

# TOSHIBA E-STUDIO 166: A MODERN OFFICE PRINTING MULTIFUNCTION TOOL. PART 1

By VLADIMIR KAMENOV

*In this issue of RechargEast Magazine we are offering the first part of 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 other parts will be published in November and December issues.*

**T**he goal of the present article is to preview and analyze one of the latest multifunction copiers from Toshiba. The model is aimed at the lower segment of small office workgroups.

At present, the days of analog copiers are finished. They can be found only at small private copy centers. All modern offices have already switched to digital multifunctional copier systems. Such is the case with Toshiba e-Studio 166. It represents the latest technologies and trends in the development of modern office equipment. Toshiba is one of the leaders in the field of office equipment. The presented model has almost every feature one would want in modern office – copying, printing, and scanning. Also there are some options available to upgrade the basic package, such as: ADF – automatic document feeder, additional paper cassette and a stand.

So far, so good: that is what you would expect from modern copier, especially if the words above come from the manufacturer itself. Let me cite a little from their brochure:

- **Out of the box multifunctionality: print, copy and scan in one device.**
- **Innovative digital technology for topmost reliability and excellent image quality.**
- **Highly attractive and representative design – fits into all modern office spaces.**
- **Wide and clearly layed-out operator panel for excellent user friendliness.**

But as you may have noticed, in my articles I try to analyze every office equipment model from an engineer's point of view. It is important; after all, what the service engineer and client think about a copier and



this opinion has to be based on real experience. In order for a copier to be evaluated, all its weaknesses must be revealed and then, after summarizing, the less they are the better the model is.



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Speaking about the market in Eastern Europe, things become even more complicated. Here everyone has its own opinion and thinks he knows better than every one else. Thus, the entire colorful sales brochures in the world mean nothing. The price is the only factor here. Strangely enough, this is true even for big and well known companies. Then, after the difficult deal of purchasing a new digital copier is done, the problem with maintenance comes in place. Here again the mentality dictates that the copier must at the same time be maintained only basically with minimum parts replacement and be literally worked to death. And even then, there is no money for new anyway and the existing copier must be "kept artificially alive" and kept going.

And that's where the big disagreement in the Western and Eastern Europe mentality comes in. In principle, the modern copier is designed so as to have an active life of 200 000 to 300 000 copies for low-end machines. This is called: artificial ageing of equipment and means that the manufacturer designed the copier on purpose to break down entirely after a certain number of copies. The natural next step will be to buy

a new one and recycle the old. BUT that is the western way. A purchase in Eastern Europe is considered to last forever – reminiscence from the communist times, I guess, when so little was available on the government controlled market. So is the situation with copiers.

After this grim analysis of the situation on the market of office equipment in Eastern Europe, I would like to analyze the presented Toshiba e-Studio 166 model in the light of the above factors. From my personal experience in the field with this model I can tell it successfully survives and will continue to be a preferred copier of choice in small office workgroups and small copy centers. The only great disadvantage is the lack of network card option. After all, if someone targets a model toward small office workgroups he will expect these workgroups to want to print on the equipment through a local network. I have had lost deals only because of that drawback. Another disadvantage compared to similar models from the competition is the lack of RADF – reversing automatic document feeder and duplexing module options. Now let's take a look at the periodic maintenance and parts replacement table:

Symbols used in the checklist

Cleaning	Lubrication/Coating	Replacement	Operation check
A: Clean with alcohol B: Clean with soft pad, cloth or vacuum cleaner	L: Launa 40 SI: Silicon oil W1: White grease (Molykote X5-6020) W2: White grease (Molykote HP-300) AV: Alvania No.2 FL: Floil (GE-334C)	Value: Replacement cycle (Value x 1000) R: Replace if deformed or damaged	O: After cleaning or replacement, confirm there is no problem.

**NOTE** - Perform cleaning and lubricating in the following timing:

- Exceptionally, the lubrication for the drum unit, main charger, developer unit and transfer unit must follow the PM cycle of each unit of e-STUDIO163/166 every 72,000 sheets.
- The replacement cycle of the parts in the feeding section equals to the number of sheets fed from each paper source.
- Be careful not to put oil on the rollers, belts and belt pulleys when lubricating.

