

TOSHIBA THE 60TH SERIES ANALOG COPIERS – AN OVERVIEW

The 60th series of Toshiba – that's how service technicians in East Europe refer to the last analog copier models of Toshiba. The series consists of the following models: 1360/1370, 1550/1560, 2060/2860, 3560 and 4560, and is designed for both clients from small to middle offices and for copy-centers making copy services in middle volumes. For a better understanding of the merits of these copiers, here are the technical specifications of the models:

TOSHIBA 1360/1370

Designed as an office copier for small business, or a departmental, desk side machine for larger companies, the 1360/1370 produces exceptional copy quality and lifetime cost efficiency. Performance that maximizes functionality includes a standard 65%-141% zoom functions with convenient, pre-set ratios for easy reduction and enlargement, 1-999 multiple copy selection, and an array of copy quality features such as automatic exposure control, automatic toner control, photo mode, and edge-to-edge copying. Here are the actual specifications, divided into categories:



High productivity:

- 13cpm (A4)
- First copy time – 7.8 sec. (A4)
- Warm-up time – 27 sec.+Auto Job Start
- 1-999 multiple copying
- Maximum paper capacity – 251 sheets(cassette + bypass)

Reliability & User Friendliness:

- Easy access clamshell design
- Self-diagnostic display
- Quick Copy

Copy quality:

- Automatic toner & exposure control
- Photo mode (image mode)
- Edge-to-edge
- Special anti-humidity kit to assure optimum condition for consistent copy quality

Lifetime cost economy:

- Auto energy saver
- Lower cost-per-copy with larger monthly copy volume

TOSHIBA 1550/1560

The Toshiba 1550 is a desktop type, front clamshell design, fixed platen, desk side copier capable of producing a brisk 15 copies per minute (A4), copying up to A3 size. Here are the actual specifications, divided into categories:



Productivity:

- 15 copies per minute
- A5 to A3 copy size range
- First copy time: 5.8 sec.
- Warm-up time: 28 sec
- Maximum paper capacity: 1001 sheets
- Auto cassette change
- 1-999 multiple copying

Feature rich:

- 50%-200% zoom range
- 6 fixed reproduction ratios
- Edge-to-edge copying
- Photo mode
- Auto exposure control
- Dual page copying with reduction/enlargement
- Automatic multiplication/paper selection

TOSHIBA 2060/2860

The Toshiba 2060/2860 copiers showcase an exciting, all-new modular concept and compact design that are sure to prove popular with end users. These clamshell, desktop type machines feature an array of easy to use functions, which enable consistent, high copy quality delivery at speeds of 20cpm and 28cpm respectively. Here are the actual specifications, divided into categories:

Productivity:

- 2060 – 20cpm (A4); 2860 – 28cpm
- First copy time- 4 sec (A4a)
- Warm-up time – 80 sec.
- Maximum paper capacity – 4500
- Four types of sorters

Serviceability:

- Simple attachment or detachment of optional equipment by a service technician
- Exposure and paper edge setting adjustment of new machines is significantly quicker due to fine tuning at the manufacturing stage



TOSHIBA 3560 AND 4560

When it comes to office copiers, the more things change, the more you need the expandable features of the Toshiba 3560. Toshiba's innovative modular design gives you the flexibility to customize and configure the 3560/4560 any way you choose. You can select from an array of optional features, including Document Feeders, Paper Feed Pedestals, and Sorters, that let you quickly adapt the 3560 to meet your current, and future, office copying requirements.



Specifications:

- Copying Process: Indirect Electrostatic Photographic (Dry Method).
- Type: Desktop with Clamshell Design.
- Original Table: Stationary Platen.
- Copy Speed: 35 Copies Per Minute (A4).
- Warm-Up Time: Approximately 80 Seconds.
- First Copy Time: Approximately 4.0 Seconds (A4).
- Multiple Copying: Up to 999 Copies.
- Reduction/Enlargement: 50%-200%.
- Paper Supply: 600 Sheet Cassette plus Expansion Slot; 50 Sheet Stack Feed "Smart" Bypass.
- Expansion Slot: accommodates Optional 600 Sheet Cassette or Automatic Duplexing Unit.
- Toner Control Method: Automatically Controlled Toner Empty Detection.
- Maximum Monthly Copy Volume: 50,000 Copies.
- Displays: Graphic Display: Shows Operational Status at a Glance; Icon Based Touch Panel Allows One-Touch Operation; LCD Message Display With Step-By-Step Operations Procedures.

In the following series of publications, I will try to make a summarizing overview of the models from the 60th series copiers. I will reveal their good and bad sides, based on my experience in technical maintenance of Toshiba office equipment. The present paper is motivated from the fact that in contrast to West Europe and The USA, here in East Europe clients are still widely using analog copiers in their businesses. This necessitates the need of training service technicians to maintain this type of office equipment.

The copiers from Toshiba's 60th series have proven themselves as reliable and cheap to run office equipment. In my practice I still maintain copiers from this series with copy-counters over 1 or even 2 millions copies, never mind Toshiba recommends the machines being replaced half that copy-counter. This fact is only to confirm the solid structure of the machine and the way they were designed. These copiers are designed for easy service maintenance and repair. Each module of the machine is easy to detach and is quite serviceable, in contrast to modern digital copiers, where most of the modules are constructed entirely of plastic, which greatly reduces their service life.

