CHAPTER 11: FB ORIGINAL SCANNING SECTION

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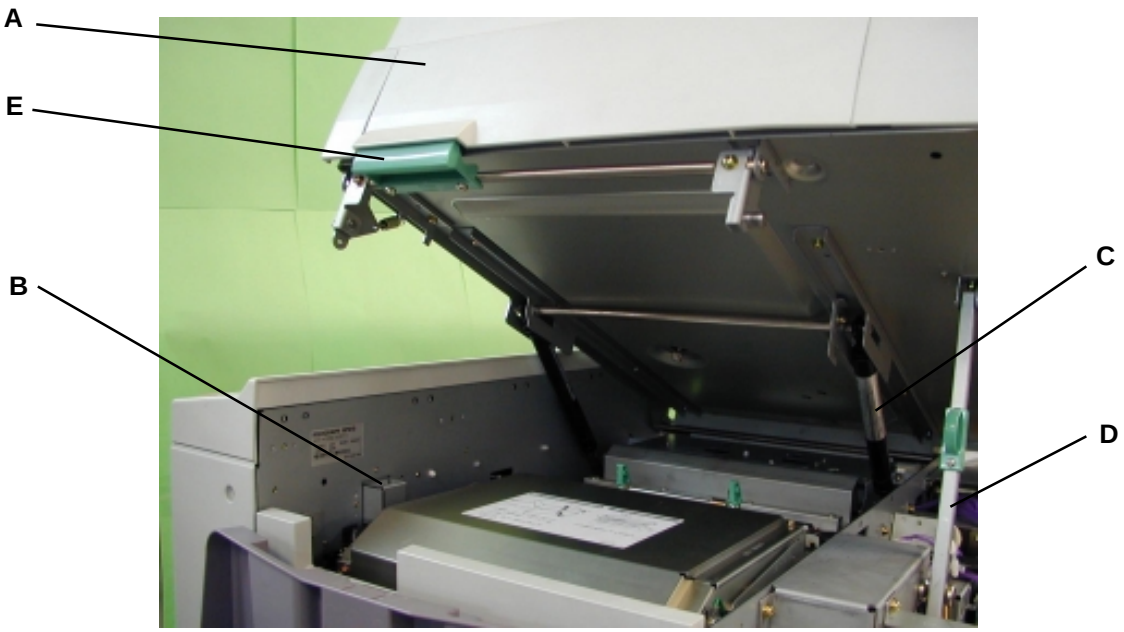
Mechanism

1. Scanner Table Setting System

The Flat bed set switch [B] checks whether or not the Scanner table [A] has been set correctly.

This switch also acts as a Safety switch, which cuts the power supply to the main motor and clamp motor, and thermal power to the TPH if the scanner table is open.



A: Scanner table
B: Flat bed set switch
C: Damper spring
D: Scanner unit support shaft
E: Scanner table open lever

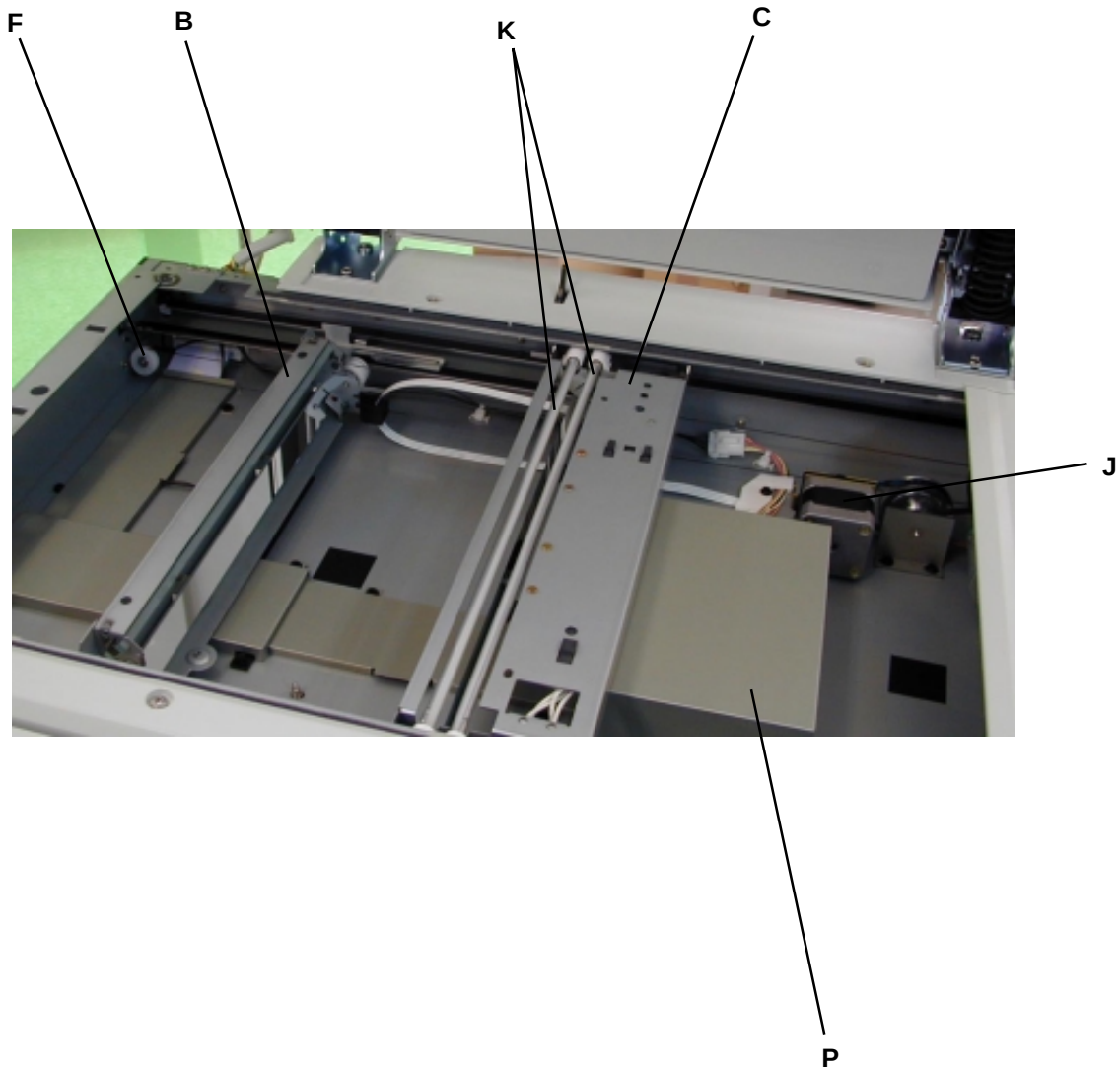
[Memo]

2. Original Scanning Mechanism

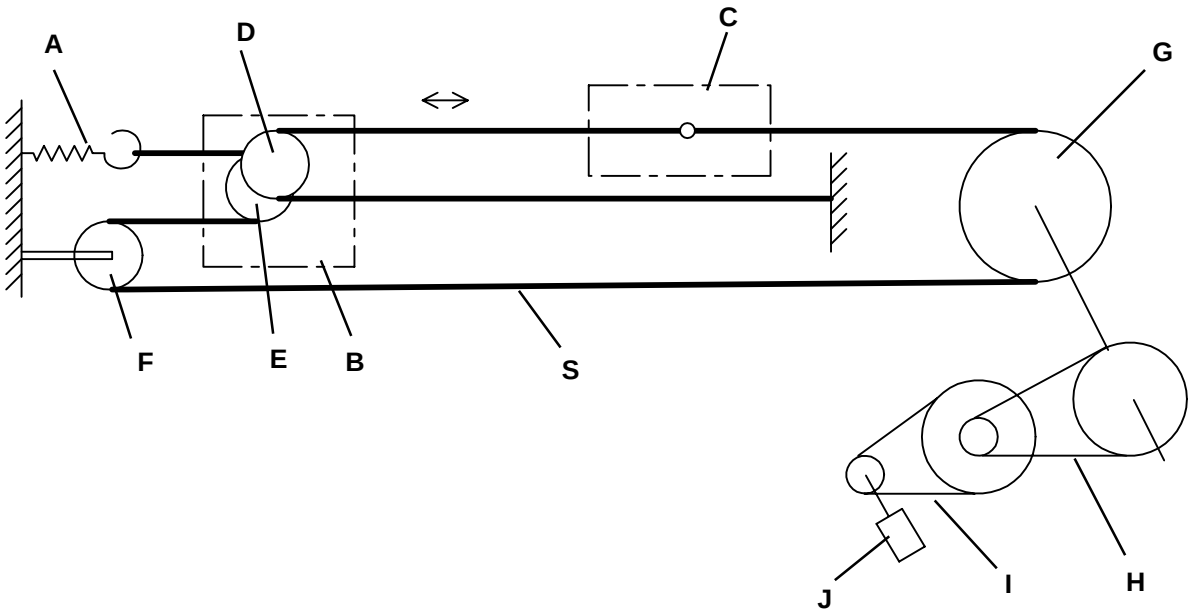
The FB read pulse motor [J] drives the front and rear Wire spool pulleys [G] via the 2-stage reduction pulleys linked by the Timing belts [H], [I]. The front and rear wire spool pulleys are configured symmetrically.

