TOSHIBA THE 60TH SERIES ANALOG COPIERS – A FINAL ANALYSIS OR WHICH ARE THE MOST COMMON AND MIND SCRATCHING PROBLEMS IN THESE MACHINES PART 2.

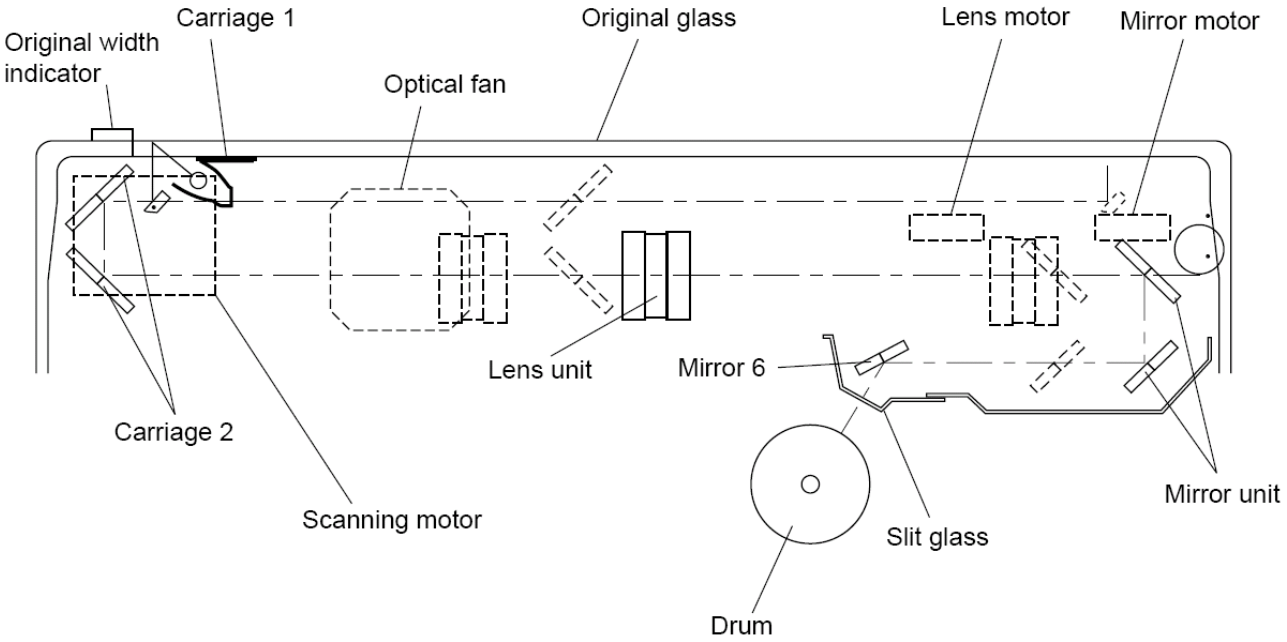
This is the final article about Toshiba's 60th series analog copiers. In the article you will find the most common problems, found in the models 2060, 3560 and 4560, as well as in their options – duplexing unit, sorters and automatic document feeders.

The models, mentioned, are the working horses of the middle class office equipment. They are found in many offices, public organizations and particularly in small copy centers. It is obvious that the times when these models were new are far gone. This means that except for the regular service maintenance and periodical replacement of parts, according to the service documentation, you have to expect the unexpected. I mean that many of the copiers in the field now have made over half and even over a million copies. Often these copiers are so dirty that one may wonder how they work at all. The result is a poor quality copy and all sorts of weird behavior of the machine. Many "improvements" are found too. The best way to bring such machine back to life again is to first make a complete periodical maintenance and cleaning, according to the methods, I have given in previous articles. Just after you have done this you can start to "cure" the other defects of the machine, which occur after many many thousands of copies and are not described in the service manuals.

TROUBLESHOOTING THE 2060 3560 AND 4560 MODELS

OPTICS MODULE

From a design point of view, this is a very reliable and well built module. In fact I have rarely had any problems with the module, apart from the regular cleaning of mirrors.

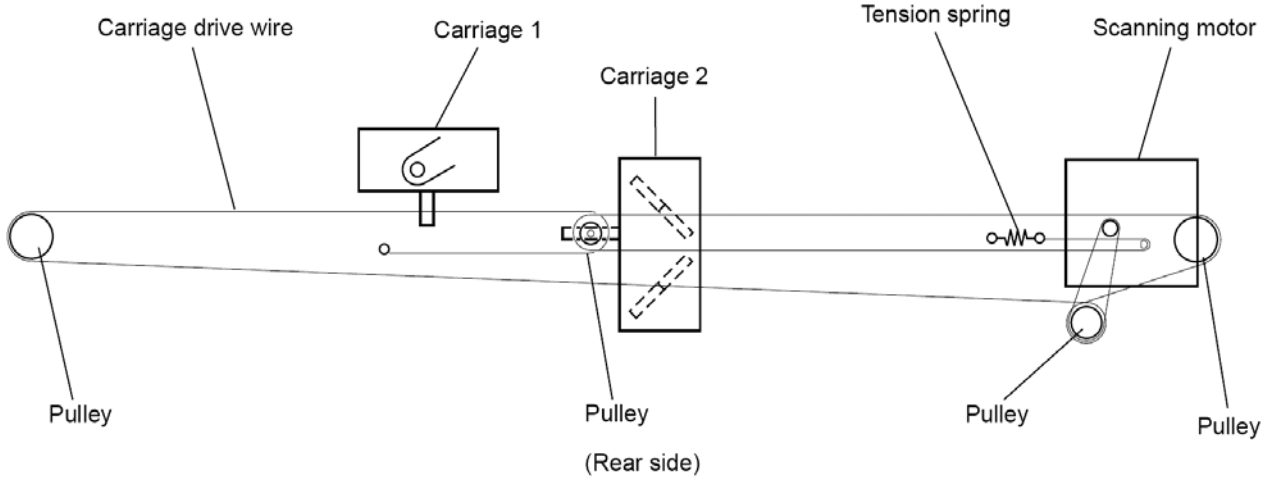


Optical system (front view)

The biggest issue here is to have to change the optics carriages drive wire, but it happens very rarely:

Installation of Carriage Drive Wire

When the carriage drive wire is replaced, attach the new wire as shown:



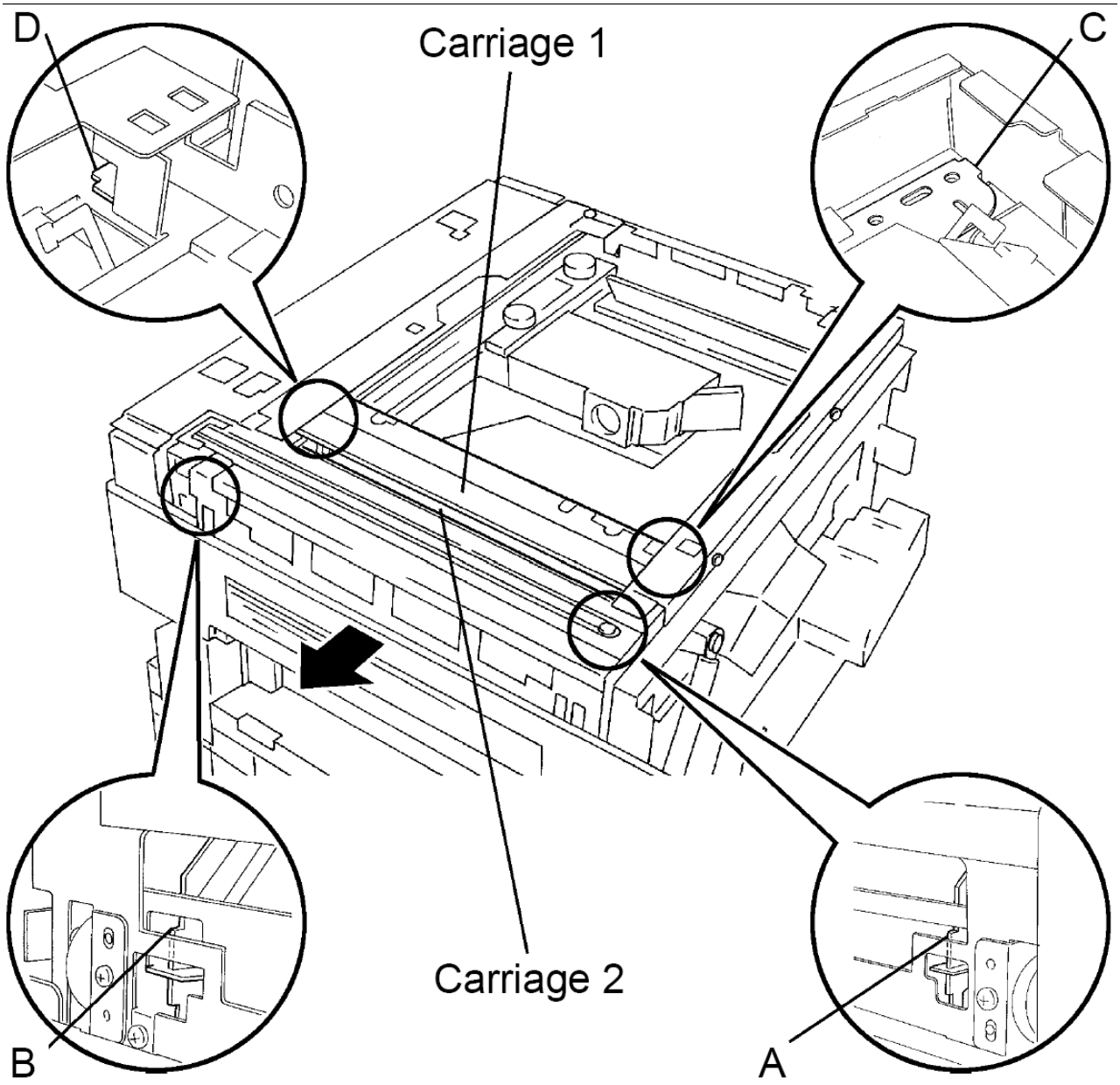
(Rear side)