The method of disassembly and adjustment of modules in these machines is given in detail in Toshiba service manuals. That's why in following publications I will emphasize only on specific defects and failures, their causes and various methods for preventing their occurrence again.

First of all I want to emphasize the importance of the following – more than half of the service calls are caused by contamination (household dust, dirt, paper fibers, toner and developer) and poor periodical maintenance of the copiers. That's why I will present a summarized method for proper periodical and technical maintenance of analog Toshiba copiers. Periodical maintenance is performed according to the service tables, provided by Toshiba, but given the poor conditions the copiers operate in East Europe offices and their poor maintenance (caused by lack of financial recourses of the customers), a service technician often is forced to service the machine earlier. A good sign that the time for maintenance has come earlier is when the copy quality deteriorates – exclusively in Toshiba copiers the copy becomes darker. When the machine is dirty the copy, made in auto exposure mode is often a little darker, but the copy in manual exposure mode (central position) is significantly darker than the recommended copy of the Toshiba test chart. This phenomenon is valid for all of the 60th series copiers. I recommend that all copy defects be diagnosed

only after a complete periodical maintenance of the machine is made. In this way you will eliminate potential defects caused by contamination. Here is one more important reason for thorough implementation of the periodical maintenance procedures – disassembly and cleaning of the modules of the copier is the best way to evaluate the condition of the parts contained and to replace them if necessary, before they cause damage to other components connected to them by the transmission mechanism of the copier.

PERIODICAL MAINTENANCE – USEFUL PRACTICES

Toshiba 1360/70 Series

According to the periodic inspection check list of the manufacturer, periodical maintenance should be performed every 15000 copies or, I advise earlier if the copier operates at dusty environment:

Symbols Used in the Periodic Inspection Check List

Cleaning	Lubrication	Replacement	Date
(A) Cleaning with alcohol	(V) Vacuoline (H) Heavy-medium oil (L) Launa 40	(30) Every 30,000 copies (60) Every 60,000 copies (90) Every 90,000 copies Same thereafter	Customer's name
(P) Cleaning with Pit Clean (RC60)	Application		Machine No.
○ Cleaning with soft pad, cloth, or cleaner (vacuum cleaner)	(SI) Silicone oil (M) Molytherm (W) White grease (Molycoat)	(△) Replace in event of deformation or other damage	Inspector
			Remarks

Periodic Inspection Check List

Area	Item to check	Clean at 15,000 copies	Lubricate at × 1,000 copies	Replace × 1,000	Check while on	Remarks
Cleaner	1. Overall unit	○				
	2. Main blade	○		30	○	*1
	3. Toner bag			16 or more		Conducted by key operator
	4. Recovery blade	○		90		*2
	5. Drum bushing	○				
	6. Discharge lamp	○				
Drum	10. Drum shaft	○				
	11. Drum	○		30 or more		*3
Original holder	12. Glass	(A)				
	13. Original cover	(A)				
Optical system	15. No.1 mirror	○ or (A)				
	16. No.2 mirror	○ or (A)				
	17. No.3 mirror	○ or (A)				
	18. No.4 mirror	○ or (A)				
	19. No.5 mirror	○ or (A)				
	20. No.6 mirror	○ or (A)				
	21. Silt glass	○ or (A)				Both sides
	22. Reflector	○ or (A)				
	23. Lens	○ or (A)				
	24. Exposure lamp			△	○	
	25. Automatic exposure sensor	○			○	
	26. Reproduction mechanism section (mirror)				○	
	27. Reproduction mechanism section (lens)				○	
	28. Slider sheet	(A)		△		
	29. Air filter	○		△		*9
	30. Ozone filter	○		30		
Charger	70. Unit	○ or (A)				
	31. Case	(A)		△		
	32. LED eraser array (for 1350)	○				
	33-1. Main charger wire	(A)		30 △	○	
	33-2. Transfer/separation charger wire	(A)		60 △	○	
	34. Terminal contact	○				Use sandpaper if necessary
	35. Grid	(A)		60		*10

I can assure that if you work according to the here presented method, the copier will work more predictably, which will give your clients confidence in your technical abilities and also you will encounter “strange” behavior of the machine very rarely. It is also true that when performing periodical maintenance more frequently, you can increase (some times more than twice) the service life of consumable parts. This reduces the cost-per-copy value of the copier.

