RICOH

D182/D183/D184 DETAILED DESCRIPTIONS MANUAL

D182/D183/D184
DETAILED DESCRIPTIONS

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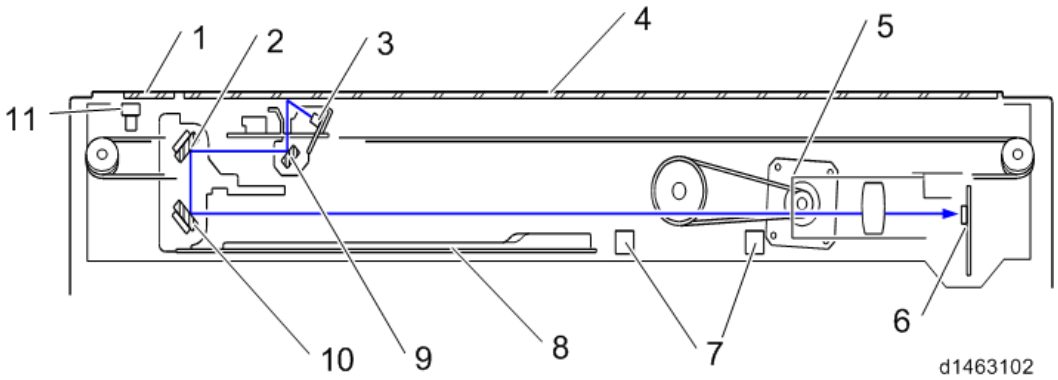
1. SCANNING

1.1 OVERVIEW



No.	Description	No.	Description
1	Sheet-through exposure glass	7	Original length sensor
2	2nd mirror	8	Anti-condensation heater (Scanner heater)
3	Scanner lamp Unit (LED)	9	1st mirror
4	Exposure glass	10	3rd mirror
5	Scanner motor	11	Scanner Home Position sensor
6	Sensor board unit (SBU)		

The scanner unit comprises a Scanner lamp and Scanner Home Position sensor, first to third mirrors, lens, and CCD. Light from the Scanner lamp which has illuminated the document reaches the CCD via the following route.

1st mirror > 2nd mirror > 3rd mirror > lens > CCD

1.2 MECHANISM

1.2.1 READ SYSTEM

In book mode (pressure plate mode), the scanner scans the document from left to right.
When the ADF is used, the scanner is fixed in the home position on the left edge, and the document is transported and read (sheet-through method).