The wire [S] has one end secured to the frame via Coil spring [A], and is wound onto Sliding pulley No. 2 [E] mounted on the Mirror carriage [B]. It is wound approximately 6.5 times around the rear wire spool pulley [G] via the Fixed pulley [F] secured to the frame. It is then attached to the Lamp carriage [C] and then secured to the frame via Sliding pulley No. 1 [D] mounted on the Mirror carriage [B]. The Lamp carriage [C] carries two original illumination Lamps [K] (and lamp inverters) and Mirror No. 1 [M], and the mirror carriage carries the two mirrors [N], [O].

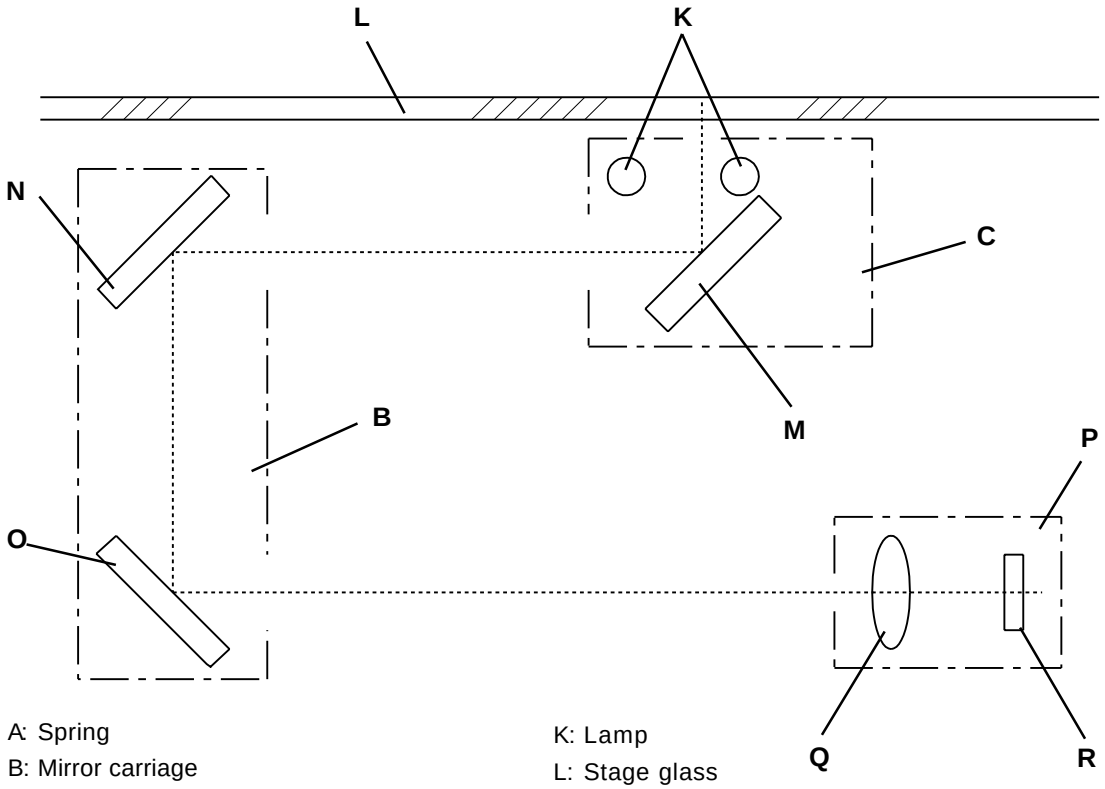
The mechanism uses a “full/half-rate mirror scanning” system, in which the mirror carriage moves 1/2 L mm as the lamp carriage moves L mm in the same direction. This means that when the FB read pulse motor [J] is activated, the original surface can be scanned while maintaining a constant distance between the original and the center of the lens mounted on the frame. The original on the scanner table illuminated by the lamp is reflected via mirrors No. 1, 2, and 3, and is then focused onto the CCD [R] by the lens [Q] in the lens ass’y [P].



Drive system diagram



Optical system diagram



A: Spring
B: Mirror carriage
C: Lamp carriage
D: Sliding pulley No. 1
E: Sliding pulley No. 2
F: Fixed pulley
G: Wire spool pulley
H: Scanner timing belt 1
I: Scanner timing belt 2
J: Flat bed read pulse motor
K: Lamp
L: Stage glass
M: Mirror No. 1
N: Mirror No. 2
O: Mirror No. 3
P: Lens ass'y
Q: Lens
R: CCD
S: Wire

3. Flat Bed Initialization Movement

Initialization is performed in the following situations to bring the flat bed unit to standby mode.

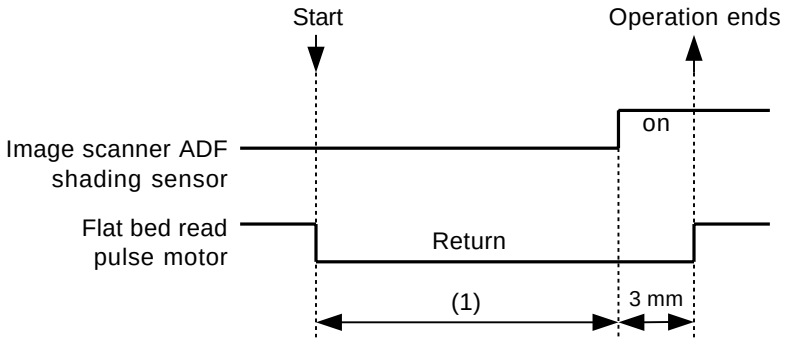
- When power is switched on
- When everything has been reset

Initialization operation

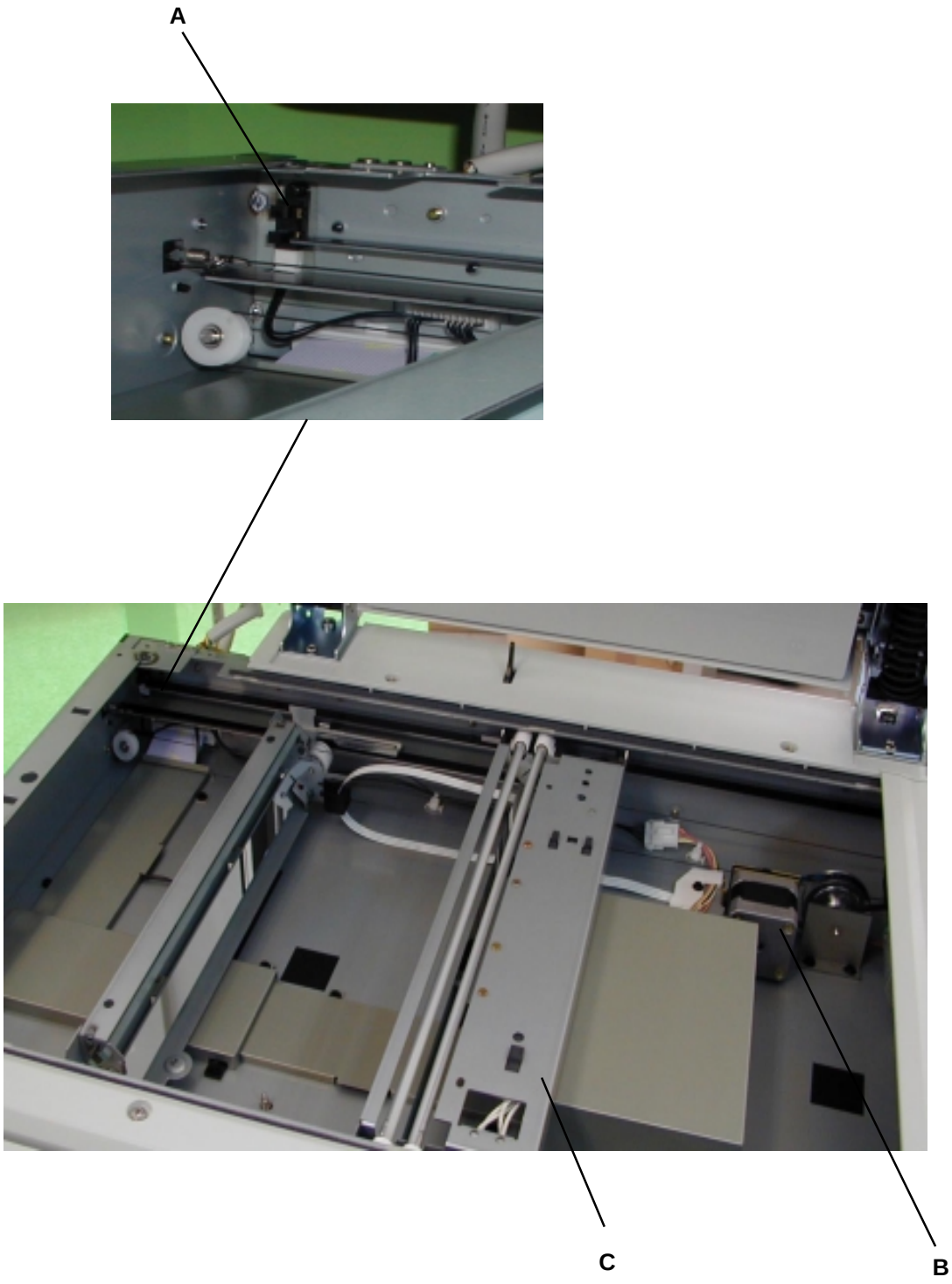
The Image scanner ADF shading sensor [A] is checked, and if it is OFF (light path open), the Flat-bed read pulse motor [B] is activated in the return direction until the light path is blocked, and moves the Lamp carriage [C] towards the left in the photograph. Once the image scanner ADF shading sensor is ON (blocked), it is moved a further 3 mm before the operation ends. (This position is the “standby position”.) The actuator plate of the image scanner ADF shading sensor is fixed to the lamp carriage.

