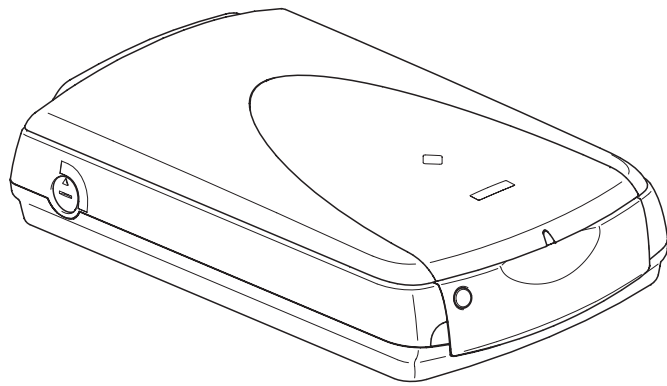


SERVICE MANUAL



Color Image Scanner

EPSON Perfection 3200 Photo



EPSON®

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PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1) Personal injury and 2) damage to equipment.

DANGER Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by DANGER Headings.

WARNING Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/maintenance procedures.

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.
4. WHEN DISASSEMBLING OR ASSEMBLING A PRODUCT, MAKE SURE TO WEAR GLOVES TO AVOID INJURIES FROM METAL PARTS WITH SHARP EDGES.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGE IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. DO NOT REPLACE IMPERFECTLY FUNCTIONING COMPONENTS WITH COMPONENTS WHICH ARE NOT MANUFACTURED BY EPSON. IF SECOND SOURCE IC OR OTHER COMPONENTS WHICH HAVE NOT BEEN APPROVED ARE USED, THEY COULD CAUSE DAMAGE TO THE EPSON PRODUCT, OR COULD VOID THE WARRANTY OFFERED BY EPSON.

About This Manual

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of the printer. The instructions and procedures included herein are intended for the experienced repair technicians, and attention should be given to the precautions on the preceding page.

Manual Configuration

This manual consists of six chapters and Appendix.

CHAPTER 1. PRODUCT DESCRIPTIONS

Provides a general overview and specifications of the product.

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of electrical and mechanical operations of the product.

CHAPTER 3. TROUBLESHOOTING

Describes the step-by-step procedures for the troubleshooting.

CHAPTER 4. DISASSEMBLY AND ASSEMBLY

Describes the step-by-step procedures for disassembling and assembling the product.

CHAPTER 5. ADJUSTMENT

Provides Epson-approved methods for adjustment.

CHAPTER 6. MAINTENANCE

Provides preventive maintenance procedures and the lists of Epson-approved lubricants and adhesives required for servicing the product.

APPENDIX Provides the following additional information for reference:

- Circuit board connection and connector signal layouts
- Electrical circuit component layout diagrams
- Electrical circuit diagrams
- General disassembly diagrams and parts list

Symbols Used in this Manual

Various symbols are used throughout this manual either to provide additional information on a specific topic or to warn of possible danger present during a procedure or an action. Be aware of all symbols when they are used, and always read NOTE, CAUTION, or WARNING messages.



Indicates an operating or maintenance procedure, practice or condition that is necessary to keep the product's quality.



Indicates an operating or maintenance procedure, practice, or condition that, if not strictly observed, could result in damage to, or destruction of, equipment.



May indicate an operating or maintenance procedure, practice or condition that is necessary to accomplish a task efficiently. It may also provide additional information that is related to a specific subject, or comment on the results achieved through a previous action.



Indicates an operating or maintenance procedure, practice or condition that, if not strictly observed, could result in injury or loss of life.



Indicates that a particular task must be carried out according to a certain standard after disassembly and before re-assembly, otherwise the quality of the components in question may be adversely affected.

Revision Status

Revision	Issued Date	Description
A	November 18 , 2002	First Release

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CHAPTER

1

PRODUCT DESCRIPTION

1.1 Features

The main features of the Perfection 3200 Photo are:

- ☐ High speed and high-resolution A4 color image scanner that is ideal for consumer / SOHO applications.
 - High speed:
 - Monochrome: 29 sec
 - Color: 29 sec
 - Conditions: A4 600dpi, Reflective, Draft mode
 - High quality:
 - Resolution: 3200 dpi(Optical resolution by 6 line CCD with 81600 pixels)
 - depth: 16 bit (16 bit-in, 16 bit-out)
- ☐ Lid-type TPU equipped for Photo Model
 - Built-in 4" x 9" transparency unit included for scanning:
 - 35mm x 12 frames Strip film
 - 35mm x 4 frames Mount film
 - 4" x 5"
 - Brownie film (120)
- ☐ Ease of Use
 - EPSON Smart Panel
 - New Scan to PDA and PDF
 - Achieved easy scanning with a start button.
 - Export a image data to applications easily.
 - New Twain functions Full automatic mode for films thumbnail view support.
 - Monochrome negative film support.
 - PRINT Image Matching capabilities ensure more accurate printout with PRINT Image Matching Epson printers.

- Driver 21 (Tentative Name)
 - New graphic user interface: Full Auto Mode, Home mode and Professional mode.
 - Works not only as a TWAIN driver but also as a stand-alone application to save image without a graphic application e.g. Photoshop
 - Professional tools are newly added: Histogram, multiple level unsharp mask and de-screening, Photoshop like Tone curve editor.
- ☐ High Speed I/F
 - IEEE 1394 I/F and USB 2.0 I/F* both available in a single model
 - * USB 2.0 compatibility depends on the capabilities of the operating system and computer environment.
- ☐ Option
 - Transparent document unit (standard accessory)

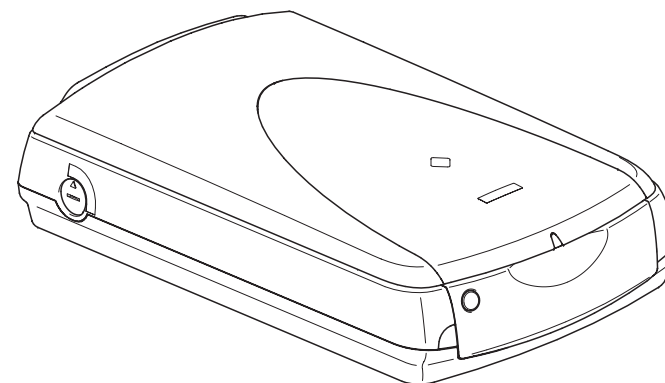


Figure 1-1. Exterior View of Perfection 3200 Photo

1.2 Basic specifications

BASIC SCANNER SPECIFICATIONS

- ☐ Product Type: Flatbed color image scanner
- ☐ Sub-scanning method: Movement of the Scanner-Head
- ☐ Photoelectric device: 6 line alternate color CCD
- ☐ Maximum Read Area: 8.5 x 11.7 (216 x 297mm)
- ☐ Maximum effective picture element: 27200 x 37440 pixels (3200dpi)
- ☐ Resolution:
 - Main 3200 dpi (Optical resolution by 6 line CCD with 81,600 pixels)
 - Sub 6400 dpi with Micro Step
- ☐ Scanning resolution 50 ~ 6400 dpi (1 dpi step)
(12800dpi scanning is achieved by 6400dpi x 200%)
- ☐ Gray scale levels: 16 bits/pixel (Input 16 bits/pixel, Output 1-16/bits/pixel)
- ☐ Zoom: 50 ~ 200% (1% step)
- ☐ Scanning Speed:
 - Color: 8.7 msec/line
 - Monochrome (bi-level): 3.0 msec/line
(A4, 2400 dpi, High-speed scanning mode)
- ☐ Command level: ESC/I (B8), FS
- ☐ Dimensions: 304(W) x 476(D) x 122(H) mm
- ☐ Weight: Approx. 5.8 Kg
- ☐ Warm-up time
 - Scanner Within 25 sec (25°C), within 40 sec (5°C)
 - TPU Within 40 sec (25°C), within 60 sec (5°C)

- ☐ Image processing
 - Gamma Correction: Output correction types : 5 standard types
CRT 2 level (A, B)
PRINTER 3 level (A, B, C)
User defined 1 level
 - Color Correction: Output correction types : 4 standard types
Impact-Dot Printer
Thermal Printer
Ink-Jet Printer
CRT Display
User defined
 - Brightness: 7 levels
 - Line Art: Fixed threshold
TET (Text Enhancement Technology)
 - Digital halftoning: AAS
Error Diffusion 3 modes (A, B, C)
(Bi-level, Quad-level)
Dither (Resident) 4 modes (A, B, C, D)
Dither (User defined) 2 modes (A, B)
- ☐ Interface (Resident): IEEE 1394 (6-pin connector): 1
USB 2.0 (Type-B Receptacle Connector) : 1
- ☐ USB Hosts: All of USB ports work correctly. (The functionality of the USB port (s) must be ensured by the vendor of the Host)
- ☐ Number of Hub: This device must be in the Tier 1 or 2 with recommended USB cable. (Tier1: Host-this device
Tier2: Host-Hub-this device)
- ☐ Light Source: White Cold cathode Fluorescent Lamp

☐ Operating System:

- IEEE1394 I/F: Microsoft Windows XP
Microsoft Windows 2000 Professional
Macintosh Windows Me
Mac OS 8.6 to X
(FireWire updater 2.1 or later needed)
- USB 1.1 I/F: Microsoft Windows XP
Microsoft Windows 2000
Microsoft Windows 98/Me
Mac OS 8.6 to X
- USB 2.0 I/F: Microsoft Windows XP

BASIC TRANSPARENCY DOCUMENT UNIT SPECIFICATIONS

- ☐ Type: Surface-emitting transparency unit
- ☐ Light source: White fluorescent tube
(cold cathode fluorescent lamp)
- ☐ Max. scanning area: 4" x 9.1" (101 mm x 231 mm)
- ☐ Applicable originals: 35 mm stop film (positives and negatives)
35 mm mounted film (positives and negatives)
- ☐ Setup: Scanner document cover: Integrated lid-type TPU
- ☐ Power supply: Supplied from scanner
- ☐ Switches: N/A
- ☐ Display: Indicator ON/OFF
(Lights blue in sync with TPU indicator
ON/OFF operation)
- ☐ Warm-up time:
 - Scanner: Within 25 sec (25°C), within 40 sec (5°C)
 - TPU: Within 40 sec (25°C), within 60 sec (5°C)

ELECTRICAL SPECIFICATIONS

- ☐ Rated voltage: AC100-120V
AC220-240V
- ☐ Input voltage: AC 100 -120V $\pm 10\%$
AC 220 - 240V $\pm 10\%$
- ☐ Rated Current : 0.45A (Input AC100V)
0.25A (Input AC200V)
- ☐ Rated Frequency Range: 50-60 Hz
- ☐ Input Frequency Range: 49.5-60.5 Hz
- ☐ Power consumption: Approx. 23W (Operating)
Approx. 7W (Stand-by)
- ☐ Insulation resistance: 10 M Ω at 500VDC (between AC line and chassis)
- ☐ Dielectric strength: AC.1.2kV, 1 min (between AC line and chassis)

SAFETY, EMC, EPA

- ☐ Safety: UL 1950 (UL)
CSA C22.2 NO.950 (CSA)
EN60950
IEC60950
- ☐ EMC: FCC Part15 Subpart B Class B
AS/NZS3548 Class B
CISPR Pub22 Class B
CNS 13438 Class B
- ☐ CE Marking:
 - Low Voltage Directive 73/23/EEC EN60950
 - EMC Directive 89/336/EEC EN55022 Class B
EN61000-3-2
EN61000-3-3
EN55024-1
- ☐ EPA: Energy Star

RESISTANCE TO ELECTRIC NOISE

- ☐ Static electricity: panel - 10 kV
 metal - 7kV/150 pF, 150Ω

ENVIRONMENTAL CONDITIONS

- ☐ Temperature:
 - Operating: 5 °C to 35 °C
 - Storage: -25 °C to 60 °C
- ☐ Humidity:
 - Operating: 10 to 80%, no condensation
 - Storage: 10 to 85%, no condensation

RELIABILITY

- ☐ MCBF: 30, 000 cycles

OPERATING CONDITIONS

- ☐ Dust: Ordinary office or home conditions. Extreme dust should be avoided.
- ☐ Illumination: Operation under direct sunlight or near strong light source is not guaranteed and should be avoided.

DOCUMENT

- ☐ Reflective type: Documents which has a smooth surface such as a printing and photograph.
- ☐ Transparency type (with transparency unit)
 - Reversal film
 - Negative film

1.3 Interface Specification

The specifications for the scanners interface are as follows.



Figure 1-2. Interface

1.3.1 IEEE-1394

- Basic specification
 - Specifications IEEE Std 1394a-2000 compliant
 - IEEE1394PHY 1394a-2000 compliant 100/200/400 Mbps PHY
 - IEEE1394LINK 1394a-2000 compliant 100/200/400 Mbps LINK
 - Max. packet size 2 Kbytes + Header (Async packets only)
 - Transmission speed
 - Average 4 Mbytes/sec. peak 50 Mbytes/sec (400 Mbps)
- Electrical specification
 - IEEE 1394a-2000 compliant
- Power supply and ground

Each node both receives and transmits power. Because more than one node must be connected in this case, the power supply passes through diodes so that current does not flow from nodes with a higher power supply to nodes with a lower power supply.

Table 1-1. Cable power supply requests

Condition	Limit	Unit
Max. output current per port	1.5	Amp
Min. power supply voltage	8	VDC
Max. power supply voltage	30	VDC
Max. output ripple (10 kHz--400 MHz)	100	mV p-p
Max. output ripple (below 10 kHz)	1	V p-p

1.3.2 USB 2.0 specifications

- Component: This device supports the following configurations.

Table 1-2. Basic configuration for USB 2.0 specifications

Device	Class: Vender-specific End point 0's MAX packet / size: 64byte Vender ID: 0x04B8 Product ID: 0x0112 No.of structure: 2
Structure	Interface supported: 1 Characteristic <ul style="list-style-type: none"> • Self power supply • Remote / wake up function is not available Bus electrical power consumption:2mA
Interface 0	substitutes setting value: NO Endpoint: 2 Class: Vender-specific
End point 1	Bulk IN transfer Max data transfer size: 64 byte(Full Speed), 512 byte(High Speed)
End point 2	Bulk OUT transfer Max data transfer size: 64 byte(Full Speed), 512 byte(High Speed)
String / descriptor	Manufactured by: EPSON Product Name: Perfection 2450 Photo

- Electric specification: Complies with full speed (12 Mbps) and high speed (480 Mbps) modes as described in the Universal Serial Bus Specification Revision 2.0.
- Connection Connector: Receptacle (Series B) (Figure 1-3 and Table 1-3)

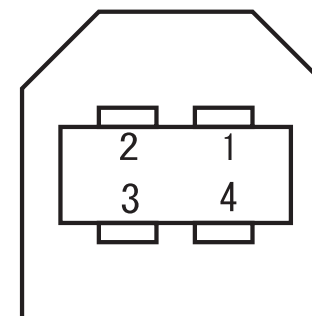


Figure 1-3. Receptacle (Series B)

Table 1-3. USB pin Assignments

Pin No.	Signal
1	VCC
2	- Data
3	+ Data
4	GND

1.4 External specifications

1.4.1 Switch Specification

- ☐ OPERATE Switch
 - Turns the scanner ON/OFF
 - When the power is turned on, the scanner is initialized.
- ☐ PUSH Button

The status of this button can be checked by [ESC !].

1.4.2 Indicators

- ☐ Indicator display
 - Status LED (green + red)

This lights, flashes or turns off to indicate the ready, busy or error status of the scanner.

Table 1-4. Status LED condition and status indication

Status	LED condition
Ready	Lit green
Busy *1	Flashing green at low speed
Error *2	Flashing red at high speed
Operation off	Off

*1: Warm-up, scanning, initialization, etc.

*2: Does not light red for some errors (option errors, command errors)

- TPU lamp LED (blue)

Lights in sync with TPU indicator ON/OFF operation

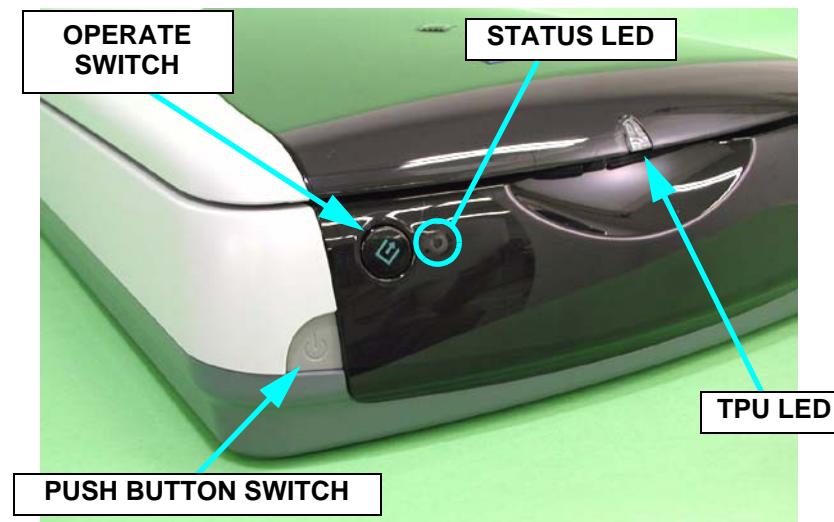
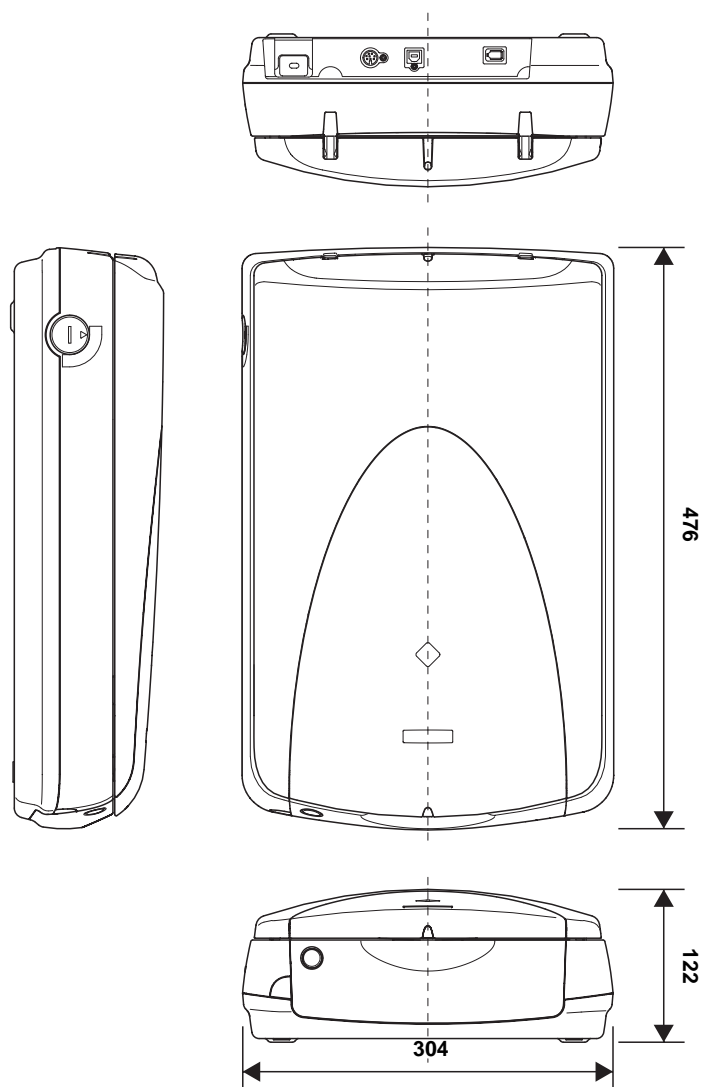


Figure 1-4. Switch and LED Locations

EXTERNAL VIEW**Figure 1-5. Size**☐ Physical dimensions and weight

■ Dimensions: 304(W) x 476(D) x 122(H) mm

■ Weight: Approx. 5.8 Kg

☐ Size and weight of packing container

■ Dimensions: 410(W) x 570(D) x 210(H) mm

■ Weight: Approx. 1.6 Kg

1.5 Control Code

The table below lists the control codes for the scanner.

