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SERVICE MANUAL

AUTOMATIC DOCUMENT FEEDER MR-2017/2020



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Trademarks

- The official name of Windows 95 is Microsoft Windows 95 Operating System.
- The official name of Windows 98 is Microsoft Windows 98 Operating System.
- The official name of Windows Me is Microsoft Windows Millennium Edition Operating System.
- The official name of Windows 2000 is Microsoft Windows 2000 Operating System.
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General Precautions for Installation/Service/Maintenance for the MR-2017/2020

The installation and service should be done by a qualified service technician.

- 1) When installing the MR-2017/2020 to the Equipment, be sure to follow the instructions described in the "Unpacking/Set-Up Procedure for the MR-2017/2020" booklet which comes with each unit of the MR-2017/2020.
- 2) The MR-2017/2020 should be installed by an authorized/qualified person.
- 3) The equipment must be grounded for safety.
- 4) Before starting installation, servicing or maintenance work, be sure to turn OFF and unplug the equipment first.
- 5) The equipment shall be installed near the socket outlet and shall be easily accessible.
- 6) Be sure to fix and plug in the power cable securely after the installation so that no one trips over it.
- 7) Unplug the power cable and clean the area around the prongs of the plug and socket outlet once a year or more. A fire may occur when dust lies on this area.
- 8) The MR-2017/2020 should be grounded to the specified positions on the machine frame.
- 9) When servicing or maintaining the MR-2017/2020, be careful about the rotating or operation sections such as gears, pulleys, sprockets, cams, belts, etc.
- 10) Reassembly of disassembled parts is the reverse of the disassembly unless otherwise noted in this manual or other related documents.
Care should be taken that small parts, such as screws, washers, pins, E-rings, star washers, harnesses are not installed in the wrong places.
- 11) Basically, the machine should not be operated with any parts removed or disassembled.
- 12) Delicate parts for preventing safety hazard problems (such as switches, sensors, etc. if any) should be handled/installed/adjusted correctly.
- 13) Use suitable measuring instruments and tools.
- 14) During servicing or maintenance work, be sure to check the serial No. plate and other cautionary labels (if any) to see if they are clean and firmly fixed. If not, take appropriate actions.
- 15) The PC board must be stored in an anti-electrostatic bag and handled carefully using a wristband, because the ICs on it may be damaged due to static electricity. Before using the wrist band, pull out the power cord plug of the equipment and make sure that there is no uninsulated charged objects in the vicinity.
- 16) For the recovery and disposal of used MR-2017/2020, consumable parts and packing materials, follow the relevant local regulations/rules should be followed.
- 17) After completing installation, servicing and maintenance of the MR-2017/2020, return the MR-2017/2020 to its original state, and check operation.

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1. SPECIFICATION

Item	MR-2017	MR-2020
Maximum number of originals on the original feeding tray	Up to 100 sheets or 16 mm in height. * 50 - 80 g/m ² (13.3 - 21.3 lb. Bond)	←
Acceptable paper size	A5-R, A4, A4-R, B5, B5-R, B4, A3, FOLIO, ST-R, LT, LT-R, LG, LD, COMPUTER	←
Acceptable paper weight	50 - 127 g/m ² (13.3 lb. Bond - 33.8 lb. Cover)	←
Dimensions	W600 x D513 x H135 (mm) * Excluding hinges and original tray	W575 x D528 x H135 (mm) * Excluding original tray
Weight	Approx 11 kg	←
Power consumption	Approx. 30W	←
Power requirements	DC5 V, DC24 V * Supplied from the equipment	←
Co-packed items	Unpacking Instruction (1 set) Charts (A4/LT: 1 sheet each) Mounting screws (6 pcs) Positioning pins (2 pcs) Washer (1 pc) Hinge bracket (1 pc) Hinge bracket fixing screw(2 pcs) Hinge bracket cover (1 pc) Connector cover (1 pc)	Unpacking Instruction (1 set) Charts (A4/LT: 1 sheet each) Mounting screws (6 pcs) Positioning pins (2 pcs) Washer (1 pc) Hinge bracket (1 pc) Hinge bracket fixing screw(2 pcs) Stopper bracket (1 pc) Stopper bracket fixing screw (2 pcs) Connector cover (1 pc)
Applicable models	e-STUDIO163/203 e-STUDIO165/205 e-STUDIO166/206 e-STUDIO167/207/237	e-STUDIO181/211 e-STUDIO182/212/242
Remarks		

2. GENERAL DESCRIPTION

2.1 Main Components

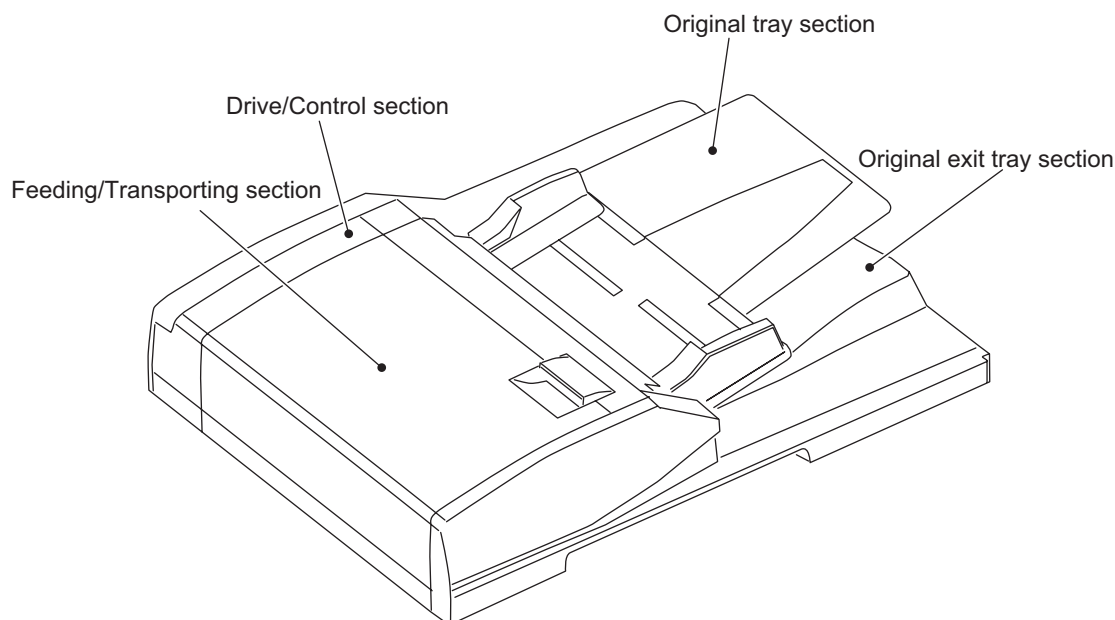


Fig. 2-1

Location	Components	
Feeding/Transporting section	Pickup roller Feed roller Separation roller Registration roller Intermediate transfer roller Pre-reading roller Platen roller Post-reading roller Exit roller	Original empty sensor (S3) Original registration sensor (S4) Read sensor (S5) Original exit sensor (S6) Jam access cover sensor (S7)
Original tray section	Original width guide Original tray	Original tray sensor (S1) Original tray width sensor (S2)
Original exit tray section	Original exit tray	
Drive/Control section		Original feed motor (M1) Read motor (M2) Original pickup solenoid (SOL) ADF opening/closing sensor (S8) Jam access cover opening/closing switch (SW) ADF control PC board (ADF)

2.2 Sectional View

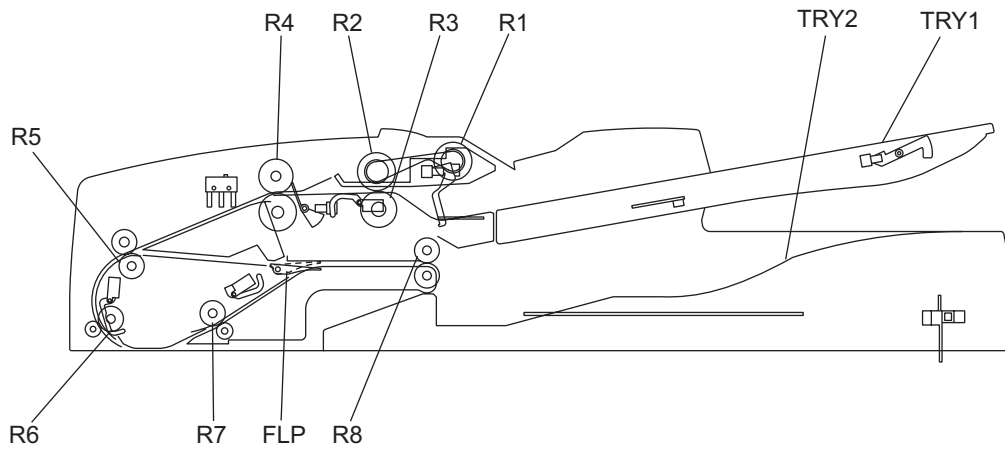


Fig. 2-2

TRY1	Original tray	R4	Registration roller
TRY2	Original exit tray	R5	Intermediate transfer roller
FLP	Exit gate	R6	Pre-reading roller
R1	Pickup roller	R7	Post-reading roller
R2	Feed roller	R8	Exit roller
R3	Separation roller		

2.3 Electric Parts Layout

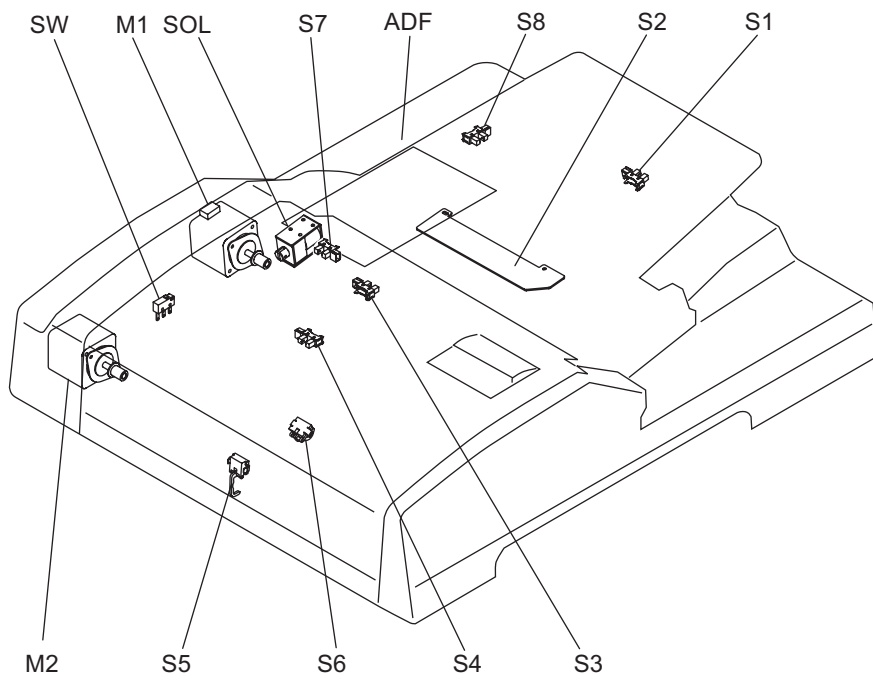


Fig. 2-3

2.4 Symbols and Functions of Various Components

1) Motors

Symbol	Name	Function
M1	Original feed motor	Drives the original feed roller, pickup roller and registration roller.
M2	Read motor	Transports originals by driving the intermediate transport roller, front read roller, rear read roller and exit roller.

2) Sensors and Switches

Symbol	Name	Function
S1	Original tray sensor	Detects the length of the original set on the original tray.
S2	Original tray width sensor	Detects the width of the original set on the original tray.
S3	Original empty sensor	Detects the original set on the original tray.
S4	Original registration sensor	Detects transport of the original at the registration roller section.
S5	Read sensor	Detects the leading edge of the original at the original scanning section.
S6	Original exit sensor	Detects the exit (transit) of an original.
S7	Jam access cover sensor	Detects opening/closing of the Jam access cover.
S8	ADF opening/closing sensor	Detects opening/closing of the ADF.
SW	Jam access cover opening/closing switch	Switches between cutoff and supply state of the 24 V power by opening/closing of the jam access cover.

3) Solenoid

Symbol	Name	Function
SOL	Original pickup solenoid	Drives up and down the original pickup roller.

4) PC board

Symbol	Name	Function
ADF	ADF control PC board (ADF board)	Controls the ADF.

2.5 Diagram of Signal Blocks

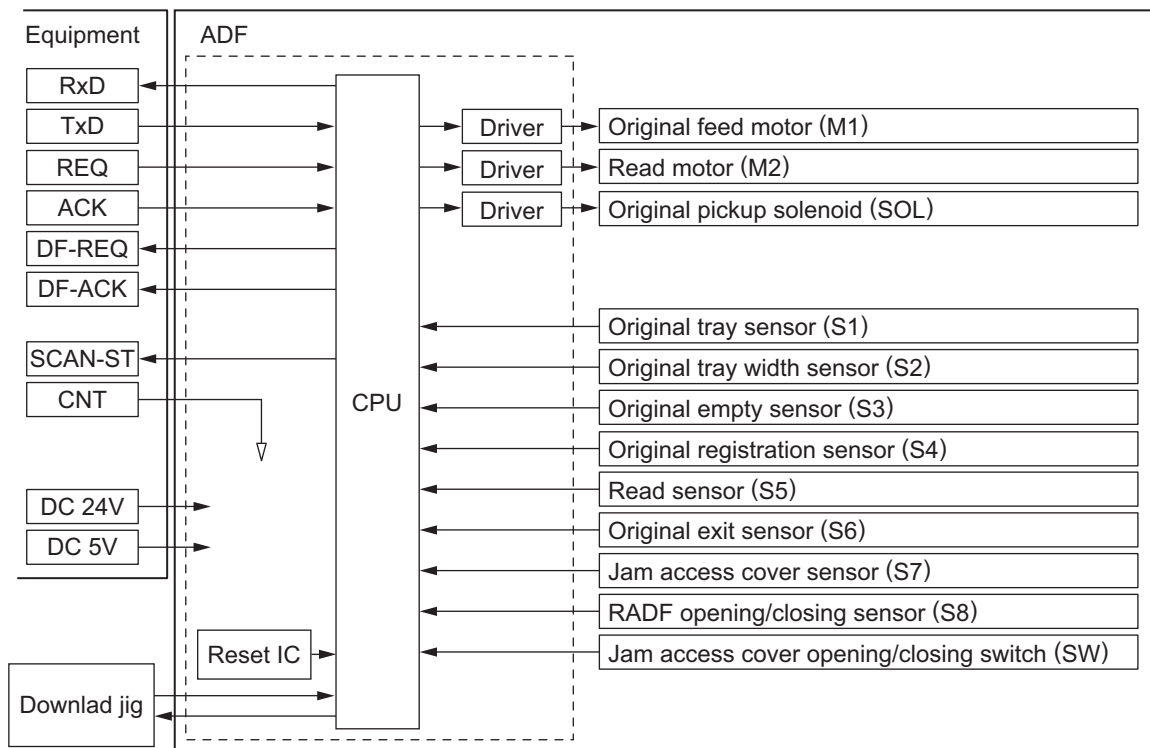


Fig. 2-4

2.6 Description of Interface Signals

The following 6 lines are used to transmit/receive signals between the equipment and the ADF.

- REQCommunication request signal (from equipment to the ADF)
- DF-REQCommunication request signal (from the ADF to equipment)
- DF-ACK.....Communication request acknowledging signal (from the ADF to equipment)
- ACK.....Communication request acknowledging signal (from equipment to the ADF)
- TxDData transmitted from equipment to the ADF
- RxDData transmitted from the ADF to equipment

Data communication (RxD and TxD) between the scanner and the ADF has adopted the serial communication system which does not allow checking using testing devices to see whether the signals are transmitted/received properly in the field.

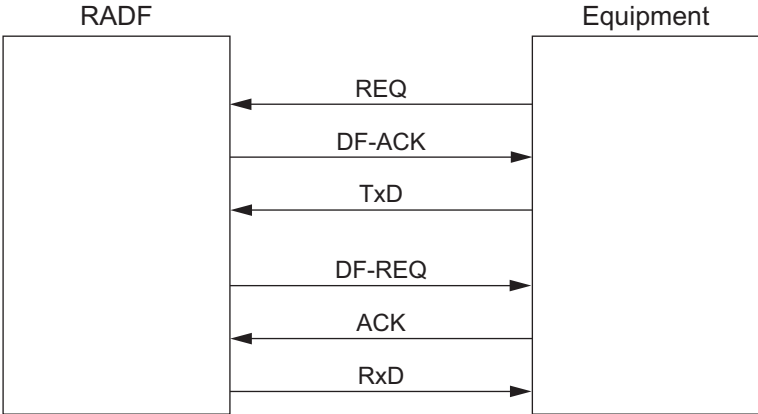


Fig. 2-5

3. DESCRIPTION OF OPERATIONS

3.1 DRIVE SYSTEM

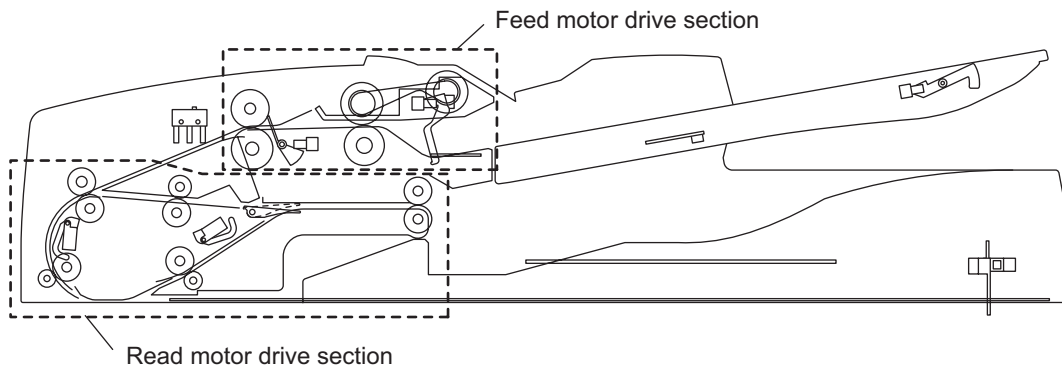


Fig. 3-1

3.1.1 Outline

Originals are transported by the original feed motor and read motor. Each motor has a drive section for the following operations:

Original feed motor drive section: picks up originals and drives the registration roller.
Read motor drive section: transports originals and drives parts such as the exit roller.

The Original feed motor rotates reversely when the originals are being transported at the registration roller, compared to its rotational direction when they are being picked up.
The read motor always rotates in a constant direction.

3.1.2 Original feed motor drive section

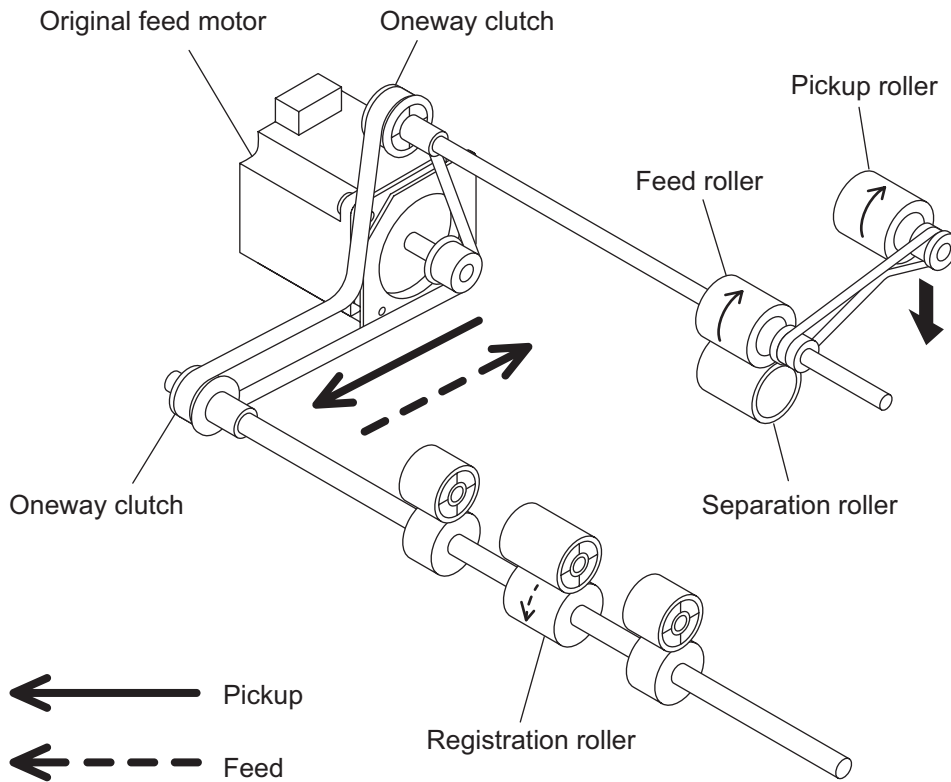
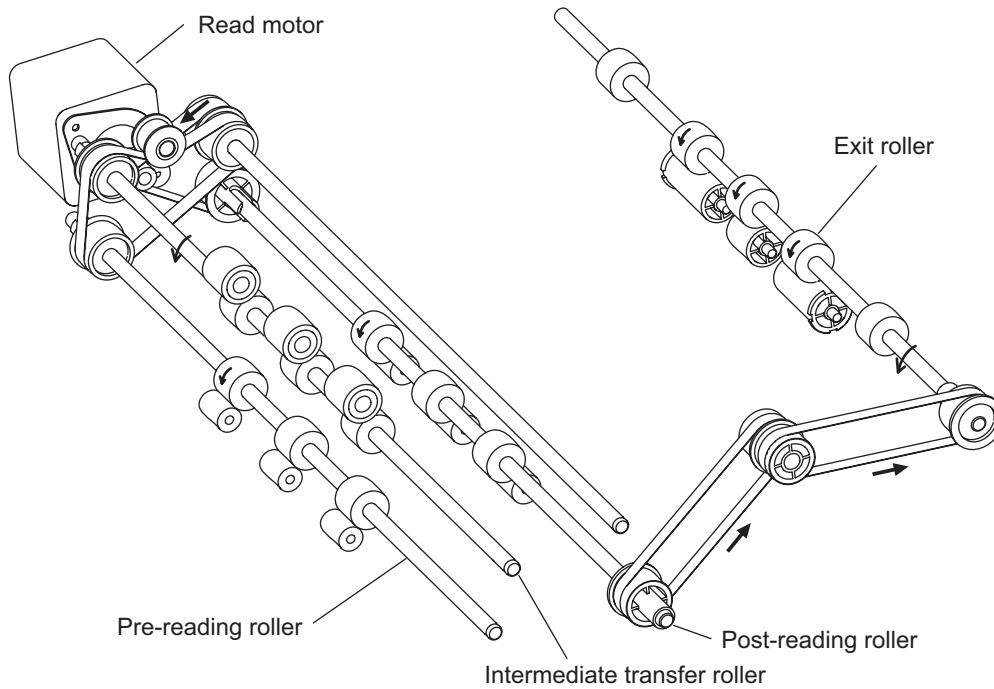


Fig. 3-2

When an original is placed on the original tray and the RADF receives a feed request signal from the equipment, the feeding of the original is started. The original empty sensor detects the presence of the original, and then the pickup roller is lowered by the drive from the original pickup solenoid. The Original feed motor rotates, and the pickup roller and the feed roller then rotate in a normal direction (shown in a solid line in the figure) to guide the original into the transport path. Then the original is transported to the registration roller to be aligned. The original aligned with the registration roller is then transported by the reverse rotation of the Original feed motor (shown in a dotted line in the figure). A one-way clutch is installed inside of each gear of the feed roller and the registration roller, so these gears will not be driven in a reverse rotation. When the original empty sensor detects that there is no original on the original tray, the original pickup solenoid is turned OFF and the pickup roller is raised. The original pickup solenoid is the one can operate both suction and recovery.

3.1.3 Read motor drive section



The transported original is driven by the read motor.
Then the original is transported to a scanning start position by the intermediate transfer roller and pre-reading roller.
The original transported to the scanning start position is then scanned in the scanner function of the equipment.
When the data of the original have been scanned, the original is then transported to the original exit tray side by the post-reading roller.

3.2 Original Size Detection

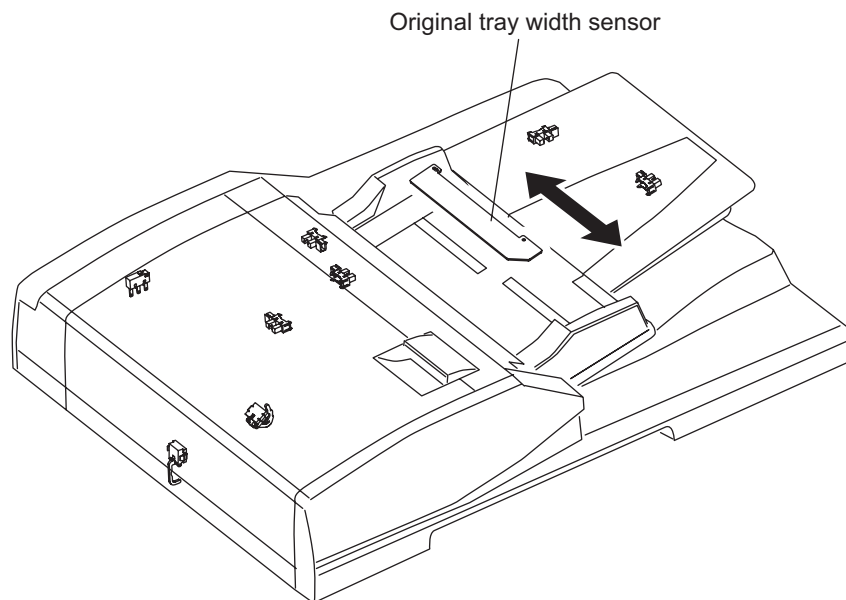


Fig. 3-3

3.2.1 Outline

When an original is placed on the original tray, the width of the original is detected by the positions of the original width guides.