No movement is made when the image scanner ADF shading sensor is ON (blocked).

When image scanner ADF shading sensor is OFF



(1) If the image scanner ADF shading sensor does not switch to ON when the flat bed read pulse motor is moved 487 mm in the return direction, the flat bed read pulse motor is assumed to be locked, and “T14-100” is displayed.



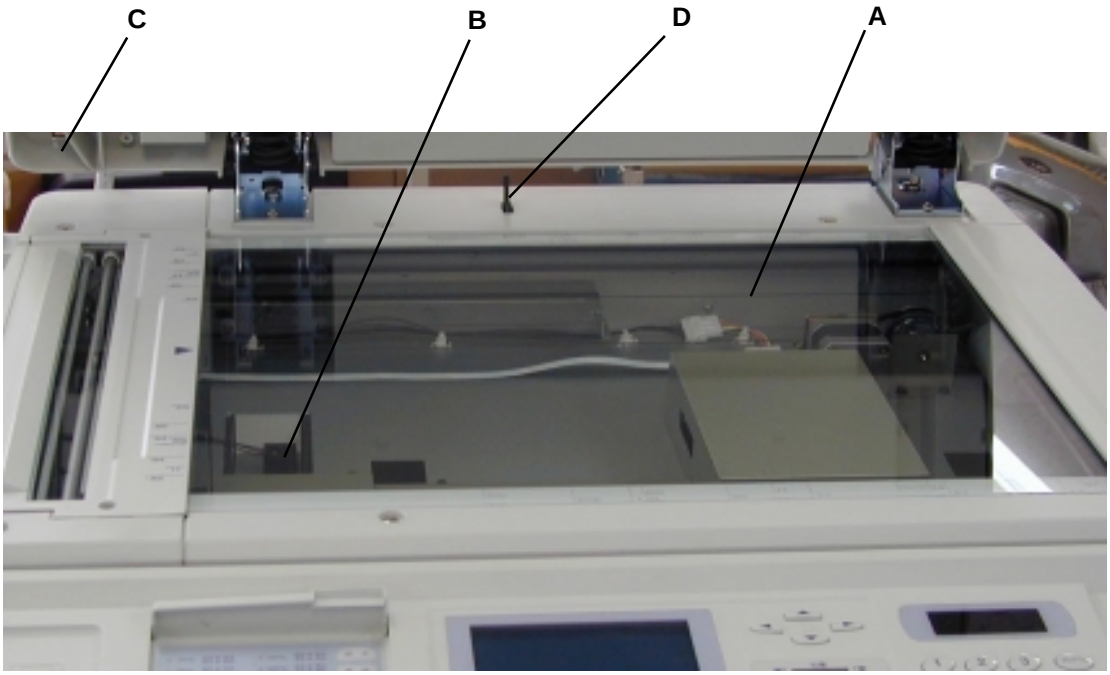
A: Image scanner ADF shading sensor
B: Flat bed read pulse motor
C: Lamp carriage

4. Stage Glass Original Detection System

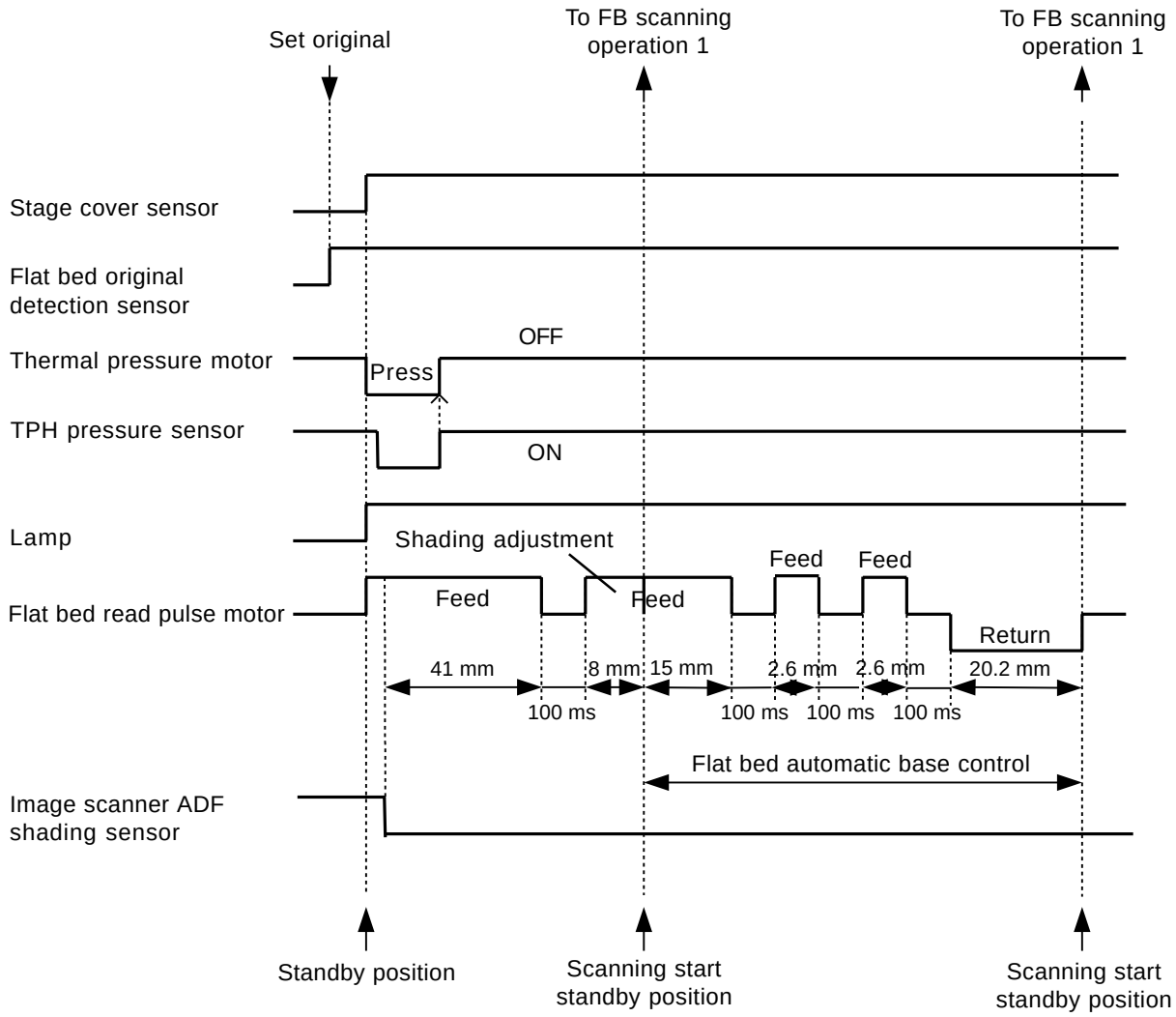
The Flat bed original detection sensor [B] checks whether an original is placed on the Stage glass [A]. The Flat bed original detection sensor [B] performs its check as soon as the Stage cover [C] is closed halfway, blocking the light path to the Stage cover sensor [D].