Table 1-5. Control Codes

Category	Command Name	Code
Execute Command	ID request	ESC I
	Status request	ESC F
	Extension status request	ESC f
	Status setting request	ESC S
	Read start command	ESC G
	Push Button Status request	ESC !
	Expansion ID request	FS I
	Scanner Status request	FS F
	Read parameter request	FS S
	New read start	FS G
Data format setting	Sets Data format	ESC D i
	Sets resolution rate	ESC R n1 n2
	Sets zoom rate	ESC H i1 i2
	Sets the reading range	ESC A n1 n2 n3 n4
	Sets the color	ESC C i
	Mirroring	ESC K i
	Sets reading parameter	FS W
Correction process	Set brightness	ESC L i
	Set Gamma correction	ESC Z i
	Set Gamma correction table	ESC z i d0 d1...d255
	Set sharpness	ESC Q i

Table 1-5. Control Codes

Category	Command Name	Code
Image process	Set Digital Halftoning	ESC B i
	Set Auto Area Segmentation	ESC s i
	Download Dither Pattern	ESC b ijd (j2)
	Color correction	ESC M i
	Download Color Correction	ESC m df d2...d9
Auxiliary	Set Threshold	ESC t i
	Set scanning mode	ESC g i
	Initialize	ESC @
	Set line counter	ESC d i
	Control option	ESC e i
	Focus adjustment	ESC p i
	Focus position status request	ESC q
	Eject paper	FF
	Film type	ESC N i
Control	Normal response	ACK
	Abnormal response	NACK
	Abort scanning	CAN
	Header	STX

1.6 Process when an error happens

Table 1-6. List of Error Contents and Error Processing

Type	Indicator	Cause	Disposition	Remedy	Acceptable command
Command error	-	Unidentified command or unidentified command parameter is detected.	<ul style="list-style-type: none"> The scanner ignores the wrong command or parameter. (Therefore, the current setting or the default value remain effective.) Scanner sends NACK, and waits for the next command or parameter. 	The error condition is cleared when the scanner receives a correct command.	
Interface error	READY LED Off ERROR LED (red) blinking (short interval)	<ul style="list-style-type: none"> Wrong procedure is detected in the interface communication. In the case of SCSI, a transmission is frozen more than 30 seconds except BUS FREE phase. 	The lamp goes off and the scanner stops operation.	<ul style="list-style-type: none"> Turn the scanner off and then back on. RST signal in SCSI turns active. 	Nothing
Fatal error	READY LED Off ERROR LED blinks	<ul style="list-style-type: none"> The lamp is broken. Power is turned on before removing the transportation screw. System breakdown. 	<ul style="list-style-type: none"> The lamp goes off and the scanner stops operation. The bit 7 of the status byte is set. 	<ul style="list-style-type: none"> Turn the scanner off and then back on. Send ESC@ code to the scanner. RESET signal in SCSI turns active. Complete BUS DEVICE RESET message in SCSI. 	ESC F, ESC f, ESC @
Option error	-	<ul style="list-style-type: none"> Unit cover open Paper Empty 	The bit 7 of the status byte is set.	Remove the error condition	ESC F, ESC f, ESC @

*: When an optional device is connected, this error occurs when the option control command (ESC @) has been used to set the optional device to operation ready status.

1.7 Document area

1.7.1 Reflective Documents

- Maximum read area 8.5" x 11.7" (216 x 297 mm)
(Horizontal x vertical)

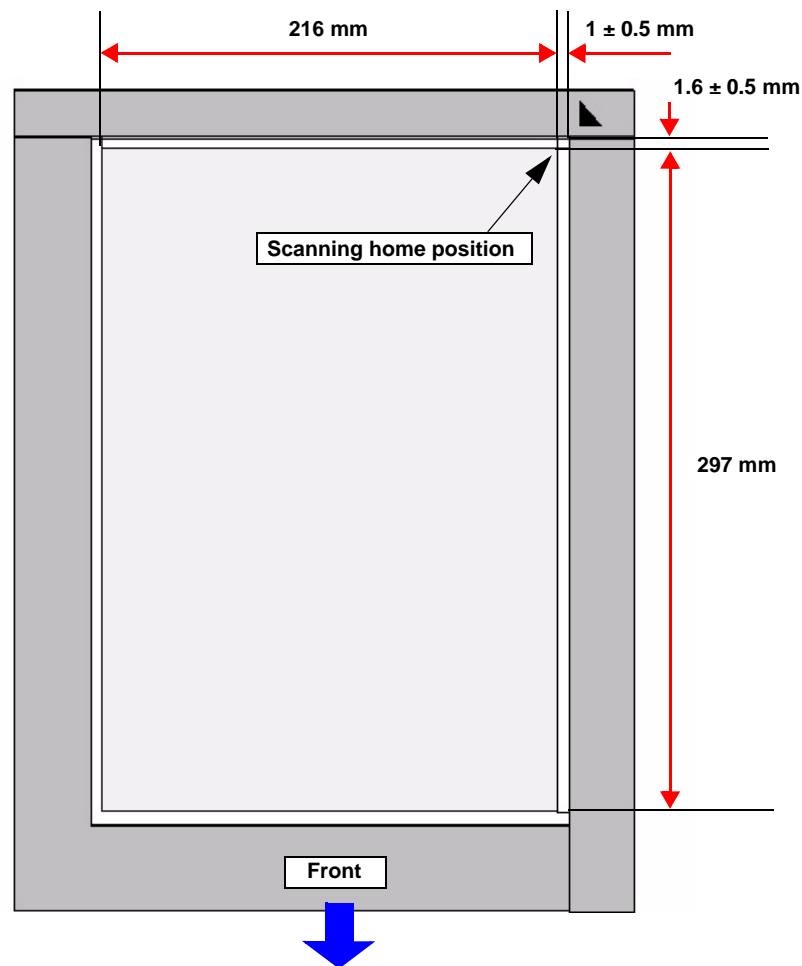


Figure 1-6. Reflective Document Scanning Area

1.7.2 Transparent Documents

- Maximum read area 4" x 9.1" (101 x 231 mm)
(Horizontal x vertical)

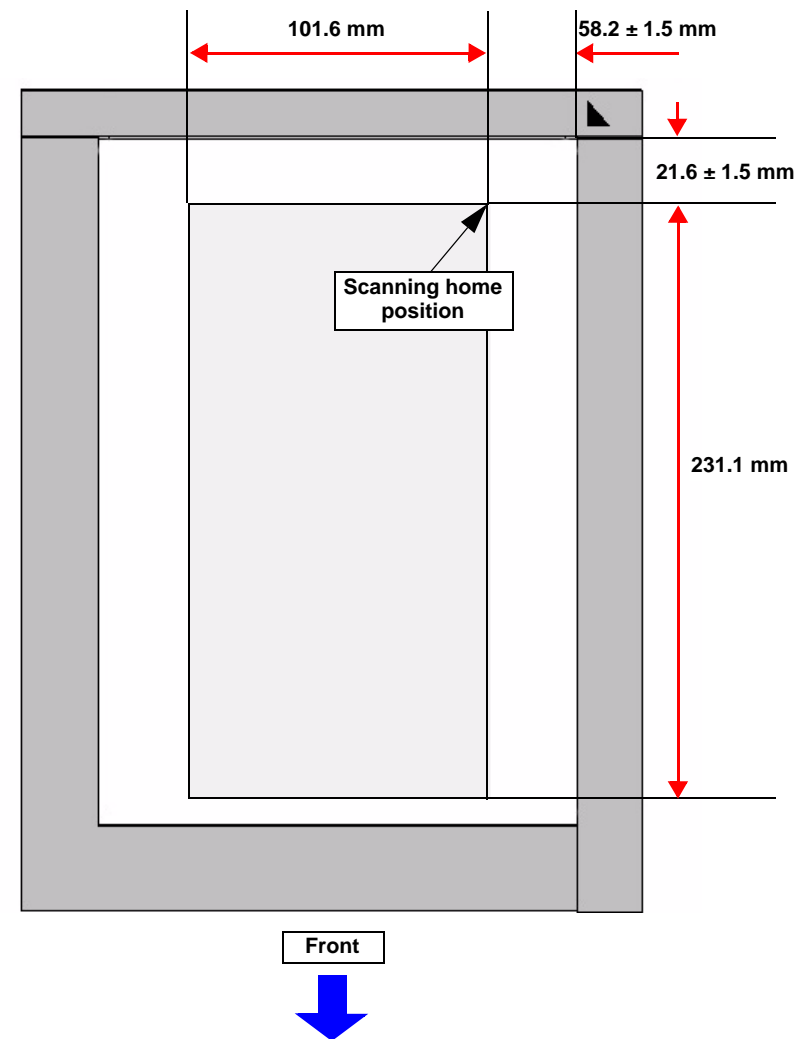


Figure 1-7. Transparent Document Scanning Area

1.8 Energy Save Mode

When the scanner switches to energy save mode, the control status is as shown below.

1.8.1 Mode transitions

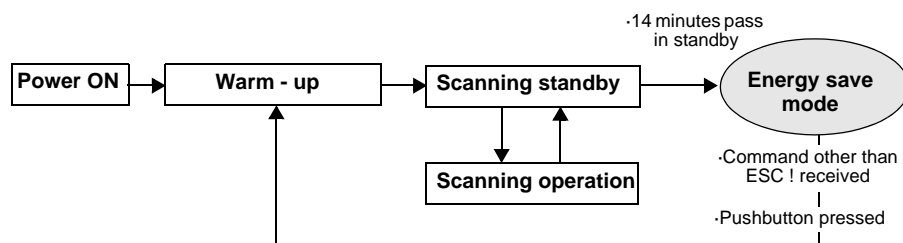


Figure 1-8. Mode Transition Diagram

1.8.2 Energy save control

- ☐ During scanning standby

The following control operation is carried out during scanning standby.

 - The CCD clock is fixed at LOW level.
This control is carried out after the carriage returns once scanning is complete.
- ☐ During energy save mode

The following control operations are carried out during energy save mode.

 - CCD and AFE clocks are fixed at LOW levels.
 - 12 V power supply stops.
 - Indicators switch off.

CHAPTER

2

OPERATING PRINCIPLES

2.1 Engine Mechanism

This section explains the engine function and operating principles. Engine can be divided into Carriage Unit and Carriage Move Mechanism.

2.1.1 Carriage Unit

Carriage unit is mainly composed of CCD sensor board, Inverter board, Lamp (light source), Mirror and Lens mechanism. (See Figure 2-1, Figure 2-2)

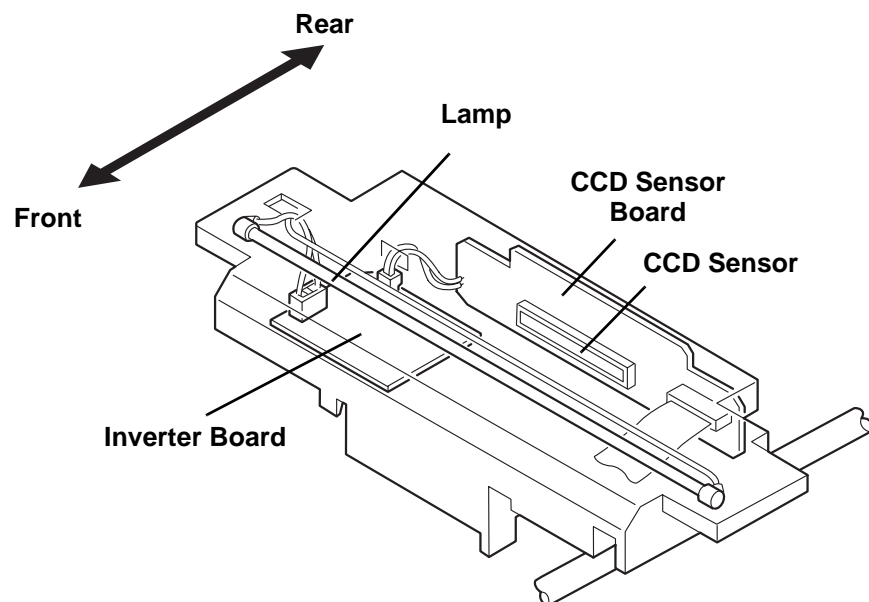


Figure 2-1. Carriage Unit Component

- **CCD Sensor Board:** This board has Color CCD line sensor (independent R,G,B), and controls it and drives circuit.
- **Inverter Board:** This board generates voltage to drive the lamp by pressing up to the +24VDC and converting it from direct current to alternating current.
- **Lamp:** White cold fluorescent Lamp is used as light source. When the light quantity is not stable, the scanner blinks the Operate light until the light becomes stable and goes to stand-by mode.
- **Mirror and Lens Mechanism:** The light emitted to the document reaches the CCD sensor after being reflected on some mirrors one after another. Not by changing the light source to create R/G/B light component which can be found in the previous models, Color CCD itself creates each R/G/B light component.

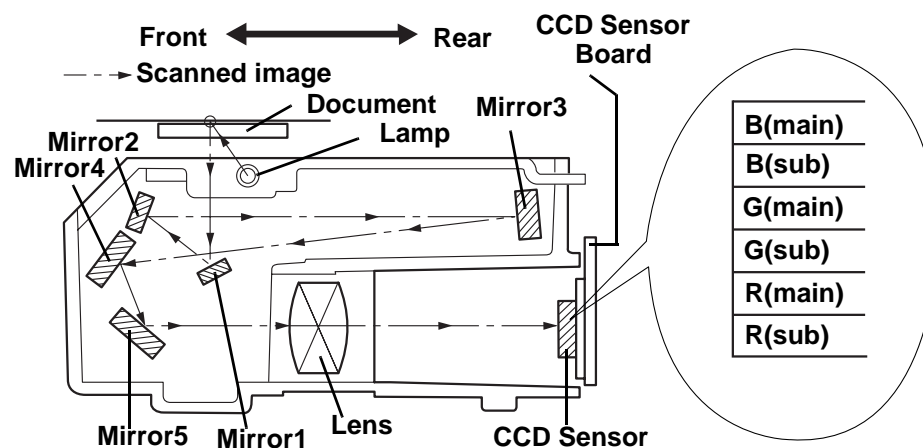


Figure 2-2. Mirror, Lens Mechanism

2.1.2 Carriage Move Mechanism

Scanning image is performed in the main scan direction (=1 line) by the CCD sensor and in the sub-scan direction (=several lines) combined with carriage unit movement. (See Figure 2-3)

Line type, color CCD sensor can scan 1 line in main scan direction (parallel to the carriage unit) by one time. When scanning next lines after the second line in sub-scan direction, CR driving moves the carriage unit, which has CCD sensor inside, and scan the other lines. The scanned data is sent to the control board. The scanned data for "n" lines and "n-1" line are processed consecutively.

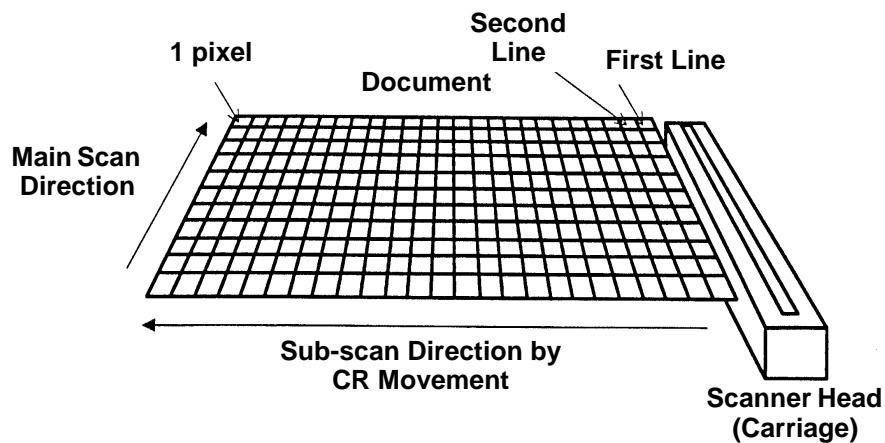


Figure 2-3. Carriage Movement

Carriage Unit slides into sub-scan direction along with the guide rail. For this sliding operation, the carriage motor drives the timing belt attached to the carriage unit by conveying the driving force through the drive pulley and reduction gear. Scanning start position is determined by CR HP sensor, which is located on the control board. Since the stepping motor is used for CR motor, carriage home position is controlled under the open loop system. (See Figure 2-4)

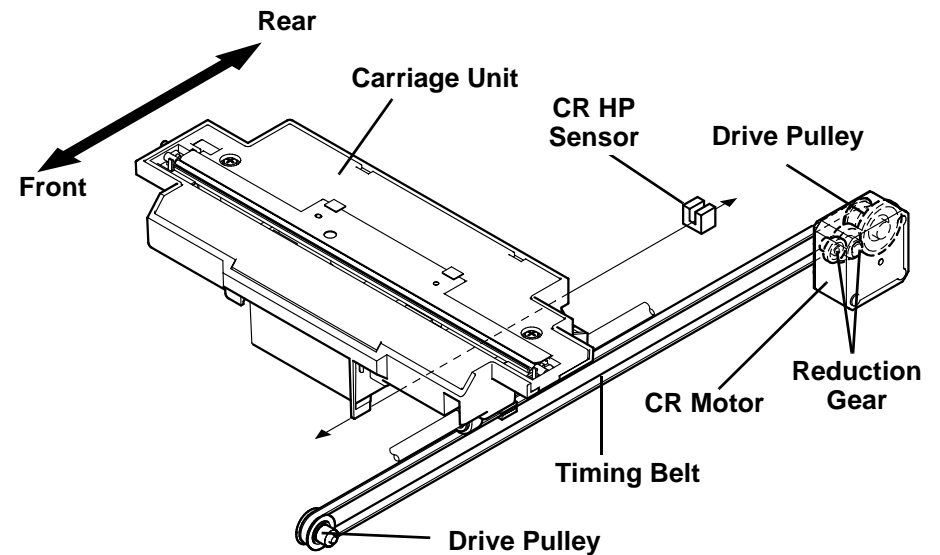


Figure 2-4. Carriage Operation

2.2 Power Supply Circuit

Power supply circuit in this scanner generates direct current DC power necessary for driving the controller board and scanner engine. Table below shows each power supply circuit for different destinations.