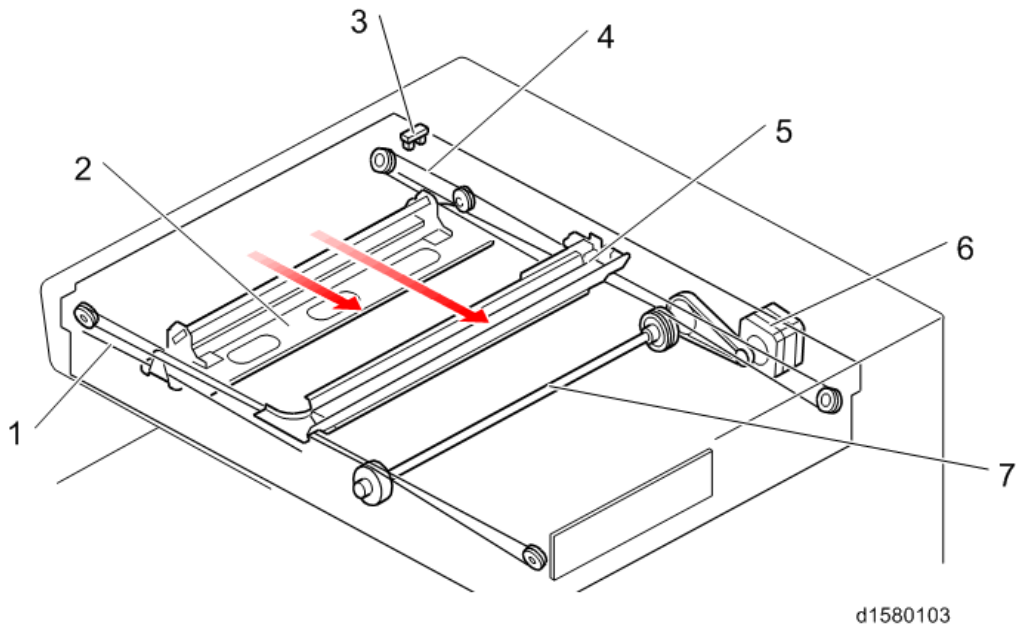
1.2.2 SCANNER

- **Scanner lamp**
  The light source is an LED. The LED emits little heat (low power consumption), and has excellent light output rise characteristics.
- **CCD**
  The 3 line color CCD converts shade in the document to 3 color (B, G, and R) electrical signals. The use of a 4.7 µm image CCD achieves low-cost and compactness.
- **Reflection plate (reflector)**
  The reflection plate reflects light from the Scanner lamp, and collects light for the document read unit. The light which illuminates the document is adjusted to be the same on the left and right so as not to cast any shadow on the document.
- **White reference seal**
  A white reference seal for shading correction is affixed to the underside of the scale on the left of the MFP. This is read by the scanner and CCD when the power is ON. The data read are temporarily stored in a RAM, and used for correction of document image data.

1.2.3 SCANNER DRIVE

The scanner is driven by a stepping motor via a scanner wire. For each mode, reading is completed in one pass.

Scanner (first carriage) position control uses a Scanner Home Position sensor as a reference. Scanner Home Position is located in the same position as the read position of the sheet-through DF.



No.	Description
1	Scanner wire: forward
2	2nd carriage
3	Scanner Home Position sensor
4	Scanner wire: rear
5	1st scanner
6	Scanner motor
7	Drive axis

1.2.4 DOCUMENT SIZE DETECTION

In this MFP, for document size detection, reflecting sensors (two) are used for the sub scanning direction, and a CCD is used for the main scanning direction.

- **Sub scanning direction**

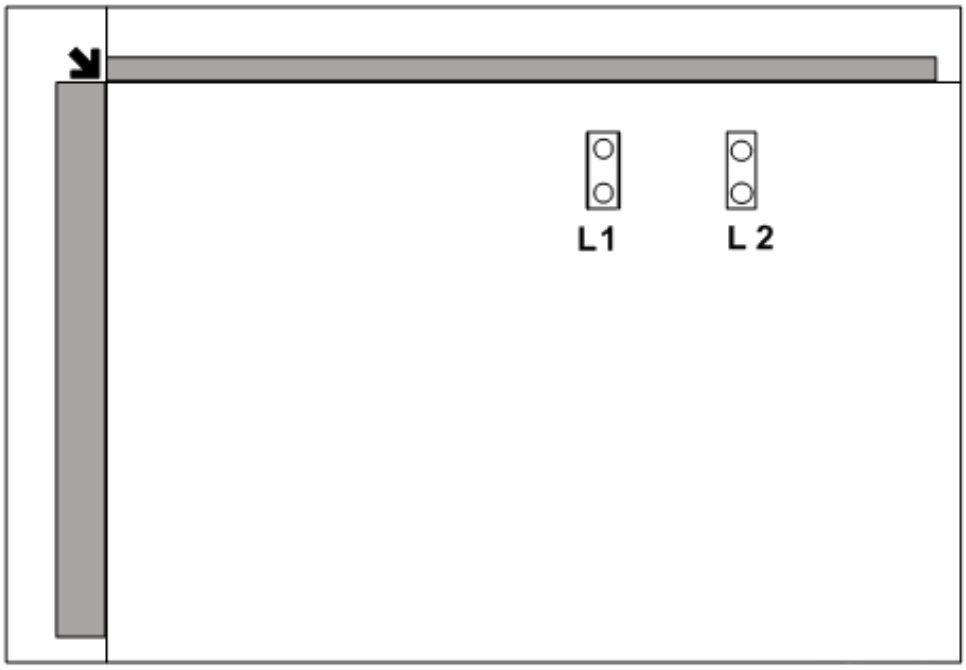
  The document size is detected by ON/OFF of the reflection sensors (L1 & L2) in the illustration below. A pressure plate open/close sensor is used for the document size detection timing. When the pressure plate open/close sensor has changed from “no cover” to “cover,” the size is determined.

  L1 and L2 can be checked using SP 4-301. L1 is bit 0 and L2 is bit 1.