Area	Item to check	Clean at 15,000 copies	Lubricate at × 1,000 copies	Replace × 1,000 copies	Check while on	Remarks
Developer unit	36. Overall unit	○				
	37. Developer material			30		*4
	38. Front shield	○		△		
Paper feed system	41. Paper – feed roller	(A)		90 △		
	44. Aligning roller	(A)		△		
	45. Paper guide	○				
	46. Brush	○		△		
Fuser unit	50. Teflon roller (upper)	(P)		90		*5
	51. Heat roller guide	(P)				
	52. Rubber roller (lower)	(P)		90		*6
	53. Cleaning felt			30		*7
	54. Thermistor	○ or (P)		△		
	55. Scraper (for heat roller)	(P)		90		*8
	56. Heat roller exit guide	(P)				
Drive unit	60. Heat roller drive, Collar around edges		90 (SI)			

1. Optical section cleaning

1.1 Remove two screws A, holding the original position plate.

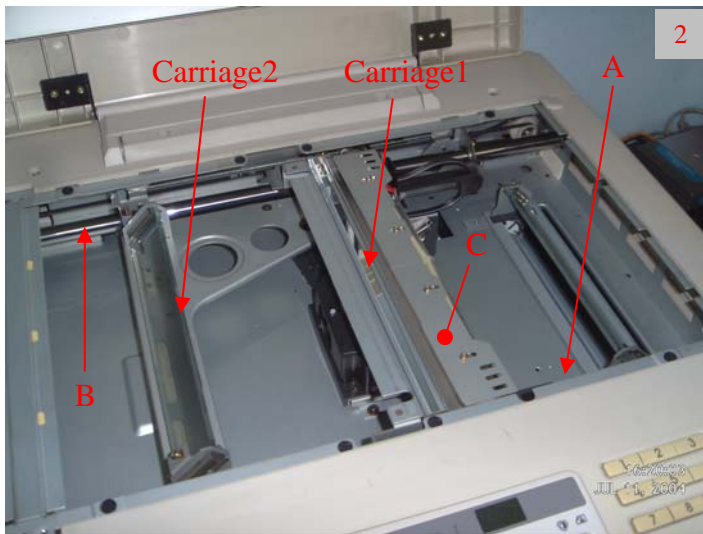
Mark its position, because it determines the start of the image on the copy as well as the image skew.

1.2 Clean the original glass both sides using window cleaner.

1.3 Remove the cover B, protecting the carriage with mirrors 4 and 5. See figure 1.

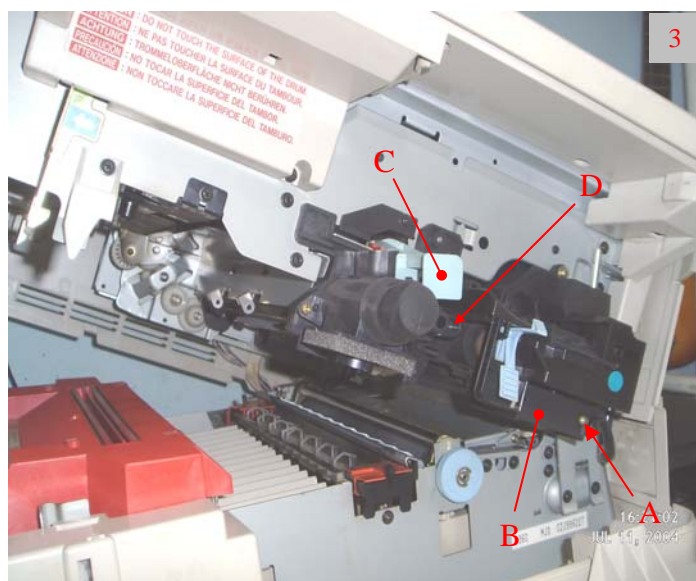


- 1.4 Clean with vacuum cleaner the optical section. Note – for moving carriage 1 and 2 push only from the back side (where the guide is), otherwise you can bend it causing image distortion.
- 1.5 Clean the plastic strip A on which the carriage 1 and 2 slide using isopropyl alcohol.
- 1.6 Lubricate the guide B of carriages 1 and 2.
- 1.7 Clean mirrors 1, 2, 3 and 4 as well as the two expo-lamp reflectors using a lint free cloth. Note – do not try to move the shading plates over the expo-lamp. They are factory preset and movement will cause uneven density on the copy.
- 1.8 Assemble the optical section in a reverse order. See figure 2.



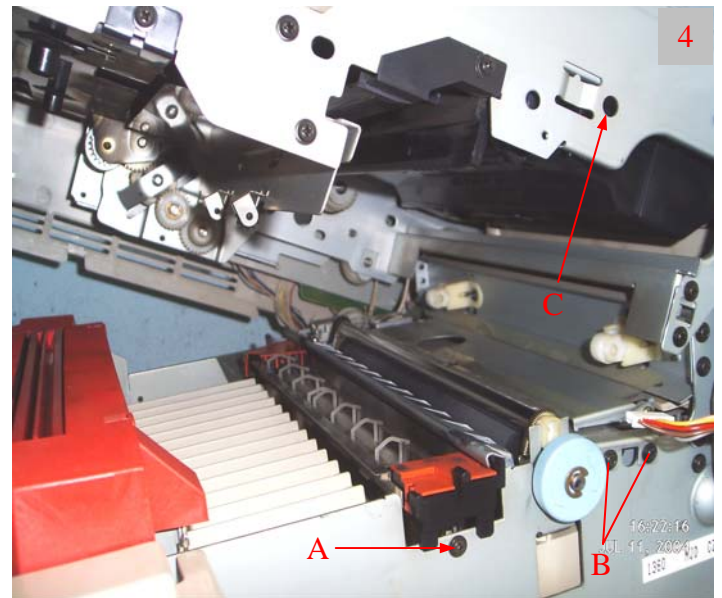
2. Disassembly of the modules of the copier

- 2.1 Remove the toner cartridge. Remove screw A and cover B. Unplug the connector of the developer unit. Remove the main corotron assembly C. Remove screw D and carefully pull out the process unit from the copier. Note – put the process unit in a dark place, carefully as not to scratch the surface of the OPC drum. See figure 3.