Table 2-1. Power Supply Circuit Board for Destination

Specification	Unit Part No.	Fuse
100-120 VAC Range	2027705	2.5 A/125 VAC
220-240 VAC Range	2027704	T2.5AH/250 VAC

Figure 2-5 shows diagram of power supply circuit.

Output from the power supply circuit is performed by closing or opening the No. 4 pin of CN102 connector. When opening, as it is shown in the Table below, each output voltage becomes active. Also, each output voltage has over current protection and over voltage protection circuit.

Table 2-2. Output and Protection Function

Output Voltage	Output Current	Over Current Protection (Current value to activate)	Over voltage Protection (Voltage value to activate)
5 VDC	1.2A	Fold-back characteristic. Automatic Recovery. (Less than 1A)	Shut down. Turn off the power and back on to recover. (5.5 -7.5 VDC)
12 VDC	0.2A	Constant current limiting. Automatic Recovery. (less than 0.5 A)	Shut down. Turn off the power and back on to recover. (14 -17 VDC)
24 VDC	0.7A	Shut down. Turn off the power and back on to recover.	Shut down. Turn off the power and back on to recover. (28 -33 VDC)

NOTE: 1. If a part of output is shut down, all the other output are also shut down.
2. Off time required to recover is maximum 5 minutes.

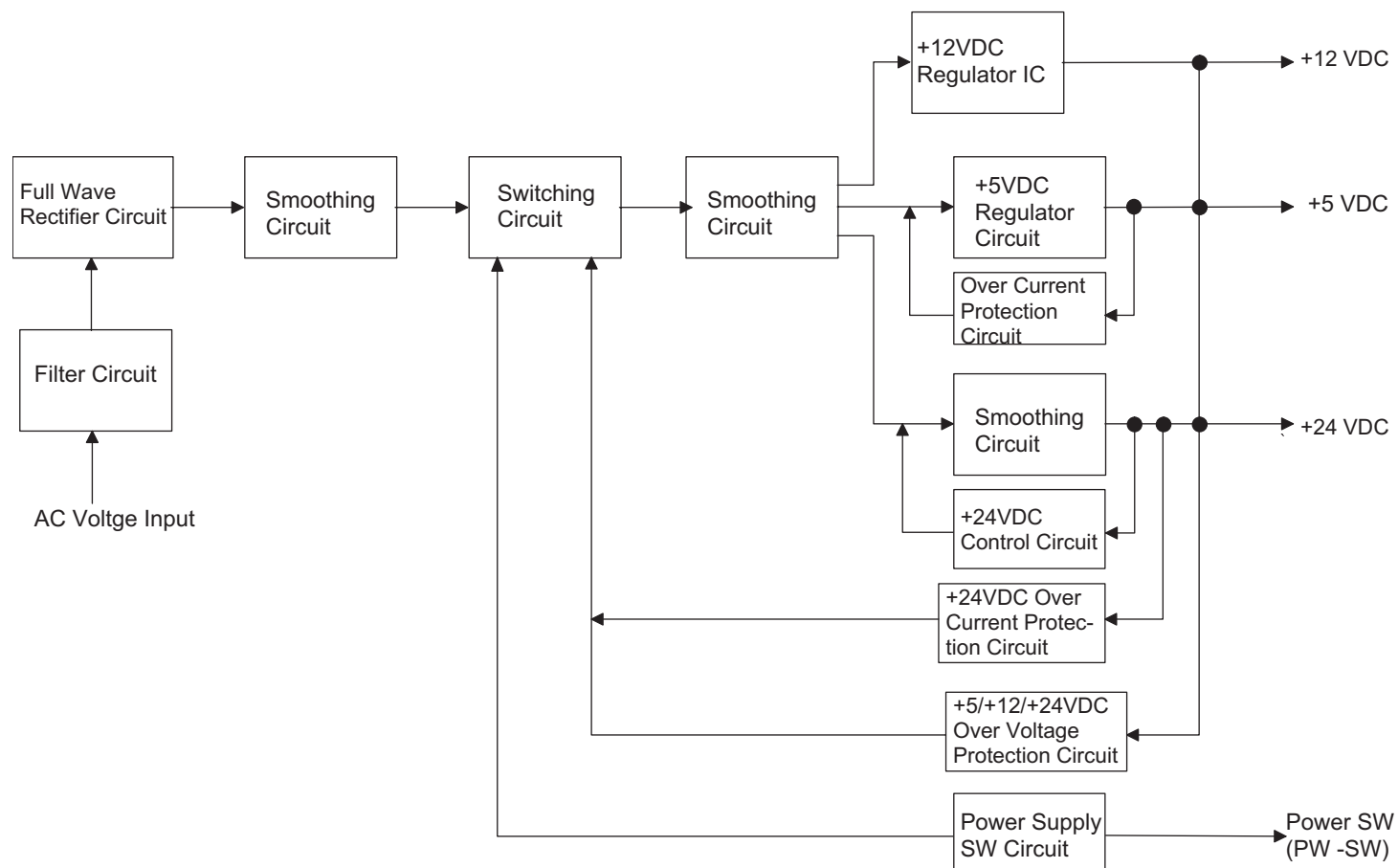


Figure 2-5. Power Supply Circuit Block Diagram

2.3 Control Circuit

2.3.1 Outline of Control Circuit Operation

The control circuits for this scanner are as follows. (See Figure 2-6, "Control Circuit Block Diagram".)

- ☐ Main circuit board

Table 2-3. Major ICs

IC	Location	Function
E01A23EA	IC1	System LSI <ul style="list-style-type: none"> • CPU • Image processing ASIC • USB 1.1 interface • Stepping motor controller • Programmable frequency divider • Multi-purpose I/O
IS61LV256AH-15J	IC4	SRAM
M27W402-100B6	IC3	OTPROM
HY57V281620AT-S or K4S281632C-TC1L	IC2	Image processing SDRAM
A3957SLB	IC12,IC13	Carriage motor driver with wireless-type 4-bit DAC
ISP1581	IC14	USB 2.0 controller USB 2.0 interface controller Full speed (12 Mbit/sec)/high speed (483 Mbit/sec) support
TSB43AA82	IC5	IEEE 1394 controller
AT93C46-10SCTE	IC15	EEPROM

- ☐ CCD circuit board

Table 2-4. Major ICs

IC	Location	Function
ILX137K	IC5	CCD <ul style="list-style-type: none"> • 64,200-pixel (10,700 pixels x 6), 6-line CCD color linear sensor • Pixel size 4 μm x 4 μm • Channel top width 1.6 μm • Line interval: 2 lines (4 μm) between same colors, 16 lines (64 μm) between different colors
AD9826	IC2	AFE CDS 3CH ADC 16bit
E02A38YA	IC3	CCD/AFE clock generator ASIC Variable point for each bit of AFE digital output is varied at random

- ☐ SUB_A circuit board (power switch)
 - Power supply circuit board
 - Switch: SPPJ22D19A
- ☐ SUB_B circuit board (LED)
 - LED circuit board (Built into Lid TPU)
 - LED: READY LED (blue) DB3804X
ERROR LED (red) BR3874X
- ☐ Panel circuit board (pushbutton)
 - Pushbutton circuit board
 - Switch: EVQPEE04M
- ☐ Power supply
 - 100V: MPW0837
 - 200V: MPW0708

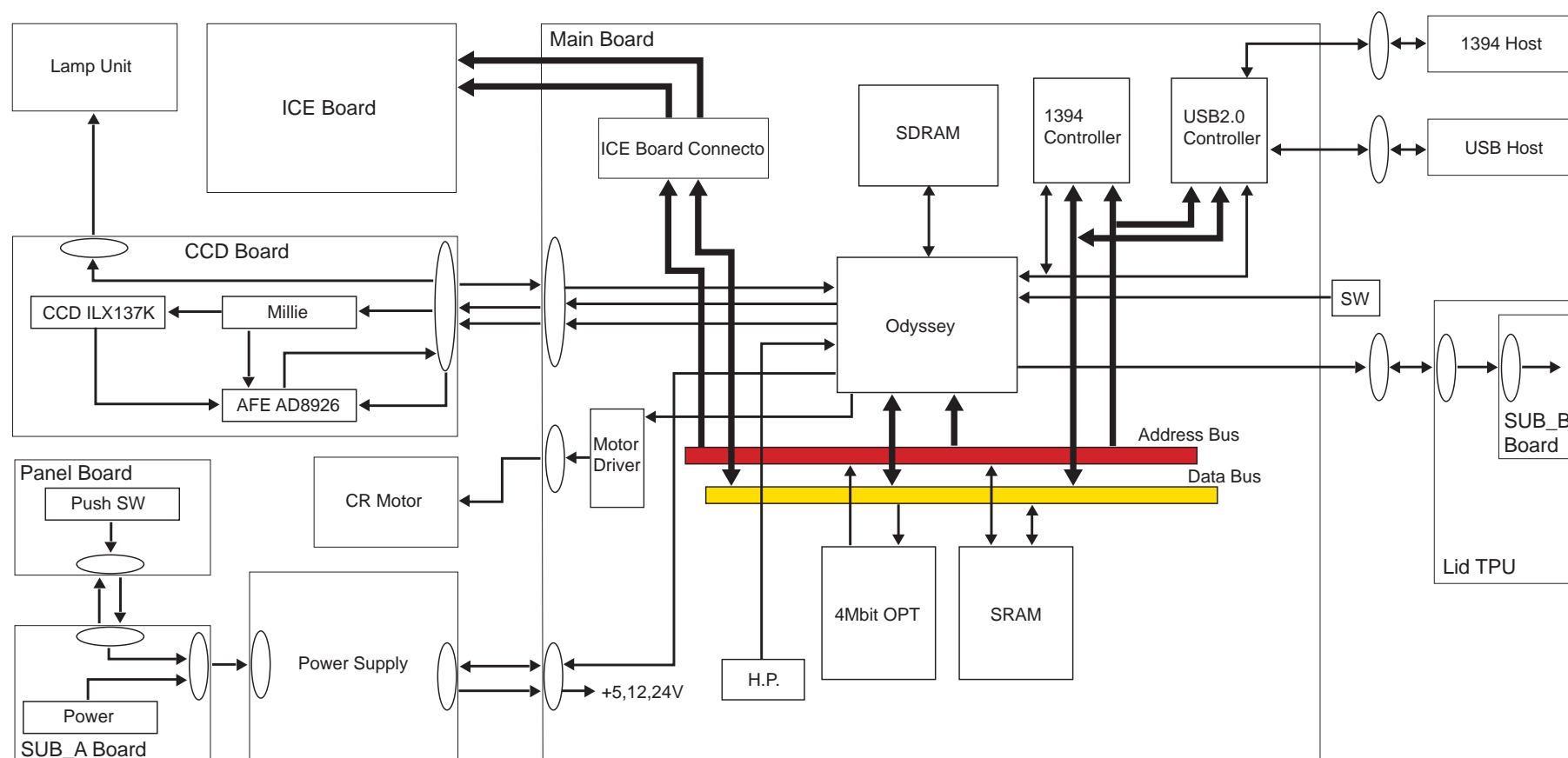


Figure 2-6. Control Circuit Block Diagram

2.3.2 Image Processing Operations

The following section describes the flow of scanned image processing in the order that the operations are carried out.

1. CCD circuit board (CCD image sensor)
 - Photoelectric transfer processing (conversion of light reflected from the document surface [optical energy] into an electrical charge [electrical energy])
 - Amplification processing
2. Main circuit board (scanned image data processing)
 - A/D conversion processing (conversion of scanned image data comprising analog electrical signals into digital signals)
 - Shading correction processing (scanned data correction according to white and black benchmarks)
 - Other image correction processing (such as gamma correction, color correction and halftone correction, carried out based on settings from host)
3. The above processing operations are carried out, and finally the scanned image data is output to the host.

CHAPTER

3

TROUBLESHOOTING

3.1 Overview

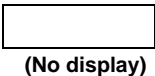
This chapter describes the responses to errors that are detected by the self-diagnosis function and check points for each trouble symptom which are necessary so that troubleshooting can be carried out efficiently when a problem occurs.

3.1.1 Self-Diagnostic Function

This scanner is equipped with a self-diagnosis function that automatically checks the operation of the various scanner components. The problem that are detected by this function and the way they are handled them are given below.

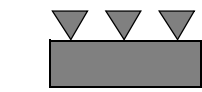
COMMAND ERROR

Table 3-1. Command error

LED display	Cause	Solution
 (No display)	Undefined command or undefined command parameter received.	<ul style="list-style-type: none"> The scanner ignores incorrect commands and incorrect command parameters. (Current settings maintained) The scanner returns a NACK and waits for the next command parameter.
Resetting	The error status is reset when a correct command or command parameter is received.	


INTERFACE ERROR

Table 3-2. Interface error

LED display	Cause	Solution
 (Flashes at high speed)	<ul style="list-style-type: none"> Wrong procedure is detected in the interface communication. In the case of SCSI, a transmission is frozen more than 30 seconds except BUS FREE phase. 	Indicator turns off and operation stops.
Resetting	Turn off the scanner and then back on. RST signal in SCSI turns active.	

FATAL ERROR


Table 3-3. Fatal error

LED display	Cause	Solution
 (Flashes at high speed)	<ul style="list-style-type: none"> The lamp is broken. Power is turned on before removing the transportation screw. System break down. 	<ul style="list-style-type: none"> Indicator turns off and operation stops. Status bit 7 is set.
Resetting	(After cause of error is eliminated) <ul style="list-style-type: none"> Turn the power off and then back on again. Send an initialization command (ESC @). Send an SCSI bus device reset message. Assert an SCSI RESET signal. Allowable commands: ESC F, ESC f, ESC @	

OPTION ERROR

(Only when an optional unit is connected and operation is enabled using the control command [ESC e].)

Table 3-4. Option error

LED display	Cause	Solution
 (No display)	Unit cover open, or paper Empty	Status bit 7 is set.
Resetting	Remove the error condition. The error status is reset when a correct command or command parameter is received.	

3.2 Troubleshooting

This section describes the troubleshooting methods for surface errors.

This section describes troubleshooting from the abnormal phenomenon. You can isolate the faulty unit based on the abnormal phenomenon. See the table below to find the closest phenomenon and the corresponding table to refer to.

Table 3-5. Trouble Symptoms, Causes and Reference Flow Charts

Phenomenon	Description	Problem Location	Reference Flow Chart
Scanner does not operate even its power is On.	Scanner does not operate the initializarian.	<ul style="list-style-type: none"> Connector Power supply circuit board Carriage motor Main circuit board 	3-1
Fatal error occurs. (LED flashes red.) The error listed occurs and is not reset by turning power off and back on.	Carriage Unit does not operate.	<ul style="list-style-type: none"> Carriage lock Upper housing Connector Harness Carriage mechanism Carriage motor Main circuit board 	3-2
	The lamp does not light up.	<ul style="list-style-type: none"> Connector Fluorescent lamp Carriage mechanism Main circuit board 	3-3
Scanned image quality problem	Scanned image is unclear.	<ul style="list-style-type: none"> Dirty document platen Dirty mirror CCD Board Main Board 	3-4

Table 3-5. Trouble Symptoms, Causes and Reference Flow Charts

Phenomenon	Description	Problem Location	Reference Flow Chart
"Interface Error" is indicated.	Host does not recognize scanner even when power is turned on.	<ul style="list-style-type: none"> Host support status (USB, IEEE 1394) Twain driver Cable (USB, IEEE 1394) Main circuit board 	3-5
Option TPU does not operate.	Option TPU does not operate.	<ul style="list-style-type: none"> Cable(option) Option main circuit board Scanner main circuit board 	3-6

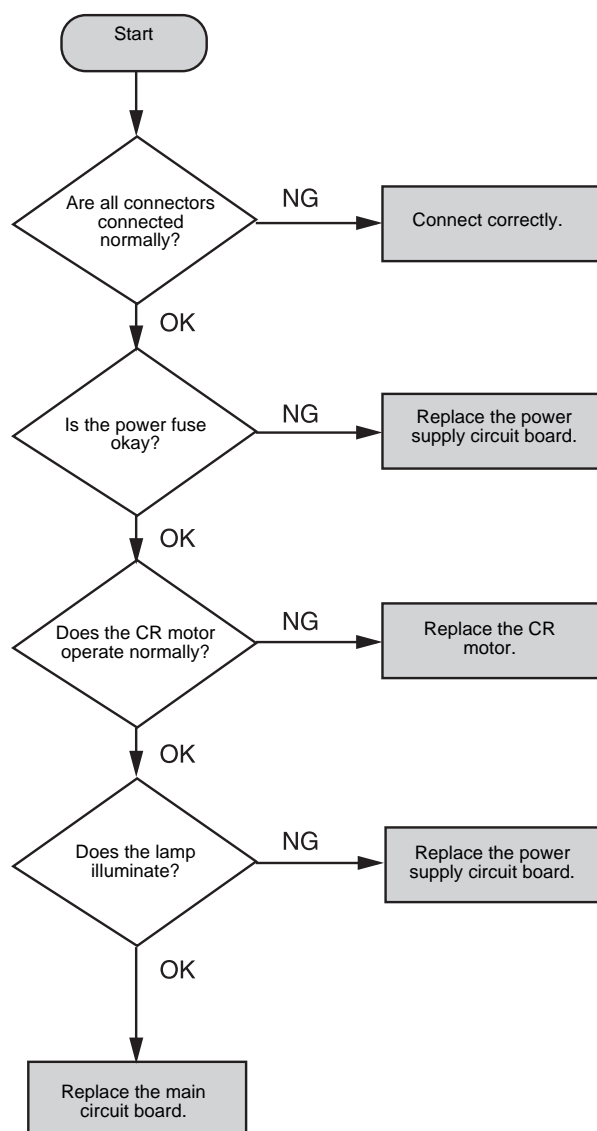


Figure 3-1. Scanner does not operate the initialization.

