# TOSHIBA E-STUDIO 166: A MODERN OFFICE PRINTING MULTIFUNCTION TOOL. PART 2

By **VLADIMIR KAMENOV**

*In this issue of RechargEast Magazine we are continuing the analysis of e-Studio 166 copier, its structure, disassembly and assembly issues. We will also consider a number of repairs problems and solutions to them. The final part of the article will be published in the December issue of RechargEast Magazine.*

***Principle of operation of specific units, which are different from the analog copiers described in the previous articles.***

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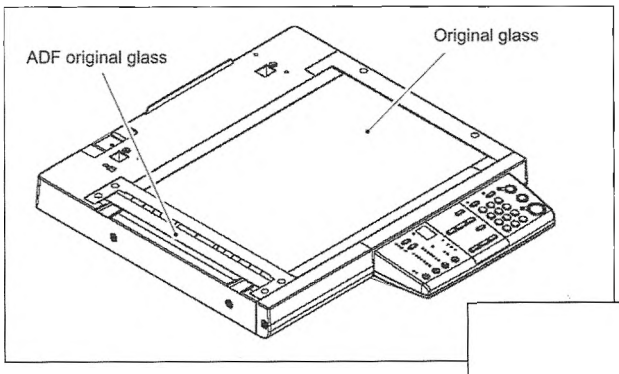
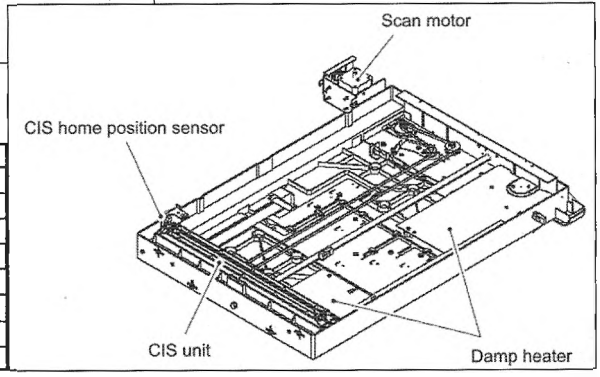
## SCANNER

In the scanning section, this equipment uses a CIS (Contact Image Sensor) for scanning the image. The surface of an original is irradiated with light from the LED array mounted on the CIS unit and the reflected light is scanned by the CCD where the optical image data are converted into a digital electrical signal, and then transmitted to the MAIN board. After the various image processing operations necessary for image formation are performed on the MAIN board, the data are transmitted to the writing section.



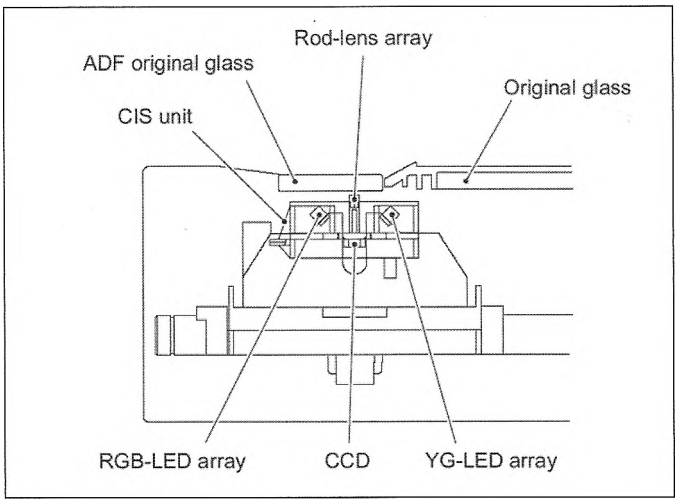

| Scanning section | |
|---|---|
| Original glass | Original glass |
| | ADF Original glass |
| CIS unit (CIS) | CCD |
| | YG-LED array |
| | RGB-LED array |
| | Rod-lens array |
| Drive section | Scan motor (M1) |
| CIS home position sensor (S1) | |

## FUNCTIONS

1) Original glass: This is a glass for placing the original. The original (image) placed on the original glass is scanned by the CIS. The ADF original glass is used when original is read with the Automatic Document Feeder. Original is transported on the ADF original glass by the Automatic Document Feeder, and the transported original is read under the ADF original glass by the CIS. Do not use such solvents as alcohol when cleaning the surface of the ADF original glass, because it is coated so as not to be scratched by originals.