**Scanner**

Items to check	Cleaning	Lubrication	Replacement (x 1,000 sheets)	Operation check	Parts list <P-I>	Remarks
A1 Original glass	B or A				P17-I1	*a1
A2 ADF original glass	B				P17-I2	*a1
A3 Carriage rail	B					
A4 Original glass guide	B		R		P9-I9	

**Laser Unit**

Items to check	Cleaning	Lubrication	Replacement (x 1,000 sheets)	Operation check	Parts list <P-I>	Remarks
B1 Slit glass	B					

**Feed Unit**

	Items to check	Cleaning	Lubrication	Replacement (x 1.000 sheets)	Operation check	Parts list <P->	Remarks
C1	Pickup roller			90		P16-117	
C2	Drive gear (tooth face and shaft)		W1				*c1
C3	Paper guide	B					
C4	GCB bushing bearing		L				
C5	One side of the plastic bushing		W1				
C6	Registration roller (metal)	A		R		P16-14	
C7	Registration roller (rubber)	A		R		P11-118	

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	Items to check	Cleaning (30K)	Lubrication	Replacement (x 1.000 sheets)	Operation check	Parts list <P->	Remarks
D1	Pickup roller	A		90		P5-11	
D2	Separation roller	A		90		P4-110	
D3	Feed roller	A		90		P5-11	
D4	Registration roller	A					
D5	Intermediate transfer	A					
D6	Front read roller	A					
D7	Rear read roller	A					
D8	Exit/reverse roller	A					
D9	Platen sheet	B or A					



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**Bypass Feed Unit**

	Items to check	Cleaning	Lubrication	Replacement (x 1,000 sheets)	Operation check	Parts list <P-I>	Remarks
E1	Pickup roller			90		P14-I22	
E2	Feed roller			90		P14-I22	
E3	Separation pad			90		P13-I22	
E4	Bypass tray	B					
E5	Drive gear (tooth face and shaft)		W1				
E6	GCB bushing bearing		L				
E7	One side of the plastic bushing		W1				

**Main Charger**

	Items to check	Cleaning	Lubrication	Replacement (KD)	Operation check	Parts list <P-I>	Remarks
F1	Main charger case	B				P18-I1	*f1
F2	Needle electrode			72/90		P18-I2	*f1
F3	Contact point of termi- nals	B					
F4	Main charger wire cleaner			R	○	P18-I7	
F5	Main charger grid			72/90		P18-I3	

**Transfer/separation charger**

	Items to check	Cleaning	Lubrication	Replacement (KD)	Operation check	Parts list <P-I>	Remarks
G1	Charger case	B				P19-I2	*g1
G2	Transfer charger wire			72/90	○	P19-I18	*g1
G3	Separation charger wire			72/90	○	P19-I18	*g1
G4	Pre-transfer guide	B or A					
G5	Post-transfer guide	B or A					
G6	Separation supporter	B				P19-I17	
G7	Terminal cover	B				P19-I10	
G8	Contact point of termi- nals	B					
G9	Transfer guide roller	B		R		P19-I14	

**Drum/cleaner related section**

	Items to check	Cleaning	Lubrication	Replacement (KD)	Operation check	Parts list <P-I>	Remarks
H1	Photoconductive drum			72/90			Chap. 4.7.2
H2	Discharge LED	B					
H3	Whole cleaner unit	B					
H4	Drum cleaning blade			72/90		P20-I5	*h1
H5	Separation finger for drum			72/90		P20-I17	*h2
H6	Recovery blade	B		72/90		P20-I6	*h3
H7	Ozone filter			72/90		P11-I3	