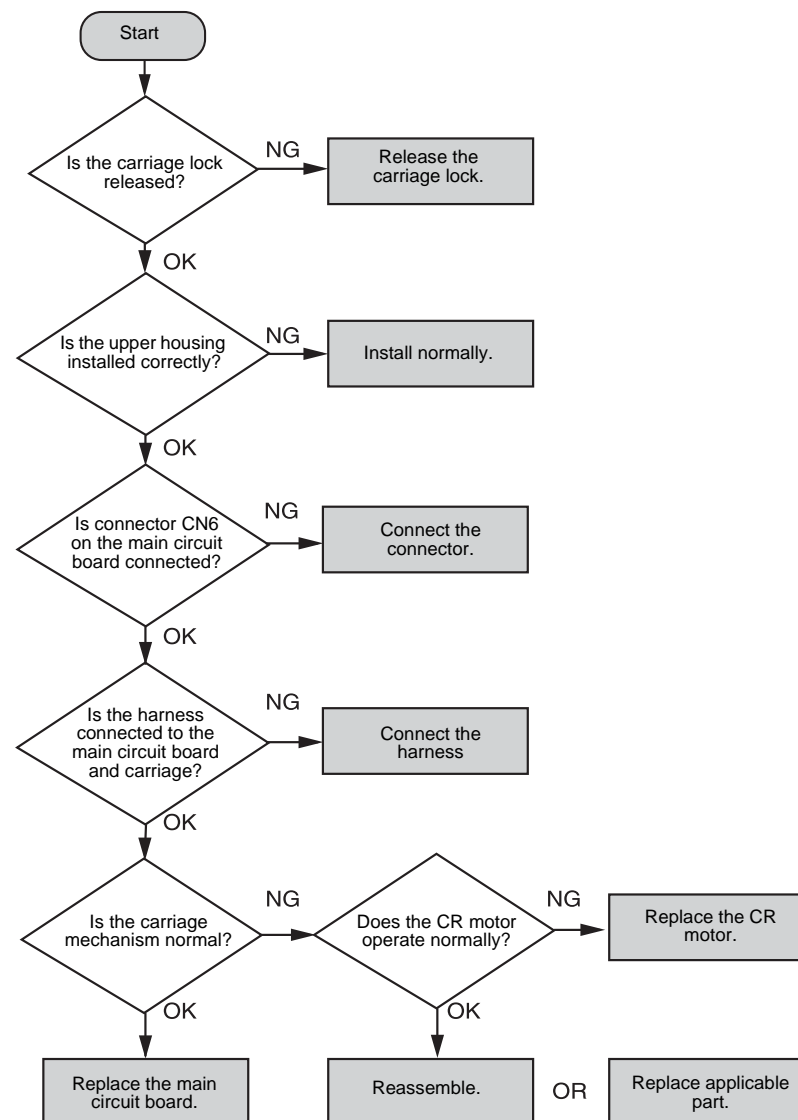


Figure 3-2. Carriage Unit does not operate.

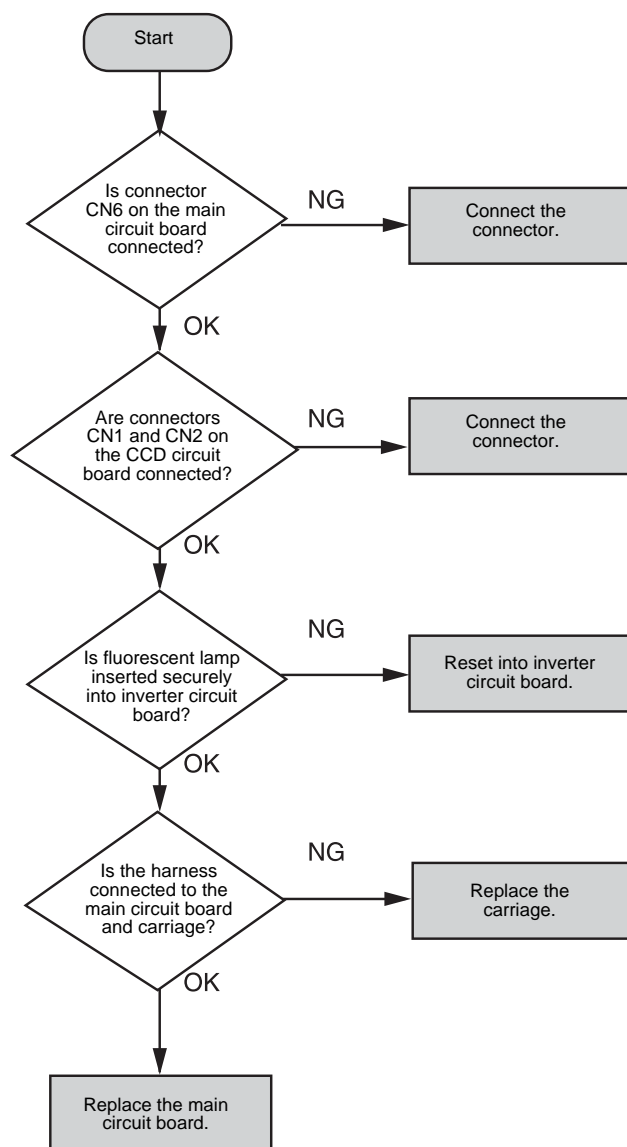


Figure 3-3. The lamp does not light up.

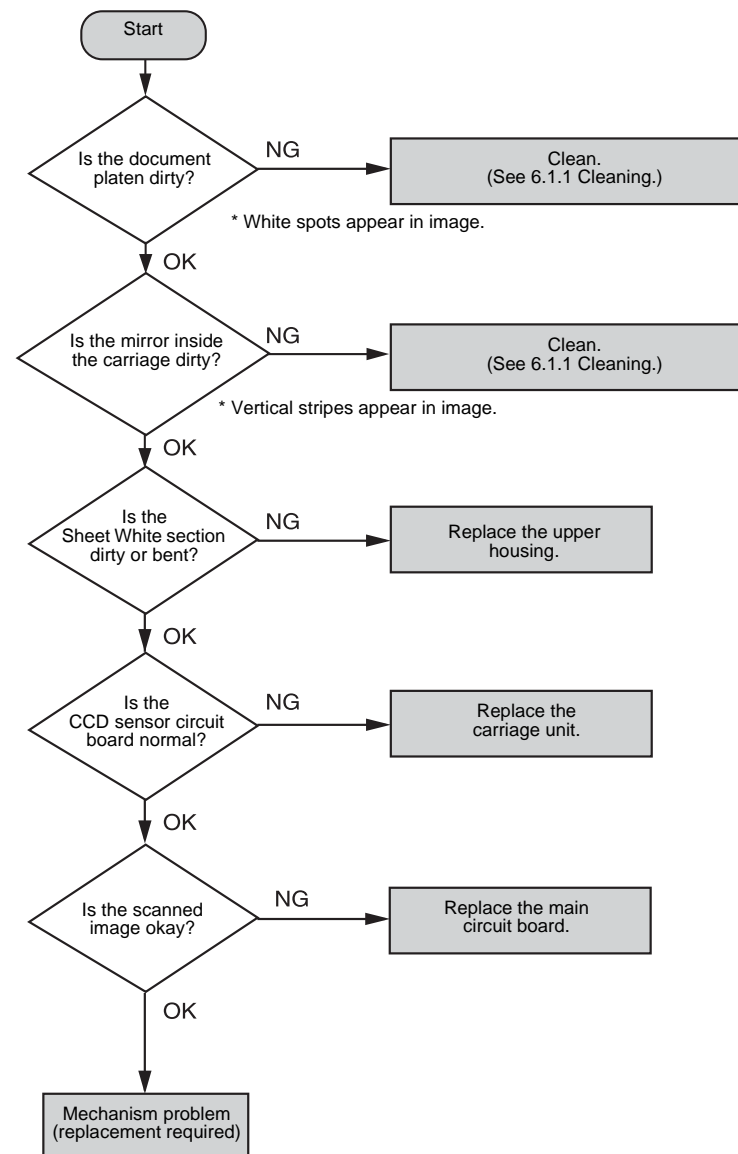


Figure 3-4. Scanned image is unclear.

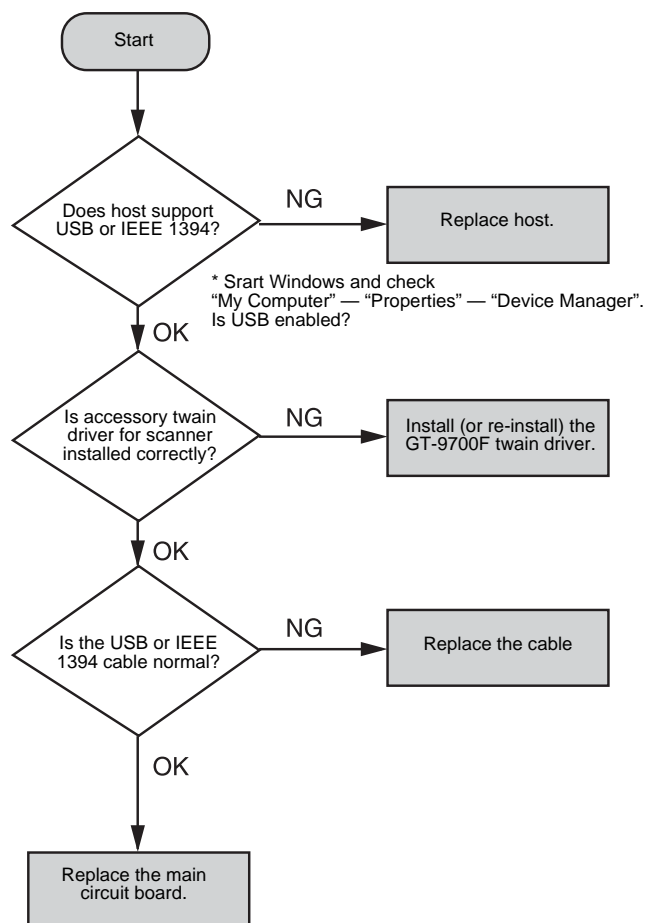


Figure 3-5. Host does not recognize scanner even when power is turned on.

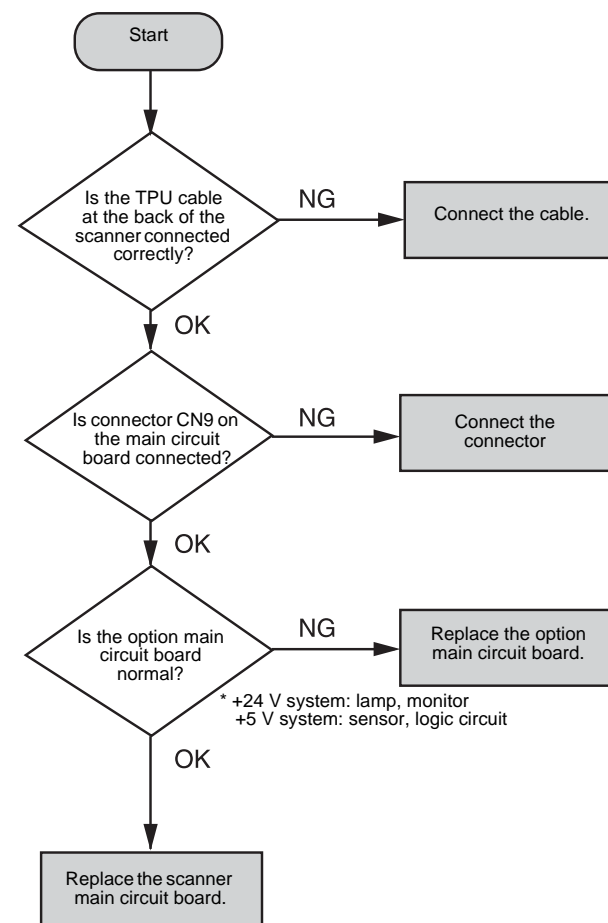


Figure 3-6. Option TPU does not operate.

CHAPTER

4

DISASSEMBLY AND ASSEMBLY

4.1 Overview

This chapter describes the procedures for disassembling and assembling the main components of the scanner. Except where indicated separately, all procedures for re-assembling the disassembled assemblies and components should be carried out by following the disassembly procedures in reverse. If disassembly of assemblies or components that are not mentioned in this chapter are required, please refer to the separate general disassembly diagram.

Be sure to read the Precautions section below before starting any disassembly procedures.

4.1.1 Precaution

Make sure that you read and understand the following warnings and cautions before disassembling or re-assembling the scanner.



- The power supply cable and interface cable should always be disconnected when disassembling and assembling the scanner.
- Before starting disassembly and re-assembly work, make sure that the power supply cable is disconnected from the wall outlet. However, if tasks such as voltage measurement need to be carried out, take care to avoid electric shocks. The procedures given in this manual should be followed closely.
- Be sure to wear gloves when disassembling or assembling any parts of the scanner in order to avoid injury from cuts.
- Use anti-static devices such as wrist straps in order to avoid static electric discharges when touching internal components, in order to protect the microprocessor and other circuits.



- Use only the specified tools when carrying out disassembly, assembly and adjustments.
- Screws should always be tightened to the specified tightening torques.
- The specified adjustments must be carried out when the scanner is disassembled.

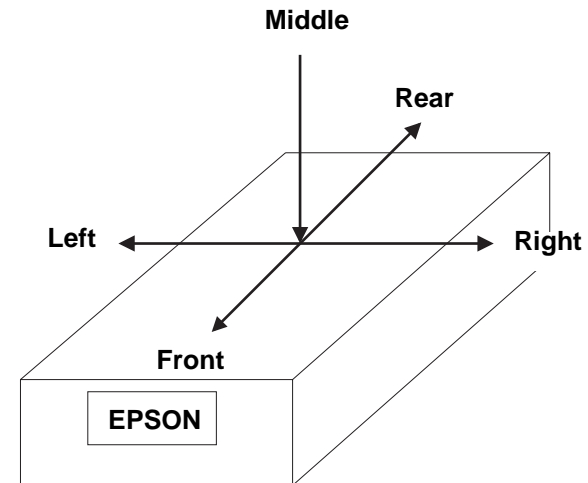


Figure 4-1. Notations

4.1.2 Tools Required







The tools that are required for disassembly and assembly are listed in the table below.

Table 4-1. List of Tools Required

Description	Availability	SE Part No.
(+) Screw Driver No.2	Commercially-available	B743800200
(-) Screw Driver	Commercially-available	B743000100
Tweezers	Commercially-available	B641000100
5 mm box screwdriver	Commercially-available	-
Radio pliers	Commercially-available	B740400100
Socket spanner (5.5mm)	Commercially-available	B741300100

4.1.3 Screws

Table 4-2. List of screws Used

No.	Name and specification	Shape
1	CBP (M3x12)	
2	CBP (M3x8)	
3	CBS (M3x5)	
4	CPS (M3x4)	
5	CP (M3x5)	
6	6N (5)	

4.2 DISASSEMBLY AND ASSEMBLY

This section describes the disassembly and removal procedures for each major component of the scanner in the form of a flow chart. Except where indicated separately, all procedures for re-assembling the disassembled assemblies and components should be carried out by following the disassembly procedures in reverse, and so these procedures are not given here. Refer to the exploded diagram in the Appendix for details on the relationships between the major components. The flow chart below shows the disassembly procedures as a series of steps. When disassembling each unit, refer to the page numbers shown in the chart.

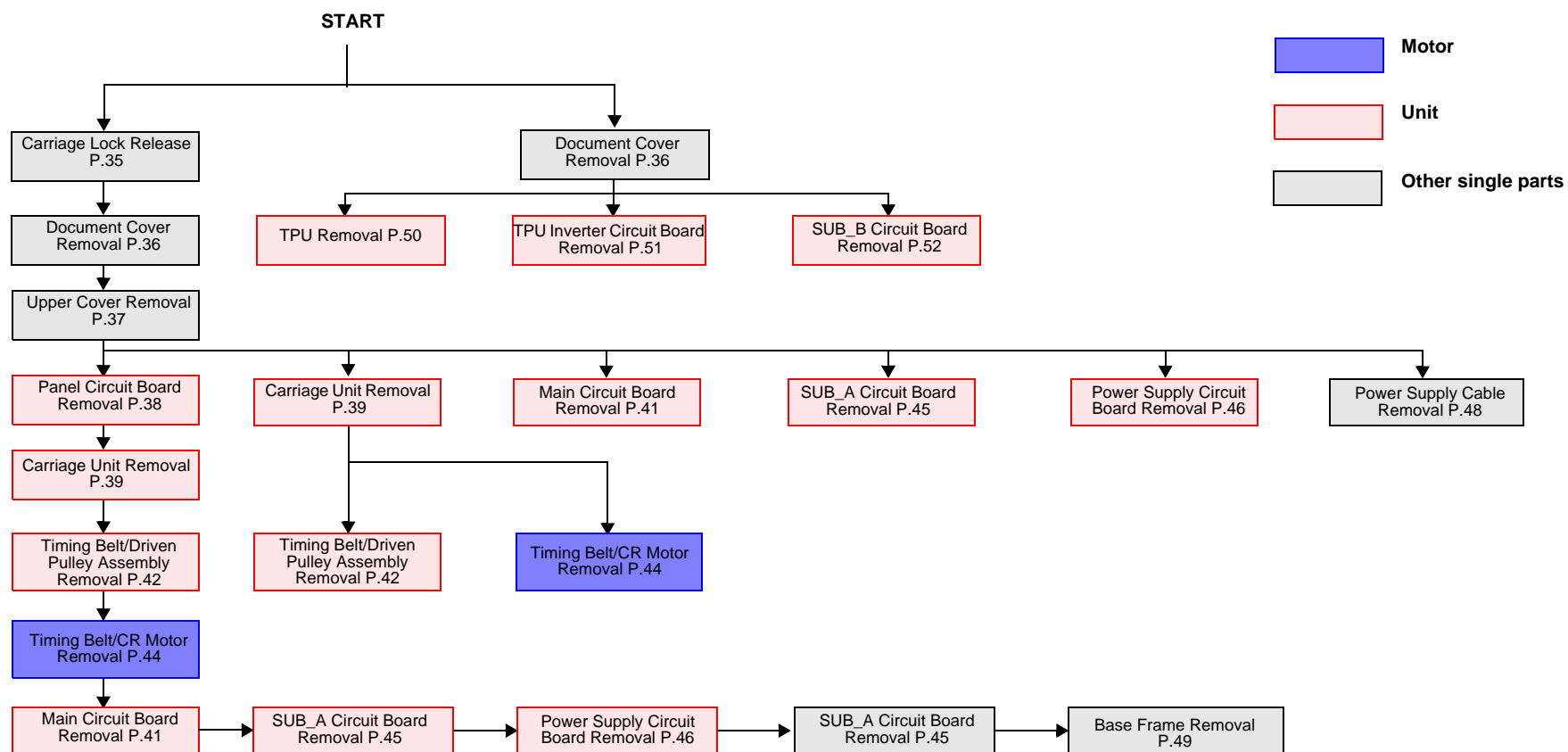
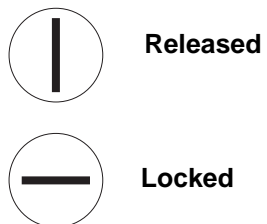


Figure 4-2. Disassembly and Assembly Flow Chart

4.2.1 Carriage Lock Release

1. Release the carriage lock located at left side of the scanner body by using (-) screw driver.

**CAUTION**

When you need to lock the carriage again for transportation, move the carriage to the home position first.