Belt tension adjustment

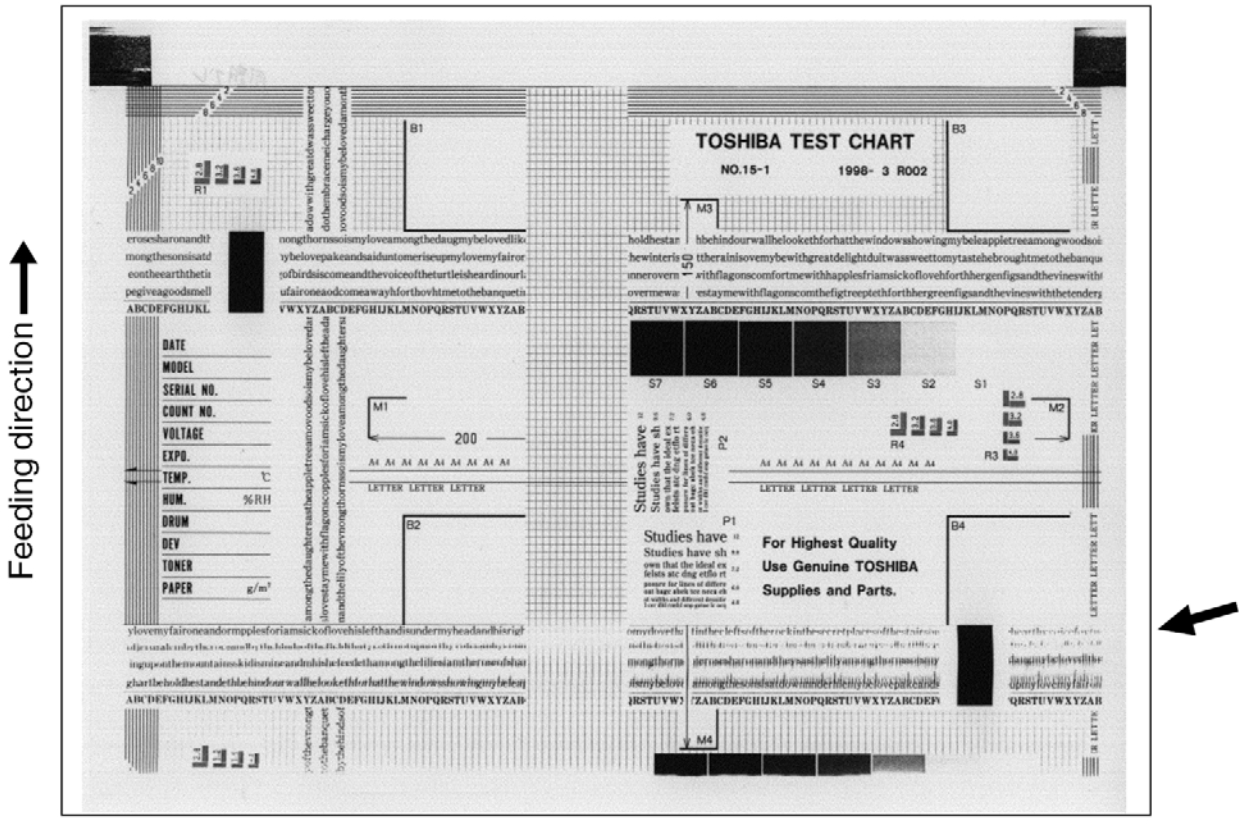
(1) For this model, it is unnecessary to adjust the carriage drive wire tension.

Adjustment of carriage 1 and carriage 2

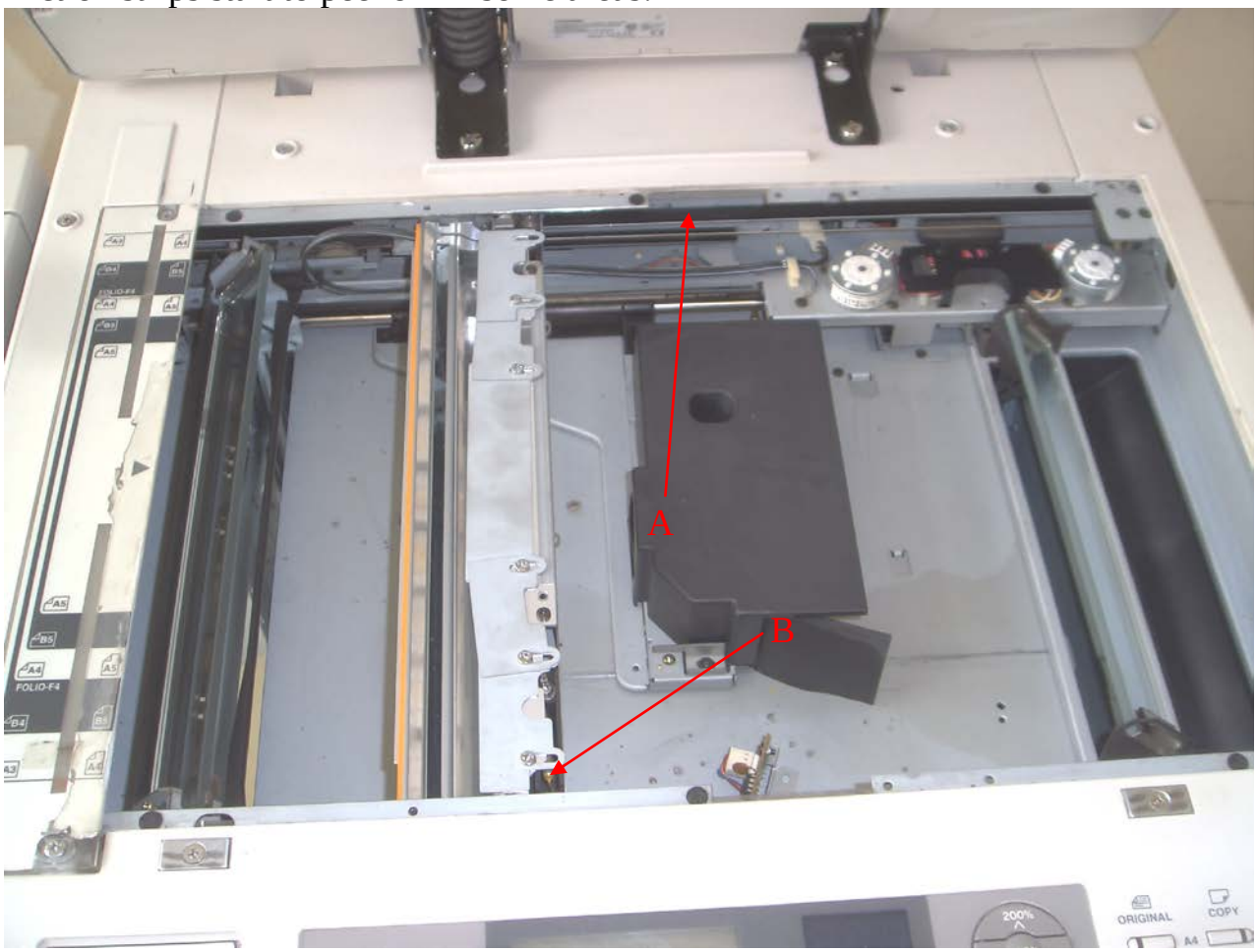
(1) Loosen the 3 screws fixing carriage-1 (2 screws) and -2 (1 screw in front) to the wire.
(2) While pressing carriage-2 against the exit side frame (A & B), tighten the carriage-2 fixing screws.
(3) Also while pressing carriages 1 and 2 against the exit side frame (C & D), tighten the carriage-1 fixing screws.



Another issue in the optics module is to have uneven focused strips on a specific area on the copy, shown on the figure bellow:



This is due to bumps forming in the guides A of the carriages, when the low friction strips start to peel off in some areas:



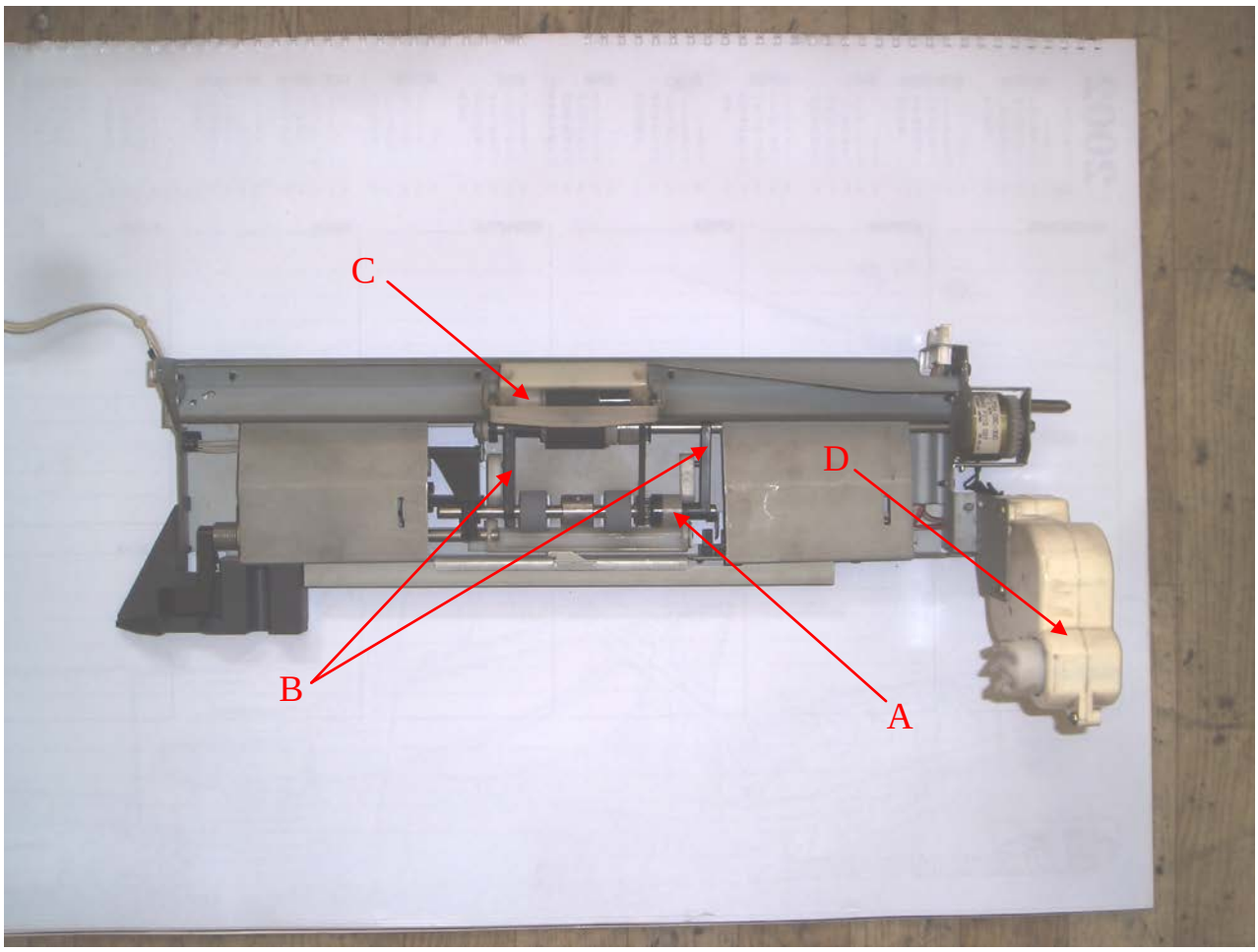
Another problem in the optics module is when the machine blows again and again the thermo fuse on the exposure halogen lamp (see B on the figure above). The problem is the cooling optics fan, found at the back of the machine.

