

# TOSHIBA THE 60<sup>TH</sup> SERIES ANALOG COPIERS – DETACHABLE OPTIONS FOR 1550 2060 3560 AND 4560 MODELS

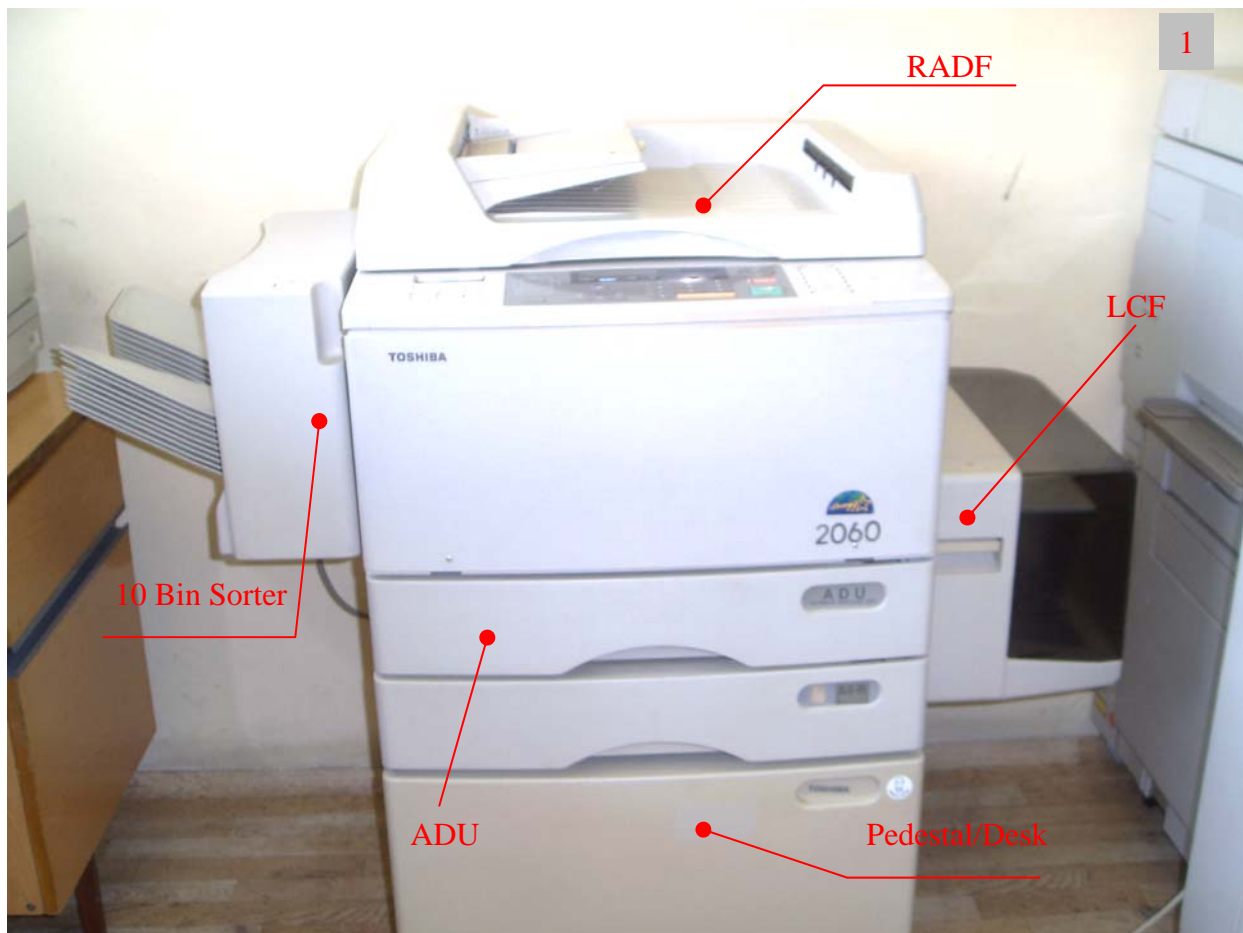
## OVERVIEW

Following the technical review of all analog copiers from Toshiba 60<sup>th</sup> series, comes the present article about the extensive list of detachable option modules. The available options are RADF – reversing automatic document feeder (ADF – automatic document feeder); LCF – large capacity feeder; Sorters with or without stapler; ADU – automatic duplexing unit and Pedestal.

The copiers from the 60<sup>th</sup> series are quite capable of doing most of the daily copying needs of the users, but however nothing is perfect. So there comes the options list.

- The RADF module enables users to copy up to 50 originals at a time automatically both one and two sided.
- The LCF is a useful option for users that demand a steady continuous supply of copy paper. The module has a capacity of 1500 sheets.
- The sorter is a valuable option module for copy shops and busy offices, which operate with great number of multiple pages documents that need to be copied, sorted and stapled in up to 20 sets at a time. The sorters available are either of 10 or 20 bin types. The first is a hanging type and the second is a stand-alone type. The stand alone type demands the original stand desk of the machine to be used or the optional pedestal module, for correct alignment of the sorter with the copier.
- The ADU module is also preferable for busy offices. There is no need to explain the advantages of automatic double-sided copying.
- The pedestal is yet another option for even greater volume of copy paper supply. It consists of either 3 or 2 auxiliary paper trays with variable paper formats.

The places and external view of the described options are shown on figure 1:



## PERIODICAL MAINTENANCE – USEFUL PRACTICES

In general, the option modules are very reliable and rarely need special attention, apart from the regular maintenance and replacement of worn parts (mostly rubber parts). However the goal of this article is, as usual, to give you guidelines to proper maintenance.

### 1. REVERSING AUTOMATIC DOCUMENT FEEDER (RADF) MR-3006/2008

The main difference between the two models is that the second can handle only one sided originals. This is preferred for machines that have no duplexing module for 2 sided copies.

#### Specifications of the MR-3006/2008 RADF module:

Model Name	MR-3006/MR-2008
Number of Originals	Up to 50 originals (A4/60~80 g/m <sup>2</sup> or Letter/16~22 lb.) can be set at a time.
Feeding Speed	Approx. 20 originals/minute (A4 or Letter, side feeding) when installed on the 2060 Approx. 28 originals/minute (A4 or Letter, side feeding) when installed on the 2860/2870
Acceptable Original Size	Minimum : A5-R or Statement-R, Personal check Maximum : A3 or Ledger Paper weight: 60~90 g/m <sup>2</sup> 16~24 lb.
Power Source	Supplied from the copier
Power Consumption	60W (MR-3006) / 55W (MR-2008)
Dimensions	W597 x D494 x H120 (W23.5" x D19.4" x H4.7")...MR-3006 W597 x D494 x H120 (W23.5" x D19.4" x H4.7")...MR-2008
Weight	Approx. 9.5 Kg or 20.9 lb. ...MR-3006 Approx. 9 Kg or 19.8 lb. ....MR-2008

#### Periodical maintenance and replaceable parts:

The periodical maintenance intervals and the corresponding parts location are given on figure 2:

Parts to check	450K	160K
(R1) Pick-up roller		C1
(R2) Feed roller		C1
(R3) Aligning roller		C1
(R4) Reversing roller		C1
(R5) Exit roller		C1
(P1) Separation pad	Replace	C1
(B1) Transport belt		C1
(B2) Brush		C2
(S1) Empty sensor		C3
(S2) Size sensor		C3
(S3) Aligning sensor		C3
(S4) Exit sensor		C3

**Note:** K=1 000 copies;  
 C1: Cleaning (Isopropylalcohol);  
 C2: Cleaning (Cloth);  
 C3: Cleaning (Cotton Swab)

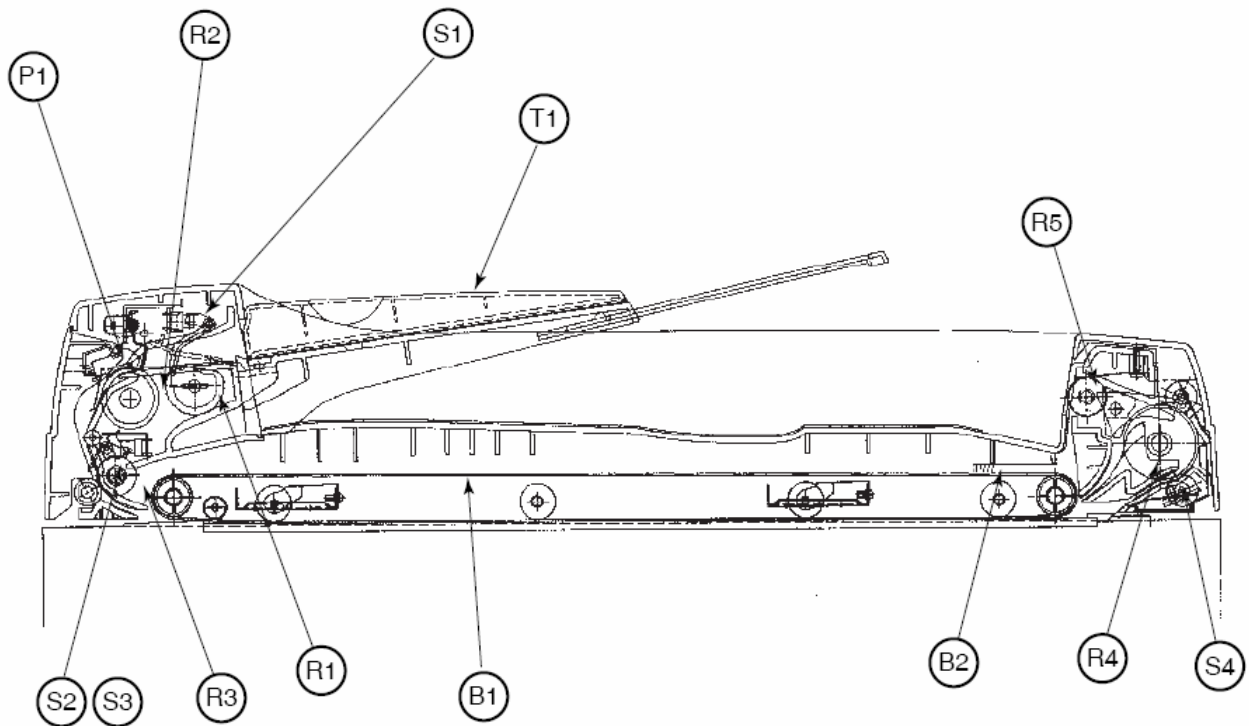
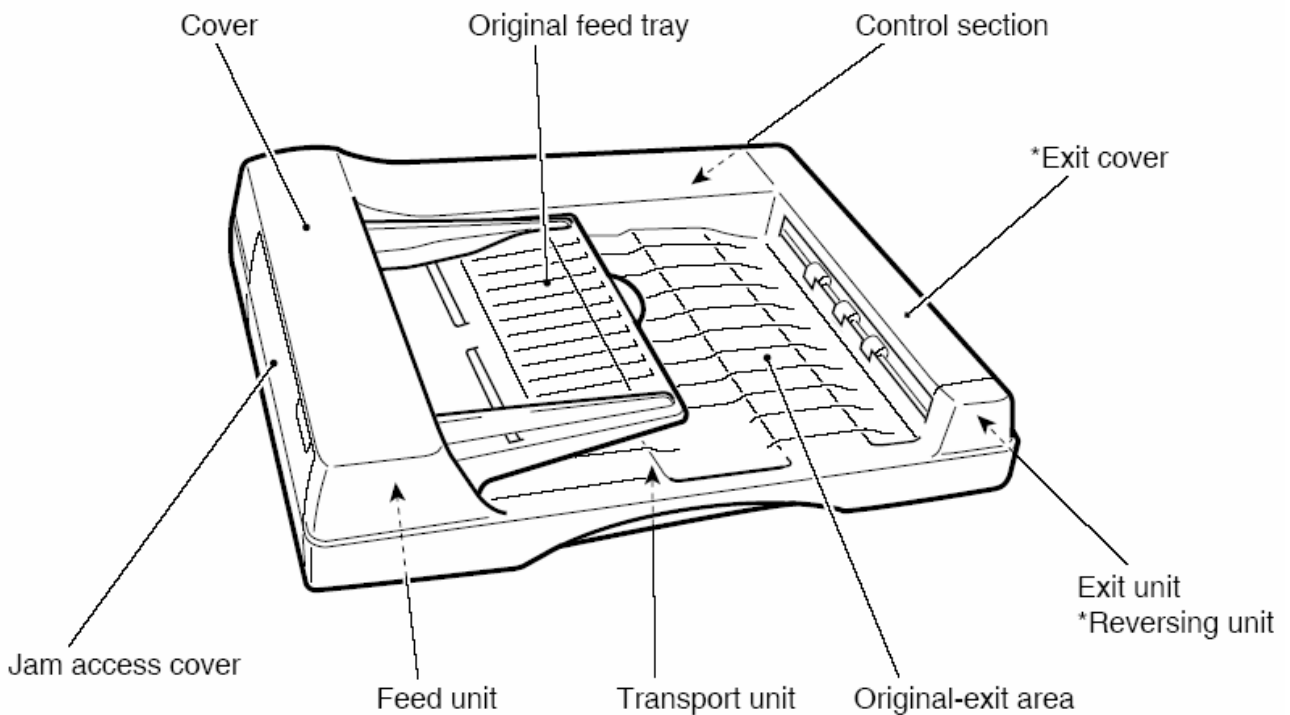


Figure 2 – RADF maintenance cycle and parts

In order to better troubleshoot and repair malfunctions in this unit it is useful to understand how it works. The construction of the module is shown on figure 3:



	Mechanical	Electrical
Feed unit	<ul style="list-style-type: none"> <li>• Pick-up roller</li> <li>• Feed roller</li> <li>• Separation pad</li> <li>• Aligning roller</li> <li>• Jam access cover</li> </ul>	<ul style="list-style-type: none"> <li>• Drive motor</li> <li>• Transport clutch, *Feed clutch</li> <li>• Empty sensor</li> <li>• Aligning sensor</li> <li>• Size sensor</li> <li>• Feed-cover switch</li> <li>• ADF set switch</li> </ul>
Transport unit	<ul style="list-style-type: none"> <li>• Transport belt</li> <li>• Belt rollers</li> <li>• Belt holding rollers</li> </ul>	—
Exit unit (*Reversing unit)	<ul style="list-style-type: none"> <li>• *Reversing roller</li> <li>• Exit roller</li> <li>• *Exit cover</li> </ul>	<ul style="list-style-type: none"> <li>• Exit sensor</li> <li>• *Exit-cover switch</li> </ul>
Tray	<ul style="list-style-type: none"> <li>• Tray</li> <li>• Side guide</li> <li>• Fold-out holder</li> </ul>	—
Control section	—	• PC board
Other	<ul style="list-style-type: none"> <li>• Cover</li> <li>• Hinges</li> </ul>	—

