Vesta-P2a SP C360DNw



Vesta-MF2ab SP C360SFNw SP C360SNw SP C361SFNw

Technical Training Full class room training









- After completing this training you should be able to:
 - Install the SP C360 series in the field
 - Instruct the customer
 - Trouble shoot and repair the engine in the field
 - Perform maintenance



- SP C360DNw and SP C361SFNw
- Service manual
- This Presentation



RICOH imagine. change.





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- Before starting this training you must already have followed the My-Ricoh training for:
 - Digital imaging V2 HW servicing
 - Colour Awareness R2- Introduction
 - Smart Operation Panel V2 HW Servicing

• At the end of this course, you can do the exam on:

www.my-ricoh.com





1. Product Outline





What Models?

- Vesta-P2a (M0B0) SP C360DNw
 - sGW basic controller, 30 ppm, 28 ppm (duplex)
- Vesta-MF2a (D0A0, 4 in 1) SP C360SFNw
- Vesta-MF2a (D0AA, 3 in 1) SP C360SNw
 - sGW basic controller, 30 ppm, 28 ppm (duplex)
- Vesta-MF2b (D0AB) SP C361SFNw
 - sGW value controller, 30 ppm, 28 ppm (duplex)
- Low-end A4 printer
- sGW basic & value Controller (17S)
- Contains PostScript3, Gigabit Ethernet, duplex unit, and bypass tray as standard equipment.

imagine. change.



SIMVA controller is changed to "sGW" controller.
 "sGW" controller has 2 concepts, value added and basic.

Category		Model concept	
Value added	-	SGW	sGW value (MF2b)
Basic	SIMVA		sGW basic (MF2a/P2a) (Same concept as SIMVA)

sGW: (selectable/smart/simple GW)



CTL Basic Function

Features	Content	GW+	sGW	sG W	Comment
reatares			(Value)	(Basic)	ooninent
Utility	@Remote	Y	Y	Y	Improved from KIBO CTL
Security	Access control	Y	Y	Y.	
	User code authentification	Y	Y	Y	
	Windows/LDAP Authentication	Y	Y	γ*	*Only MF2a is supported.
Device	Remaining toner	Y	Y	Y	(1000 10%, near end/end alert)
management	E-mail alert	Y	Y	Y	Alert machine conditions to administrator
	Quota Setting/Account Limit	Y	Y	Y	
	Remote operation panel	Y	Y	Y	
	WIM support	Y	Y	Y	
Network	Wireless LAN	N	Y	Y	G₩+ is optional
Copy/Scan	Auto Tray Switch	Y	Y	Y	
	Paper selection (from panel)	Y	Y	Y	
	ID card Copy	Y	Y	Y	
	Combine Copy (2in1)	Υ	Υ	Y	
	Scan to USB/SD	Υ	Υ	Y	
	TWAIN Scan	Y	Y	Y	
Print	PCL5/PCL6	Y	Y	Y	
	Postscript3 emulation	Y	Y	Y	
	Media Direct Print	Y	Y	Y	
	Locked Print	Y	Y	Y	
	Sort	Y	Y	Y	
	Economy Printing Mode	Y	Y	Y	
	AirPrint	N	Y	Y	



CTL Basic Function

Features	Content	GW+	sGW (Value)	sGW (Basic)	Comment
Copy/Scan	Auto Color Selection	Y	N	N	
	2 color Copy	Y	Ν	Ν	
	Combined Size Copy/Scan	Y	Ν	Ν	
	Directional Magnification	Y	N	Ν	
	Combine (Over 4in1/Booklet	Y	Ν	N	2in1 is supported.
	Front Cover Sheet	Y	Ν	N	
	Endorse	Y	Ν	Ν	
Document box	Document box	Y	Ν	Ν	
	RPCS	Y	Ν	Ν	
	Basic Driver	Y	Ν	Ν	
Security	PDF Encryption	Y	N	Ν	
Utility	Eco report	Y	N	N	





Value-added Function

Features	Content	GW+	sGW (Value)	sGW (Basic)	Comment
Software	D-SDKI JAVA-SDKI	Υ	N	Ν	Smart SDK is supported.
SI support	Browser	Υ	Y	Ν	
	Application Site (Zoo)	Y	Y	Ν	
	Cheetah Apps (Download via Cloud)	Y	Y	N	
	SI-Cloud (Application support)	Y	Y	N	
	SI-Cloud (Workflow development tool)	Y	Y	N	
	3rd Vendor Apps	Y	Y*	Ν	*Depends on how the vendor develops the App



Hardware support

Features	Content	GW+	sGW (Value)	sGW (Basic)	Comment
Authentification	NEC (IC card R/W) * Optional	Y	Y	N	Gloria is not supported*.
	······································		X		* This is for 3rd vendor software and Apps.
Option	NEC (emart davice connection)	v	Y	Y	- Quick connection for Rimoco.
		•			 sGW is supported as STD.
	Memory	Y	Ν	Ν	
	NIC2 port	Y	N	Ν	
	Wireless LAN	Y	Υ	Y	sGW is supported as STD.
	HDD	Y	V*	N	SD card is supported as STD for internal
				IN	storage.
	Key Card	Y	N	N	



Specific functions of Cheetah will be supported for MF models*. *sGW basic model will not support Browser NX, Zoo, an ICE.