- **Main scanning direction**

  RGB color densities at 3 locations are detected by a CCD, and when any of the RGB densities is 12 digits or more, it is determined that “document is present.”

  A pressure plate open/close sensor is used for the document size detection timing. When the pressure plate open/close sensor is “no cover,” the scanner lamp is moved to the right; when it is “cover,” the Scanner lamp is moved to Home Position while lit, and during this time, the size is read.



NOTE:

To determine the main scanning direction (document width), the outermost determination is used (only “ ”is used, “○”is ignored)

◆ **Sensor state**

The sensor state can be determined in SP mode.

- SP4-301 (APS Operation Check)

  How to read the screen

  (7)00000000(0)

  0: no document

  1: document present

  When the sensor responds, bit 0 is displayed as “1.”
- SP4-310 (Scan Size Detect Value)

  Viewed from the control panel, labeling positions from rear to front S1-S3 in that order, the RGB density at each position is displayed in digit units (value just before scan is displayed).

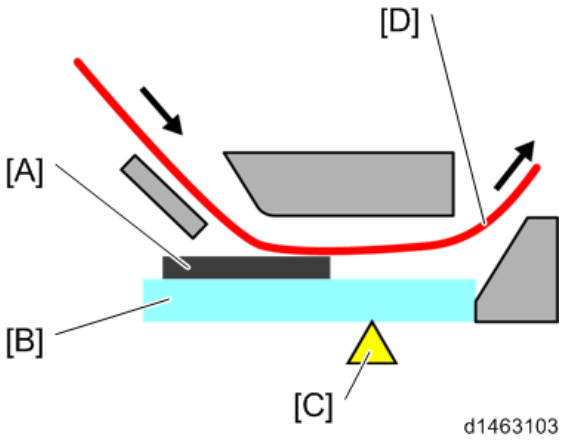
◆ **Other**

- By changing over SP4-305-001 (8K/16K Detection), you can change between A4 size/letter size or Chinese paper size (8×16).
- If the user specifies that the pre-scan lamp is too bright, the brightness pre-scan can be reduced by decreasing the value of SP4-309-004 (Scan Size Detect:Setting > LED PWM Duty). However, if the lamp brightness is reduced, size detection precision tolerance to a document with a large number of solid images will be less.

1.2.5 IMPROVED TOLERANCE TO BLACK LINES WHEN PAPER PASSES THROUGH ADF

The original document does not come in contact with the target glass, which prevents adhesive dirt (ball pen ink) on the document from adhering to the target glass.

ADF CROSS-SECTION DIAGRAM



[A]: Sheet

[B]: Target glass

[C]: Read position

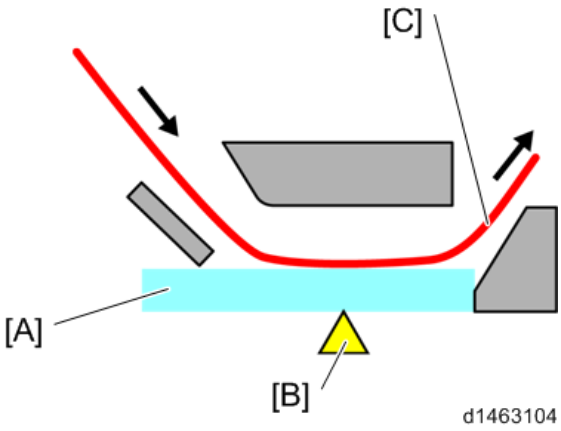
[D]: Document

- Reference (conventional mechanism)

  As the document comes in contact with the target glass, this is useful for dealing with adhesion of free dirt particles (paper scrap, etc.). (Self-cleaning mechanism using paper)

  On the other hand, tacky dirt adhering to the document sticks to the target glass, and may give rise to the appearance of black lines.

ADF CROSS-SECTION DIAGRAM



[A]: Target glass

[B]: Read position

[C]: Document

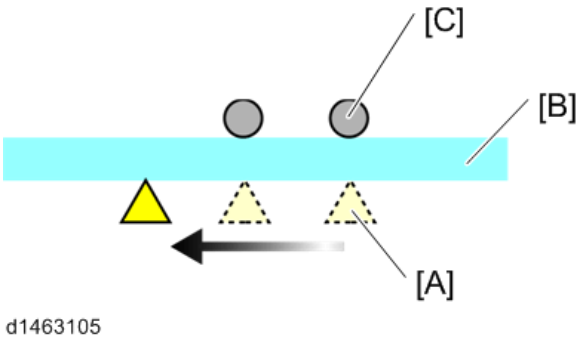
* If black lines due to free dirt particles appear in a short time, such as when users have documents with large amounts of paper scrap, you can return to the original configuration by the following procedure.