### FRONT SECTION AND DRIVE SYSTEM DIAGRAMS

#### Front section diagram MR-3006 model:

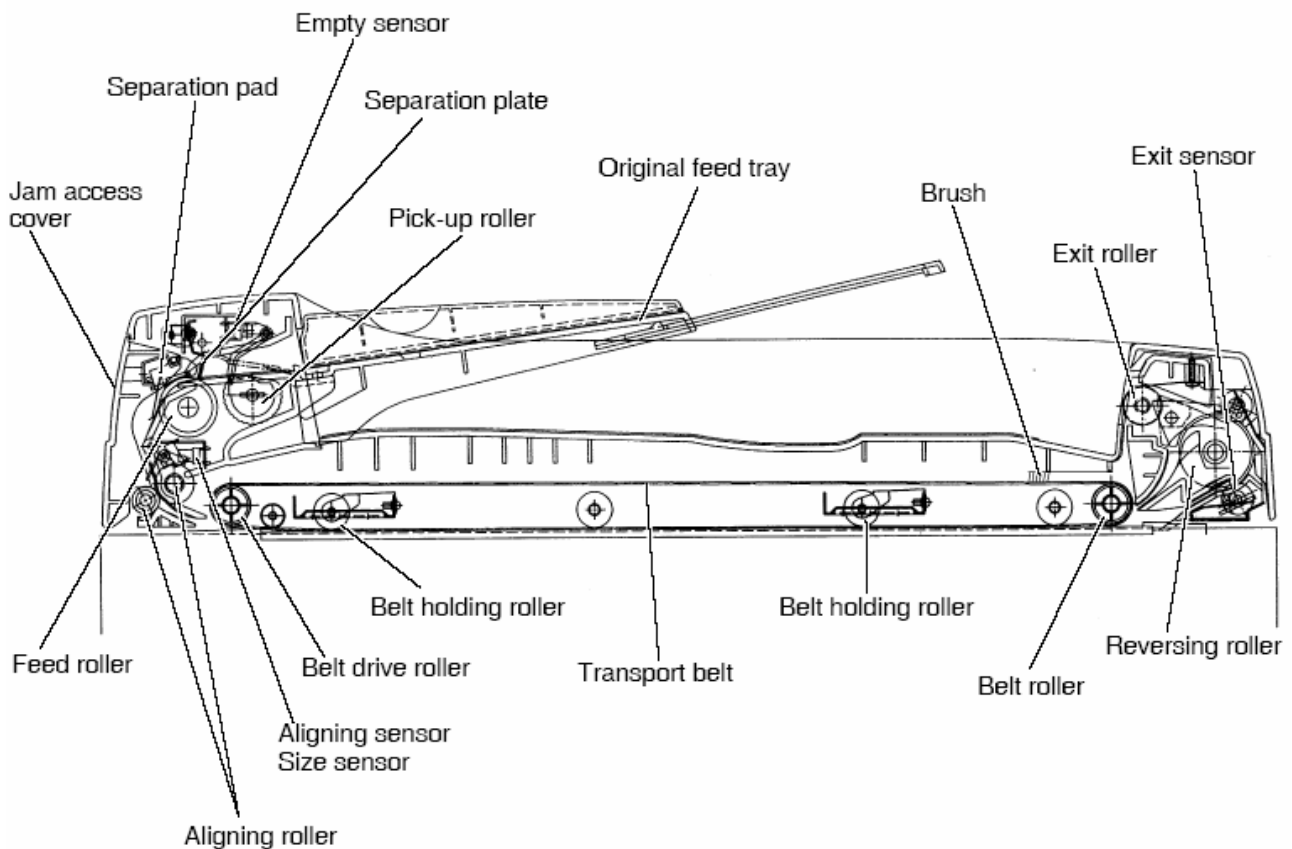


Figure 3 – Construction of the module

**Front section diagram MR-2008 model differences:**

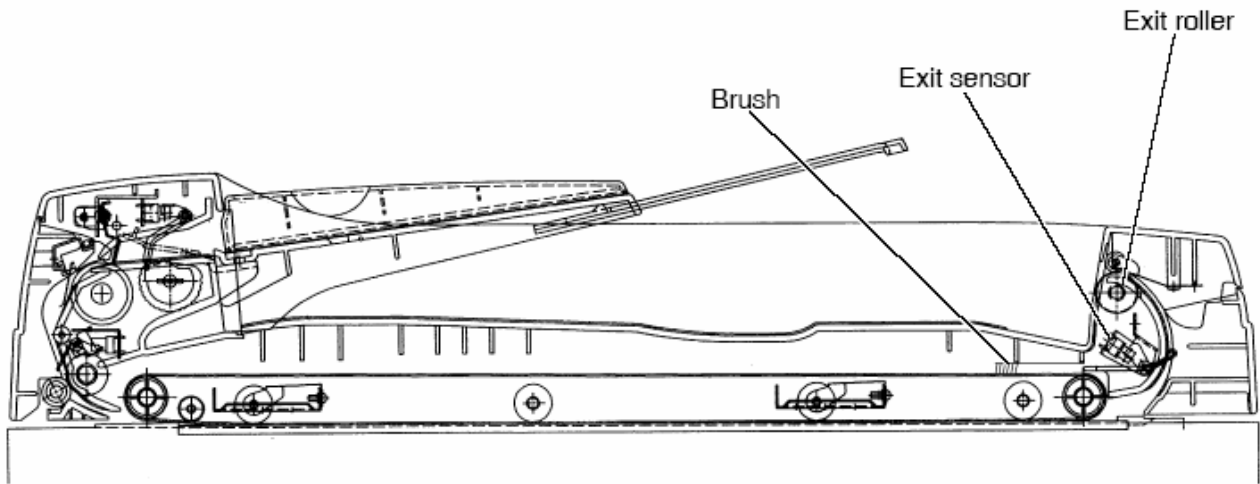
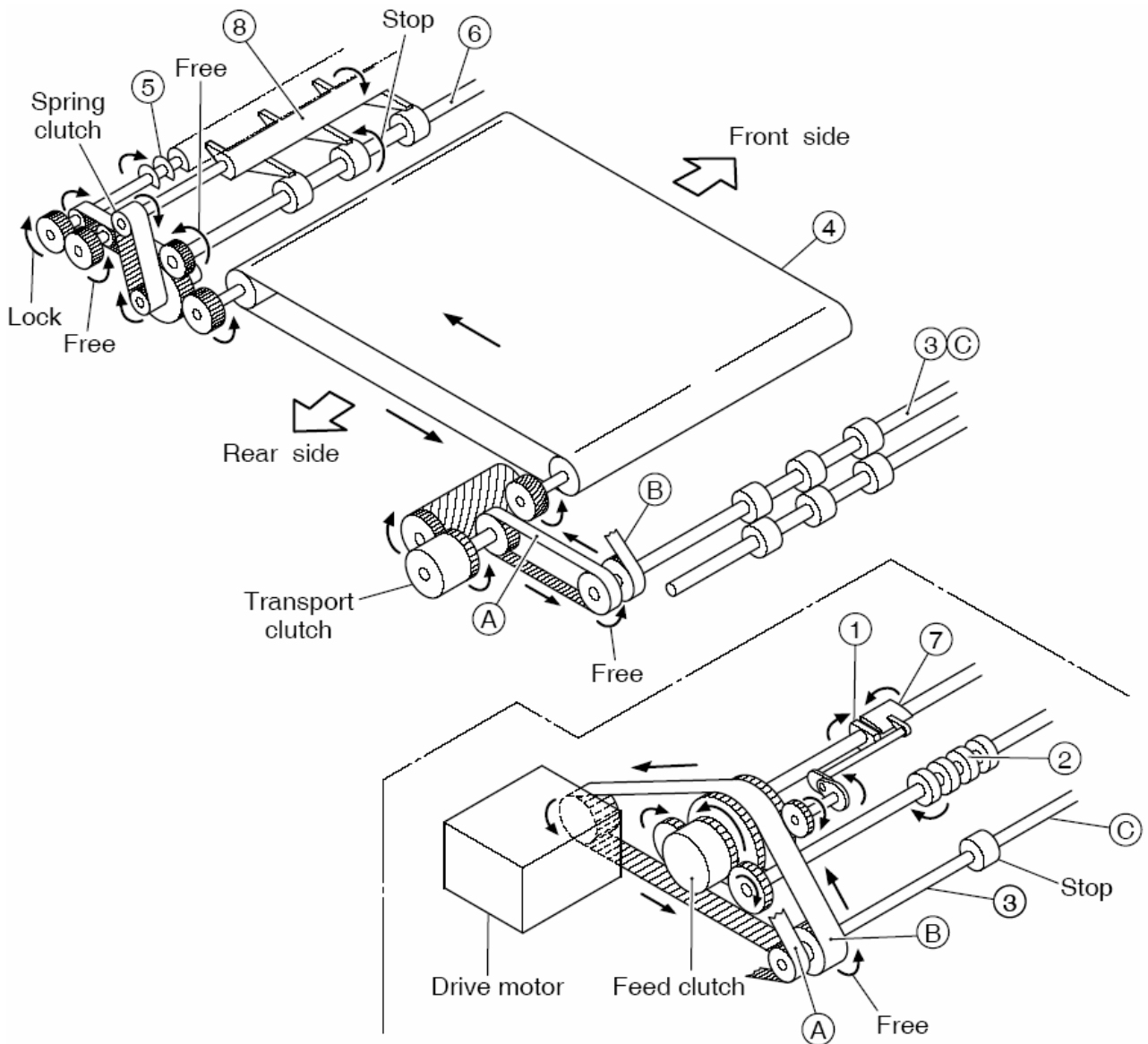


Figure 3 – Construction of the module continued

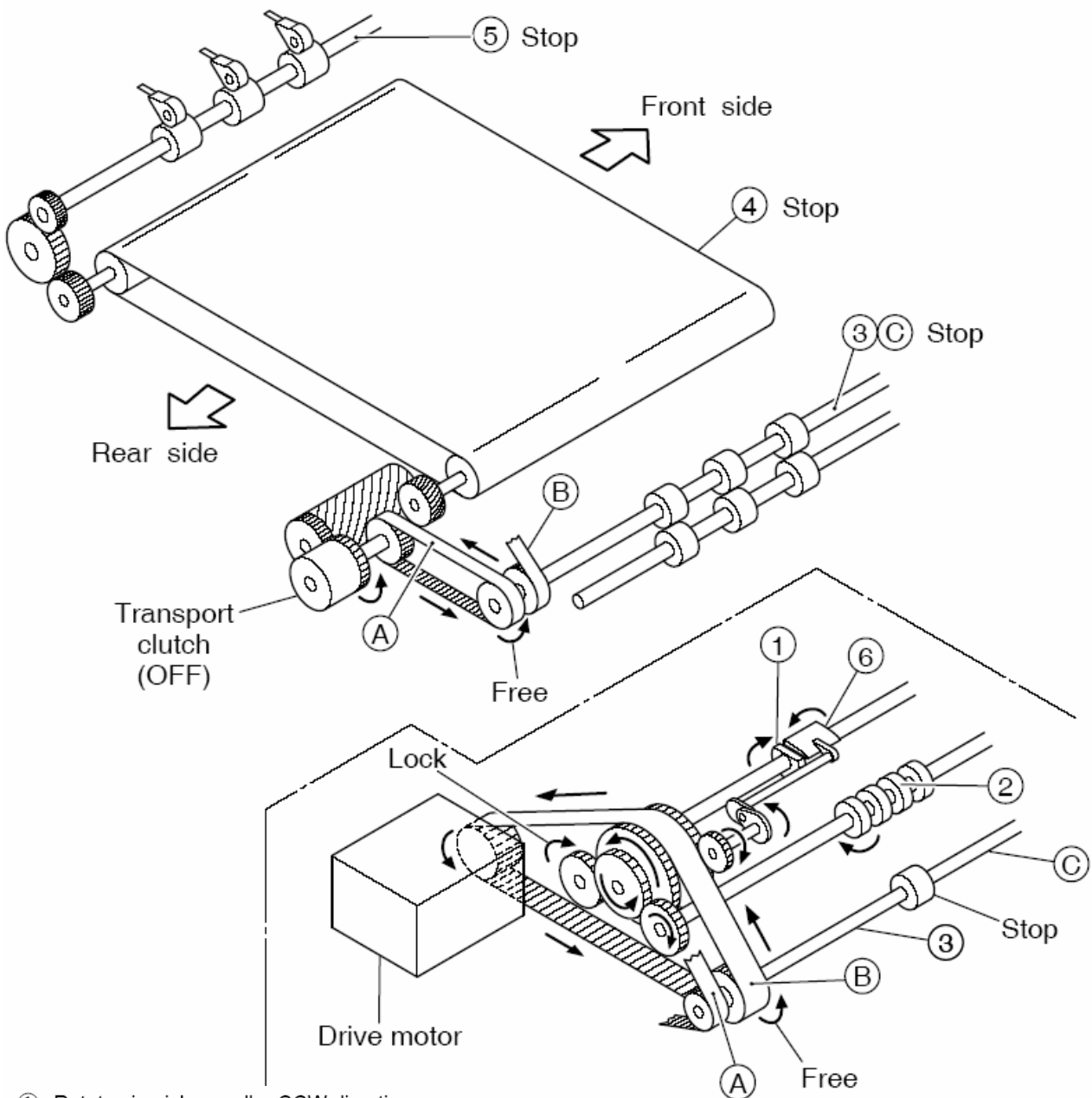
**DRIVE SYSTEM DIAGRAM**

**1. Drive motor rotates clockwise (viewed from front side) MR-3006:**



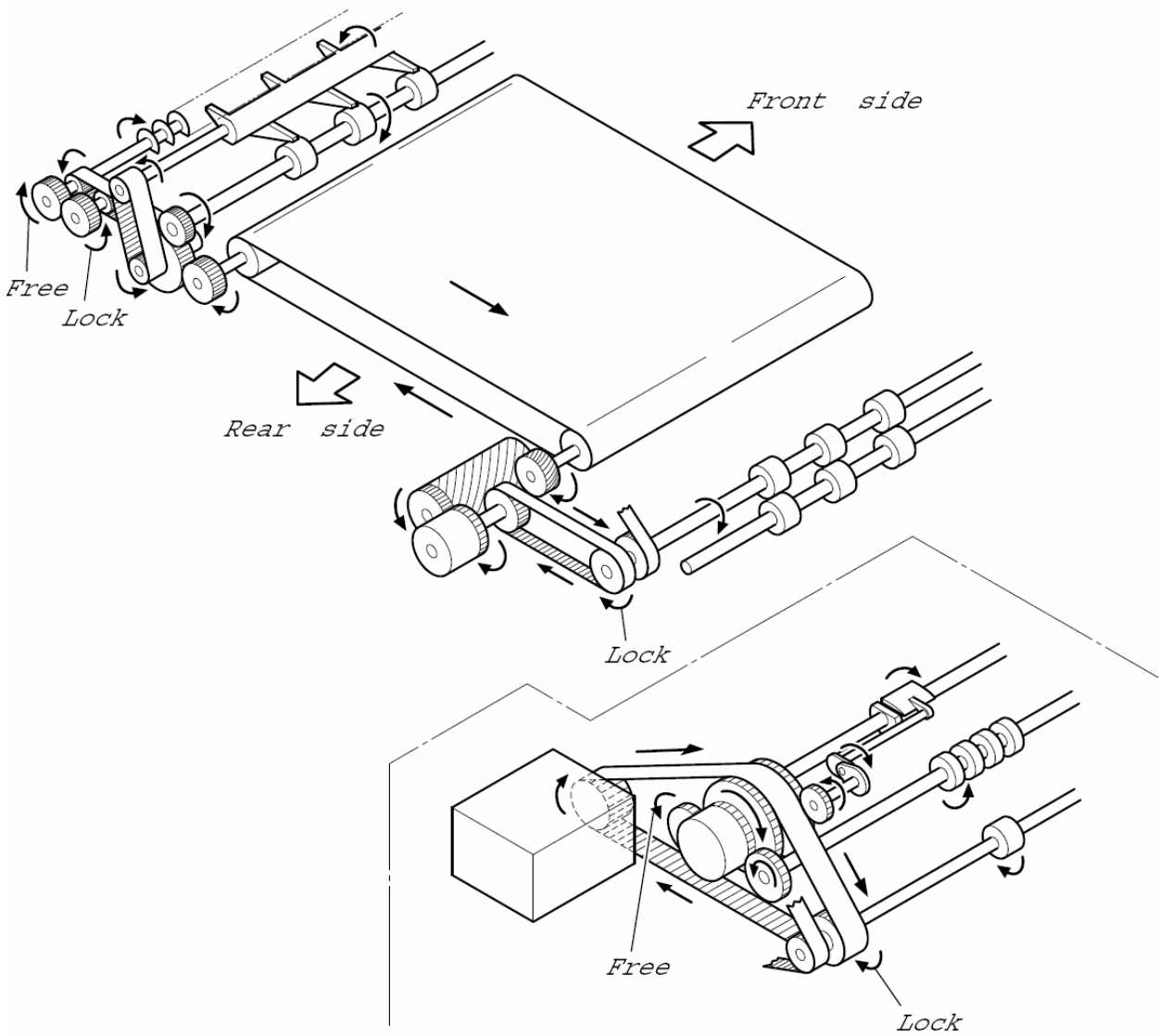
- ① Rotates in pick-up roller CCW direction. : When feed clutch is ON
- ② Rotates in feed roller CCW direction. : When feed clutch is ON
- ③ Aligning roller stops.
- ④ Rotates in transport belt CW direction. : When transport clutch is ON
- ⑤ Rotates in reversing roller CCW direction. : When transport clutch is ON
- ⑥ Exit roller stops.
- ⑦ Weight falls.
- ⑧ Flapper rises. : When transport clutch is ON

**1. Drive motor rotates clockwise (viewed from front side) MR-2008:**



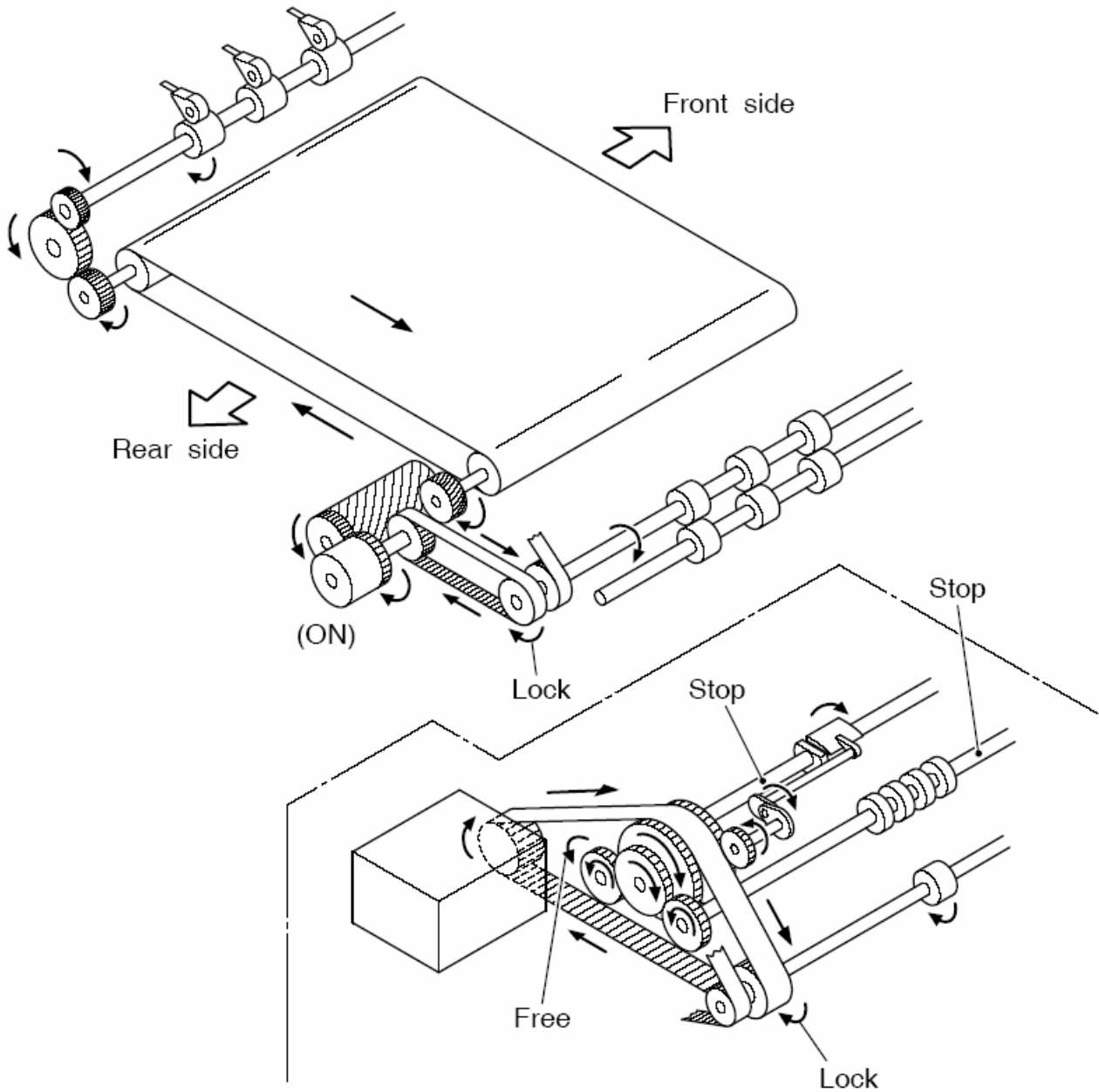
- ① Rotates in pick-up roller CCW direction.
- ② Rotates in feed roller CCW direction.
- ③ Aligning roller stops.
- ④ Transport belt stops.
- ⑤ Exit roller stops.
- ⑥ Weight falls.