PAPER FEEDING MODULE

Normally the module works very reliably. However there are some problems over the years of exploitation. Sometimes the copier wouldn't pick up paper from the paper trays, built in the machine, even though the rollers are replaced. This is caused by the one way clutch A mounted on the pick up rollers. It becomes dirty and doesn't transmit torque to the pick up rollers. The solution is to remove it and spray it with isopropyl alcohol and clean it with cotton swabs.

The other cause may be the pick up roller engaging levers B snap of f its places. The solution is to snap the levers in place.

Yet another reason may be uneven wear of the separation roller. The pick up rollers take the paper, but it stops at the feed/separation rollers. This is caused by contamination of the separation spring clutch. The separation roller fails to rotate following the fed paper and wears only in a strip. The solution is to replace the roller and to lubricate the clutch C :

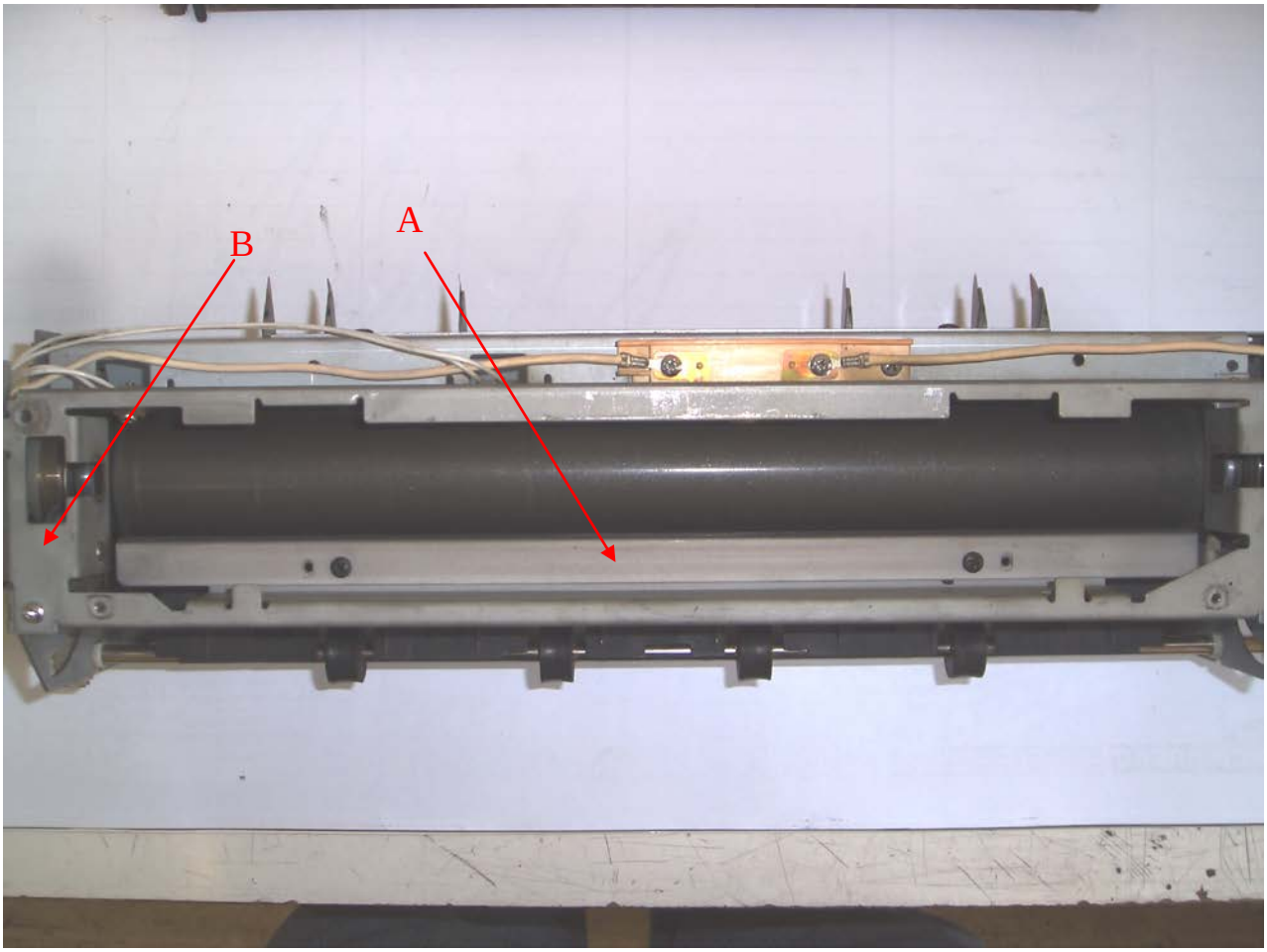


Sometimes the copier says that a certain paper tray is empty, even though it is not. This is caused by failure (broken teeth) in some of the gears in the reduction unit D on the figure above.

FUSER MODULE

This is a relatively reliable module, given proper and regular maintenance, as described in detail in previous articles. However there are some problems with this module. Often, due to poor cleaning, performed on the cleaning fuser blade A, it flips off and causes damage to the upper fuser rollers and even worse – to the drive gears of the module. The solution – simply be patient and clean entirely all the components in the fuser module.

Another problem is the drive gear B which drives the silicone roller. It is made of weak plastic material and wears off very quickly. It also wears quickly if you apply silicone grease on its teeth. It is important to clean with alcohol the opening for the shaft in the gear:

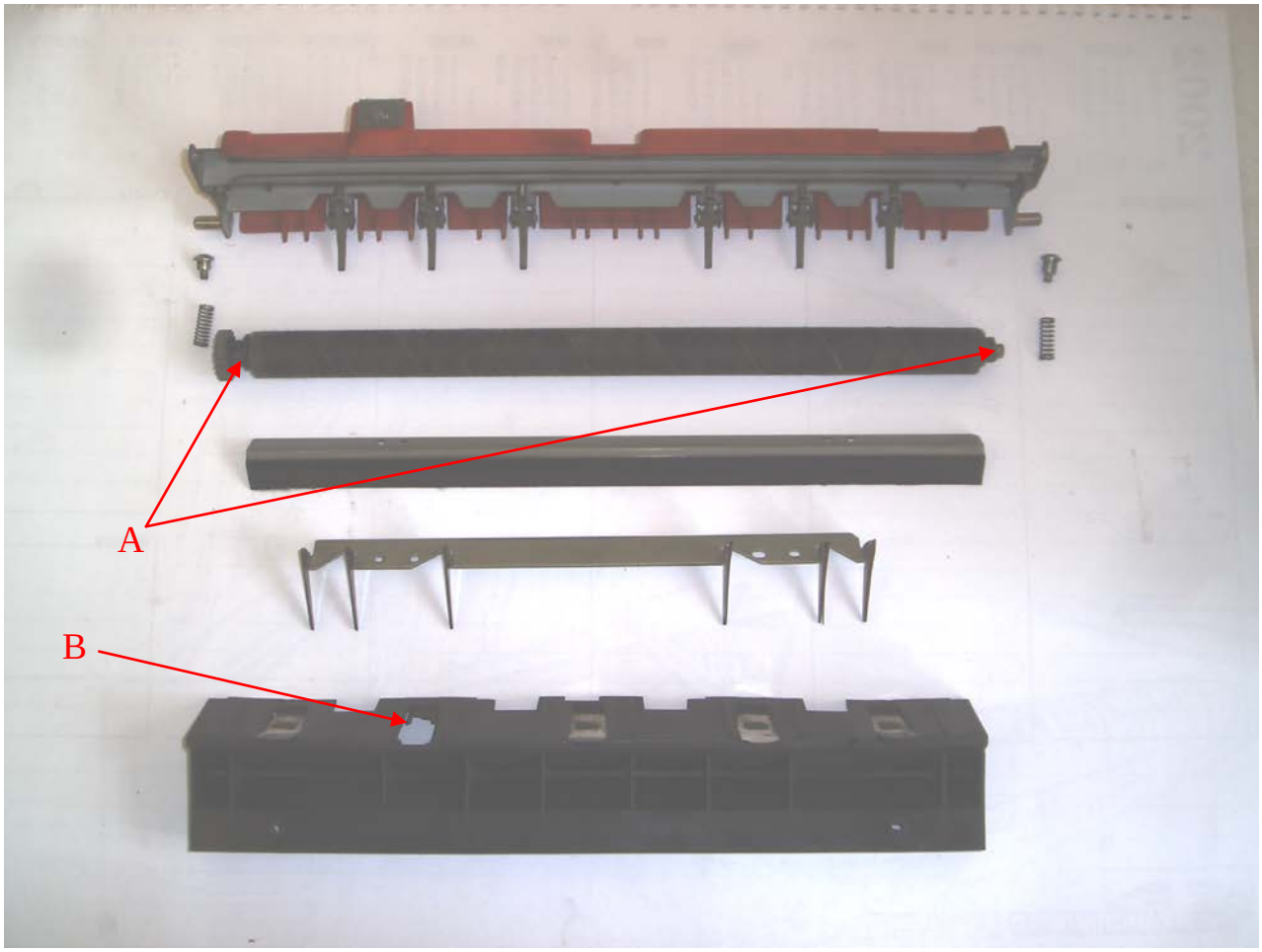


Sometimes when removing the bushings A of the silicone rollers, one can break the guides for the loading springs of the roller.