Cheetah Apps

Features	Content	GW+	sGW	sGW	Comment
	oontent	0441	(Value)	(Basic)	Comment
Basic	Browser (Android)	Y	Y	N	
	Browser NX	Y	Y	N	
	Application Site (Zoo)	Y	Y	N	
Smart series	Smart Copy/Smart Fax/Smart Scan	Y	Y	Y	
Quick series	Quick Copy/Quick Fax/Quick Scan	Y	Y	Y	
Widget	Various Widgets (System message/Fax reception/Remaining Toner/Time & Date/Remaining paper/Setup/Mobile connection/etc.)	Y	Y	Y	
	Eco Widget	Y	N	N	
Specfic use	ID Card copy	Y	Y	Y	
	ID Card Scan/Print	Y	Y	Y	
	Navigator for folder address setup	Y	Y	Y	
	Scan to Me	Y	Y	N	
	QR Code (for HedgeHog)	(Y)	Y	Y	
	Cloud Fax	Y	Y	Y	
Others	ICE (Cloud Apps)	Y	γ*	N	* To be evaluated.
	Camel(Remote Assist)	Y	TBD	TBD	12



Ricoh software

Features	Content	GW+	sGW (Value)	sGW (Basic)	Comment
Device	UZ-A1(appliance box)	Y	Y	Y	
Management	Birdie(Device Manager NX)	Y	Y	Y	
	Ibis(Printer Driver Packager NX)	Y	Y	Y	
Integrate solution	RIS(Streamline NX)	Y	Ν	N	
Capture&	XG-SD(Global Scan NX)	Y	N	Ν	
Distribution	Ispi(RICOH Scan NX)	Y	Ν	N	
Output solution	Karachi(FlexRelease CX)	Y	N	Ν	
	Gloria(Enhanced Locked Print NX)	Y	N	N	





- LED print head
- QSU fusing unit
- SPDF including ID card copy/scan
- Installation and maintenance can be done by users
 - Including installation of optional paper tray units.







- One optional tray can be installed (not shown).
- Duplex and bypass are standard.
- There are no finishers.
- There is an external USB slot by the operation panel.
 - The cover below the operation panel (in the red circle) slides up to reveal these slots.







- One optional tray can be installed (not shown).
- SPDF is standard.
- Duplex and bypass are standard.
- There are no finishers.
- There is an external USB/SD slot on the side of the operation panel.



		Also used with these new models:	Note
Paper Feed Unit TK1230	New		250 sheets
(M407)			
Paper Feed Unit TK1240	New		500 sheets
(M408)			





- Memory:
 - Standard memory: 2 GB
- No upgrades.
 - An internal SD card inside the SP C361SFNw can be used for storage.





Ports on the Controller Board (printer)







Ports on the Controller Board (MF)









- Input Tray Capacity
 - Standard Tray:250 sheets
 - Bypass tray: 100 sheets
 - Optional Paper Feed Unit: 250 or 500 sheets
 - Maximum
 - 850 sheets total capacity (Std tray + Option*1 + Bypass)
- Output Tray Capacity (Face down)
 - Up to 200 sheets



- Paper Size:
 - Standard tray: A4/LT SEF A6/HLT LEF
 - Non-standard sizes: Width: 82.5 216 mm (3.25" 8.5"), Length: 148 - 356 mm (5.8" - 14.0")
 - Optional tray: A4/LT SEF A5/HLT LEF
 - Non-standard sizes: Width: 139.7 216 mm (5.5" 8.5"), Length: 210 356 mm (8.3" 14.0")
 - Bypass tray: A4/LT SEF A6/HLT LEF
 - Non-standard sizes: Width: 64 216 mm (2.5" 8.5"), Length: 127 - 1260 mm (5.0" - 49.6")
 - Duplex: A4/LT SEF A6/HLT LEF
 - Non-standard sizes: Width: 100 297 mm (3.9" 11.7"), Length: 148 - 432 mm (5.8" - 17.0")
- Paper Weight
 - Standard Tray: 56 220 g/m² (15 lb. Bond 80 lb. Cover)
 - Bypass tray: 56 220 g/m² (15 lb. Bond 80 lb. Cover)
 - Duplex: 56 163 g/m² (15 lb. Bond 90 lb. Index)
 - Optional Paper Feed Unit: 56 220 g/m² (15 lb. Bond 80 lb. Cover)



- Memory: 2 GB
- Interface
 - Rear
 - Ethernet interface (1000BASE-T/100BASE-TX/10BASE-T) x1
 - IEEE 802.11a/b/g/n wireless LAN interface x1
 - USB 2.0-Device (Type B) x1
 - Front
 - USB 2.0-Host (Type A) x1
 - SD card slot x1 (MF Only)
- PDL
 - Standard: PJL, PCL 5c/XL, IRIPS PostScript 3, MediaPrint (TIFF, IRIPS PDF)



Targets



APV, per month	1.2k
Color Ratio	50%
MPBF (Mean Prints Between Failure)	70k
Call ratio (Mainframe)	0.021
Estimated Unit Life	450k or 5 years whichever comes first





- Toner
 - K: 7k
 - CMY: 5k
- Maintenance Parts
 - See the 'Maintenance Parts' slide later in the course.





