

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

After the detailed analysis of the models included in the Toshiba's 60th series copiers, comes the time to study the most common but hard to solve problems. By "hard" I mean that they are not necessarily explained in the service manuals, or the book mentions some code but doesn't explain the reasons that lead to it.

One more thing – always remember that the service documentation of any copier is written when the model was new. That is to say that the developers of the model didn't have the necessary feed back information about the model's weak spots. When a machine is new, you can stick to the manual. There is given all the needed data about the service life of parts, places for regular lubrication and so on. However most of the troubles starts when the copier becomes old – that is when the machine has made, depending on the model between 3 or 4 periodical maintenance services (according to the recommended copy count at which to perform them).

The reality is that if a copier is not properly maintained, all sorts of weird problems may occur and even the service manual won't help you. My advice: always perform proper periodical maintenance according to the rules I have given in the previous 4 articles about Toshiba copiers. The useful thing about always following a strict routine when maintaining a copier is that you get used to it and it is not a big effort anymore. Even more – the machine will "appreciate" it, I guarantee you that. One more benefit is that when you perform these operations correctly, you memorize all the correct locations of parts, screws, wire connectors and harnesses etc.

From my experience I can tell you that is especially useful when you come to service a copier that you don't know. That is – you don't know what the previous service repairs were and you are not sure about their quality.

Believe me; I have seen all sorts of "weird" problems on machines I did not service from new. The solution to most of them was simply to put every part in the machine on its original location, to screw all the missing screws and to clean thoroughly the machine.

This was the description of the first group of copier problems. The second group concerns problem that occur regardless of the proper maintenance and periodically replaced parts. These problems are not described in the service manuals. They occur only after thousands and thousands of copies made on a copier. In some cases even the manufacturer didn't think that a certain part would wear at all!

THE BIG PROBLEMS OF SMALL COPIERS

Usually the lower class copiers suffer the most. In poor countries like some from East Europe, customers don't have money to buy a machine from the corresponding class according to their copying needs. They buy low segment machines, sometimes even second hand ones. They regularly overwork them and don't have the money to condition them properly. This leads to all sorts of failures, mainly mechanical, which can be avoided by proper diagnostics during periodical

maintenance. The main purpose of this article is to describe these problems and give them a solution.

TOSHIBA 1350/1360/ 1370

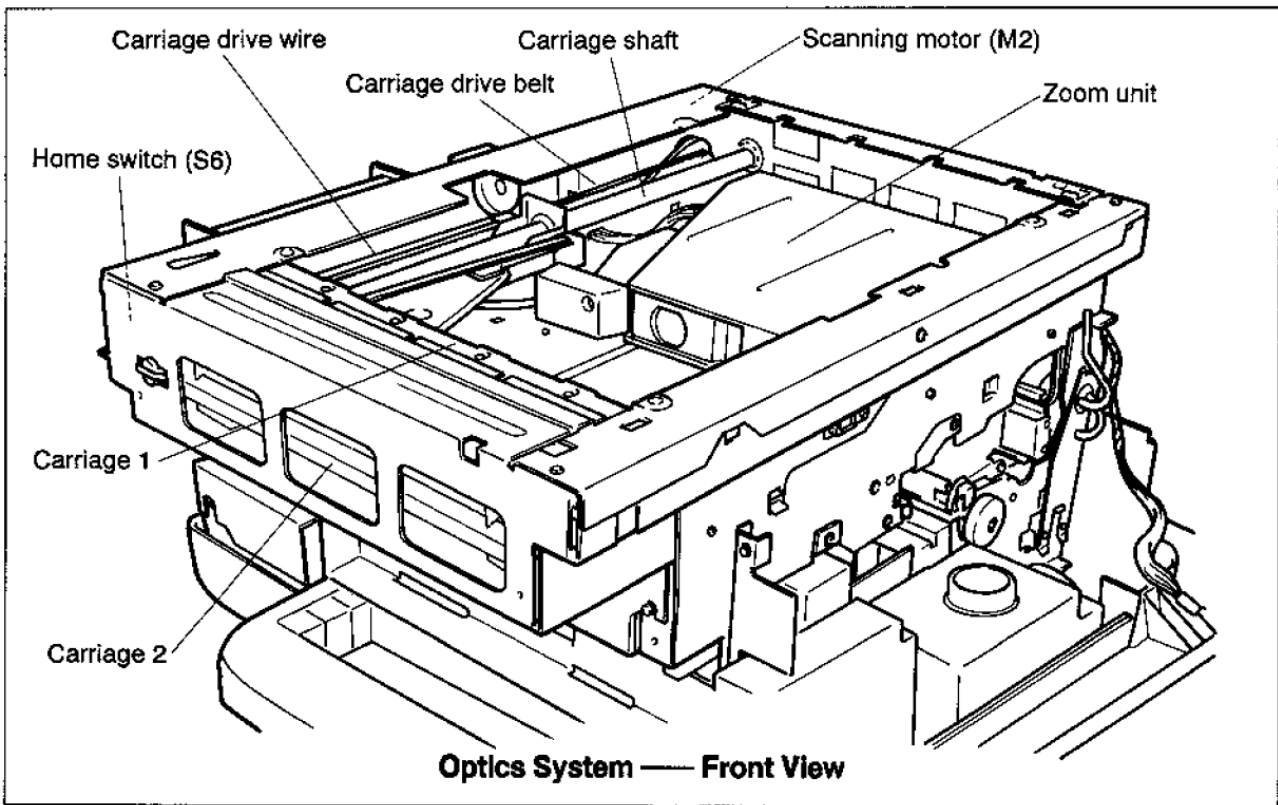


Normally this is a very reliable and tough small copier. In my field experience I've had least problems with these machines, even though some of them were overworked and the copy count was well over 300 000 copies. Given proper maintenance the consumable parts may live up to twice their predicted life. However there are some problems with these machines:

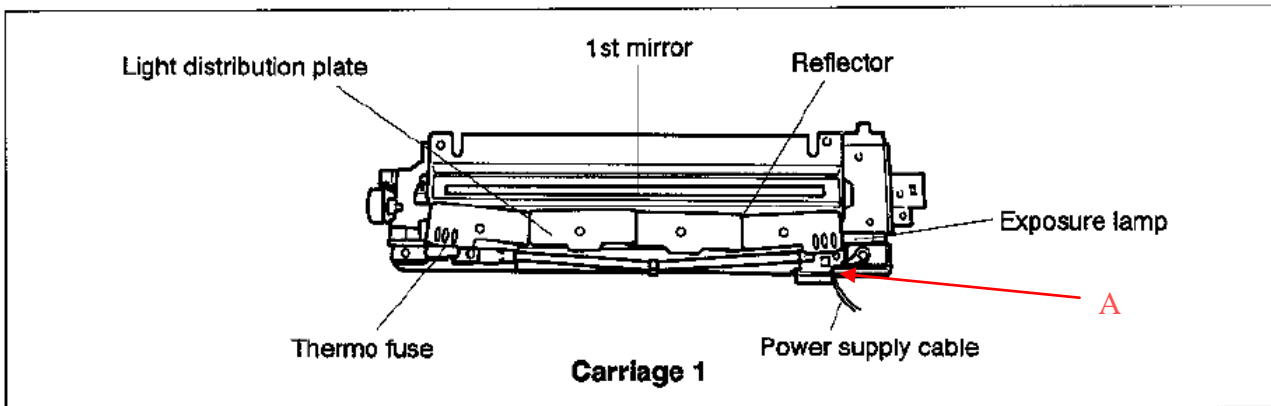
OPTICS MODULE

As shown on the pictures bellow, the optics module consists of 3 carriages. Carriages 1 and 2 slide on a carriage shaft. You should always check it and lubricate it if necessary.

Another very common and unpleasant problem, both for the service technician and the machine, is the exposure lamp power supply wire. Due to its design the wire is bent repeatedly during scanning of originals, as the carriages move. This leads to deterioration of the wire's insulation and after a while a short circuit directly into the main power supply unit, as the expo lamp operates directly on 220V AC. If this happens you will have to replace the wire, which is quite time consuming repair. If you are unlucky enough you will have to repair the main power supply unit too. To prevent this, always check this wire in spot A. Usually the crack in the wire is not visible, as it occurs on the underside of the wire.



- Carriage 1 consists of the following components.

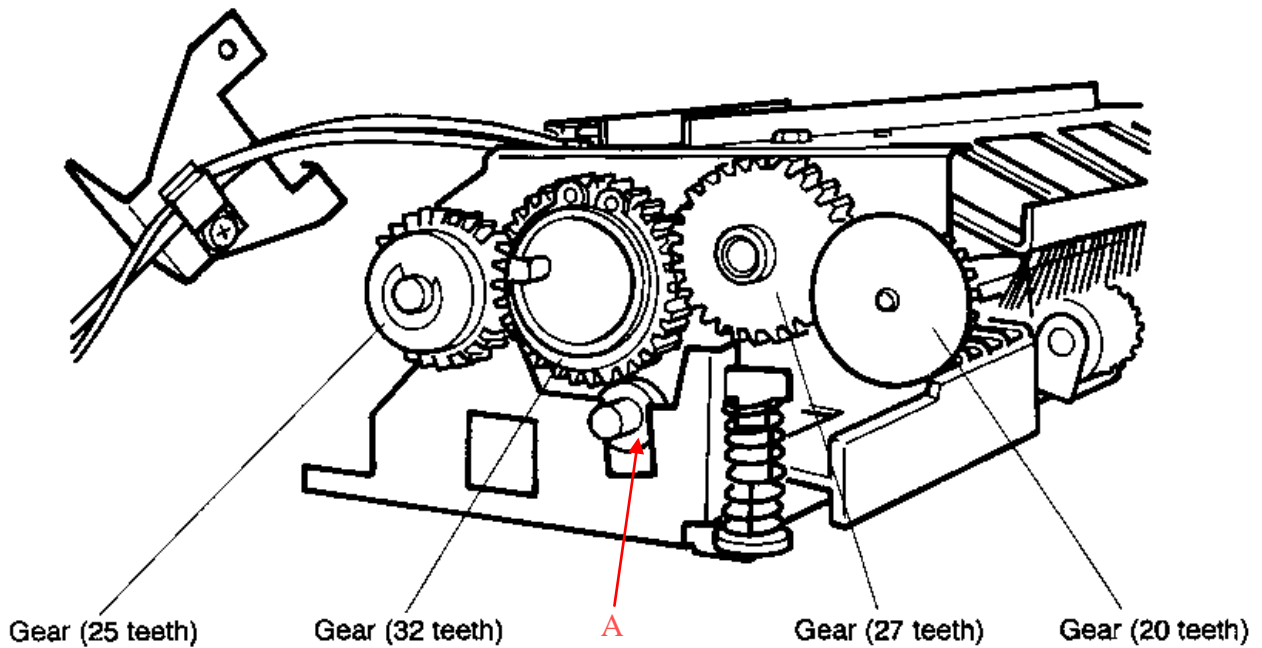


FUSER MODULE

Very often the service technician is called on site to repair a not fusing properly copier. Indeed the copy is not fused and the toner gets stained. This is due to the lower pressure roller coming off its support levers. The bearings A at the end of the roller fall off their supports when a miss feed in the fuser happens. The users pull violently and the roller falls off. The solution is simply to adjust the lower pressure roller bearings back onto their supports. And by the way – it is useful to clean and lubricate the cleaning felt.