**2. Drive motor rotates counterclockwise (viewed from front side) MR-3006:**



- ① Pick-up roller stops.
- ② Feed roller stops.
- ③ Rotates in aligning roller CCW direction.
- ④ Rotates in transport belt CCW direction. : When transport clutch is ON
- ⑤ Rotates in reversing roller CCW direction. : When transport clutch is ON
- ⑥ Rotates in exit roller CCW direction. : When transport clutch is ON
- ⑦ Weight rises.
- ⑧ Flapper falls. : When transport clutch is ON

**2. Drive motor rotates counterclockwise (viewed from front side) MR-2008:**

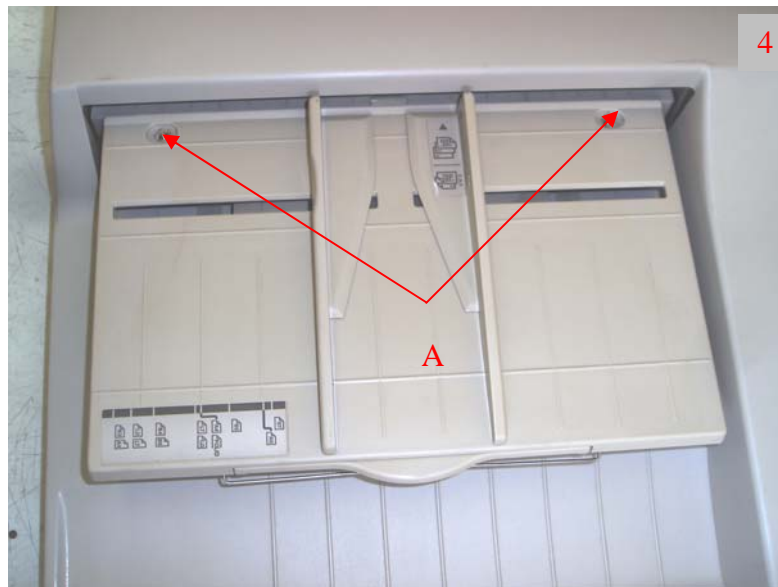


- ① Pick-up roller stops.
- ② Feed roller stops.
- ③ Rotates in aligning roller CCW direction.
- ④ Rotates in transport belt CCW direction.
- ⑤ Rotates in exit roller CCW direction.
- ⑥ Weight rises.

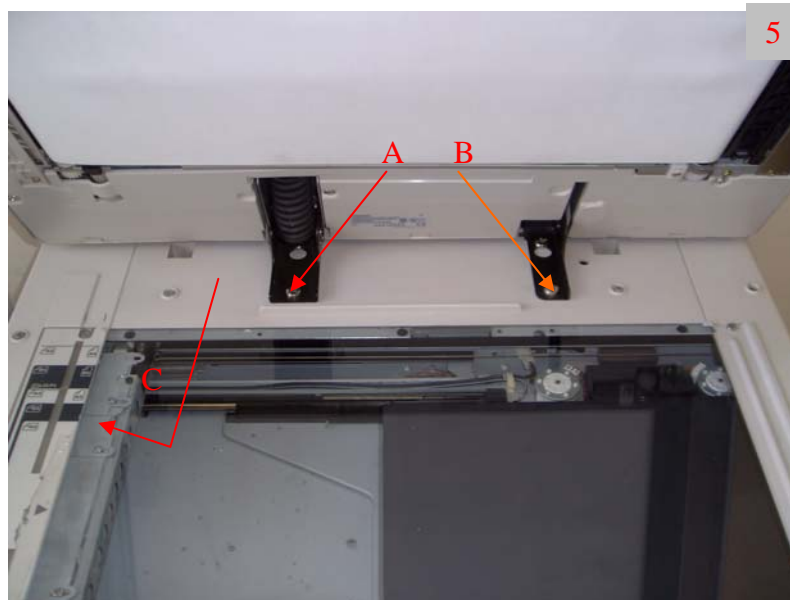


### Disassembly and adjustments:

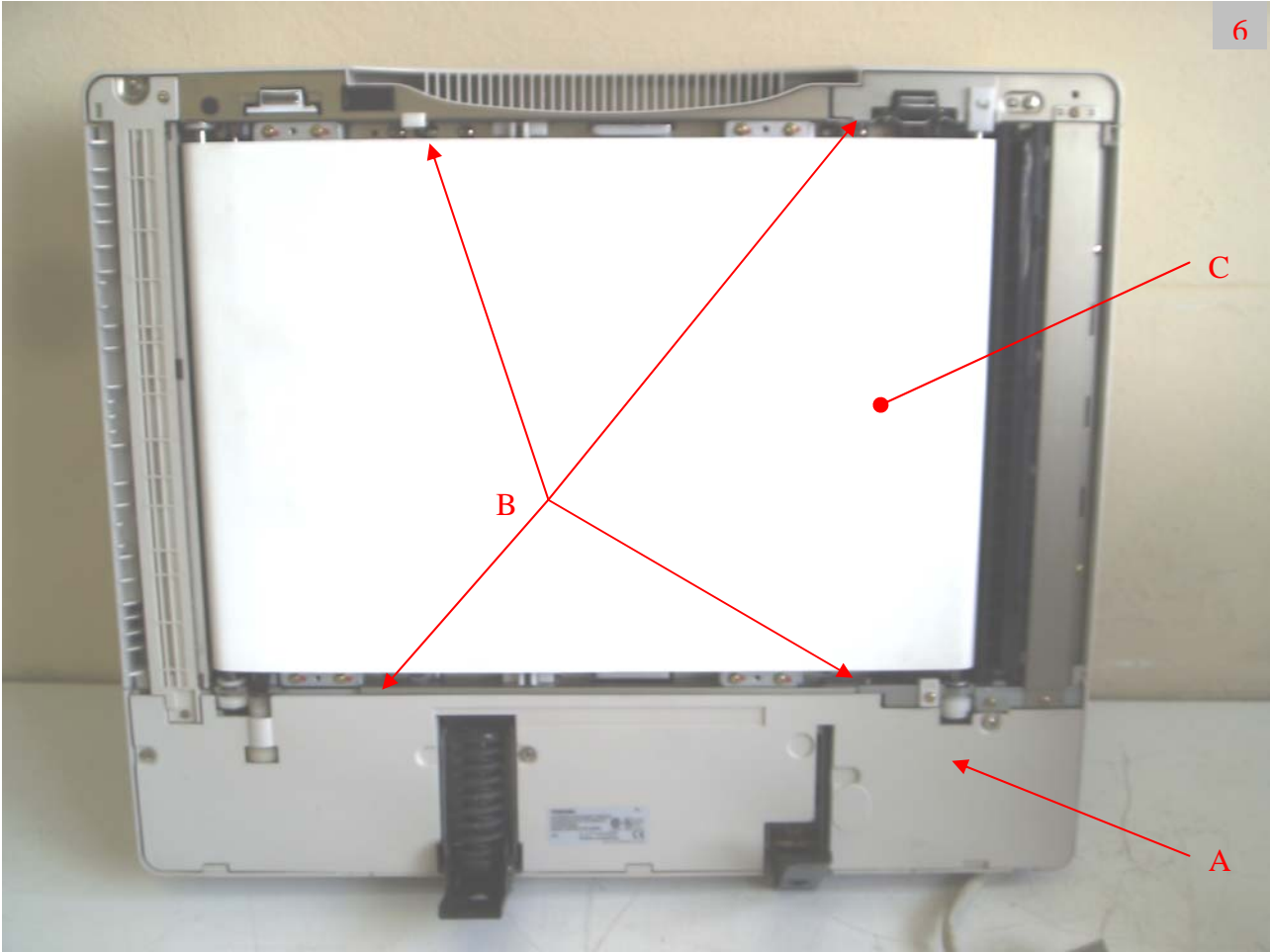
1. Slide the originals guides towards each other.
2. Remove screws A. See figure 4:



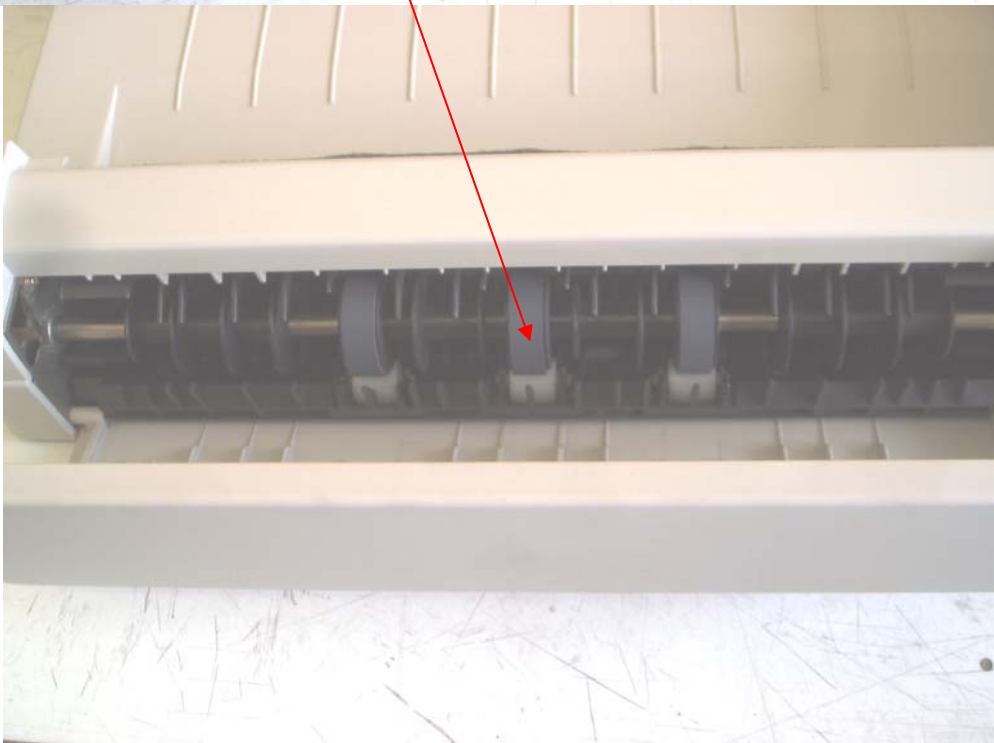
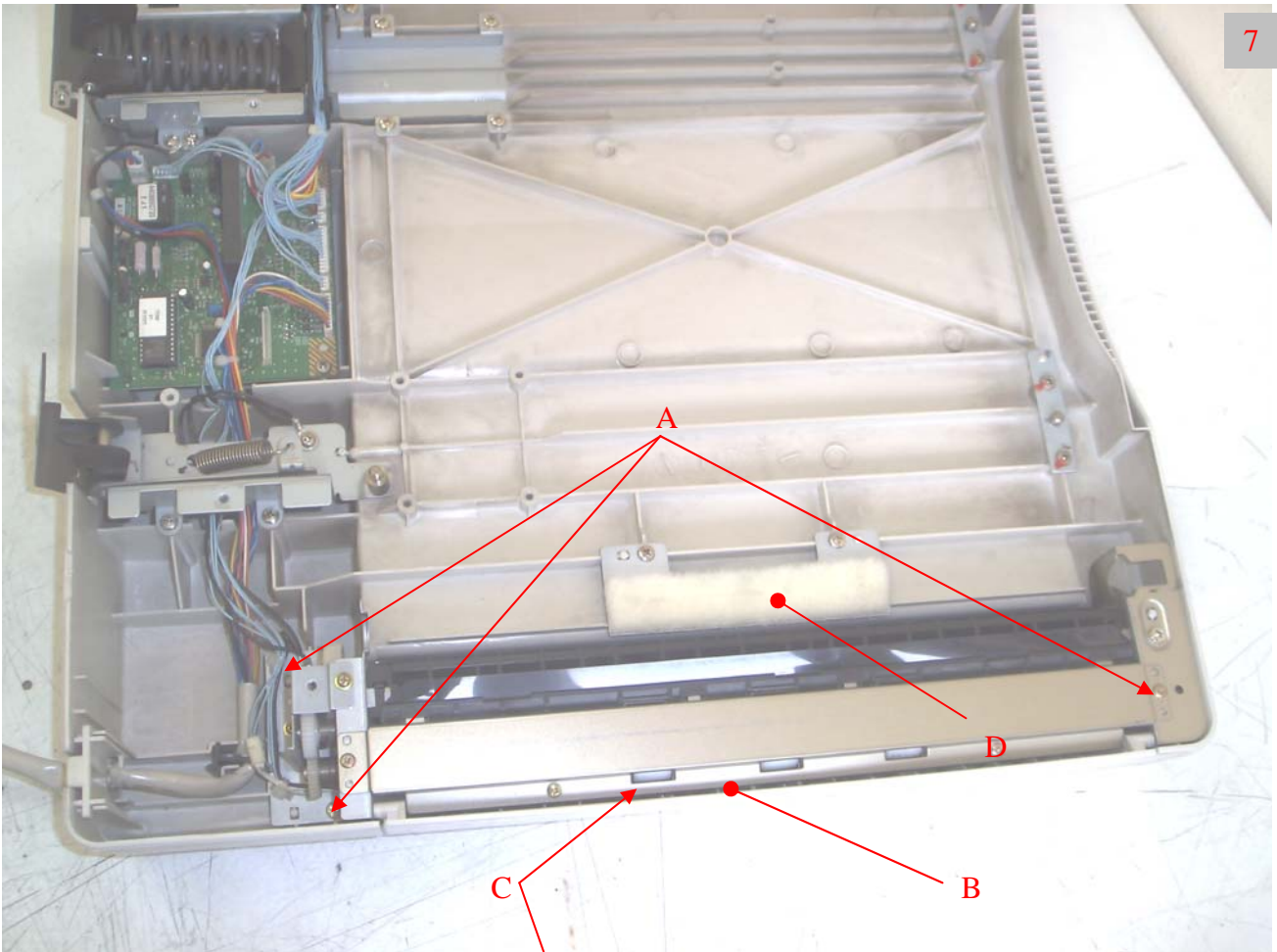
3. Lift the RADF. Remove screws A and B. Note the relative position of the smaller hinge to screw B. This is an important reference used for correcting image skew. Unplug the module's connector to the copier (located at the back of the machine). Remove the module in direction C. See figure 5:



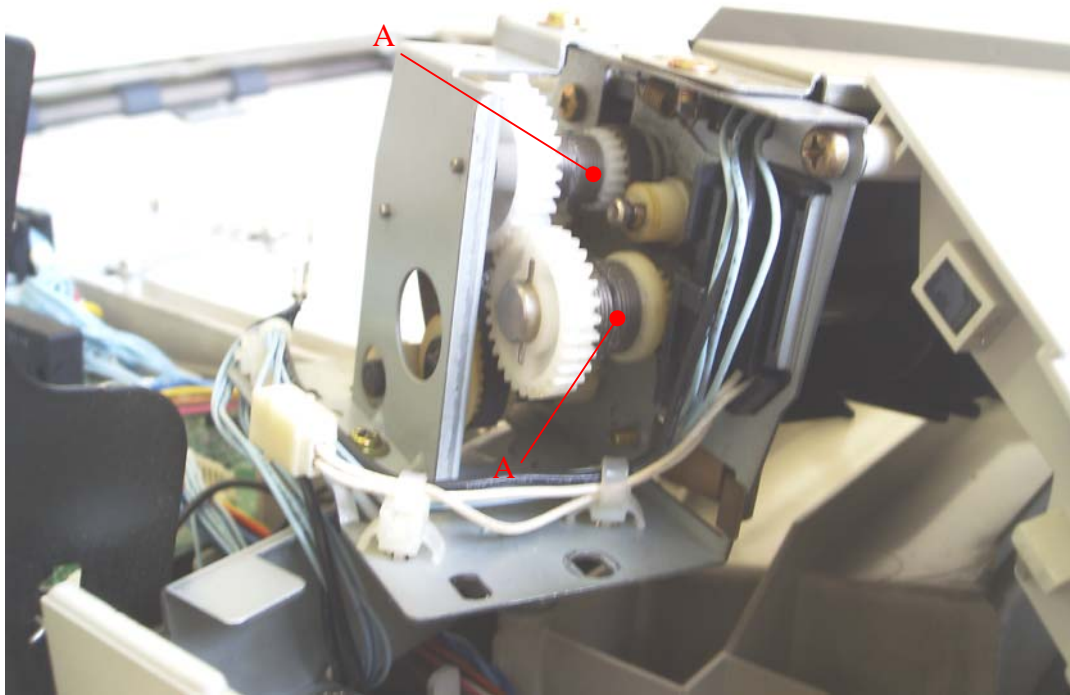
4. Remove the cover A by unscrewing three screws. Remove the four plastic clips B that hold the ADF's transport belt assembly C and remove it. See figure 6:



5. To remove the exit/reversing assembly remove screws A. Open the cover B and remove the entire assembly. Be careful with the wire connectors. You should remove the assembly only if you plan to make repairs on it. Otherwise open the cover B and clean the three transport tires C with rubber restoring fluid. Clean with vacuum cleaner the transport belt cleaning brush D. See figure 7:



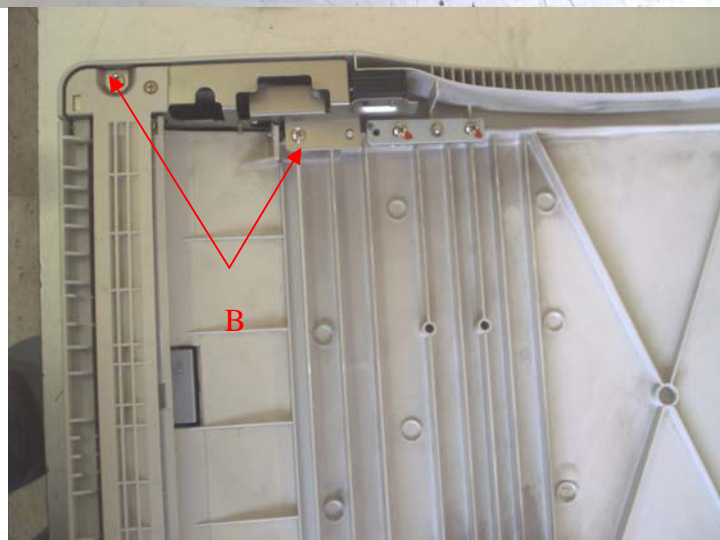
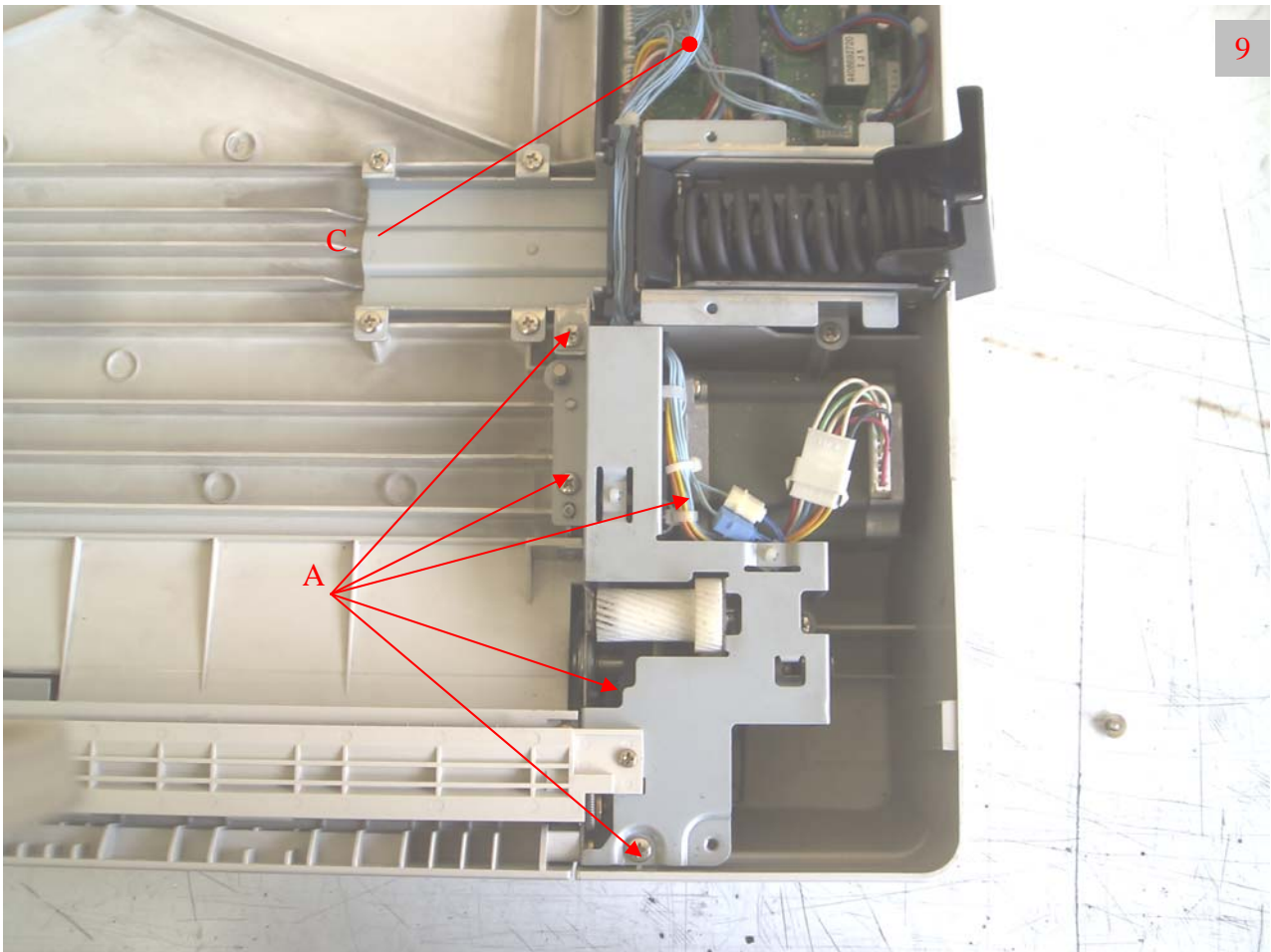
6. If you received a service call related with RADF/ADF original exit problems, you should remove the exit assembly. Follow the instructions in stage 5. If cleaning the exit rubber rollers doesn't solve the problem, look at the spring clutches A. They are responsible for the transport of the original in the exit direction and in the reverse direction when making double-sided copies. Often after a significant number of originals fed through the module, these spring clutches break. See figure 8:



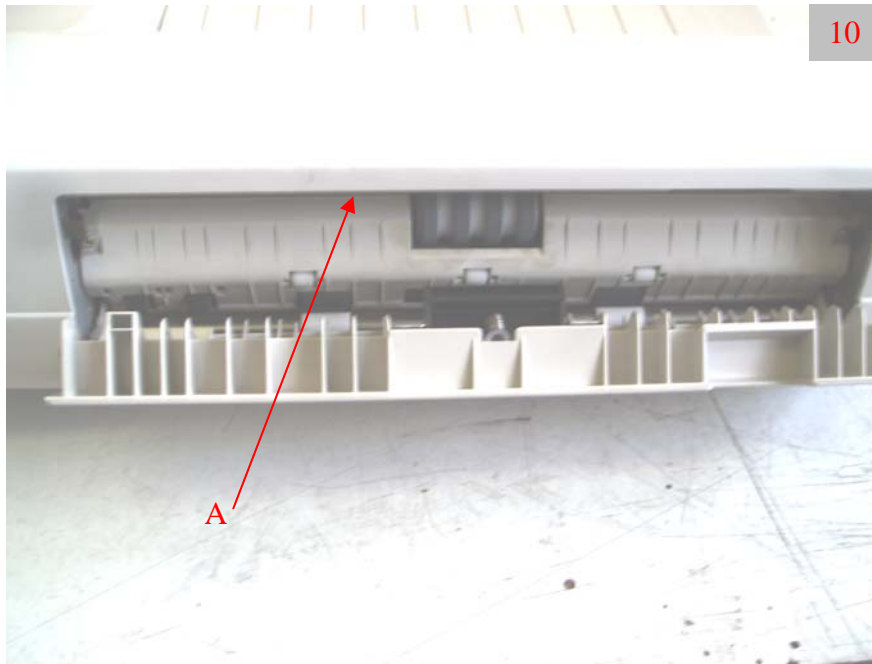


7. If your clients complain that the ADF module doesn't stand in the open position and the copies are skewed and some times the originals even don't exit, causing paper jams, you should look at the main hinge of the module. It is made of a spring and a shock absorber inside. If the module doesn't stand open it indicates the absorber is worn. This causes the module not to close entirely on the original glass. The originals are not correctly transported onto the glass and thus the copy is skewed. The solution is to replace the entire hinge assembly. See figure 10.

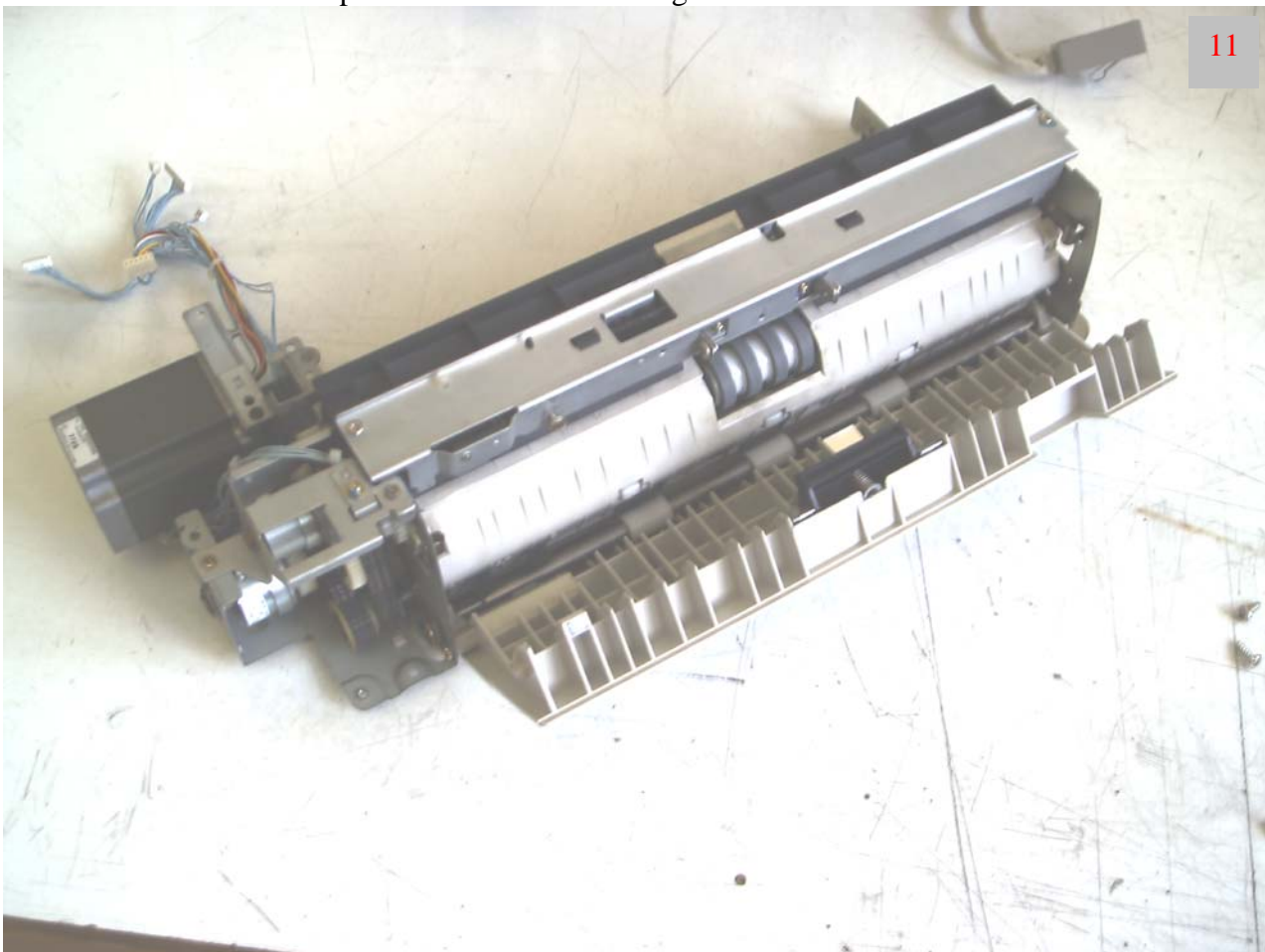
8. If you want to replace the pick-up, feed of separation tires in the ADF module, you should remove the entire feed assembly; otherwise only clean the feed rubber parts with rubber cleaning fluid. To remove the feed assembly remove screws A and B. Unplug the connectors C from the main board. See figure 9:



9. Open the left ADF cover and loosen the screw A. Figure 10.



10. Remove the feed assembly. If you are not sure how to disassemble it, consult the service manual, because it has a rather complicated mechanics. See figure 11:

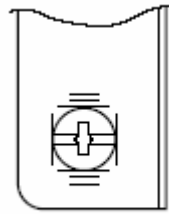


## Adjustments:

### 1. Adjustment of skew (image inclination):

(1) Please confirm the installation as shown (RIGHT HINGE).

**Note:** Install the screw on the center of scale.



RIGHT HINGE

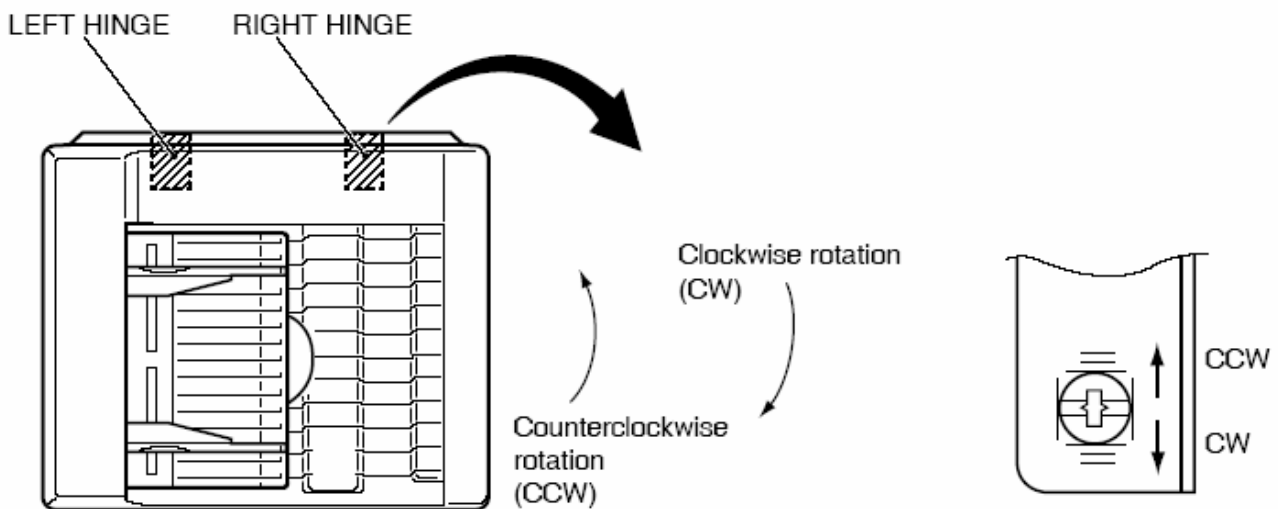
(2) Place the test original face up in the tray, press PRINT to make a copy.

Check that the copy isn't skew.

(3) If not, loosen the two screws on hinges and adjust the position of RIGHT HINGE. Repeat the procedure until the copy isn't skew.