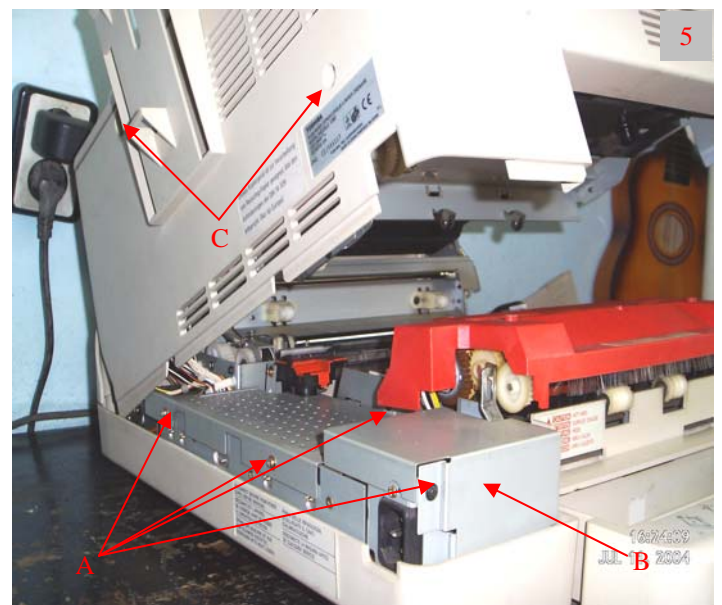
- 2.2 Remove screw A holding the transfer/separation corotron assembly and two screws B, holding the front end of the registration assembly.

- 2.3 Remove screw C, fixing the protective cover of mirror 6. Remove carefully the cover paying attention not to break the two pins holding it to the bottom of the optical section. See figure 4.



- 2.4 Remove 4 screws A, holding the cover B and pull it away. Remove 2 screws C and remove the rear cover of the copier.

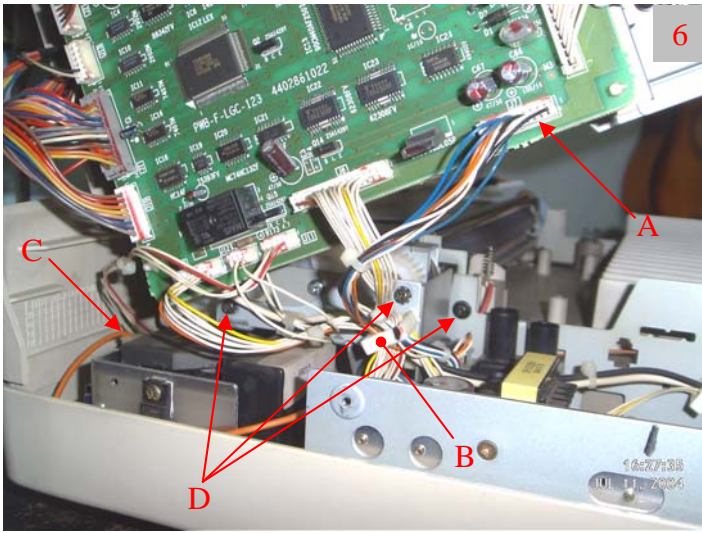
- 2.5 Remove the transfer/separation corotron assembly carefully. See figure 5.



- 2.6 Unplug connector A from the main board and release it from the clamp B. Unplug the connector C.

- 2.7 Remove screws D, holding the back end of the registration assembly.

- 2.8 Pull out the paper tray. Note – if you do not do so, there is a risk of breaking the paper empty sensor, attached to the registration assembly when removing it. See figure 6.

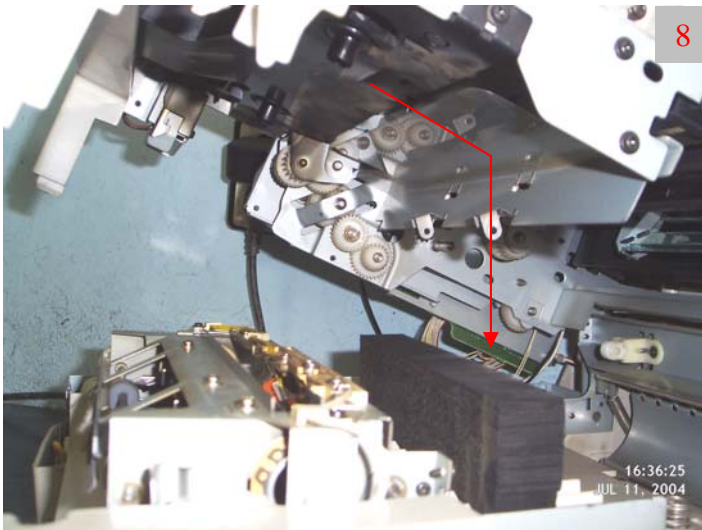


2.9 Carefully pull out the registration unit, as you watch the two connectors to come off with it too. Note – the orange wire leads to a terminal attached to the registration assembly. Pulling it too hard may cause the terminal to break off its pins. This will lead to irregular defects on the copy, due to poor contact. See figure 7.