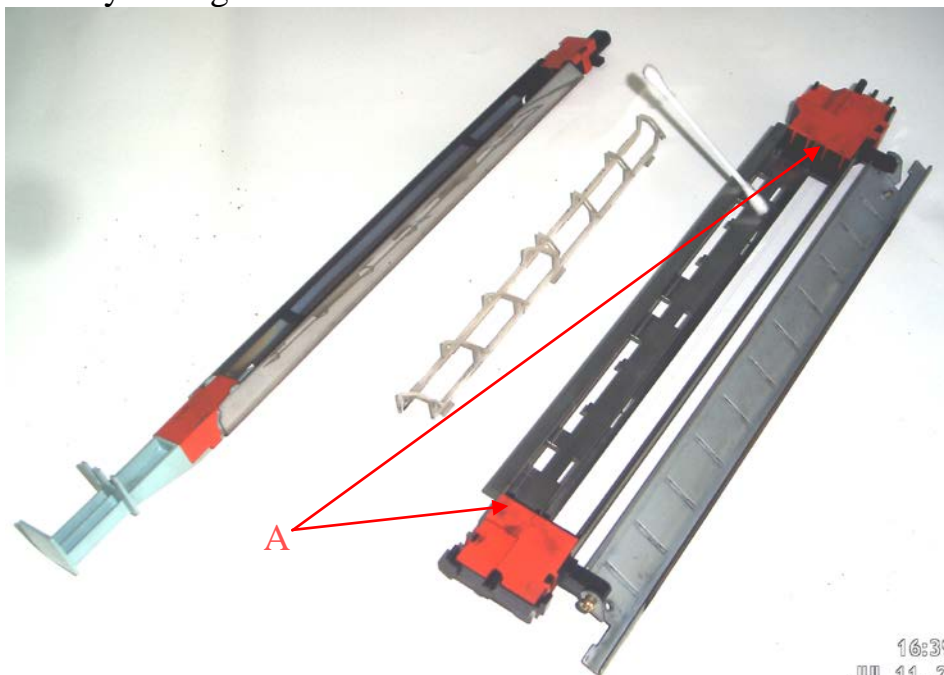


Another problem is the C7 code displayed on the copier's display and the service symbol flashing. This is a fuser temperature related problem. Often one would check the fuser lamp, the thermo fuse and the thermistor, but they will be all right. However the C7 code will still flash. The explanation is that sometimes the copier simply cannot reach the normal fuser temperature for the predetermined time. The copier counts each failure and when the count reaches 3, the C7 code is displayed. The solution is to enter 08 mode and to set the C7 counter to zero (code 89).



HIGH VOLTAGE RELATED PROBLEMS

Very often these copiers are not cleaned thoroughly. The transfer and separation corotron assembly collect a lot of dust, toner and developer material. As the time passes, these deposits form a conductive layer and a leakage occurs. This phenomenon happens around the corotron terminals A. The result is a faint copy or no image at all. The solution is to replace the terminals or to clean them and pain with nail-varnish. To check if there is still a leakage you can remove the process unit, block the interlock key and power on the copier with the front cover open. Enter the 05 adjustment mode and energize the transfer and separation corotron (codes 39 and 40). You should see the corotron wires glow in violet and if the assembly is operating properly, there wouldn't be arches from the wire to the terminals. Be careful not to touch the assembly during these checks.



Another similar problem occurs when you remove the registration assembly for cleaning. Often the auxiliary high voltage terminal C, located on the assembly gets broken. The effect is irregular and is visible as a faint and foggy copy. The solution is to replace the terminal or to glue it or to attach it with cable tie.

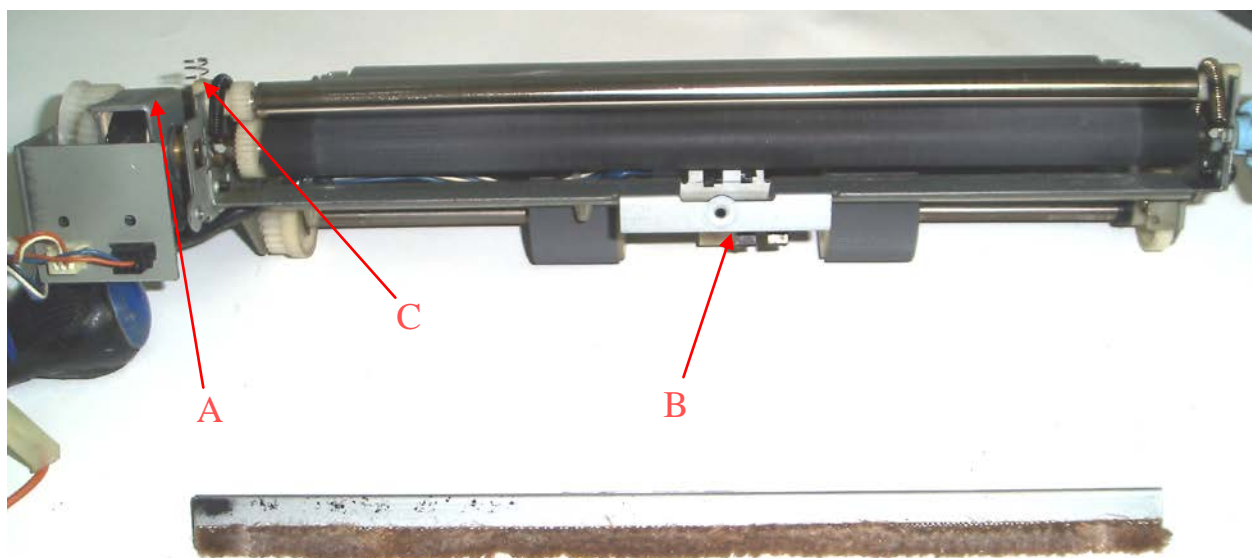
PAPER FEED PROBLEMS

Often after 100 000 or more copies, the copier experiences frequent paper feed problems. Don't hurry to change the feed tires. These are so durable, that even after 400 000 copies they are still like new. The problem is elsewhere. There are two electromagnetic clutches A located in the registration assembly. If the paper doesn't reach the registration rollers, you should clean or replace the feed clutch. You should also clean the one way bearing B, located between the two feed tires. Sometimes it sticks and doesn't transmit the torque from the electromagnetic clutch to the feed tires.

If the paper reaches the registration rollers but becomes rippled and jams there, the cause is still in the feed clutch. The situation is the opposite to the above. This time the clutch fails to disengage when it is turned off and creates resistance, which counteracts to the torque created by the registration clutch.

If the paper reaches the registration roller, but simply fails to proceed you should replace the registration clutch.

In general, if you have doubts about these clutches, you can check them using the service codes 02 (feed clutch) and 03 (aligning roller clutch) in 04 service mode. Turn the main motor (code 1 in 04 service mode). Turn the clutches on and feel them with your fingers, by trying to stop the feed and registration rollers respectively. They should transmit the torque steadily. More important – when you turn them off, they should immediately disengage the drive shafts.