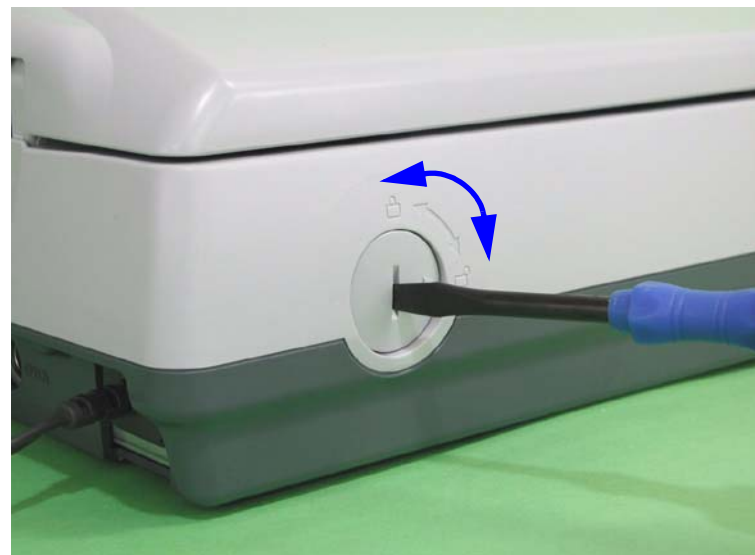


Figure 4-3. Carriage Lock Position

4.2.2 Document Cover Removal

1. Disconnect the TPU connector at the back of the scanner. (See Figure 4-4)
2. Open the document cover. (See Figure 4-5)
3. Hold the document cover with two hands and lift it up to remove it. (See Figure 4-5)

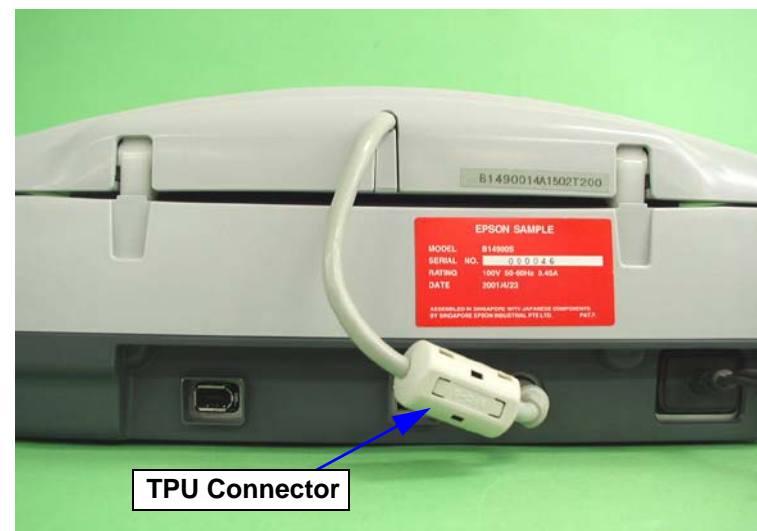


Figure 4-4. Document Cover Removal (1)

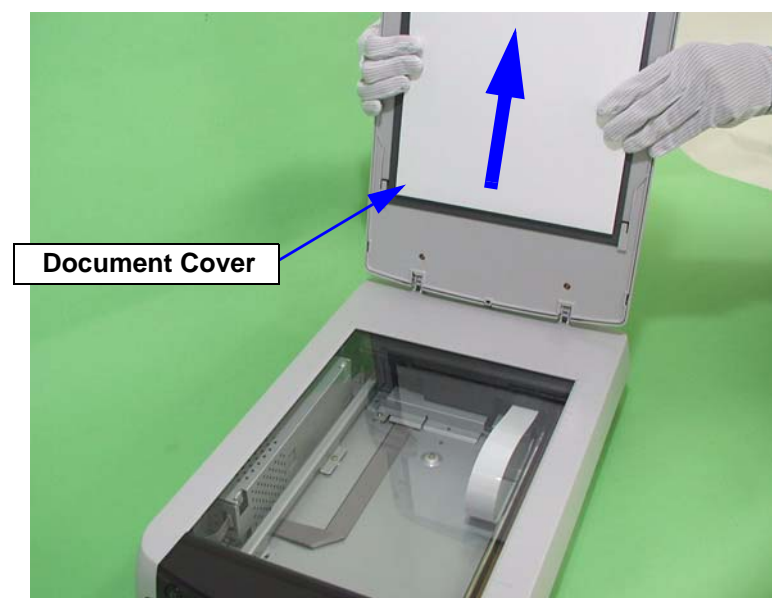


Figure 4-5. Document Cover Removal (2)

4.2.3 Upper Cover Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the two screws (CBP, M3x8) at the back of the scanner. (See Figure 4-6.)
4. While lifting up the upper cover and pulling it forward, disengage the three hooks at the front of the upper cover, and then remove the upper cover.
5. Disconnect the connector (CN1) from the SUB_A circuit board. (See Figure 4-8)

CAUTION

When removing the upper cover, make sure that the hooks are properly disengaged so that the tabs do not get broken.

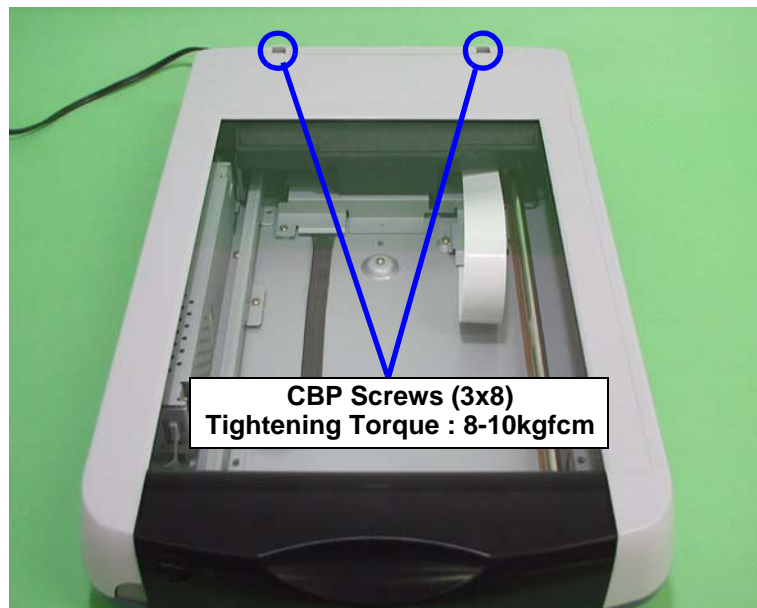


Figure 4-6. Upper Cover Removal (1) - Screw Positions

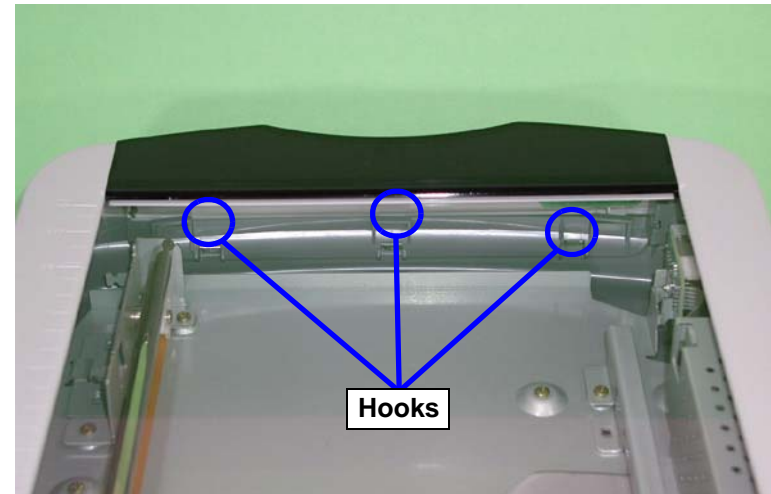


Figure 4-7. Document Cover Removal (2)

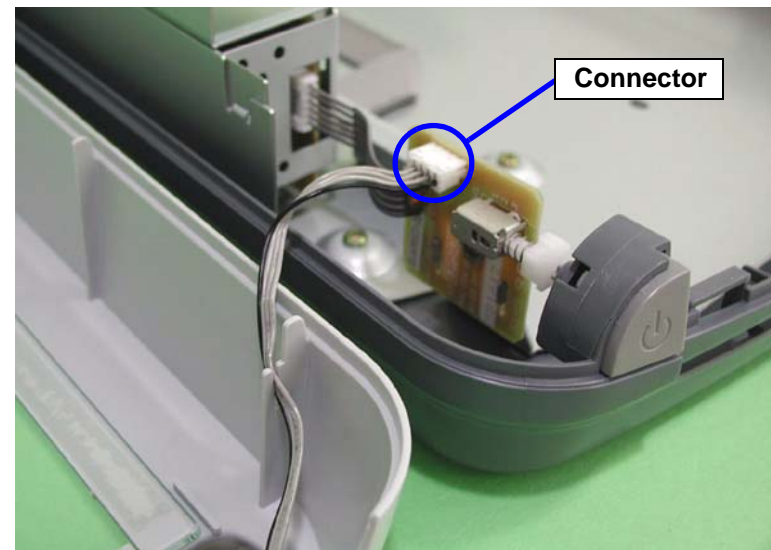


Figure 4-8. Upper Cover Removal (3)

4.2.4 Panel Circuit Board Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section Section 4.2.3.)
4. Remove the two screws (CPS, M3x4), and then remove the panel circuit board. (See Figure 4-9)

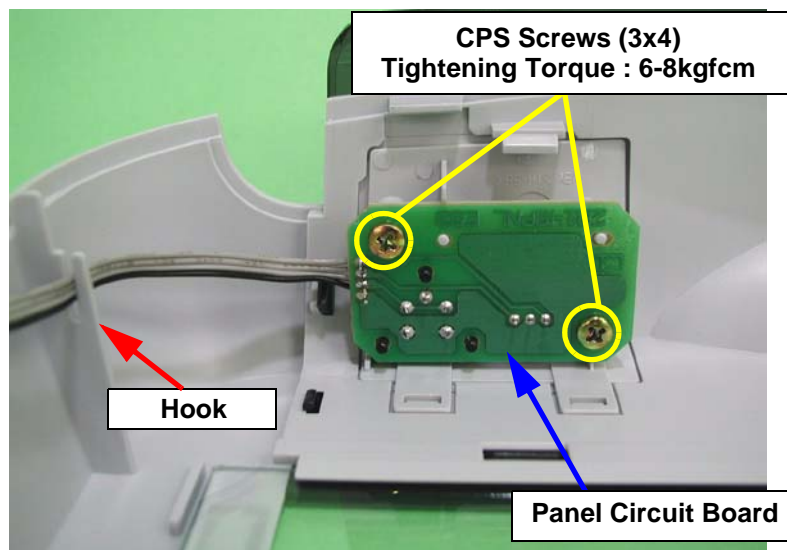


Figure 4-9. Panel Circuit Board Removal

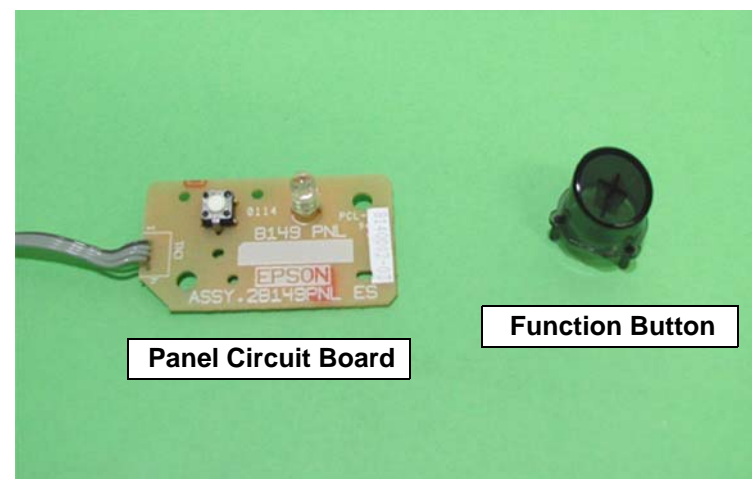


Figure 4-10. Panel Circuit Board and Function Button



Make sure that the direction of the function button is correct.

4.2.5 Carriage Unit Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Remove the hexagon nut (6N, 5). (See Figure 4-11)
5. Use a spanner or similar tool to turn the carriage guide shaft until the notches are aligned, and then remove the carriage guide shaft. (See Figure 4-12)
6. Slide the carriage unit forward by hand, and then lift up the carriage unit and remove the timing belt. (See Figure 4-13)

CAUTION


Never remove the CCD circuit board, otherwise it will cause problems with focus and optical axis misalignment.

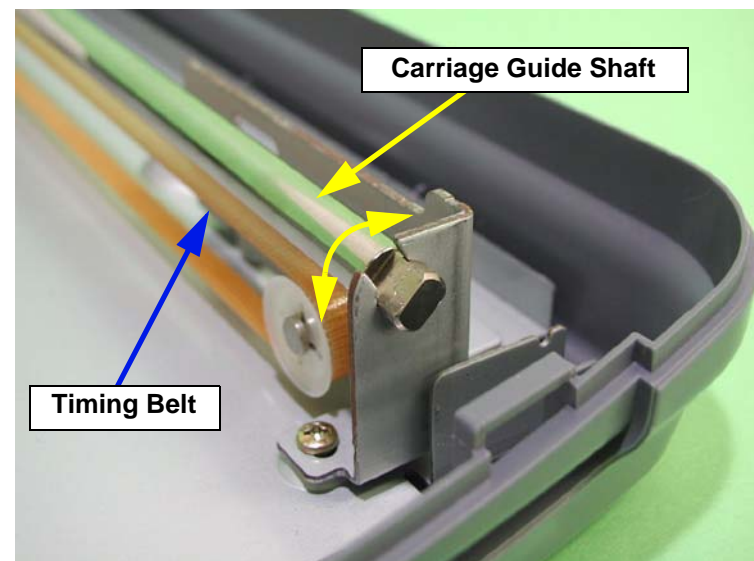


Figure 4-12. Carriage Unit Removal (2)

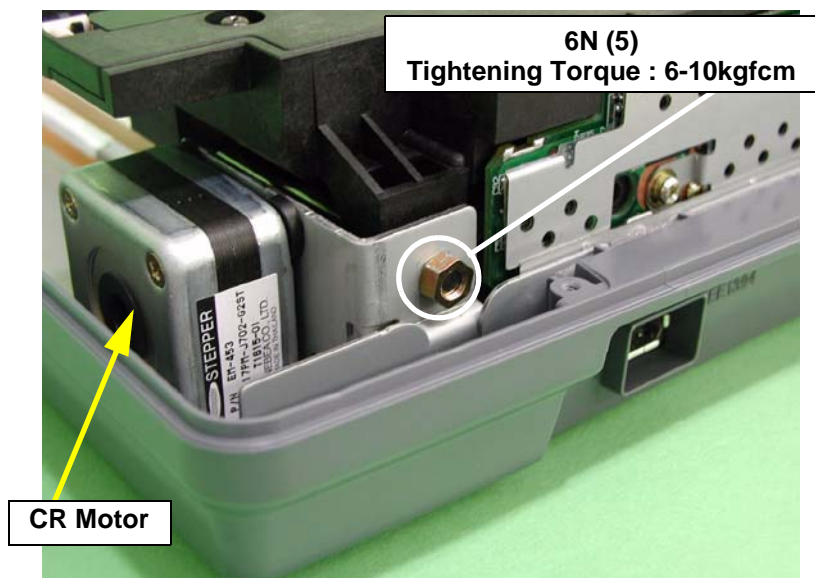


Figure 4-11. Carriage Unit Removal (1)

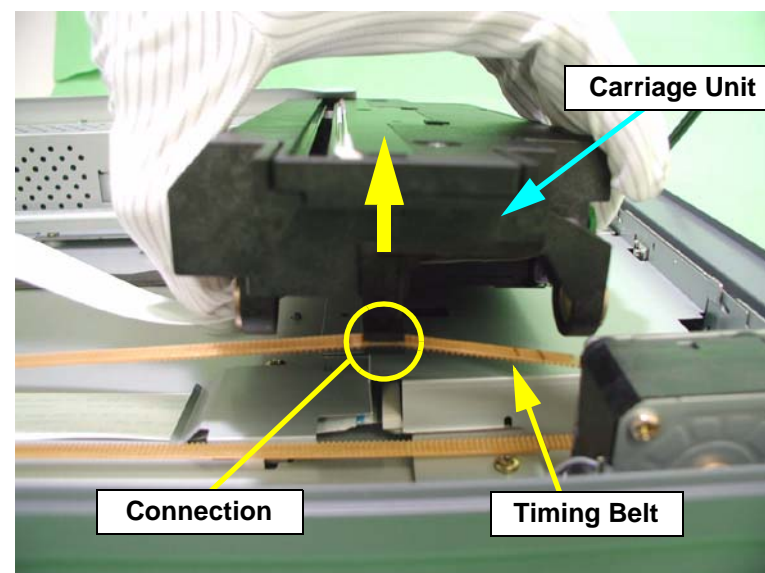


Figure 4-13. Carriage Unit Removal (3)

7. Remove the two screws (CBS, M3x5) and disengage the three hooks, and then remove the main circuit board shield plate. (See Figure 4-14)
8. Disconnect the white FFC from the main circuit board. (See Figure 4-15)
9. Disconnect the white FFC from the ferrite core. (See Figure 4-15)
10. Disconnect the white FFC from the carriage unit. (See Figure 4-16)

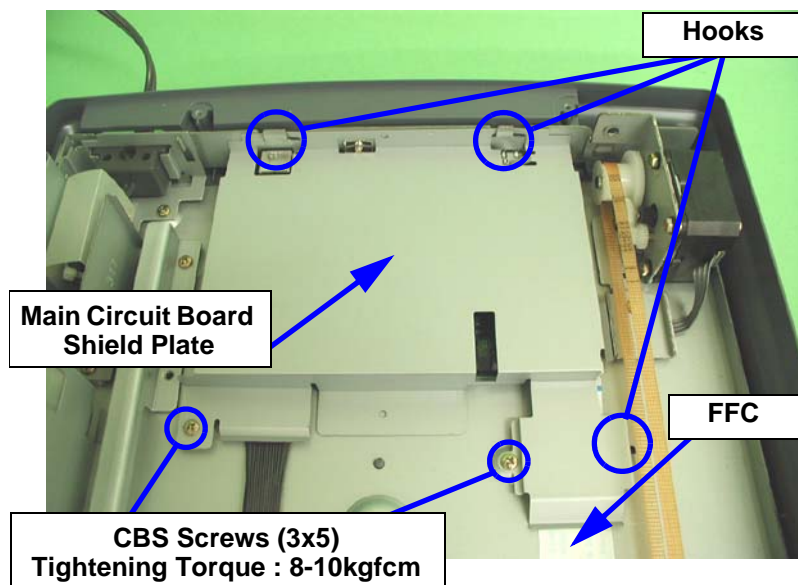


Figure 4-14. Carriage Unit Removal (4)



The FFCs should be attached to the base frame with double-sided tape.