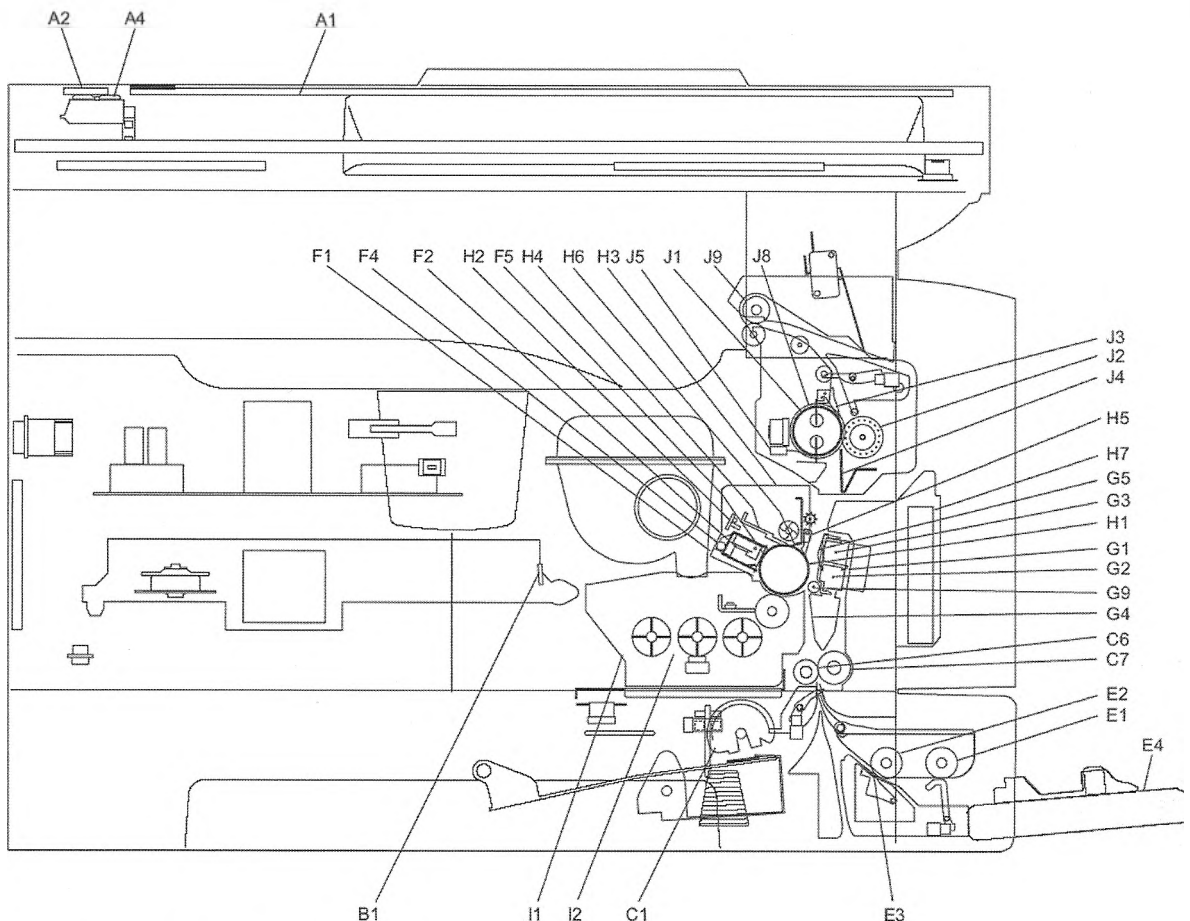
**Developer Unit/toner cartridge related section**

	Items to check	Cleaning	Lubrication	Replacement (x 1,000 sheets)	Operation check	Parts list <P-I>	Remarks
I1	Whole developer unit	B					
I2	Developer material			72/90			*1
I3	Front shield	B		R			
I4	Oil seal (6 pcs.)		AV	360/450		P21-I11	*2
I5	Guide roller	B or A					
I6	Side shield	B		R			
I7	Developer unit lower stay	B					
I8	Toner cartridge drive gear shaft		W1				