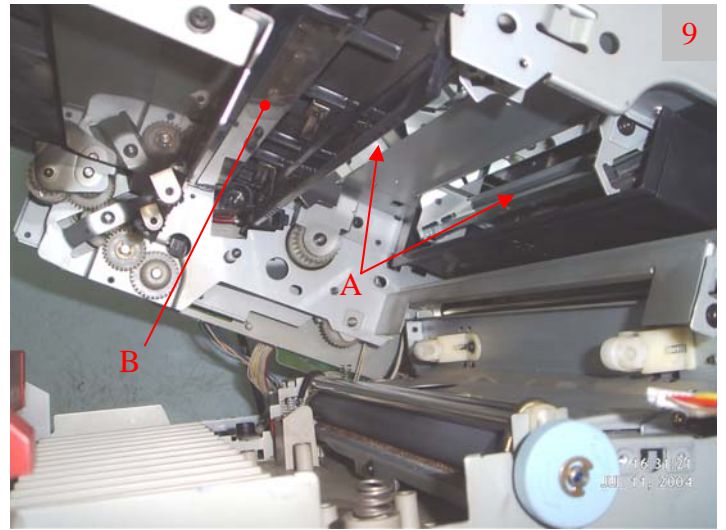
2.10 Remove the protective cover of the fuser unit.

2.11 Carefully remove the ozone filter in the direction shown. See figure 8.



2.12 Inspect thoroughly the inside of the machine and clean it with vacuum cleaner.

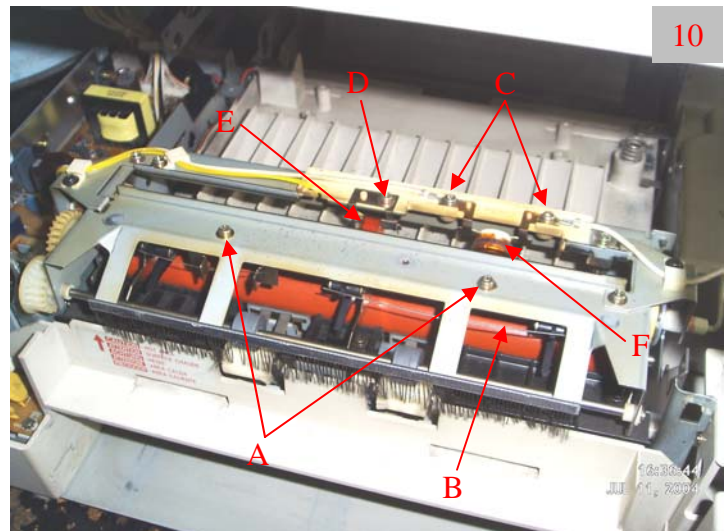
2.13 Clean mirrors 5 and 6 (A) as well as the transparent cover B of the discharge lamps using a lint free cloth. See figure 9.



2.14 Remove screws A and carefully remove the upper fingers assembly. Note – pay attention not to lose the springs B holding the fingers.

2.15 Remove screws C and D and remove the thermistor E and the thermo fuse F. Note – when removing the thermistor, be careful not to pull too hard its wires, because they may detach from the print-circuit board. This will lead to C7 error codes.

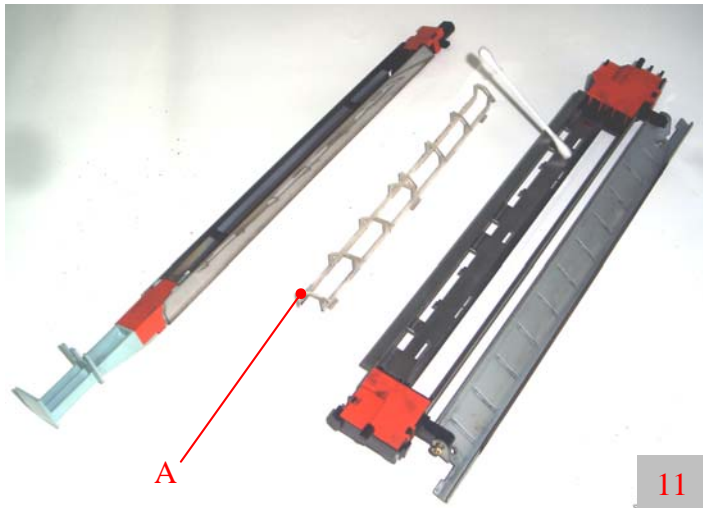
2.16 Clean the two elements using a cotton swab dipped in thinner. This will dissolve the deposited toner and paper dust. See figure 10.



