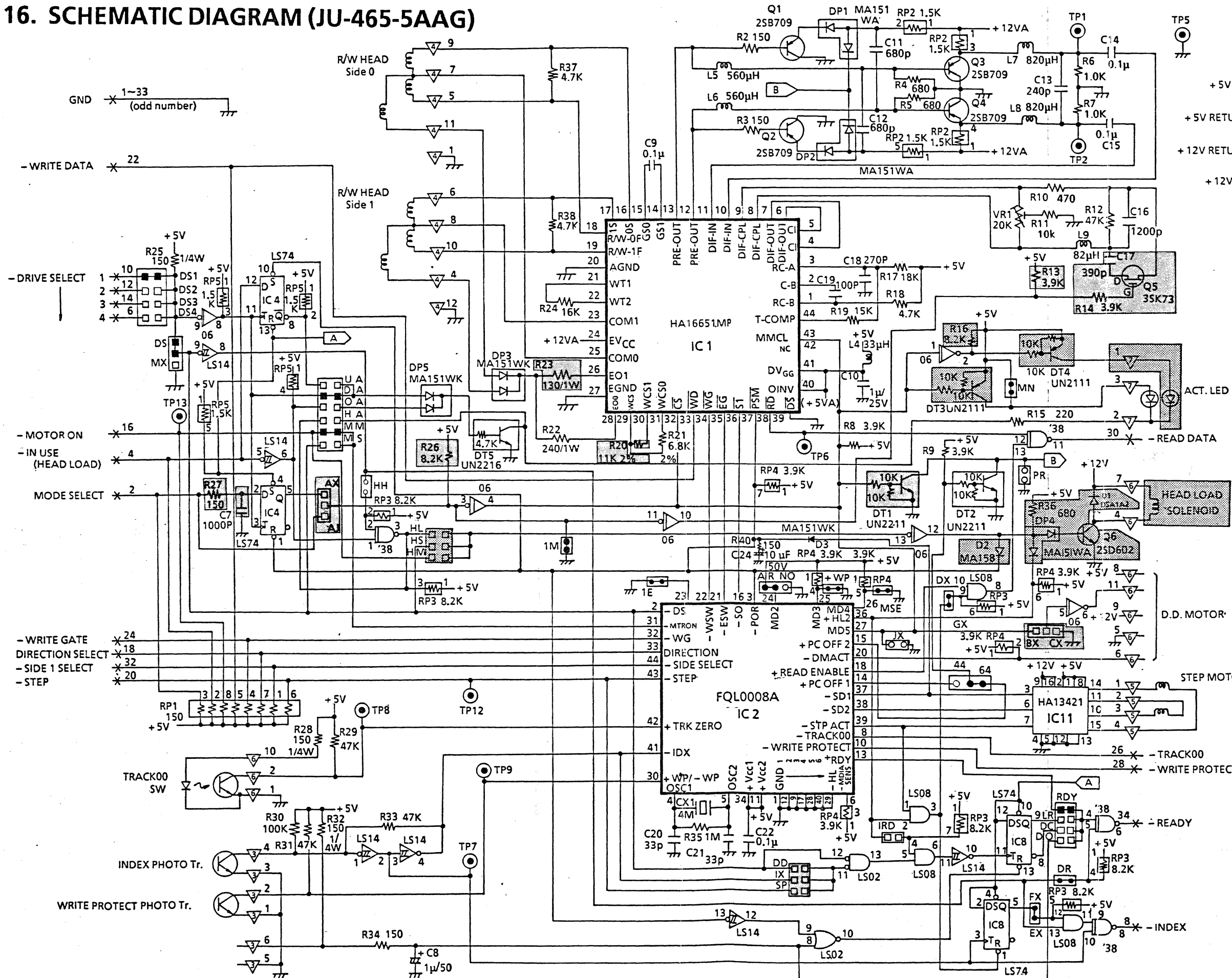
Ref. No.	Part No.	Description	PerSet (pcs.)	Recommend Service Parts Per 1,000 Units
R1,30	FRA00040B496	Chip Resistor	2	
R2,3,27,34,40	FRA00040B428	Chip Resistor	5	
R4,5	FRA00040B454	Chip Resistor	2	
R6,7	FRA00040B450	Chip Resistor	2	
R8,9,13,14	FRA00040B462	Chip Resistor	4	
R10	FRA00040B444	Chip Resistor	1	
R11,12,29,31,33	FRA00040B488	Chip Resistor	5	
R15	FRA00040B432	Chip Resistor	1	
R17,24	FRA00040B478	Chip Resistor	2	
R18	FRA00040B464	Chip Resistor	1	
R19	FRA00040B476	Chip Resistor	1	
R25,28,32	FRA00010B428	Chip Resistor	3	
R26	FRA00040B470	Chip Resistor	1	
R35	FRA00050B420	Chip Resistor	1	
R37,38	FRA00040B460	Chip Resistor	2	
R	MCR18EZHG113	Chip Resistor	1	
R	MCR18EZHG562	Chip Resistor	1	
C5,6	FCC00060B408	Chip Capacitor	2	
C7	FCC00070B404	Chip Capacitor	1	
C9,22	FCC00060B420	Chip Capacitor	2	
C11,12,19	FCC00040B426	Chip Capacitor	3	
C13	FCC00040B424	Chip Capacitor	1	
C14,15	FCC00060B412	Chip Capacitor	2	
C16,17	FCC00040B436	Chip Capacitor	2	
C18	FCC00040B431	Chip Capacitor	1	
C20,21	FCC00040B420	Chip Capacitor	2	
CN5	B4B-PH	Connector	1	
CN6	FJC00220B404	Connector	1	
D	MA151WA-TW	Diode	1	2
D	MA151WK-TW	Diode	2	2
D	MA151WA-TX	Diode	1	2
D	MA151WK-TX	Diode	2	2
Q	UN2211-TW	Digital Transistor	1	2
Q	UN2211-TX	Digital Transistor	1	2
Q	UN2216-TW	Digital Transistor	1	2
Q	UN2216-TX	Digital Transistor	1	2
Q	2SB709-TW	Chip Transistor	2	2
Q	2SB709-TX	Chip Transistor	2	2