If the light path to the Flat bed original detection sensor [B] is open (original present), the Master-Making/ Print indication on the panel switches to “Master-Making”, and the thermal pressure motor is activated to lower the thermal head until the TPH pressure sensor switches ON.

At the same time, the lamp illuminates until the shading compensation is made (automatic base control operation is also performed if original scanning intensity is set to “Auto”), and the lamp carriage returns to the scanning start standby position and waits. If START key is not pressed within 60 seconds, the lamp turns off and the lamp carriage returns to the standby position.



A: Stage glass
B: Flat bed original detection sensor
C: Stage cover
D: Stage cover sensor

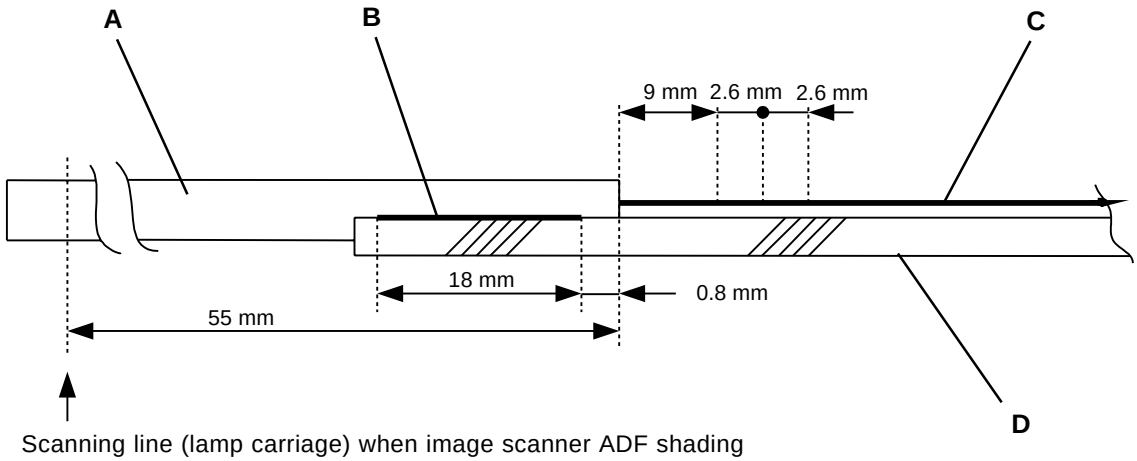

Set original
To FB scanning operation 1
To FB scanning operation 1
Stage cover sensor
Flat bed original detection sensor
Thermal pressure motor
OFF
Press
TPH pressure sensor
ON
Lamp
Shading adjustment
Feed
Feed
Feed
Feed
Flat bed read pulse motor
Return
41 mm
8 mm
15 mm
2.6 mm
2.6 mm
20.2 mm
100 ms
100 ms
100 ms
100 ms
Flat bed automatic base control
Image scanner ADF shading sensor
Standby position
Scanning start standby position
Scanning start standby position

5. Flat Bed Automatic Base Control

This operation is performed after the shading compensation for line mode only when the original scanning density is set to “Auto”. (It is not performed in photo, line/photo, dot, and book modes.)

When the START key is pressed, the lamp illuminates, and the flat bed read pulse motor activates in the scanning direction. It moves 41 mm after the image scanner ADF shading sensor switches from ON to OFF, and then pauses for a set period. Shading compensation is then performed while it moves 8 mm, and it then moves 15 mm (9 mm from the leading edge of the original) before the image sensor scans the surface density of the original. After this, the lamp carriage moves approximately 2.6 mm twice and scans the surface density of the original. (Total 3 times)

The flat bed read pulse motor then operates in reverse (in the return direction) to return the lamp carriage to the scanning start standby position, and proceeds to FB scanning operation 1.



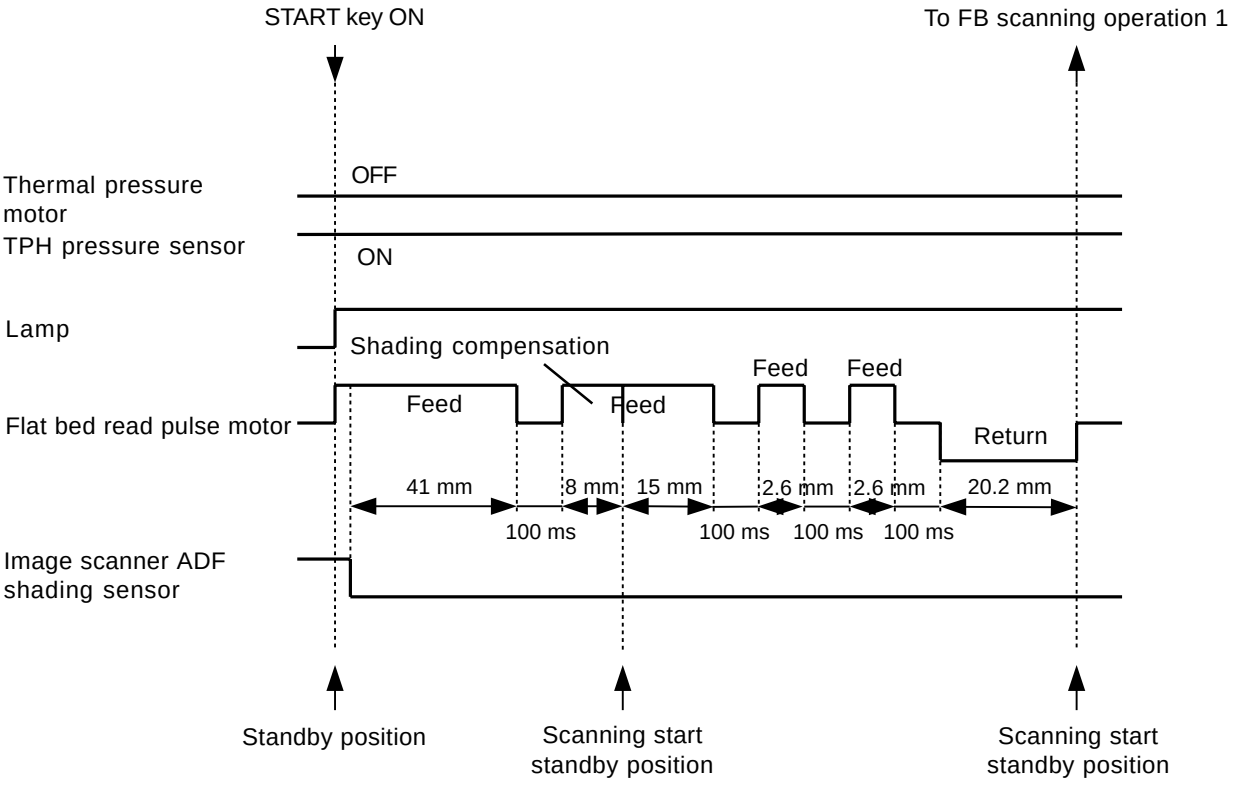
Scanning line (lamp carriage) when image scanner ADF shading sensor switches from ON to OFF

A: Original stopper

B: Shading plate

C: Original

D: Stage glass


START key ON
To FB scanning operation 1
Thermal pressure motor
OFF
TPH pressure sensor
ON
Lamp
Shading compensation
Feed
Feed
Feed
Feed
Flat bed read pulse motor
Return
41 mm
8 mm
15 mm
2.6 mm
2.6 mm
20.2 mm
100 ms
100 ms
100 ms
100 ms
Image scanner ADF shading sensor
Standby position
Scanning start standby position
Scanning start standby position