3.2.2 Original tray width sensor

The original tray width sensor detects the width of an original placed on the original tray.

It is detected by the brush attached to the rack moving on the original tray width sensor, which is a board with the different length of the patterns written.

This brush is moved as the original width guide is moved. Signals (TWID0S, TWID1S, TWID2S) are opened and shorted to SG by this movement.

The combination of these short (= low level) and open (= high level) can determine the width of the original.

Sizes detectable in combination of these open and short of the signals are as follows:

TWID2S (Orange)	TWID1S (Yellow)	TWID0S (Gray)	Original width size (LT series)	Original width size (A4 series)
H	H	H	LD / LT	A3 / A4
H	H	L	-	B5-R
H	L	H	ST-R	A5-R
L	H	H	LD / LT	A3 / A4
L	H	L	-	Postcard
L	L	H	8.5x8.5 / LT-R / KLG / 13"LG	A4-R / FOLIO
L	L	L	COMPUTER	B4 / B5

H (= high level): Open

L (= low level): Short

3.3 FLOW CHART

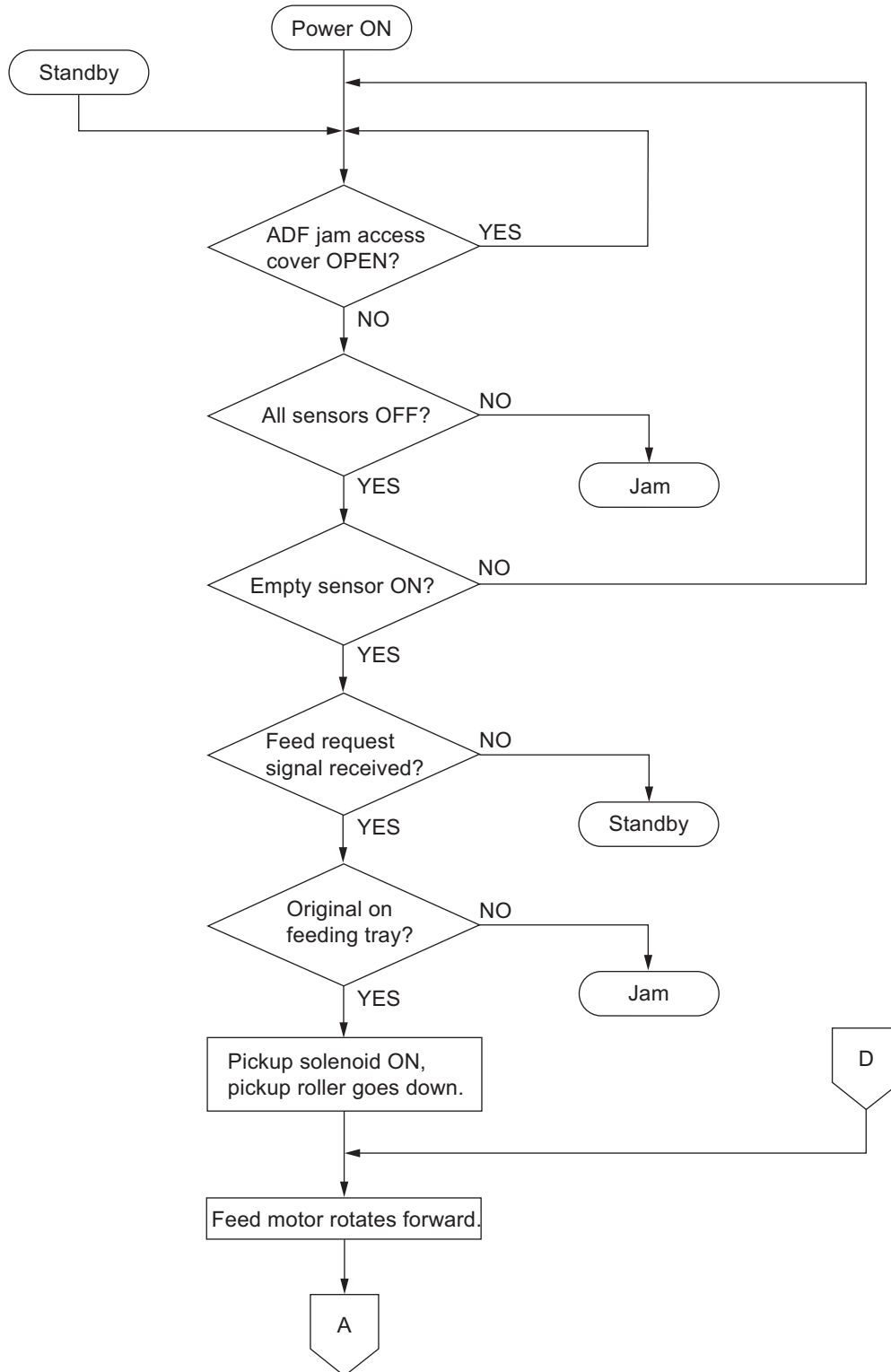


Fig. 3-4

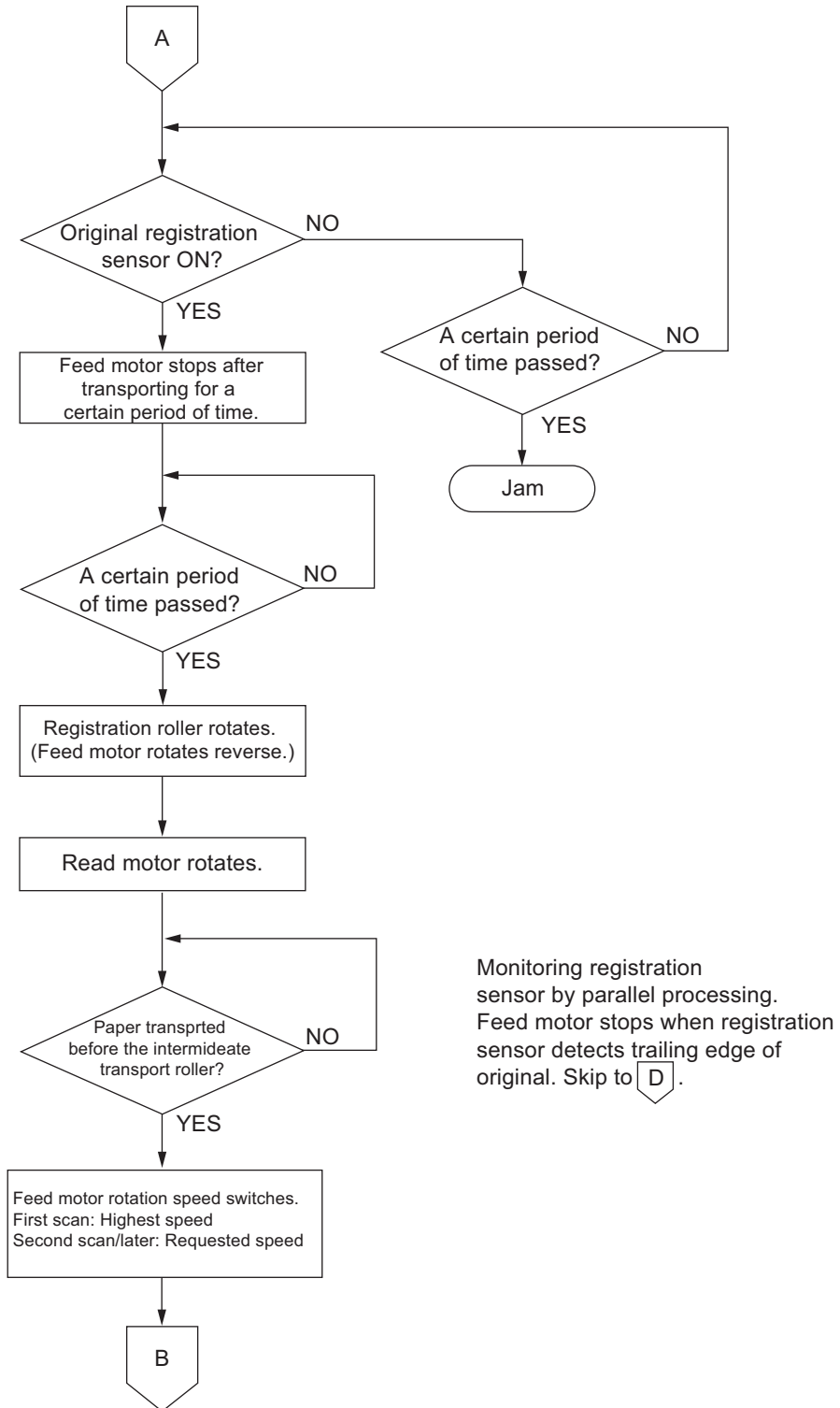


Fig. 3-5

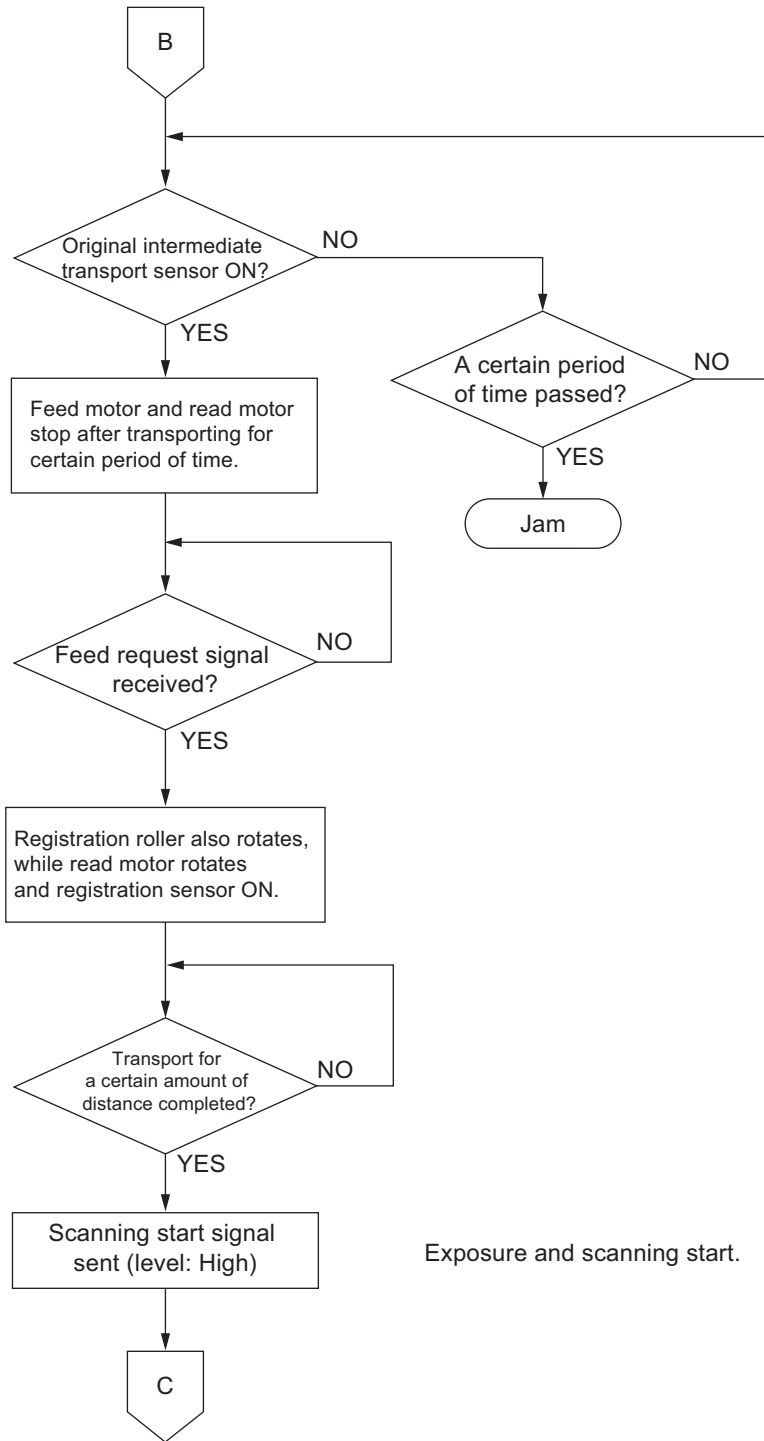


Fig. 3-6

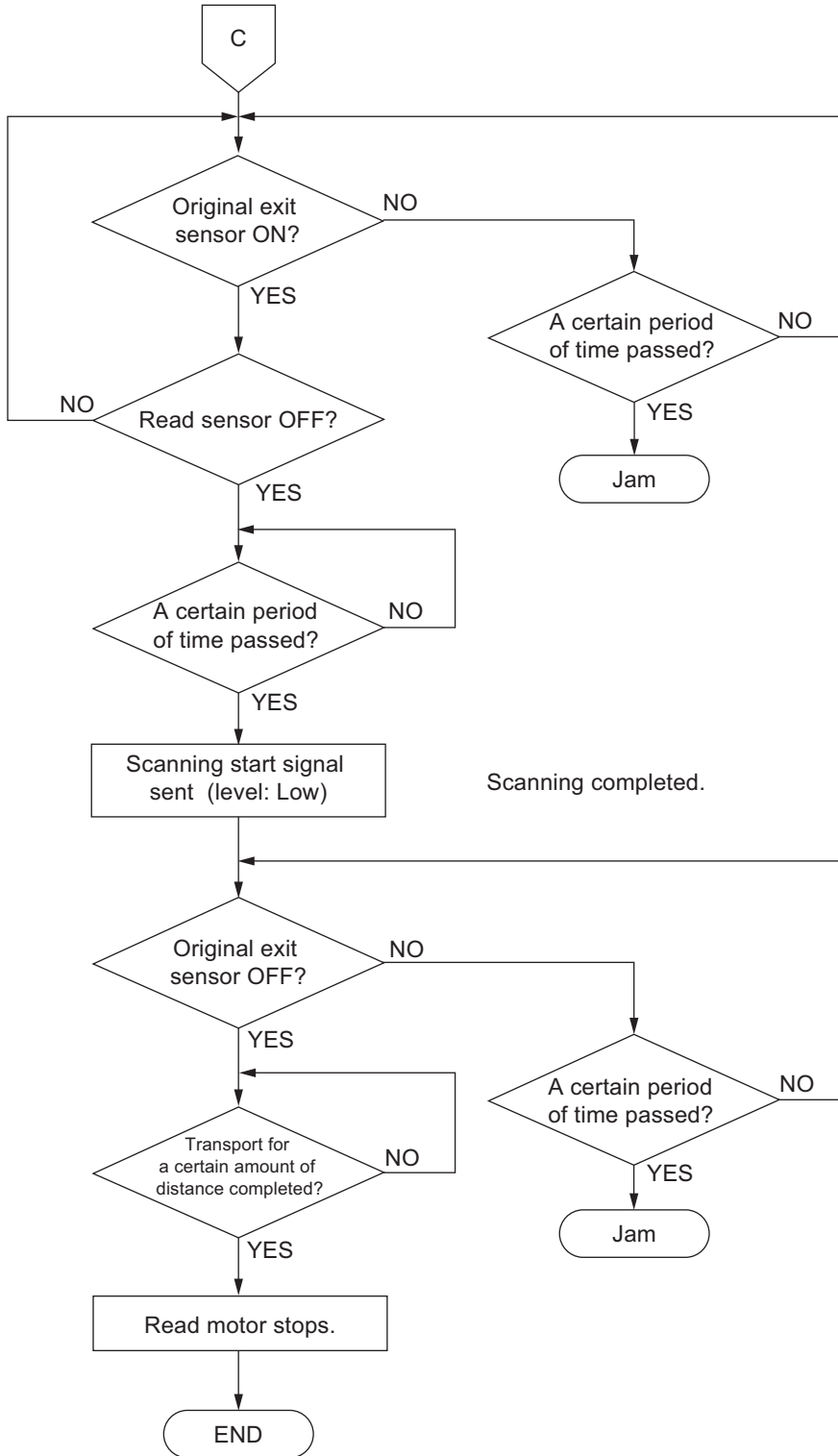


Fig. 3-7

3.4 DESCRIPTION OF CIRCUIT

3.4.1 Drive Circuit for Feed Motor

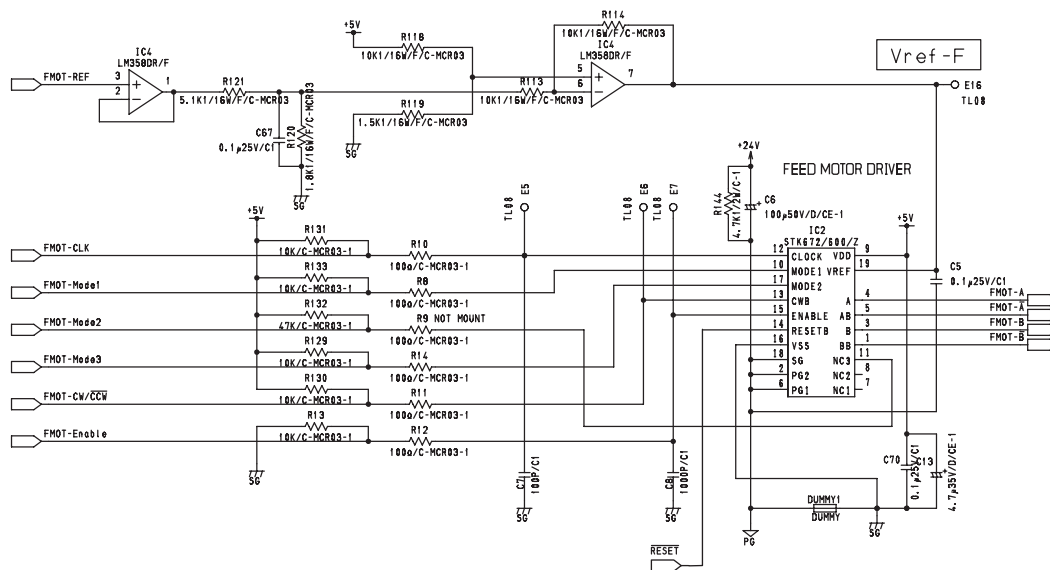


Fig. 3-8

This circuit controls the rotation/stoppage and the direction of rotation, excitation mode and motor current of the feed motor.

A drive clock signal (FMOT-CLK) and rotation direction signal (FMOT-CW/ $\overline{\text{CCW}}$) are input to control the speed and direction of the motor rotation.

When the level of the enabling signal (FMOT-Enable) is set to "L", motor current is turned OFF regardless of the state of other signals.

For the excitation mode, either of 2 phase excitation or 1-2 phase excitation can be selected using the excitation switching signal (FMOT-Mode1/FMOT-Mode2).

The edge switching signal (FMOT-Mode3) is used to specify the switching timing for excitation phase either from when both the rise and decay edge of the CLK input are detected or when only the rising edge is detected.

Motor current value can be set discretionary by changing the level of the reference setting signal (FMOT-REF).

3.4.2 Drive Circuit for Read Motor

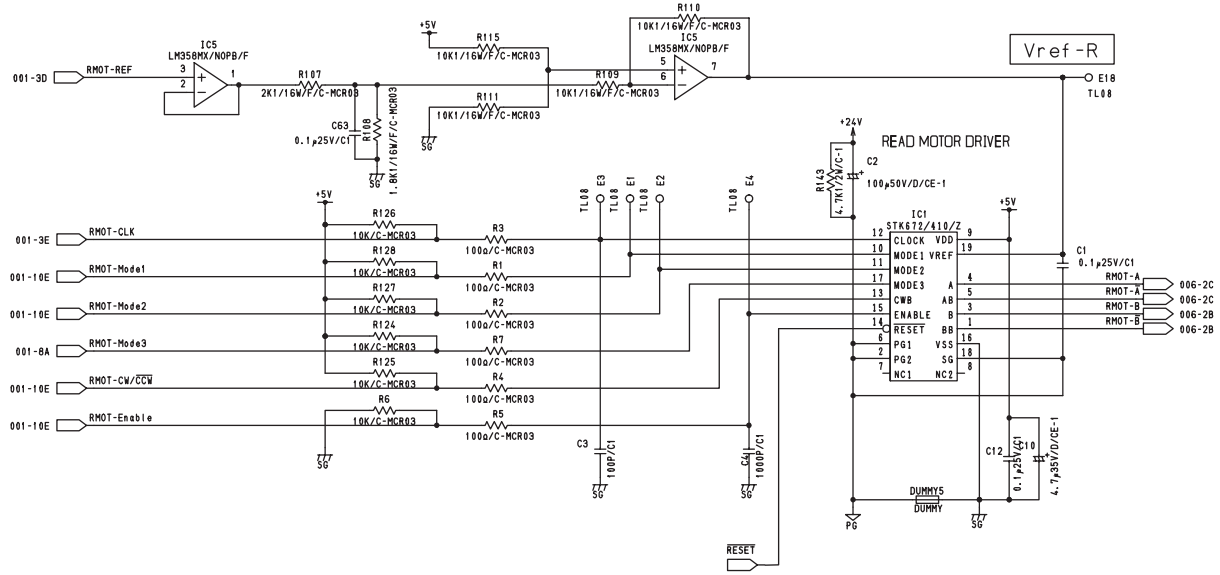


Fig. 3-9

This circuit controls the rotation/stoppage and the direction of rotation, excitation mode and motor current of the read motor.

A drive clock signal (RMT-CLK) and rotation direction signal (RMT-CW/CCW) are input to control the speed and direction of the motor rotation.

When the level of the enabling signal (RMT-Enable) is set to "L", motor current is turned to OFF regardless of the state of other signals.

For the excitation mode, either of 2 phase excitation, 1-2 phase excitation, W1-2 phase excitation, 2W1-2 phase excitation or the 4W1-2 phase excitation can be selected using the excitation switching signal (RMT-Mode1/RMT-Mode2).

The edge switching signal (RMT-Mode3) is used to specify the switching timing for excitation phase either from when both the rise and decay edge of the CLK input are detected or when only the rising edge is detected.

Motor current value can be set discretionary by changing the level of the reference setting signal (RMT-REF).

3.4.3 Reset Circuit

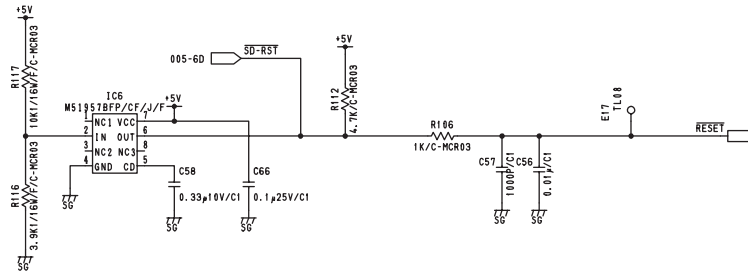


Fig. 3-10

This circuit generates a reset signal when the power is turned ON and the power voltage is blocked or cut off/lowered temporarily.

At the power-ON, the circuit shifts the level of the reset signal from “L” to “H” to put the CPU in a operative state after the reset pulse duration (T_{pd}) determined by the capacitance of C58 has passed from when the power voltage has reached the supervisory voltage (V_s) divided by R116 and R117.

When a power voltage drop (cutoff, temporary cutoff, temporary low voltage) occurs and the power voltage becomes lower than the set value for the supervisory voltage for the power, the circuit sets the level of the reset signal (\overline{RESET}) to “L” to put the CPU in a halt state.

3.4.4 Drive Circuit for Pickup Solenoid

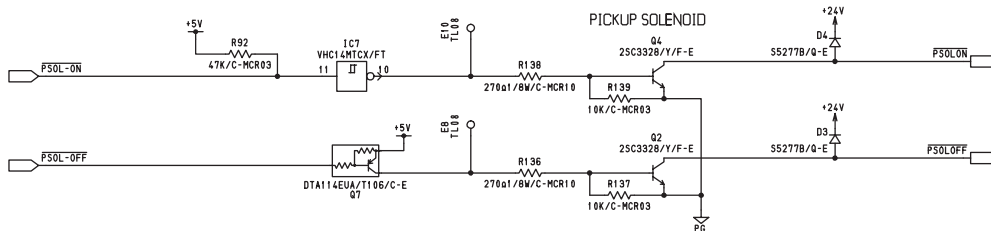


Fig. 3-11

Pick up solenoid is a two-way solenoid that can be operated both in suction and recovery, and driven by two transistors (Q4 and Q2) for each operation respectively.

When the PSOL-ON-Signal level is set to “L”, Q4 is turned ON, the power of 24V is applied to the coil for suction operation, the solenoid is turned ON, and then the pickup roller goes down.

When the PSOL-ON-Signal level is set to “L”, Q2 is turned ON, the power of 24V is applied to the coil for recovery operation, the solenoid is turned OFF, and then the pickup roller goes up.

4. DISASSEMBLY AND ASSEMBLY

4.1 Cover

[A] Front cover

- (1) Open the RADF and remove 3 screws.

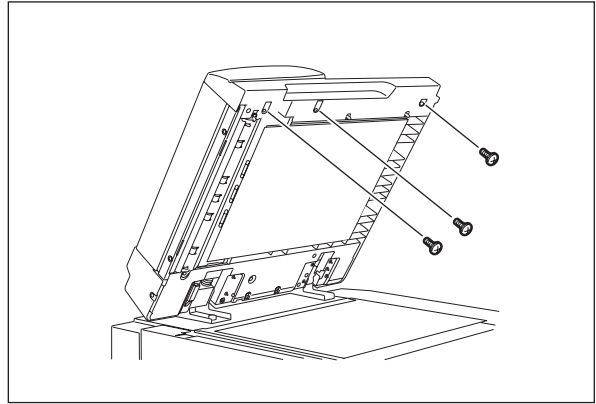


Fig. 4-1

- (2) Close the RADF.
- (3) Open the jam access cover and remove 2 screws.