**Note:** After the adjustment, tighten the two screws of LEFT and RIGHT HINGE without fail.

### Image Inclination



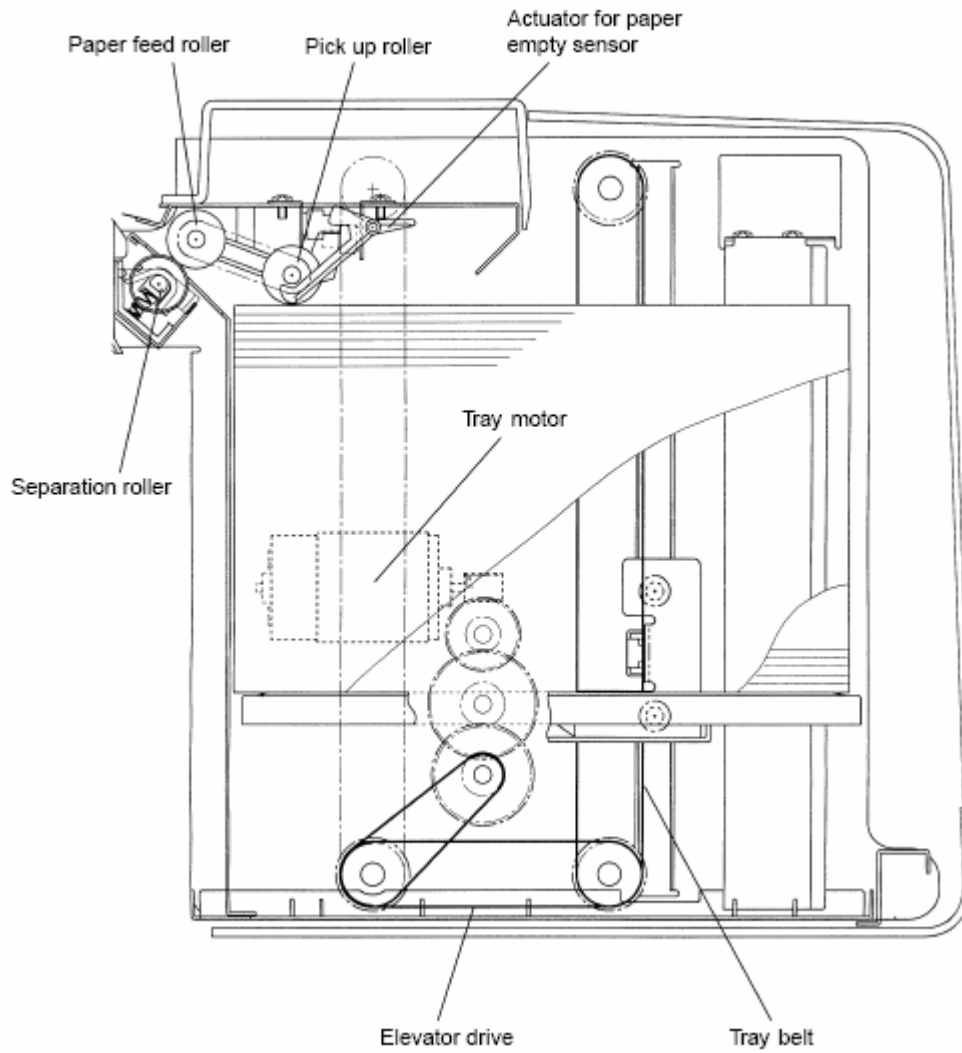
## 2. LARGE CAPACITY FEEDER (LCF) MP-1501

As far as my experience goes – this is a very reliable module. I've hardly ever made repairs on it, apart from the regular cleaning and repair of the pick up, feed and separation rollers.

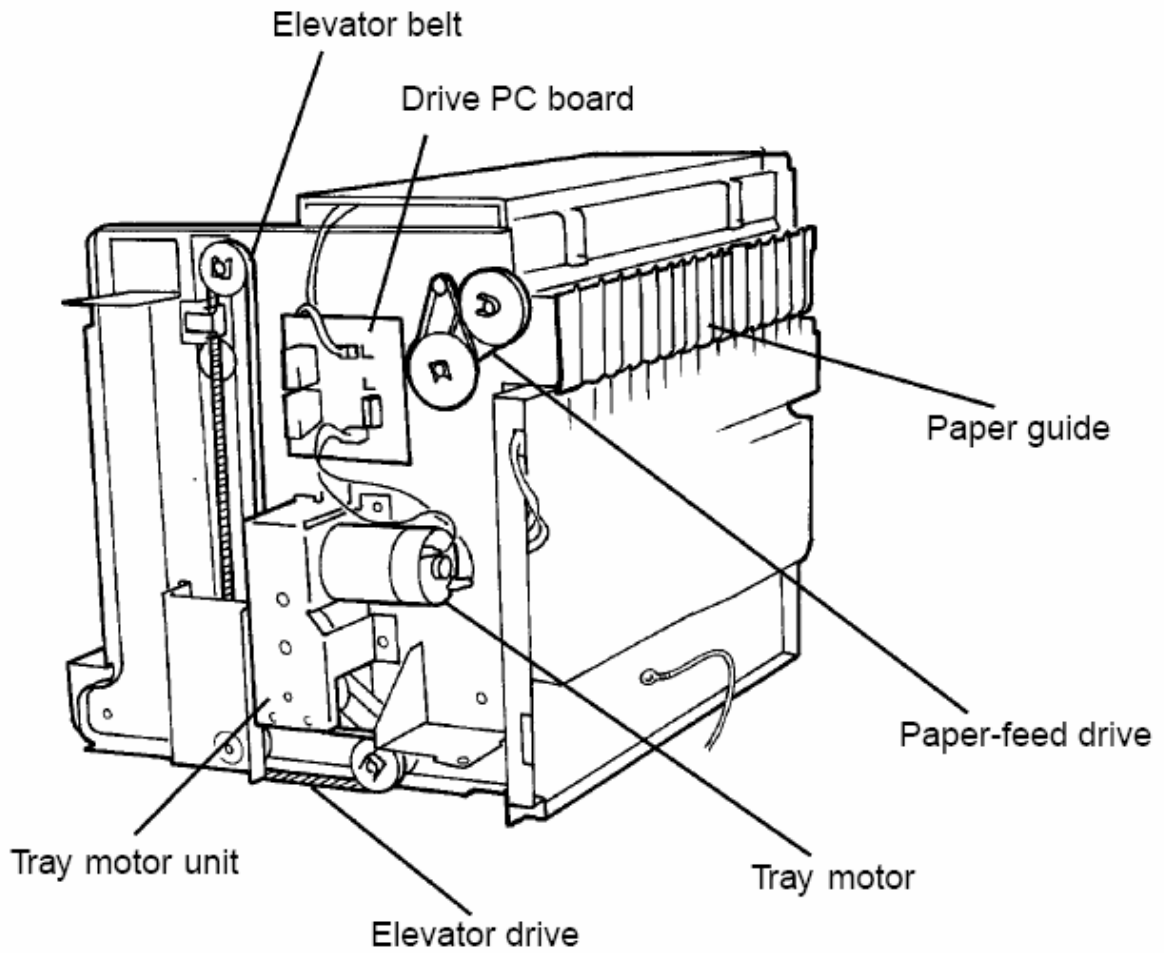
**Periodical maintenance and replaceable parts:**

	Clean at 160,000 copies	Replace x 1000
Paper feed roller	A	160, △
Pick up roller	A	160, △
Separation roller	A	160, △

**FRONT AND REAR SECTION DIAGRAMS**





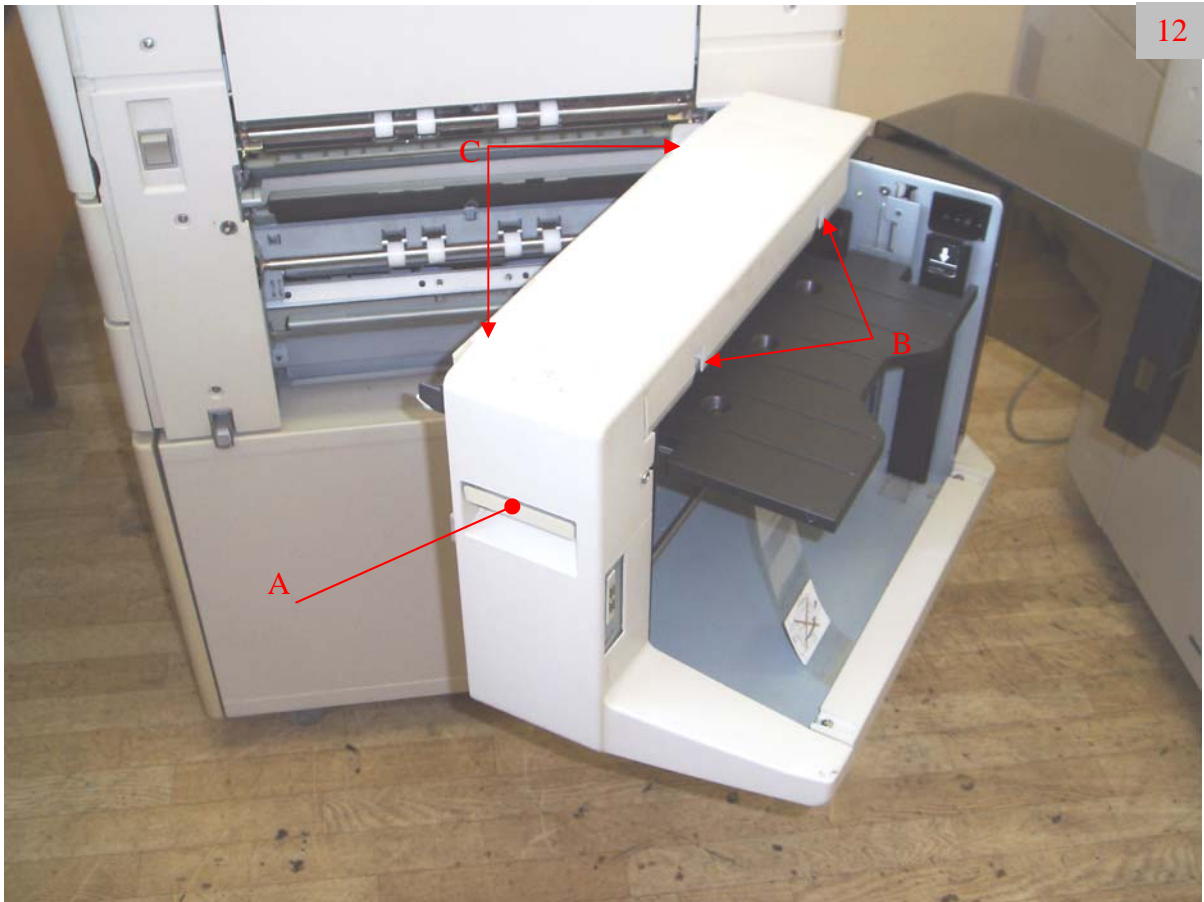


Rear side view

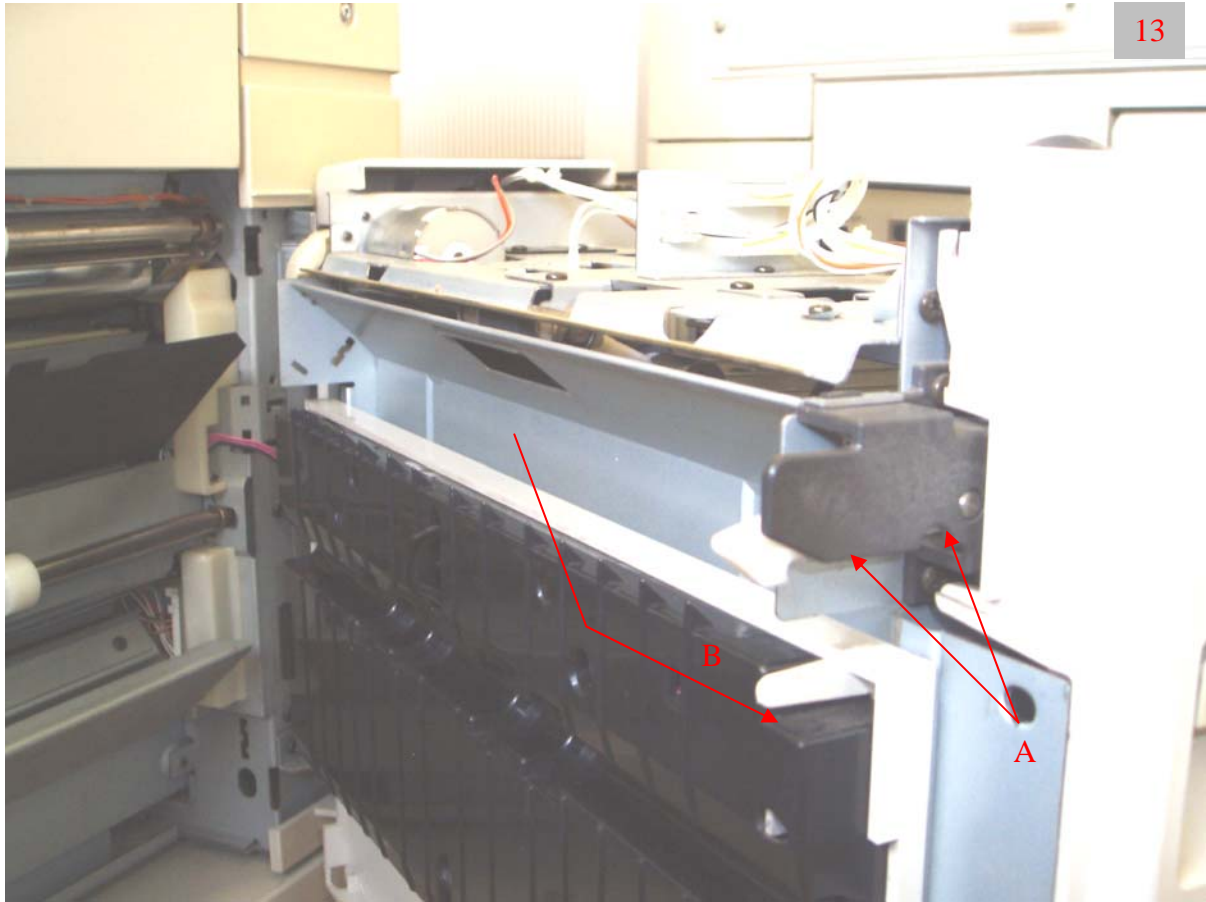
### Disassembly and adjustments:

If you plan only to perform a periodical maintenance of the module, you should open the LCF's door while the tray is in the upper position and clean the bottom of the module with vacuum cleaner. Then close the door and press the tray-down button. When the tray is down open the front door and clean with rubber restoring fluid the pick-up, feed and separation rollers. Note: some times operators complain about frequent paper jams in the module, but the pick up and separation rollers are ok. You should look at the separation roller – often it wears unevenly. If the roller has a worn strip along its length, you should replace it. To replace the three feed rollers follow the instructions bellow.

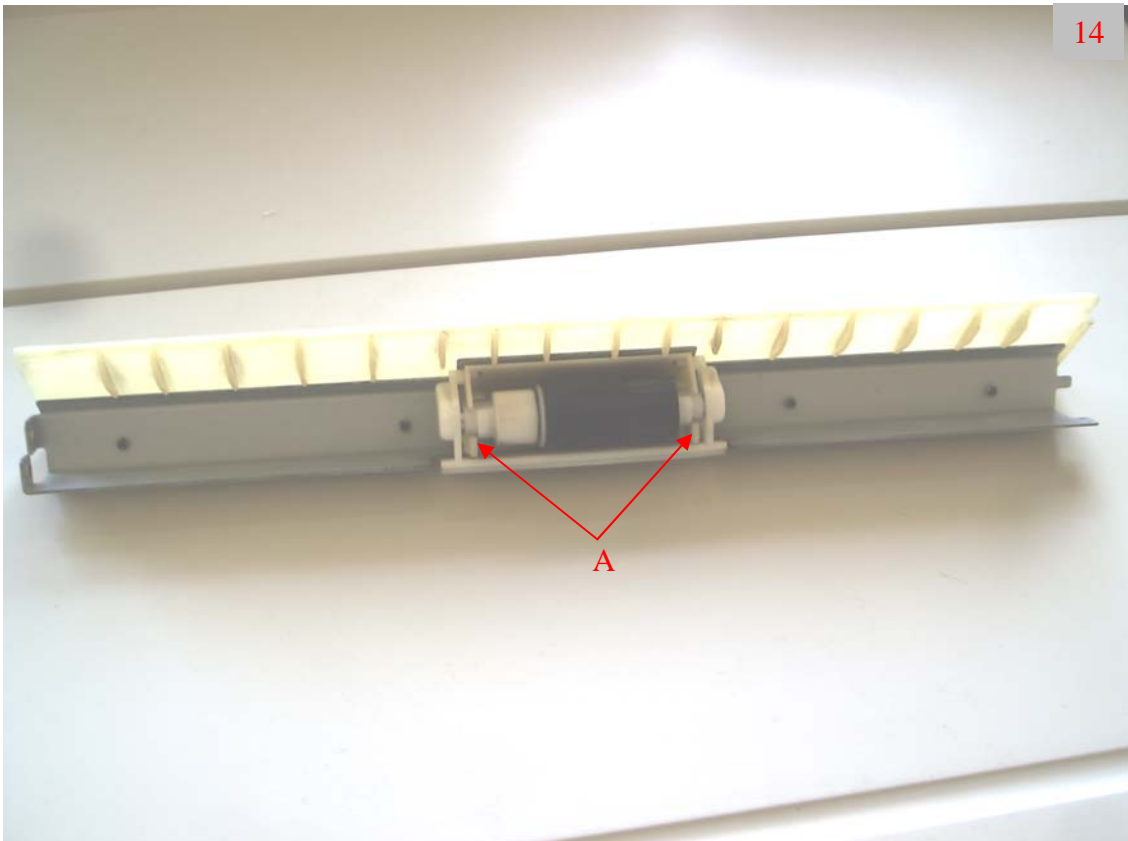
1. Press the tray-down button. Wait until the tray is in the lowest position. Lift the handle A and open the LCF. Open the front door too. Loosen screws B. Remove screws C. Remove the upper cover. See figure 12:



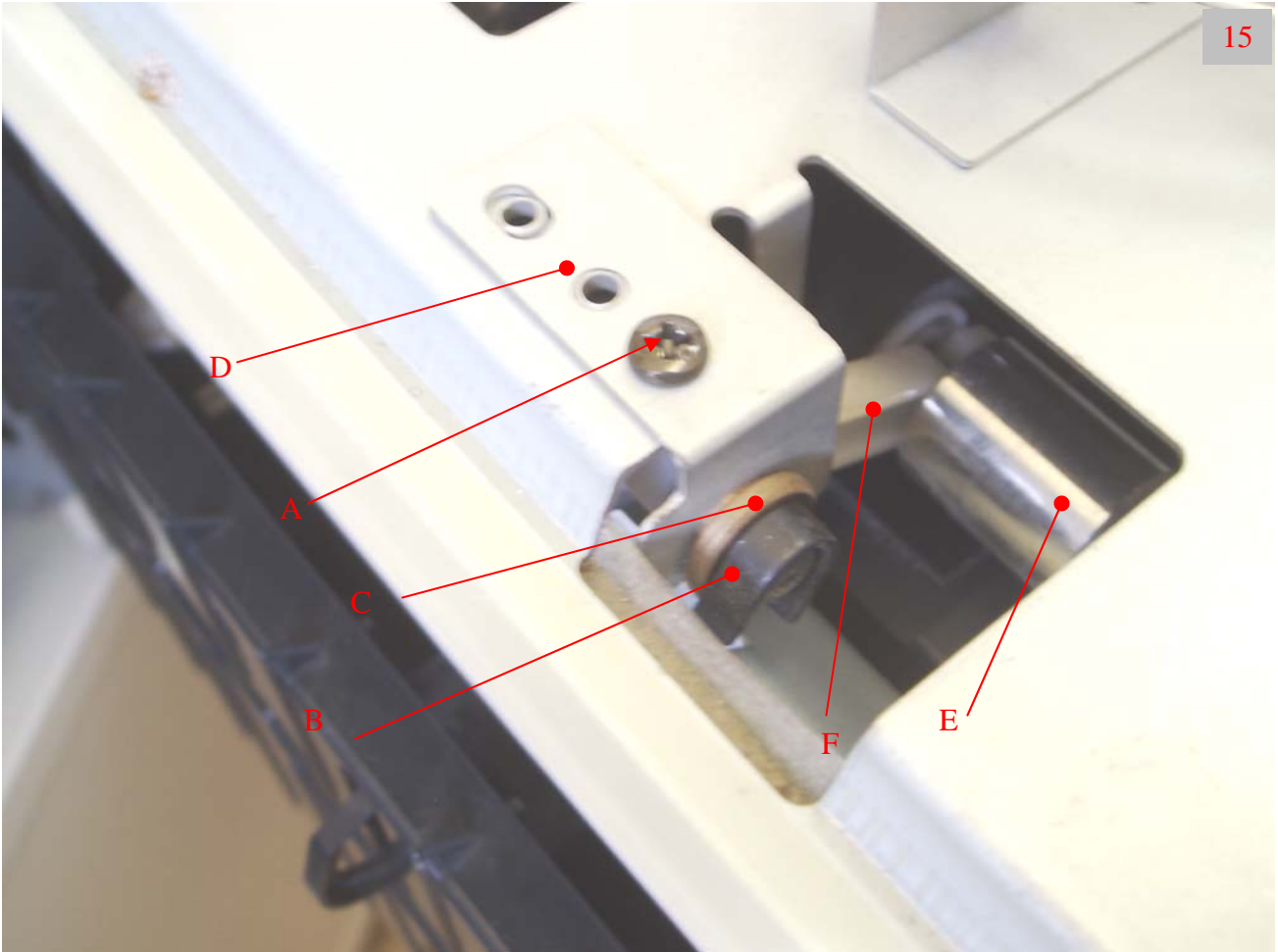
2. Remove screws A. Remove the separation roller plate in direction B. See figure 13.



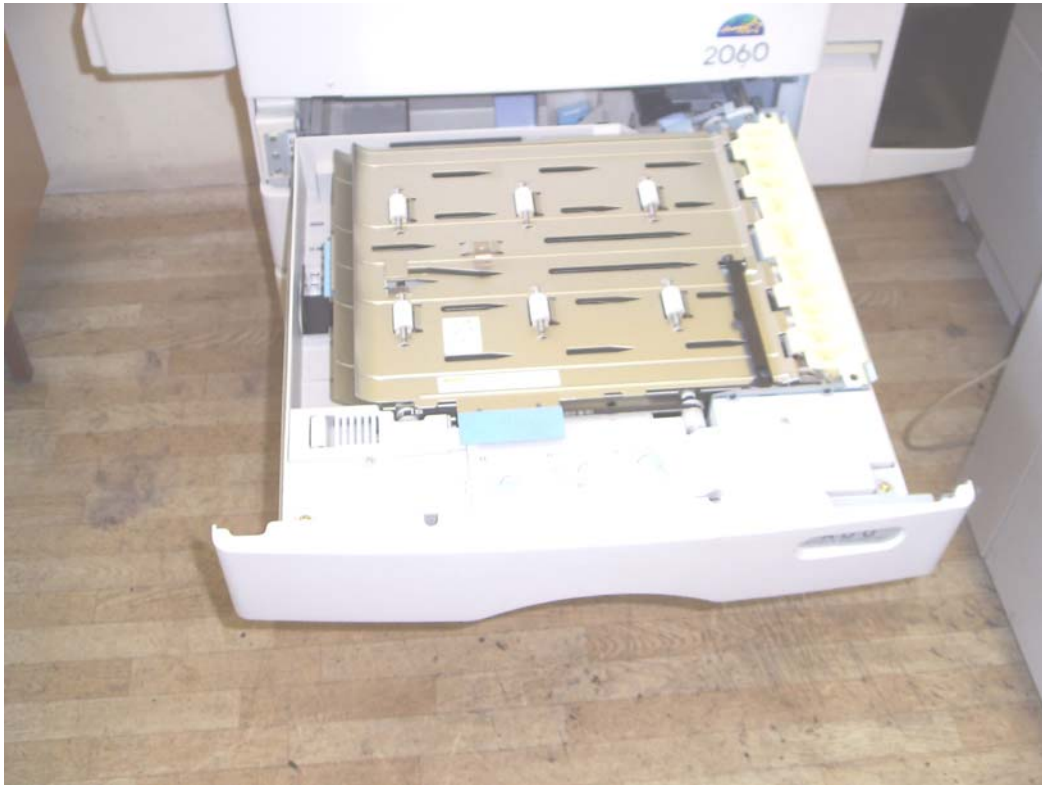
3. To remove the separation roller push the assembly tabs A. See figure 14.



4. To remove the pick up and feed tires, remove one screw A, a plastic clip B, the bronze bushing C and the support plate D. Remove the cylindrical weight E from the pick up roller and pop out the shaft from the white lever F. You should be able now to pull out the pick up roller. Remove the white lever from the feed roller shaft. Pull out the feed roller. Note: pay attention to the orientation of the rollers. They have built in one-way clutches and if you change their orientation during assembly the feed mechanism won't operate at all. See figure 15.



### 3. AUTOMATIC DUPLEXING UNIT – ADU



This is a very useful option for operators. I've maintained such units for years without even replacing the rubber feed rollers. All they needed was a periodical cleaning with rubber restoring fluid.

How ever there are some underwater stones with these modules. First of all sometimes operators open too rough the two metal sheet transport plates and bend them. As a result the gap between them becomes too narrow or even disappears, causing paper jams. The other effect if that the sheet would stop in the middle of its path to the stack tray at the bottom of the module. This is caused again by the bent plates. They have two paper actuated transport sensors, which position has become too high and they cannot contact with the receiving led parts. The solution to these problems is to gently bend the plates to their original position.

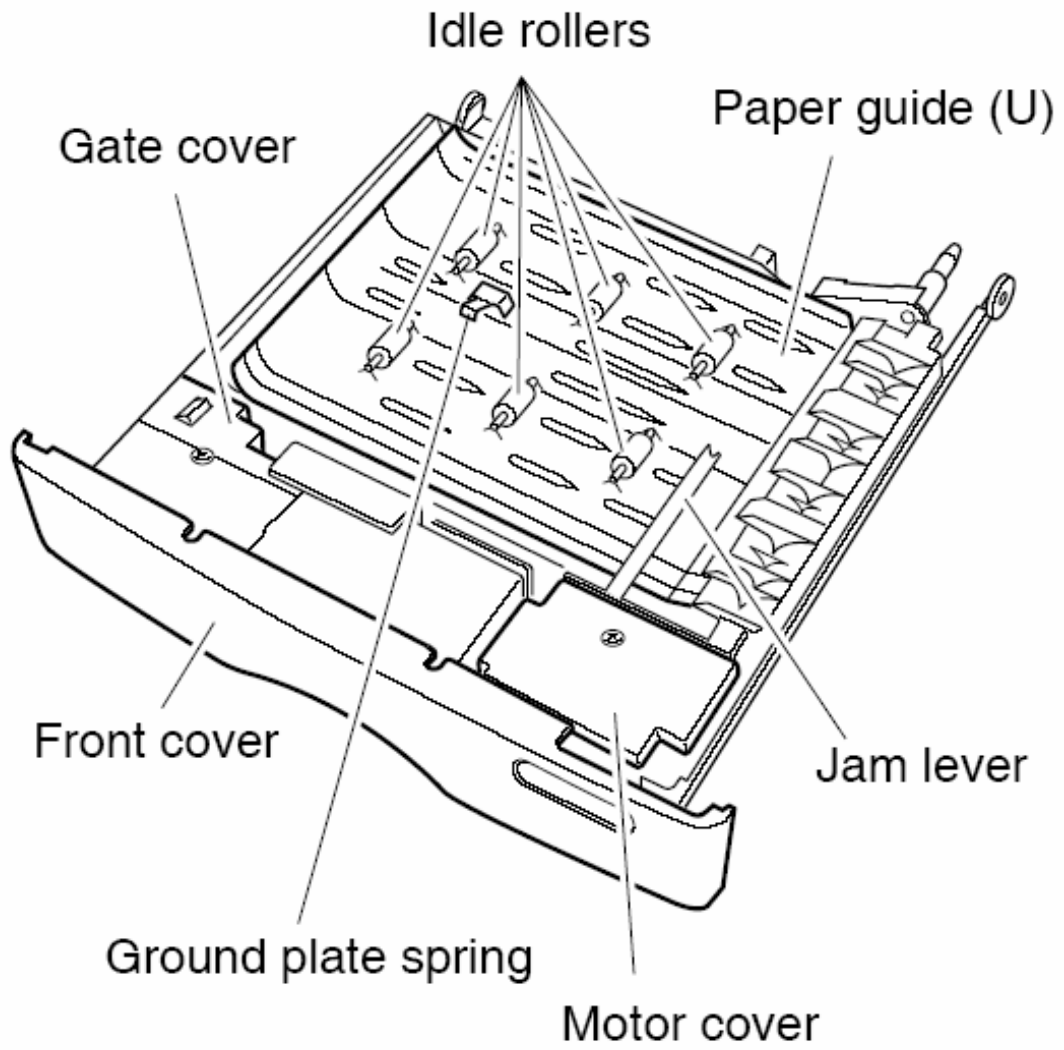
Another problem is paper jams, when the sheets enter the ADU, but fail to be picked up for copying on their back side. This is caused by a failed spring clutch, located at the back of the module. See Disassembly chapter. Bellow is the periodical maintenance list:

#### Periodical maintenance and replaceable parts

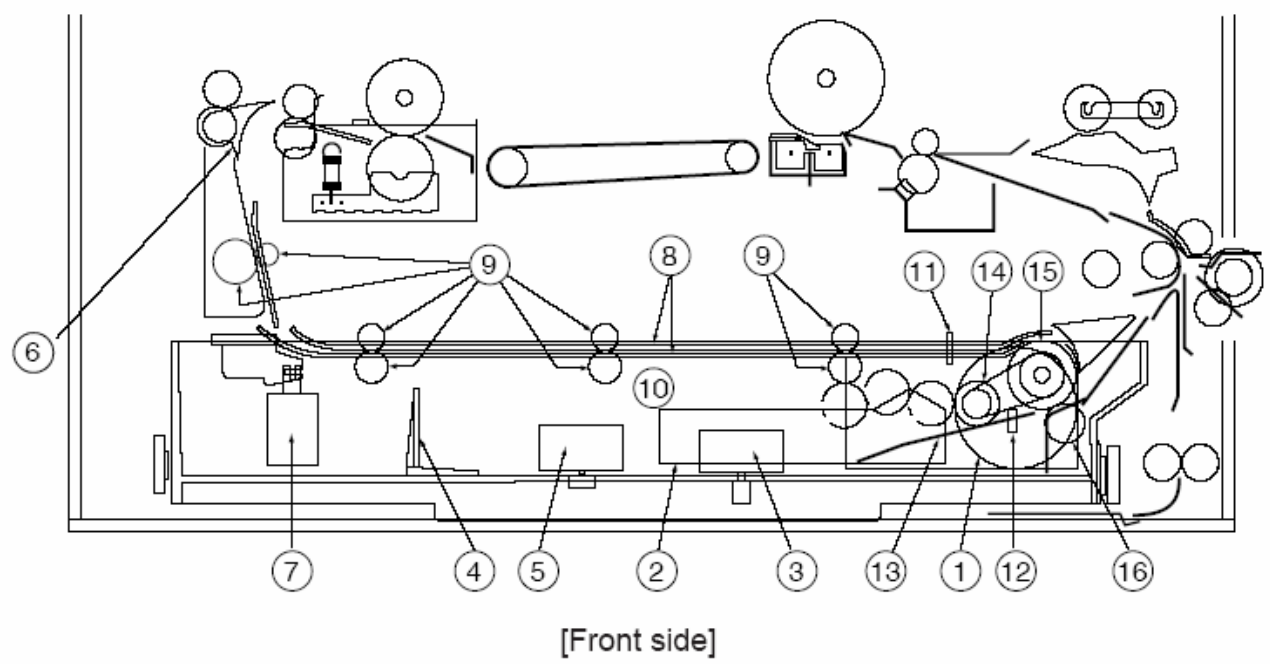
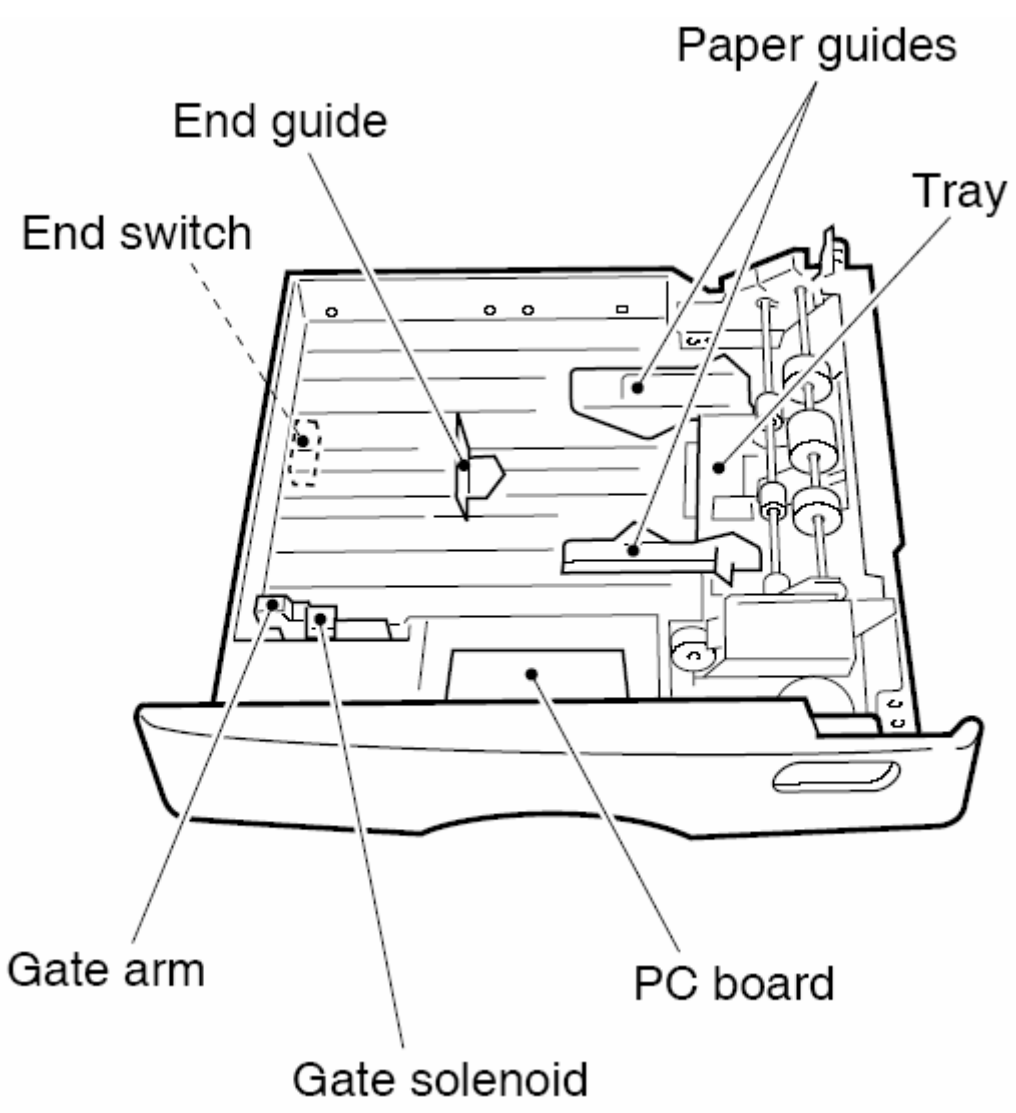
Area	Item to check	Clean at 160,000 copies	Lubricate None	Replace x 1,000	Check while on	Remarks
ADU	71. Pick-up roller	A		80, △		
	72. Feed roller (main)	A		80, △		
	73. Feed roller (sub)	A				
	74. Separation roller	A		80, △		
	75. Transport roller	A				
	76. Empty sensor	○				
	77. Jam sensor	○				
	78. Side guide sensor	○				
	79. End sensor	○				