6. FB Original Scanning Mechanism

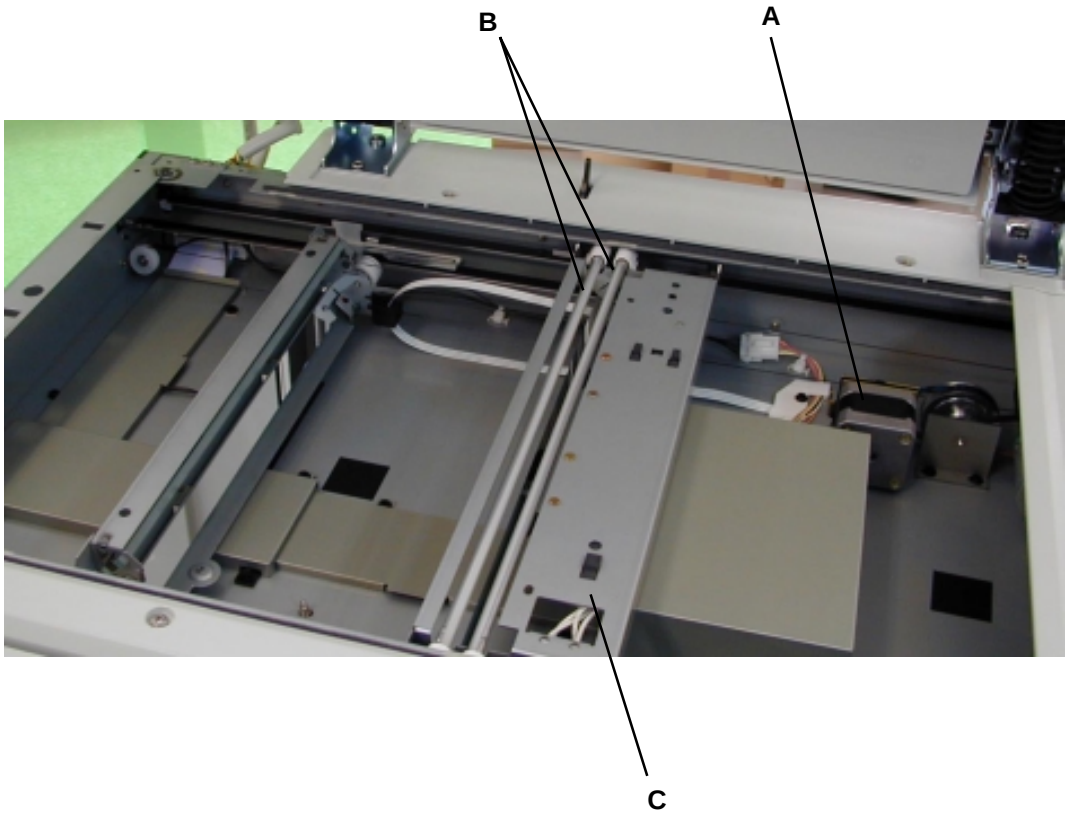
This scanning operation describes the following situations. One is in which the ABC (Auto Base Control) is not performed. The other is when the START key is pressed within 60 seconds of placing the original on the stage glass (START from FB original scanning operation 1), and when the START key is pressed after 60 seconds.

If the START key is pressed after 60 seconds have elapsed, the lamp [B] illuminates, and the Flat bed read pulse motor [A] activates in the feed direction. The Lamp carriage [C] moves to the shading compensation position, and shading compensation is performed. (See the previous section for the case in which line mode is selected with original scanning density set at “Auto”, i.e. with ABC.)

It then moves a preset distance in the scanning direction (to the right) from the scanning start standby position, and the write pulse motor activates. It then moves a further preset distance, switching ON the read/write signal and initiating scan of the original. (The master making process starts at the same time.)

Once the master making for the size of the original is made, the read/write signal is switched OFF, and scanning ends. (The master making process also ends at the same time.) The Flat bed read pulse motor [A] moves the lamp carriage a further 3 mm in the scanning direction before stopping. The Lamp [B] turns off, and the scanning operation is complete.

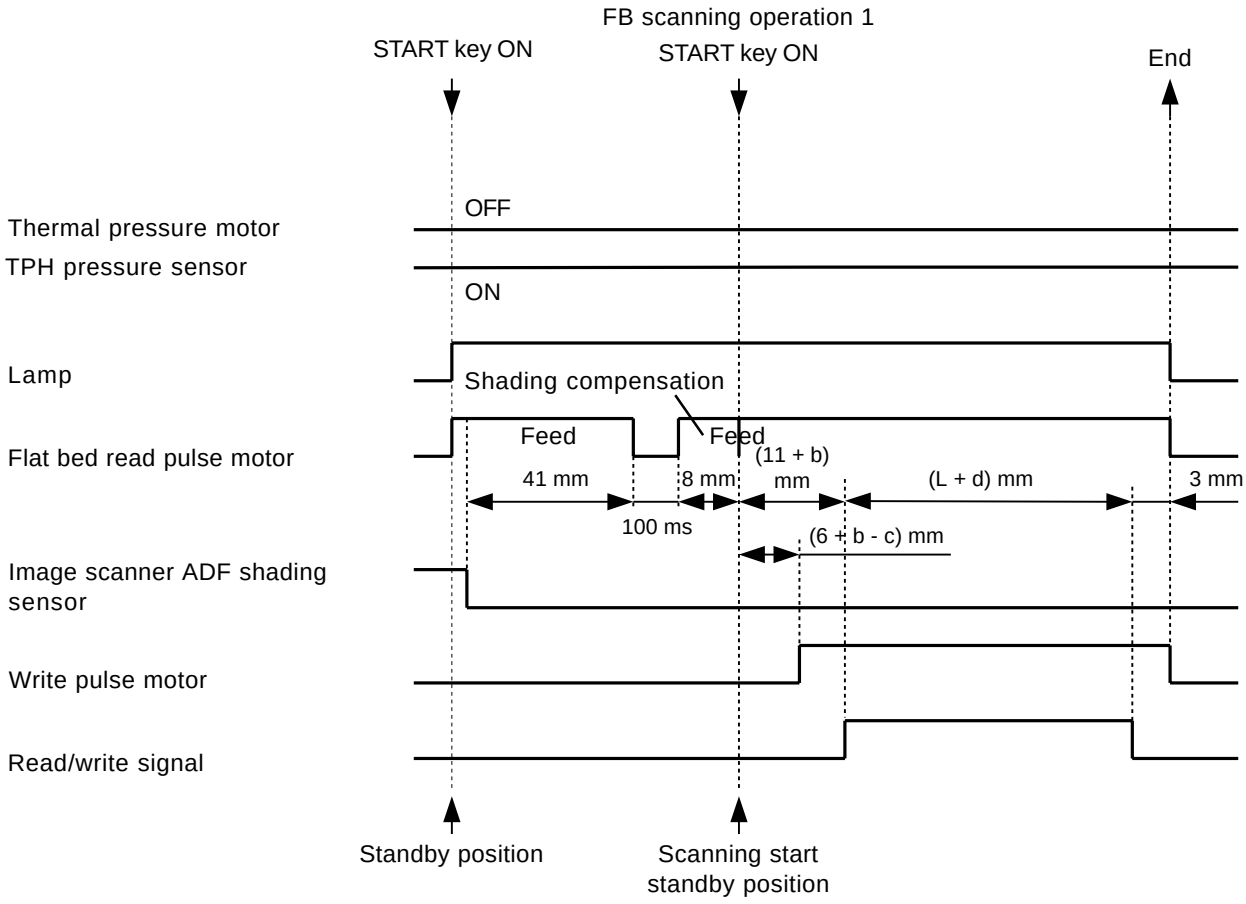
The Lamp carriage [C] then returns to the standby position. (Flat bed initialization operation)



A: Flat bed read pulse motor

B: Lamp

C: Lamp carriage



* L = paper size set by the Users Mode.
Adjustment value b = Adjusted by test mode No. 181 (Flat bed scanning start position adjustment)
Adjustment value c = Adjusted by test mode No. 281 (Master making start position adjustment)
Adjustment value d = Adjusted by test mode No. 282 (Master making length adjustment)

Removal and Assembly

1. Removing the Scanner Unit

(1) Move the carriage to the locking position using test mode No. 154 (scanner lock action), open the Scanner table [I], secure the mirror carriage using the Transport lock screw [J], and then close again.

(2) Switch off the power, and remove the rear cover.

(3) Remove the Scanner unit cover (left) [B] by removing the four screws (M4 x 8). (If the ADF unit is fitted, remove the Original receiving tray bracket [C] with the two (M4 x 10) screws and two (M4 x 8) screws, and then remove the Scanner unit cover (left) [B] before disconnecting the ADF wire harness connector and ground lead.)

(4) Remove the Stage cover [A] by removing the two screws (M4 x 8), and detach the ground lead. (If the ADF unit is fitted, turn the ADF mount plate on the rear of the hinge 180 degrees to lock it (see photograph below), and then remove the ADF unit with the two screws (M4 x 10).)

(5) Remove the Scanner unit cover (rear) [D] by removing the three screws (M4 x 8).

(6) Remove the Scanner unit cover (front) [K] by removing the two upper screws (M4 x 8), and then open the Scanner table [I] and removing the side screw (M4 x 6).

(7) Remove the Scanner unit cover (right) [E] by removing the two screws (M4 x 8).

(8) Detach the two connectors from the Scanner unit [H]. (Flat cables on main PCB connectors)

(9) Remove the two screws (M4 x 8) on the two Stage cover brackets [G] that secure the Scanner unit [H].

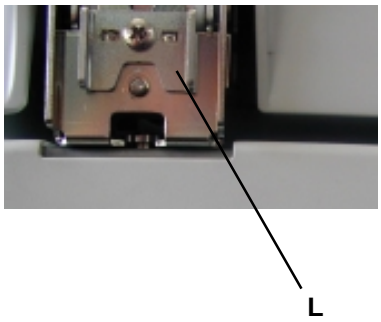
(10) Remove the Stage cover sensor assembly [F] with the screw (M4 x 8).