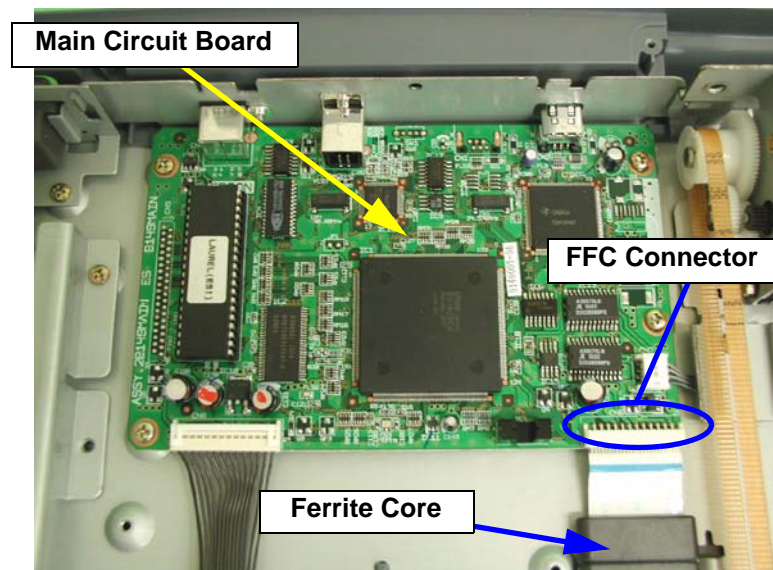


Figure 4-15. Carriage Unit Removal (5)

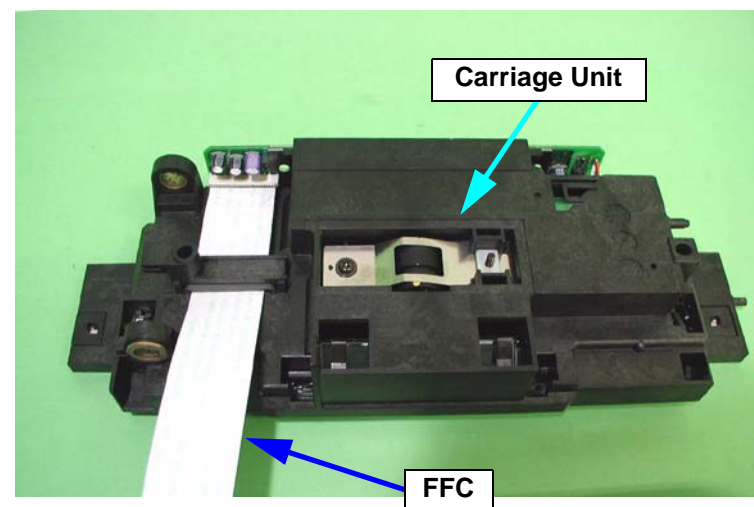


Figure 4-16. Carriage Unit Removal (6)

4.2.6 Main Circuit Board Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Gently slide the carriage unit forward so that the main circuit board shield plate is visible. (See Figure 4-17)
5. Remove the two screws (CBS, M3x5) and disengage the three hooks, and then remove the main circuit board shield plate. (See Figure 4-17)
6. Disconnect the CR motor connector (CN7), carriage FFC connector (CN6) and power supply circuit board connector (CN8) from the main circuit board. (See Figure 4-18)
7. Remove the four screws (CBS, M3x5) from the main circuit board and the two screws (CP, M3x5) at the back of the scanner, and then remove the main circuit board. (See Figure 4-18 and Figure 4-19)

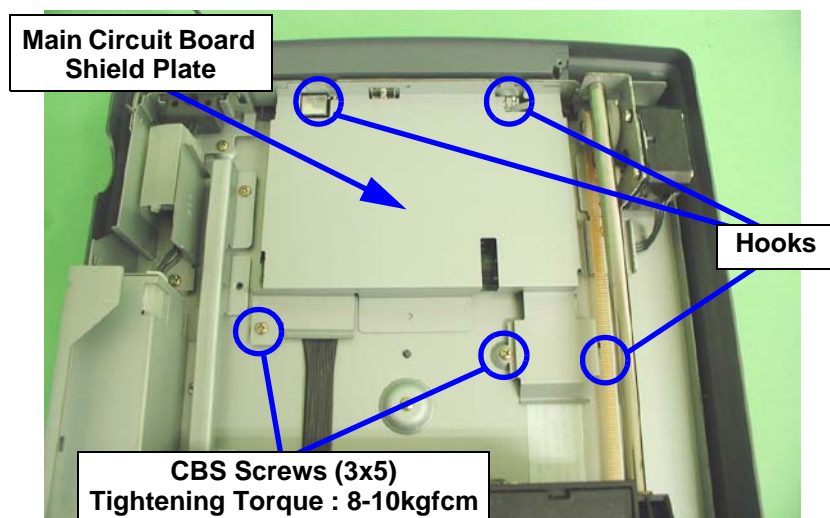


Figure 4-17. Main Circuit Board Removal (1)

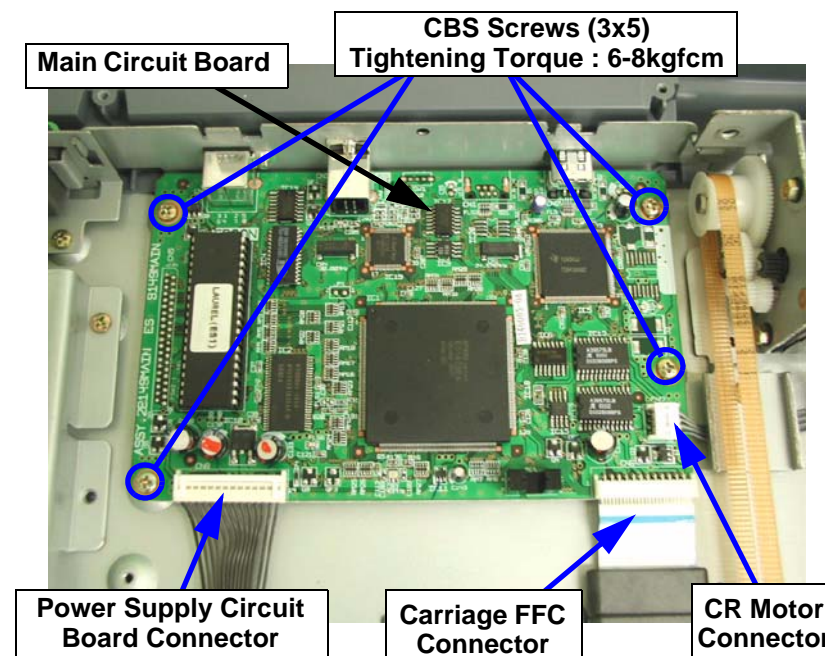


Figure 4-18. Main Circuit Board Removal (2)

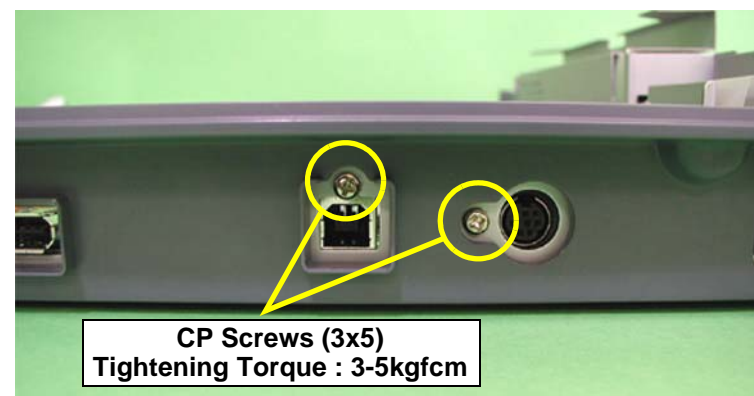


Figure 4-19. Main Circuit Board Removal (3)



Figure 4-20. Main Circuit Board

4.2.7 Timing Belt/Driven Pulley Assembly Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Remove the carriage unit. (See Section 4.2.5.)
5. Remove the two screws (CBS, M3x5). (See Figure 4-21)
6. Remove the driven pulley assembly from the base frame, and then remove the timing belt. (See Figure 4-22)
 1. Remove the flange pulley. (See Figure 4-23)
 2. Remove the driven pulley. (See Figure 4-23)

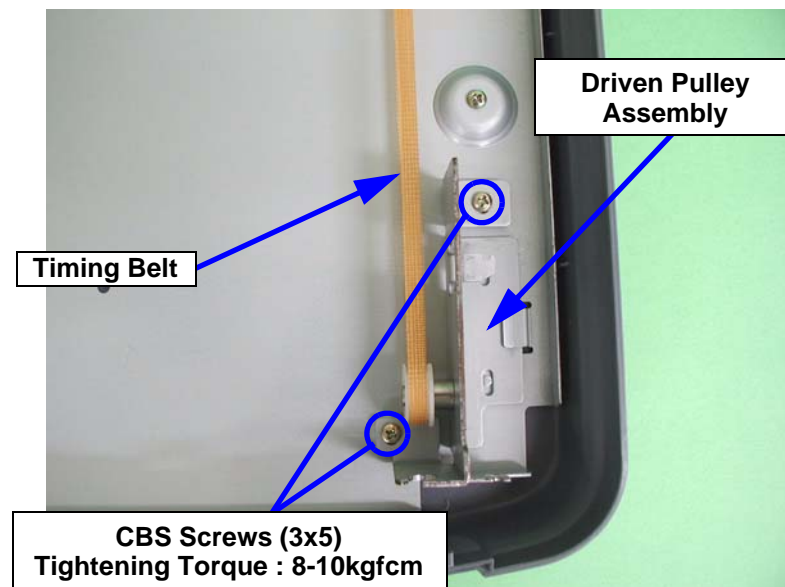


Figure 4-21. Driven Pulley Assembly Removal (1)

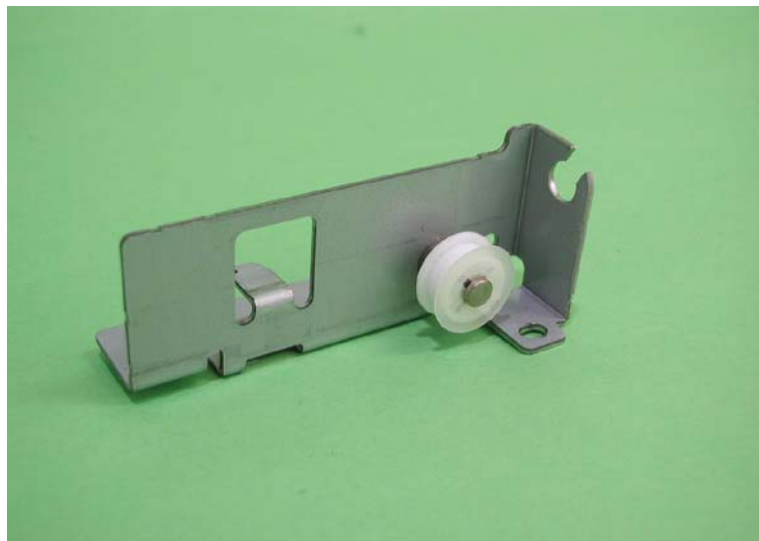


Figure 4-22. Driven Pulley Assembly

CAUTION

After installing the timing belt, be sure to adjust the belt tension.
(See Chapter 5 - Adjustment in this manual.)

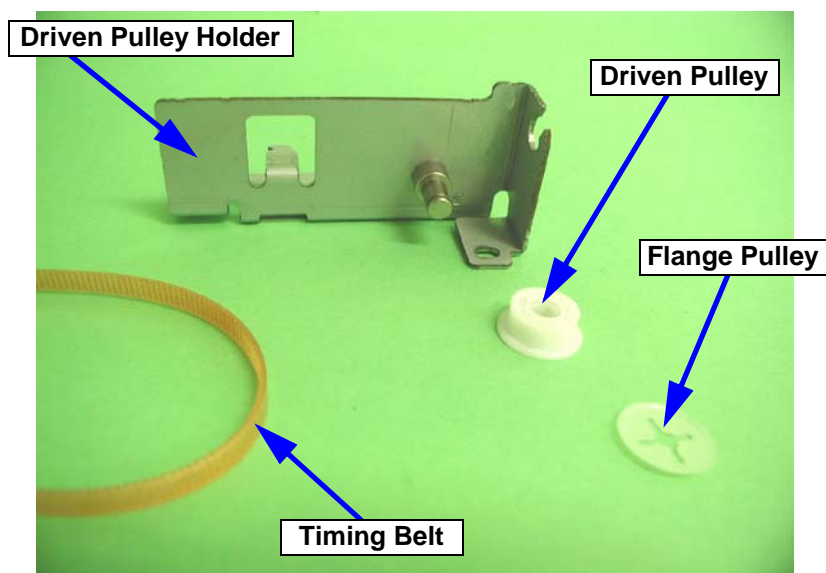


Figure 4-23. Driven Pulley Assembly Removal (2)

4.2.8 Timing Belt/CR Motor Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Remove the carriage unit. (See Section 4.2.5.)
5. Remove the two screws (CBS, M3x5) that are securing the CR motor unit. (See Figure 4-24)
6. Disconnect the CR motor connector (CN7) and disengage the hook, and then remove the CR motor unit. (See Figure 4-25)
 - 1.Remove the flange pulley.
 - 2.Remove the flat washer.
 - 3.Remove idle pulley _A.
 - 4.Remove the idle pulley.
 - 5.Remove the drive pulley.



Pass the CR motor unit cable under the shield plate and then connect it to the main circuit board.

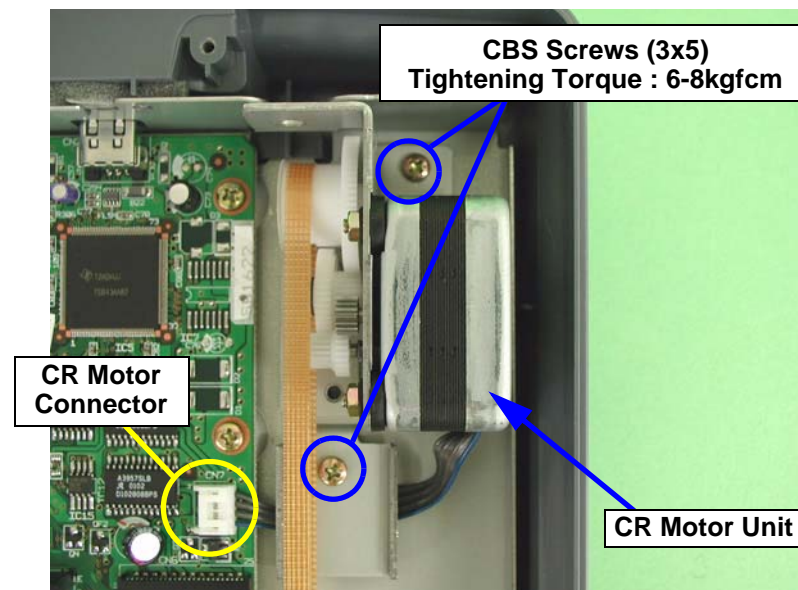


Figure 4-24. CR Motor Removal (1)

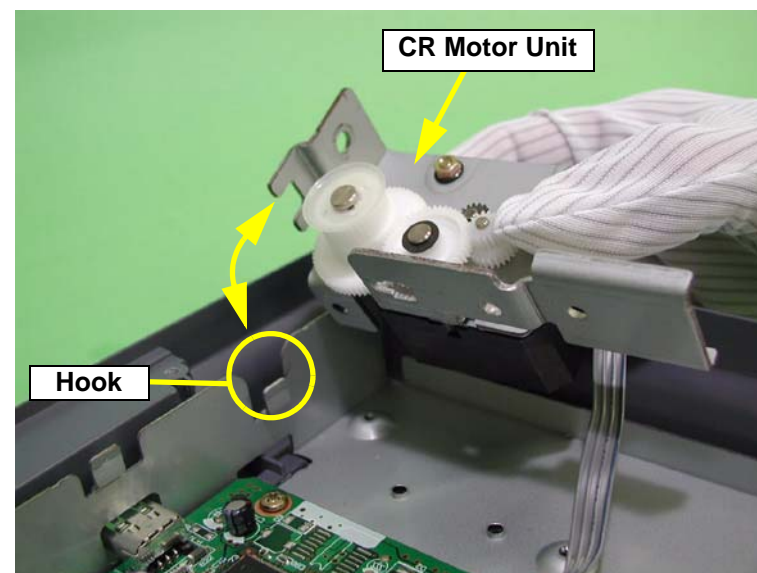


Figure 4-25. CR Motor Removal (2)