MODEL: JU-475-2AAG
Component Side (Top)

Solder Side (Bottom)

Ref. No.	Part No.	Description	PerSet (pcs.)	Recommend Service Parts Per 1,000 Units	Ref. No.	Part No.	Description	PerSet (pcs.)	Recommend Service Parts Per 1,000 Units
R22	ERG1SJ241	Metal Oxide Film Resistor	1		R1,30	FRA00040B496	Chip Resistor	2	
R23	ERG1SJ131	Metal Oxide Film Resistor	1		R2,3,27,34,40	FRA00040B428	Chip Resistor	5	
C1,10,23	FCJ00080B400	Ceramic Capacitor	3		R4,5	FRA00040B454	Chip Resistor	2	
C2,24	ECEA1HKS100E	Electrolyte Capacitor	2		R6,7	FRA00040B450	Chip Resistor	2	
C8	ECEA1HKS010E	Electrolyte Capacitor	1		R8,9,13,14	FRA00040B462	Chip Resistor	4	
CN	FJC00080B400	Connector	1		R10	FRA00040B446	Chip Resistor	1	
CN	FJC00080B401	Connector	3		R11,12,29,31,33	FRA00040B488	Chip Resistor	5	
CN	FJC00090B401	Connector	1		R15	FRA00040B432	Chip Resistor	1	
CN	FJC00090B402	Connector	2		R17,24	FRA00040B478	Chip Resistor	2	
CN	FJC00090B404	Connector	1		R18	FRA00040B464	Chip Resistor	1	
CN2	172294-1	Connector	1		R19	FRA00040B476	Chip Resistor	1	
CN2	172296-1	Connector Clamp	1		R20	FRJ8GEYG113V	Chip Resistor	1	
CN3	FFC6TLBW1B	Connector	1		R21	ERJ8GEYG562V	Chip Resistor	1	
CN4	FJC00030B4	Connector	1		R25,28,32	FRA00010B428	Chip Resistor	3	
CN7	FJC00180B400	Connector	1		R26	FRA00040B470	Chip Resistor	1	
IR1	EXBRB8151JW	Block Resistor	1	2	R35	FRA00050B420	Chip Resistor	1	
IR2,5	RGLD4X152J	Block Resistor	2		R37,38	FRA00040B460	Chip Resistor	2	
IR3	RGLD6X822J	Block Resistor	1		C5,6	FCC00060B408	Chip Capacitor	2	
IR4	RGLD6X392J	Block Resistor	1		C7	FCC00070B404	Chip Capacitor	1	
IC1	HA16651MP	R/W LSI	1	3	C9,22	FCC00060B420	Chip Capacitor	2	
IC2	FQL00081B4	LSI	1	2	C11,12,19	FCC00040B426	Chip Capacitor	3	
IC3	DN74LS145	IC	1	2	C13	FCC00040B424	Chip Capacitor	1	
IC4,8	DN74LS74AS	IC	2	2	C14,15	FCC00060B412	Chip Capacitor	2	
IC5	DN74LS16-1S	IC	1	2	C16,17	FCC00040B433	Chip Capacitor	2	
IC6	DN74LS38-1	IC	1	2	C18	FCC00040B431	Chip Capacitor	1	
IC7	DN74LS08S	IC	1	2	C20,21	FCC00040B420	Chip Capacitor	2	
IC10	DN74LS02S	IC	1	2	CN5	B4B-PH	Connector	1	
IC11	HA13421	LSI	1	3	CN6	FJC00220B404	Connector	1	
L1,2	ZBF503D-03	Choke Coil	2	2	D	MA151WA-TW	Diode	1	2
L3	LAL03KH101K	Choke Coil	1	2	D	MA151WK-TW	Diode	2	2
L4	ELEPG330KA	Choke Coil	1	2	D	MA151WA-TX	Diode	1	2
L5,6,7,8	FNC00030B434	Low-Frequency Coil	4	2	D	MA151WK-TX	Diode	2	2
L9	FNC00030B429	Low-Frequency Coil	1	2	DT	UN2211-TW	Digital Transistor	1	2
VR1	3321P-203	Variable Resistor	1		DT	UN2211-TX	Digital Transistor	1	2
X1	CSA4-00MG	Resonator	1		DT	UN2216-TW	Digital Transistor	1	2
P	FJP00280B400	Plug	8		DT	UN2216-TX	Digital Transistor	1	2
XV	DILB16P8J	IC Socket (without cap)	1		Q	2SB709-TW	Chip Transistor	2	2
Q5	3SK73-GR	Transistor	1	2	Q	2SB709-TX	Chip Transistor	2	2
TP	RT01T1.3B	Terminal (pin)	10						