Lubrication point: None

**Structure of the ADU:**



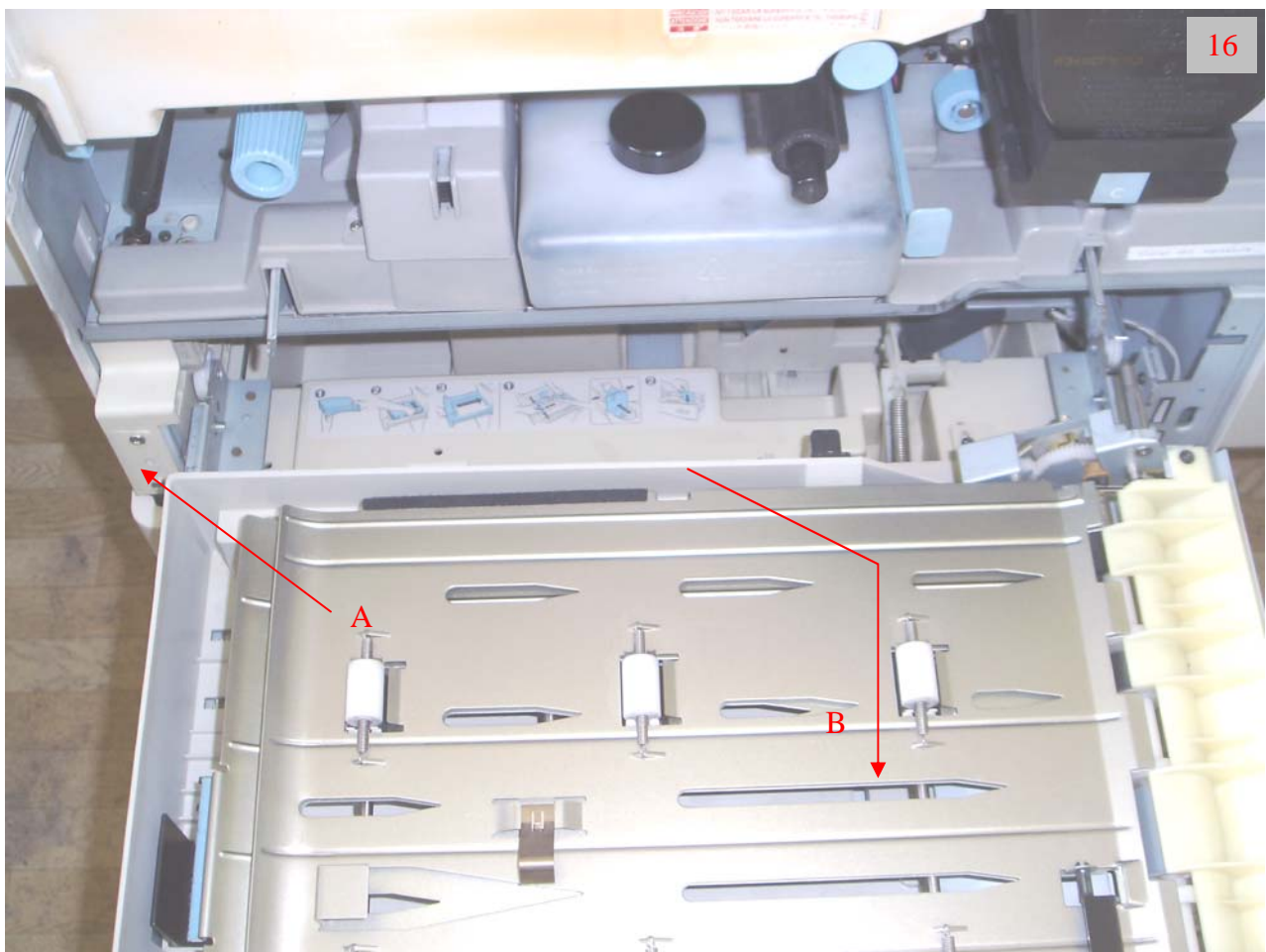




- |   |                         |   |                   |
|---|-------------------------|---|-------------------|
| ① | ADU motor               | ⑨ | Transport roller  |
| ② | Side guide              | ⑩ | Stacking section  |
| ③ | Side motor              | ⑪ | Jam switch        |
| ④ | End guide               | ⑫ | Empty switch      |
| ⑤ | End motor               | ⑬ | Tray              |
| ⑥ | EXIT/ADU selection gate | ⑭ | Pickup roller     |
| ⑦ | Gate solenoid           | ⑮ | Stack/feed roller |
| ⑧ | Open guide              | ⑯ | Separation roller |

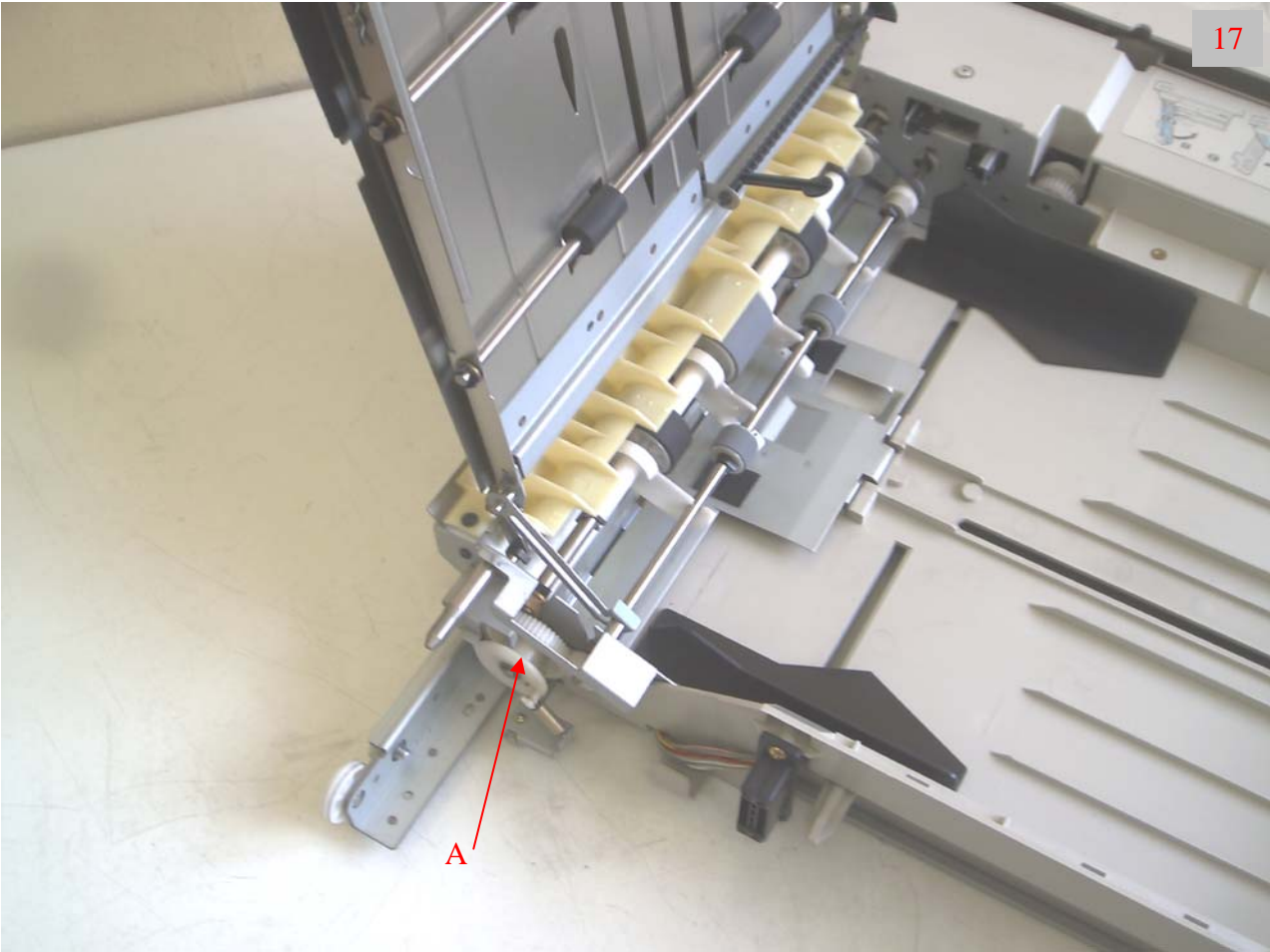
### Disassembly and adjustments:

1. Pull Out The ADU. Open the front cover of the copier and remove the two pins that hold it to the machine. Remove the cover. Remove screw A and the magnet plate with it. Lift the entire unit upwards and remove it from its rails in the copier (direction B). Place it on a work desk. See figure 16.





2. Carefully inspect the spring clutch A for damage. It is responsible for lifting up the plate with stacked sheets of paper as well as for the rotation of the pick up and feed rollers at the same time. Clean all rubber rollers with rubber restoring fluid. See figure 17.



#### 4. SORTER MG-1003

This is a 10 bin sorter without stapler, but it is also the most reliable one. Basically sorters don't need so much technical attention, during exploitation. Their mechanical parts are made tough and hardly ever break if the module is used normally.



There are two defects that you may encounter servicing the sorter. In order to correctly understand their description and solution it is useful to know the construction of such unit.

#### Bin Up/Down Moving Mechanism:

Since this sorter is of a bin moving type, a bin designated moves to the paper transport position and copy sheets exit into the designated bin. The drive force of the bin moving motor is transmitted through a timing belt and gears to the spiral cam 1. At the same time, it is also transmitted through a drive shaft to the spiral cam 2. The bins are moved up or down by changing the rotation direction of the motor. The bins are stopped at the preset position by one-rotation detection sensor tab attached to the spiral cam 2.

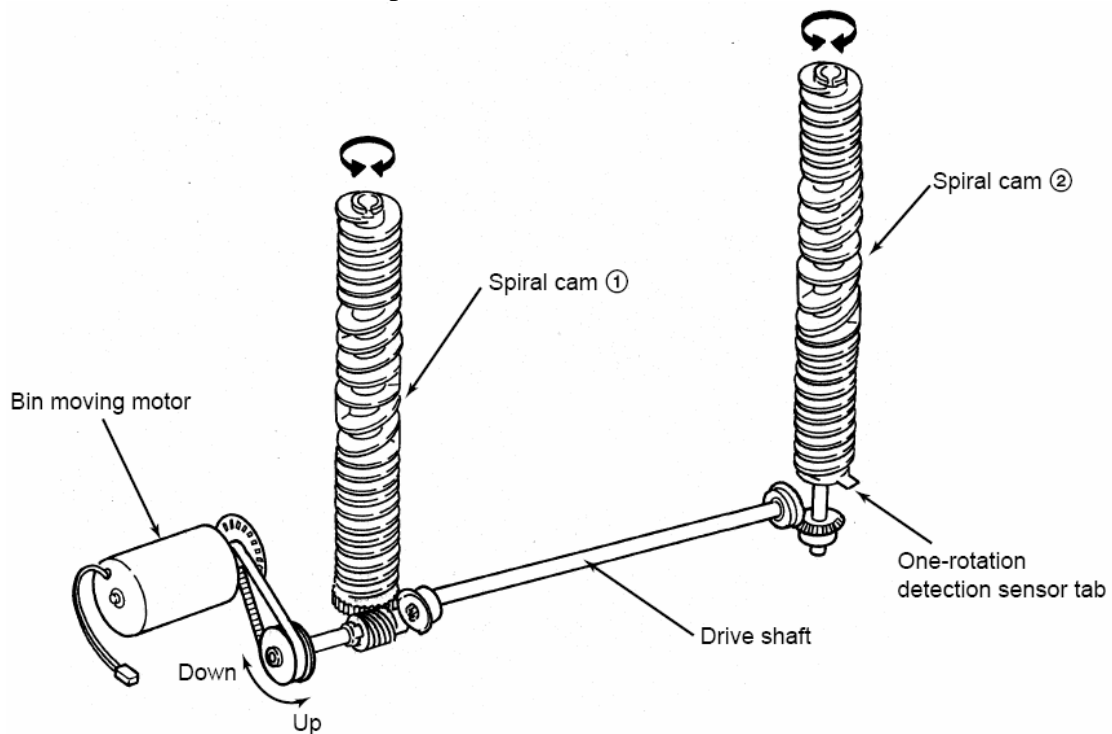


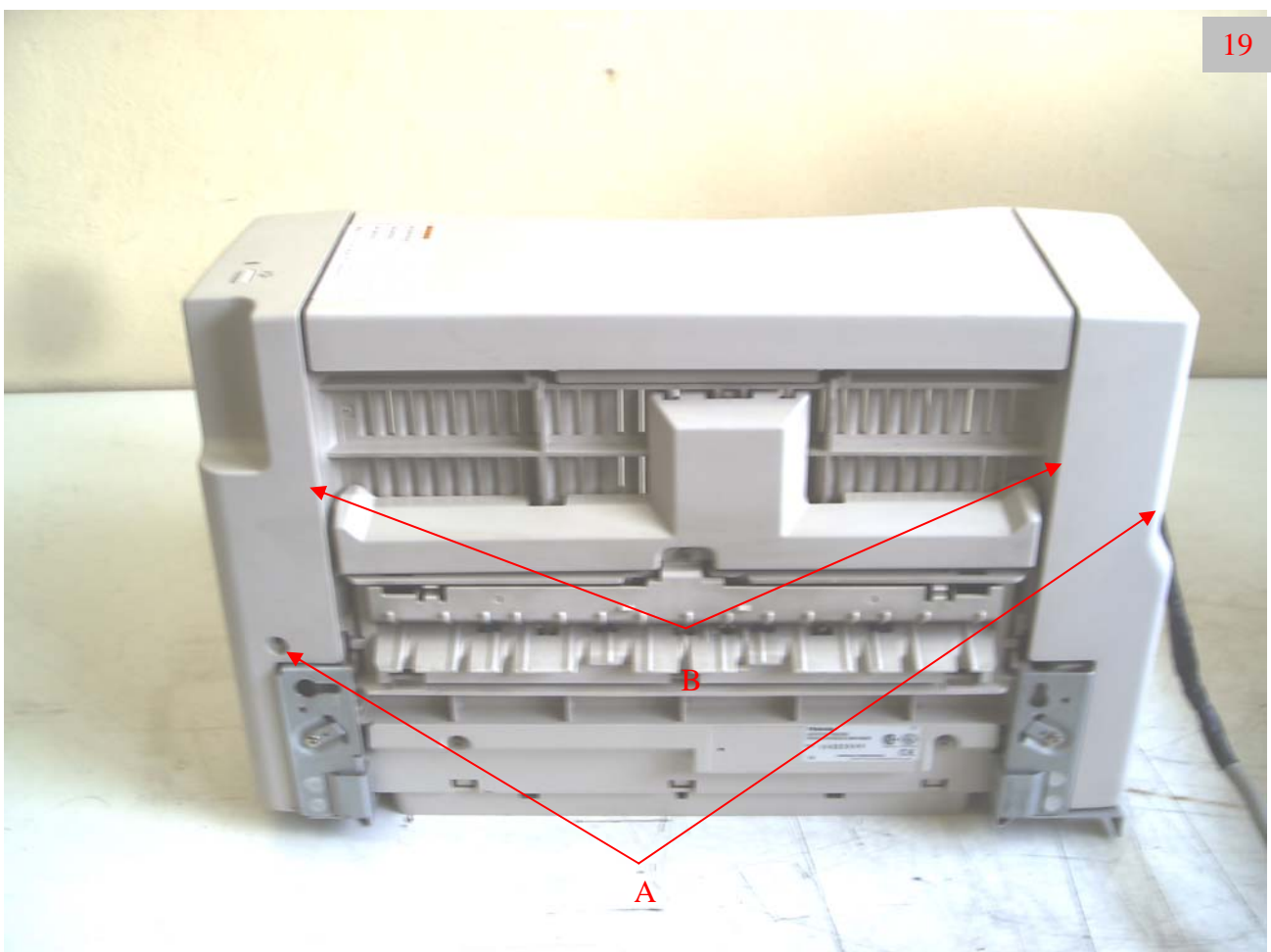
Figure 18 – Sorter construction

Operators sometimes push the sorter's bins too hard. This leads to breaks in the guide rollers at the back of every bin, or in the sliders in front of each bin. The broken bin stands at an angle relative to the remaining horizontal bins. When the sorter attempts to lift the bin assembly the broken one creates tension and the drive mechanism slips. This in turn leads to misalignment in the drive shafts with cam grooves. The drive gears of the mechanism may break, or yet more bin rollers may break. This is the only serious trouble that sorters can experience. Advise the operators of sorters with angled bins not to use them until the misalignment is corrected. Generally the procedure is the same in every sorter model. It is described in the corresponding service manual, but the rule is: disengage the front from the rear drive cam-grooved shafts. Rotate them correspondingly so that the notch of each of them is in the right position. Maintaining this position engage the two shafts again. Make sure that all bins are horizontal and all bin guide rollers and sliders are correctly position one on top of the other. See figure 18.