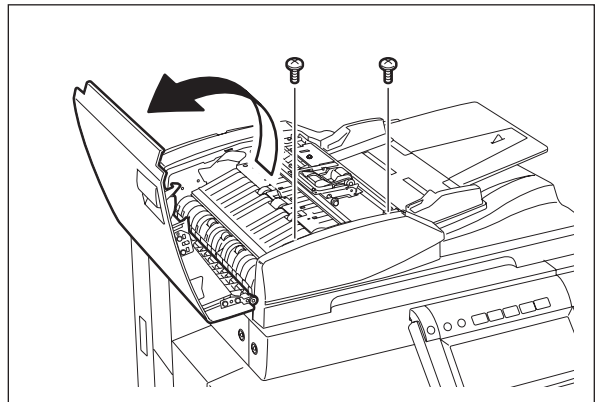


Fig. 4-2

- (4) Take off the front cover toward you.

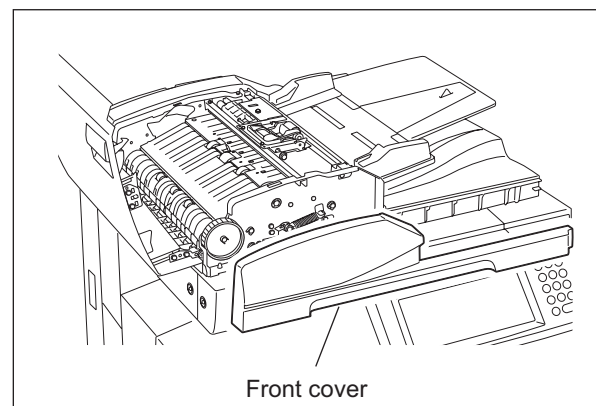


Fig. 4-3

[B] Rear cover

- (1) Open the jam access cover and remove 4 screws.

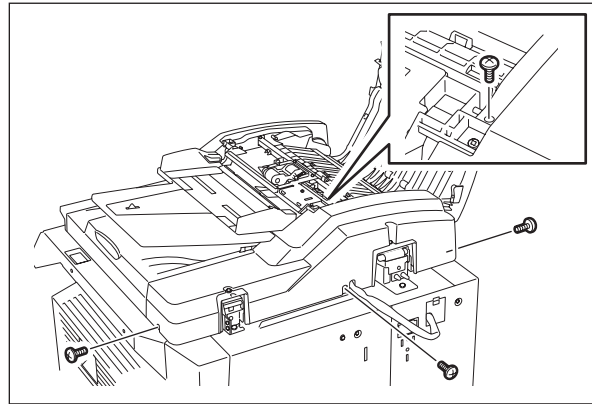


Fig. 4-4

- (2) Raise the original tray and take off the rear cover upward.

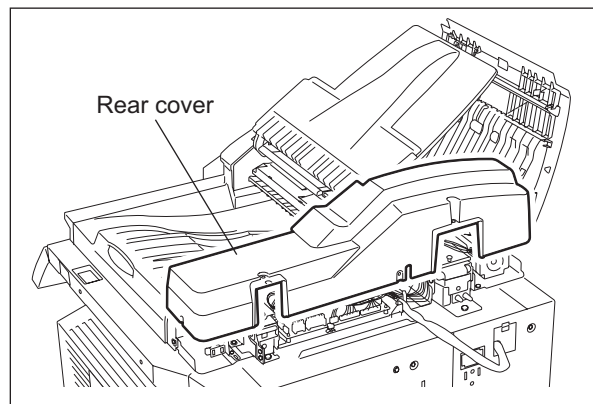


Fig. 4-5

[C] Jam access cover

- (1) Take off the front cover.
(📖 P. 4-1 "[A] Front cover")
- (2) Take off the rear cover.
(📖 P. 4-2 "[B] Rear cover")
- (3) Remove 1 clip and then the dial and pin.

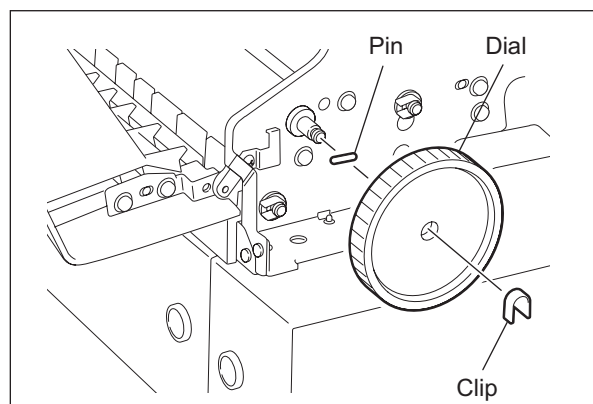


Fig. 4-6

- (4) Remove 1 screw and the hinge pin.

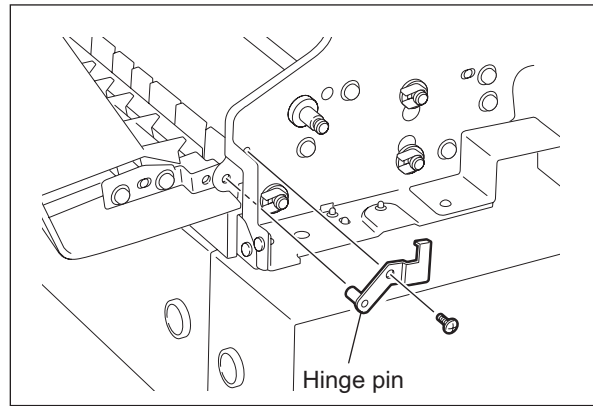


Fig. 4-7

- (5) Take off the jam access cover by sliding it.

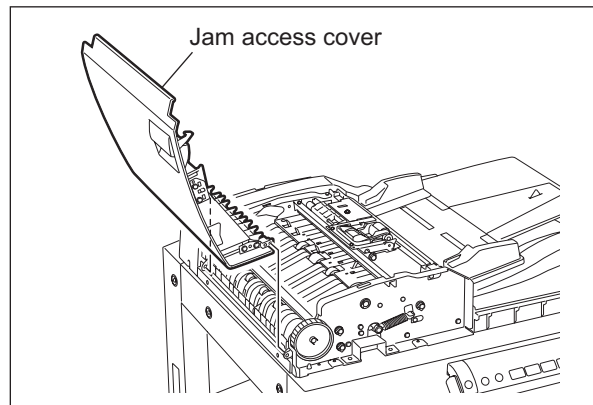


Fig. 4-8

[D] Left cover

- (1) Remove 2 screws and take off the left cover.

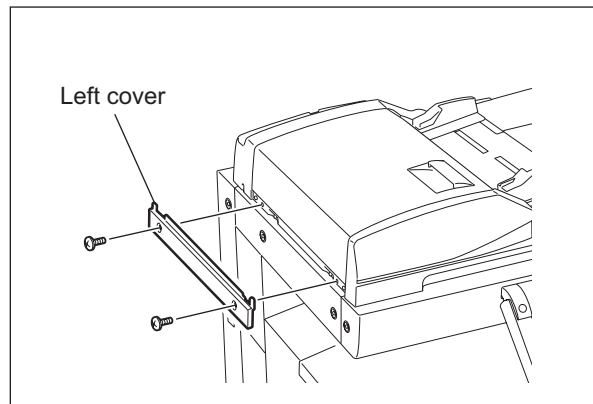





Fig. 4-9

[E] Original tray

- (1) Take off the front cover.
( P. 4-1 "[A] Front cover")
- (2) Take off the rear cover.
( P. 4-2 "[B] Rear cover")
- (3) Take off the paper feeder unit.
( P. 4-5 "[A] Paper feeder unit")
- (4) Remove 2 screws. Lift up the feeder upper guide by sliding it to the right.

Note:

Do not pull the harness too strong.

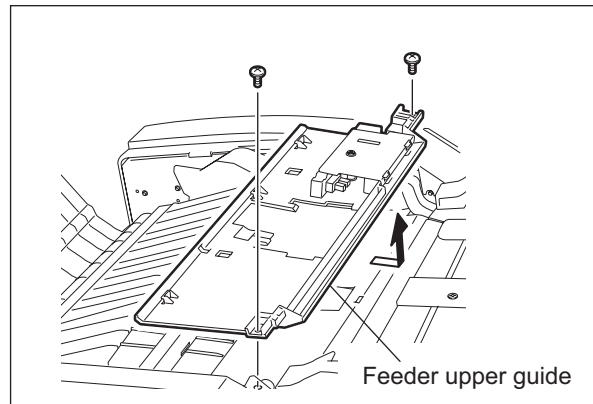


Fig. 4-10

- (5) Disconnect 1 connector from the ADF control PC board.

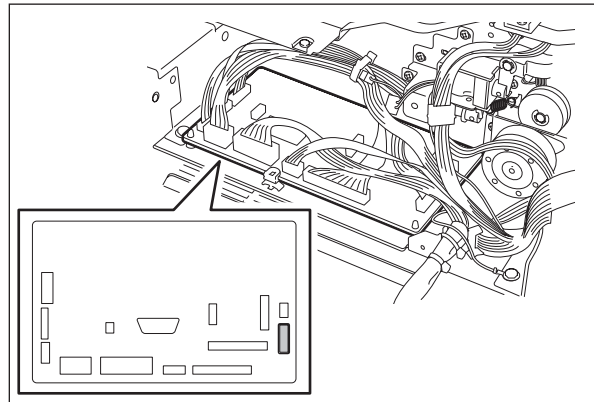


Fig. 4-11

- (6) Remove 1 screw and take off the bushing.
- (7) Take off the original tray.

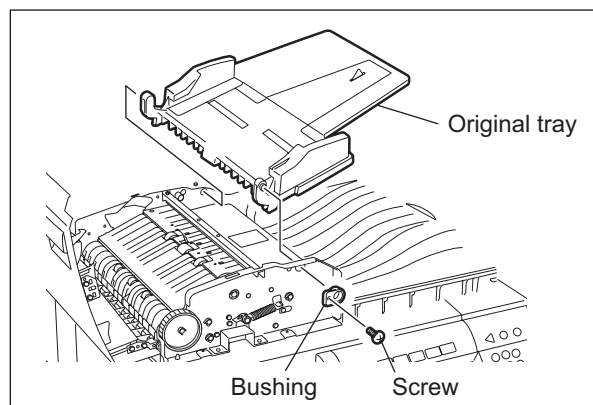


Fig. 4-12

4.2 Roller

[A] Paper feeder unit

- (1) Open the jam access cover.
- (2) Remove 2 screws and take off the bracket.

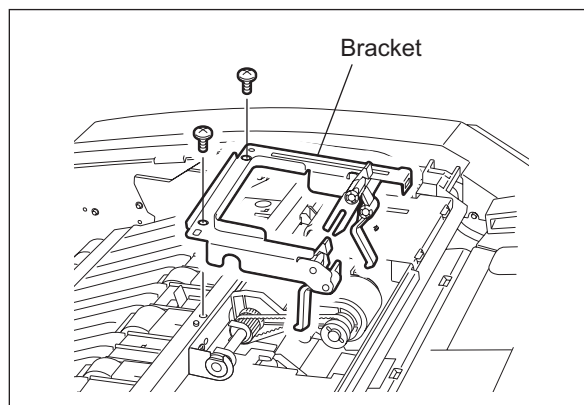


Fig. 4-13

- (3) Remove 1 clip and slide 2 bushings.

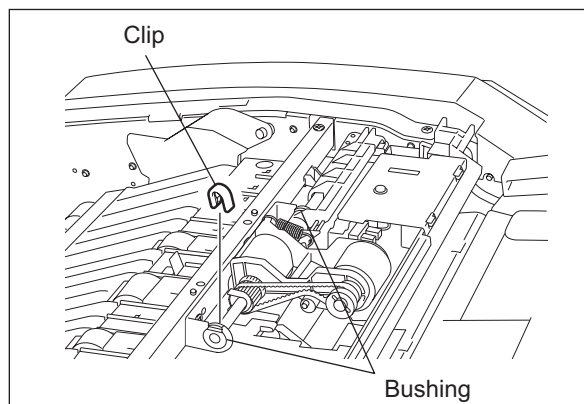


Fig. 4-14

- (4) Take off the paper feeder unit.

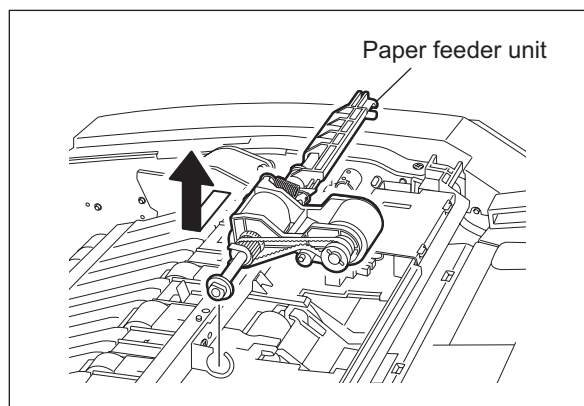



Fig. 4-15

[B] Pickup roller [PM]

- (1) Take off the paper feeder unit.
( P. 4-5 "[A] Paper feeder unit")
- (2) Remove 1 clip and pull out the shaft. Take off the pickup roller.

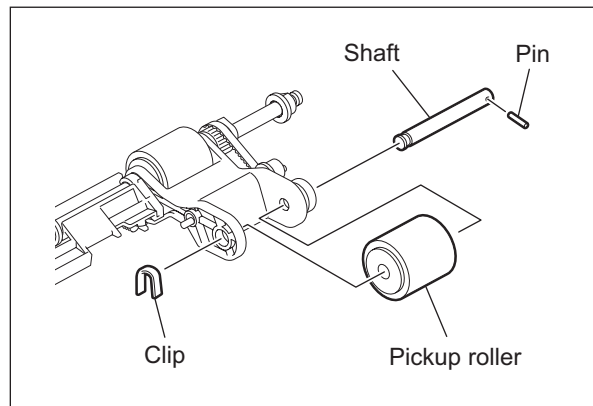


Fig. 4-16

Notes:

1. Be careful not to drop the pin because it will come off when the shaft is pulled out.
2. Make sure you assemble the pickup roller with the one-way clutch in the correct direction.

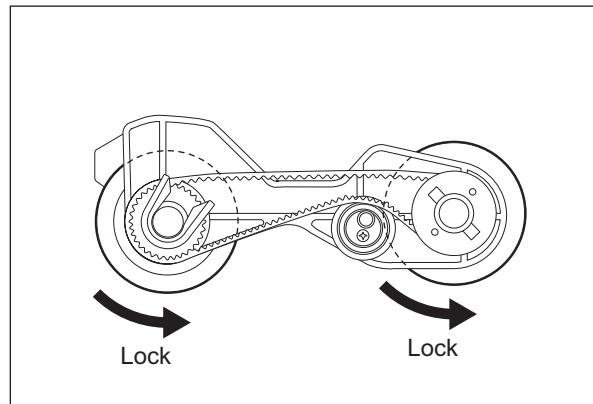



Fig. 4-17

[C] Feed roller [PM]

- (1) Take off the paper feeder unit.
( P. 4-5 "[A] Paper feeder unit")
- (2) Remove 1 clip.

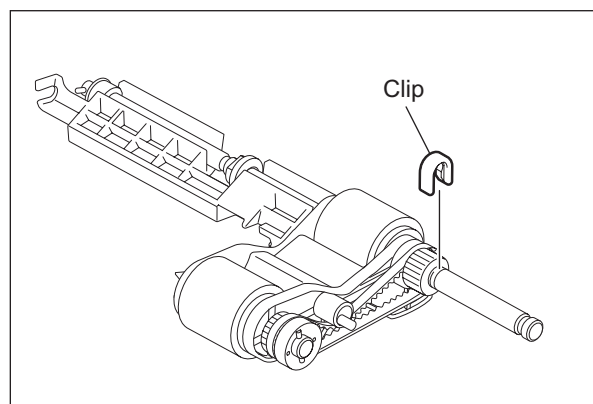


Fig. 4-18

(3) Slide the pulley and remove 1 pin.

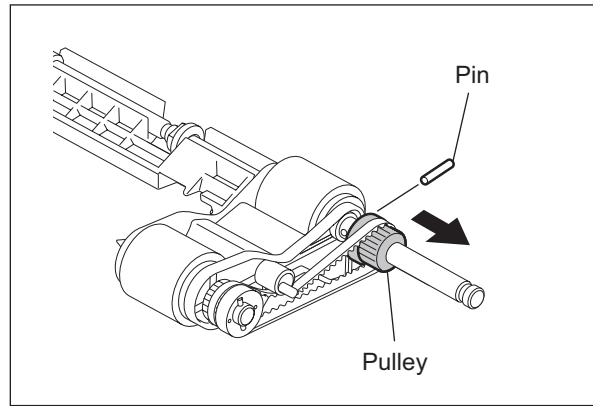


Fig. 4-19

(4) Pull out the shaft and take off the feed roller.

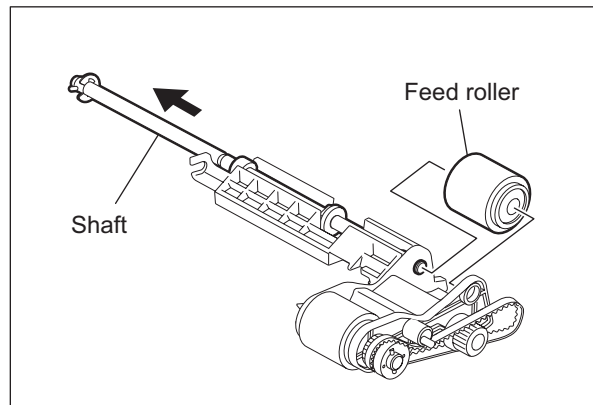


Fig. 4-20

Note:

Make sure you assemble the feed roller with the one-way clutch in the correct direction.

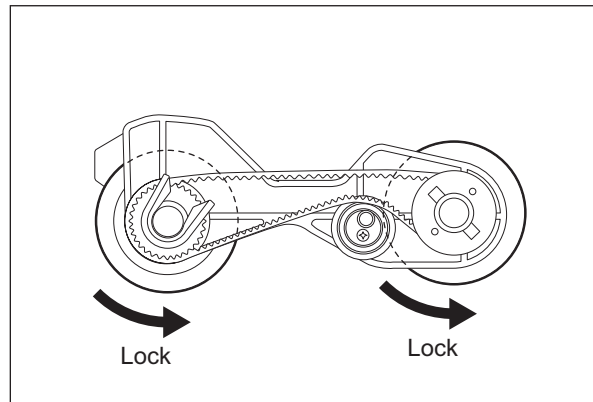



Fig. 4-21

[D] Separation roller [PM]

- (1) Take off the paper feeder unit.
( P. 4-5 "[A] Paper feeder unit")
- (2) Remove 2 screws. Slide the feeder upper guide to the right and raise it.

Note:

Do not pull the harness out with too much force.

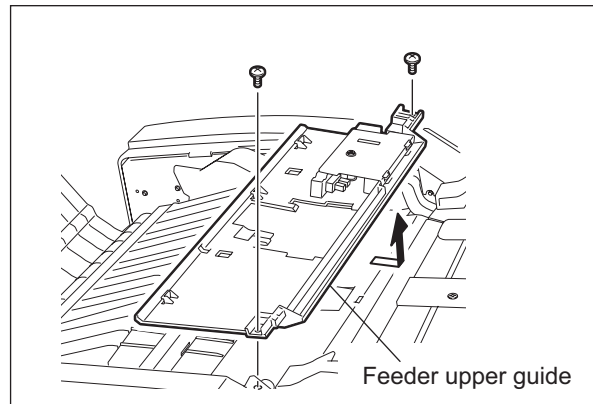


Fig. 4-22

- (3) Remove 2 screws and take off the separation roller holder and separation roller unit.

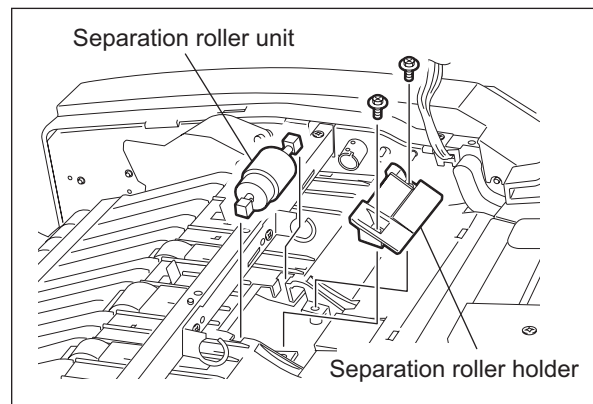


Fig. 4-23

- (4) Remove 1 bushing and clip, and then take off the separation roller.

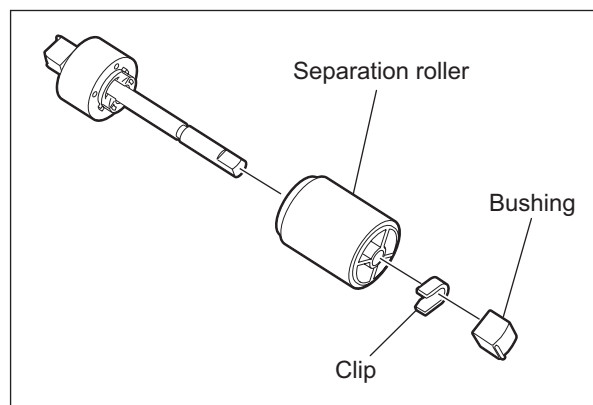


Fig. 4-24

[E] Feeder lower guide

- (1) Take off the original tray.
(📖 P. 4-4 "[E] Original tray")
- (2) Take off the paper feeder unit.
(📖 P. 4-5 "[A] Paper feeder unit")
- (3) Remove 2 screws and take off the stay.

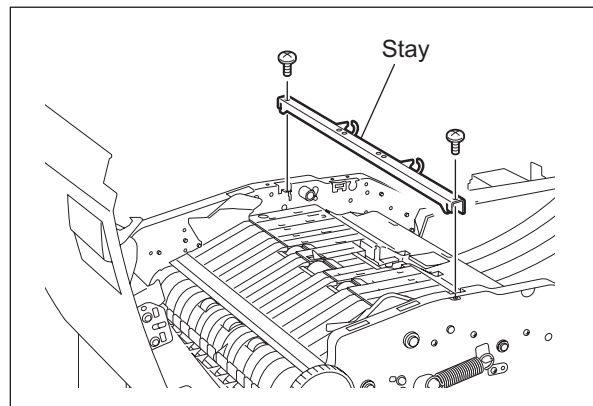


Fig. 4-25

- (4) Take off the jam access guide.

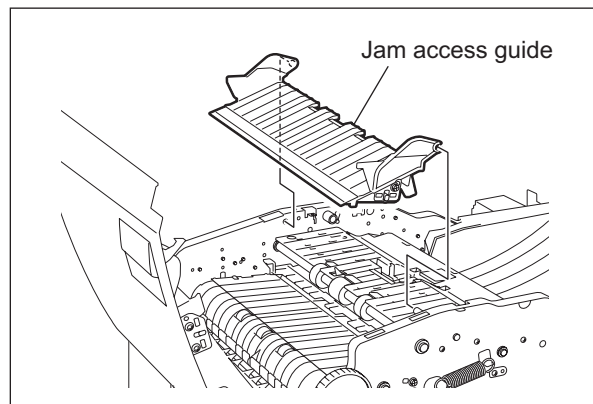


Fig. 4-26

- (5) Remove 4 screws. Disconnect 1 connector and take off the feeder lower guide.

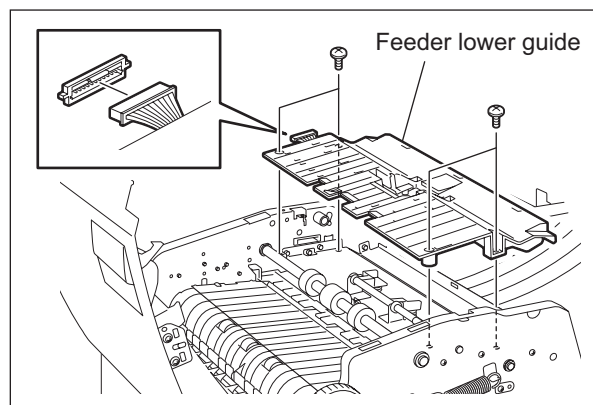


Fig. 4-27

[F] Registration roller

- (1) Take off the feeder lower guide.
(P. 4-9 "[E] Feeder lower guide")
- (2) Take off the original feed motor drive section.
(P. 4-16 "[A] Original feed motor (M1)")
- (3) Remove 1 E-ring and 1 bushing from the front side of the registration roller shaft. Also, remove 1 bushing, 1 pulley, 1 E-ring and 1 bushing from the rear side of the shaft, and then take off the registration roller.

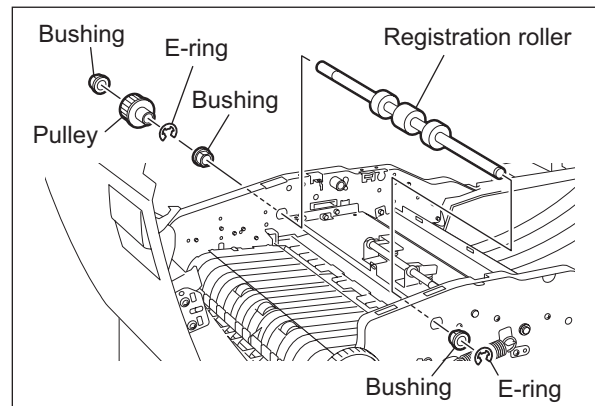


Fig. 4-28

[G] Exit roller

- (1) Take off the front cover.
(P. 4-1 "[A] Front cover")
- (2) Take off the original feed motor drive section.
(P. 4-17 "[B] Original feed motor drive section")
- (3) Remove 1 screw, 1 leaf spring, 1 clip and 1 bushing from the rear side of the exit roller shaft.