- If this function is enabled in user tool, color process control is not done for black-and-white printing.
- It is only done when the customer starts a color print job.
 - Menu button > System > B&W Print Priority (Default: Off)





- If the customer enables this function:
 - Pre-rotation of the fusing unit is done before the first print.
 - Printing speed is reduced.
 - Menu button > Maintenance > Quality Maintenance > Curl prevention (Default: Inactive)

WARNING:

 Enabling this mode shortens the life of the PCDU, Image transfer unit and Fusing unit.





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- When the power switch is used to turn the power off, 'Please Wait' is displayed, while the machine checks the following:
 - Memory, SD card, USB memory are safe.
 - Paper is not left in the machine's paper path (except if a jam occurred immediately before the power off).
 - All print jobs and access logs are saved.
- Then the power turns off.





- If the machine freezes, hold the power switch down for 6 seconds.
- However, this method can damage the controller board, or cause data loss.
- Forced shutdown should only be carried out when in contact with a call center operator, or by a technician, after explaining the risk of the operation to the customer.
- If the normal shutdown process will not function correctly, an ASIC on the CTL board might be broken.
 - In this case, a technician visit is necessary.





2. Maintenance





- User PM:
 - This product has been designed for user maintenance.
 - The maintenance parts on the next slide have been prepared as supplies.
 - User maintenance is basically done by replacing these supplies.
- Technician PM:
 - If the printer is used at its target APV (1.5K prints), parts with a life of 90k or more will not need to be replaced within the normal life of the machine.
 - For high PV users, however, technicians should replace the parts when the counters reach their targets.





- PCDU
 - K: 15k, CMY: 12k (User PM)
 - K: 23k, CMY: 18k (Technician PM)
- Transfer Unit (contains ITB, paper transfer roller, air filter)
 - 100k (User PM)
 - 115k (Technician PM)
- Fusing Unit
 - 150k (User PM)
 - 180k (Technician PM)
- Waste Toner Bottle
 - 13k (User and Technician PM)





- Near-end for the maintenance parts can be selected in user tool.
 - Menu button > Maintenance > General Settings > Replacement Alert
- The settings are:
 - Notify Sooner
 - Normal (default)
 - Notify Later
- The settings can be done for the following parts:
 - Toner, PCDU (black), PCDU (color), waste toner bottle, transfer belt unit, fusing unit.





- Same settings as Printer.
- To access on the MF:





- For toner cartridges and the waste toner bottle:
 - When the end limit arrives, the machine stops and printing is prohibited.
- For the PCDUs, image transfer unit, and fusing unit:
 - Printing can continue even after the end limit (end of life).
- When are alert messages shown in the display:
 - Meter click setting is off (default): Alert message always shown.
 - Meter click setting is on: Alert message not shown for PCDUs, image transfer unit, and fusing unit.
 - Alerts for these can be enabled with SP mode.



Other PM - PM Table

RICOH imagine. change.

- Do the following, depending on the type of service contract.
 - Cleaning at 100k:
 - Components in the paper feed path
 - Do not use alcohol.
 - See the PM table in the service manual for details.
 - Replacement at 100k:
 - Bypass feed roller and friction pad
 - Replacement at 180k:
 - Main feed roller and friction pad




- The procedure uses SD cards and is the same as for other GW models.
- RFU (Remote Firmware Update) is also available.



3. Detailed Section Descriptions





Machine Overview







- 1. Operation Panel
- 2. Paper Exit/Reverse Roller
- 3. Toner Cartridge
- 4. PCDU
- 5. Engine Board and Controller Board
- 6. Image Transfer Belt Unit
- 7. Paper Feed Tray
- 8. Registration Roller
- 9. Bypass Tray Unit
- 10. Paper Transfer Roller
- **11.** Fusing Unit





- 1. Operation Panel
- 2. Paper Exit/Reverse Roller

3. PCDU

- 4. Toner Cartridge
- 5. Engine Board and Controller Board
- 6. Image Transfer Belt Unit
- 7. Paper Feed Tray
- 8. Registration Roller
- 9. Bypass Tray Unit
- 10. Paper Transfer Roller
- **11.** Fusing Unit







- 1. Pick Up Roller
- 2. Feed Roller
- 3. Pull-Out Roller
- 4. Pre Scanning Roller

- 5. Original front side CIS
- 6. Original Rear side CIS (Home position)
- 7. Post-scanning Roller
- 8. DF Exit Roller







- 1. Bypass Tray
- 2. Optional Paper Feed Tray
- 3. Standard Paper Feed Tray
- 4. Duplex Feed Path