Figure 4-26. CR Motor Unit

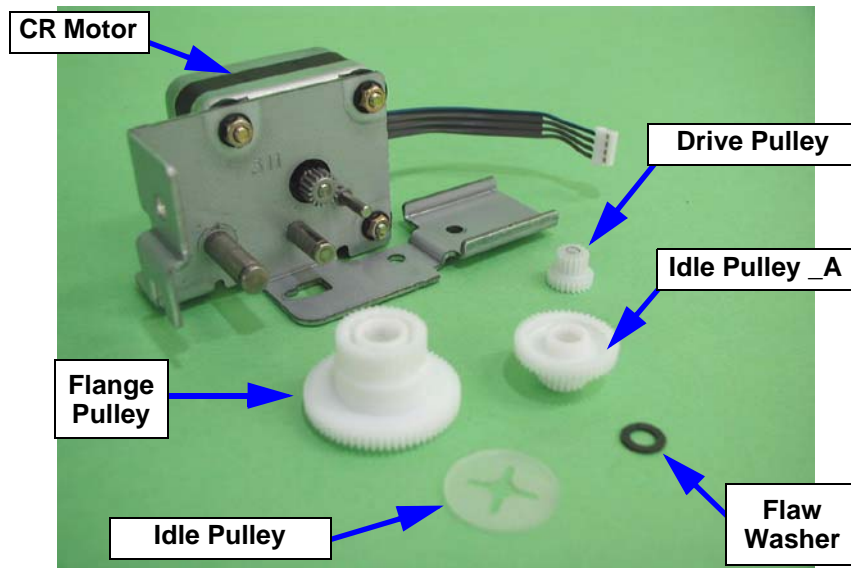


Figure 4-27. CR Motor Removal (3)

4.2.9 SUB_A Circuit Board Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Remove the four screws (CBP, M3x8) from the base frame. (See Figure 4-28)
5. Disconnect the connector (CN102) from the power supply circuit board. (See Figure 4-28)
6. While lifting up the front of the base frame, remove the screw (CBS, M3x5), and then disengage the two hooks and remove the SUB_A circuit board. (See Figure 4-29)

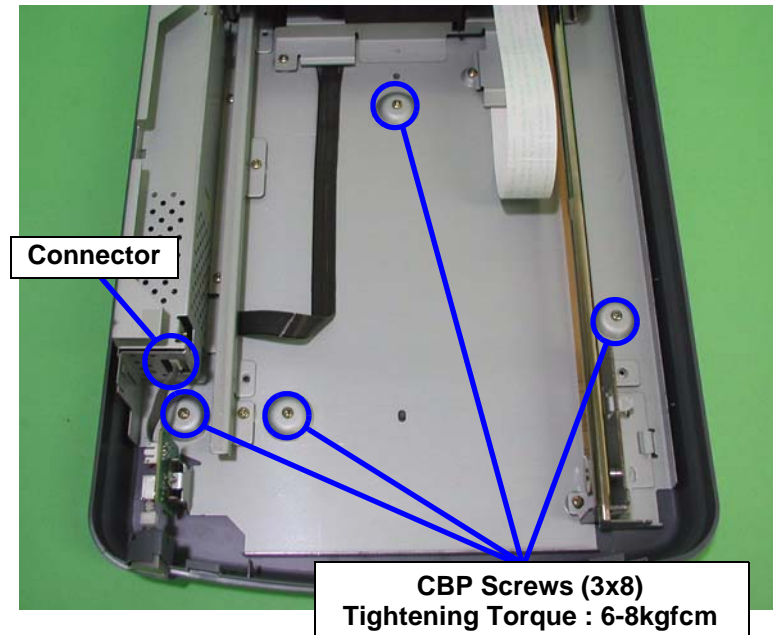


Figure 4-28. SUB_A Circuit Board Removal (1)

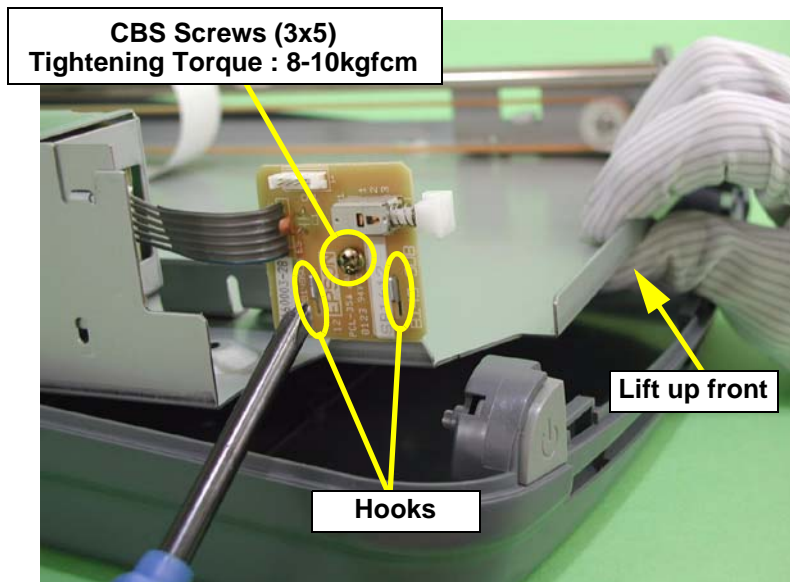


Figure 4-29. SUB_A Circuit Board Removal (2)

4.2.10 Power Supply Circuit Board Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Remove the two screws (CBS, M3x5). (See Figure 4-30)
5. Disengage the two hooks at the side of the scanner, and then remove the power supply circuit board unit. (See Figure 4-31)
6. Disconnect the lock-type AC adapter connector (CN1), SUB_A circuit board connector (CN102) and main circuit board connector (CN101). (See Figure 4-32)
7. Remove the five screws (CBS, M3x5), and then remove the power supply circuit board from the power supply circuit board cover. (See Figure 4-33)
8. Remove the power supply circuit board cover sheet from the power supply circuit board cover.

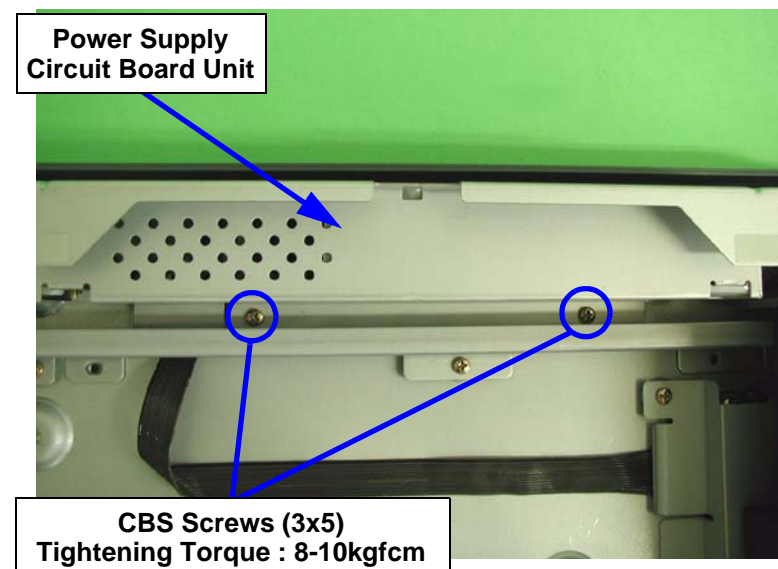


Figure 4-30. Power Supply Circuit Board Removal (1)

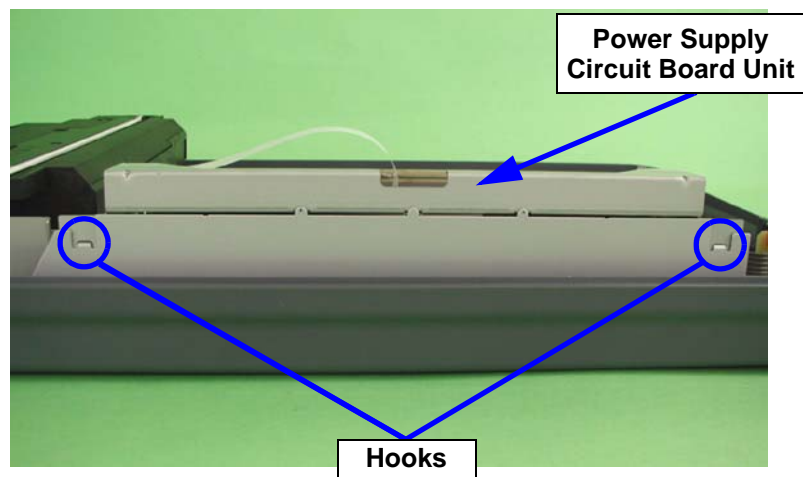


Figure 4-31. Power Supply Circuit Board Removal (2)

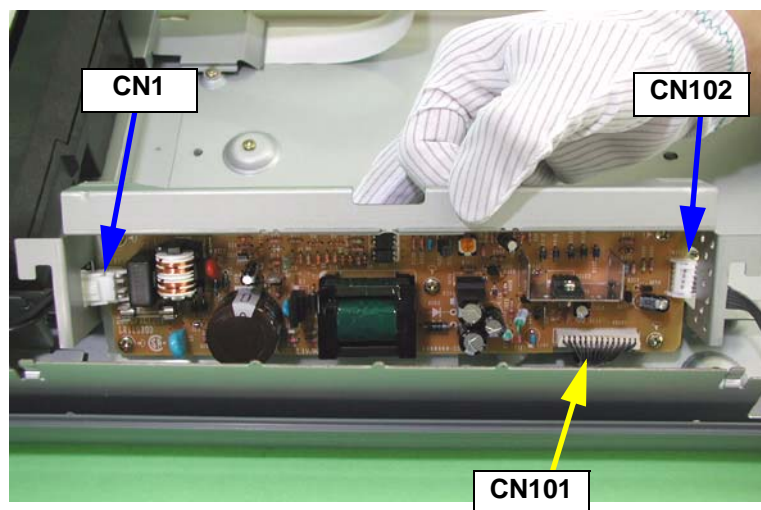


Figure 4-32. Power Supply Circuit Board Removal (3)

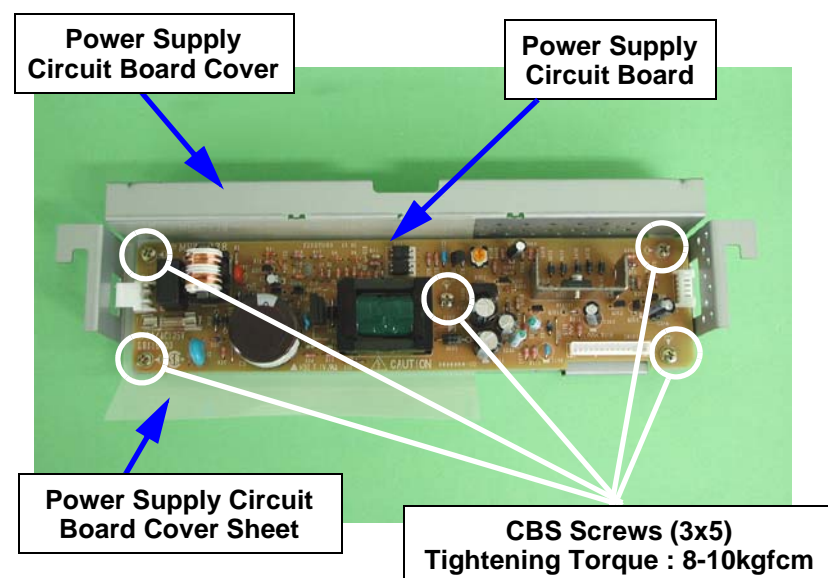


Figure 4-33. Power Supply Circuit Board Removal (4)

4.2.11 Power Supply Cable Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Remove the three screws (CBS, M3x5), and disconnect the lock-type connector (CN1) from the power supply circuit board. (See Figure 4-34)
5. Remove the power supply cable cover. (See Figure 4-34)
6. Disengage the two hooks, and then remove the power supply cable unit. (See Figure 4-35)



- When securing the power supply cable unit, secure the Cover Cover Inlet with the same screws.
- Attach the power supply cable cover to the lower housing with double-sided tape.

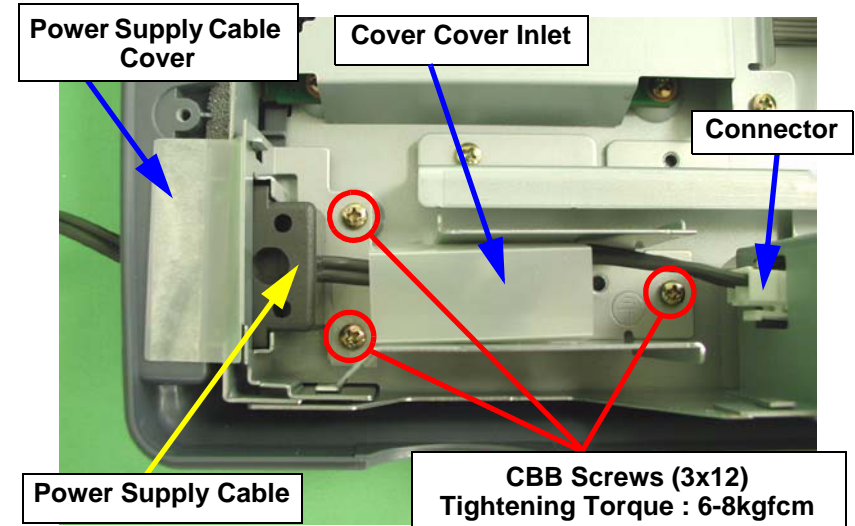


Figure 4-34. Power Supply Cable Removal (1)

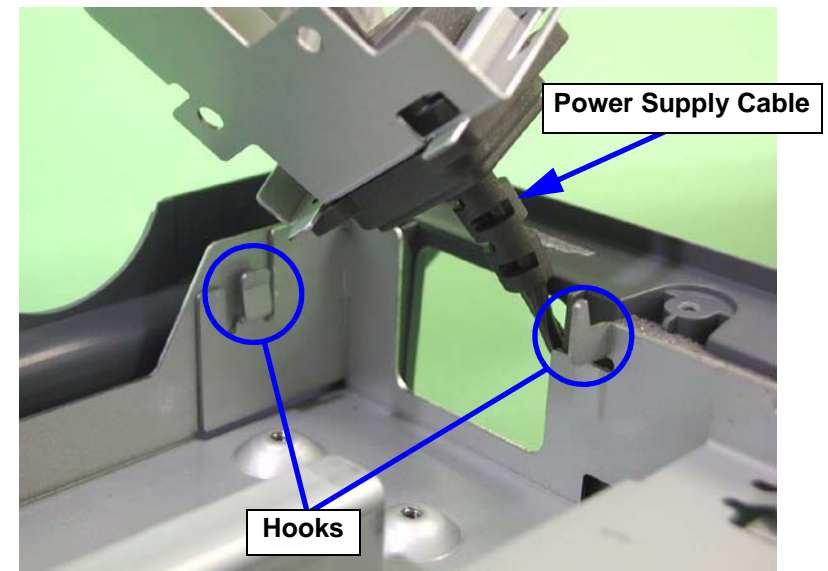


Figure 4-35. Power Supply Cable Removal (2)

4.2.12 Base Frame Removal

1. Release the carriage lock. (See Section 4.2.1.)
2. Remove the document cover. (See Section 4.2.2.)
3. Remove the upper cover. (See Section 4.2.3.)
4. Remove the carriage unit. (See Section 4.2.5.)
5. Remove the main circuit board. (See Section 4.2.6.)
6. Remove the driven pulley. (See Section 4.2.7.)
7. Remove the CR motor. (See Section 4.2.8.)
8. Remove the power supply circuit board. (See Section 4.2.10.)
9. Disconnect the power supply cable. (See Section 4.2.11.)
10. Remove the SUB_A circuit board. (See Section 4.2.9.)
11. Remove the FFC harness ferrite core.
12. Remove the three screws (CBS, M3x5), and then remove the carriage rail.
13. Lift up the front of the base frame, disengage the two hooks, and then remove the base frame.

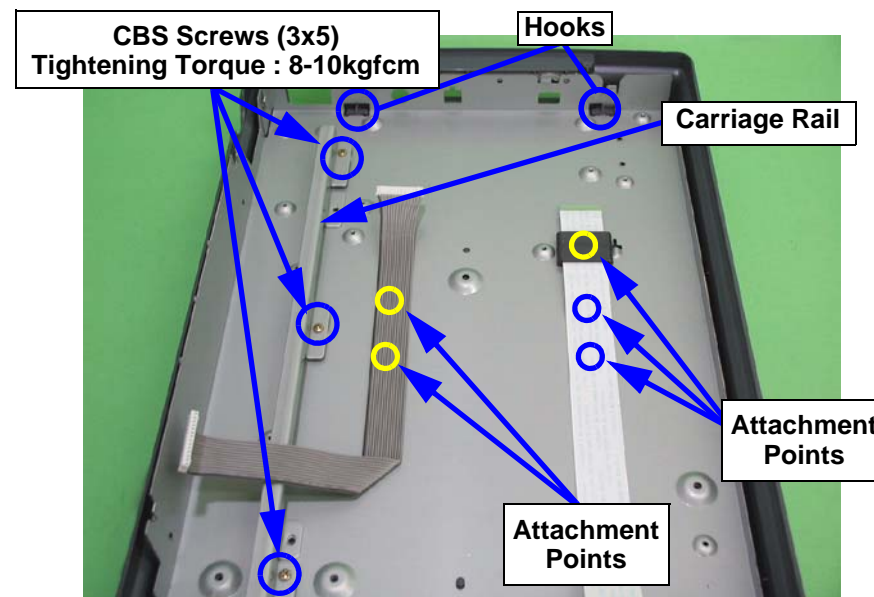


Figure 4-36. Base Frame Removal



■ Attach the cable that connects the power supply circuit board and the main circuit board, the white FFC that connects the carriage unit and the main circuit board and the ferrite core to the base frame with double-sided tape. (See Figure 4-36)

4.2.13 TPU Removal

1. Remove the document cover. (See Section 4.2.2.)
2. Remove the two screws (CBP, M3x12) and the two screws (CBP, M3x8) on the underside of the document cover. (See Figure 4-37)
3. Disengage the eight hooks, and then remove the TPU lower housing. (Insert a (-) screwdriver or similar and lift up.) (See Figure 4-37 and Figure 4-38)
4. Remove the two screws (CBP, M3x8), and then remove the presser plate. (See Figure 4-39)
5. Disconnect the connector (CN2) from the inverter circuit board. (See Figure 4-39)
6. Disconnect the cable from the hook, and then disengage the two hooks and remove the TPU. (See Figure 4-39 and Figure 4-40)

CAUTION


When removing the TPU, the fluorescent lamp inside it may break if the TPU is held by the edgers, so always hold it at the middle. (See Figure 4-40)