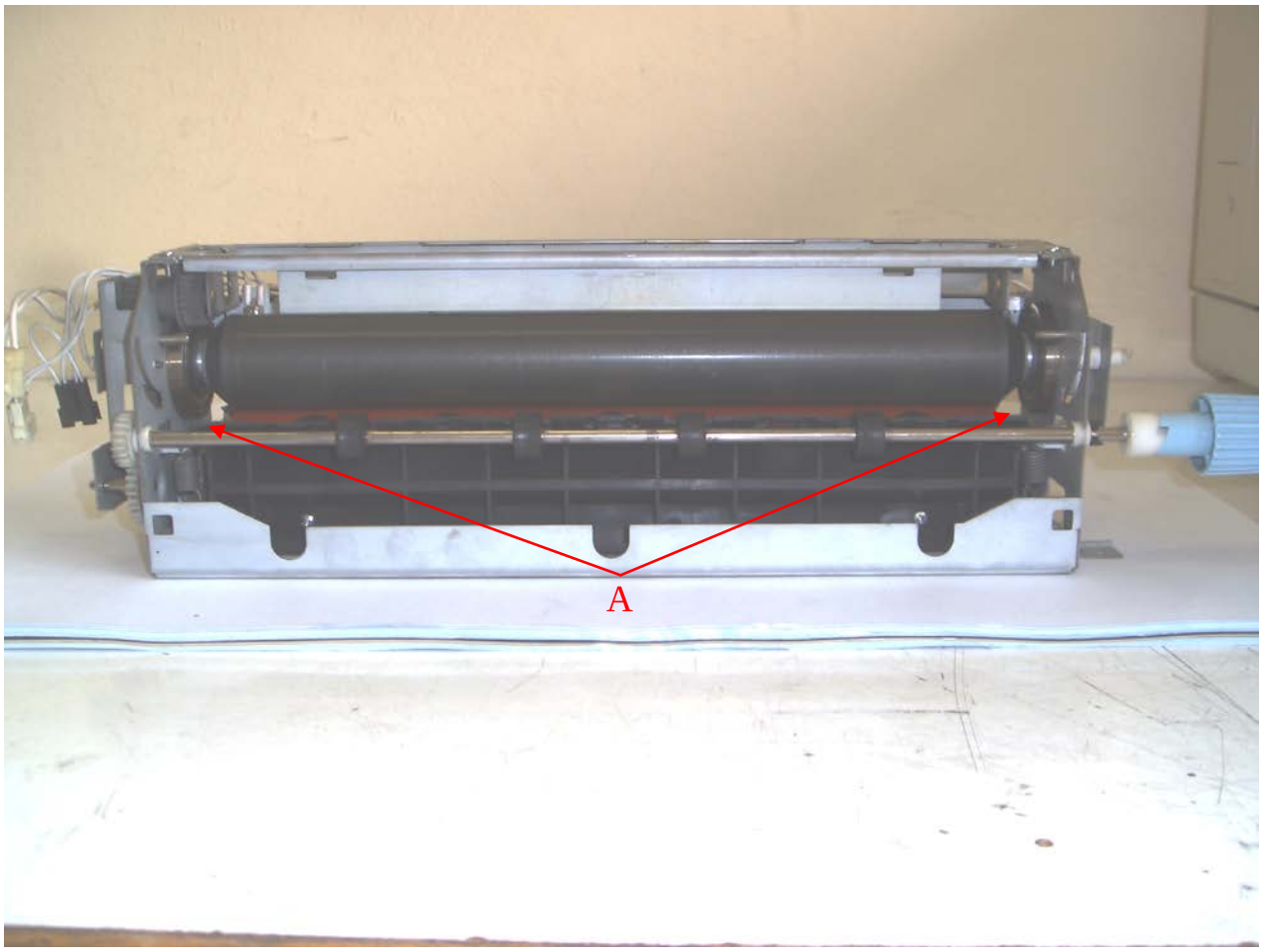
Sometimes the upper roller fingers accumulate dirt, which causes some of them to first move back from the roller, causing paper jams. When the operator removes

the jammed paper he doesn’t notice the finger and after the next copy it is forced by the paper to dig in the upper fuser roller causing severe damage.

The lower fuser roller suffers the same condition. The difference is that here the finger first digs into the lower rubber roller and then in breaks off its mounting position causing damage both to the roller and the mounting plate, made of plastic B:



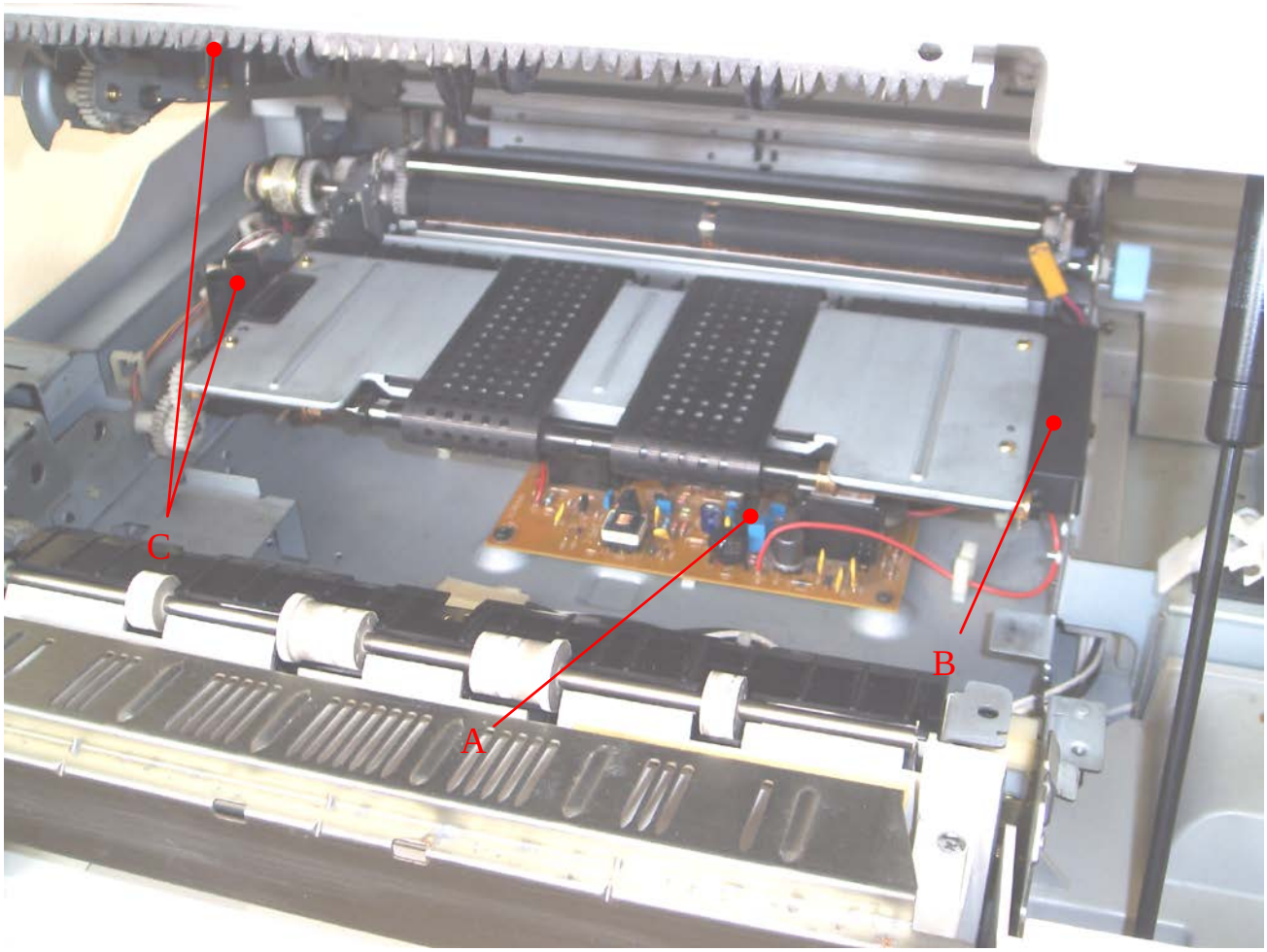
Finally after many thousands of copies, the copier begins to produce poorly fused copies. This is caused not by fatigue of the loading springs that force together the two rollers but by wear of the shafts of the lower fusing roller. It is suspended on two roller bearings A that block and cause the lower fuser roller’s shafts to rotate inside the inner bearing’s collars causing excessive friction and wear. As a result the shafts diameter decreases and the nip between the upper and lower roller reduces. That’s how you get poorly fused copies:



THE INSIDE OF THE MACHINE

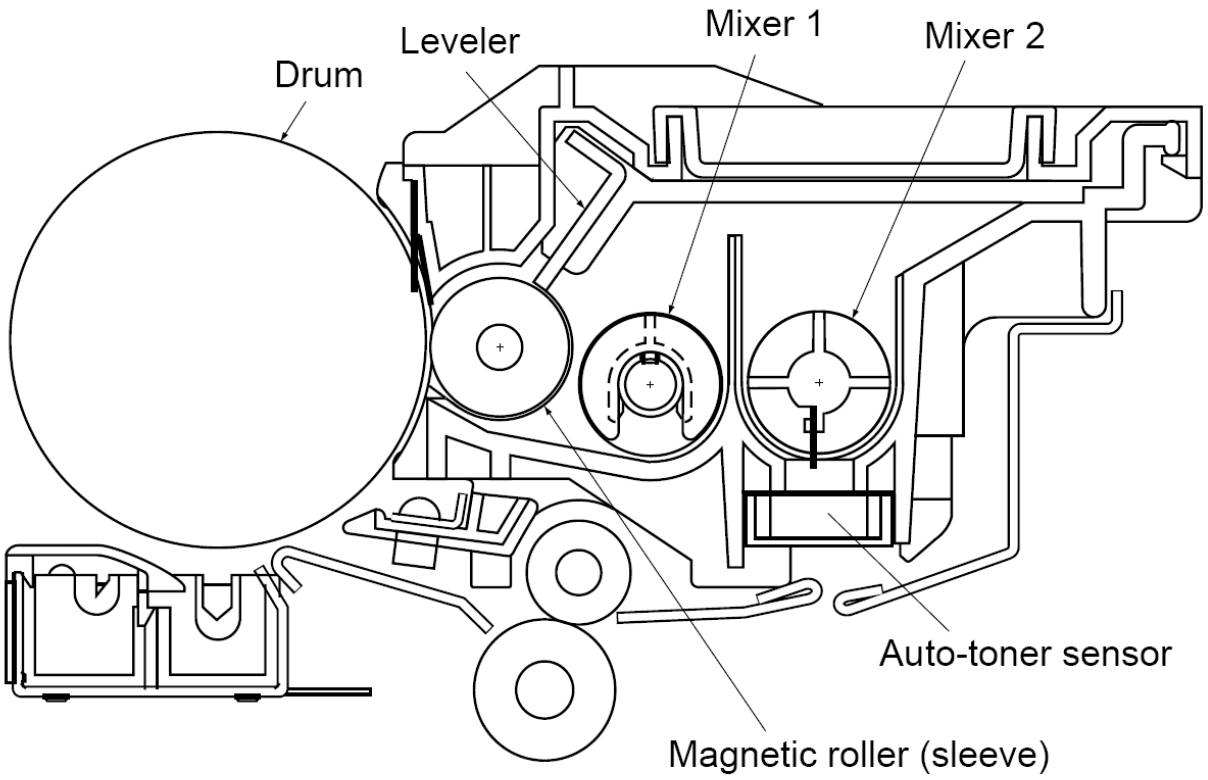
Very often the copier behaves strangely, paper jams are frequent and the inside of the copier seems to be all right. Well, the problem is that there is a developer material spilt over the high voltage boards A, beneath the transport belt, or over the separation/transfer corrotron terminals B. The solution is to clean under the belts, but if you don't find the cause for the spill in the developer module, it will leak again.

Another hidden defect occurs when the copier's shocks, that keep its top half up when opened, fail. Then the upper half drops down heavily when opened. After several drops the copier starts to produce blank copies or copies with background. What happens is, the terminals C for the main charger and grid break off their places and don't conduct the high voltage to the charger. The solution is to glue the terminals to the sides of the copier and warn the operator to be careful not to drop the upper half of the copier heavily.


C
A
B

THE DEVELOPER MODULE

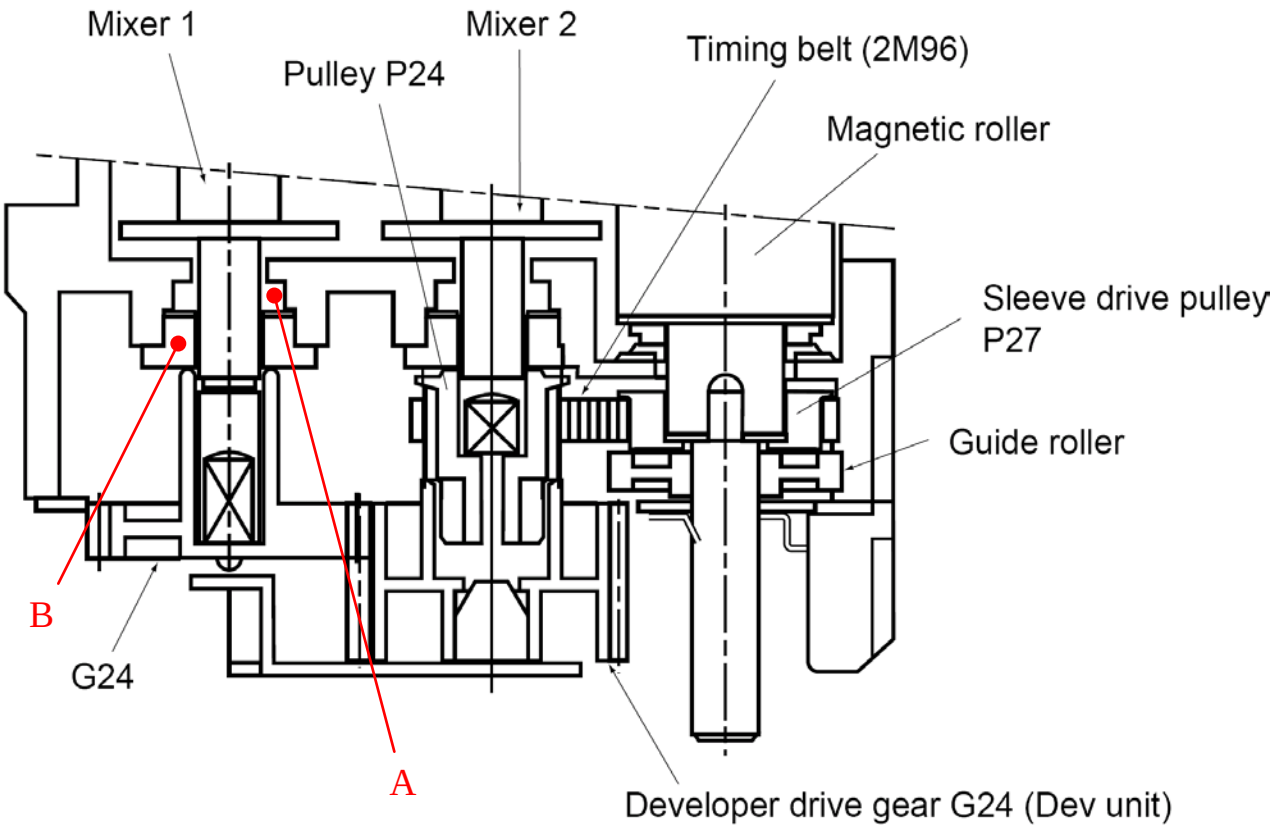
This is the most troublesome module in the copier. It is very important to know its weak spots, because it affects other parts, around it – the opc drum, the main gears and the high voltage boards. The construction of the module is explained on the following figures:



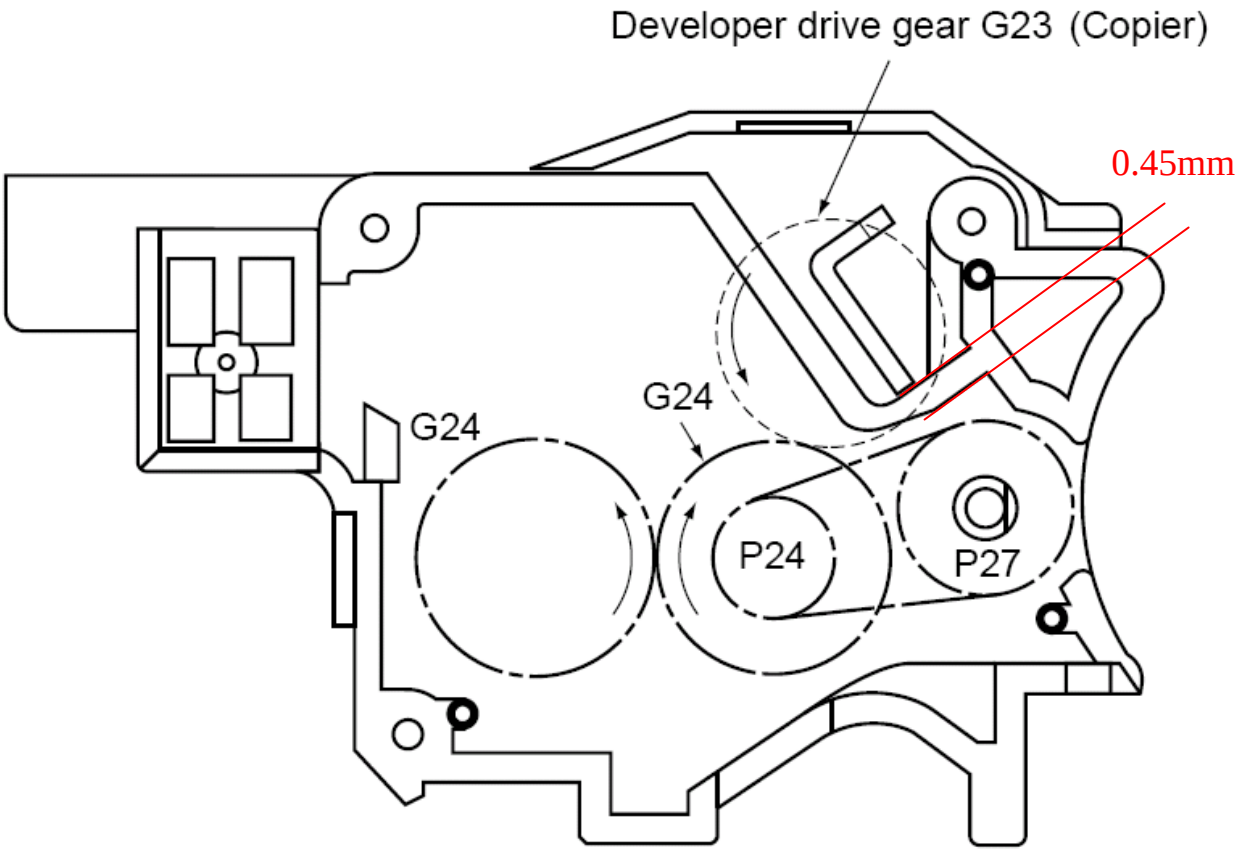
Front side sectional view

The first problem you may encounter is the blocking of the magnetic roller. It happens when around 500 to 800 thousands copies are made. The roller blocks the torque to the module and the developer drive gear G24 may break, or the timing belt 2M96 may wear and start to loose pitch. The problem arises from the magnets inside the roller. They are shaped like edges and are glued around the center shaft. When one of them falls off the shaft, it rubs against the magnetic roller sleeve and acts like an edge, blocking the rotation of the sleeve. The solution is to replace the magnetic roller and always check that the developer module rotates free, by hand cranking the module.