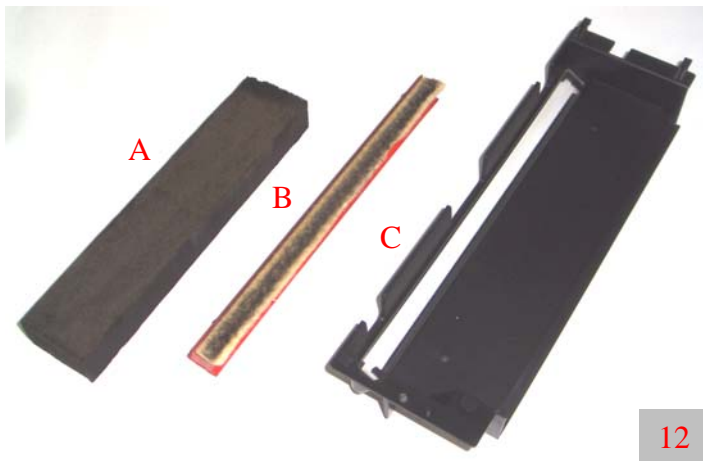
3. Cleaning the units of the copier

3.1 Clean the main and transfer/separation corotron assemblies, using a soft brush and vacuum cleaner. Pry off the orange protective caps of the terminals, inspect and clean the terminals from the deposited toner or developer if necessary. Remove the protective cover A from the separation corotron. Using cotton swabs and with window cleaner, clean the metal parts and the wires. Note – use window cleaner fluid because it removes successfully the

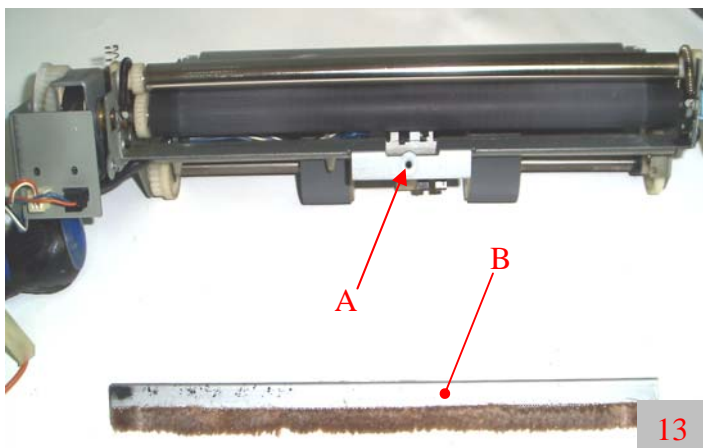
residue on these units. Dry the corotrons with cotton swabs. See figure 11.



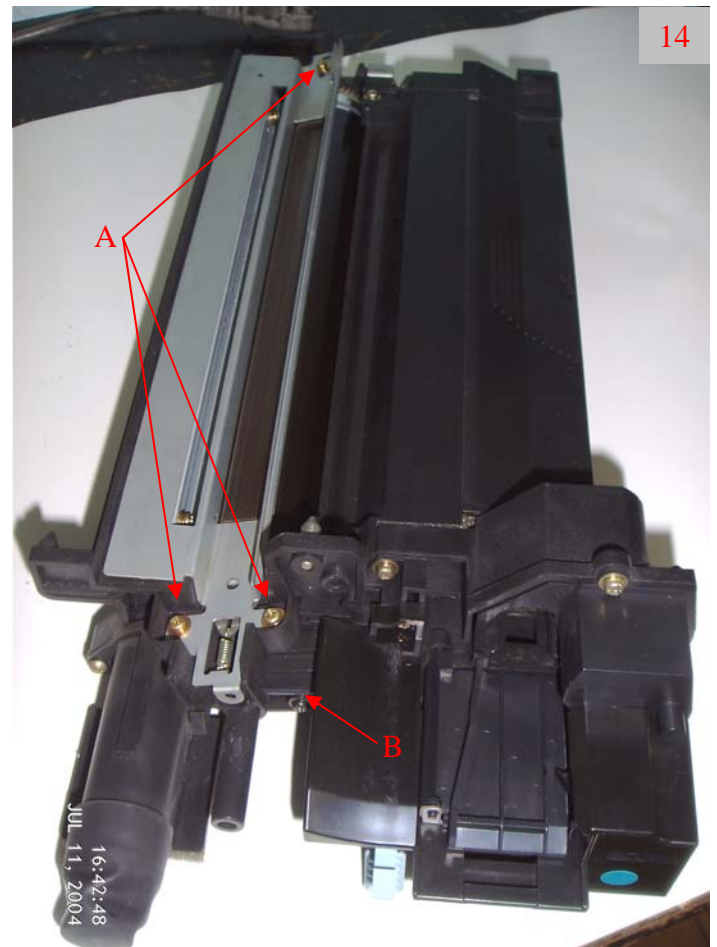
3.2 Clean with vacuum cleaner the ozone filter A and the fuser roller cleaning felt B. Be careful not to detach the felt from its housing. Pour a small amount of fuser oil on it. Clean the cover C with lint free cloth. See figure 12.



3.3 Remove the screw A, holding the cleaning brush B and remove it from the registration assembly. Clean it with vacuum cleaner. Soak a cloth in rubber rollers cleaner fluid and clean the registration assembly rubber roller from the accumulated paper dust layer. Note – a dirty registration roller may lead to registration shift of the copy (i.e. the beginning of the image on the copy will not coincide with the beginning of the original). Clean the pick up rollers, located at the bottom of the registration assembly, with the rubber roller cleaning fluid too. See figure 13.