2) CIS unit (CIS) The CIS unit (CIS) consists of an LED array, lens array and CIS sensor of the same length are closely attached and unified. The original is irradiated with the LED light source of RGB colors at one time, and then the reflected light is scanned by the CCD sensor. In the CCD method (reduction optical method), the reflected light of the exposure lamp is led through mirrors, lens and slit to the CCD where the optical-to-electrical conversion for scanned data is performed. In contrast, in the CIS method (close-contact sensor method), those operations are processed only by the CIS unit. The CIS has characteristics of shallow depth of focus and high light sensitivity.

- ***CCD:*** Scans the light reflected from an original and converts it to an electrical signal. The CCD sensor of the equipment has 7084 image pixels and 600x600-pixel resolution for scanning.



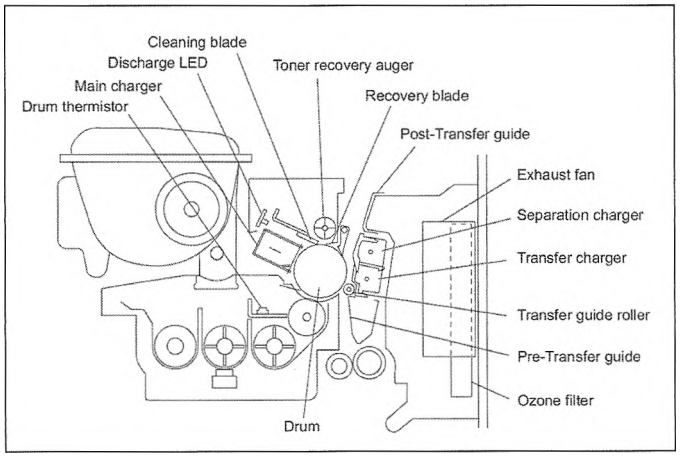

- ***YG-LED array:*** Works as an assistant light for the RGB-LED array. This YG-LED array is used to reduce the shadow of the original when scanning is performed.

- ***RGB-LED array:*** A light from the LED array mounted on the CIS unit (CIS) goes through the original glass and lights the original. Then, the reflected light from the original is scanned by the CCD. By adjusting each amount of R, B and YG-LED light with reference to the amount of G-LED light, it is possible to attain a light color which has nearly the same color effect as that of the YG xenon light for the light sensitivity of the CCD sensor. This LED array produces the output power of 4W.

***- Gradient index lens (Rod-lens array):*** This is a lens of which the index of refraction within it is varied. This lens enables us to produce a unified image without combining mirrors or lenses.

## DRUM RELATED SECTION

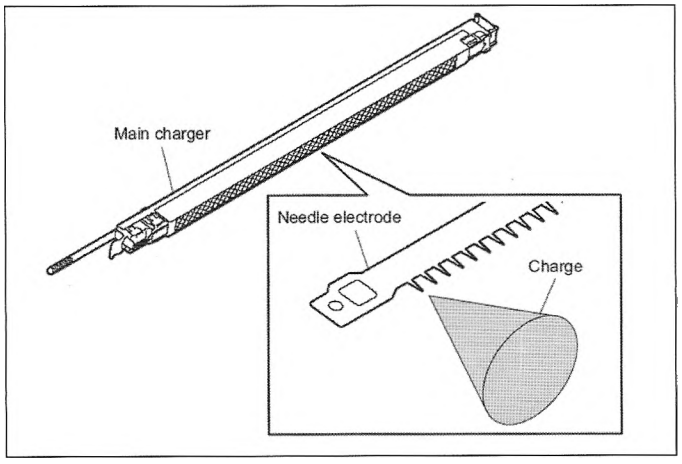
On the figure bellow, the vertical design principle is shown:



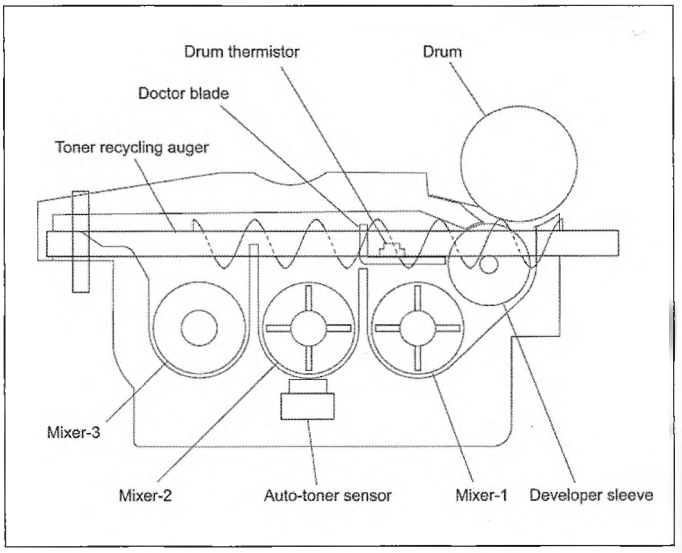

## FUNCTIONS

***Main charger:*** the main charger in this equipment consists of a metal rod with U-shaped section, insulated blocks at both ends of the rod and a needle electrode attached between them. When a high voltage is applied to the needle electrode, the air around it is charged (ionized). The ionized air then flows into the drum causing it to be charged. This phenomenon is called "corona discharge". At the same time, a control bias is applied to the main charger grid to control the charging amount. In a dark place, negative charge is evenly applied onto the drum surface by the corona discharge and this grid. In addition, a cleaner is installed to clean up the dust attached on the needle electrode.

***Needle electrode:*** the needle electrode has aligned needles and their points perform the corona is charge. These points (electrodes) discharge toward the drum in one direction to realize the more efficient discharging comparing to the charger wire which discharges in a radial direction. Therefore, the needle electrode enables to reduce the ozone amount:



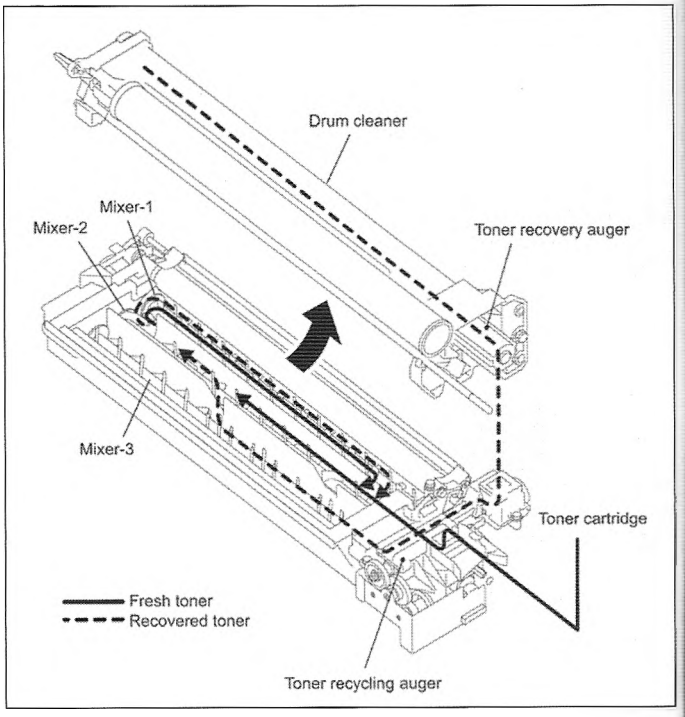

## DEVELOPMENT SYSTEM




The innovation compared to analog models is the recycling of waste toner, scraped from the OPC drum.