(11) Remove the six screws (M4 x 8) on the Scanner unit [H], and remove the unit upwards. (Take care when handling, as this is a heavy precision unit.)

[Precautions on Reassembly]

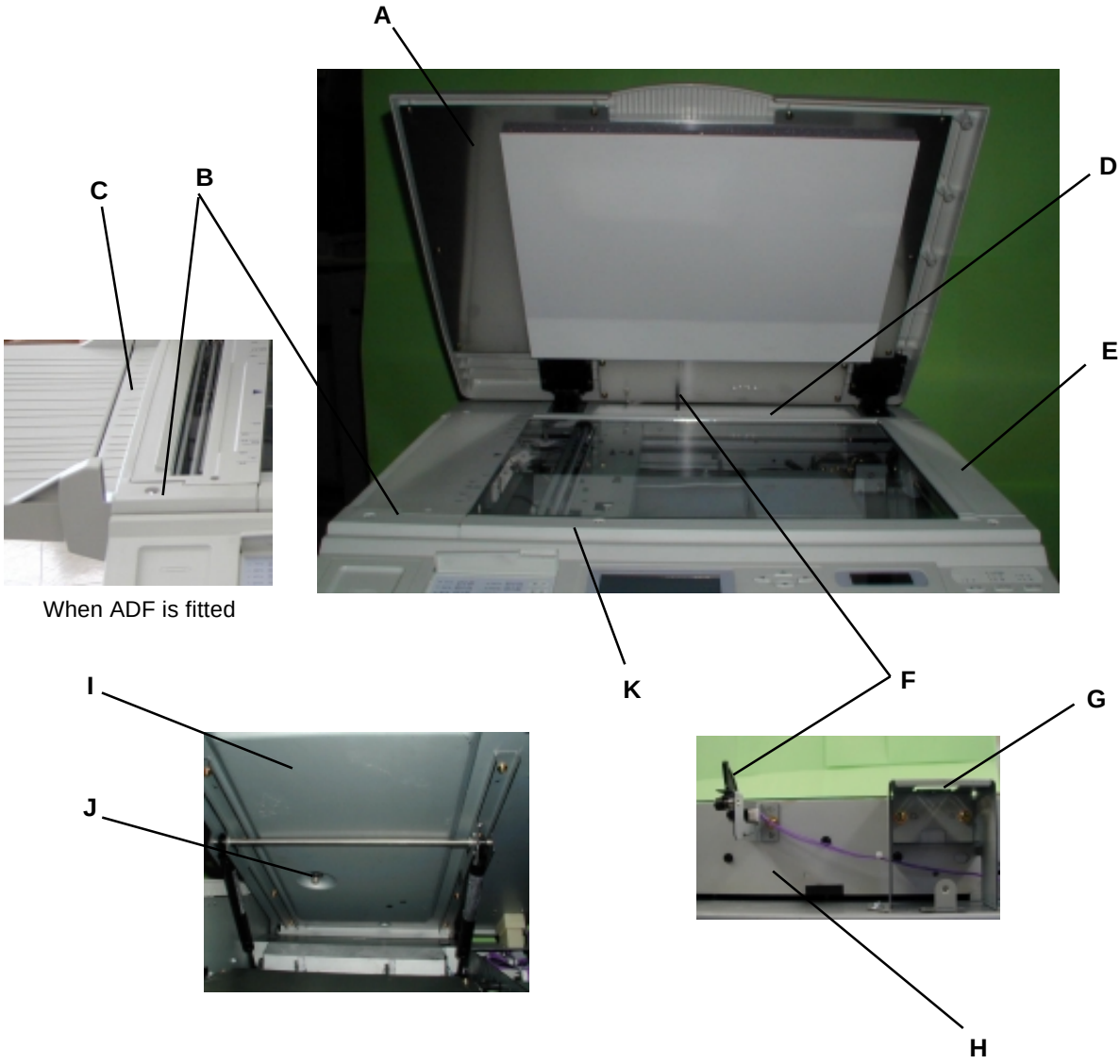
- When mounting the scanner, align the half-pierced sections of the two front alignment brackets and those on the two Stage cover brackets [G].
- After reassembling, open the scanner table and remove the transport lock screw on the mirror carriage. Clear the error message using test mode No. 155 (Scan release action).

* When ADF is fitted (hinge rear)



Position when
removing the ADF unit

* If the scanner locking mode is not cleared using the test mode after reassembling, error message "T23-111" will be displayed.



When ADF is fitted

A: Stage cover
B: Scanner unit cover (left)
C: Original receiving tray bracket
D: Scanner unit cover (rear)
E: Scanner unit cover (right)
F: Stage cover sensor ass'y
G: Stage cover bracket
H: Scanner unit
I: Scanner table
J: Transport lock screw
K: Scanner unit cover (front)
L: ADF mount plate

2. Removing the Stage Glass

(1) Switch off the power.

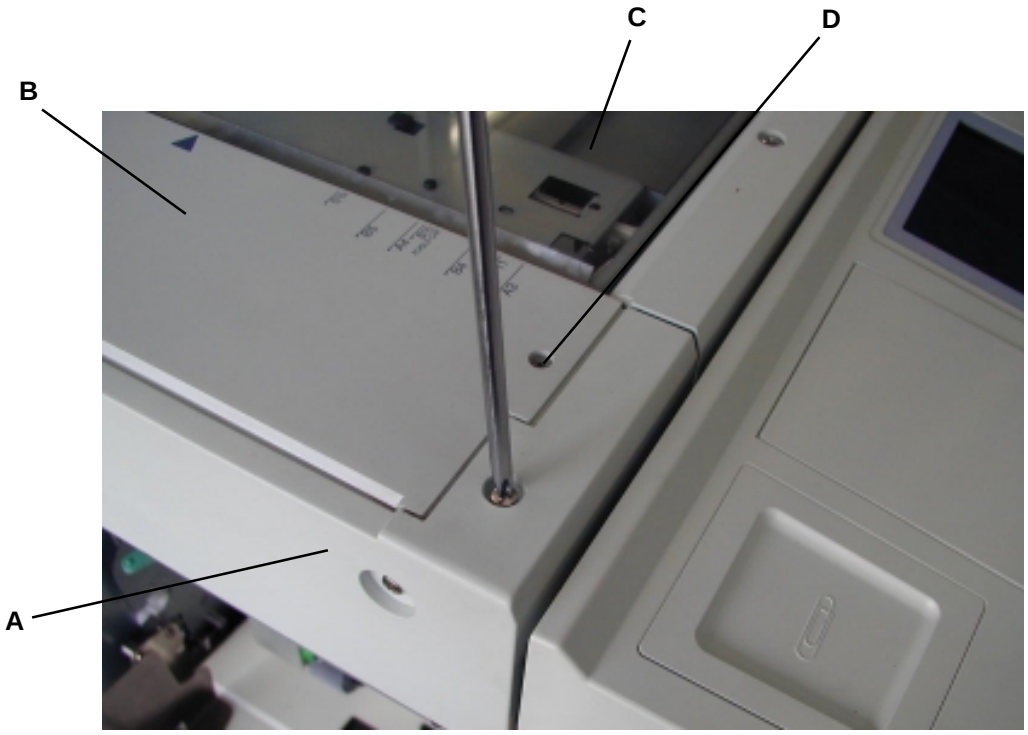
(2) Remove the scanner unit cover (left) [A] by removing four screws (M4 x 8). (If the ADF unit is fitted, remove the original receiving tray bracket by removing the two (M4 x 10) screws and two (M4 x 8) screws, and then remove the scanner unit cover (left).)

(3) Remove the Original stopper [B] by removing two Special step screws [D], and slide to the left (paper feed side) slightly before lifting up and removing.

(4) Lift up the left-hand side (paper feed side) of the Stage glass [C] slightly, and slide it out towards the paper feed side.

[Precautions on Reassembly]

- Push the stage glass firmly against the right-hand side (ejection side) after placing it on the scanner unit frame.