16. SCHEMATIC DIAGRAM (JU-465-5AAG)

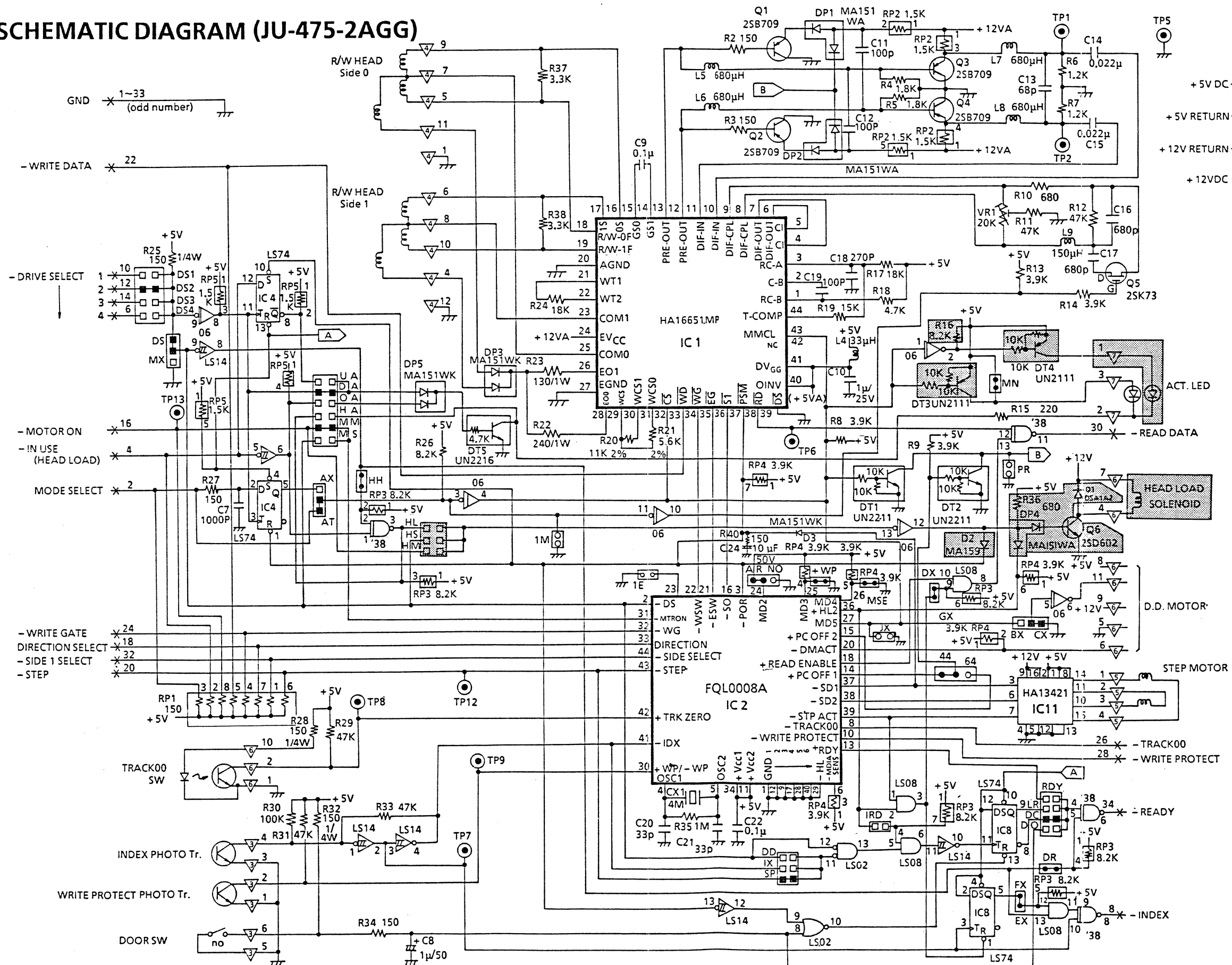


TYPE	POS.	UN USED
HA16651MP	1	
FQL0008A	2	
HA13421	11	
74LS74	4,8	
74LS14	3	
74LS08	7	
74LS02	10	2/4
7406	5	
7438	6	

RP	LAST USED
1	R40
2	C24
3	L9
4	D3
5	Q6
6	DP5
	DT5
	VR1
	RP6

- CONNECTOR REFERENCES SYMBOL:
 * = J1, ▽ = J2, ▽ = J3
 ▽ = J4, ▽ = J5, ▽ = J6
 ▽ = J7
- ○ INDICATES SOLDER JUMPER.
- □ INDICATES SHORT-PLUG OPTION.
- NOT USED

SCHEMATIC DIAGRAM (JU-475-2AGG)