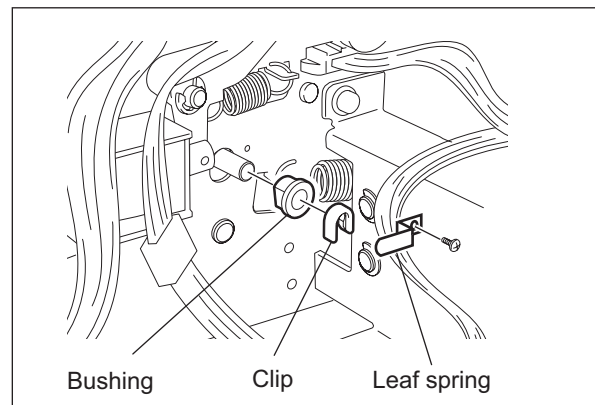


Fig. 4-29

- (4) Remove 1 clip, 1 pulley, 1 pin, timing belt and 1 bushing from the front side of the exit/reverse roller shaft.

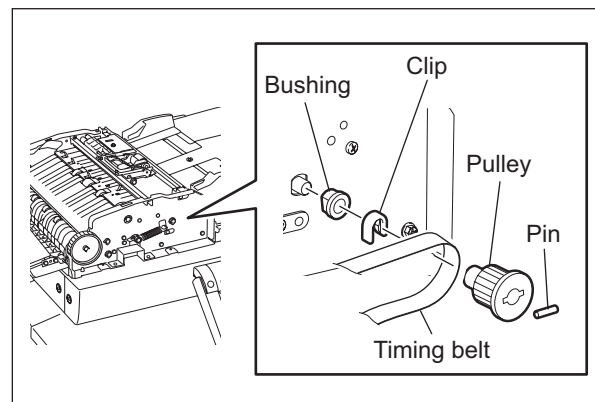


Fig. 4-30

(5) Take off the jam access guide.

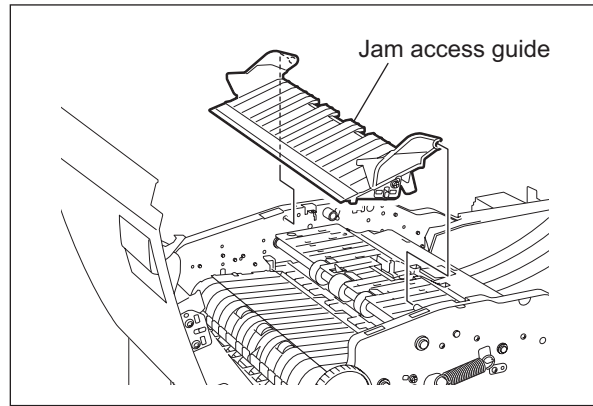


Fig. 4-31

(6) Pull out the exit guide.

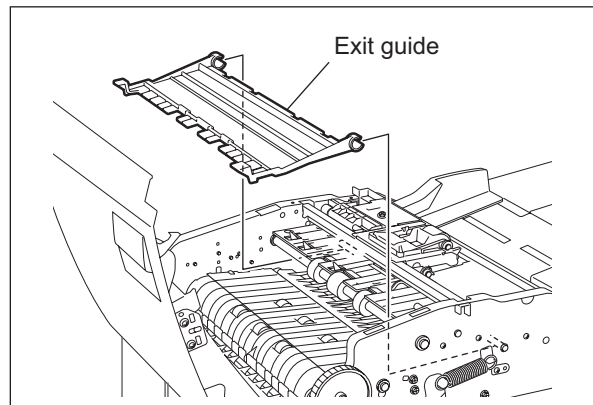


Fig. 4-32

(7) Take off the exit roller.

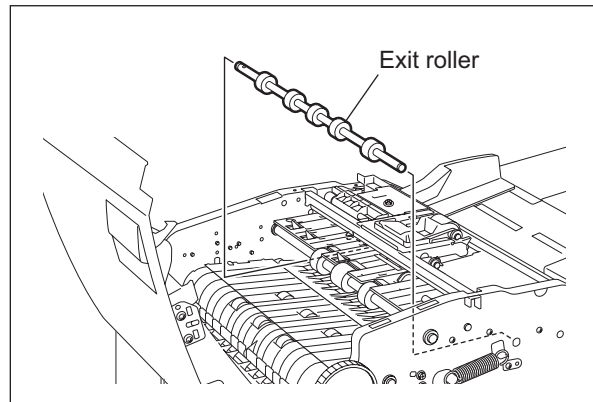


Fig. 4-33

[H] Pre-reading guide

- (1) Take off the front cover.
(📖 P. 4-1 "[A] Front cover")
- (2) Take off the rear cover.
(📖 P. 4-2 "[B] Rear cover")
- (3) Take off the jam access cover.
(📖 P. 4-2 "[C] Jam access cover")
- (4) Take off the left cover.
(📖 P. 4-3 "[D] Left cover")
- (5) Remove 1 screw and take off the hinge pin.

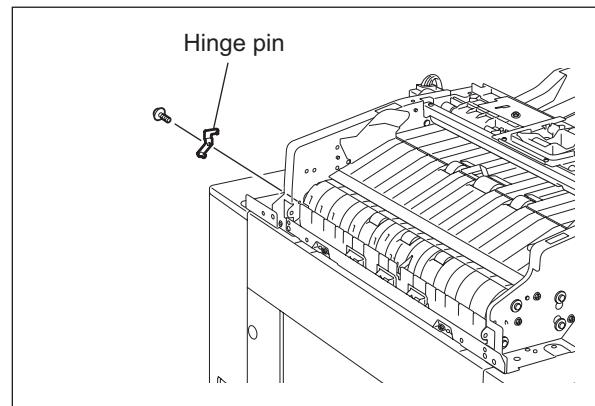


Fig. 4-34

- (6) Disconnect 1 connector. Remove 2 screws and take off the pre-reading guide.

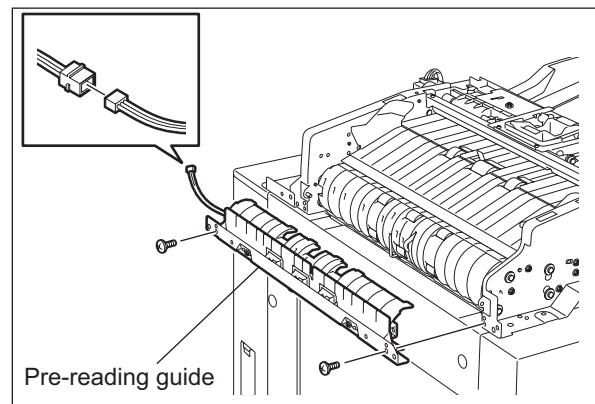


Fig. 4-35

[I] Intermediate transport roller

- (1) Take off the pre-reading guide.
(📖 P. 4-12 "[H] Pre-reading guide")
- (2) Take off the read motor drive section.
(📖 P. 4-18 "[C] Read motor (M2)")
- (3) Remove 1 bushing, 1 screw, 1 pulley and 1 bushing from the rear side of the intermediate transport roller shaft.
- (4) Remove 1 bushing from the front side of the intermediate transport roller shaft.
- (5) Take off the intermediate transport roller.

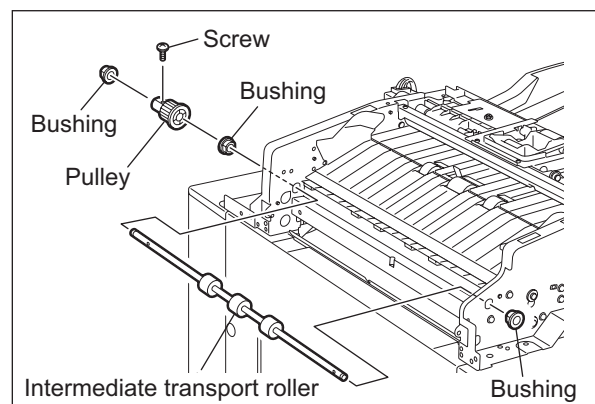




Fig. 4-36

[J] Pre-reading roller

- (1) Take off the pre-reading guide.
( P. 4-12 "[H] Pre-reading guide")
- (2) Take off the read motor drive section.
( P. 4-18 "[C] Read motor (M2)")
- (3) Remove 1 bushing, 1 screw, 1 pulley and 1 bearing from the rear side of the pre-reading roller shaft.

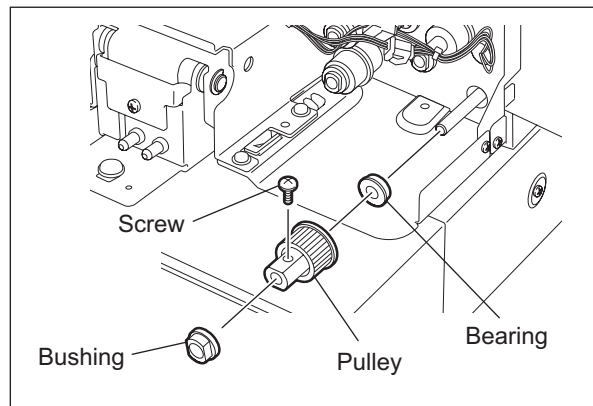


Fig. 4-37

- (4) Remove 1 clip and 1 bushing from the front side of the pre-reading roller shaft.
- (5) Take off the pre-reading roller.

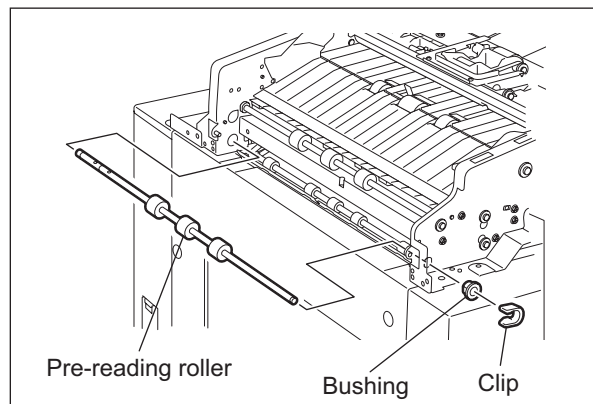



Fig. 4-38

[K] Post-reading roller

- (1) Take off the pre-reading guide.
( P. 4-12 "[H] Pre-reading guide")
- (2) Disconnect 1 connector.

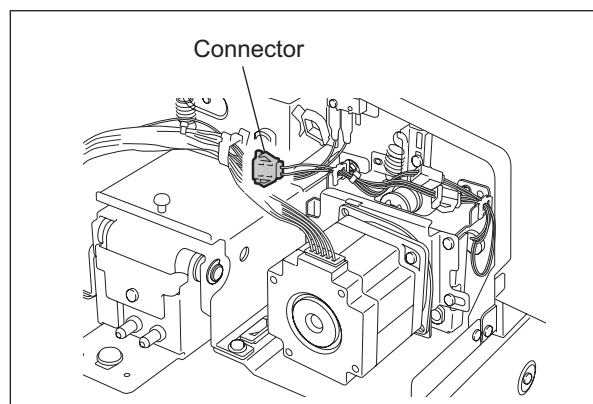


Fig. 4-39

- (3) Take off the read motor drive section.
(P. 4-19 "[D] Read motor drive section")
- (4) Remove 1 bushing, 1 E-ring and 1 pulley from the rear side of the post-reading roller shaft. Loosen 2 setscrews and take off 1 flange. Take off 1 bearing.

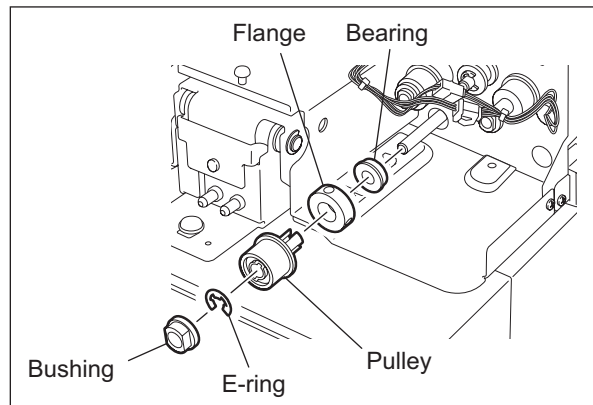


Fig. 4-40

- (5) Remove 1 clip, timing belt, 1 pulley, 1 pin, 1 E-ring and 1 bushing from the front side of the post-reading roller shaft.

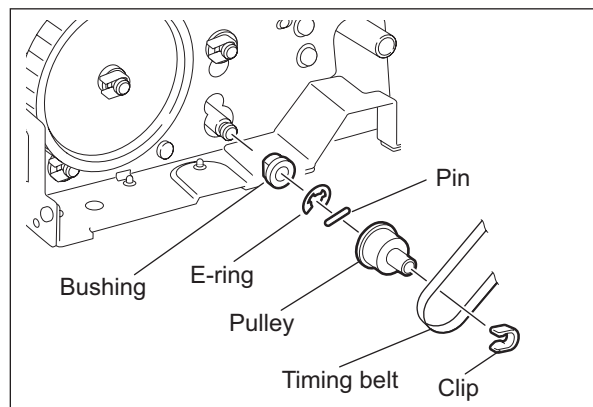


Fig. 4-41

- (6) Open the RADF. Remove 4 screws, take off 2 holders and platen guide.

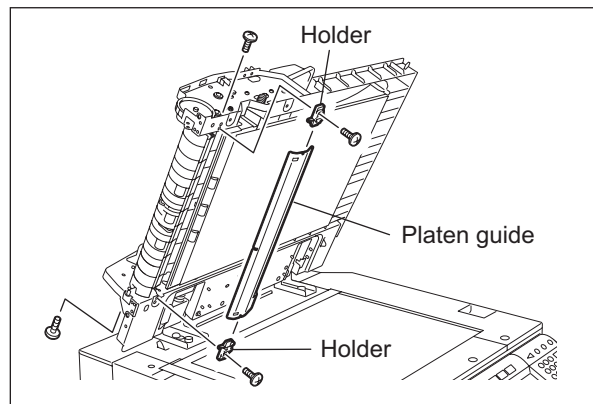


Fig. 4-42

- (7) Remove 2 screws. Open the post-reading lower guide and take off the post-reading upper guide.

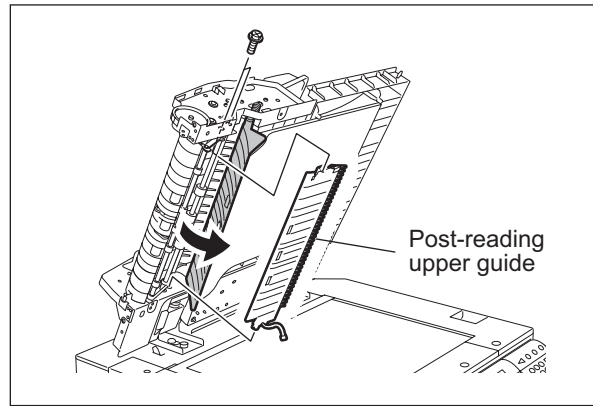


Fig. 4-43

- (8) Take off the post-reading roller.

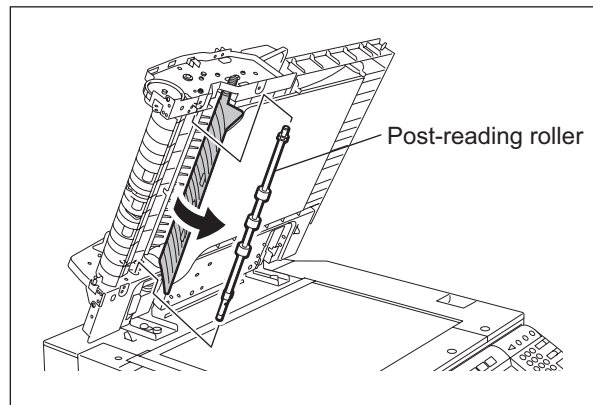



Fig. 4-44

4.3 Motor / Motor drive section

[A] Original feed motor (M1)

- (1) Take off the rear cover.
( P. 4-2 "[B] Rear cover")
- (2) Disconnect 1 connector, and then remove 1 spring. (Spring: Outside diameter of coil – $\varnothing 9.6$ mm, acceptable turns of coil – 12 turns)

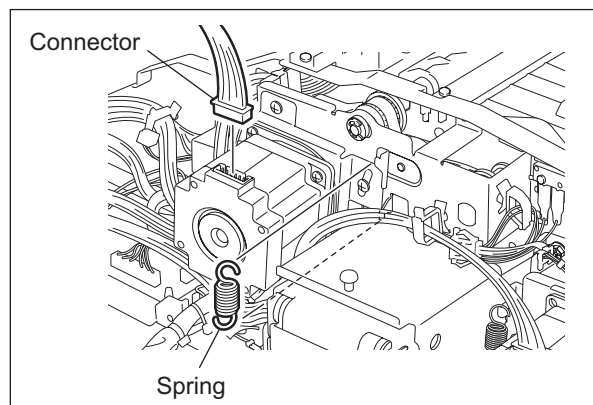


Fig. 4-45

- (3) Remove 3 screws, and then take off the original feed motor with its bracket.

Note:

When the unit is being assembled, temporarily tighten the screws removed at step (3) and then attach the spring removed at step (2). Then fully tighten these screws.

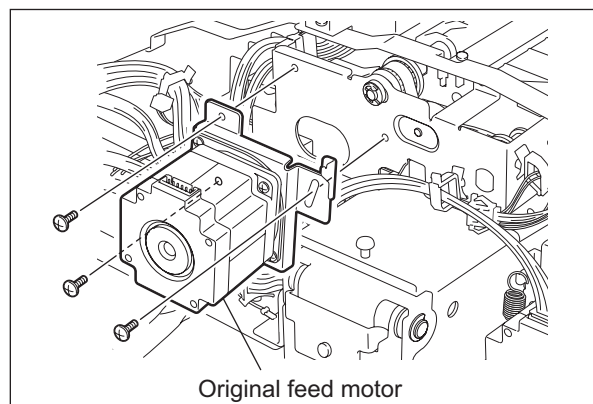


Fig. 4-46

- (4) Remove 2 screws and take off the original feed motor.

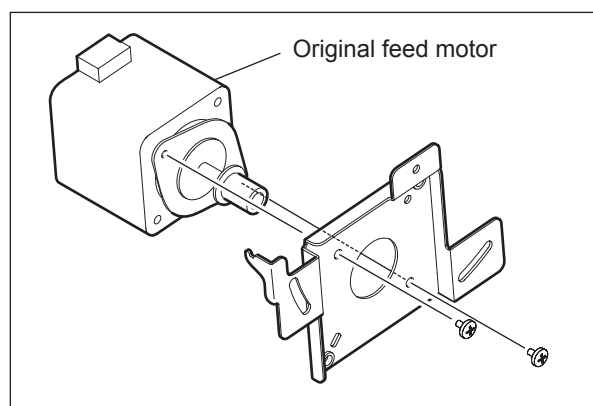


Fig. 4-47

[B] Original feed motor drive section

- (1) Take off the the original feed motor.
(📖 P. 4-16 "[A] Original feed motor (M1)")
- (2) Release the harness from 3 harness clamps.
- (3) Remove 1 E-ring and take off the bushing.

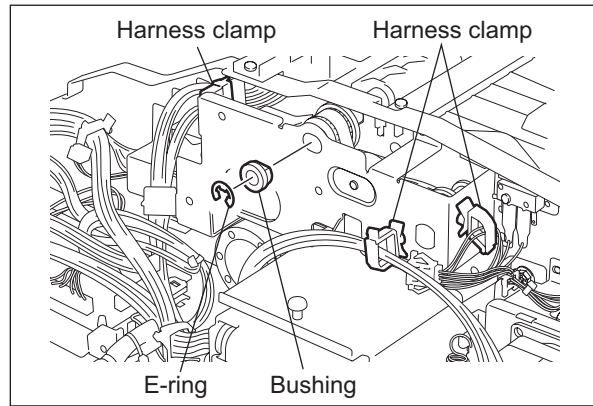


Fig. 4-48

- (4) Disconnect 3 terminals of the switch.
- (5) Remove 4 screws, and then take off the bracket.

Note:

When connecting the terminal, make sure that the color of the harness is correct.

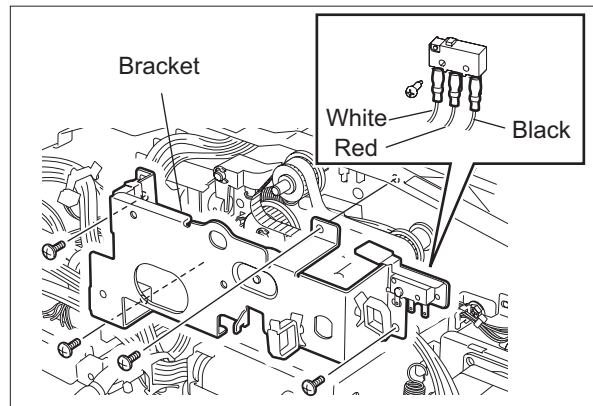


Fig. 4-49

- (6) Take off the timing belt, bushings and 2 pulleys.

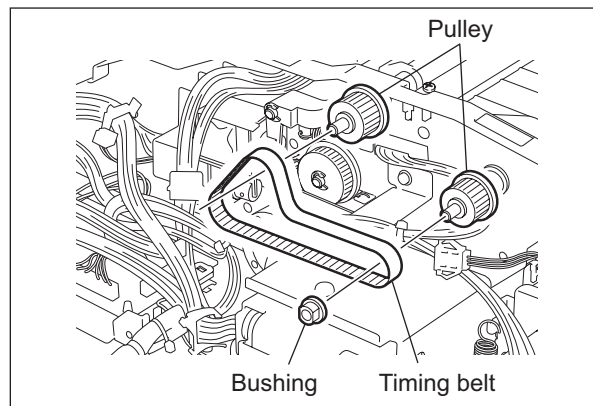



Fig. 4-50

[C] Read motor (M2)

- (1) Take off the rear cover.
( P. 4-2 "[B] Rear cover")
- (2) Disconnect 1 connector, and then remove 1 spring. (Spring: Outside diameter of coil – $\varnothing 10.2$ mm, active coils – 12.5)

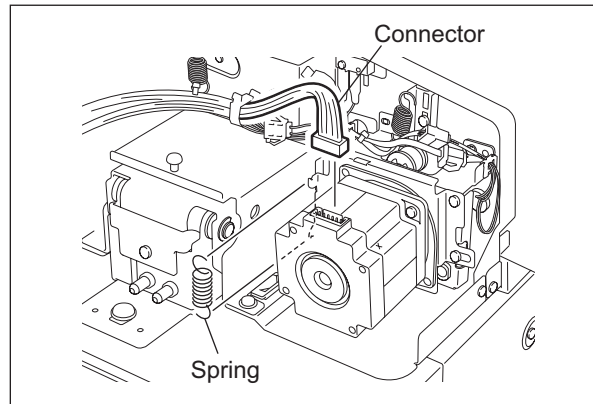


Fig. 4-51

- (3) Remove 3 screws, and then take off the read motor with its bracket.

Note:

When the unit is being assembled, temporarily tighten the screws removed at step (3), and then attach the spring removed at step (2). Then fully tighten these screws.

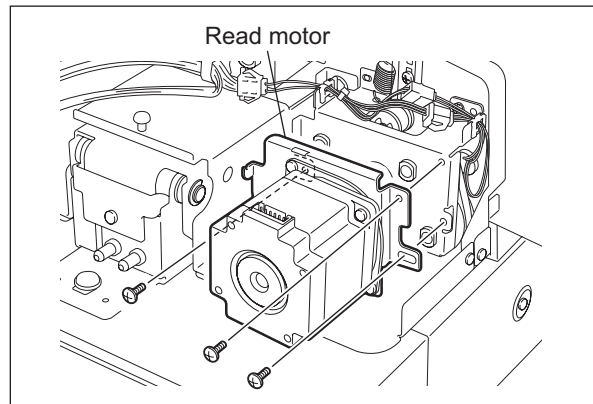


Fig. 4-52

- (4) Remove 2 screws and take off the read motor.

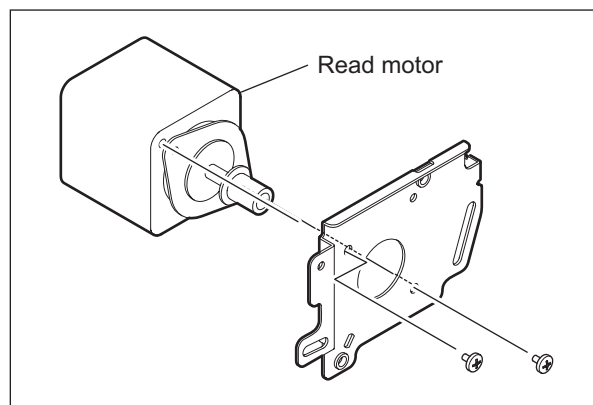



Fig. 4-53

[D] Read motor drive section

- (1) Take off the rear motor.
( P. 4-18 "[C] Read motor (M2)")
- (2) Remove 1 spring. (Spring: Outside diameter of coil – \varnothing 8.8 mm, active coils – 12.5)
- (3) Release the harness from 2 harness clamps.

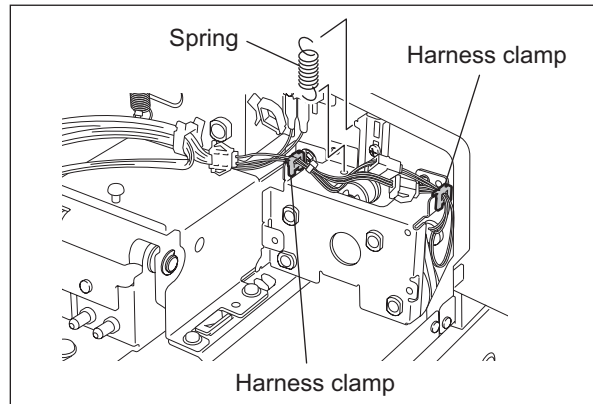


Fig. 4-54

- (4) Remove 3 screws and then take off the bracket.