## RECOVERED TONER SUPPLY MECHANISM

The toner scraped off by the drum cleaning blade is transported by the toner recovery auger and the toner recycling auger to be recycled, and then returned into the developer unit. Then the recovered toner in the developer unit is mixed by the developer material using the mixer-3. The mixer-3 is mounted exclusively for the recovered toner to mix it in a sufficient period of time. On the other hand, the (fresh) toner transported from the toner cartridge into the developer unit is mixed by the mixer-2. Then the (fresh) toner and the recovered toner are mixed together and further transported to the mixer- 1. They are further mixed by the mixer-1 and transported to the developer sleeve.

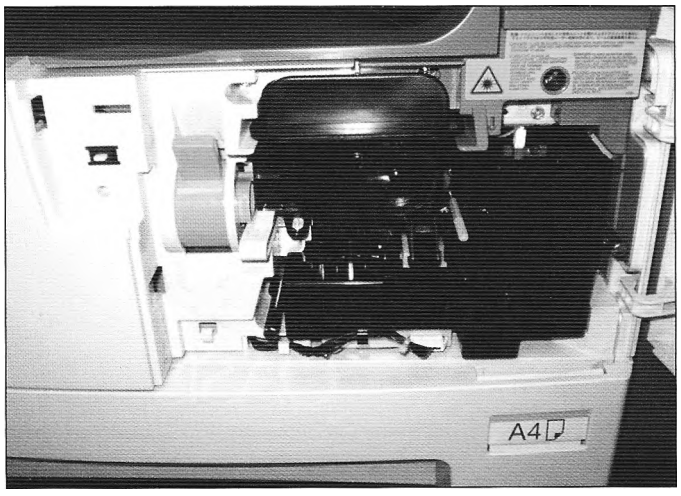


## DISASSEMBLY AND PERIODICAL MAINTENANCE OF THE COPIER

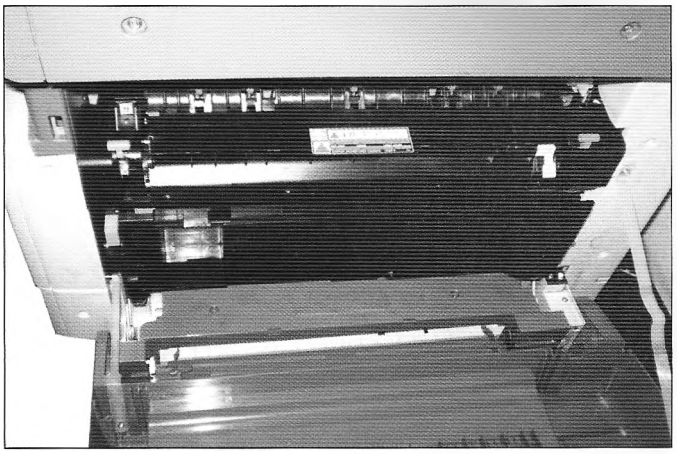
Remove four screws, which are hidden under rubber circles. First remove the ADF glass. Note – do not use cleaning agents to clean this glass!!! It has special anti-scratch coating which can be damaged. The coating is used to enhance the movement of the originals during scanning from the ADF. Clean the platen glass with window cleaner. Usually, that is all that's needed for the optical unit.

Note – do not touch or clean with agents the CIS scanner. You can brush it with soft brush.

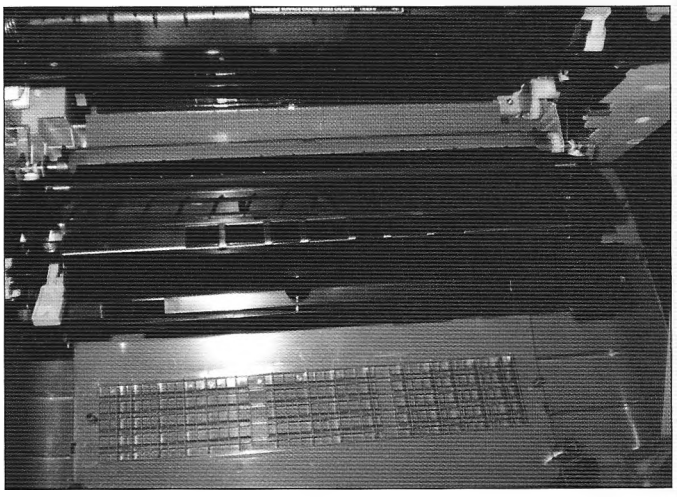
Open the front cover and remove the toner cartridge by pressing the big green lever.