Another common problem is spillage of developer material from the mixers shafts 1 and 2 at the rear end of the module. The shafts rotate inside the developer hopper, but receive torque though the gears at the rear end. The shafts go through the walls of the hopper and are secured by seals A. If these seals leak, the developer damages the bronze bushings B and the driving teeth of the module. This happens always at the rear end seals. So it is important to check these seals, every time you perform a periodical maintenance of the module.



Common for all Toshiba 60th series developer unit is the use of adjustable doctor blade. The developer layer thickness is adjusted by rotating two screws at the ends of the doctor blade, using a gauge. If the thickness of the layer is over 0.45mm the developer brush reaches the OPC drum surface and polishes it. This makes the OPC drum useless. The rotation of the module is very difficult and the gears may break. If the thickness is bellow 0.45mm the developer material wouldn't cover entirely the magnetic roller and the copies will have "fluffy clouds" effect.

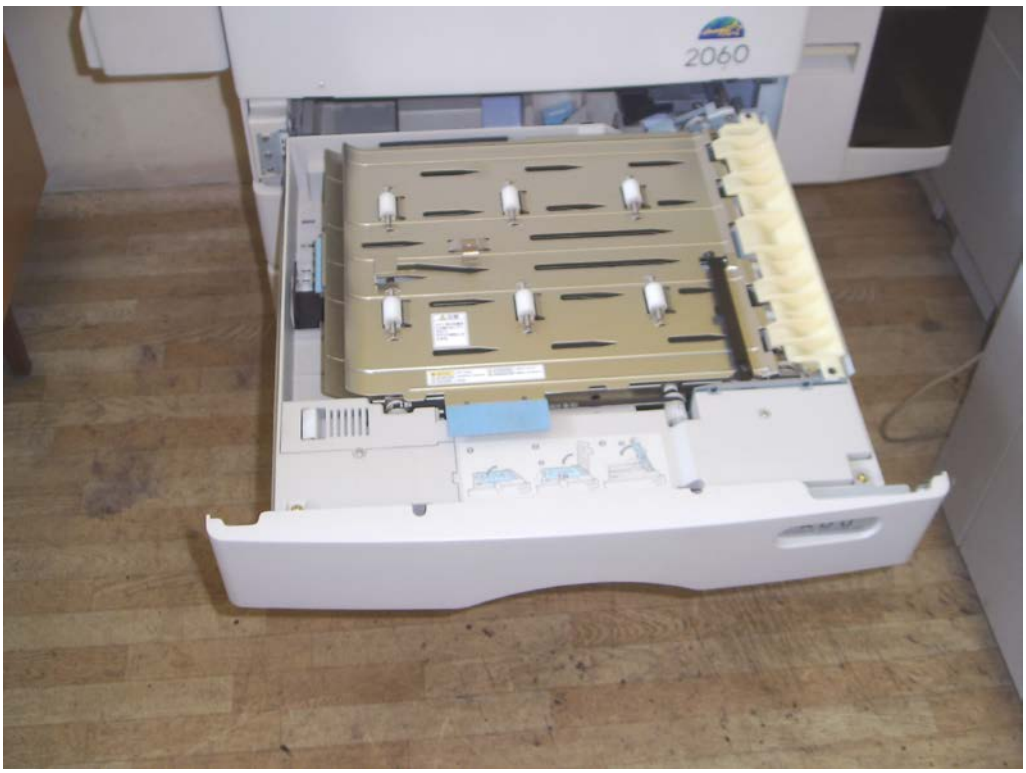


[Rear side]

Finally – often the service technician encounters polished OPC drums that are not good for copying and he wonders why, when everything seems normal. The developer gap is 0.45mm and still the drum is damaged. Well, this is one of the biggest flaws of all developer modules from the 60th series. The developer unit is kept apart from the OPC drum unit at a preset distance, using two guide rollers A. They are mounted on each end of the developer roller and rotate onto the OPC drum's surface. Their inner and outer diameter determines the correct distance between the developer brush and the OPC surface. It is very important to check the free rotation of the guide rollers as well as their diameter and replace them if necessary.

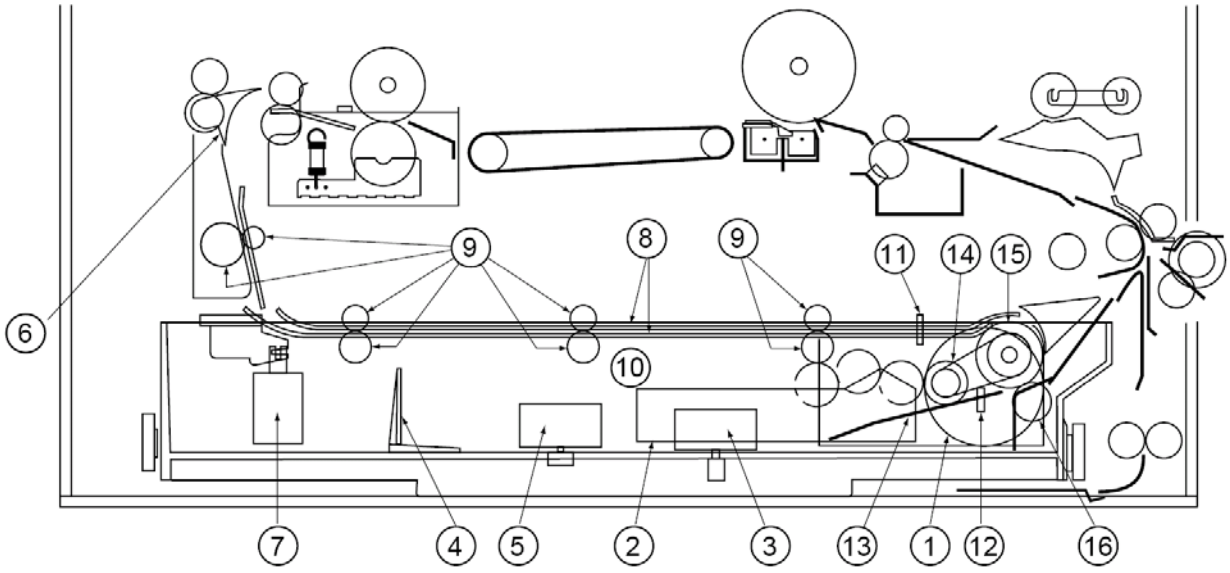
TROUBLESHOOTING THE OPTIONS ADU, SORTER AND RADF MODULES

ADU – automatic duplexing module



The construction of the module is shown on the figure bellow. Normally the operation of the module is quite reliable, but sometimes the one-sided copy enters the ADU and stops half way the paper path to the stacking tray. The reason is that when the operator removes jammed paper he opens the two entrance guides pos.8, but they are hinged very loosely and their material is soft steel. As a result they bend and the gap between the upper and lower guide plate becomes too narrow for the copy to pass.