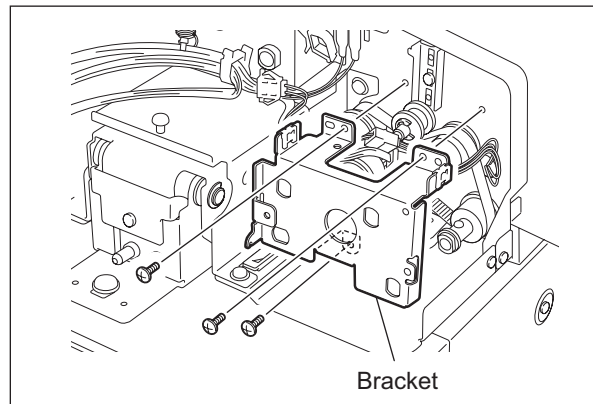


Fig. 4-55

- (5) Take off 1 timing belt and 4 bushings.

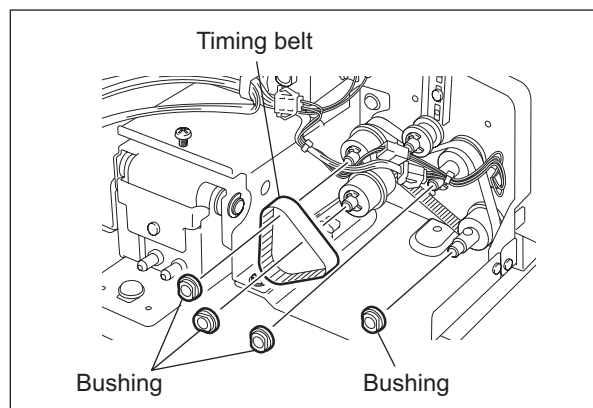


Fig. 4-56

- (6) Loosen 1 screw of the belt tensioner.
- (7) Remove the 4 E-rings, and then take off the 4 pulleys and timing belt.

Note:

When the unit is being assembled, first install the parts removed at steps (3), (4), (5) and (7), and attach the spring removed at step (2) next. Then tighten the screw loosened at step (6).

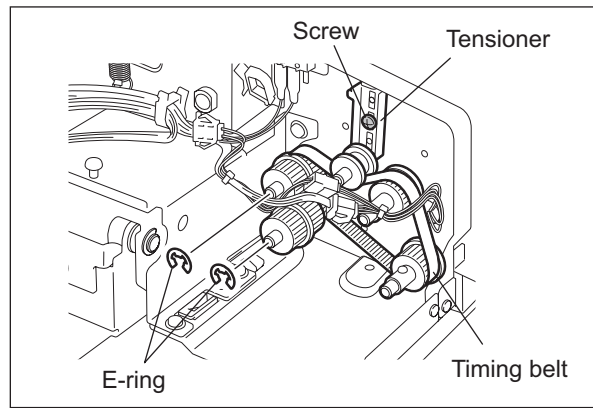


Fig. 4-57

4.4 Solenoid

[A] Original pickup solenoid (SOL)

- (1) Take off the original feed motor drive section. (P. 4-17 "[B] Original feed motor drive section")
- (2) Disconnect 1 connector. Remove 2 screws and take off the original pickup solenoid with the bracket.

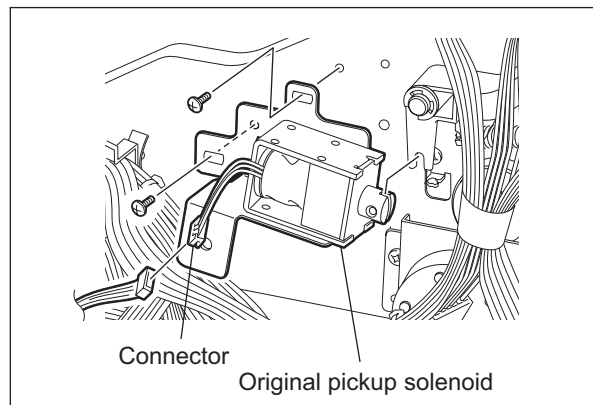


Fig. 4-58

- (3) Remove 2 screws and take off the original pickup solenoid from the bracket.

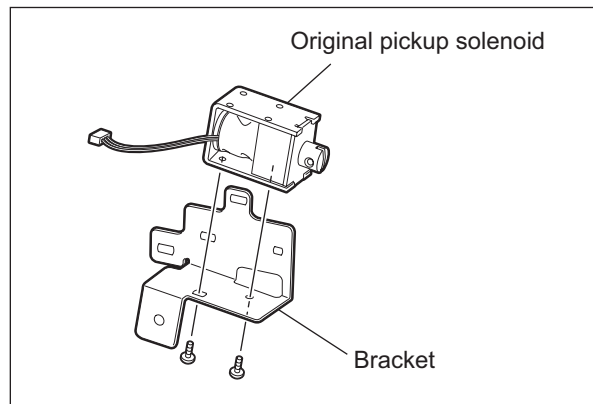


Fig. 4-59

Note:

When installing the original pickup solenoid, be sure to align the edge of the original pickup solenoid with the mark-off line on the frame.

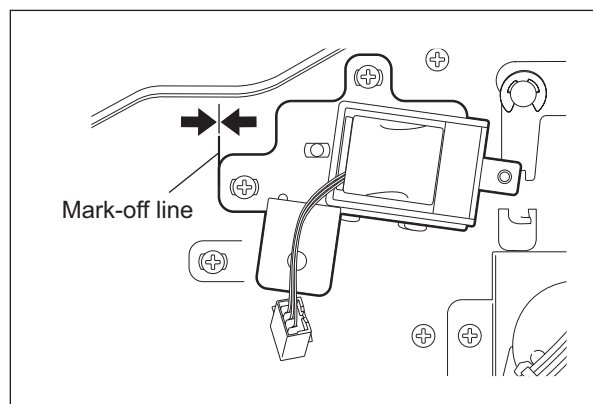



Fig. 4-60

4.5 Sensor/switch

[A] Original tray width sensor (S2)

- (1) Take off the original tray.
( P. 4-4 "[E] Original tray")
- (2) Remove 3 screws. Release 8 latches and separate the original tray into 2 parts.

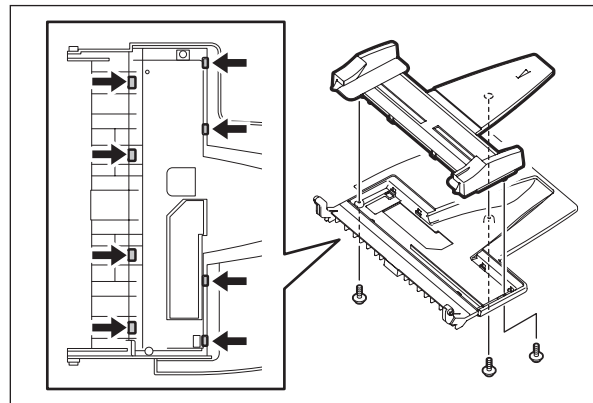


Fig. 4-61

- (3) Remove 1 screw and take off the cover.
- (4) Disconnect 1 connector and take off the original tray width sensor.

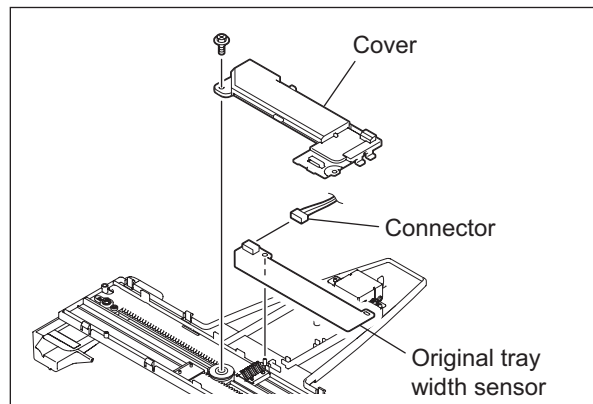


Fig. 4-62

Note:

If washers (3 pcs) and a pinion come off, assemble them in the order as shown in the illustration.

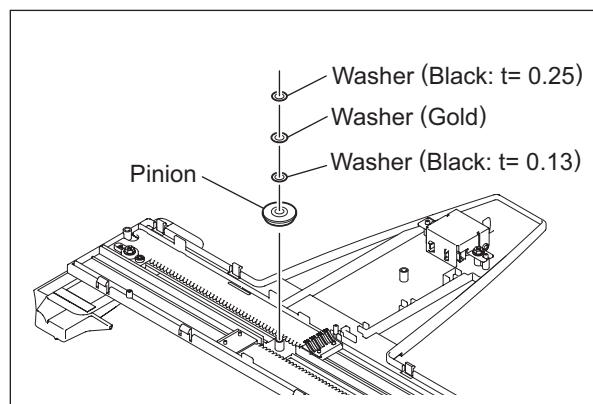



Fig. 4-63

[B] Original tray sensor (S1)

- (1) Take off the original tray.
( P. 4-4 "[E] Original tray")
- (2) Remove 3 screws. Release 8 latches and separate the original tray into 2 parts.

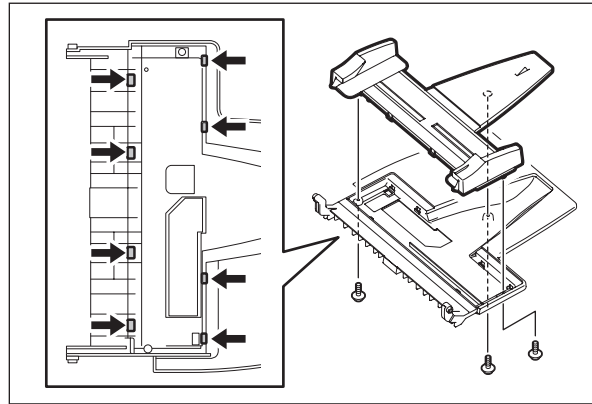


Fig. 4-64

- (3) Remove 2 screws and take off the holder.

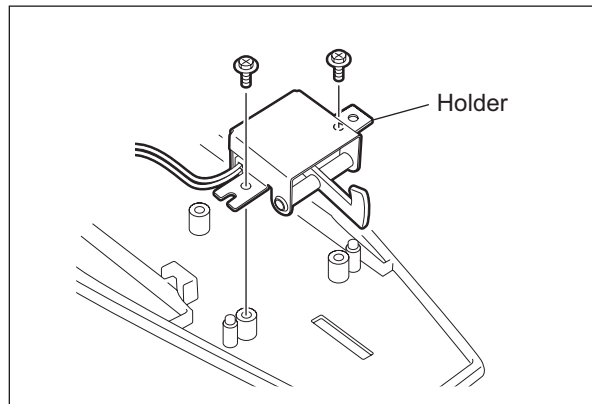


Fig. 4-65

- (4) Release 2 latches and take off the original tray sensor.

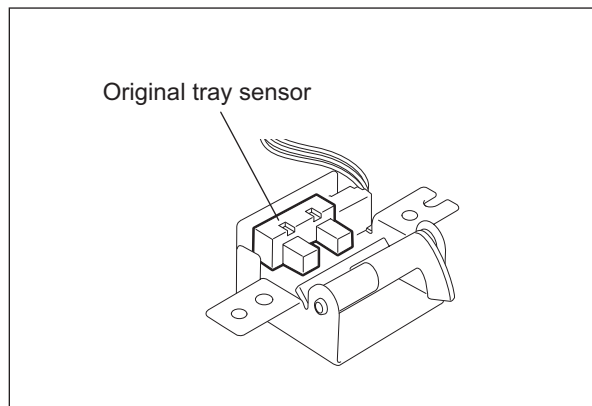


Fig. 4-66

[C] Jam access cover sensor (S7)

- (1) Open the jam access cover.
- (2) Remove 1 screw and take off the metal plate cover.

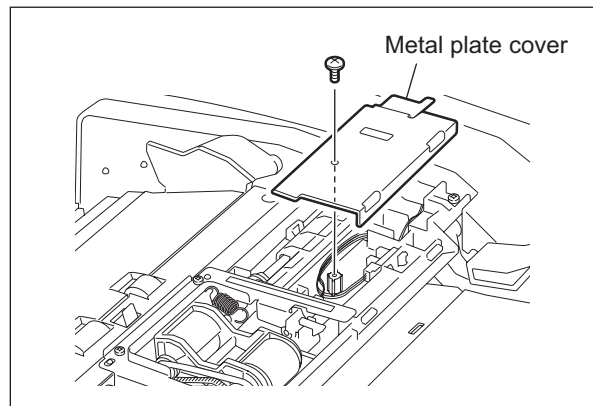


Fig. 4-67

- (3) Disconnect 1 connector. Release 2 latches and take off the jam access cover sensor.

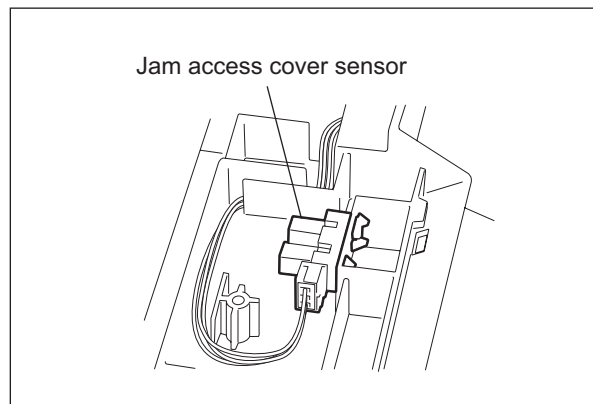


Fig. 4-68

[D] Original empty sensor (S3)

- (1) Open the jam access cover.
- (2) Remove 1 screw and take off the metal plate cover.

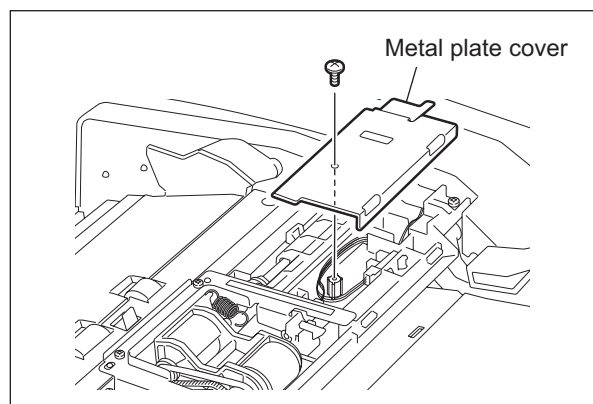


Fig. 4-69

- (3) Remove 2 screws and take off the bracket.

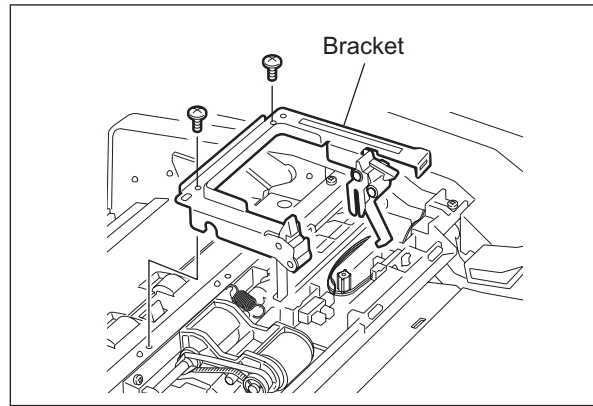


Fig. 4-70

- (4) Disconnect 1 connector. Release 2 latches and take off the original empty sensor.

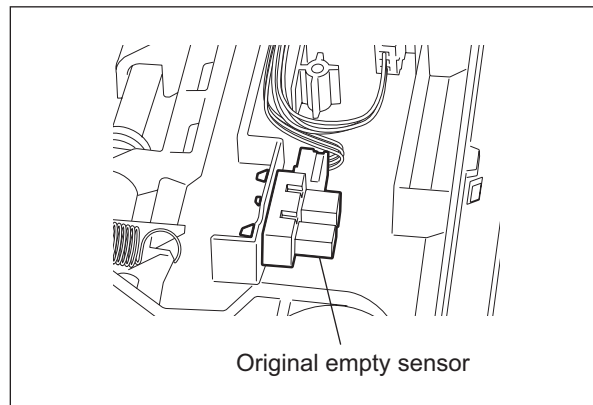



Fig. 4-71

[E] Original registration sensor (S4)

- (1) Take off the feeder lower guide.
( P. 4-9 "[E] Feeder lower guide")
- (2) Disconnect 1 connector. Release 2 latches and take off the original registration sensor.

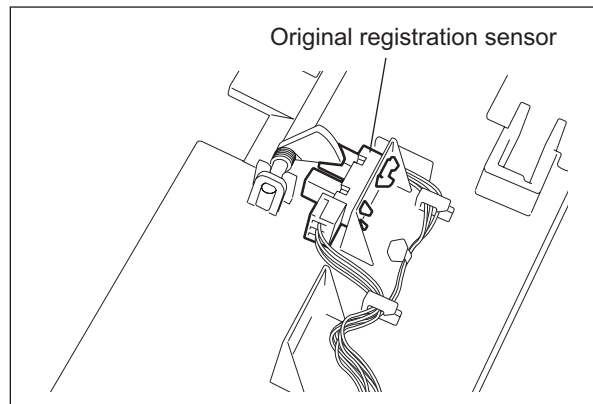



Fig. 4-72

[F] Read sensor (S5)

- (1) Take off the pre-reading guide.
( P. 4-12 "[H] Pre-reading guide")
- (2) Release 2 latches and take off the read sensor from the pre-reading upper guide.

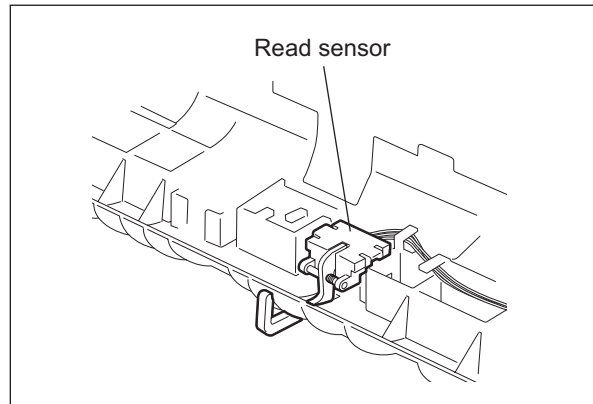



Fig. 4-73

[G] Original exit/reverse sensor (S6)

- (1) Take off the pre-reading guide.
( P. 4-12 "[H] Pre-reading guide")
- (2) Disconnect 1 connector.

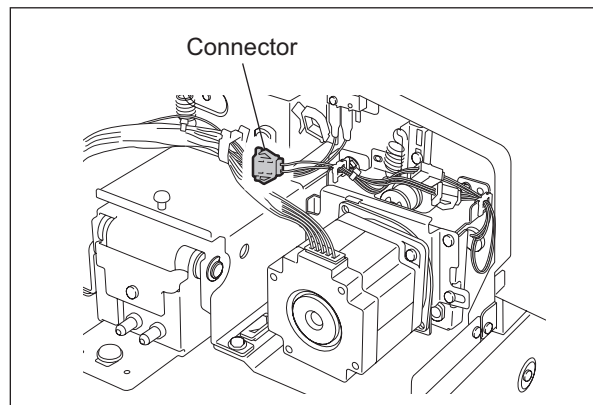


Fig. 4-74

- (3) Open the ADF. Remove 4 screws, and then take off 2 holders and platen guide.

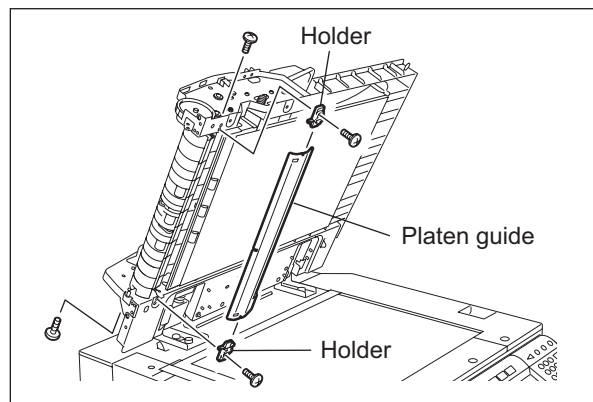


Fig. 4-75

- (4) Remove 2 screws. Open the post-reading lower guide and take off the post-reading upper guide.

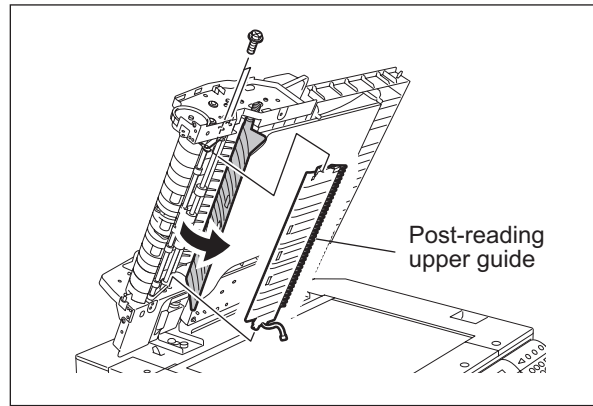


Fig. 4-76

- (5) Release 2 latches and take off the Original exit sensor from the post-reading upper guide.

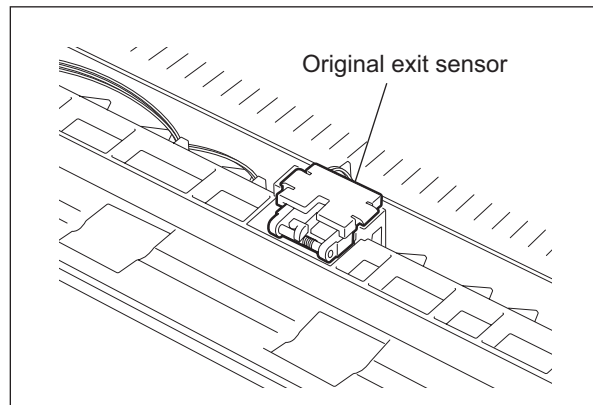


Fig. 4-77

[H] ADF opening/closing sensor (S8)

- (1) Take off the rear cover.
(P. 4-2 "[B] Rear cover")
- (2) Disconnect 1 connector. Release 2 latches and take off the ADF opening/closing sensor.

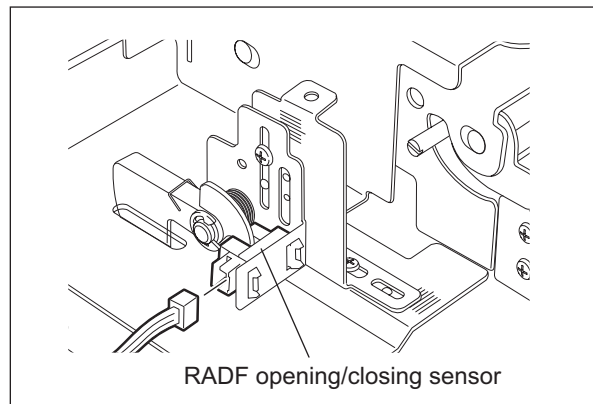



Fig. 4-78

[I] Jam access cover opening/closing switch (SW)

- (1) Take off the bracket of the original feed motor drive section.
( P. 4-17 "[B] Original feed motor drive section")
- (2) Disconnect 3 terminals. Remove 1 screw and take off the jam access cover opening/closing switch.

Note:

When connecting the terminal, make sure that the color of the harness is correct.

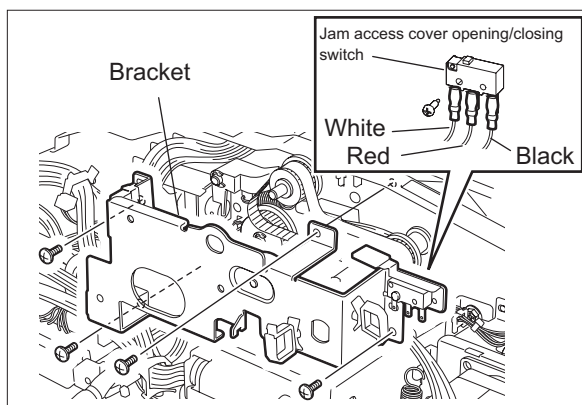



Fig. 4-79

4.6 PC Board

[A] ADF control PC board (ADF board)

- (1) Take off the rear cover.
( P. 4-2 "[B] Rear cover")
- (2) Disconnect 9 connectors.

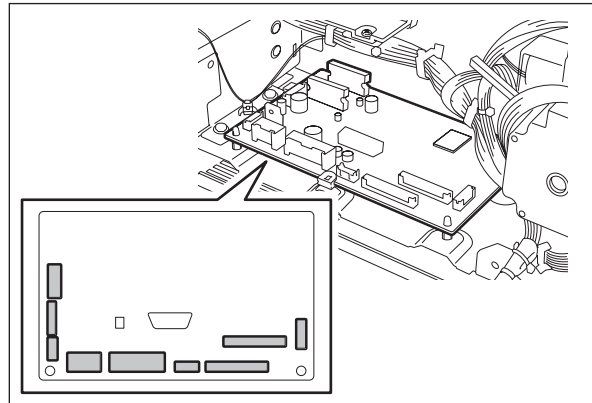


Fig. 4-80

- (3) Release 2 lock supports and 3 edge spacer. Take off the ADF board.

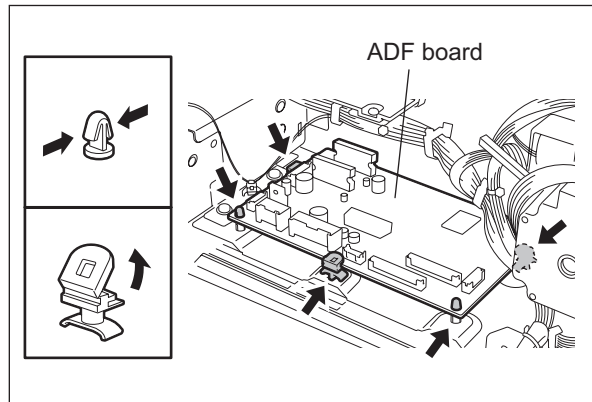


Fig. 4-81

4.7 Others

[A] Hinge stopper

- (1) Remove 1 screw and then take off the hinge stopper.