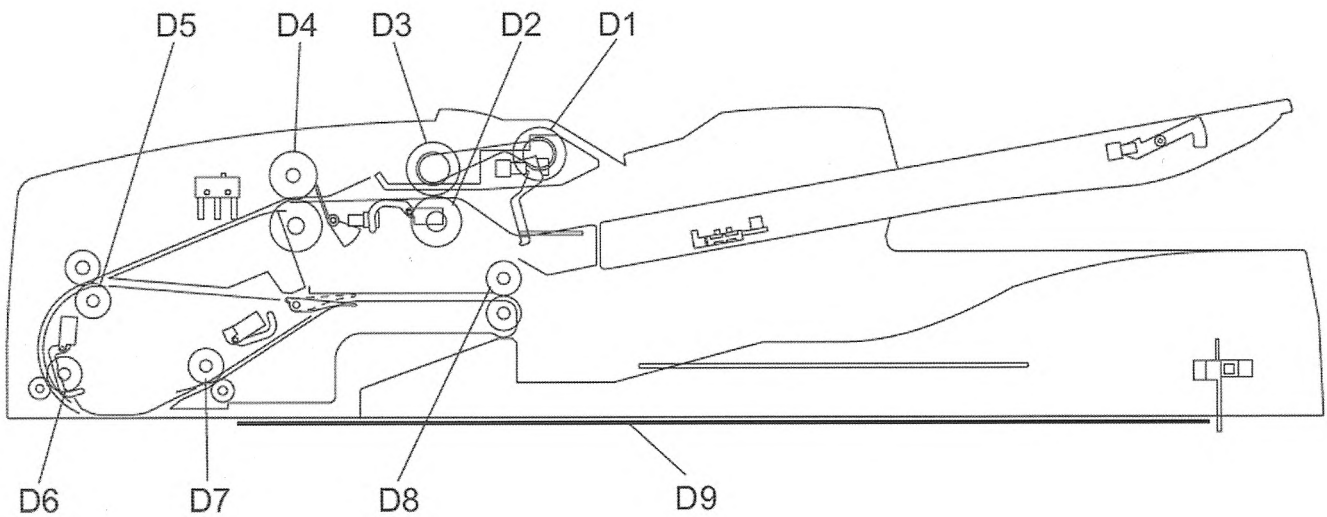
**Fuser/paper exit unit**

	Items to check	Cleaning	Lubrication	Replacement (x 1,000 sheets)	Operation check	Parts list <P-I>	Remarks
J1	Fuser roller			72/90		P23-I8	
J2	Pressure roller			72/90		P24-I4	
J3	Separation finger for fuser roller			72/90		P23-I14	*1
J4	Fuser unit entrance guide	A				P24-I9	
J5	Thermistor (3 pcs.)	A		R		P23-I6	*2
J6	Drive gear (tooth face and shaft)		W2	R		P23-I22 P23-I23	
J7	Fuser roller gear			R		P23-I10	
J8	Pressure roller bush- ing			72/90		P23-I30	
J9	Exit roller	A		R		P23-I19	

The letters in the first column of the tables above are the position of the parts mentioned, shown on the following diagram:



**Fig.1 - Front side of the copier**



**Automatic document feeder – ADF**

So, the periodical maintenance cycle of the copier is 72000 copies, but from experience I can assure that most of the parts can survive double cycle and more – drum, cleaning blade, and developer and so on. Currently, I am servicing copiers that have a copy count of 200 000 copies and still the only parts replaced are the drum and cleaning blade. This fact speaks about the quality of the model and I am sure it will be very popular having in mind the economical and cultural reality in Eastern Europe.

Before I continue with the disassembly of the copier I want to emphasize on its biggest Achilles heel – the separation claws in the fuser unit. These constantly break and come off place, which causes deep scratches on the upper heat roller. Simply replacing these fingers won't help – they will continue to cause problems. The reason is that the new way of designing modules for copiers involves computers and plastic materials. That is why every part is designed to endure stress only to a certain theoretical point and we all know the real life is far away from theory. Namely, the entire fuselage of the fuser unit is made from plastic and the separation fingers are directly attached to it. In the event of a paper jam the operator simply pulls away the jammed paper,

not realizing that it pulls in turn these fingers out. This breaks the hinges of the fingers and the bed in the fuselage, they are seated. There is no other solution than replacing all five fingers, their springs, the upper heat roller and the fuser fuselage. No need to mention – this is expensive operation. So my piece of advice is: in the early stages of the copier's life instruct the operators about this problem. This will save you and them a lot of worry and money.