- Reference (read position correction)

  By changing SP4-020-001 (Dust Check > Dust Detect:On/Off), when dirt/soiling is detected at the read position, the read position may be changed to avoid the dirt/soiling.

  (If it cannot be avoided, an alert is displayed on the control panel advising the user to perform target glass cleaning).

IMAGE DIAGRAM



[A]: Read position

[B]: Target glass

[C]: Dirt

Dirt/soiling is detected when a document passes through, so the alert will not disappear until reading of the next document begins, even after target glass cleaning is performed.

If dirt/soiling is detected not on the target glass but on the background guide plate, the alert will not disappear even if the glass is wiped.

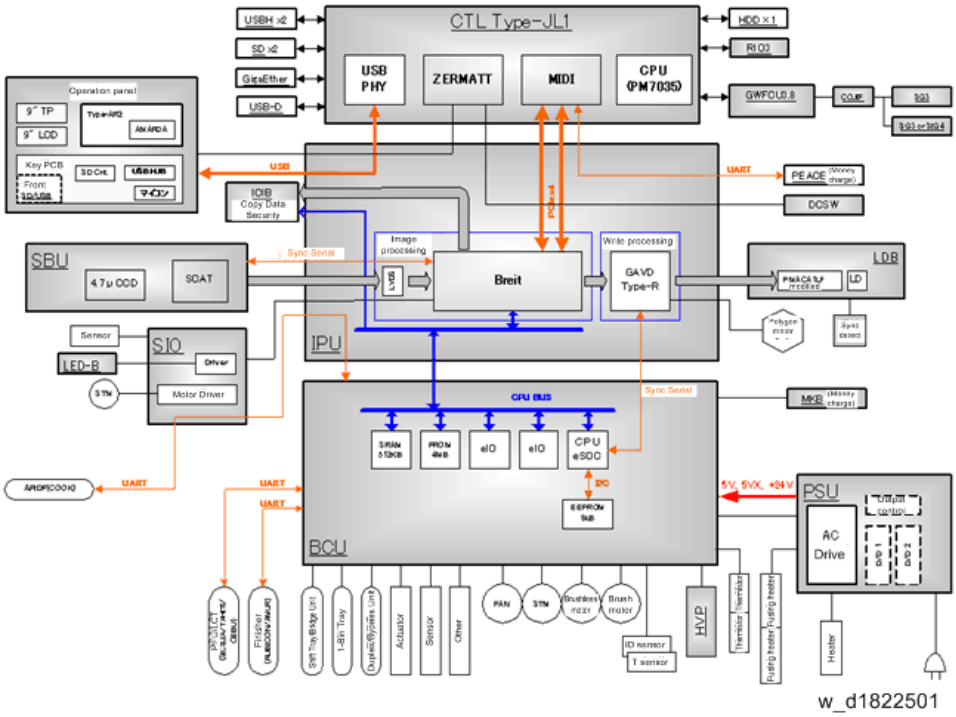
The time required for the first copy is slightly (almost imperceptibly) longer.

The detection threshold value can be changed using SP4-020-002 (Dust Check > Dust Detect:Lvl). (The larger the value is, the smaller the dirt particles that can be detected become.)

It is prohibited to change the setting of SP4-020-003 (Dust Check > Dust Reject:Lvl).

2. IMAGE PROCESSING

2.1 STRUCTURAL BLOCK DIAGRAM



2.2 MECHANISM

2.2.1 SBU

- **Functions**

  Performs Black level correction and White level correction （AGC）, Creating the SBU test pattern, and A/D conversion.

- **Operation overview**

  Samples 2 analog signals (ODD, EVEN) from RGB output from the 3-line CCD by an analog ASIC: SCAT, and converts them to digital signals (output 10 bit) by a built-in 12-bit A/D converter.

  The digital signals which are A/D converted by the analog ASIC are output to the IPU as an LVDS signal.