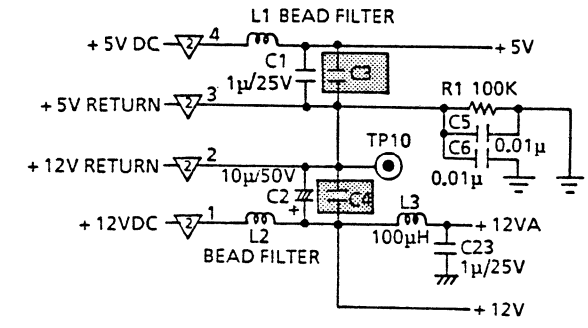
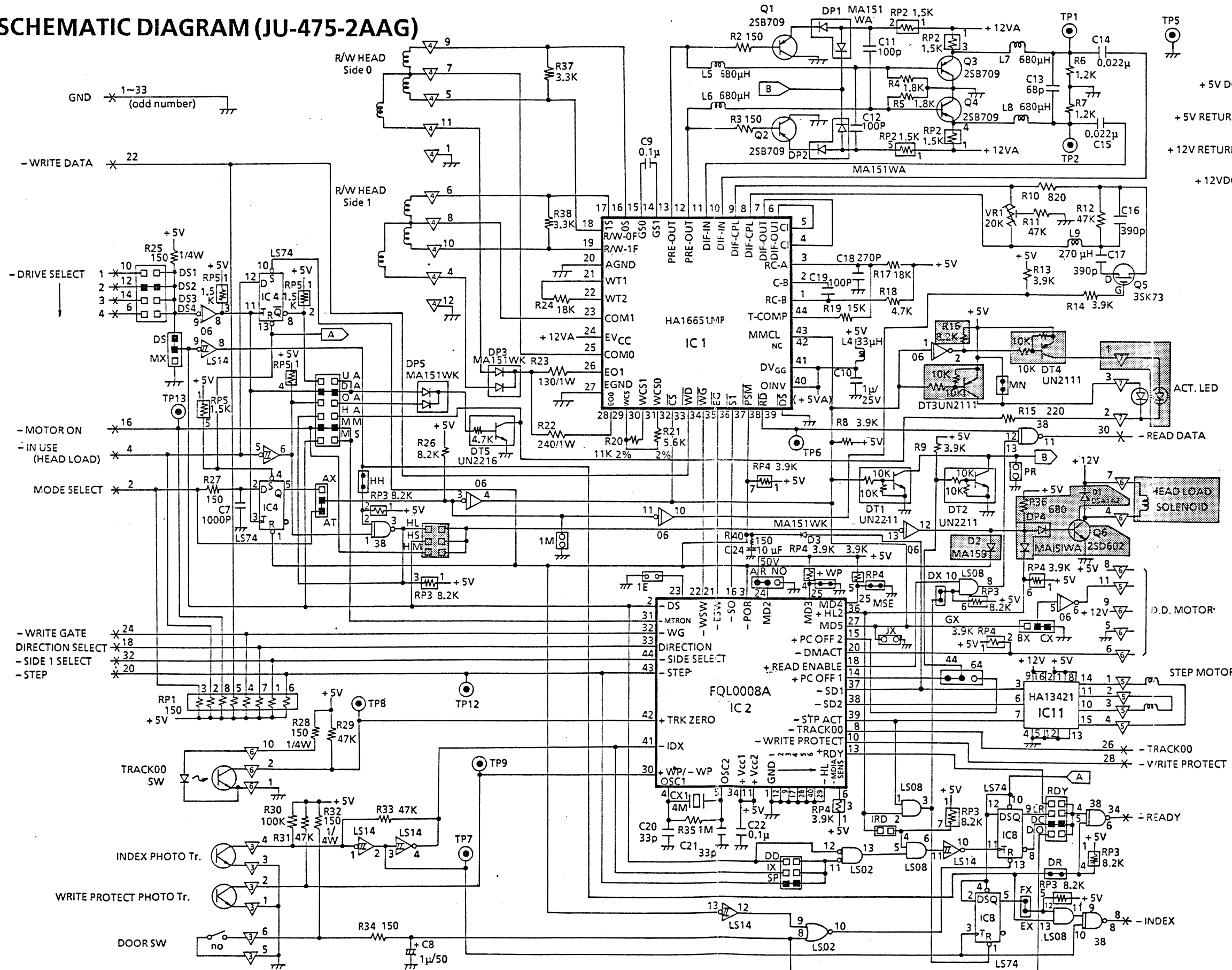


TYPE	POS.	UN USED
HA16651MP	1	
FQL0008A	2	
HA13421	11	
74LS74	4,8	
74LS14	3	
74LS08	7	
74LS02	10	2/4
7406	5	
7438	6	

RP	LAST USED
1	R40
2	C24
3	L9
4	D3
5	Q6
6	DP5
	DT5
	VR1
	RP6

- CONNECTOR REFERENCES SYMBOL:
 - X = J1, ∇ = J2, ▽ = J3
 ▽ = J4, ▽ = J5, ▽ = J6
 ▽ = J7
- INDICATES SOLDER JUMPER.
- INDICATES SHORT-PLUG OPT.
- NOT USED