A: Scanner unit cover (left)
B: Original stopper
C: Stage glass
D: Special step screw

3. Removing the Flat Bed Original Detection Sensor

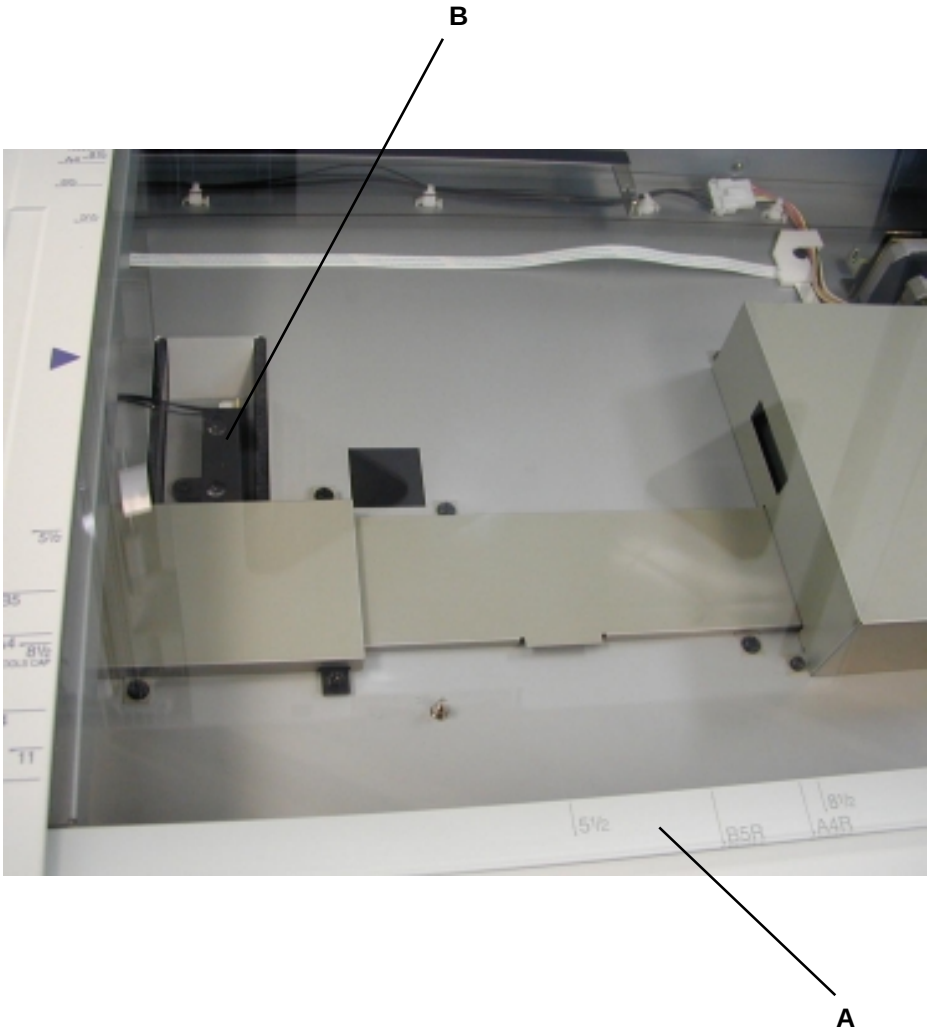
(1) Switch off the power.

(2) Remove the Stage glass [A]. (Refer to this section for details.)

(3) Unplug the connector, and remove the flat bed original detection sensor [B] by removing one screw (M3 x 8).

[Precautions on Reassembly]

- Engage the hooks on the bottom of the Flat bed original detection sensor into the holes in the bracket.



A: Stage glass

B: Flat bed original detection sensor

4. Removing the Lamp

(1) Switch off the power.

(2) Remove the scanner unit cover (left) by removing four screws (M4 x 8). (If the ADF unit is fitted, remove the original receiving tray bracket by removing two (M4 x 10) screws and two (M4 x 8) screws, and then remove the scanner unit cover (left).)

(3) Remove the Original stopper by removing the two special step screws, and slide it to the left (paper feed side) slightly before lifting it up and removing it.

(4) Remove the Stage glass bracket [A] by removing two special screws (M3).

(5) Push the Lamp carriage [B] by hand (taking care not to touch optical components) and move it to the cutaway [C] in the scanner unit frame. Perform the following procedures on the cutaway section on the operation panel side of the scanner unit.

(6) Remove the Stopper [D], which holds the lead wire, by removing the screw (M3 x 6).

(7) Remove the wire harness connector [E] of the Lamp.

(8) Remove the Lamps [G].

a) To remove the Lamp on the right-hand side (paper ejection side)of the lamp carriage

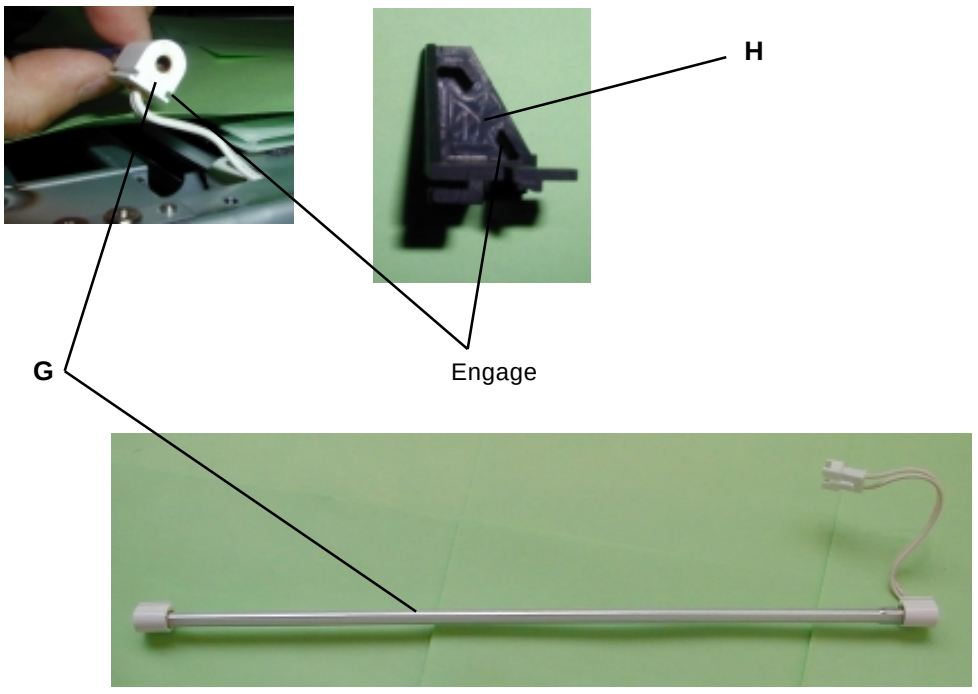
Remove the Lamp bracket (with screw hole) [F] by removing screw (M3 x 4), and then remove the Lamp [G] by pulling it towards the front.

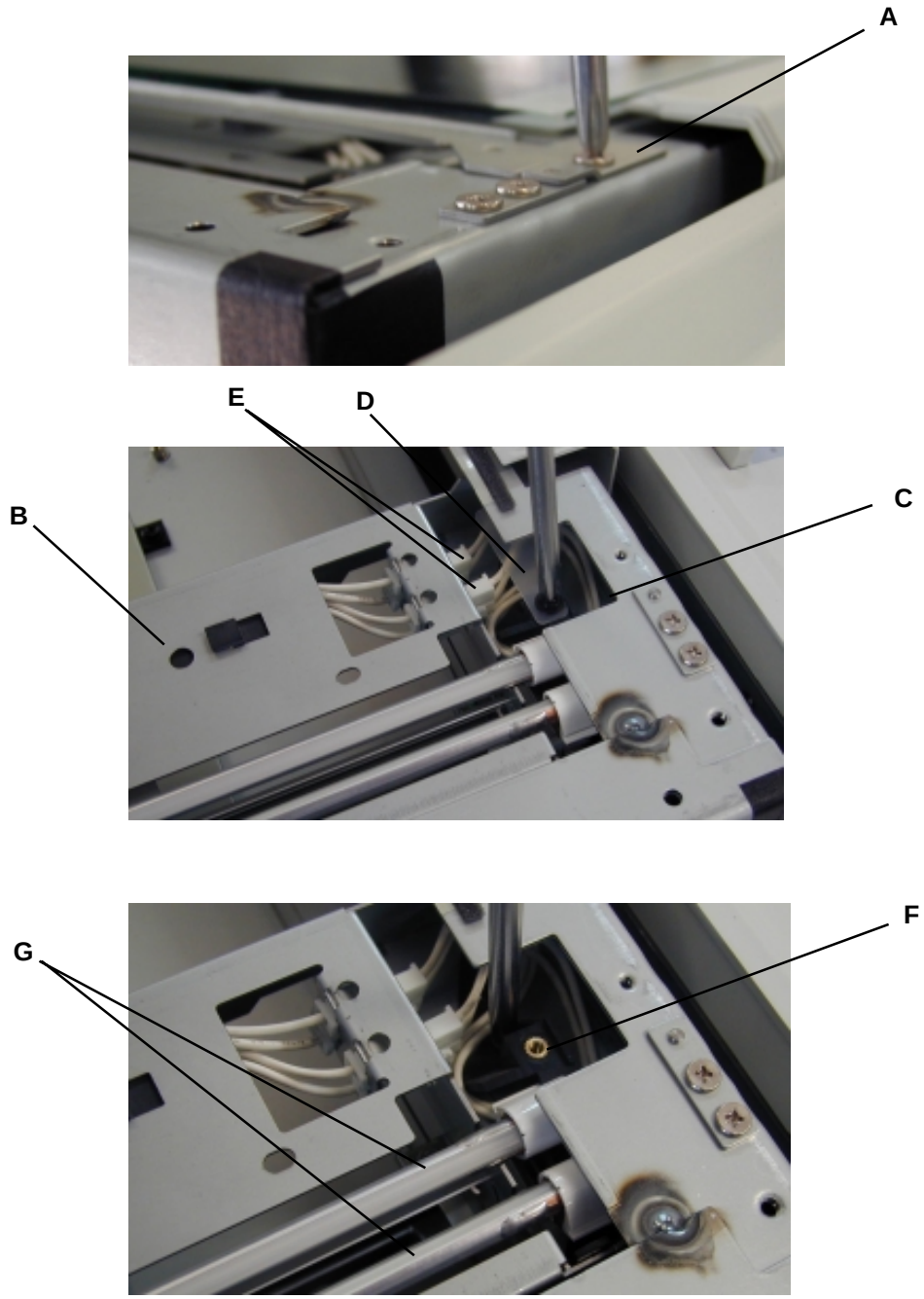
b) To remove the Lamp on the left-hand side (paper feed side) of the lamp carriage