◆ **SP correction value storage**

The SBU correction value is stored in an EEPROM of the BCU. This correction value must be re-adjusted when the lens block is replaced.

- SP4-008 (Sub Scan Mag.Adjustment)
- SP4-010 (L-Edge Regist Adjustment)
- SP4-011 (S-to-S Regist Adjustment)
- SP4-688-001 (Scan Image Density Adjustment ARDF)

NOTE:

Dirt prevention when using DF:

The read density when using the DF may be lower compared to the pressure plate. A corrected density value can therefore be set by SP4-688-001 (Scan Image Density Adjustment ARDF) above.

◆ **SBU Test Mode**

There is SP code to create a test pattern which can be used as a diagnostic tool to troubleshoot problems in the SBU:

- SP4-699-001 (SBU Test Pattern Change)
  Pattern 1: fixed value
  Pattern 2: main scanning gradation pattern
  Pattern 3: width scanning gradation pattern
  Pattern 4: main scanning/width scanning lattice pattern
  SBU (SCAT) has a function to generate four test patterns.

2.2.2 IPU

◆ **Image processing function overview**

The image signals from the SBU are subjected to various image processing, and output to the controller (memory) via a PCI bus. The image signals from the controller (memory) are received via the PCI bus, and output to the LDB via a GAVD (the LDB is provided in the write unit).

The image signals from the SBU are subjected to various image processing, and output to the FCU via the PCI bus (for direct fax application transmission).

◆ **Image processing overview (copy application)**

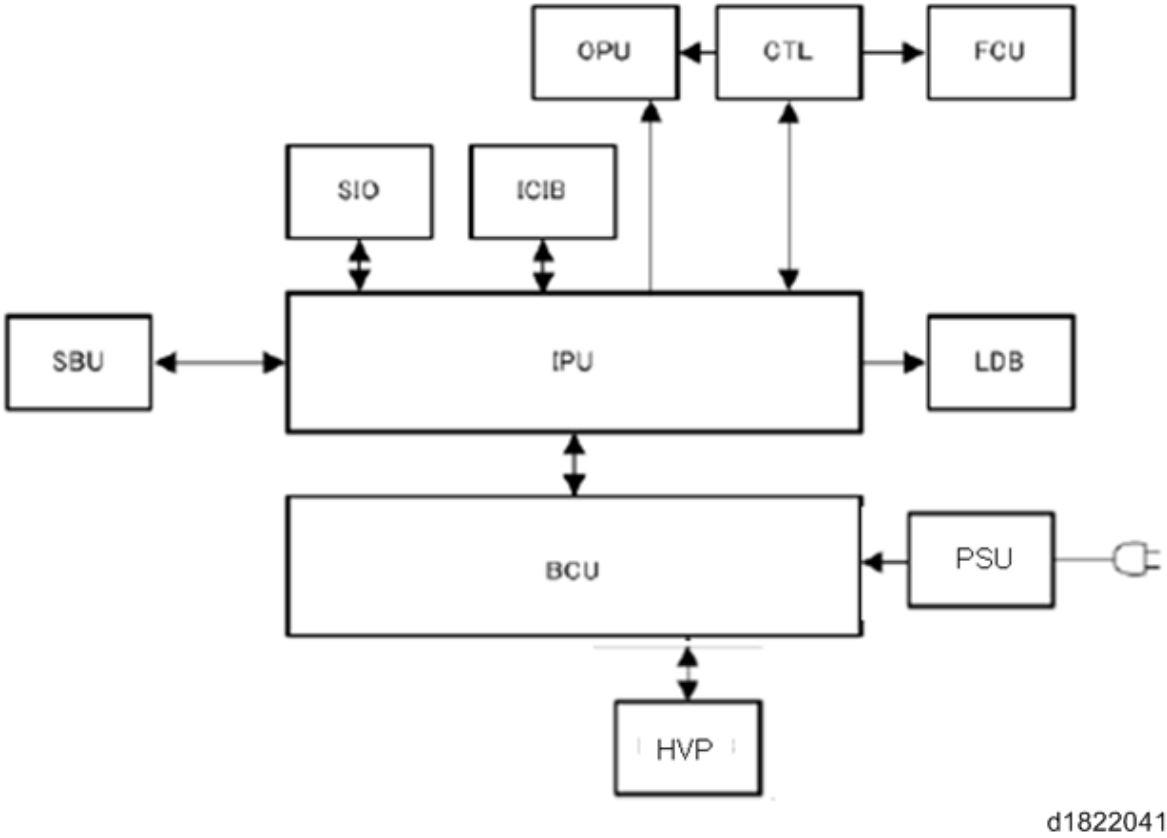
Digital signal data output from the SBU is subjected to shading correction and line interval correction, as well as image processing, which are performed by the IPU. Finally, the data is sent to the MFP unit as digital signals-4 bit/pixels.