- **1**. Transfer/Transport Motor
- 2. Toner Supply Clutch (Y)
- 3. Toner Supply Clutch (M)
- 4. Toner Supply Clutch (C)
- 5. Toner Supply Clutch (K)
- 6. Drum Motor: K
- 7. Fusing Motor
- 8. Drum Motor: CMY
- 9. ITB (Image Transfer Belt) Contact Clutch
 - Paper Feed Clutch
- **11**. Registration Clutch
- 12. Optional Paper Feed Clutch
 - Grip Roller Clutch
 - Duplex Paper Exit Clutch
- 15. Bypass Feed Clutch
- 16. Bypass Bottom Plate Clutch
- 17. Duplex Intermediate Clutch





- 1. Scanner Drive Motor
- 2. DF Drive Motor
- 3. DF Feed Clutch



Major Electrical Components (P&MF)





- 1. PSU
- 2. Main Power Switch
- 3. NFC Board
- 4. Speaker
- 5. OPRB
- 6. Fusing Fan
- 7. New PCDU Detection Board
- 8. HVP
- 9. Cooling Fan
- 10. PSU Fan
- 11. Wireless LAN
- 12. CTL
- **13**. EGB



- EGB (Engine Board): Controls the engine, the controller interface, image processing, color registration adjustment (MUSIC), input/output, interfaces with the optional units, and the operation panel.
- CTL (SGW Controller): Controls the interface between the operation panel and EGB, and applications. The controller is connected to the EGB through the PCI Bus.
- PSU: This unit supplies DC voltage.
- HVP (High Voltage Power supply): This unit supplies high voltages.
 - There are two boards.
 - A small separate board provides power to the discharge plate, which separates paper from the transfer belt and paper transfer roller.



- Before you start to remove parts from the machine, do the following for your safety and to prevent damage to the machine:
 - Turn off the power using the safe shutdown procedure.
 - Then disconnect the power cord and press the power switch again to discharge the remaining current.





- This is a long procedure.
- It is only needed if the front cover must be replaced.
- The main point is to make sure that you don't break the Mylar [A].





Removing the Left Cover

RICOH imagine. change.

 Remove the waste toner bottle before you remove the left cover. Otherwise the waste toner bottle could fall over and toner may be spilled.







 Remove the EEPROM from the old EGB and install it on the new EGB.





- The photo below shows some screws painted in white.
- You can see these after the fusing unit is removed from the printer.
- The wire is connected to the front cover. The tension is determined by the screws. They should not be loosened.



- When replacing the EEPROM on the Engine Board, please check the following points:
 - If a near end alert for the fusing unit, paper transfer roller unit, or PCDU is displayed, replace them with new units before carrying out EEPROM replacement. Not doing so may cause image quality problems or SC490.
 - If the Waste Toner Bottle is near full, replace it with a new one. Not doing so may cause toner overflow.
 - After replacing the EEPROM, check that there is no image quality problem. If an image quality problem occurs, do not try to fix it by putting the old EEPROM back, but make adjustments so that they are stored in the new EEPROM.

- If the EEPROM download/upload feature cannot be used, do the following:
 - 1. With cover open, Login to the machine using the factory SP mode.
 - Set these SPs in the factory SP mode.
 - 5-807-001 "Machine Type Area Selection"
 - 5-807-002 "Machine Type Model Selection"
 - 5-988-002 "Brand ID" <-Set the value on the latest SMC sheet
 - 5-811-001 "Machine Info Set: Serial No
 - 5-801-002 Execute "Engine Memory Clear"
 - 2. Power OFF, then power ON. With cover open login to the normal SP mode.
 - Input values from the latest SMC sheet.
 - 3-333-001 to 3-333-006 "TM (ID) sensor (right) adjustment value"
 - 3-334-001 to 3-334-006 "TM (ID) sensor (left) adjustment vale"
 - 1-001-013 to 1-001-020 "Sub scan direction registration"
 - 1-002-001 to 1-002-003 "Main scan direction registration"
 - 1-003-001 to 1-003-012 "Paper buckle adjustment"
 - 3. Close Cover, then do the following steps in this order.
 - 2-111-002 Execute "Line position adjustment factory mode"
 - 3-011-001 Execute "Normal Process Control"
 - 2-185-002 Input "1" in "Margin Position: Base Calculation Flag"
 - 2-111-001 Execute "Line position adjustment normal mode"
 - 2-185-002 Input "1" in "Margin Position: Base Calculation Flag"
 - 2-111-003 Execute "Line position adjustment Black mode"
 - Ready to use the machine





- Remove the NVRAM from the old board and install them on the new one.
- Do not change any of the DIP switch settings.





Image Creation







- An LED array [1] writes the latent image on the OPC [3].
- Each OPC (K, C, M, Y) has its own LED array.
 - These arrays are identical.
- A spacer [2] on the drum keeps the LED array at the correct distance from the OPC for correct focus.
- The LED writing method contributes to machine downsizing, and is superior to the LD writing method in image quality, noise reduction, and energy saving.