Push the stopper on the Lamp bracket [H] to the right (ejection side) to unlock, and remove it upwards. Remove the Lamp [G] by pulling it towards the front.

[Precautions on Reassembly]

- The bracket and lamp engage with each other. First engage the lamp on the rear bracket, and then engage it on the front bracket, which was detached, before finally securing the lamp.
- Mount the Stopper [D] while pressing down the lead wire.
- Secure the Stage glass bracket [A] by engaging it positively with the half-pierced sections on both sides.





A: Glass stage bracket
B: Lamp carriage
C: Cutaway
D: Stopper
E: Connectors
F: Lamp bracket (with screw hole)
G: Lamps
H: Lamp bracket

5. Removing the Lens Ass'y

(1) Switch off the power.

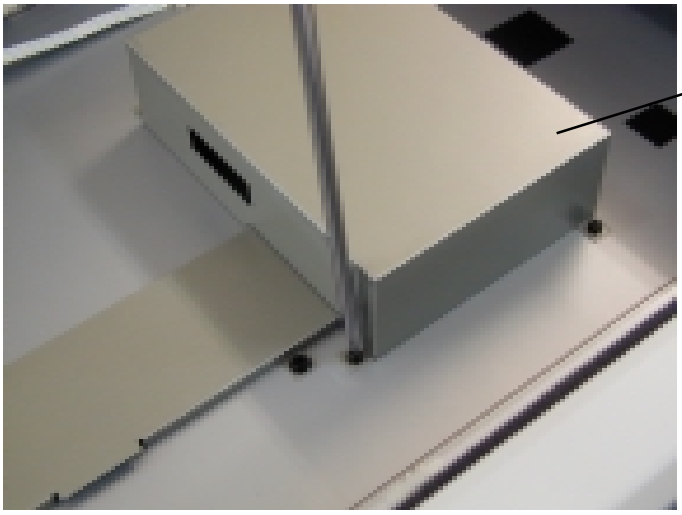
(2) Remove the stage glass. (Refer to this section for details.)

(3) Remove the Lens cover [A] and the three screws (M3 x 6).

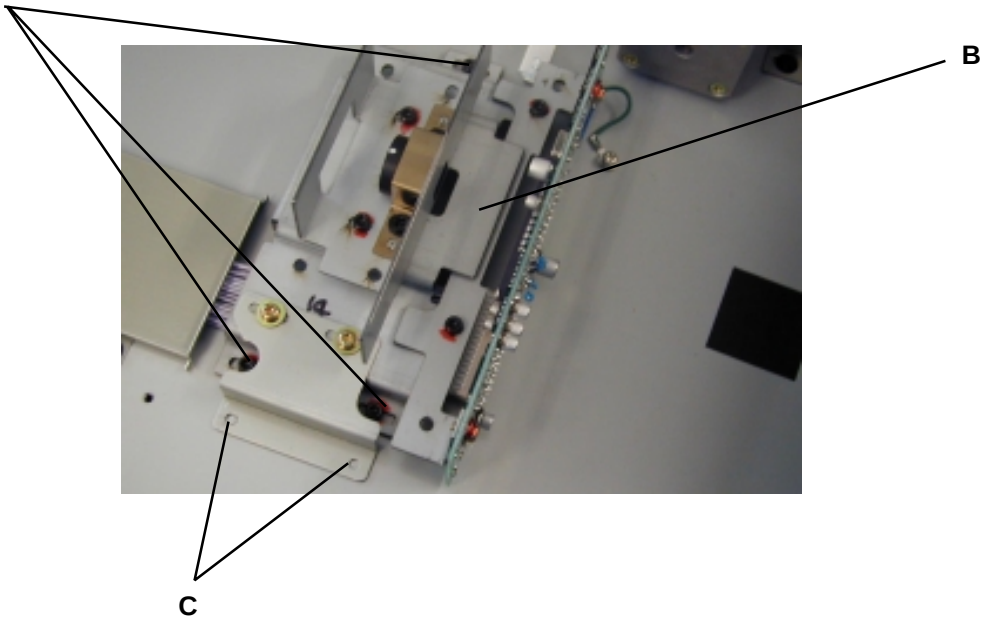
(4) Remove the three washer screws (M3 x 6), detach the ground wire and connector, and then remove the Lens ass'y [B].

[Precautions on Reassembly]

- Align the two half-pierced sections [C] on the front of the lens ass'y.
- Do not loosen any screws other than those specified.
- Do not touch the lens or other optical components.



Loosen these screws.



A: Lens cover
B: Lens ass'y
C: Half-pierce

Adjustment

1. Flat Bed Read Pulse Motor Speed Adjustment

Before making this adjustment, first adjust the image elongation and shrinkage by adjusting the Write pulse motor speed (see chapter 13).

Checks and procedure

(1) Place B4 size papers on the paper feed tray, place Test chart No. 15 on the stage glass, and make a master.

(2) Lay the print on top of the test chart original to check that the image elongation and shrinkage of the print is within ±1.4% at the 310-mm line of the test chart original.

(3) If the elongation or shrinkage is more than the specified range, adjust using test mode No. 182 (flat-bed scanning image elongation and shrinkage adjustment).

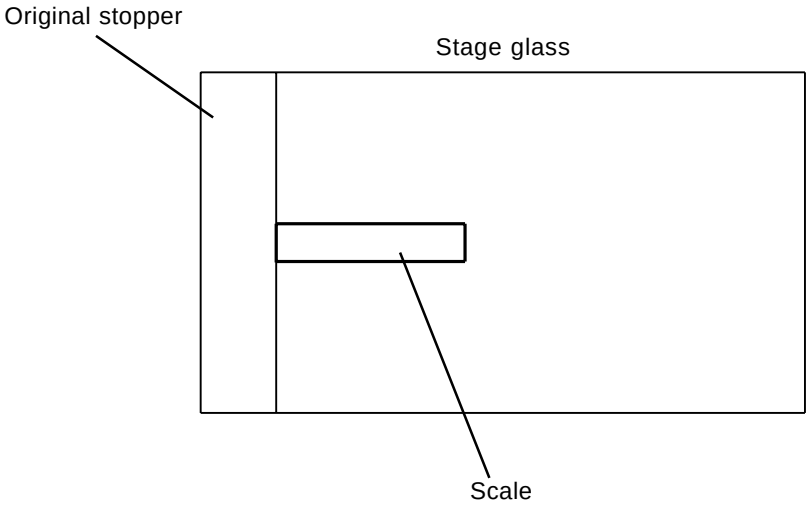
2. FB Scan Start Position Adjustment

Checks and procedure

(1) Place a scale face down on the stage glass, pressing the front edge flush against original stopper, and then close the stage cover.

(2) Select photograph mode, make a master, and then print. Check that the scanning start position is at 5 mm ± 2 mm on the scale (top 5 mm ± 2 mm is erased).

(3) If the scanning start position is out of the specified range, adjust using test mode No. 181 (flat bed scanning start position adjustment).



3. FB Horizontal Scan Position Adjustment

Checks and procedure

(1) Place B4 size papers on the paper feed tray, place Test chart No. 15 on the stage glass, and make a master.

(2) Inspect the master made on the print drum, and check that pattern “e” is not omitted on both the left and right of the image on the master.

(3) If the pattern is omitted, adjust using test mode No. 180 (Flat bed horizontal scan position adjustment).