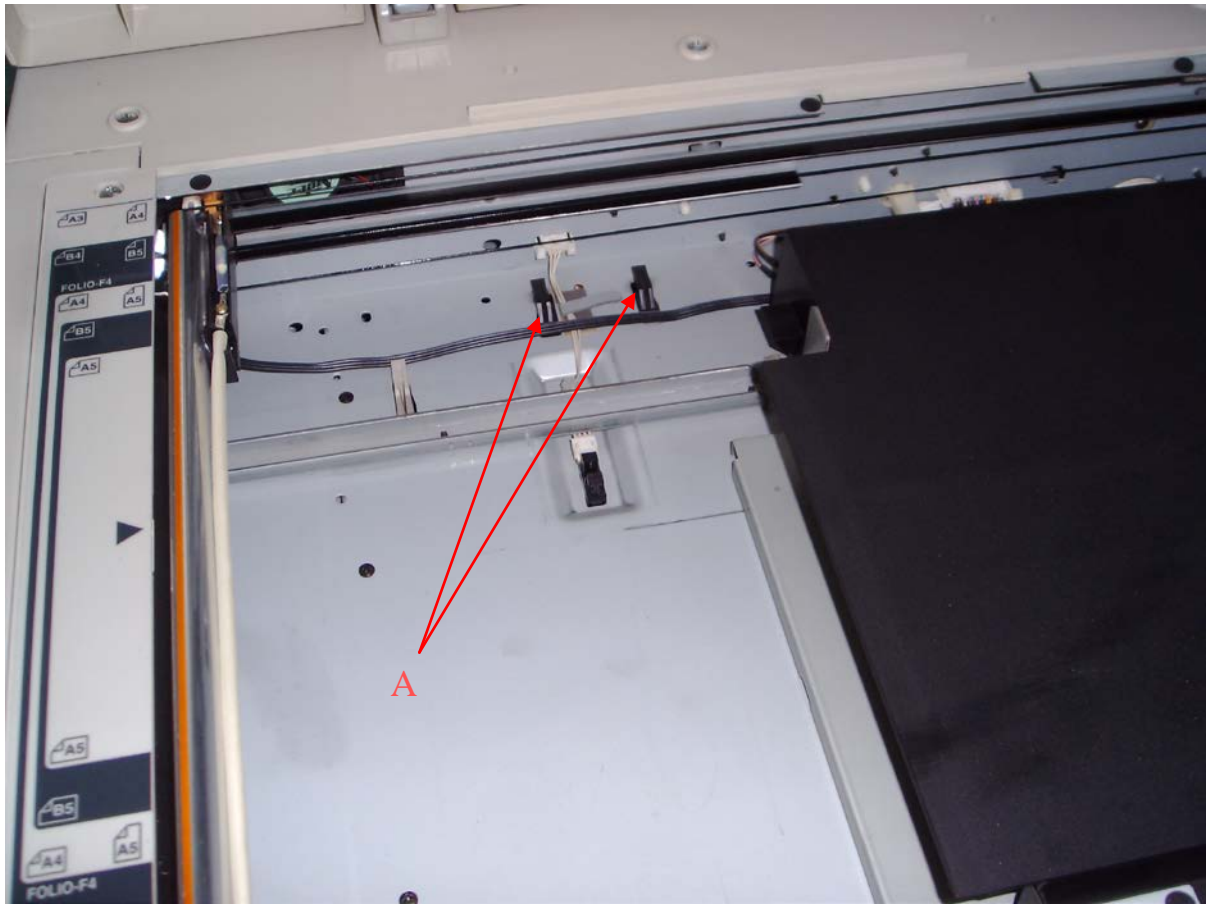
TOSHIBA 1550

As I mentioned in previous articles, this model is the most loved and most hated among the service technicians. There are so many problems with this model, but if you catch them on time it is quite sure it will work for more than half a million copies and more.



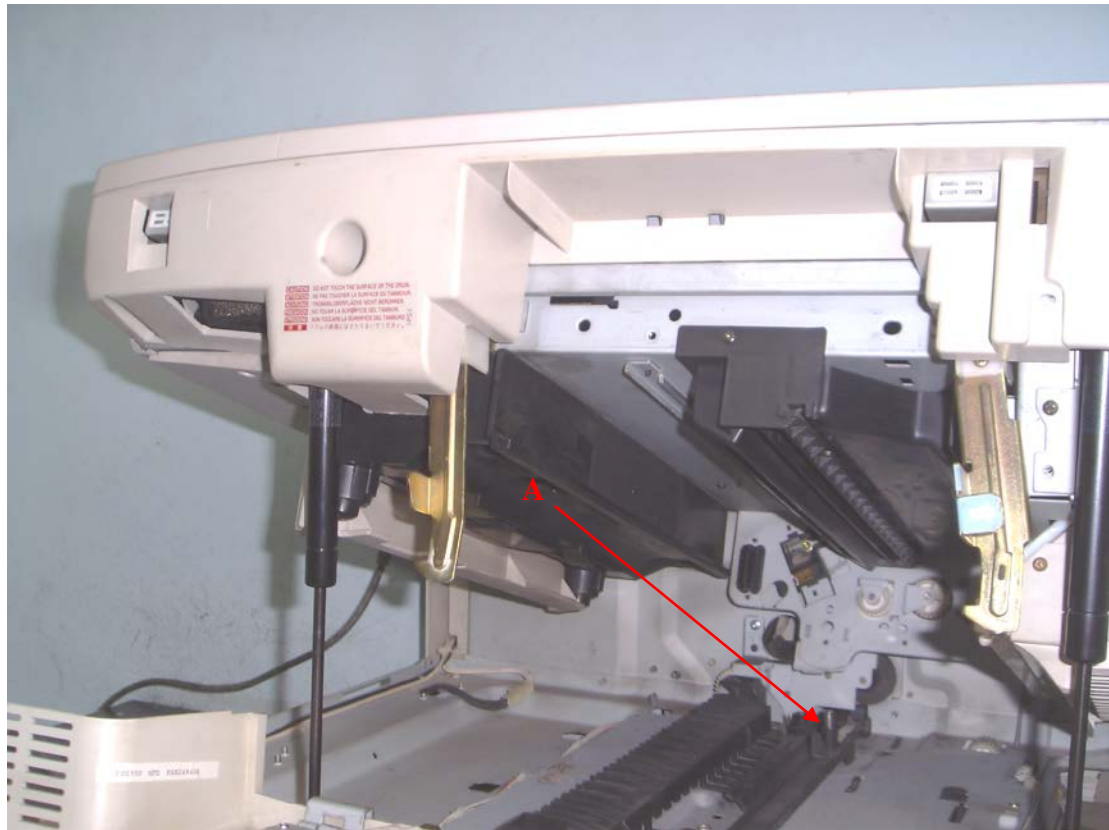
OPTICS MODULE

Actually there isn't anything worrying about this module. The easiest way to look for the most common failure in these machines is through this module. Often clients complain about skewed copies and increased mechanical noise from the machine. This is due to broken teeth of the process unit holder. The holder is attached to the bottom of the optics module via two teeth A that protrude from the bottom. The problem is that these teeth age and break. When this happens the whole holder that supports the process unit starts to move back and forth. The copy is then skewed, but the worst is that the drive train in the main frame of the machine is not properly coupled with the gears of the module. This leads to excessive mechanical noise, wear and finally gears failures. The solution is to remove the holder. Inside it there is a wire harness attached to it by a plastic clip. Remove the clip and enlarge the existing hole so as it matches the hole on the bottom plate of the optics unit (right between the two teeth). Connect the holder and the bottom plate using a long screw and a nut. Thus the holder will never break again.