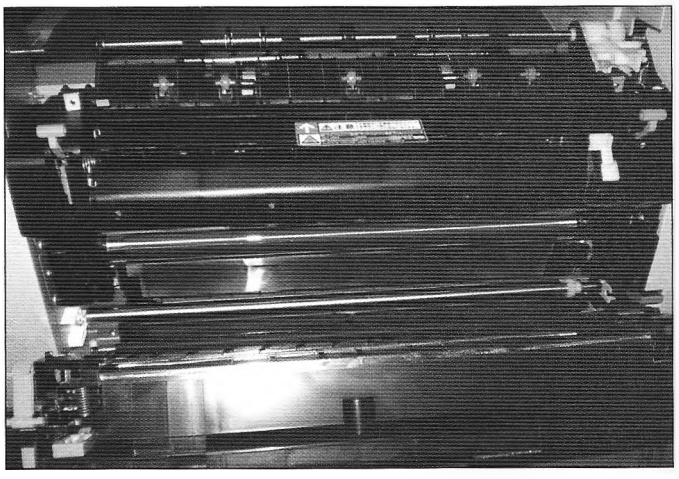

Open the right-side cover of the copier



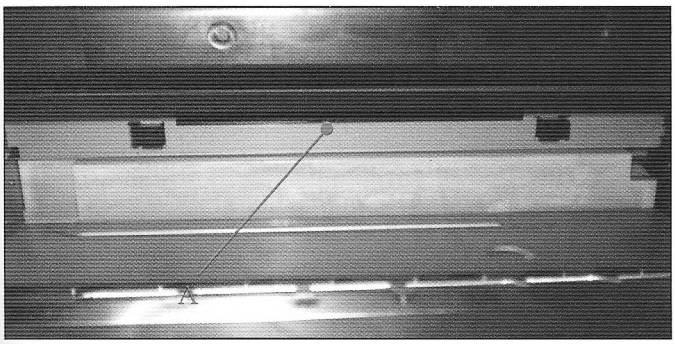
Open the inner cover by pulling the green lever out (shown on the figure above). Now you can remove the transfer/ separation charger assembly by releasing it from the tabs at each end. Remove the grid from the separation charger and carefully brush the accumulated dirt and toner from the corotron assembly housing. If there is layer of dirt formed on the walls, clean it with cotton swabs dipped in window cleaner fluid.



With the drum unit exposed, remove two screws in front of the unit and a connector. With the side covers opened, carefully remove the imaging unit towards the front of the machine.

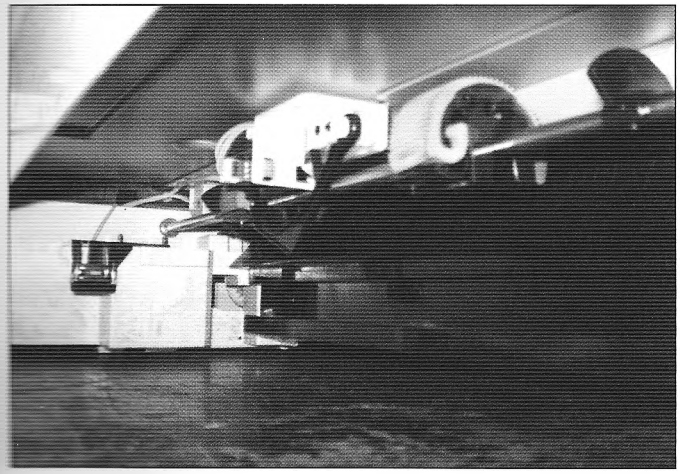


With the imaging unit removed, you can clean the laser scanner assembly exposure slit – A. Usually that's all the module needs. Even after 200 000 copies made, the laser scanner doesn't require cleaning from inside the module.