Image processing items	Details
Shading correction	Corrects for uneven scanner lamp lighting, and scatter in CCD light receiving sensitivity.
Line interval correction	Line shift during subscanning magnification/reduction by scanner. Corrects integer part.
Dot correction	Line shift during subscanning magnification/reduction by scanner. Corrects below decimal point.
Vertical line correction	Corrects a vertical striped image during sheet-through ADF.
Image area separation	Determines text parts and photo parts of image.
Scanner γ correction	Corrects scatter of image data relative to exposure amount. From reflectivity linear to density linear.
Filter	Performs image sharpness adjustment and removes moire.
ADS	Performs natural complexion removal in full color mode.
Color compensation preprocessing	Determines hue in masking mode, and improves chromaticity.
Color compensation	Converts RGB data to density value CMYK data of color materials.
Image magnification change	Arbitrarily changes main scanning magnification, subscanning fixed image reduction and magnification of scanner image.
Image shift function	Shifts image data in the main scanning or subscanning directions.
Image binarization function	In scanner mode, outputs a binary signal.

Image processing items	Details
Image mask	Masks an area outside a frame of an arbitrary region in scanner or printer data.
Image compression/expansion	Compresses or expands an image.
Printer γ correction	Adjusts exposure amount of photosensitive body relative to image density.
Gradation processing	Applies 600dpi, 4bit 16 value gradation processing.

3. ELECTRICAL PARTS

3.1 BLOCK DIAGRAM



3.2 BOARD OUTLINE

3.2.1 CONTROLLER

Controls the MFP system overall. Comprises an MIPS CPU, controller ASIC, IO control ASIC, and RAM.

3.2.2 SBU

Read control circuit which performs analog signal processing and AD image conversion of the CCD read image.
It also has an IPU I/F, and controls scanner input output signals according to CPU commands.

3.2.3 SIO

Circuit which controls generation of SBU power, scanner internal sensor I/F, carriage drive stepping motor and LED drive.

3.2.4 LDB

LD control circuit which drives the laser diode by a universal driver.

3.2.5 BCU

Controls the engine.

3.2.6 IPU

Processes digital signals by an IPU.

3.2.7 FCU

Controls the fax program.

3.2.8 OPU

Controls the control panel.

3.2.9 HVP(COMPOSITE HIGH-VOLTAGE POWER SUPPLY TTS/CB)

Generates the high-voltage power required for process control. Divided into two units, i.e., transfer (TTS) and electrostatic/developing (CB).

3.2.10 PSU

Generates DC power from a commercial AC power supply, and supplies it to each control circuit. Comprises an A/C drive circuit for controlling the fixing heater.

4. JAVA VM AS STANDARD FEATURES

Java VM is now standard features (CTL board NAND flash) from the SD card option.
Java VM that aim to further expand sales of ESA applications, conventionally, had options available in the SD card, are a standard feature on the controller board of the MFP.
With the specification change, there are the following notes.

- Changing how to upgrade the Java VM
- Notes on the CTL board replacement

◆ **Changing how to update the Java VM**

Conventionally, updating Java VM was conducted on a PC by using the update tool that is downloaded from Firmware Download Center. Because of the standard feature (on-board) it can be done on the MFP.

Please refer to the "Field Service Manual" - “Updating Java VM” for more information.

◆ **Notes on the CTL board replacement**

It is necessary before replacing the controller board, check the ESA application that was installed. After replacing the controller board, it is necessary to re-install the application by following the installation instructions for each application.

NOTE:

In order to identify each ESA application which has been in operation at time of visit, when you have installed the ESA application, do the following:

Output the SMC sheet with SP5-990-024/025 (SDK/J Summary, SDK/J Application Info) and store it in the machine.

Store the SD card for the ESA application in the machine.