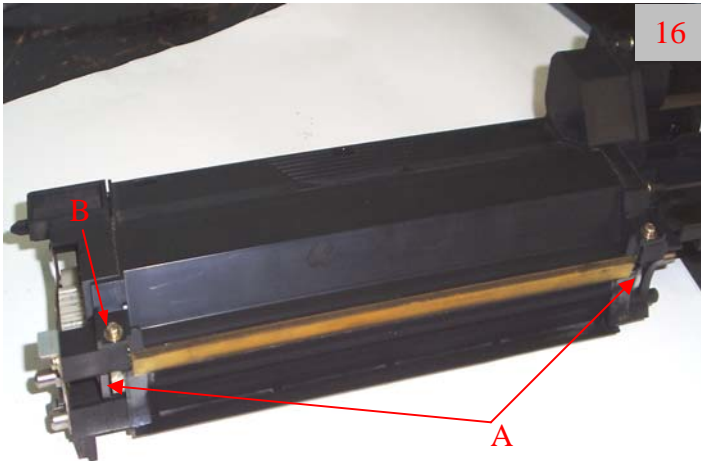
3.4 Process unit – remove the screws A and pull out the main corotron assembly. Remove screw B and carefully separate the process unit from the developer unit. Inspect the surface of the OPC drum for any signs of mechanical wear and defects. Inspect the cleaning blade. If its color is copper-yellow that is a sign it has to be changed soon. See figure 14.



3.5 Carefully lift the main charger grid in the direction A and detach it from the pin B. Remove the spring C. Clean the grid with soft brush if it is not so much dirty. Otherwise spray it with window cleaner liquid and clean it with brush. Dry the grid with lint free cloth. If any fibers stay on the grid, they can cause copy defects. See figure 15.

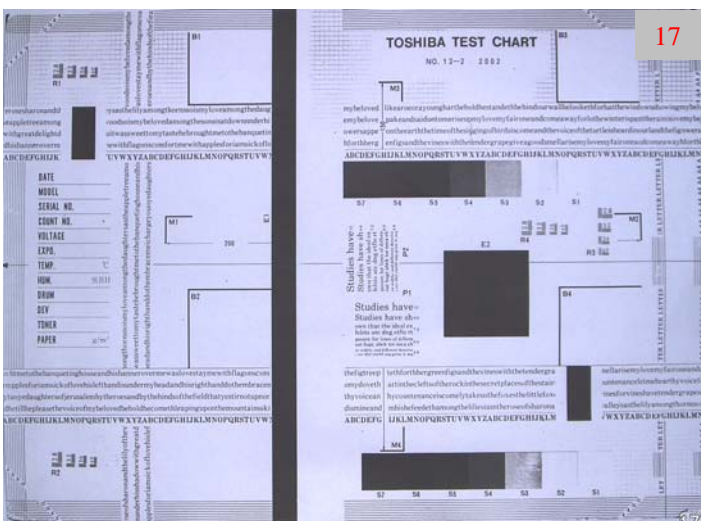


3.6 Inspect the developer unit. Clean with vacuum cleaner any deposited toner under the magnetic developer roller. Check if the roll guides A rotate freely. Turn the developer unit input gear by hand in the direction B. If the developer roller is not freely rotating it is an indicator of a mechanical failure which may lead to wear and break in the main drive of the copier. Mechanical defects in this module will be reviewed in following articles. See figure 16.



4. Adjustments of the copy density

After cleaning the modules and the main frame of the copier, reassemble in reverse order. Make a test copy in manual exposure mode (slider in the middle). If you are using a Toshiba test chart the copy should look like this on figure 17 (square S2 slightly visible). If the copy density is not like on the figure it is necessary to make adjustments in the following order:

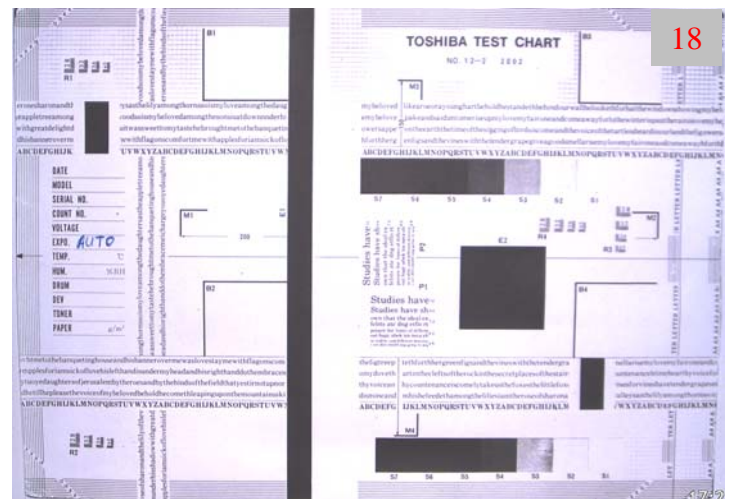


4.1 Hold together numerical buttons 0 and 5 and power on the copier. AJ is shown on the display. In this AJ (adjustment mode) follow strictly the procedure above.