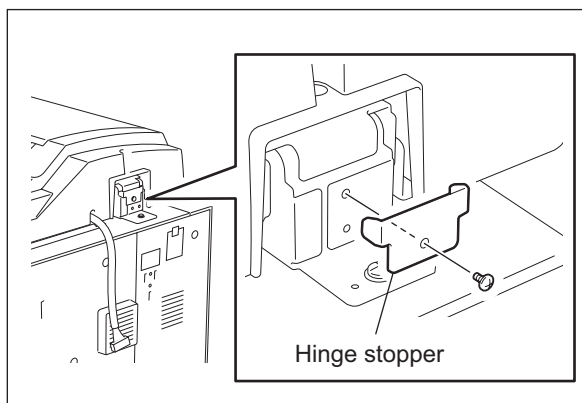


Fig. 4-82

Note:

When the hinge stopper is taken off, the opening angle for the RADF becomes approx. 90 degrees. Take off the hinge stopper only when it is needed for installation, maintenance service, etc.

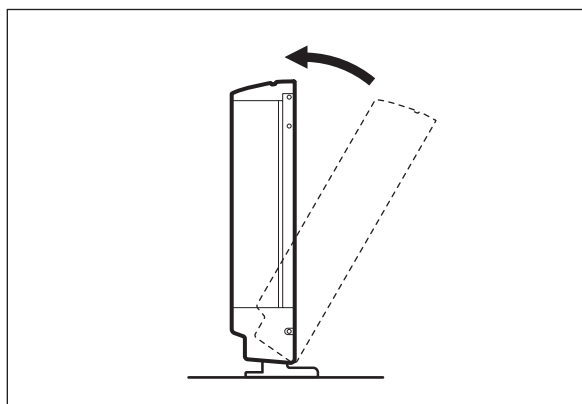


Fig. 4-83

5. ADJUSTMENT

5.1 Adjustment of Position

Perform this adjustment when the ADF is not installed in the correct position.

Note:

Check if the image adjustment for the equipment is performed properly before this adjustment of the ADF. (See the Service Handbook of the applicable equipment.)

[A] Checking

- (1) Open the ADF and install 2 positioning pins (the positioning pins are installed to the back side of the hinge which is on the left side of the ADF).

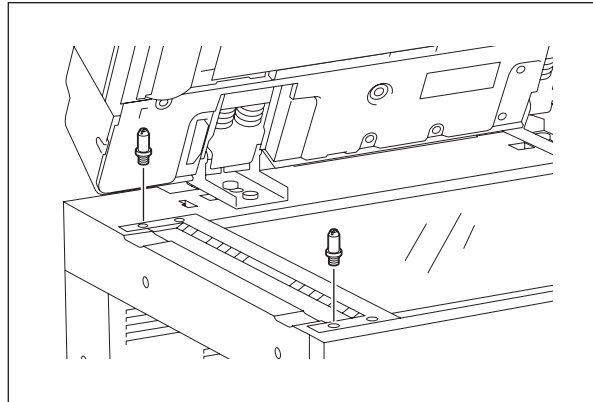


Fig. 5-1

- (2) Remove the platen sheet.

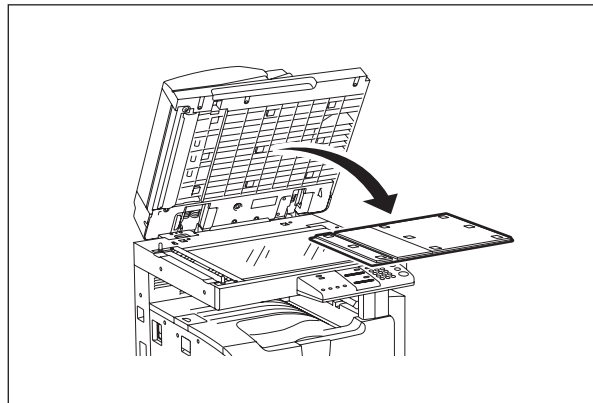


Fig. 5-2

- (3) Close the ADF and check if the positioning pins fit the holes on the ADF.

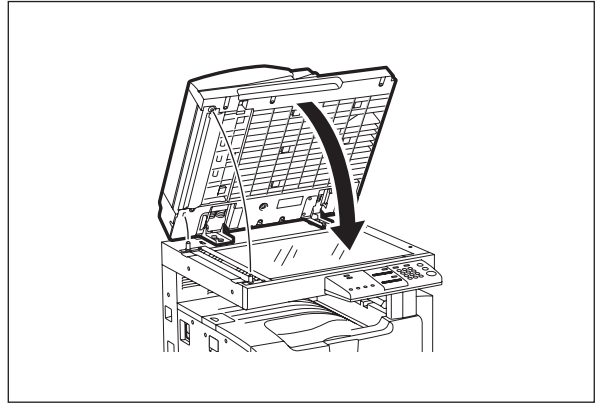


Fig. 5-3

[B] Adjustment

If the pins cannot be fitted into the holes, perform the adjustment according to the following procedure.

- (1) Remove the right-hand hinge screw at the rear side.

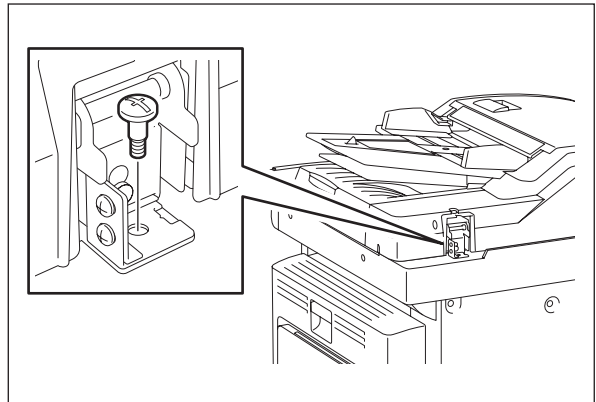


Fig. 5-4

- (2) Remove the bracket on the left-hand hinge. (MR-2020 only)

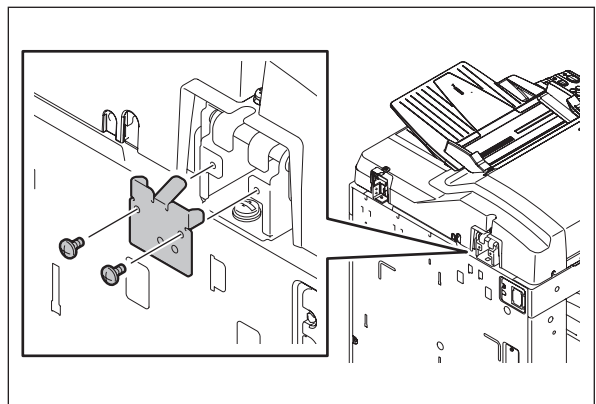


Fig. 5-5

- (3) Loosen the left-hand hinge screw at the rear side.

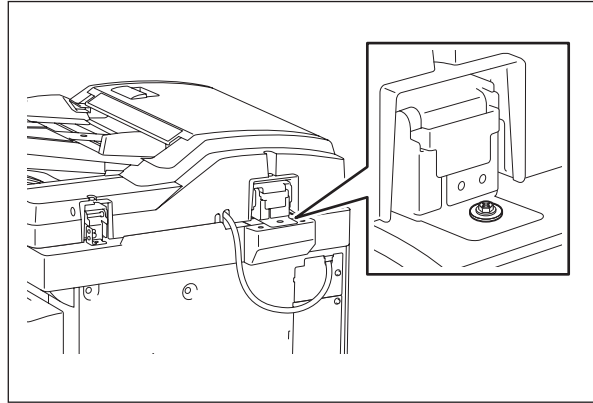


Fig. 5-6

- (4) Loosen the hinge screws at the front side.

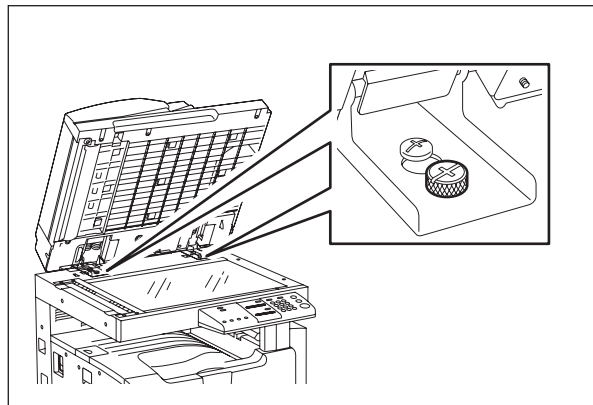


Fig. 5-7

- (5) Position the pins with the holes on the ADF by moving it so that the pins fit into the holes when the ADF is closed.

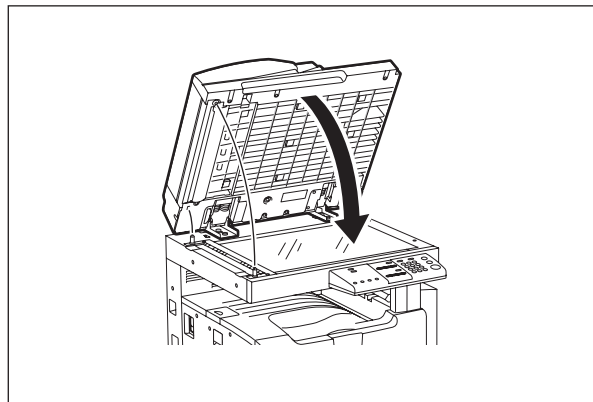


Fig. 5-8

- (6) Tighten the left-hand hinge screw at the rear side.

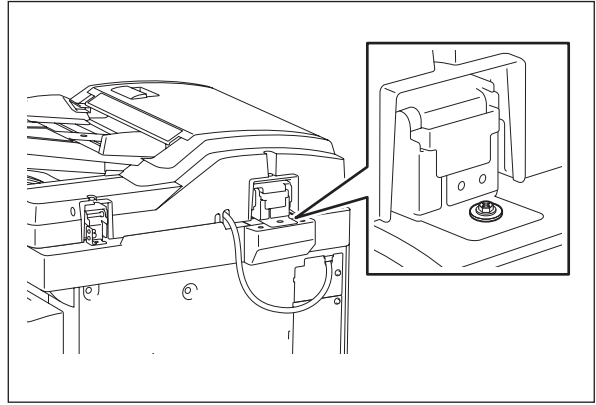


Fig. 5-9

- (7) Loosen the hole position adjustment screws on the right hand side.

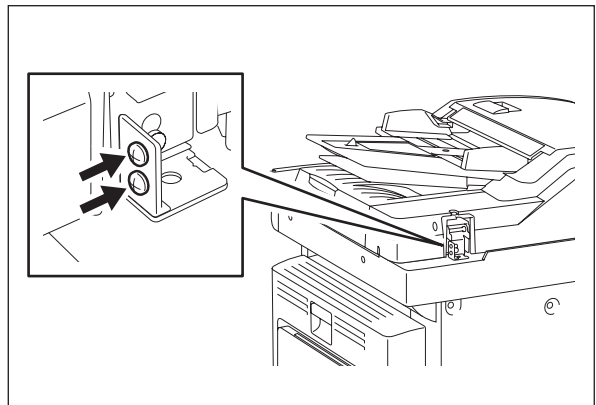


Fig. 5-10

- (8) Match the screw hole positions.

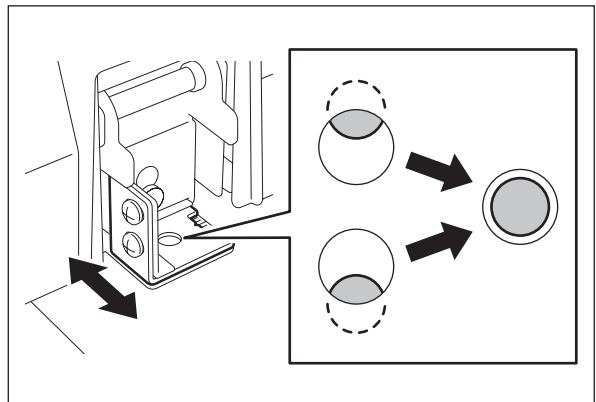


Fig. 5-11

- (9) Install the right-hand hinge screw at the rear side.

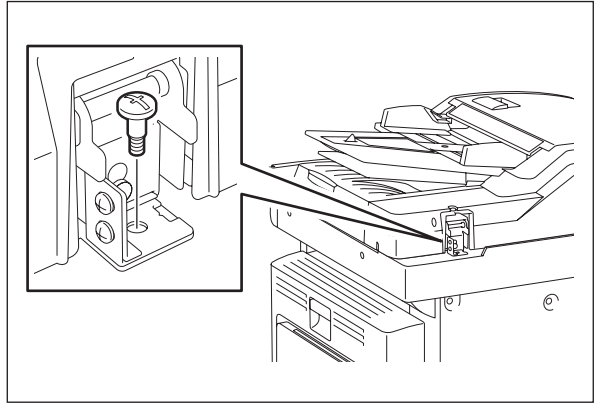


Fig. 5-12

- (10) Install the bracket on the left-hand hinge.
(MR-2020 only)

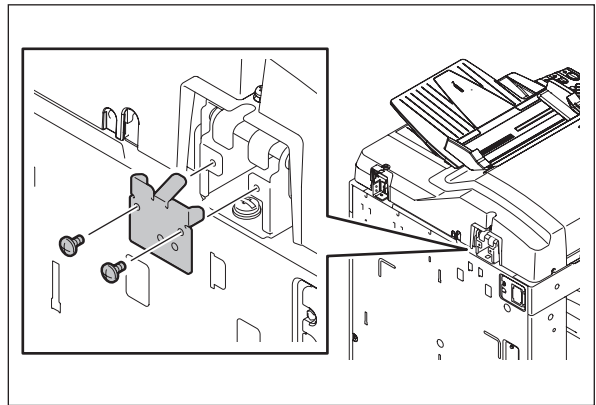


Fig. 5-13

- (11) Tighten the hinge screws at the front side.

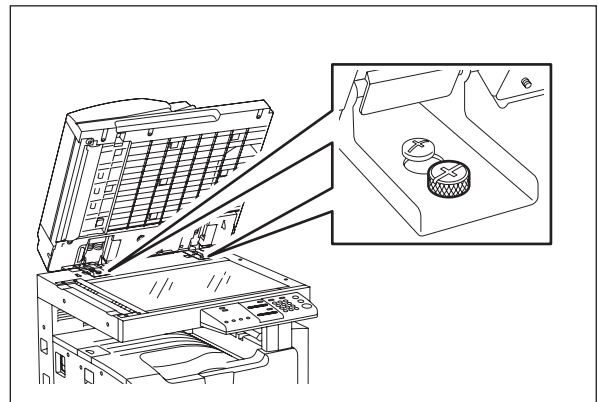


Fig. 5-14

- (12) Place the platen sheet on the original glass and align it to the top left corner.
Close the ADF gently and open it to check if the platen sheet is attached properly.

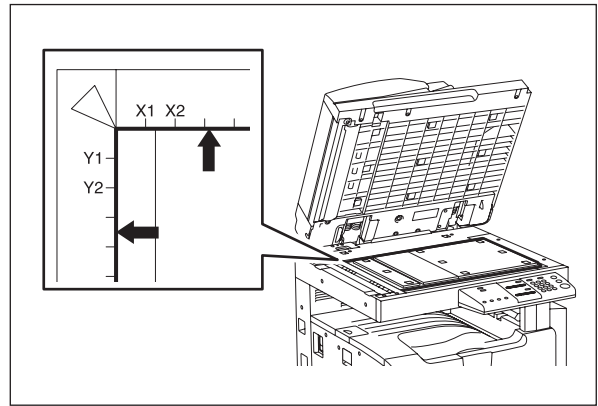


Fig. 5-15

5.2 Adjustment of Height

Note:

Check if the image adjustment for the equipment is performed properly before this adjustment of the ADF. (See the Service Handbook of the applicable equipment.)

[A] Checking

- (1) Close the ADF.
- (2) Light the exposure lamp.
 - Turn the power ON while pressing [0] and [4] simultaneously.
 - Key in [261], press the [START] button, and then wait until the CIS unit stops.
 - Key in [267] and then press the [START] button. The exposure lamp is turned ON for a given length of time.
- (3) Visually check the gap between platen guide holder "A" and upper surface of the original glass "B" from the left hand side of the equipment. If the value is not within the tolerance, perform the adjustment according to the following procedure.

[Tolerance of the gap]

Rear side: 0 - 0.2 mm

Front side: 0 mm

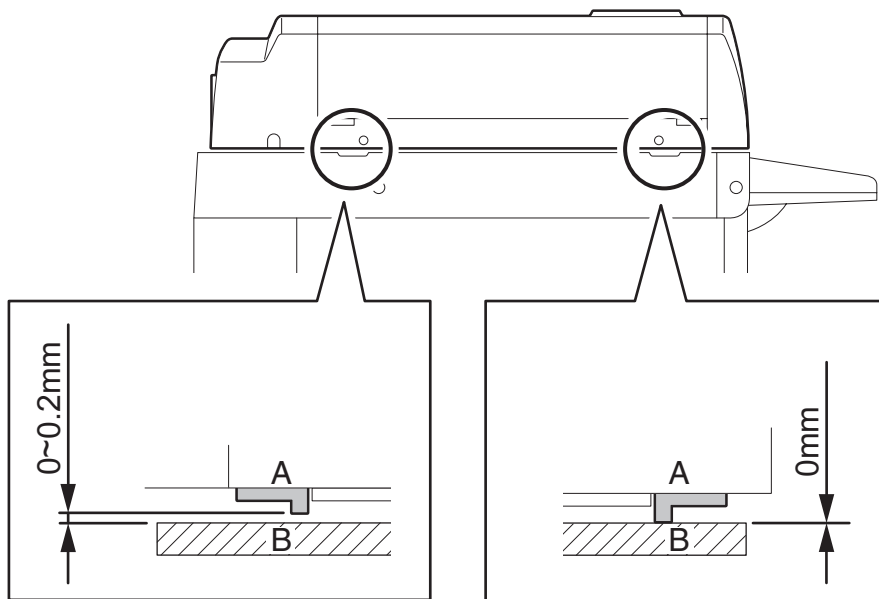


Fig. 5-16

[B] Adjustment

- (1) Close the ADF.
 - (2) Adjust it by turning the adjustment screws on the hinges.
 - Adjust the height on the rear side by means of the screw on the hinge on the feed side of the ADF.
- Turn it clockwise Heightened
Turn it counterclockwise Lowered

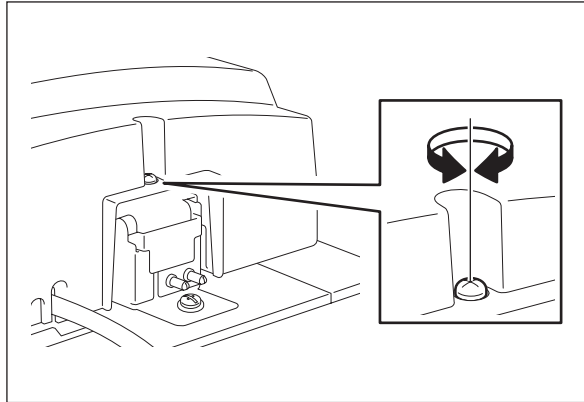


Fig. 5-17

- Adjust the gap on the rear side by means of the screw on the hinge on the feed side of the ADF.
- Turn it clockwis Lowered
Turn it counterclockwise Heightened

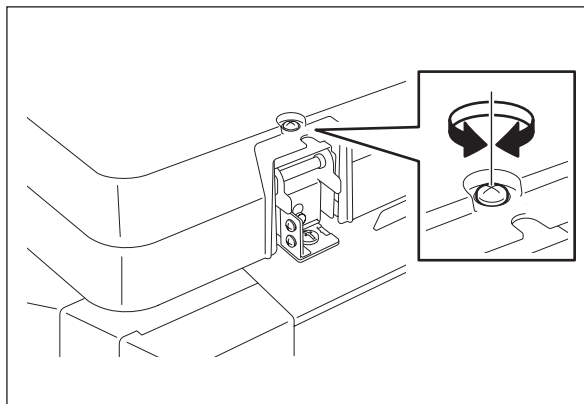


Fig. 5-18

5.3 Adjustment of Skew

Note:

Check if the image adjustment for the equipment is performed properly before this adjustment of the RADF. (See the Service Handbook of applicable equipment.) Also, the RADF position and height shall be adjusted properly.

[A] Checking

Check the image using the chart (original) with vertical and horizontal lines in the following procedure.

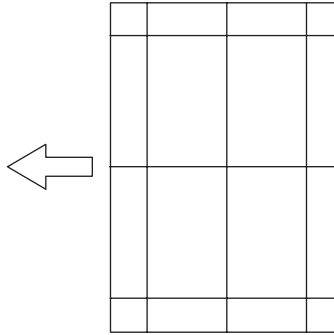


Fig. 5-19 Chart (Original)

- (1) Place the chart provided as an original with its face up on the original tray of the ADF, select [1 Sided -> 1 Sided] and press the [START] button.
- (2) Superimpose the chart on the copy and check the inclination of the copy image.

[B] Adjustment

- (1) Shift the aligning plate with the scale as the guide shown in the figure below to adjust the skew.

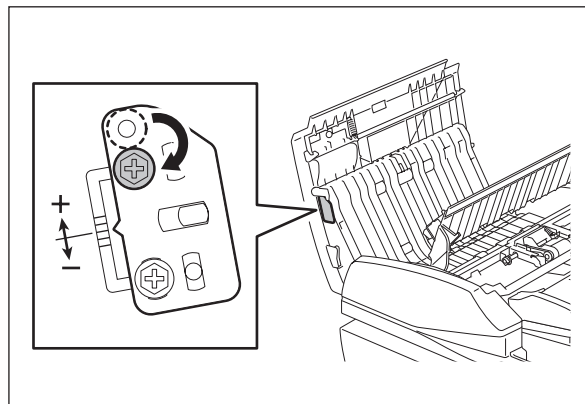


Fig. 5-20

(2) If the image skew is "C" as shown in the figure below, shift the aligning plate in the direction of "+", and if "D", shift it to "-".

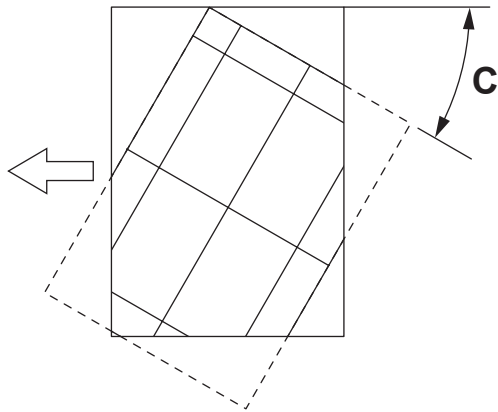


Fig. 5-21

Shift the aligning plate in the direction of "+".

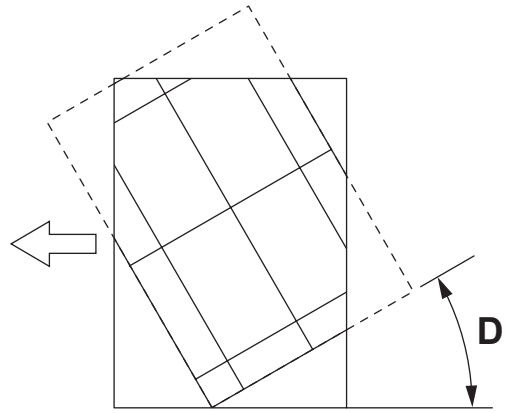


Fig. 5-22

Shift the aligning plate in the direction of "-".

5.4 Adjustment of the Leading Edge Position

Note:

Check if the image adjustment for the equipment is performed properly before this adjustment of the ADF. (See the Service Handbook of applicable equipment.) Also, the ADF position and height shall be adjusted properly.

[A] Checking

Check the image using the chart (original) with vertical and horizontal lines in the following procedure.

- (1) Place the chart provided as an original with its face up on the original tray of the ADF, select [1 Sided -> 1 Sided] and press the [START] button.
- (2) Superimpose the chart on the copy and check the leading edge E of the chart and F of the copy.

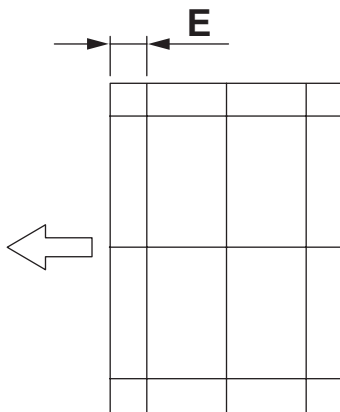


Fig. 5-23 Chart (Original)

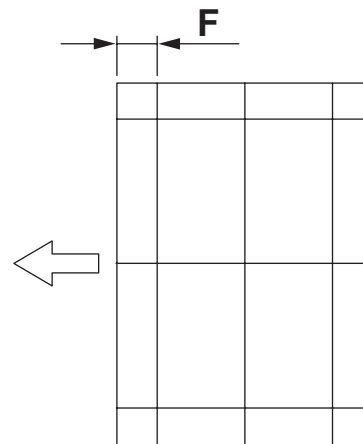


Fig. 5-24 Copy

[B] Adjustment

- (1) Turn the power ON while pressing [0] and [5] simultaneously, key in [365] and then press the [START] button.
- (2) Enter the value.
 - If the leading edge (F) margin of the copy image is larger than the (E) margin of the chart, enter a value smaller than the current one.

Note:

Changing one value shifts the copy image by 0.2 mm.

- If the leading edge (F) margin of the copy image is smaller than the (E) margin of the chart, enter a value larger than the current one.

Note:

Changing one value shifts the copy image by 0.2 mm.

- (3) Press the [INTERRUPT] button.

5.5 Adjustment of Horizontal Position

Note:

Check if the image adjustment for the equipment is performed properly before this adjustment of the ADF. (See the Service Handbook of applicable equipment.) Also, the ADF position and height shall be adjusted properly.

[A] Checking

Check the image using the chart (original) with a center line in the following procedure.