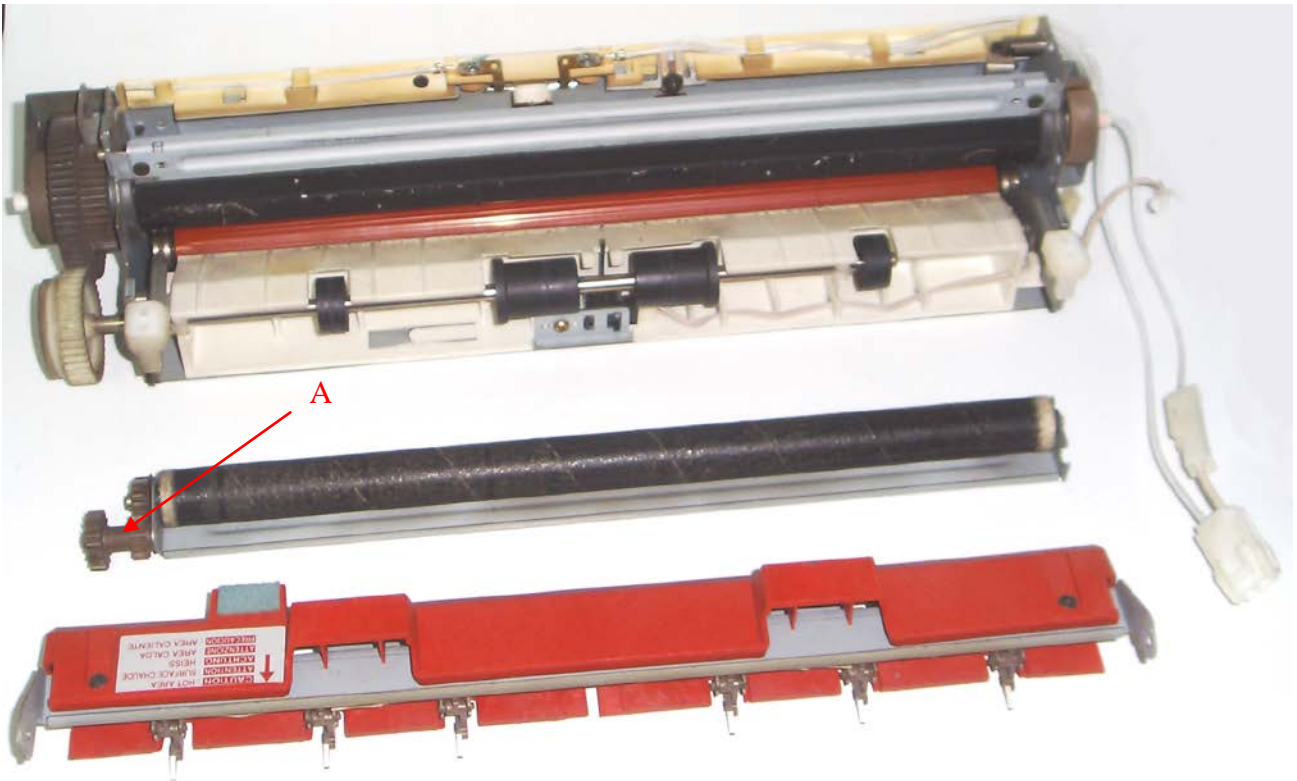
HIGH VOLTAGE RELATED PROBLEMS

Again such problems are present in the model as well. The difference is that there the transfer/separation corotron module is built pretty reliable. The problem comes from the power supply terminal A, located in the rear of the machine, under the corotron assembly. Again paper dust, developer material and toner build up there, forming a conductive layer over time and causing leakage to the metal base of the machine. The result – copies with white patterns all the way of the front and rear edge of the copy, or put in another way – faint copies. The solution is only to replace the terminal. The nail varnish won't work here.