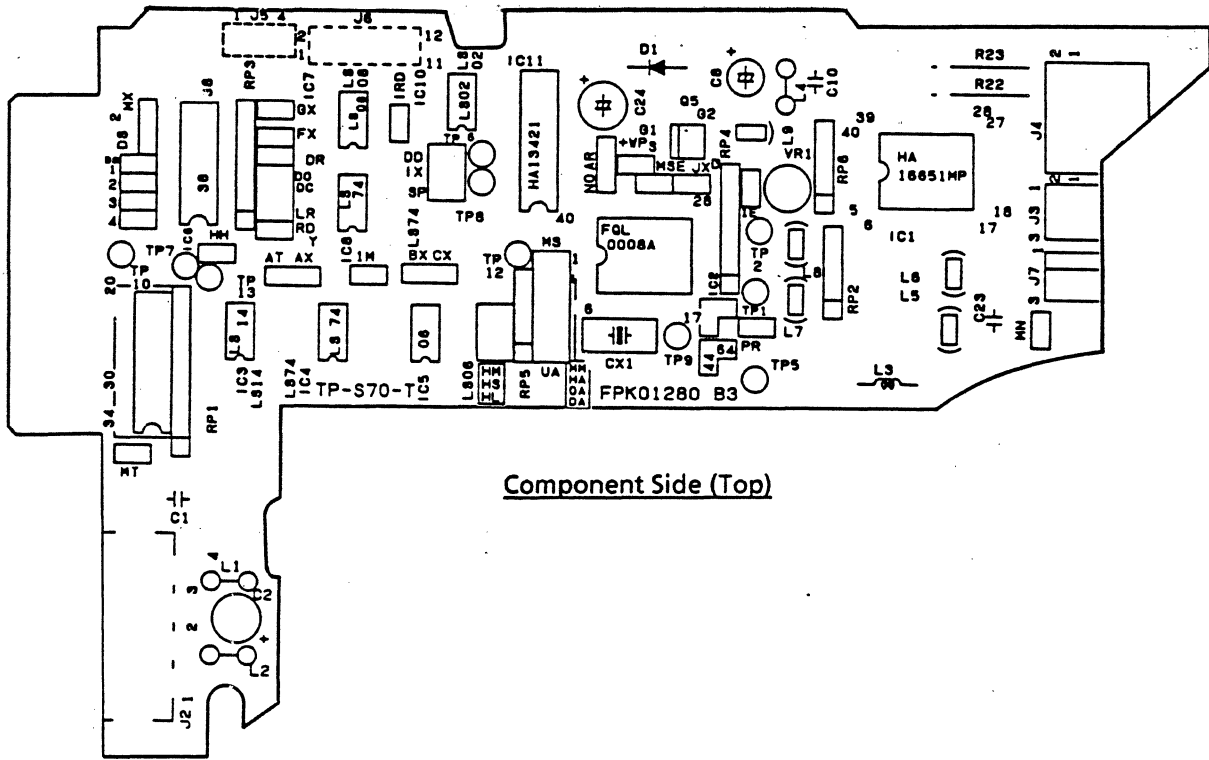
SCHEMATIC DIAGRAM (JU-475-2AAG)



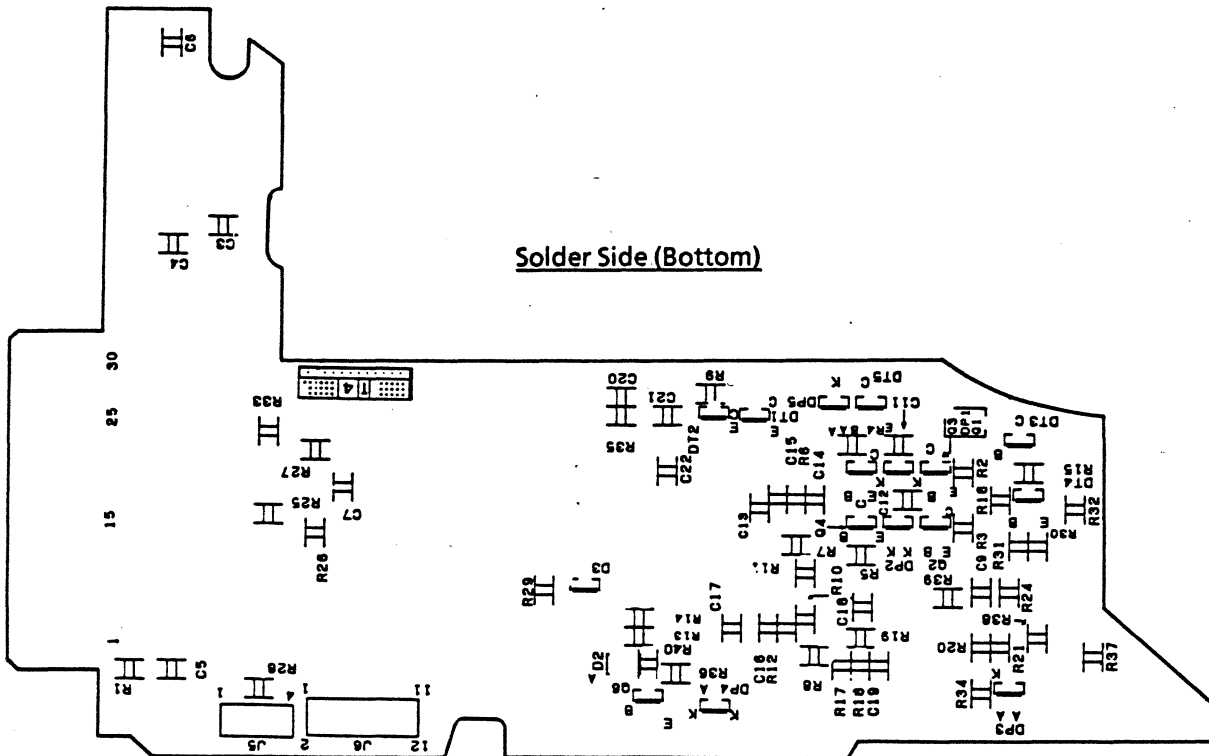
TYPE	POS.	UN USED
HA16651MP	1	
FQL0008A	2	
HA13421	11	
74LS74	4,8	
74LS14	3	
74LS08	7	
74LS02	10	2/4
7406	5	
7438	6	