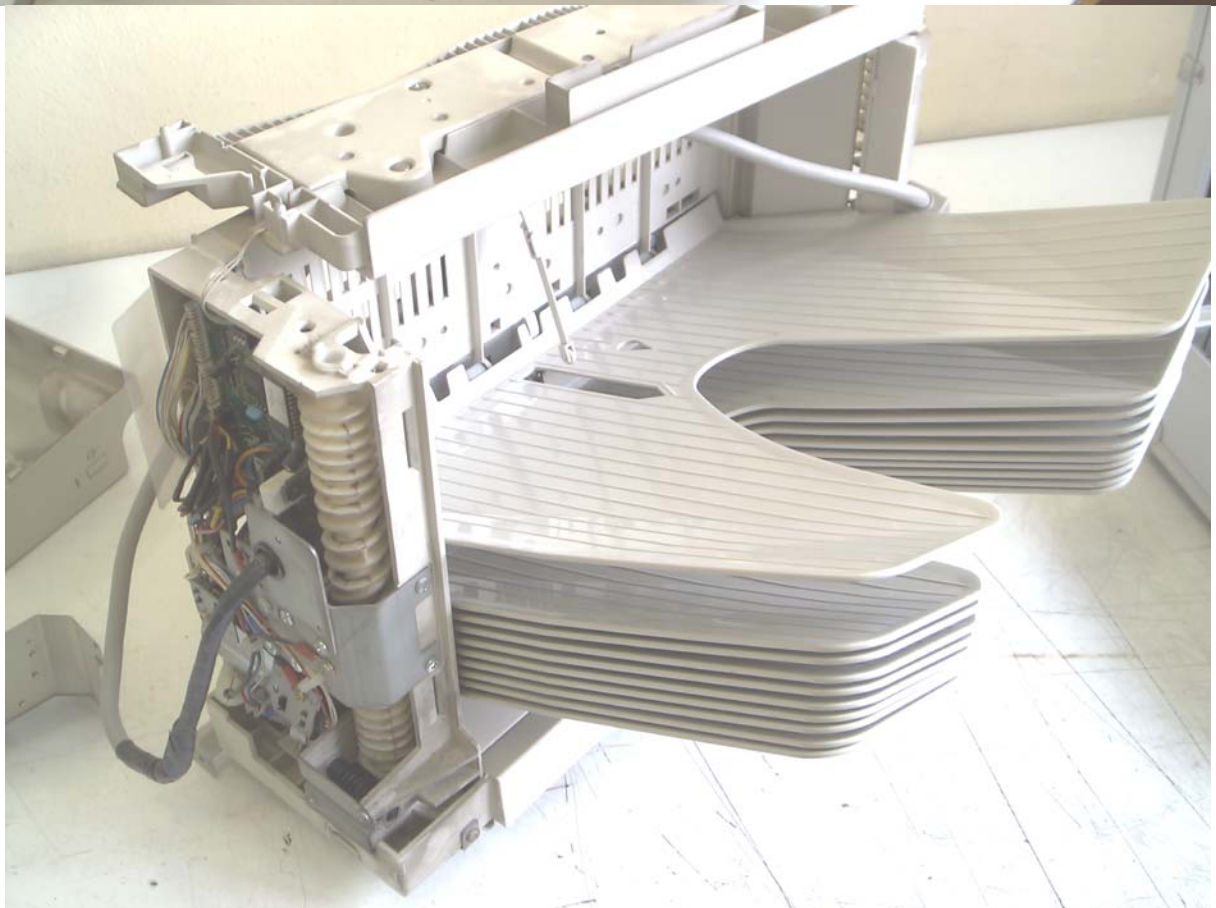
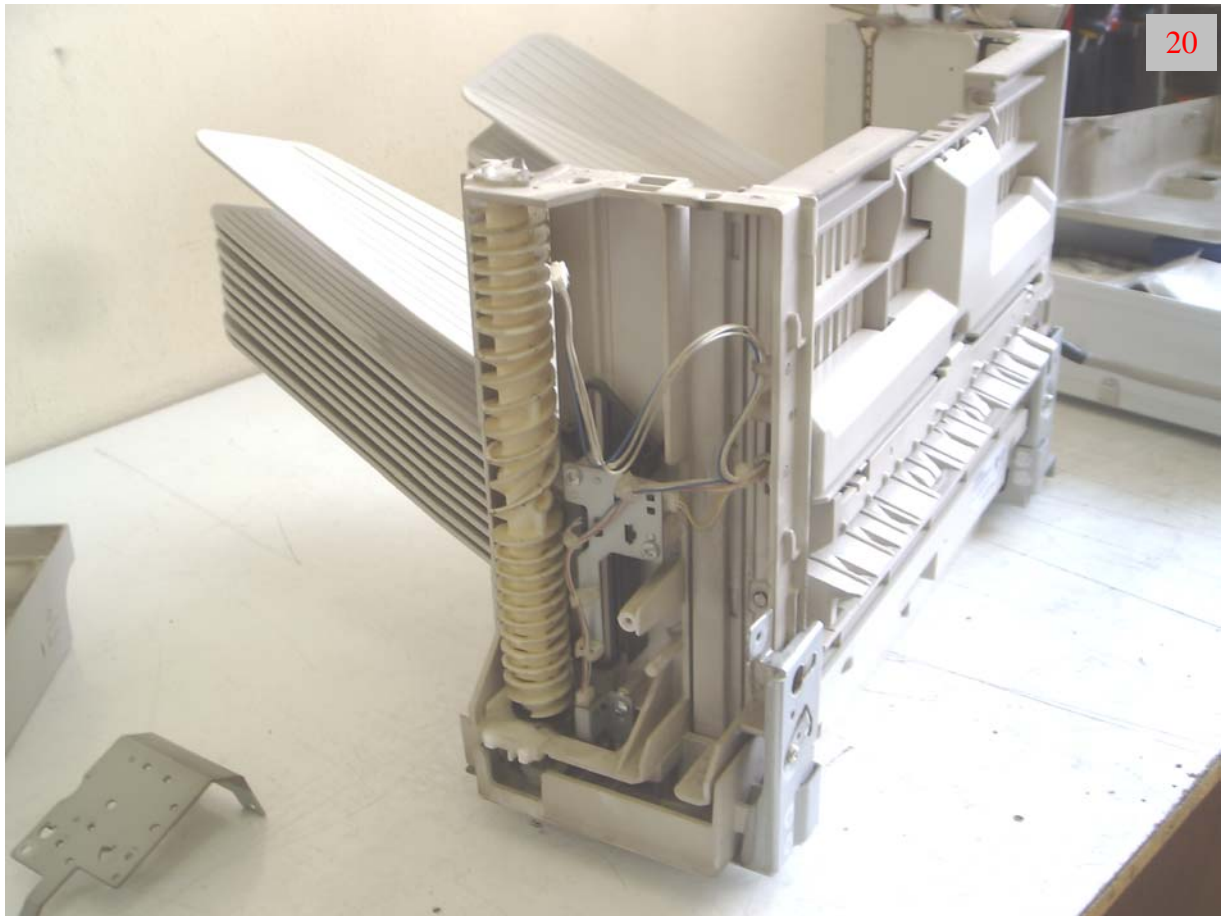
Another problem is that the sorter seems to think that it has paper in the bins and wants you to remove it, while there isn't any paper at all. This is caused by contamination of the optical sensor for paper in the sorter. It consists of a LED on top of the sorter and a receiver on the bottom. Clean the receiver and the problem is solved.

### **Disassembly of the sorter:**

1. Detach the sorter from the copier. Place it on a desk. Remove screws A. Lift and then pry off the ends B of the side covers to remove them. After you have removed the side covers, push the tabs on each end of the top cover and remove it. Clean the optical sensor on the back of it. See figure 19.

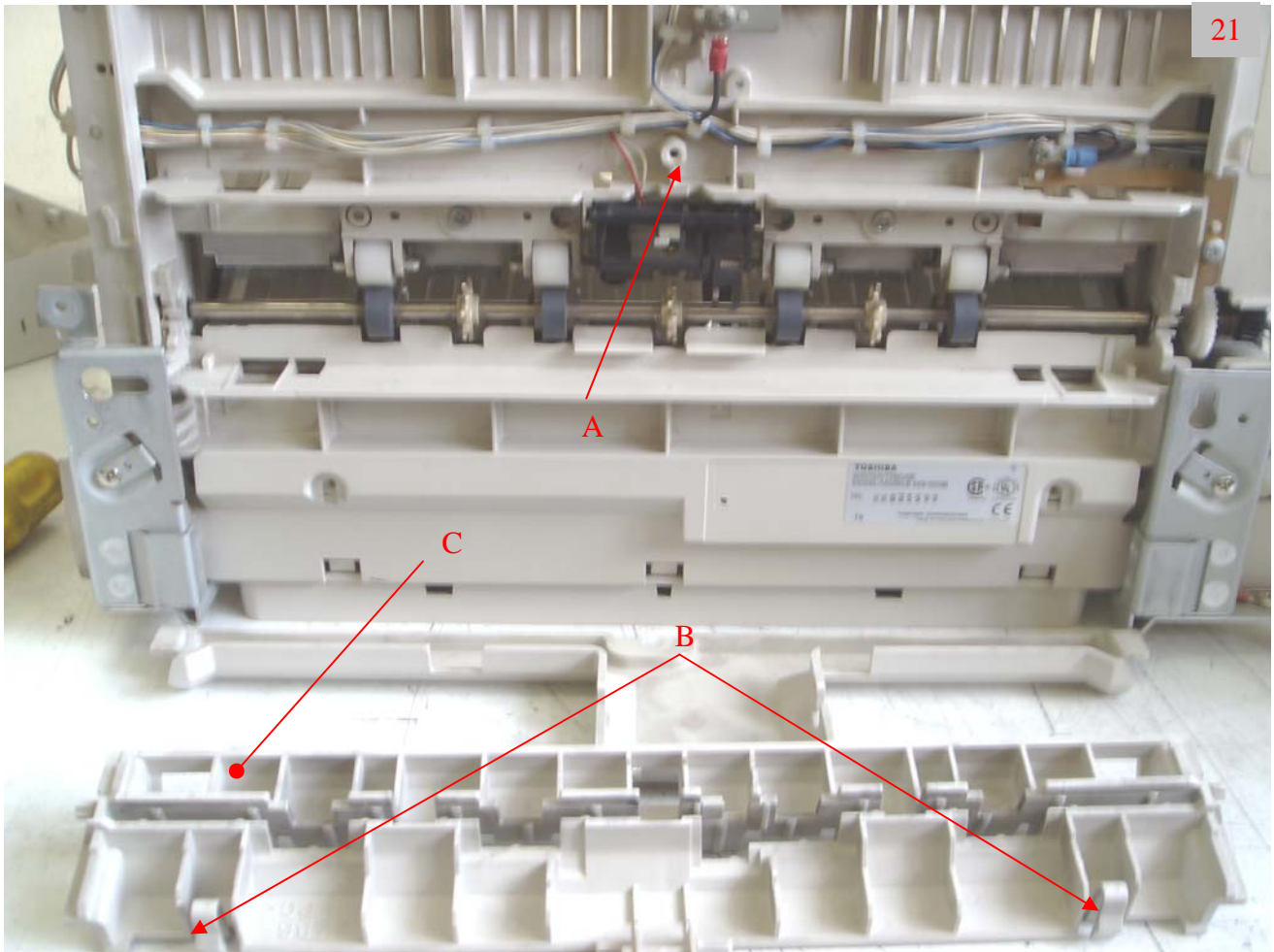


2. Figure 20 shows the construction of the sorter viewed from the front and the rear. Apply white grease to the cam-grooved drive shafts. This is important for their fail-free operation.





3. To get access to the delivery entrance rollers and the paper exit sensor, remove screw A and the cover underneath. Push the two clips B and pull out the cover C. You can clean the exit rollers with rubber cleaning fluid and inspect the exit sensor. See figure 21.

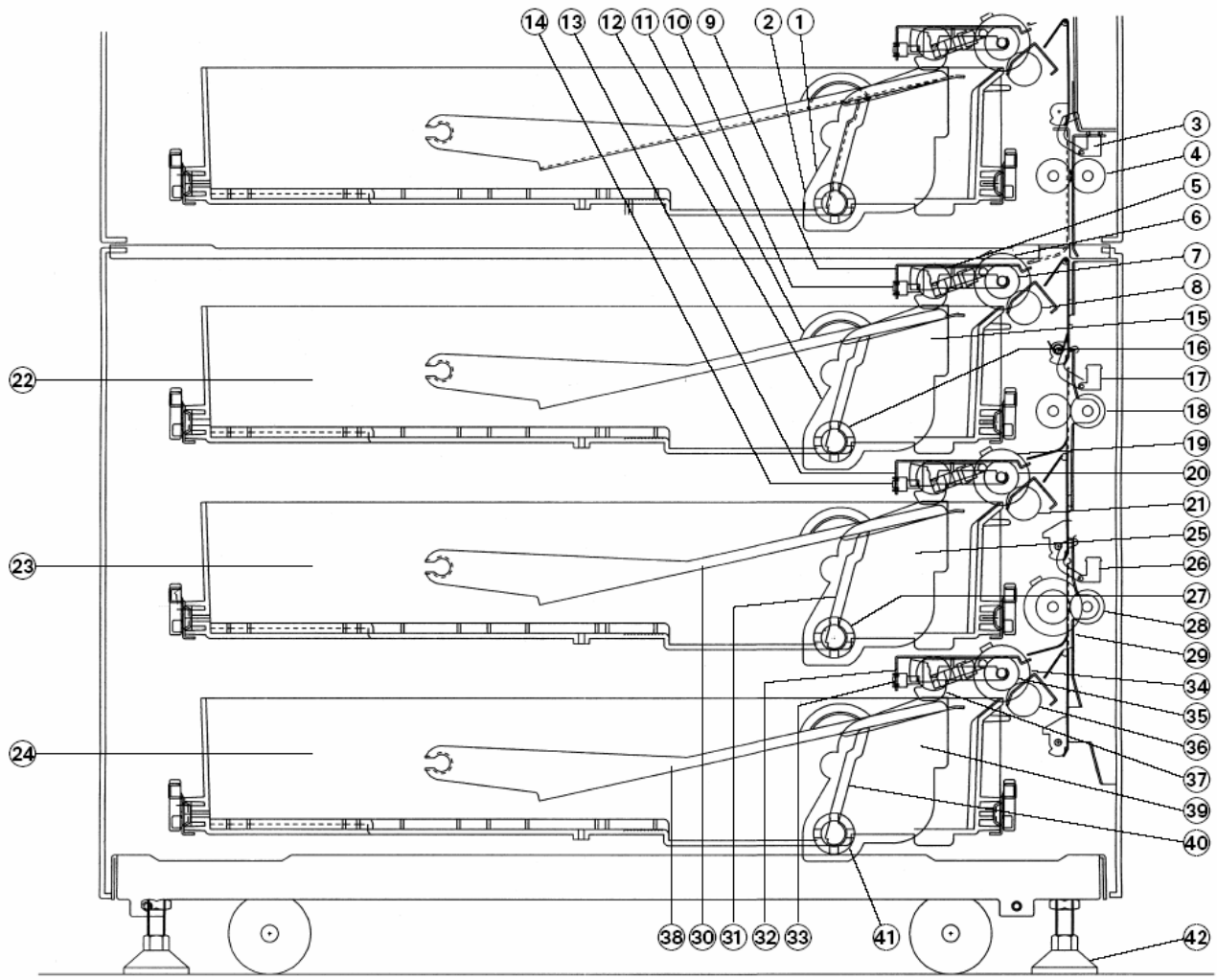


## 5. THREE PAPER TRAY PEDESTAL KD-2009

The role of the pedestal is pretty obvious. The construction of the module is very simple. It consists of 2 (model KD-1003) or 3 paper feed mechanisms, that are the same in construction. What's more – they are the same as the standard feed module, located in the copier.



The only maintenance needed for this module is to clean the feed rollers with rubber cleaning fluid and replace them when they are worn. The procedure for removing each module is the same as for the one inside the copier. It was reviewed in the previous article about Toshiba 2060/3560 and 4560 models. However it is useful to know the layout and construction of the pedestal. See figure 22:



Symbol	Name
1	TUP4-SW (S9)
2	EMP4-SW (S12)
3	Paper Stop Switch 3
4	Transport Roller 3
5	PFP-PICK-UP-ROLLER-1
6	FD3-CLT (L3)
7	PFP-FEED-ROLLER-1
8	PFP-SEPARATION-ROLLER-1
9	TUP3-SW (S8)
10	EMP3-SW (S11)
11	PFP-CST1-TRAY
12	PFP-ELEVATOR-1
13	TUP4-SW (S9)
14	EMP4-SW (S12)
15	TR3-MOT (M3)
16	PFP-ELEVATOR-COUPPING-1
17	PSTP4-SW (S3)
18	TRANS-4-ROLLER
19	FD4-CLT (CL3)
20	PFP-FEED-ROLLER-2
21	PFP-SEPARATION-ROLLER-2
22	PFP-CST-1
23	PFP-CST-2
24	PFP-CST-3
25	TR4-MOT (M4)
26	PSTP5-SW (S4)
27	PFP-ELEVATOR-COUPPING-2
28	TRANS-5-ROLLER
29	PFP-CLT (CL1)
30	PFP-CST2-TRAY
31	PFP-ELEVATOR-2
32	TUP5-SW (S10)
33	EMP5-SW (S13)
34	FD5-CLT (CL4)
35	PFP-FEED-ROLLER-3
36	PFP-SEPARATION-ROLLER-3
37	PFP-PICK-UP-ROLLER
38	PFP-CST3-TRAY
39	TR5-MOT (M4)
40	PFP-ELEVATOR-3
41	PFP-ELEVATOR-COUPPING-3
42	ADJUSTER