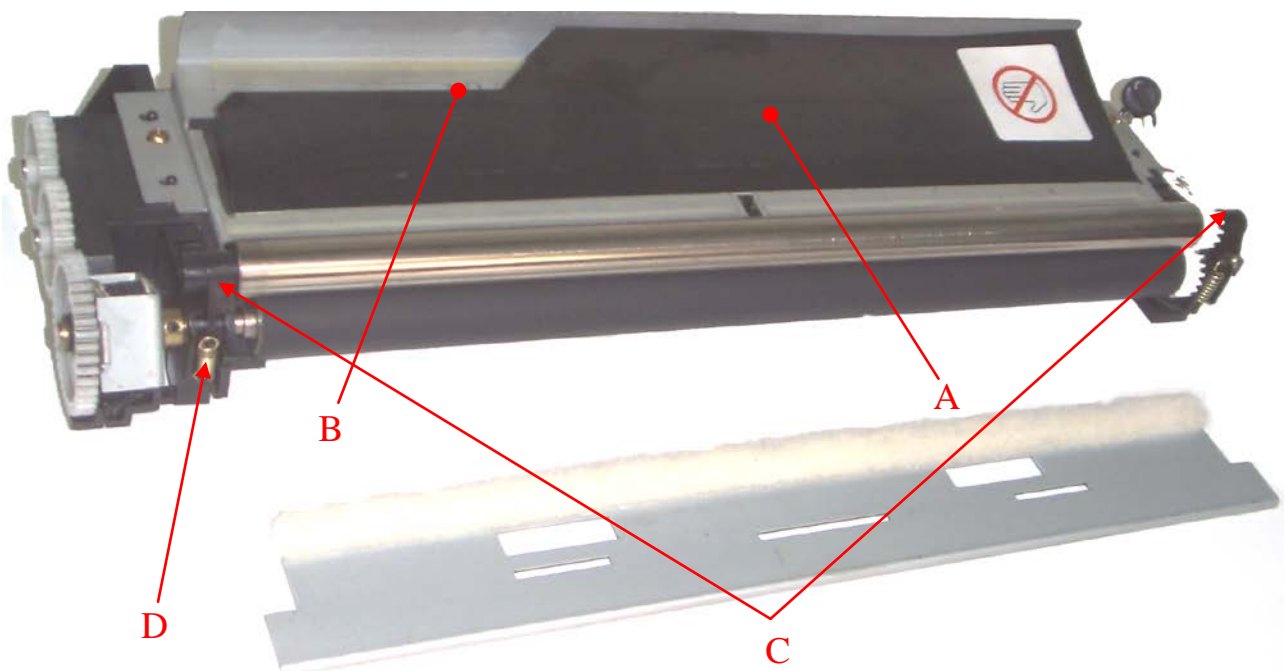
FUSER UNIT

This is quite a durable module, given proper maintenance over time. However there is a gear A, which transmits the rotation of the heat roller to the cleaning felt roller. The gear is made from soft and quite rapidly wearing plastic compound. If you hear a sharp mechanical clatter from the module, the reason would probably be the gear is worn. Apparently you should replace it, but if, during periodical maintenance, you brush the teeth of the gear from the accumulated dust and clean with alcohol the gear's axle, it would last much longer. NOTE: never lubricate the teeth of this gear. This will only make it wear faster.



REGISTRATION MODULE

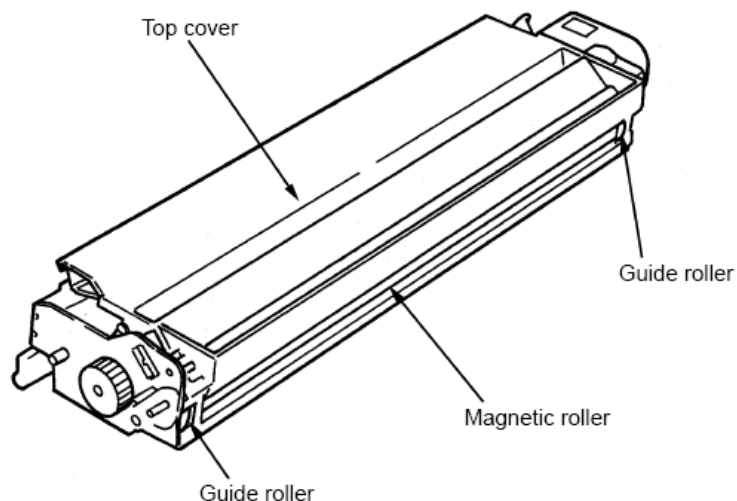
This is quite a problematic module. First of all often clients complain about paper jams in this module. The first thing is to ask them to look under the black mylar sheet A, on top of the module. Under this sheet there are several clear plastic guides B for the copy sheet. If there is an object there blocking the paper path you should remove it. Another possibility is that some of the guides are displaced and set above the metal plate instead of under it.

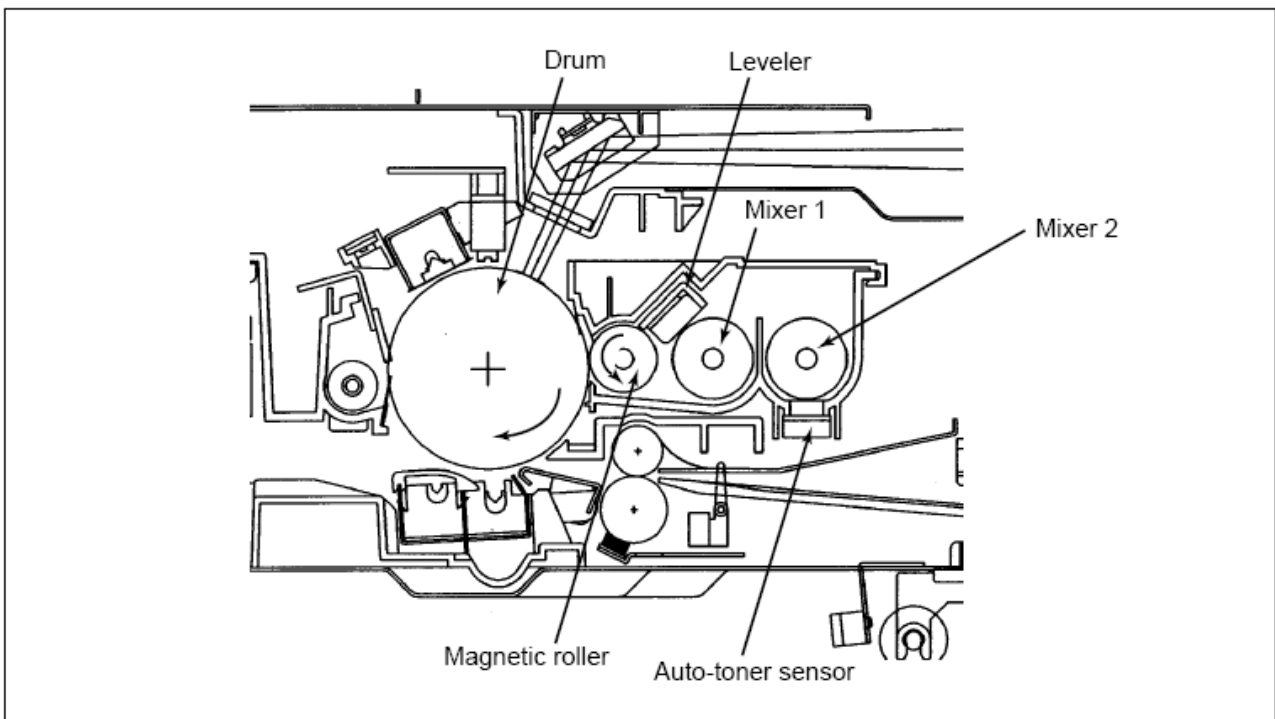


Further the reason for skewed copies can be in this module. At both end of the registration roller, there are two levers C, which press against each other the upper and lower registration rollers. The force to press them comes from two very stiff coil springs D. Stiff the springs may be, but the hooks on the upper levers are not. They break and the rollers are not creating enough friction to transport evenly and align the coming sheets of paper. One solution is to “fix” the problem by boring holes in the upper levers and hook the springs there. I wouldn’t recommend this. In short terms this solution works, but as you hook the springs on higher position you also over extend them and in long terms they loosen and the initial skew problem reoccur. The right solution is to simply change the broken upper levers. NOTE: Be careful when you attach the springs to the new levers – they are just as fragile as the old ones. Toshiba never learned its lesson with these parts.