RP	LAST USED
1	R38
2	C23
3	L9
4	D2
5	Q6
6	DP5
	DT5
	VR1
	RP6

- CONNECTOR REFERENCES SYMBOL:
 - X = J1, ▽ = J2, ▽ = J3
 ▽ = J4, ▽ = J5, ▽ = J6
 ▽ = J7
- ○ INDICATES SOLDER JUMPER.
- □ INDICATES SHORT-PLUG OPTION.
- NOT USED

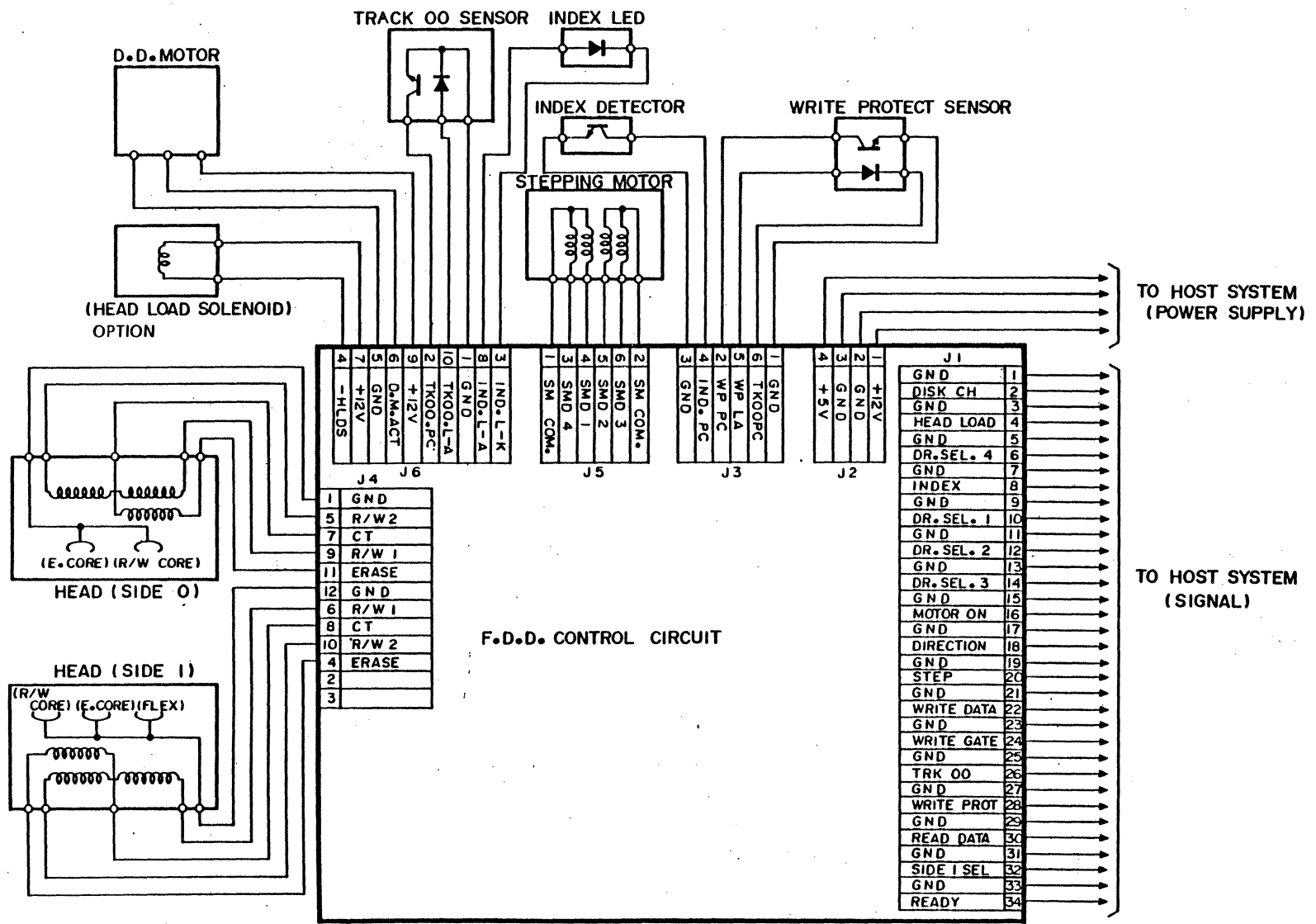


Component Side (Top)