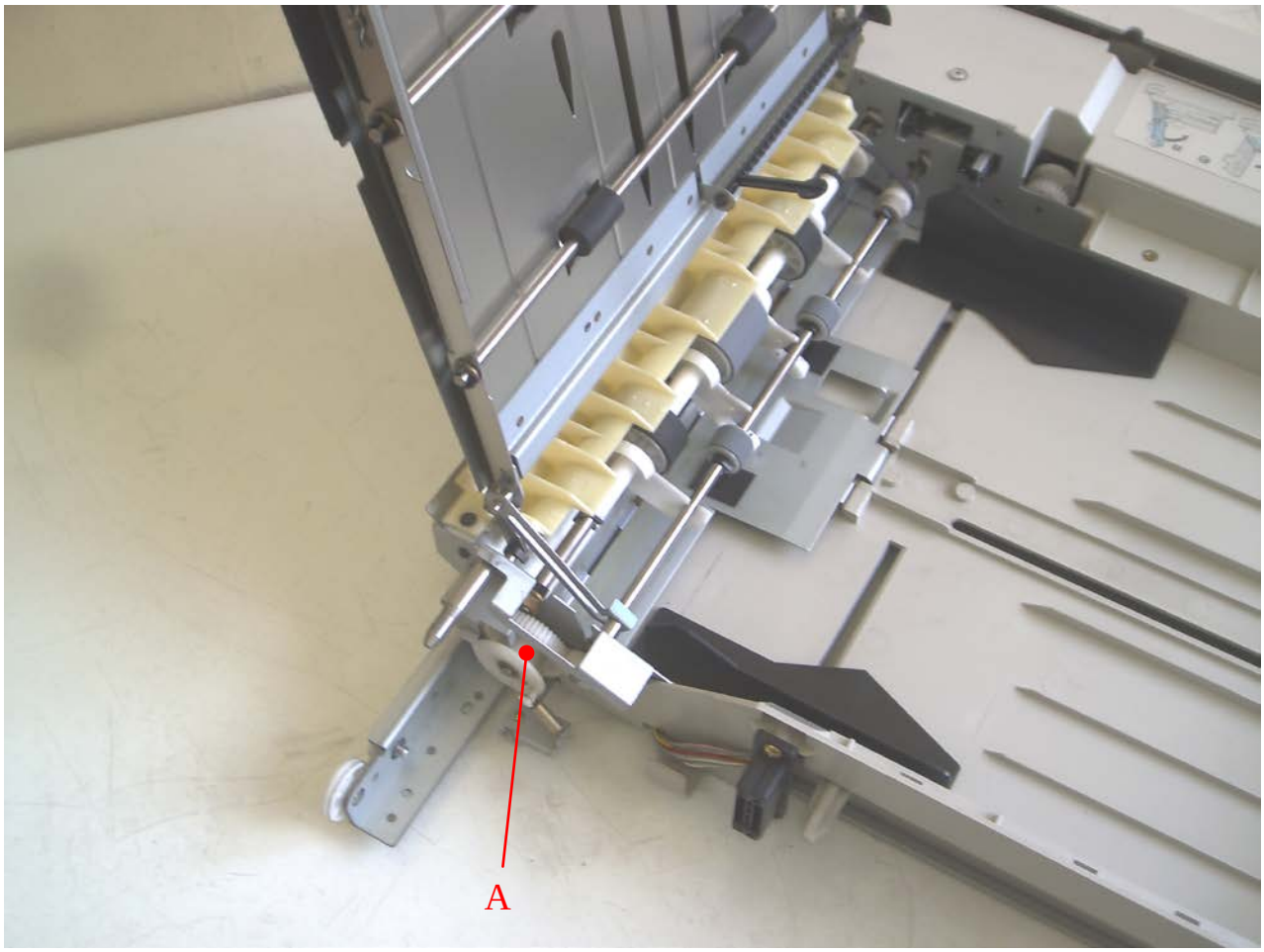
Another problem occurs when the operator bends away the guide plates. There are two paper sensors there – jam switch pos.11 and paper empty switch pos.12. When the plates are bent, the flags of the sensors are not actuated, nor don't send signals to the receivers, causing paper jams. The solution is to bend back the plates just enough the sensors flags actuate the receivers but not so much as the gap between them will become too narrow:



[Front side]

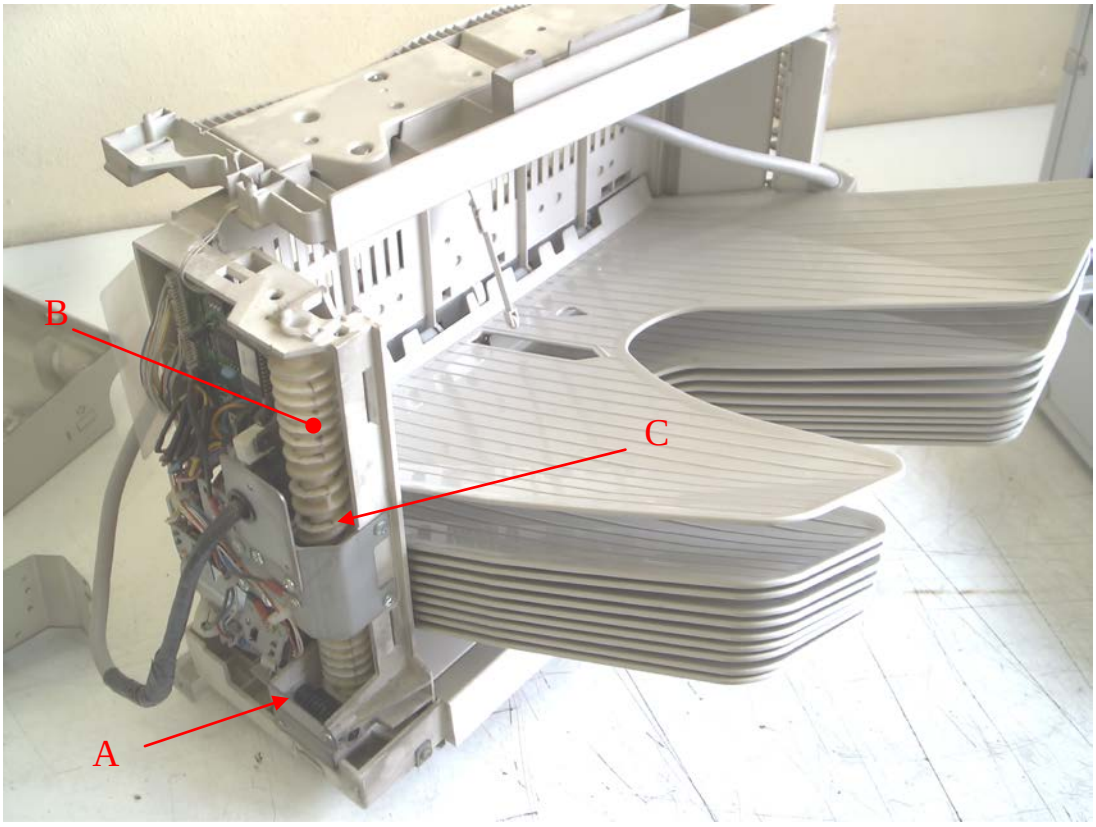
①	ADU motor	⑨	Transport roller
②	Side guide	⑩	Stacking section
③	Side motor	⑪	Jam switch
④	End guide	⑫	Empty switch
⑤	End motor	⑬	Tray
⑥	EXIT/ADU selection gate	⑭	Pickup roller
⑦	Gate solenoid	⑮	Stack/feed roller
⑧	Open guide	⑯	Separation roller

Another common problem is frequent paper jams, when the paper is stacked at the ADD paper tray and the copier executes paper pick up operation from the module. The cause for this problem is a spring clutch A, located at the back of the module. Sometimes it breaks off its spring or is just dirty and slips, causing the pick up roller not to rotate. The solution is to clean the clutch and lubricate the collars of the two hubs:



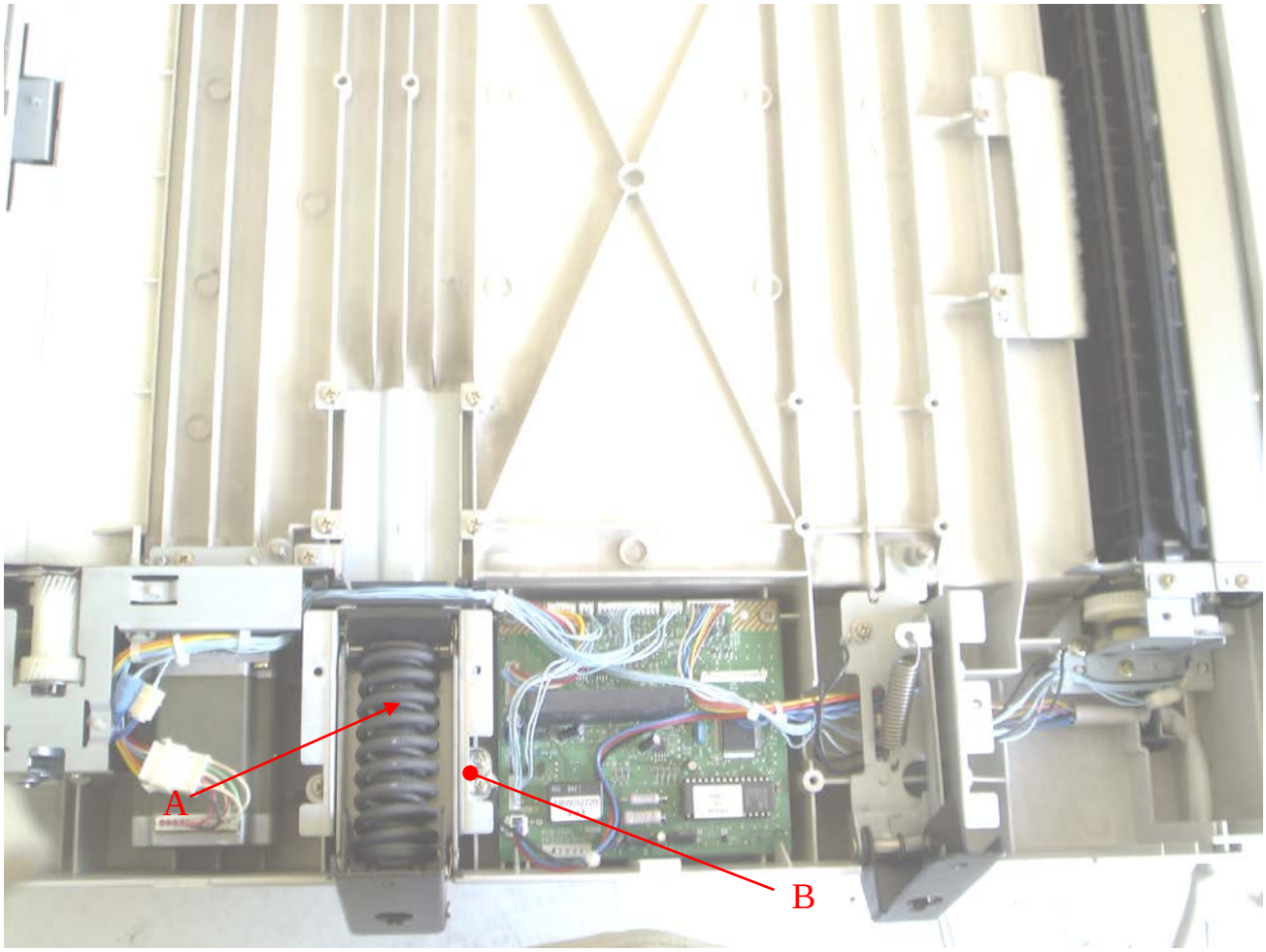
Sorter

The sorters of these machines are very reliable and hardly ever break. The only problems with them are always caused by operators. They block the movement of the sorter's bins, causing them to snap off and loose their correct position in the guides, situated on both sides of the bins. The solution is to disassemble the covers of the sorter and disengage the left from the right bin guide. To do this remove the plate A and the gear behind it. Be sure that all bin guide rollers are situated one after another on both sides and that the bins are strictly horizontal. At this moment rotate the guides B until the reference holes C on them face towards you. Reattach the plate A and the gear:



RADF – Reversing automatic document feeder

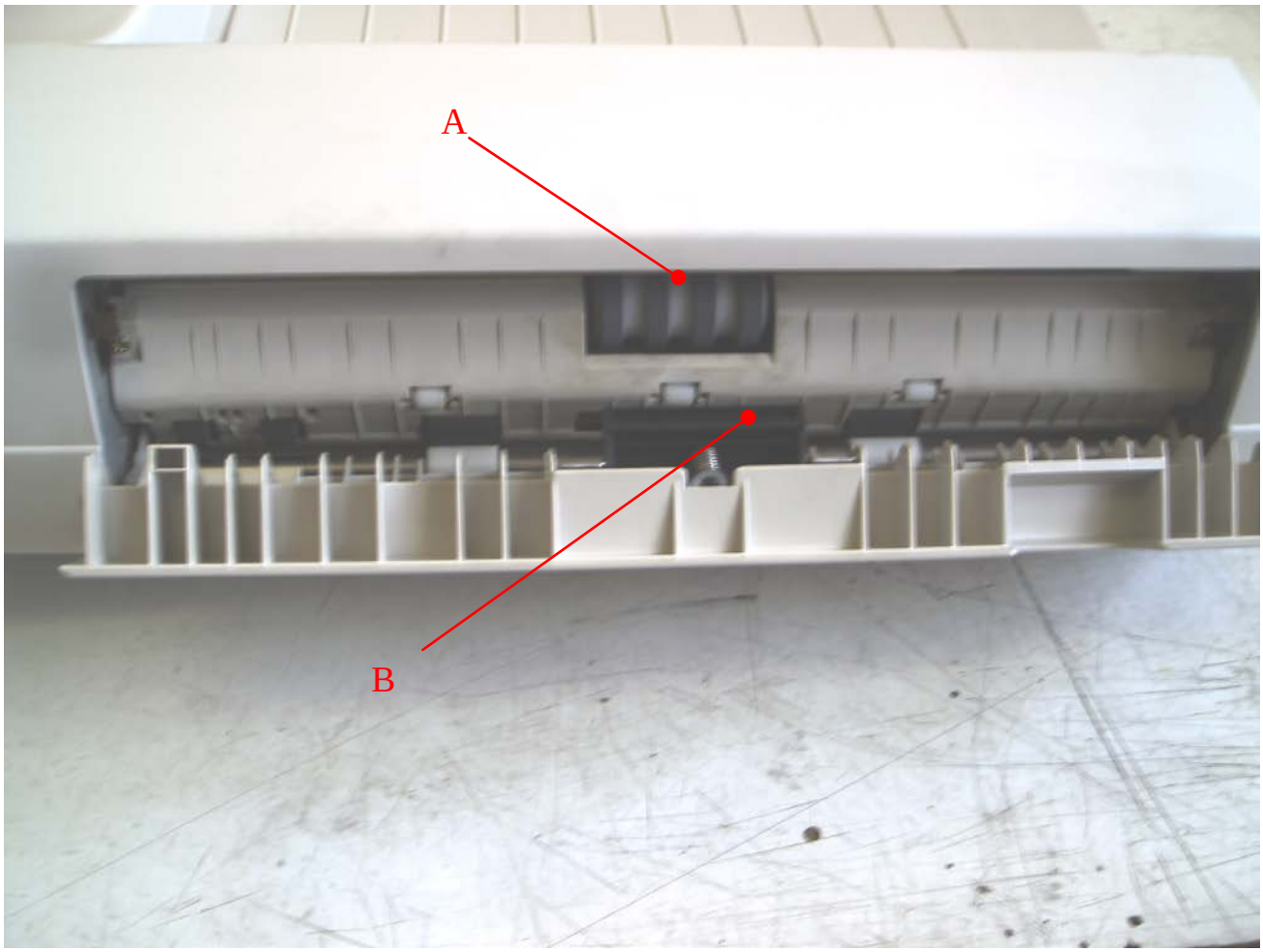
RADFs are also quite reliable modules with only a few hidden defects, which occur over many thousands of originals fed. The main problem is the open/close hinges of the module. They are made flexible to enable thick books copying from the original glass. When the RADF is closed, the hinges lift the cover. This is a useful mechanism, but in order to keep the cover in upright position when it is opened, there is a shock absorber and a spring A, built it the bigger hinge B. Very often the absorber fails and when the operator closes the cover the rear end of the module remains slightly lifted. When an original is fed it is transported by the RADF's transport belt, but it is skewed because of the uneven pressure exerted from the cover. Sadly there is no solution to this problem, but to replace the whole hinge assembly, which is quite expensive:



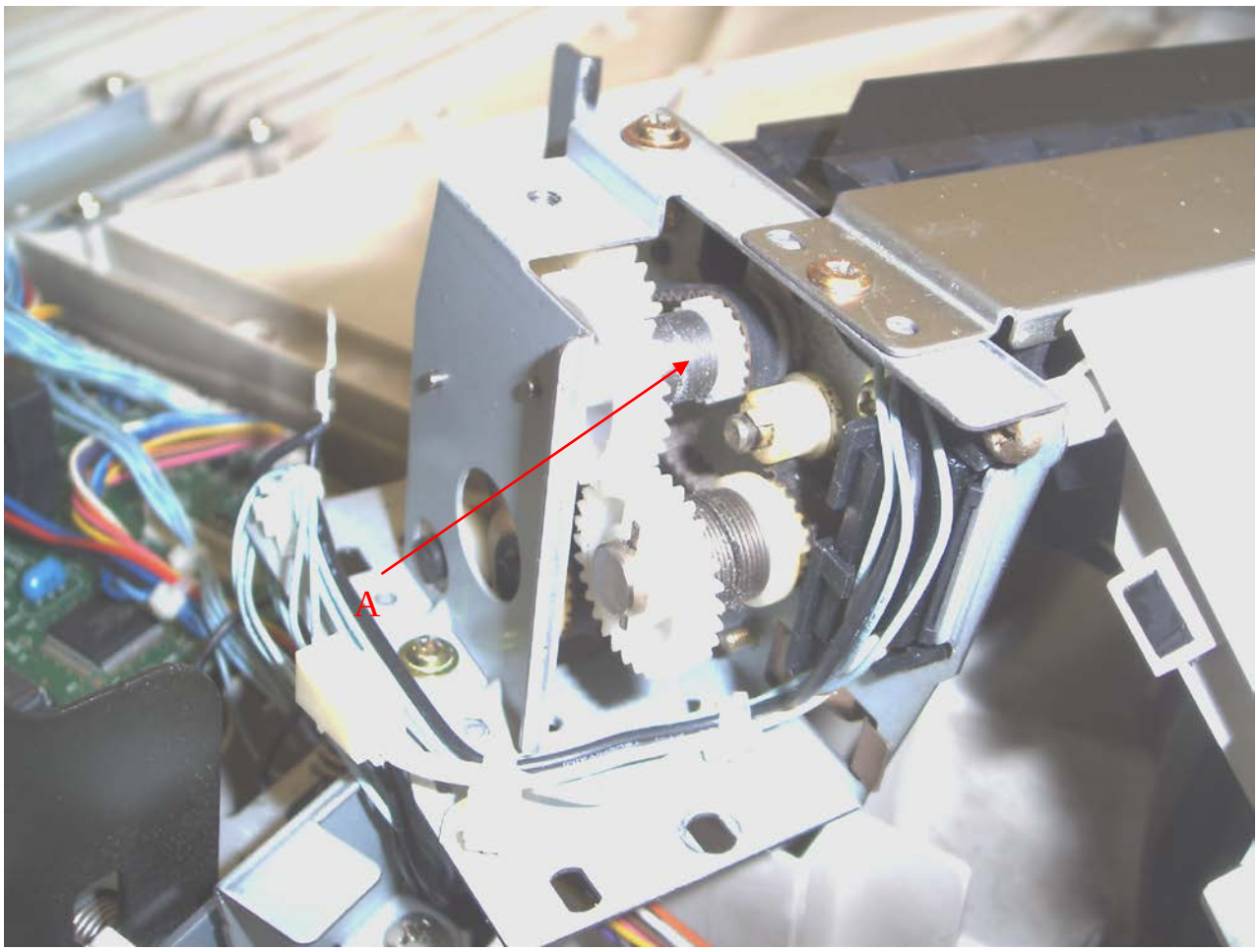
Another common problem with RADFs is when the copier tells the operator to close the module, but it is already closed. This happens when the machine is moved from one location to another by pushing it through the RADF module, rather than the machine body itself. The hinges move slightly and the built sensor for opened/closed cover is not actuated. The solution is to simply readjust the screws A of the hinges in the boundaries marked on them:

From time to time the copier will tell the operator to remove the originals from the RADF in order to copy from the original glass, but there are simply no originals in the module. This is caused by the paper empty sensor A stuck in one position. The solution is to gently adjust it in place.

Sometimes the originals are fed skewed to the original glass. This is caused by the separation pad rubber piece B. It is attached by a double sticking tape and becomes displaced from time to time. Simply reattach it with new tape:



Finally there is a hidden mechanical defect in the reversing mechanism of the module, when copying two sided originals. The RADF would feed and copy normally one sided originals and transport and exit them normally, but when the original has to be reversed in order to be copied from its other side is jams at the reversing mechanism. The defect is caused by a failed clutch A in the mechanism: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