- The LED array consists of the following parts.
 - 1. Sheet
 - 2. Base
 - 3. LED board
 - 4. Frame
 - 5. SLA (Self-focusing Lens Array)
- The LED array is replaced as one complete unit.
 - The individual components cannot be replaced in the field.





- Tiny LEDs capable of creating images at 1200 dpi are arranged in a line.
- Light beams emitted by the LEDs are focused using the Self-focusing Lens Array (SLA), creating an image on the OPC drum.
- Each LED head has 26 LED chips on board, and each chip has a line of LEDs 8mm in length.
- If a vertical white line 8mm in width appears on the image in sub scan direction, it may be caused by a broken LED chip.



- Image position adjustment
 - Horizontal (main scan): Adjusted by moving the image position.
 - Vertical (sub scan): The timing for the start of writing is changed.
 - There are no mechanical adjustments.
 - Start timing can be adjusted.
- LED light intensity
 - An EEPROM on the LED head contains data which controls the light intensity of each element.
 - There is no adjustment.
- Adjustment after replacement
 - The EEPROM on the new LED array contains data on the characteristics of the LED array.
 - No adjustment is needed by the technician.



- The LED heads are the same for all CMYK colors.
 - So it is possible to find which LED head has the problem by swapping them.
- The LED spacer contacts the OPC to keep the correct distance between the LED head and the drum for focusing.
 - The spacer contacts the OPC, so it will gradually wear out. If the PCDU is used for longer than its normal yield, the LED may gradually start to lose its focus.



Removing an LED Head

RICOH imagine. change.

 After you open the upper inner cover, protect the PCDUs with a sheet of paper, to prevent foreign objects from falling into the PCDUs.



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 When you connect the flat cables from the EGB to the LED arrays, make sure that you arrange them correctly.





Toner Cartridge and PCDU



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- Each toner cartridge contains the toner bottle and toner supply mechanisms.
- Protrusion on the side of the toner cartridge ensure each cartridge is always inserted into the correct position.
- Each toner cartridge has an ID chip [1] that contains information such as product information, the number of prints and new cartridge detection.





- Each cartridge has two shutters.
 - Toner will not leave the cartridge until both shutters are open.
- The first shutter opens mechanically when the cartridge is installed in the machine
- The second shutter is controlled by the toner supply solenoid.
- Each cartridge has its own toner supply solenoid.





 If you have to remove the solenoid and/or shutter [A], check how the shutter is installed and how it connects to the solenoid before you disassemble. This will make it easier to put it back correctly.



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- The PCDU contains the charge roller, photoconductor, development mechanism, and cleaning unit.
 - Upper Mixing Coil
 - Lower Mixing Coil
 - Development Blade
 - Toner Supply Roller
 - Development Roller
 - OPC Drum
 - Waste Toner Collection Coil
 - OPC Cleaning Blade
 - Charge Roller
 - Charge Roller Cleaner
 - Toner End Sensor (mounted on the LED array)
 - Toner End Detection Window







- When the toner supply clutch turns on, a coil in the toner cartridge rotates to transfer toner to the bottle exit and then to the PCDU.
- Toner which falls into the PCDU is transferred to the development section by the upper mixing coil [1].



- The TE sensors are mounted on the LED arrays.
- They monitor toner supply through the TNE detection windows in the PCDUs.
- TNE is detected when the TE sensor detects no-supply of toner. Then the near-end status is written to the ID chip.
 - TNE is only detected after a certain amount of toner has been supplied from the bottle.
 - If non-supply is detected before this amount has been supplied, it means something is wrong with toner supply from that bottle, and SC332 is generated.



- After TNE, the toner end alert is shown after a certain number of prints is made (the following are reference values based on 3 prints/job, color ratio 50%, 5% coverage for each color).
 - Normal (Before 5 days): 475 pages before the end.
 - Notify Later (Before 3 days): 285 pages before the end.
 - Notify Sooner (Before 7 days): 665 pages before the end.
 - Users can set "Normal / Notify Sooner / Notify Later". The default is "Normal".
- Then, the toner end status is written to the ID chip.





 The PCDUs are driven by the drum motor (K) [1], and the drum motor (CMY) [2].




- This machine uses a charge roller [1]. The charge roller gives the drum surface a negative charge.
- The machine automatically controls the charge roller voltage when process control is executed.
- The charge roller cleaner [2] which always touches the charge roller, cleans the charge roller.
- The OPC cleaning blade [3] removes the waste toner on the OPC.





Development

- The development mechanism contains the development roller [1], the toner supply roller [2], and the development blade [3].
- The toner supply roller [2] provides the development roller [1] with toner.
- The development blade [3] keeps the toner attached to the development roller [1] flat.







- The toner moves as shown in the drawing below.
- The upper mixing coil [1] moves the toner to the left side.
- The lower mixing coil [2] moves toner to the right side.
- Finally, the toner supply roller [3] supplies toner to the development roller [4].









 Toner waste within each PCDU is collected by the waste toner collection coil [7] and sent down to the waste toner bottle.