- (1) Place the chart provided as an original with its face up on the original tray of the ADF.
- (2) Press the [START] button.
- (3) Fold the copy in half and check if the center line is misaligned.

[B] Adjustment

- (1) Turn the power ON while pressing [0] and [5] simultaneously.
- (2) Key in [358] and then press the [START] button.
 - If the center line of the copy image is shifted to the front side of the equipment, enter a value larger than the current one.

Note:

Changing one value shifts the copy image by 0.042 mm.

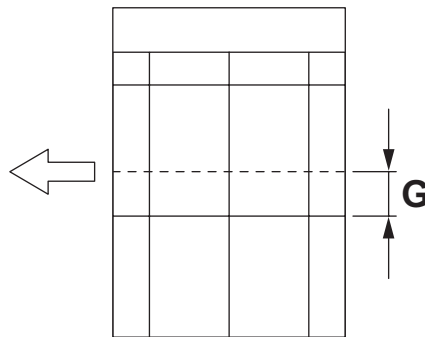


Fig. 5-25

- If the center line of the copy image is shifted to the rear side of the equipment, enter a value smaller than the current one.

Note:

Changing one value shifts the copy image by 0.042 mm.

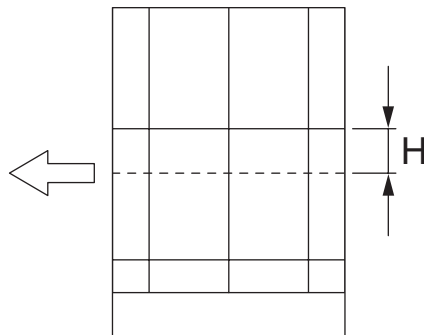


Fig. 5-26

- (3) Press the [INTERRUPT] button.

5.6 Adjustment of Copy Ratio

Note:

Check if the image adjustment for the equipment is performed properly before this adjustment of the ADF. (See the Service Handbook of applicable equipment.) Also, the ADF position and height shall be adjusted properly.

[A] Checking

Check the image using the chart (original) with vertical and horizontal lines in the following procedure.

- (1) Place the chart provided as an original with its face up on the original tray of the ADF.
- (2) Press the [START] button.
- (3) Superimpose the chart on the copy and check the image dimension "l".

[B] Adjustment

- (1) Turn the power ON while pressing [0] and [5] simultaneously.
- (2) Key in [357] and then press the [START] button.
 - If the copy image dimension "l" is larger than the chart dimension, enter a value smaller than the current one.
 - If the copy image dimension "l" is smaller than the chart dimension, enter a value larger than the current one.

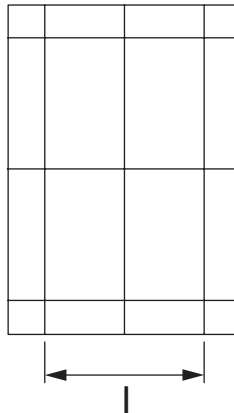


Fig. 5-27

- (3) Press the [INTERRUPT] button.

5.7 Adjustment of ADF Opening/Closing Sensor

Adjust the bracket position so that the sensor is turned ON when the height "A" becomes 100 mm or less (within the empty weight falling limit).

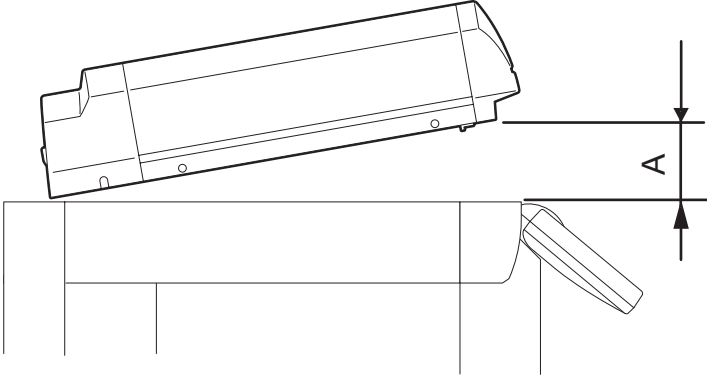


Fig. 5-28

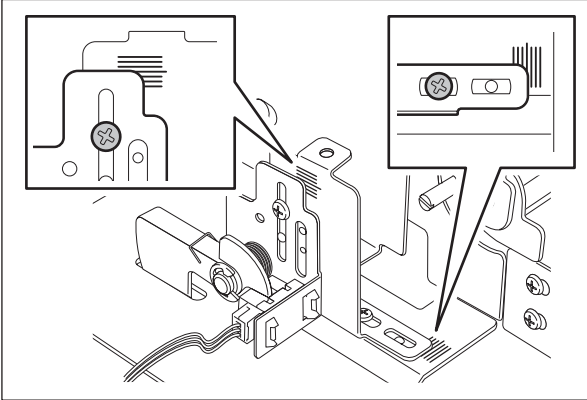


Fig. 5-29

6. TROUBLESHOOTING

6.1 Troubleshooting for Mechanical Errors

- 1) Multiple originals are transported simultaneously
Original abnormally curled or folded?
↓ YES→ Flatten the original and set it again
NO
Separation roller is dirty?
↓ YES→ Clean the roller with alcohol
NO
Replace the separation rollers with new ones

- 2) Original is not transported to registration roller
Original thicker than specified?
↓ YES→ Use originals with permissible thickness.
↓ Place thick originals manually on the platen cover to make a copy
NO
Pickup roller and feed roller are dirty?
↓ YES→ Clean the rollers with alcohol
NO
Transport power of pickup roller and feed roller is weak?
↓
YES
Replace the rollers with new ones

- 3) Leading edge of original is skewed
Front and rear protrusions at bottom of ADF are out of contact with glass?
↓ YES→ Adjust the height of the left hinge
NO
Transport rollers are dirty?
↓ YES→ Clean the rollers with alcohol
NO
Is the right hinge out of place?
↓
YES
Make a copy and adjust the position of the hinge

- 4) Edges of original and copied image are not aligned
Width between slides too wide compared to that of original?
↓ YES→ Move the slides so that they contact the edges of the original
NO
Check the scanner adjustment

- 5) Black streaks appear on copied image
ADF original glass is dirty?
↓ YES→ Clean the glass with a dry/squeezed cloth
NO
Check the scanner unit

6.2 Troubleshooting for Electrical Errors

- 1) ADF does not work (except in the case of a paper jam or when the cover is open)
 - Interface harness connected properly?
 - ↓ NO→ Connect the harness properly or replace it
 - YES
 - DC+5V supplied to CN70-2, 3pin?
 - ↓ NO→ Connect the harness properly or replace it
 - YES
 - DC+24V supplied to CN70-6, 7pin?
 - ↓ NO→ Connect the harness properly or replace it
 - YES
 - DC+24V supplied to CN72-4pin?
 - ↓ NO→ Check or replace the jam access cover switch
 - YES
 - Empty sensor is ON when there is paper?
 - ↓ NO→ Check or replace the empty sensor
 - YES
 - Check or replace the ADF board

- 2) Abnormality of motor
 - Power supplied and drives signals to connector of motor?
 - ↓ NO→ Check or replace motor
 - YES
 - There is no mechanical overloading at the motor and the drive system is correct? (Belt tension etc.)
 - ↓ NO→ Check or replace motor harness
 - YES
 - Check or replace the RADF board

- 3) Communication error
 - Interface cable normal?
 - ↓ NO→ Replace the interface cable
 - YES
 - Check or replace the ADF board and check the equipment

- 4) Size detection error
 - Is the sensor harness normal, and is it connected to the connector (CN73) properly?
 - ↓ NO→ Connect the harness to the connector properly or replace it.
 - YES
 - Are the original tray width sensor and original tray sensor normal?
 - ↓ NO→ Check the original tray width sensor and original tray sensor or replace them.
 - YES
 - Check the ADF board or replace it.

6.3 Jam

Jam not reaching the original registration sensor

- 1) Clean the pickup roller, feed roller and separation roller if they are stained.
- 2) Flatten the original if it is folded or excessively curled and place it again.
- 3) Is the original registration sensor working? (Perform the input check)
 - * If it is working properly, proceed to 7. If not, check 4 to 6.
- 4) Check if the connector CN74 on the RADF board is disconnected from the original registration sensor or the harnesses are open circuited. Correct if any.
- 5) Replace the original registration sensor.
- 6) Replace the RADF board.
- 7) Is the original pickup solenoid working?
 - * If it is working properly, proceed to 12. If not, check 8 to 11.
- 8) Check if the solenoid is installed at the center of the scale. (The scale is longer in the center.)
- 9) If it is not, correct the position, aligning with the center of the scale.
- 10) Check if the connector CN79 on the RADF board is disconnected from the original pickup solenoid or the harnesses are open circuited. Correct if any.
- 11) Replace the original pickup solenoid.
- 12) Replace the RADF board.
- 13) Replace the pickup roller, feed roller and separation roller if they are worn out.

Feed signal reception jam

- 1) Is the empty sensor working? (Perform the input check)
- 2) Check if the lever of empty sensor is working normally.
- 3) Check if the connector CN75 on the RADF board is disconnected from the empty sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the empty sensor.
- 5) Replace the RADF board.

Jam not reaching the read sensor

- 1) Clean the registration roller and the read roller if they are stained.
- 2) Is the read sensor working? (Perform the input check)
 - * If it is working properly, proceed to 6. If not, check 3 to 5 below.
- 3) Check if the connector CN75 on the RADF board is disconnected from the read sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the read sensor.
- 5) Replace the RADF board.
- 6) Replace the registration roller and the read roller if they are worn out.

Jam not reaching the exit sensor (during scanning)

- 1) Clean the read roller if it is stained.
- 2) Is the original exit sensor working? (Perform the input check)
 - * If it is working properly, proceed to 6. If not, check 3 to 5 below.
- 3) Check if the connector CN75 on the RADF board is disconnected from the original exit sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the original exit sensor
- 5) Replace the RADF board.
- 6) Replace the read roller if it is worn out.

Stop jam at the registration sensor

- 1) Clean the registration roller if it is stained.
- 2) Is the registration sensor working? (Perform the input check)
* If it is working properly, proceed to 6. If not, check 3 to 5 below.
- 3) Check if the connector CN74 on the RADF board is disconnected from the registration sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the registration sensor.
- 5) Replace the RADF board.
- 6) Replace the registration roller if it is worn out.

Stop jam at the read sensor

- 1) Clean the read roller if it is stained.
- 2) Is the read sensor working? (Perform the input check)
* If it is working properly, proceed to 6. If not, check 3 to 5 below.
- 3) Check if the connector CN75 on the RADF board is disconnected from the read sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the read sensor.
- 5) Replace the RADF board.
- 6) Replace the read roller if it is worn out.

Stop jam at the exit sensor

- 1) Clean the exit roller if it is stained.
- 2) Is the original exit/reverse sensor working? (Perform the input check)
* If it is working properly, proceed to 6. If not, check 3 to 5 below.
- 3) Check if the connector CN4 on the RADF board is disconnected from the original exit/reverse sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the original exit/reverse sensor.
- 5) Replace the RADF board.
- 6) Replace the exit roller if it is worn out.

RADF jam access cover open

- 1) Close the RADF jam access cover if it is opened. Remove if there is any original before closing it.
- 2) Is the RADF jam access cover switch working? (Perform the input check)
* If it is working properly, proceed to 6. If not, check 3 to 5 below.
- 3) Check if the connector CN72 on the RADF board is disconnected from the RADF jam access cover opening/closing switch or the harnesses are open circuited. Correct if any.
- 4) Replace the RADF jam access cover opening/closing switch.
- 5) Replace the RADF board.

RADF open jam

- 1) Close the RADF if it is opened. Remove if there is any original before closing it.
- 2) Is the RADF opening/closing sensor working? (Perform the input check)
* If it is working properly, proceed to 6. If not, check 3 to 5 below.
- 3) Check if the connector CN75 on the RADF board is disconnected from the RADF opening/closing sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the RADF opening/closing sensor.
- 5) Replace the RADF board.
- 6) Is the RADF opening/closing sensor adjusted within the specified range?

Cover open jam in the read ready status

- 1) Close the RADF jam access cover or the front cover if they are opened in the read ready status.
- 2) Is the RADF jam access cover sensor working? (Perform the input check)
- 3) Check if the connector CN75 on the RADF board is disconnected from the RADF jam access cover sensor or the harnesses are open circuited. Correct if any.
- 4) Replace the RADF jam access cover sensor.
- 5) Replace the RADF board.

7. MAINTENANCE AND REWRITING ROM

7.1 Periodic Maintenance

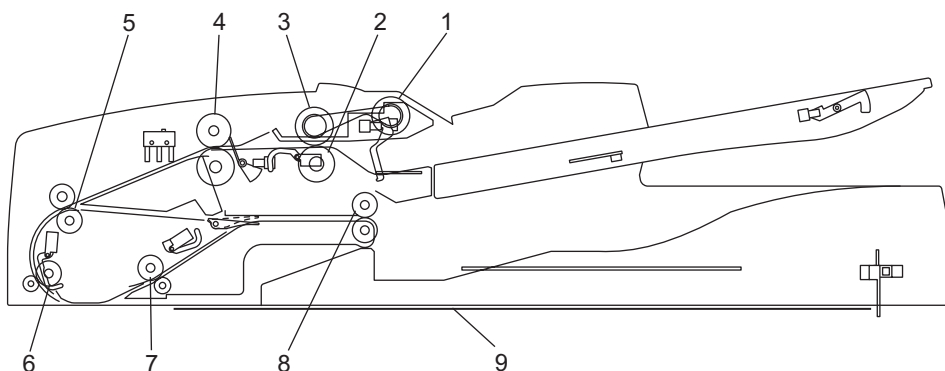


Fig. 7-1

Symbols used in the checklist

Cleaning	Lubrication/Coating	Replacement	Operation check
A: Clean with alcohol B: Clean with soft pad, cloth or vacuum cleaner	L: Launa 40 SI: Silicon oil W: White grease (Molykote X5-6020) AV: Alvania No.2	The number of sheets consumed before replacement (Value x 1,000). R: Replace if deformed or damaged	O: After cleaning or replacement, confirm there is no problem

Preventive Maintenance Checklist

Note:

Page-Item (P-I) is described in the column of the Parts list.

Item to check	Cleaning	Lubrication/Coating	Replacement (x1,000)	Operation check	Parts list (P-I)	Remarks
1 Pickup roller	A		90		5-1	
2 Separation roller	A		90		4-10	
3 Feed roller	A		90		5-1	
4 Registration roller	A					
5 Intermediate transfer roller	A					
6 Front read roller	A					
7 Rear read roller	A					
8 Exit/reverse roller	A					
9 Platen sheet	B or A					



7.2 Rewriting ROM (Firmware Updating)

It is feasible to update the firmware automatically by connecting the download jig to the PC board and turning the power of the equipment ON. The download jig K-PWA-DLM-320 is used.

< Procedure >

- (1) Turning OFF the power of the equipment and take off the ADF rear cover.
 - (2) Connect the download jig with the connector (CN81) on the PC board.
 - (3) While pressing [0] and [8] simultaneously, turn ON the power. (rewriting data starts)
 - (4) During the data is rewritten, the LED on the download jig lights. When the data rewriting is completed, the LED blinks slowly (at an interval of 0.8 sec.). If the LED blinks fast (at an interval of 0.1 sec.), the rewriting has been failed.
 - (5) Turn OFF the power of the equipment and remove the download jig.
 - (6) Install the ADF rear cover.
- * If rewriting data is failed, turn OFF the power and repeat the procedure.