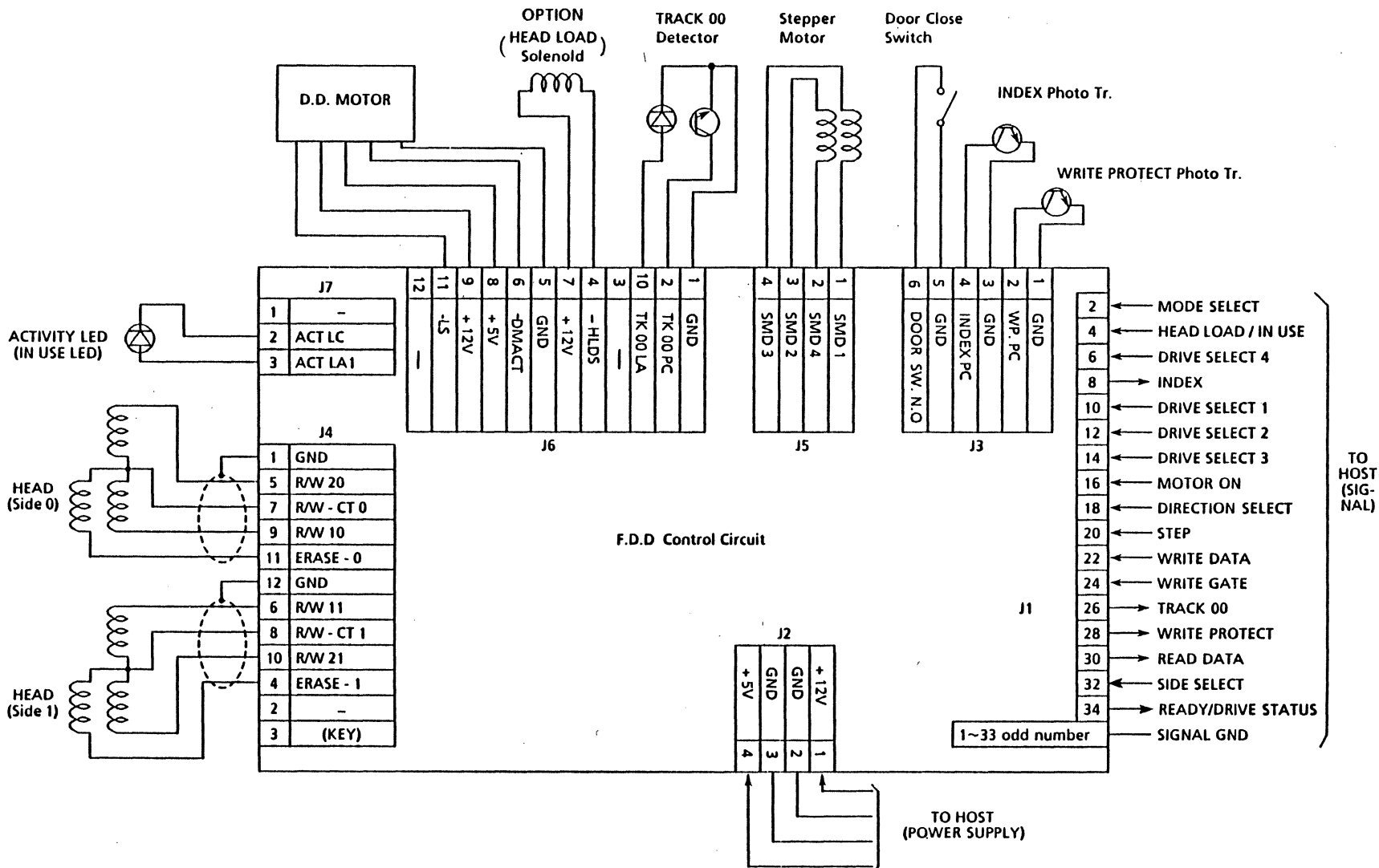


Solder Side (Bottom)

18. BLOCK DIAGRAM (JU-465-5)



BLOCK DIAGRAM (JU-475-2)



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