- A three-point terminal on the side of the cover detects when a new PCDU is inserted.
- If a new PCDU comes into contact with the terminal, a fuse resistor is opened, and the machine detects the new PCDU.
- When either the user or technician installs a new PCDU, the counter resets automatically. There is no need to reset any counters.







 The toner end sensor is built into the LED print head. If you need to replace the toner end sensor, you must replace the LED print head.



Paper Feed



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- Paper Feed Roller
- Friction Pad
- Bypass Feed Roller
- Bypass Friction Pad
- The rollers are replaced by technicians only.
- There are no counters to reset.





- For paper feed, the machine turns on the paper feed clutch, and the paper feed roller rotates (driven by the transfer/transport motor).
- The friction pad ensures that only the top sheet is fed.
- When the paper activates the registration sensor, the paper feed clutch turns off.
- When the toner image on the transfer belt is at the correct position, the registration clutch turns on to feed the paper to the image transfer unit.
- If the tray becomes empty, a feeler enters a cutout in the bottom plate, and the paper end sensor at the other end of this feeler turns on.





- When shipped from the factory, sizes up to A4 SEF can be loaded in the cassette.
- To support paper sizes larger than A4 SEF and up to LG size, unlock the tray extension lock ([1]) to extend the tray.





Securing the End Fences

- There are 3 screw holes in the paper tray, to fix the end fences.
 - [A]: Normal: A4 SEF / Extension: LG SEF
 - [B]: Normal: LT SEF
 - [C]: Normal: HLT SEF
 - [D]: Norm





Securing the Side Fences



- There are 2 screw holes in the paper tray, to fix the side fences.
 - [A]: A4 SEF
 - [B]: LG SEF/LT SEF







- The paper size switch [2] detects actuators attached to the paper size dial [1].
- The customer must select the correct paper size with this dial.





- When you slide the paper feed tray into the unit, the bottom plate arm [1] slides along the sloping guide of the main frame, and then the bottom plate is pushed upward by the spring.
- As a result, the lifted bottom plate presses the sheet on the top of the stack up against the paper feed roller.







- The bottom plate has an automatic lifting system.
- When the bypass bottom plate clutch turns on, a cam (on the left as you face the machine) starts rotating to lift the bottom plate up and down.
- The bottom plate position sensor detects up/down movement of the bottom plate by detecting a sensor actuator on the left side of the cam.
 - Sensor ON: Bottom plate is down
 - Sensor OFF: Bottom plate is rising







- 1. Bypass Paper End Sensor
- 2. Bypass Feed Roller
- Bypass feed uses a feed roller and friction pad mechanism.
- When paper is loaded into the tray, the actuator moves away from the end sensor.







- Paper Exit Full Sensor Feeler
- Paper Exit/Reverse Roller
- Junction Gate
- Paper Exit Sensor Feeler
- Duplex Entrance Roller (Drive)
- Duplex Entrance Roller (Driven)
- Duplex Intermediate Roller (Driven)
- Duplex Intermediate Roller (Drive)
- Duplex Feed Sensor Feeler
- Duplex Exit Roller (Driven)
- Duplex Exit Roller (Drive)
- Registration Roller (Drive)
- Registration Roller (Driven)







- 1. Driven Roller (Relay)
- 2. Paper Exit/Reverse Roller
- 3. Duplex Junction Gate
- 4. Duplex Inverter Solenoid

- The fusing motor drives the fusing and paper exit rollers.
- The paper feed/transport motor drives the duplex entrance, intermediate, exit rollers.
- The paper exit/reverse roller has no clutch, and is driven by the fusing motor.
- The solenoid controls movement of the junction gate and rotation of the paper exit/reverse roller.
- The same roller does exit and reverse, so route switching for the next sheet cannot begin before the current sheet has been fed out. Because of this, productivity for A4 and LT size duplex printing drops to 90%.



Solenoid (1/2)

- The solenoid has 2 functions:
 - Operate the junction gate
 - Operate the rotation direction of the exit roller.





 This diagram shows how the direction of the drive gears changes whether the solenoid is on or off.





Image Transfer



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 The transfer section consists of three units: the Image Transfer Unit [1], the Image Transfer Belt Cleaning Unit [2], and the Transport Unit [3].



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Image Transfer Belt Unit

- The transfer/transport motor [2] drives the ITB drive roller [3] via a gear to drive the image transfer belt.
- The image transfer belt rollers [1] apply transfer bias to pull toner from the photoconductor to the transferbelt.





- For monochrome printing, the image transfer belt is disengaged from the color drums.
- The transfer belt contact sensor [1] detects the status of the image transfer belt.
- The transfer belt contact clutch [3] transfers the drive from the ITB/transport motor [4], and drives the mechanism through a cam [2], to move the transfer belt into contact or away from the color





- In previous models, this roller [5] was inside the ITB unit. However, for this machine, there is no room inside the unit, so it is added at the location shown above.
- This roller keeps the belt under tension, and prevents the belt from moving to the left or right on the axis of the drive roller.







- The transfer cleaning blade [1] removes remaining toner from the belt surface.
- The waste toner transport coil [2] carries this toner to the left side of the ITB unit.