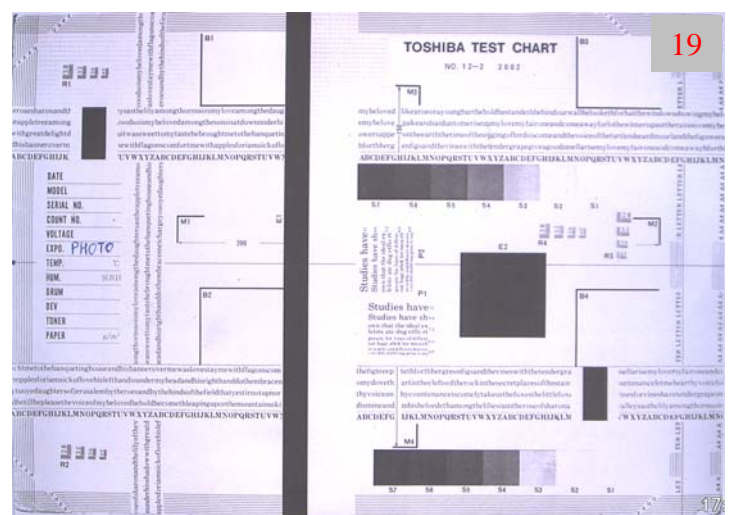
4.2 **Adjustment of copy density in manual exposure:** press numerical button 1 and then press the start button. Note the display value. If the density of the copy is low reduce the

display value by pressing the numerical button 7. If the copy density is too high increase the display value. Save the value by pressing the start button. In order to make a test copy press and hold together the numerical buttons 3 and 4. If necessary change the value of code 1 again. You should achieve copy density like the one on figure 17 after several attempts.

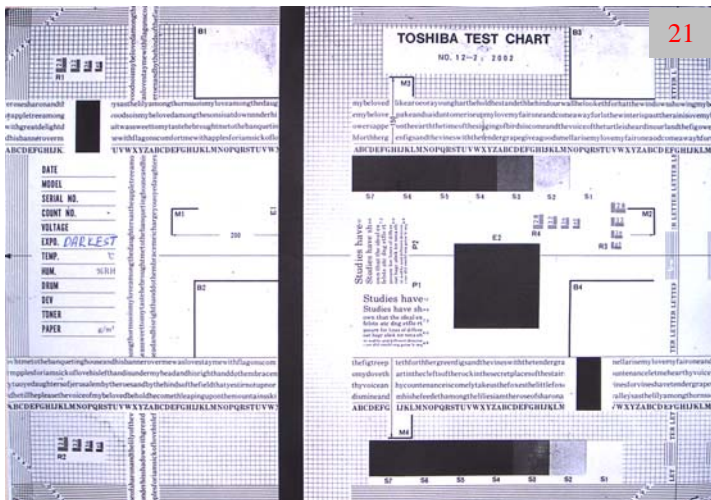
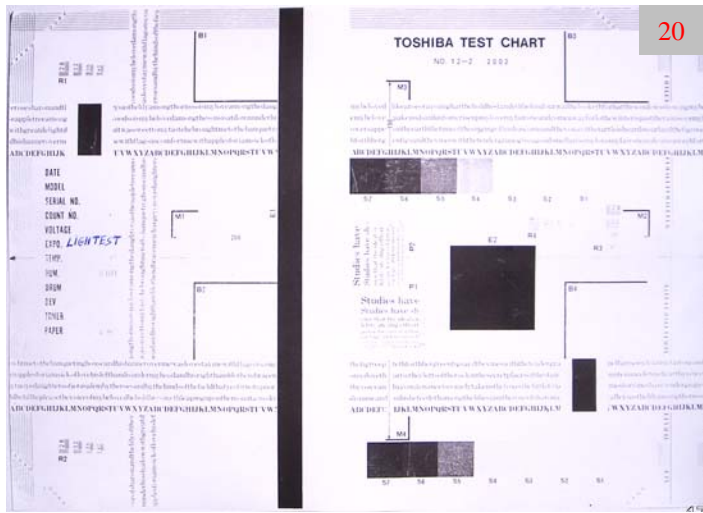
4.3 **Adjustment of copy density in auto exposure mode:** make a test copy in auto mode (buttons 3 and 4). If the copy density is not like the one on figure 18 make an auto-exposure automatic adjustment. Put several white sheets of paper on the original glass. Close the original cover and dial 49, then press the start button. The copier is performing an automatic adjustment of the auto exposure mode. Put the test-chart on the original glass and make a test copy (buttons 3 and 4). If necessary make adjustments of the auto exposure value by changing it through code 5 (the procedure is the same as with code 1).



4.4 **Adjustment of copy density in photo exposure mode:** the copy in this mode should look like the one on figure 19, if not change the value in code 14 using the same procedure as with codes 1 and 5.



4.5 **Adjustment of copy density in lightest and darkest exposure modes:** the copy density in these modes should look like the ones on figures 20 and 21. If necessary make adjustments in codes 9 and 10 respectively using the same procedure listed above.



It is possible to have other defects in the copy density or geometry, the adjustment of which is the same for all of the 60th series copiers and will be discussed in following articles.