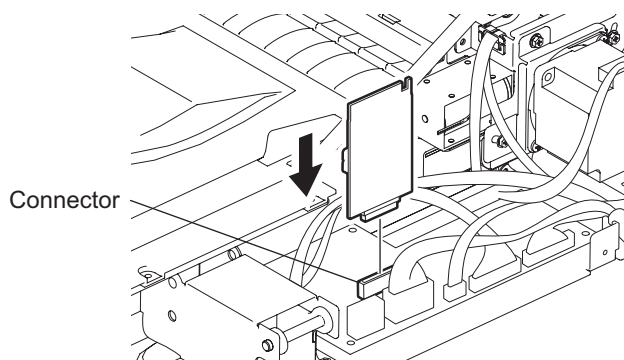


Fig. 7-2

8. CIRCUIT DIAGRAM / HARNESS DIAGRAM

8.1 Assembly of PC Board

- Component side

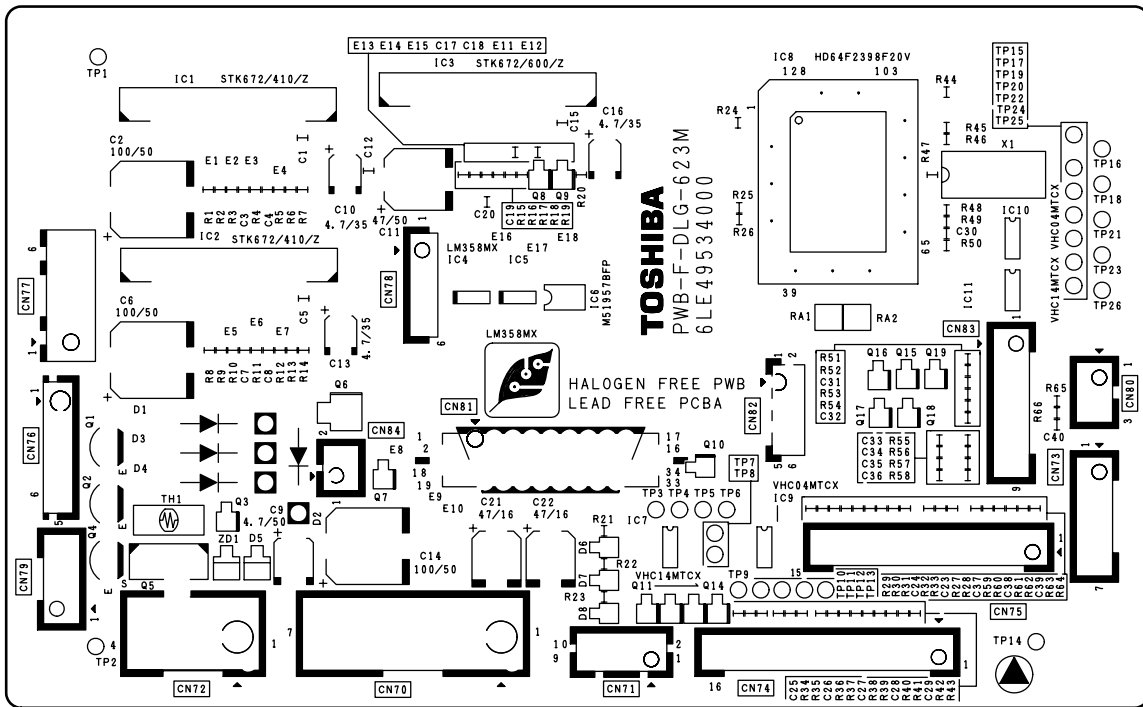


Fig. 8-1

- Soldered side

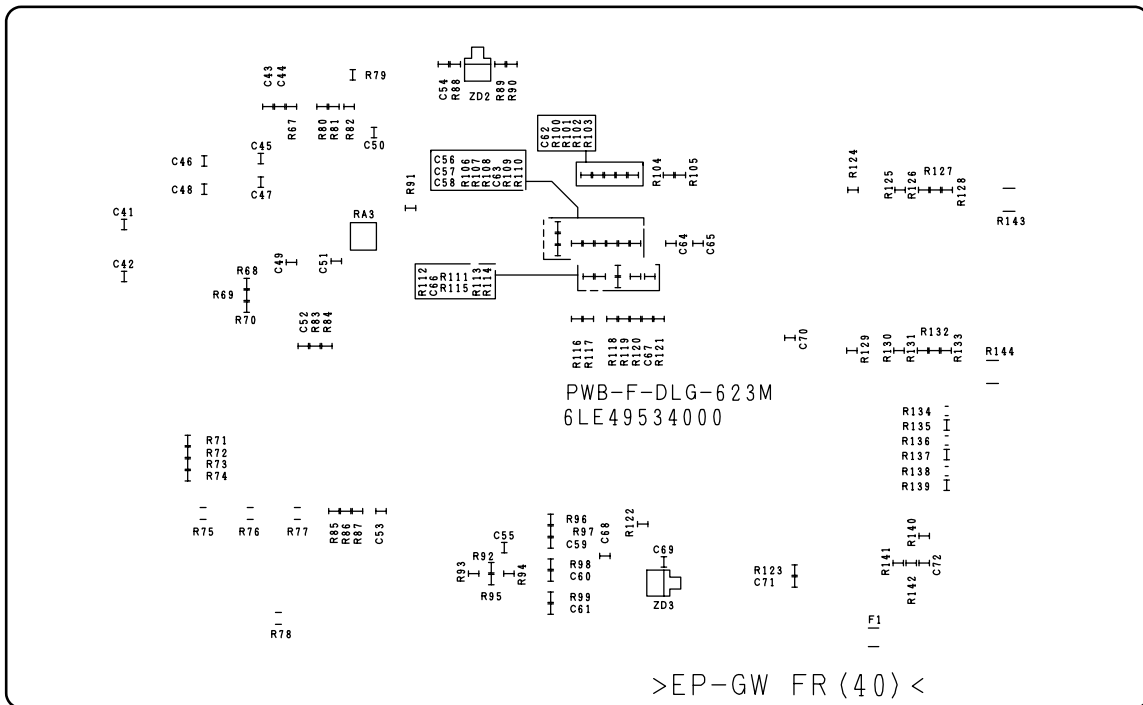


Fig. 8-2



8.2 Circuit Diagram

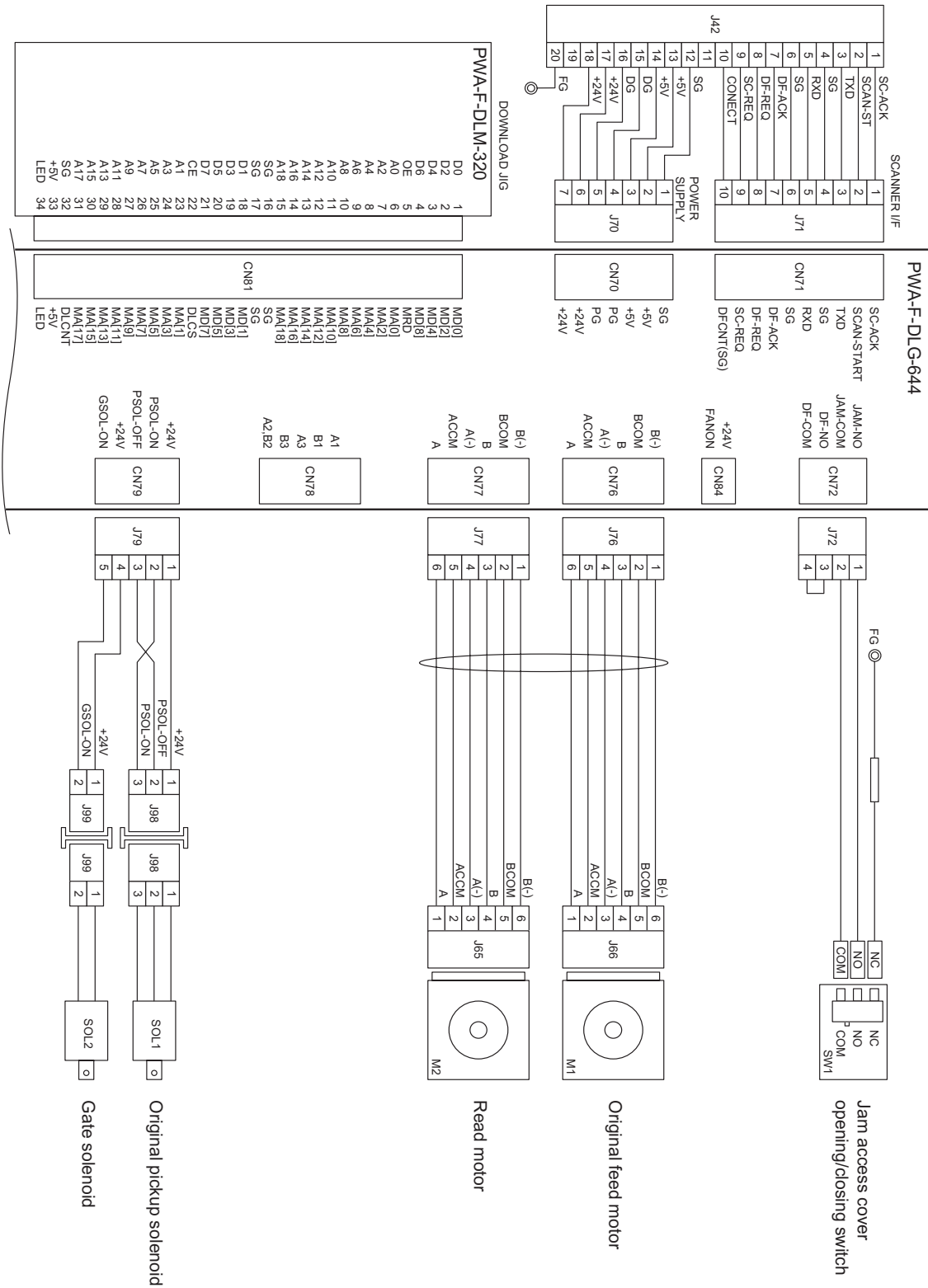


Fig. 8-3

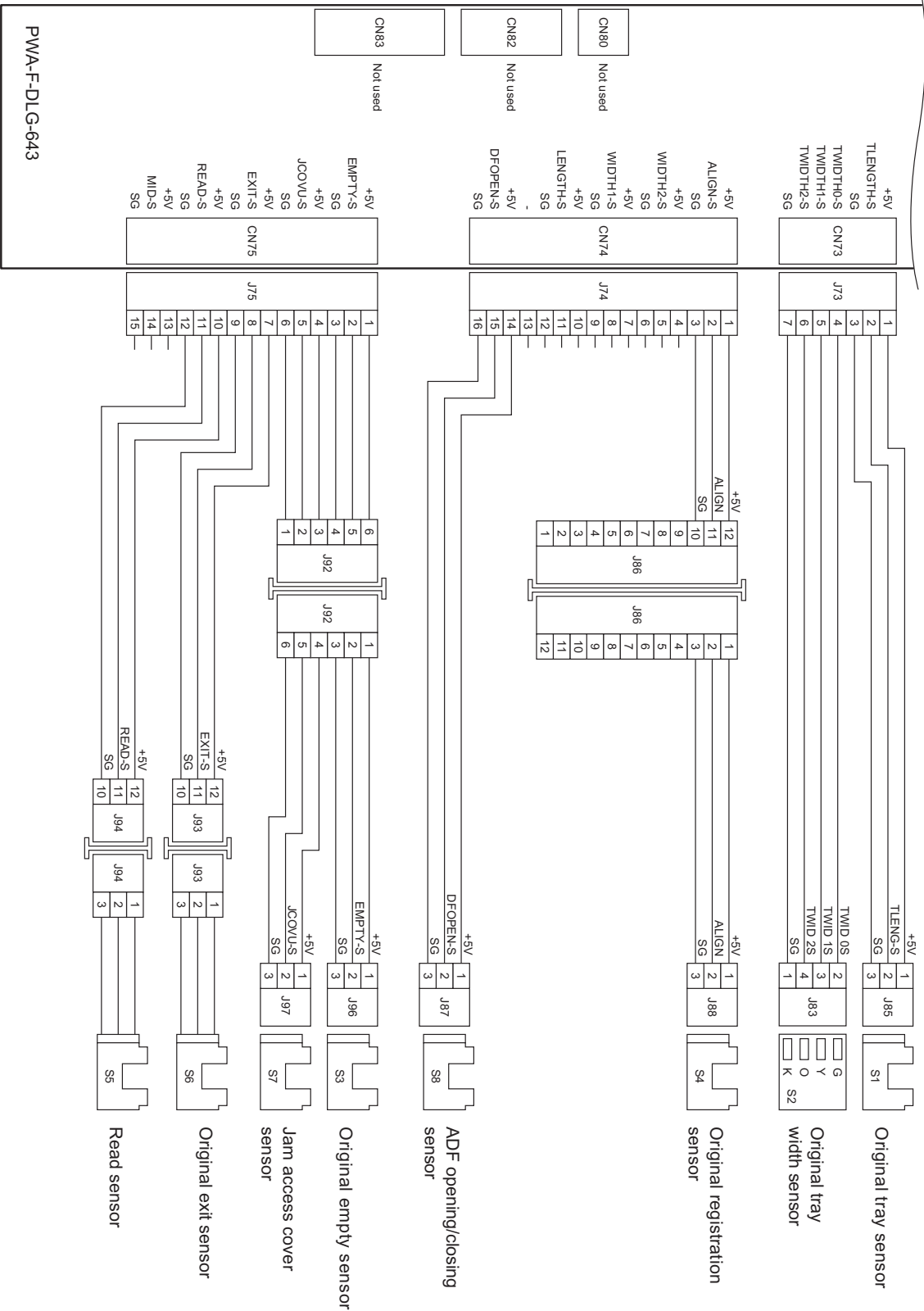


Fig. 8-4

8.3 Control PC Board Circuit

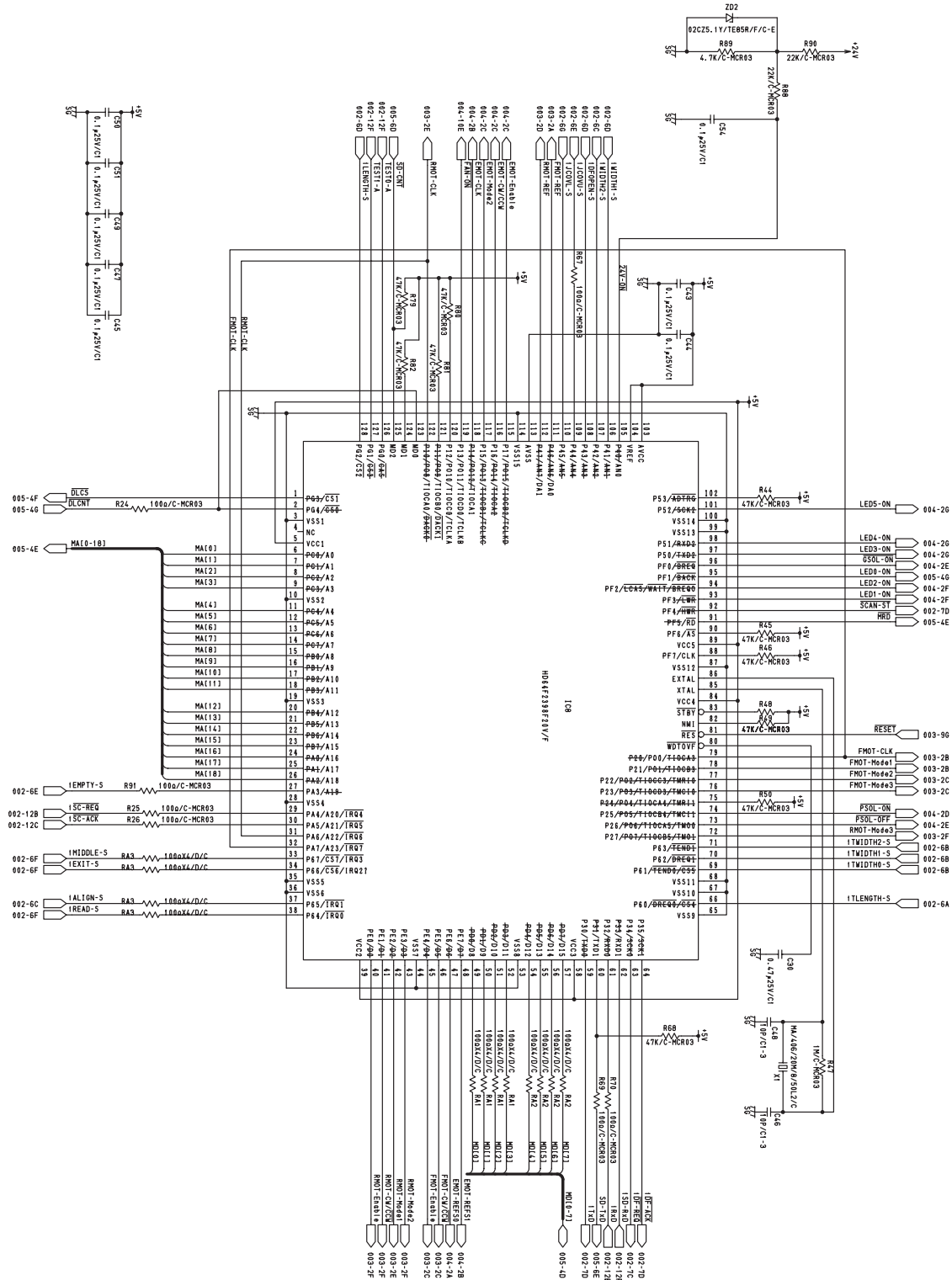


Fig. 8-5

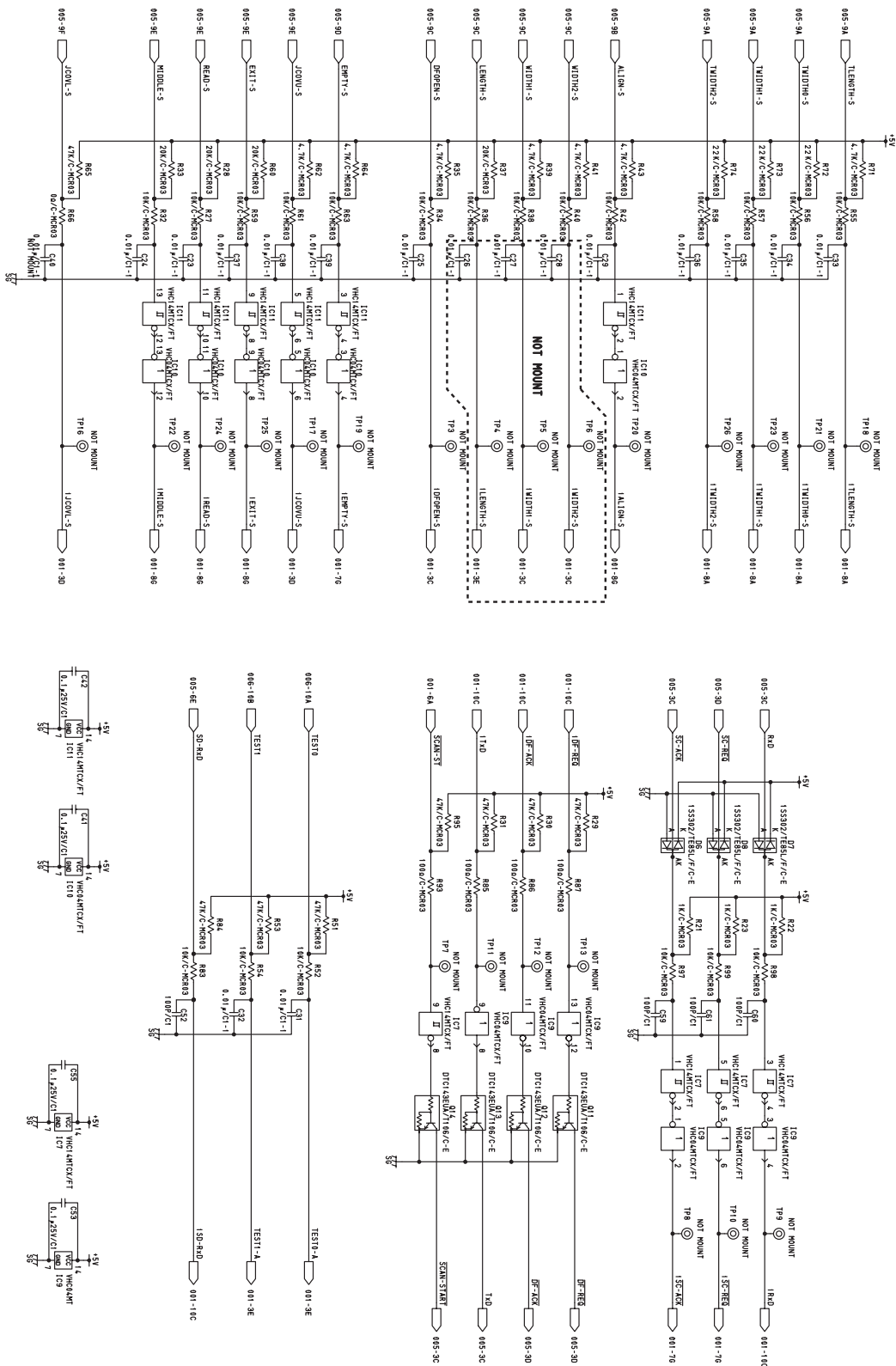


Fig. 8-6

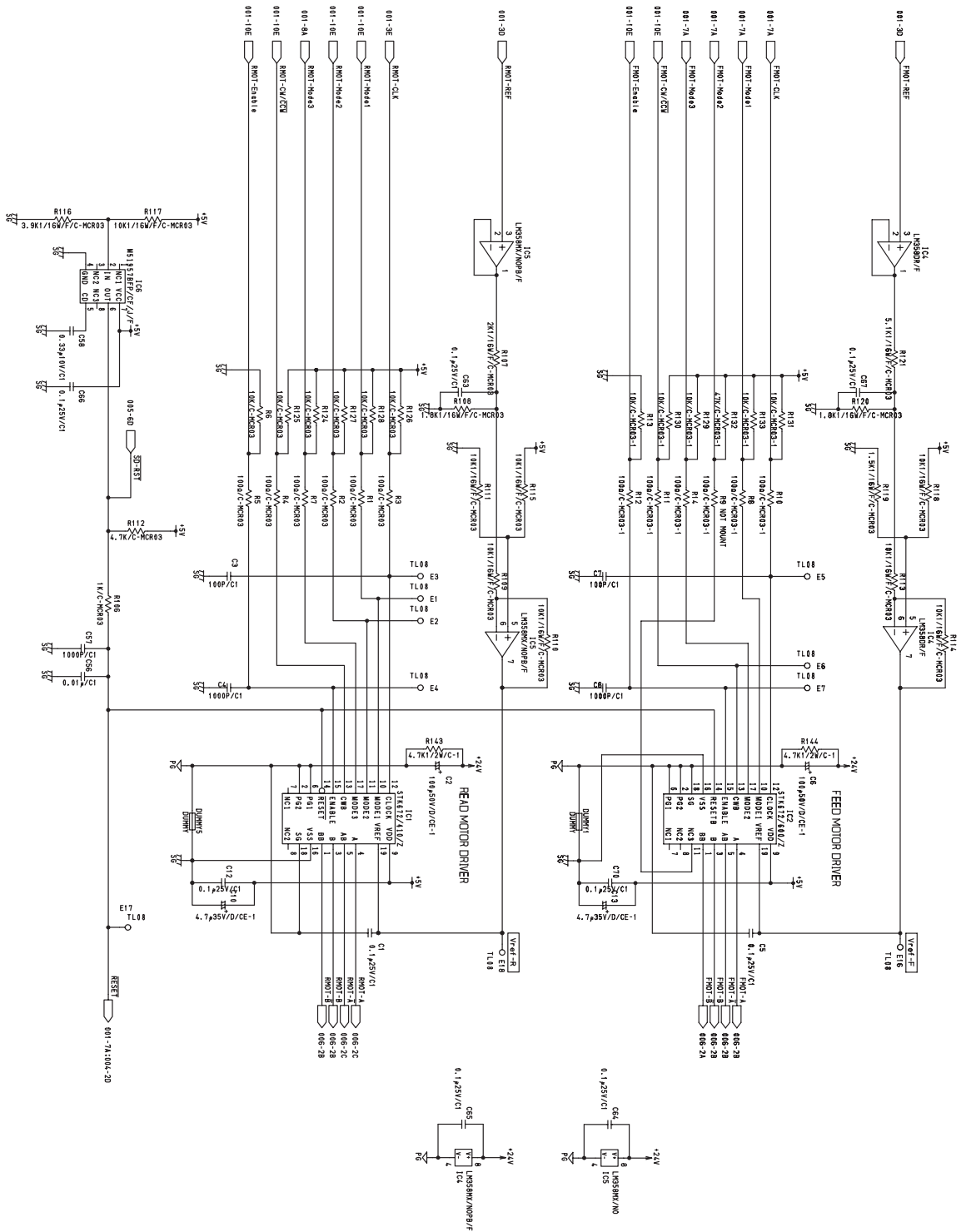


Fig. 8-7

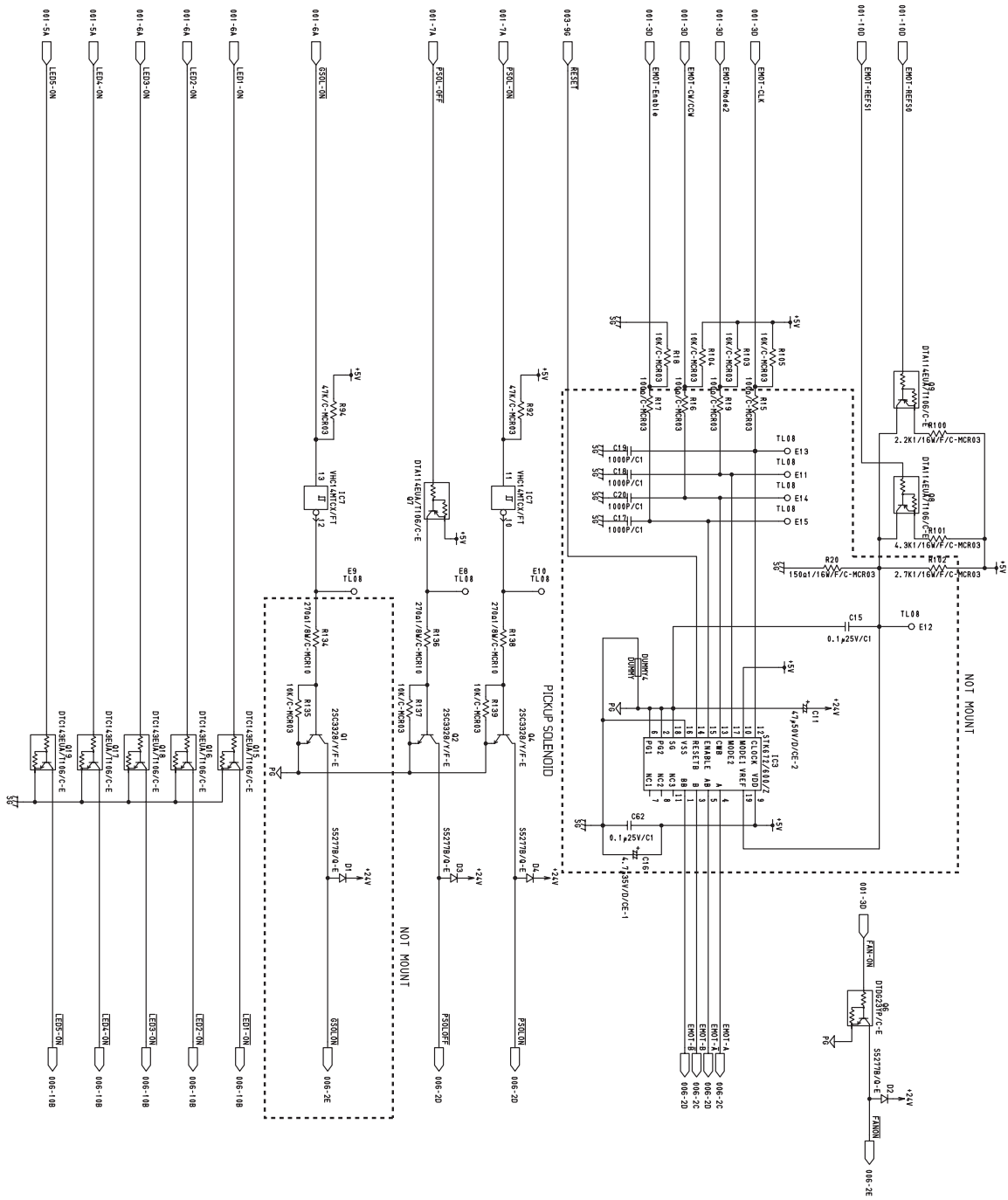


Fig. 8-8

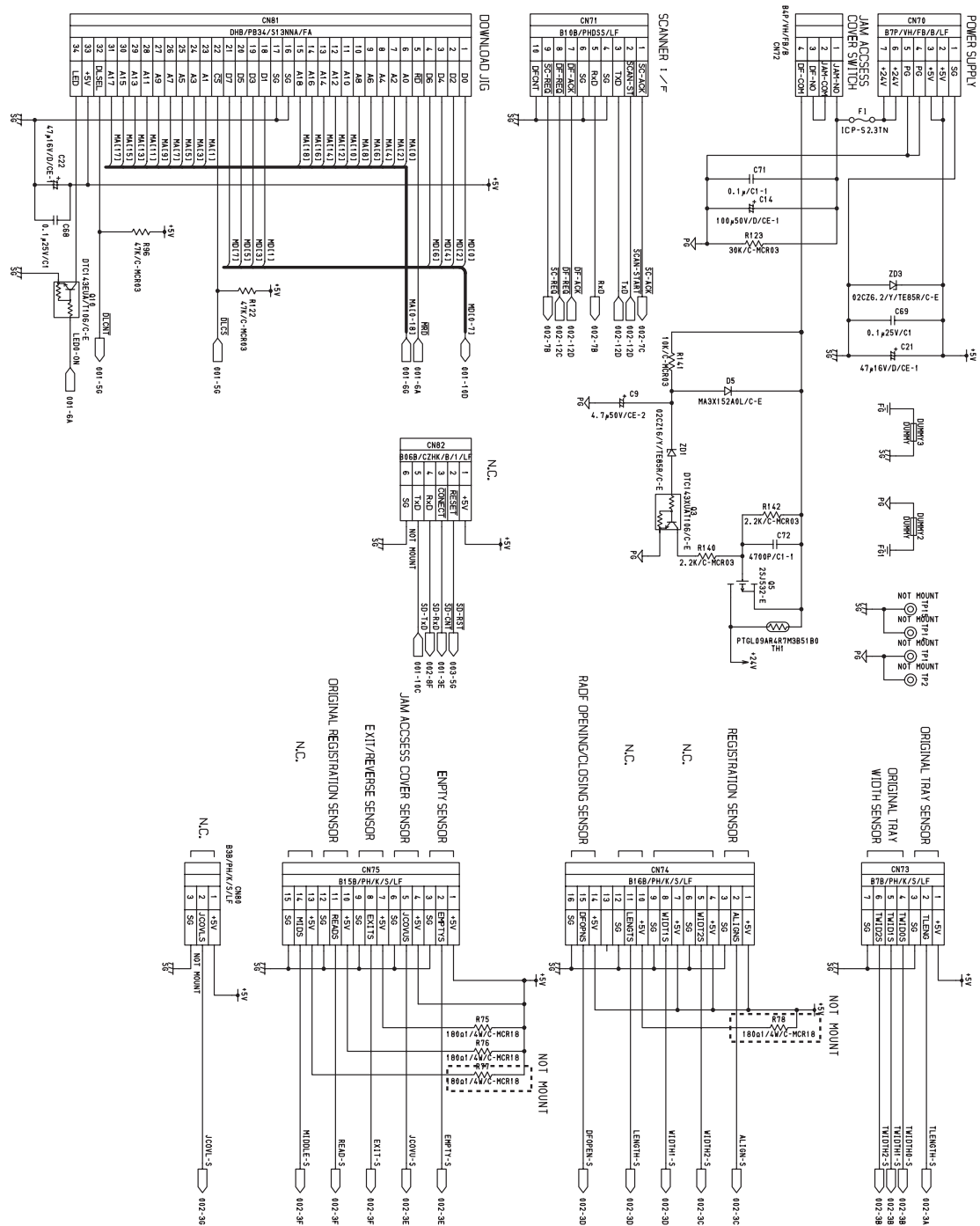


Fig. 8-9

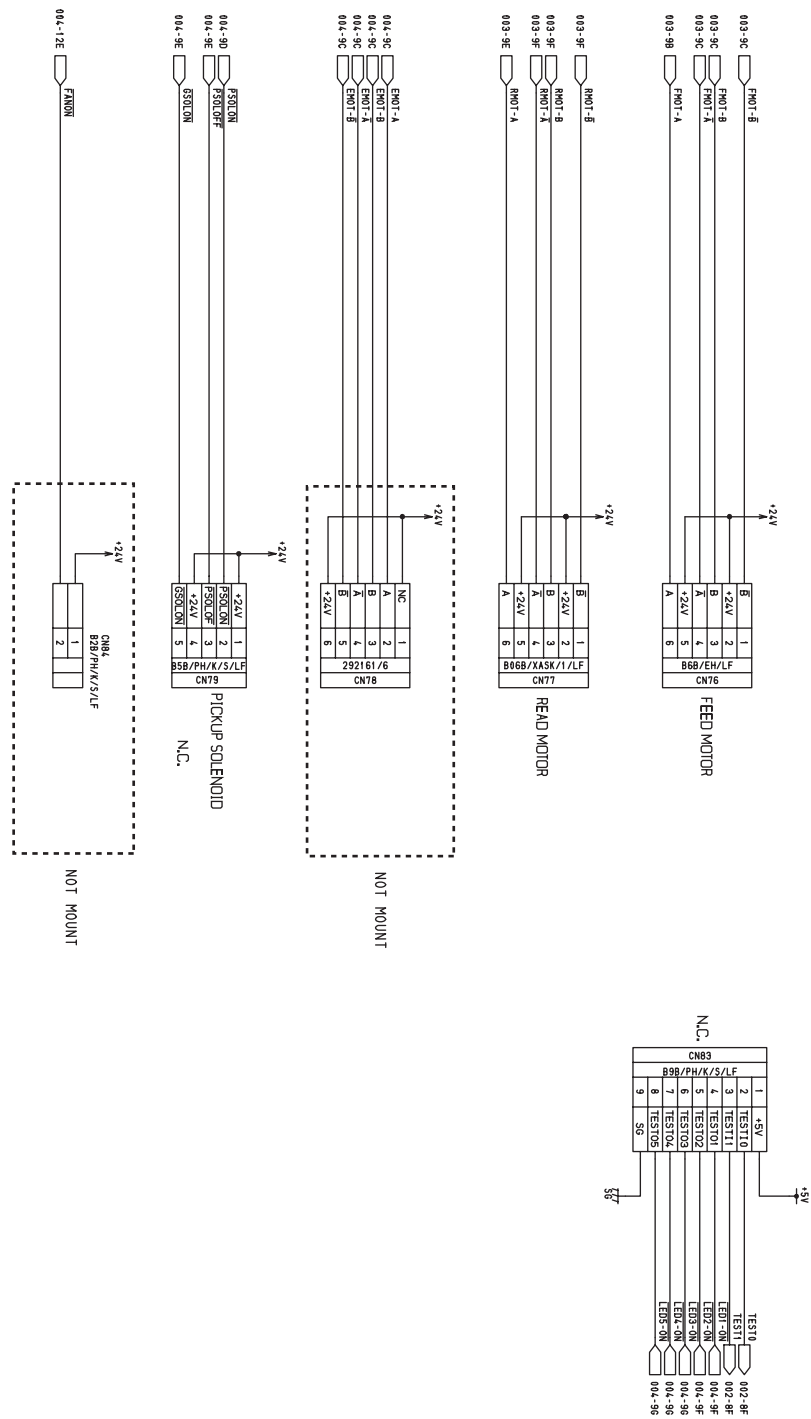


Fig. 8-10

TOSHIBA

TOSHIBA TEC CORPORATION

2-17-2, HIGASHIGOTANDA, SHINAGAWA-KU, TOKYO, 141-8664, JAPAN

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