- The bias applied to the paper transfer roller [2] pulls the toner off the ITB and onto the paper.
- The paper transfer roller is always pressed into contact with the ITB by a spring [4].
- When a sheet of paper goes between the transfer roller and the transfer belt, the transfer roller turns with the paper.
- The discharge plate [3] removes static charge from the paper that was applied during transfer





- Toner may transfer to the roller surface following a paper jam or if the paper is smaller than the image.
- Periodic cleaning of the roller is required to prevent this toner from migrating back to the rear of new printouts.
- The machine cleans the roller at the following times:
 - After initial power on.
 - After clearing a paper jam
- The machine first supplies a negative cleaning current (about -4 mA) to the transfer roller, causing negatively charged toner on the roller to move back to the transfer belt. It then applies a positive cleaning current (+5 mA) to the roller, causing any positively charged toner to migrate back to the transfer belt.





- During paper transfer, the transfer roller [A] applies a static charge to the paper [B].
- The discharge plate [C] grounds any remaining static charge after passing the transfer roller unit.





- The ITB new unit detection mechanism is not present in the service part.
 - It is only in the supplied part that is installed by the user.
 - When a technician replaces this part, the PM counter for this part must also be reset (see a later slide for more information).
- When the machine detects an unbroken fuse [1] immediately after the ITB unit is installed, the machine blows the fuse, and resets the life counter for the ITB and for the paper transfer roller.
 - However, if the only one of the parts is changed, counters must be reset as explained later in this part of the course.







 Before you install the image transfer belt, make sure that the white lever [A] is pulled out to the position shown by the red line in the 'OK' part of this photo.





- Print out the logging data using SP5-990-004 before you replace the part.
- The counter for the Image Transfer Belt Unit must be reset after installing a new one.
 - Execute SP7-804-017 and SP7-804-060
 - Turn off the power of the machine, and then turn it back on.
- This only applies to parts installed by service technicians.
- The part for replacement by users has a new unit detection mechanism (the fuse, as explained earlier).

- Print out the logging data using SP5-990-004 before you replace the part.
- The counter for the Paper Transfer Roller must be reset after installing a new one.
 - Execute SP7-804-022 and SP7-804-061
 - Turn off the power of the machine, and then turn it back on.
- This only applies to replacement by service technicians.
- The Paper Transfer Roller as a supply part is in the same kit as the Image Transfer Belt unit and does not require counter reset, because it will be replaced at the same time as the Image Transfer Belt Unit.

Installing a New Transfer Belt Cleaning Unit



 When you change the transfer belt cleaning unit, dust the new one with toner as a lubricant.







- When you remove the transfer belt cleaning unit back in the machine, remove the paper guide holders [A] and spurs [B] first.
- Also, do not reinstall the holders and spurs until after you reinstall the cleaning unit. Otherwise, the ITB might be damaged.



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Fusing



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- This machine uses a QSU (Quick Start Up) type of fusing unit.
 - One fusing lamp [5] inside a pipe [10] heats a fusing belt [9].
- This type of fusing saves energy and allows the use of a wider range of paper types than a traditional fusing unit.
- Also, the larger nip reduces image blurring.







- 1. Heating Pipe
 - Conducts heat from the fusing lamps to the fusing belt.
- [4] 2. Fusing Belt
 - Rotates by friction with the pressure roller. The space between the heating pipe and the fusing belt is lubricated to reduce friction, so that the belt will rotate smoothly.
 - 3. Nip Band Shaping Parts
 - Located beneath the fusing belt to shape the nip band where the fusing belt contacts the pressure roller.
 - 4. Pressure Roller
 - The pressure roller is driven by the fusing exit motor. At the contact with the fusing belt, the pressure roller fuses the image to the paper and feeds the paper out of the fusing unit.
 - 5. Fusing Lamp
 - This consists of one halogen heater to heat the center and both ends.





• The fusing motor [1] drives the pressure roller [2], fusing belt [3], and the exit roller [4].





New Unit Detection



- This is done using a fuse [2] on the rear frame [3] of the fusing unit. [1] is the fusing unit drawer.
- There is no service part; the technician uses the same part as the user PM kit to replace the fusing unit.
 - So there is no counter to reset.







- A pressure release mechanism makes it easy to remove paper jams in the fusing unit.
- The pressure lever is released when the front cover opens, and the pressure roller separates from the fusing belt due to a spring.



- A thermostat [3] and a non-contact thermistor [1] monitor the fusing belt temperature.
- Two contact thermistors [2] monitor the pressure roller temperature.
- The thermostat is a safety switch.





Fusing Temperature Control Warming-up Mode

- Fusing warm-up begins after the machine power is switched on.
- The fusing lamp heats without roller rotation until the temperature reaches the "pre-rotation start temp."
 - There is no roller rotation, in order to heat the lubricant between the heating pipe and the fusing belt so that the pressure roller rotation will move the belt.
- Then, the fusing motor turns on, until the fusing temperature reaches the "start-up temperature" (also called the "reload temperature").