DEVELOPER MODULE

Finally we come to the notorious even dreadful module of this machine. Most service repairs are done on this module. Almost every part of it is prone to failure. We will start with the construction of the module, shown on the figure. It is important to note that the described bellow problem occur after 200 000 or 300 000 and more copies. Even if you carefully inspect this module every time you make periodical maintenance it will still cause you troubles in future. However it is useful always to check the mechanical operation of the module by rotating the module’s input gear in the direction noted on the developer roller axel fixing plate. The gear should rotate relatively smoothly without too much torque required.





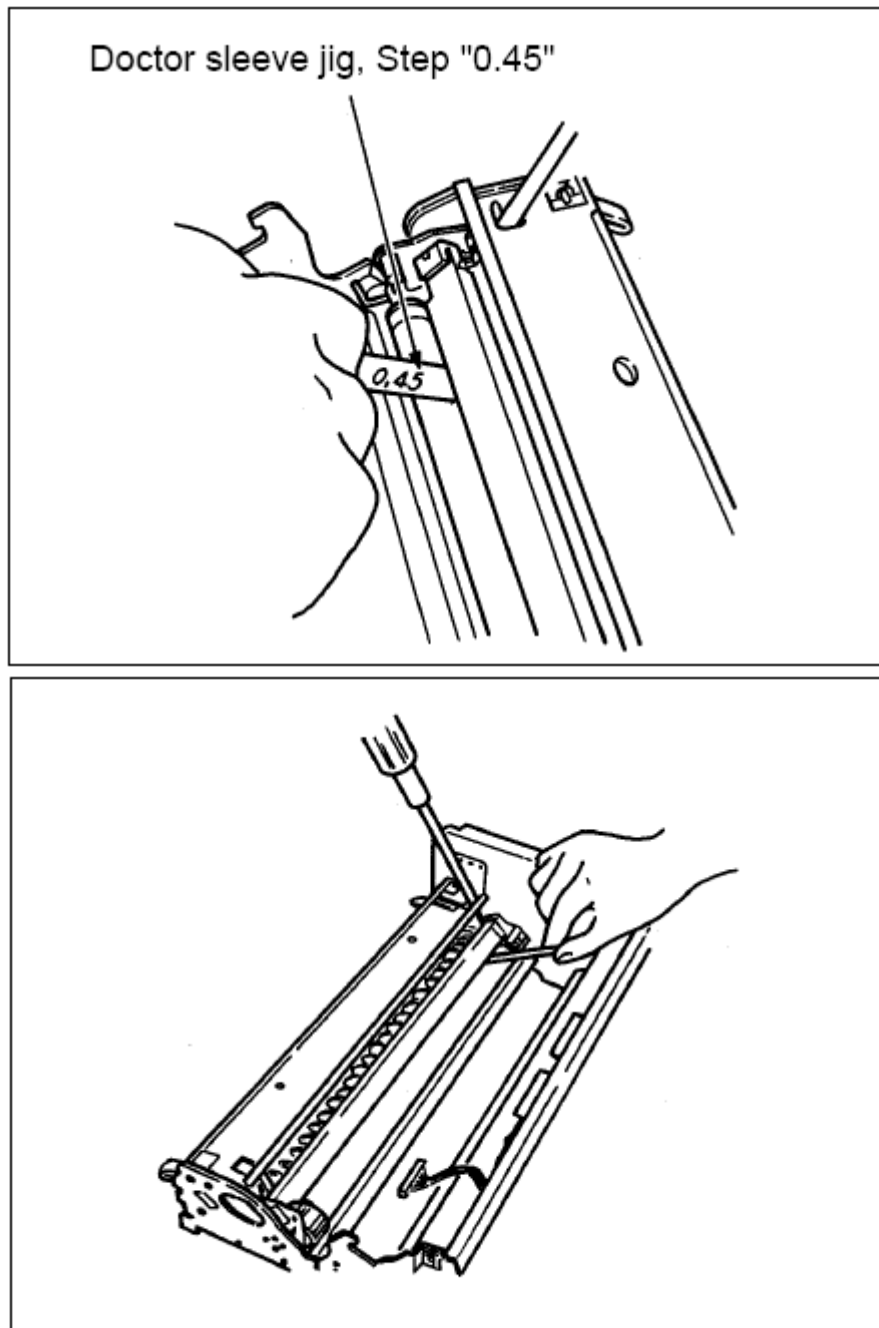
Front sectional view

Developer magnetic roller

After about 400 to 500 thousand copies this roller may lock, causing all sorts of gear failure all the way to the main gear drive in the main frame of the machine. The reason for that is in the construction of the roller. It consists of a aluminum sleeve, mounted via bronze bearing to a central axle. Inside the sleeve, the axle consists of a metal rod and segments of long magnets glued to it in a circular pattern. Over time some of these magnets unglue them selves and fall inside the sleeve, acting like edges and locking the relative movement of the sleeve to the still axle. The only working solution is to change the developer roller. This leads us to the second problem:

Leveler

Many technicians overlook the importance of proper setting of the thickness of the developer layer on the magnetic roller. In Toshiba copiers it is critical!!!! The thickness of the layer is specific for each model. For 1550 it is 0.45mm. The thickness is achieved by measuring the gap between the leveler and the magnetic roller by thickness plates:



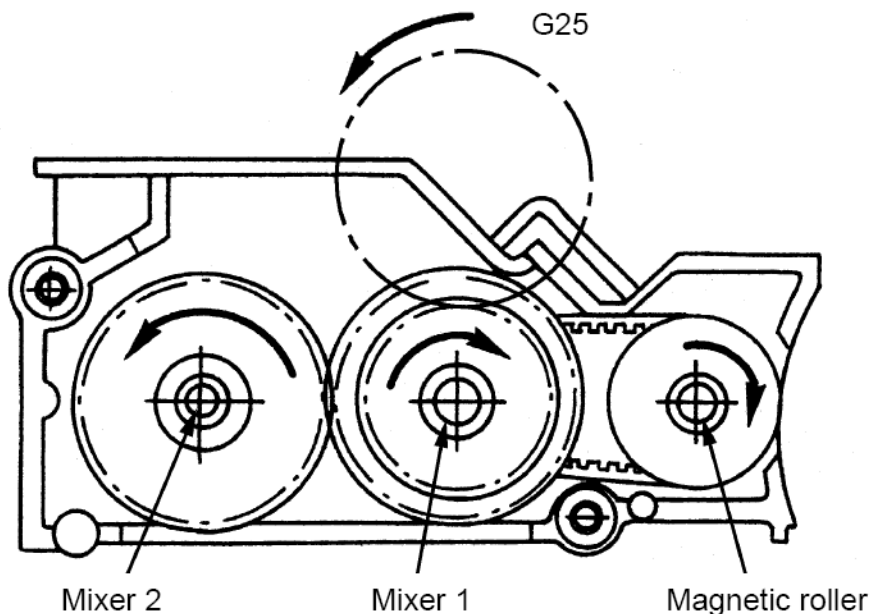
The reason for that strict tolerance is that if you increase the gap too much, the developer brush will reach the OPC drum surface and polish it, destroying the photo sensitive layer. Also the increased thickness will lead to increase in the torque required to drive the module. This in turn leads to excessive wear in the drive gears

and tooth belts. The opposite case – decreasing the gap too much may lead to failure to form developer brush on the surface of the magnetic roller at all.

Mixers

Another reason for increased torque needed to drive the module is the developer mixers. Their role is to stir the developer material in the developer container. They receive torque through the drive gears of the module. However part of them must be outside the module in order to receive movement and the other part must be inside to actually stir the developer. In order to achieve this seals must be used. They are mounted in the side walls of the developer container. After the seals there are bronze bearings on each side of the mixers. After 300 000 or so copies these seals start to leak and the problems begin. If you do not replace them immediately, the space between the seals and the bronze bearings will fill with developer material. The bearings are pushed away and press the mixers drive gears into the side metal walls of the module, causing it to block. Furthermore the developer material acts like a grinder and can decrease the diameter of the mixers shafts, which are in contact with the bearings. Once this happens the mixers are no longer fixed and the drive belt of the magnetic roller starts to loose grip.

In conclusion all of the drive gears and belts in the module are endangered of excessive wear and failure. The drive train is shown o the figure bellow:



Roll guides

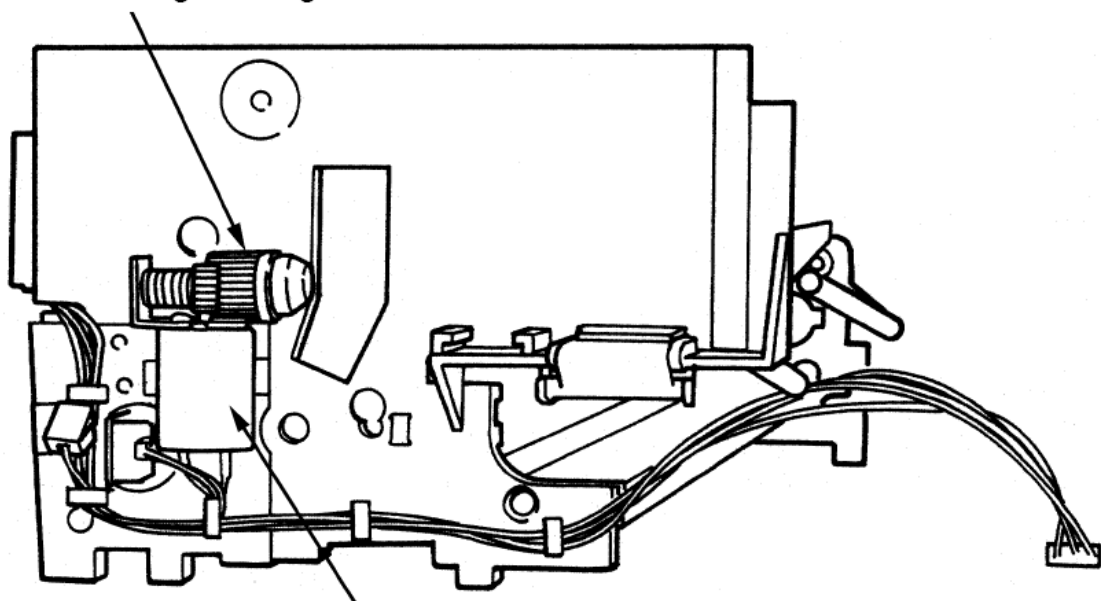
These are another dreadful parts made from Toshiba. The guide rollers have the specific role of keeping the developer roller at just the right distance from the OPC drum so as to ensure both optimal development of the latent image on the drum and to prevent the developer brush from coming into contact with the drum. If this happens the OPC drum will be very quickly ruined by the scouring action of the

brush. Sadly this happens very often in these machines. For unknown to me so far reasons these rollers wear (decrease their diameter) after three or four periodical maintenance services and ruin the OPC drum. One solution is to replace them often, but they are quite expensive. Another solution is to produce them in a machining shop from a more durable material.

Low toner concentration in the developer module

The most exotic problem I have experienced with this model is the faint copy produced by the machine, which I determined was caused by a very low toner concentration in the developer module. Sometimes due to power surges, copiers tend to forget some of their critical adjustment values such as the auto toner sensor output signal level. Usually performing the auto toner sensor adjustment solves the problem and the “add toner” symbol disappears. However sometimes there is toner in the toner cartridge. The auto toner adjustment is made, the sensor itself is working properly and again after several hundred copies the copier still shows the add toner symbol. Upon inspection the developer material is almost stripped off toner. The solution to this phenomenon turned out to be a faulty toner cartridge. The drive shaft through which toner is supplied to the developer unit was blocked and the toner supply motor couldn't rotate it. At first glimpse, this was not so obvious, because the toner motor has a preventive mechanism for just such occasions – drive gear G26 has a failsafe spring into itself, which disconnects the toner cartridge from the toner motor without causing the mechanism to rattle. The construction of the supply mechanism is shown on the figure:

Toner cartridge drive gear G26



Toner cartridge drive motor

An the conclusion is that your clients should always check the proper operation of each new toner cartridge before installing it, by turning its output shaft by hand.