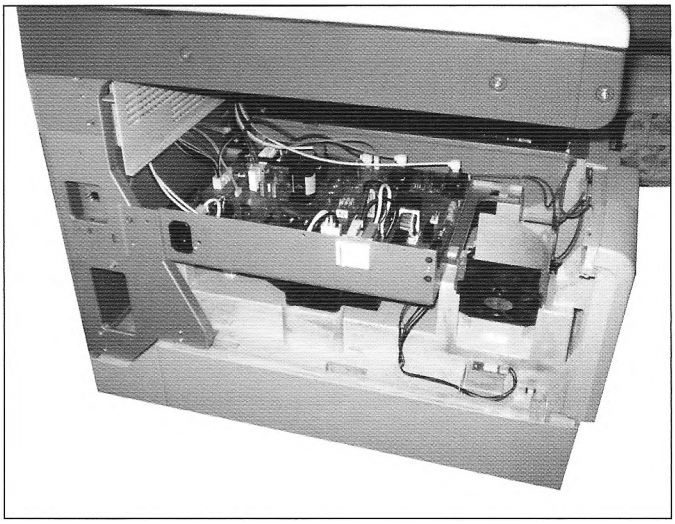



Now clean entirely the inside of the copier from the paper dust and toner accumulated with vacuum cleaner. Also clean the rubber registration roller A with rubber restoring fluid and a cloth. This is important to prevent improperly registered copies (the beginning of the copy doesn't align with the beginning of the original.

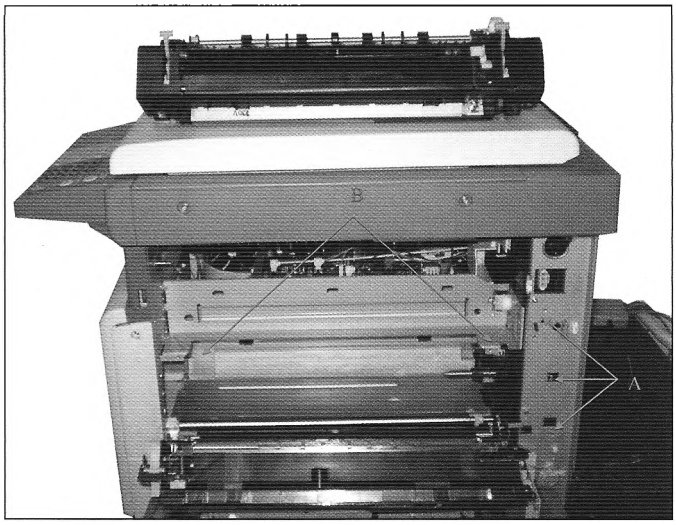

Usually the paper feeding section doesn't require attention at all!! Even after many copies the feed tires are ok and don't need cleaning. However if you have to, there is a special code found in the service handbook, which turns the feed rollers downward in order to clean them easily:



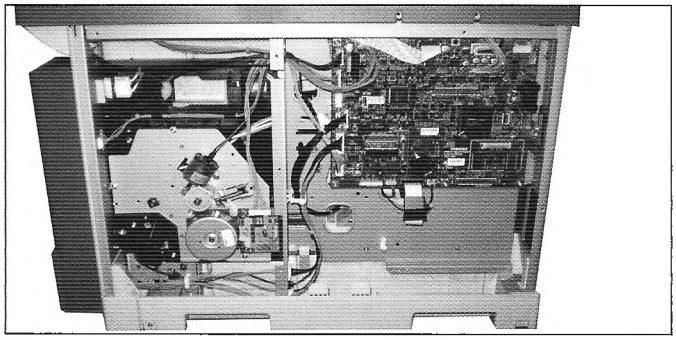
If for some reason you need to access the laser scanner unit and the exhaust fan, the operation is very easy. Just remove a few screws and the left inner cover of the copier. Now you can see the fan and after a few more screws and connectors, which hold the power supply unit, you can reach the laser scanner:



To remove the fuser unit from the copier, remove 3 screws A and a cover. Then unplug two electrical connectors and remove two more screws B. Gently remove the fuser unit from the copier:




If you want to examine and clean the rear of the machine, just remove the rear cover. Now you can reach the toner and main motor of the copier:



To be continued. RCE