Fusing Temperature Control Print Mode



- The fusing temperature increases to the "print ready temperature", and printing starts.
- To reduce energy consumption, the fusing lamps turn off before the last sheet of paper passes completely through the fusing nip band.
- After printing, the roller continues to turn, to prevent temperature overshoot after printing.
- After a certain time, the mode changes to the wait mode.



Fusing Temperature Control Wait Mode

- The fusing lamp and the fusing motor turn OFF after a certain time passes after the temperature has fallen to the print ready temperature.
- At regular intervals, the fusing motor rotates for a short time at slow speed.
- The fusing motor stops when the machine is in Sleep Mode.

Fusing Temperature Control PPM Down Mode

- PPM down control changes the feed timing to create a wider interval between the sheets of paper feeding through the fusing unit.
- This is done in some specific conditions to prevent image problems.



Waste Toner Collection







- Toner waste from the PCDUs is carried to the waste toner duct [1], and then to the front of the unit by a coil, and from there, it is moved down to the waste toner bottle.
- Toner waste from the ITB Unit is carried to the left side of the unit by the ITB waste toner collection coil [2] and then down to the waste toner bottle [4] via the same opening [3] as used for toner waste from the PCDUs.







- The ITB waste toner collection coil [2] is driven via the drive roller in the image transfer unit.
- The coil in the waste toner duct [1] is driven via the gear on the left of the image transfer unit.
- The coil inside the waste toner bottle distributes the toner evenly inside the bottle.







- The waste toner bottle set sensor [2] detects the presence of the waste toner bottle [4].
- There is no bottle replacement detection feature. If the bottle full sensor is off and the bottle set sensor is on, the machine indicates that the waste toner bottle is usable.





- When waste toner exceeds a certain amount, the rubber portion on the inner part of the waste toner bottle swells.
- This exerts pressure on the feeler [1], and the waste toner bottle full sensor [3] is turned on.
 - At this time, the machine detects that the bottle is nearly full.
- After the bottle is detected to be nearly full, the machine uses a pixel count to detect when the waste toner bottle is full.
- The required pixel count between near-full and full can be adjusted with an SP3-800-017 or a User Tool.





Toner Bottle Full

- The pixel count corresponds to a number of sheets that can be printed after indicating near full.
- However, these are reference values based on certain specified machine use conditions.
 - Normal: 475 pages
 - Notify Later: 285 pages
 - Notify Sooner: 665 pages
- The default is Normal. Users can change with a user tool.
 - Maintenance > General Settings > Replacement Alert:





- A small amount of yellow toner is applied to the rubber component shown below with a red circle.
- Do not touch this rubber, or you may remove the lubricant. If you do wipe it off, apply some yellow toner.





- Either the customer or the technician can replace the toner collection bottle.
- The counter for the pixel count resets automatically.

Replacement

- Attach the waste toner bottle with the left cover installed.
 - If not, the waste toner bottle is not positioned accurately, which may cause clogging of waste toner, because the lid between the waste toner duct and the waste toner bottle may not open.



Process Control







- Process control
 - Development bias control
 - Toner supply control
- MUSIC
 - The toner mark sensors (TM (ID) sensors) read patches made on the ITB, and the machine corrects color image registration based on the sensor readings.
 - The patches are made on the left and right of the ITB.
 - MUSIC is done automatically at specific times.
- IBACC (Image transfer Belt ACC)
 - IBACC does halftone correction by detecting the density of a gradation patch formed on the Image Transfer Belt.
 - While conventional ACC (Auto Color Calibration) prints a test chart and feeds back the density detected by the scanner, IBACC does all the operations inside the printer.
 - The TM (ID) sensors are used for this function.
 - IBACC can be executed by the user at any time, using the Auto Color Calibration function. At this time, MUSIC is done, then process control, then IBACC.



TM (ID) Sensors



- Below the image transfer belt, there are two TM (ID) (Toner Mark) sensors.
- These are used for MUSIC.
- They also act as ID sensors for use during process control and IBACC.





- Note that the sensor seen on the left [L] (as viewed from the front of the machine) is called the right TM (ID) sensor (TM sensor: R), and the one on the right [R] is called the left TM (ID) sensor (TM sensor: L).
 - This will be important when we replace the TM (ID) sensors.
- Sensors can be replaced individually (the service part consists of one sensor).



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- Before replacement:
 - Each sensor has a label with some numbers on it [A].
 - These numbers must be input into SP mode before you turn off the power and replace the old TM (ID) sensor.
 - As you look from the front of the machine:
 - The sensor on the left is TM (ID) sensor: R. These values must be input into SP 3-333.
 - The sensor on the right is TM (ID) sensor: L. These values must be input into SP 3-334.
 - After this, there are some other SP settings to initialize before replacement.
 - See the procedure in the service manual for details.





- After replacement:
 - Execute SP3-011-004 (Adjustment manual exe. Full Music / process control)
 - If there is something wrong with the image after SP execution, make sure that input values are registered in the correct SP-modes.





- MF Model:
 - To prevent of a early Tray full detection, caused by paper that hits the scanner unit, the feeler is changed to a moveable type.