**Now let's continue with the outline of the copier (fig.1)** – the construction of the model is very straight forward and follows the modern methods for designing digital office equipment. I call this method vertical design. The following table describes the names of various parts:

A1	Original glass	
A2	ADF original glass	
A3	Contact image sensor unit (CIS)	
A4	Scanner damp heater (Left side)	DH1
A5	Scanner damp heater (Right side)	DH2
A6	Scanner damp heater thermostat	THMO2
B1	Laser optical unit	
B2	Polygonal motor	M4
C1	Pickup roller	
C2	Separation claw	
C3	Paper empty sensor	S7
C4	Registration sensor	S4
C5	Registration roller	
E1	Bypass pickup roller	
E2	Bypass feed roller	
E3	Bypass separation pad	

E4	Bypass paper sensor	S8
E5	Bypass tray	
F1	Needle electrode	
F2	Main charger	
F3	Main charger grid	
F4	Toner cartridge	
G1	Transfer charger wire	
G2	Separation charger wire	
G3	Transfer guide roller	
H1	Drum	
H2	Discharge LED	
H3	Drum cleaning blade	
H4	Recovery blade	
H5	Drum separation finger	

I1	Developer sleeve (Magnetic roller)	
I2	Mixer-1	
I3	Mixer-2	
I4	Mixer-3	
I5	Doctor blade	
I6	Auto-toner sensor	S6
I7	Toner recovery auger	
I8	Toner recycle auger	
I9	Drum thermistor	THMS4
I10	Drum damp heater	DH3
I11	Drum damp heater thermostat	THMO3
J1	Fuser roller	
J2	Pressure roller	
J3	Fuser roller separation finger	
J4	Center heater lamp	LAMP1
J5	Side heater lamp	LAMP2
J6	Center/Side/Edge thermistor	THMS1/2/3
J7	Fuser thermostat	THMO1
J8	Exit roller	
J9	Exit sensor	S5
K1	Front cover opening/closing switch	SW4
K2	Front cover opening/closing interlock switch	SW3
K3	Temperature/humidity sensor	S3
K4	Switching regulator	
K5	ADU cover opening/closing interlock switch	SW2

M1	Scan motor
M2	Toner motor
M3	Main motor
M6	Switching regulator cooling fan
S1	CIS home position sensor
S2	Platen sensor
SW5	Drawer detection switch
CLT1	Registration clutch
SOL1	Pickup solenoid
SOL2	Bypass pickup solenoid

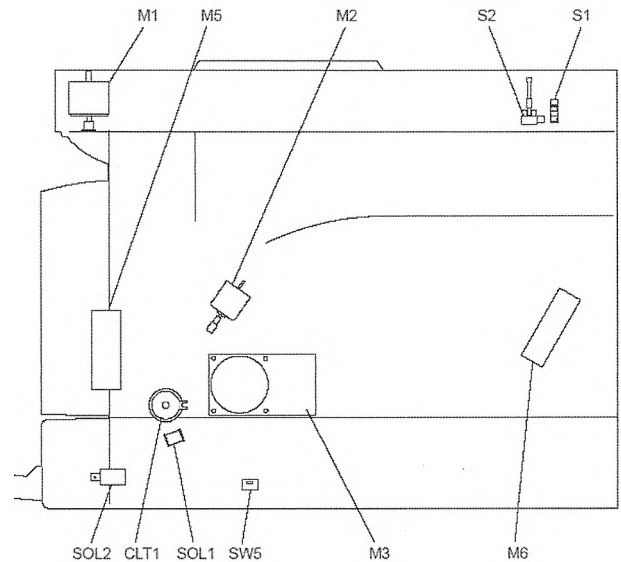


Fig.2 - Rear side of the copier

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