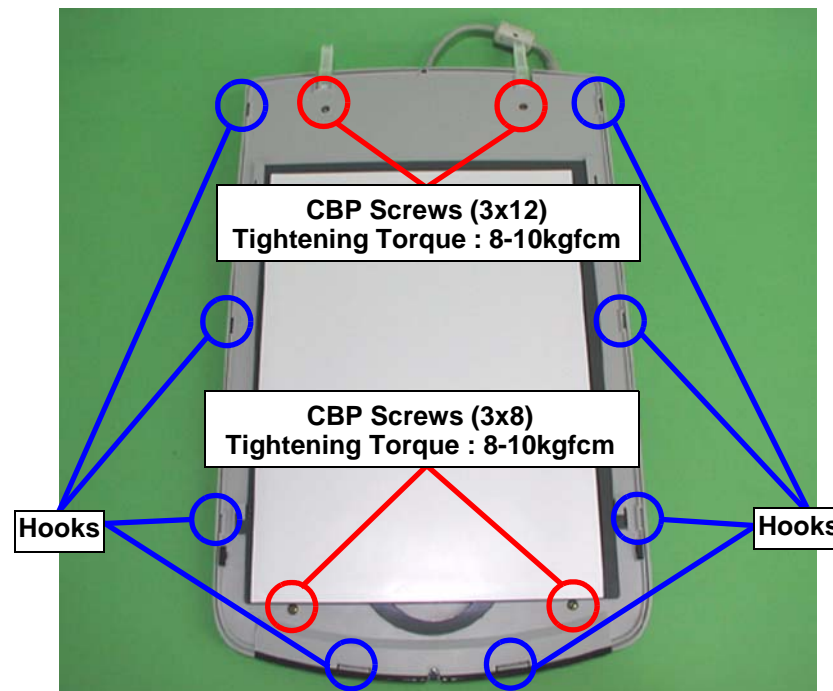


Figure 4-37. TPU Removal (1)

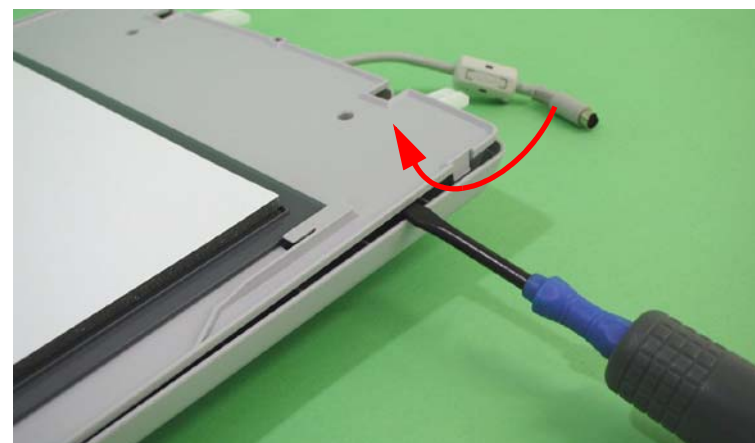


Figure 4-38. TPU Removal (2)

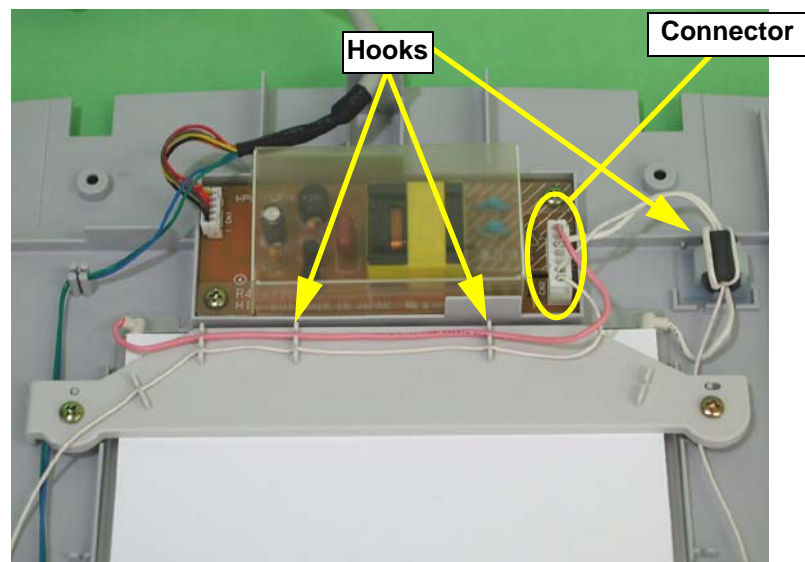


Figure 4-39. TPU Removal (3)

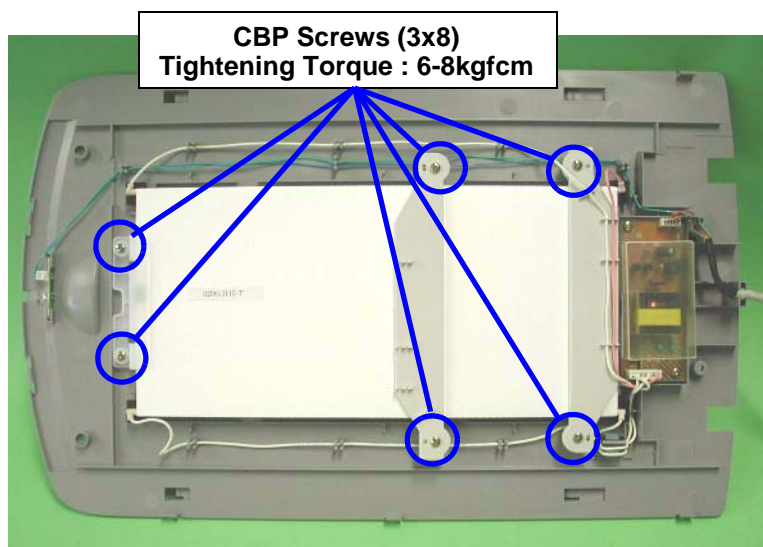


Figure 4-40. TPU Removal (4)

4.2.14 TPU Inverter Circuit Board Removal

1. Carry out steps 1 to 3 in "TPU Removal". (See Section 4.2.13.)
2. Remove the two screws (CBP, M3x8) and disconnect the connectors (CN1 and CN2), and then remove the TPU inverter circuit board unit. (See Figure 4-41)

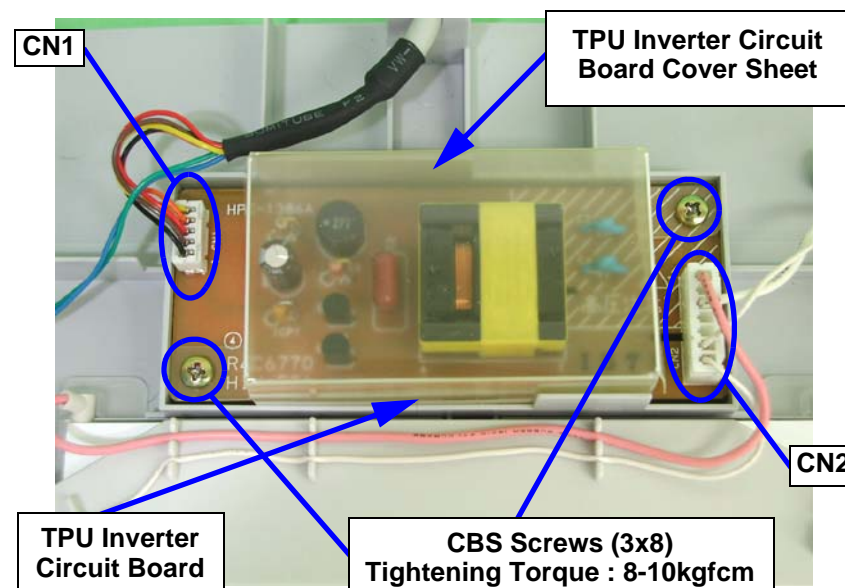


Figure 4-41. TPU Inverter Circuit Board Removal

4.2.15 SUB_B Circuit Board Removal

1. Carry out steps 1 to 3 in "TPU Removal". (See Section 4.2.13.)
2. Disconnect the connector (CN1), and then remove the SUB_B circuit board. (See Figure 4-42)

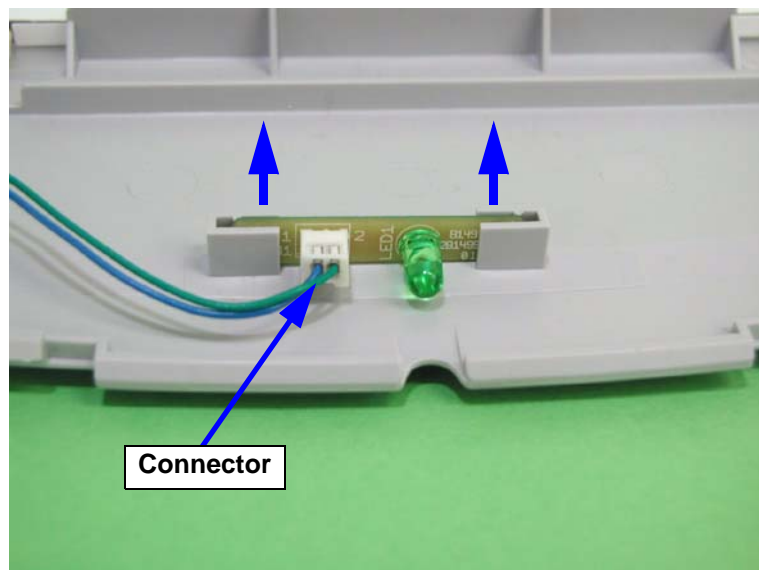


Figure 4-42. SUB_B Circuit Board Removal

CHAPTER

5

ADJUSTMENT

5.1 Adjustment Outline

This section describes the adjustment procedures necessary after replacing certain parts and explains how to perform those adjustment procedures.

5.1.1 Adjustment Tool

Table 5-1 shows adjustment tool for Perfection 2450 Photo.

Table 5-1. Adjustment Tool

Name	ASP Code	Notes
Tension spring 18.4	Exclusive tool Code : 1041401	18.4N

CAUTION



Before using the Tension Tool, make sure to measure the tension of this tool(the spring in the Tension Tool), and the tension tool value becomes $18.4 \pm 1.8\text{N}$. if the value is beyond $18.4 \pm 1.8\text{N}$, replace the spring with a new one.

5.1.2 Required Adjustment

Perfection 2450 Photo require the following adjustment.(Refer to Table 5-2.)

Table 5-2. Required Adjustment

Adjustment Item	Conditions
Timing Belt Tension Adjustment	When you loosen or remove the Timing Belt.

5.1.3 Adjustment

5.1.3.1 Timing Belt Tension Adjustment

1. Ensure the [Holder Assy., Pulley Driven] is securely installed.
2. Install the [Timing Belt].

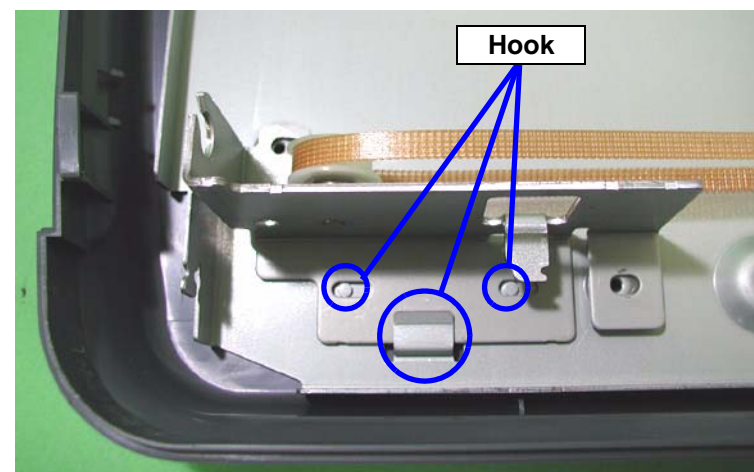


Figure 5-1. Timing Belt Tension Adjustment (1)

3. Attach the tension spring to the two hooks on the driven pulley assembly.
(See Figure 5-2)

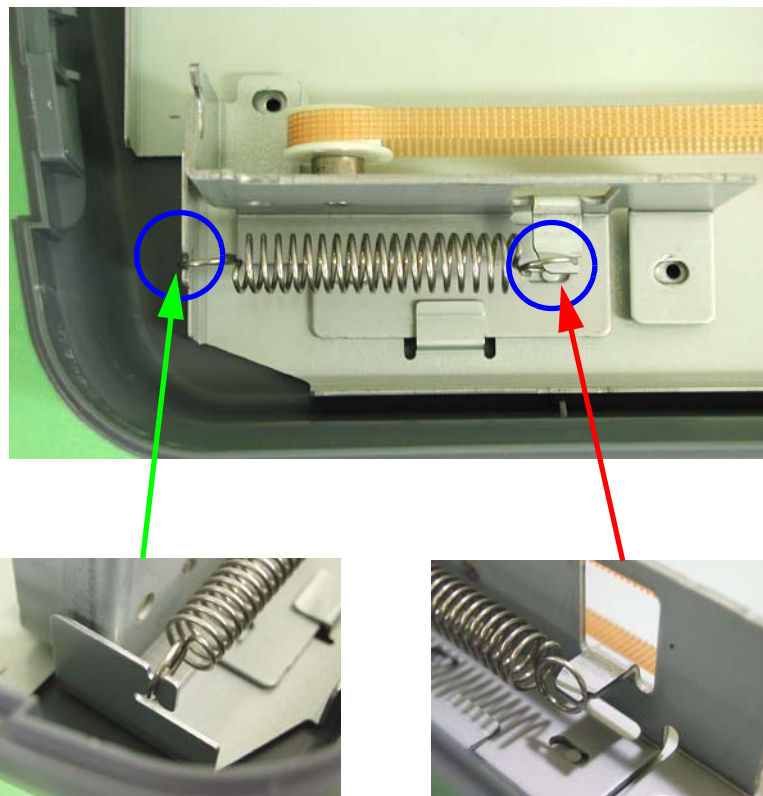


Figure 5-2. Timing Belt Tension Adjustment (2)

4. Install the two screws. (See Figure 5-3)
5. Remove the tension spring.



Figure 5-3. CR Timing Belt Tension Adjustment (3)

CAUTION



Make sure to work operation on a flat table, during the adjustment.

CHAPTER

6

MAINTENANCE

6.1 Overview

This chapter provides information necessary to keep the scanner function in optimum condition constantly and to prevent troubles.

6.1.1 Cleaning

Use a neutral detergent to clean the outside of the scanner. Use a vacuum cleaner to remove any dust and foreign particles from inside the scanner. If the document platen becomes dirty, it can have an adverse effect on image scanning quality, and so it should be treated with particular care. If the platen is dirty, wipe it with a soft cloth that is clean and dry.



Never apply any organic solvent such as thinner and benzine, since there may damage deteriorate plastic and rubber parts.

- ☐ Outer Cases
Wipe stain off with a clean cloth which is moistened with water and then squeezed tightly. To remove sever stain, use neutral detergent.
- ☐ Document Glass
Remove dust and paper debris with a dry clean cloth. If stain is severe or foreign object is stuck, use a cloth absorbed with neutral detergent. If trace is left, wipe it off well with a dry, clean cloth again.
- ☐ Mirror
If there is any dust or paper scraps adhering to the carriage mirror, blow it away with air.

6.1.2 Lubrication

When the carriage unit needs to be replaced, or the operation sound of the carriage movement becomes noisy, it is necessary to apply lubrication. Refer to Table 6-1 for the lubricant that can be used. The lubrication points are shown in Table 6-2 and on the following page.

Table 6-1. Recommended Grease

Type	Name	Supply Quantity	Part No.	Specification
Grease	G-26	40g	B702600001	E*

NOTE: "E" means exclusive product for EPSON. (Not available on the market)

Table 6-2. Lubrication Points

Figure	Lubrication Points	Lubrication
6-1	Driven shaft D of driven pulley assembly holder	G-26 (1x3mm)
6-2	Drive shaft A, drive shaft B and drive shaft C of drive pulley assembly holder.	G-26 (1x3mm)

CAUTION



Excessive lubrication may damage the mechanism part or cause the malfunction of the operation.

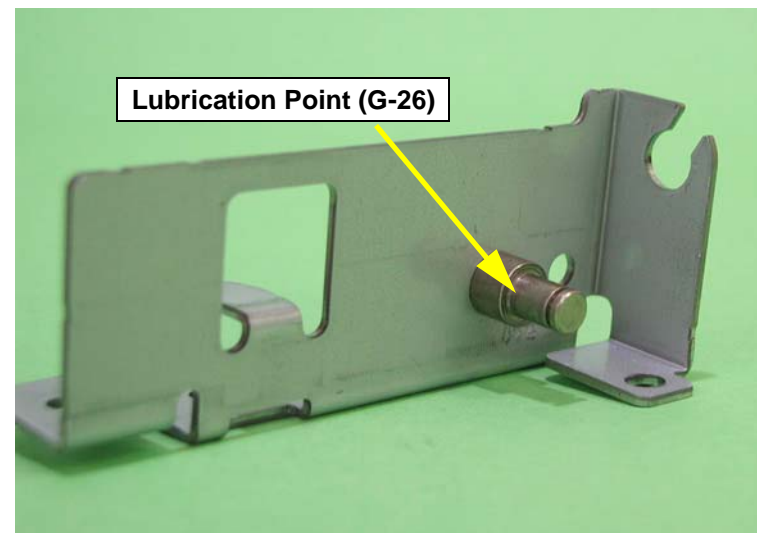


Figure 6-1. Lubrication Points 1

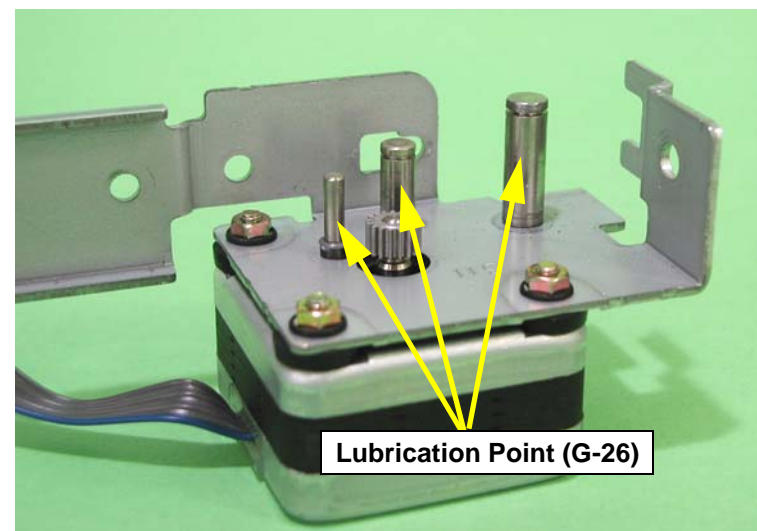


Figure 6-2. Lubrication Points 2

CHAPTER

7

APPENDIX

7.1 Connector Layout

This chapter gives additional information that is useful for carrying out service work.

7.1.1 Interconnection

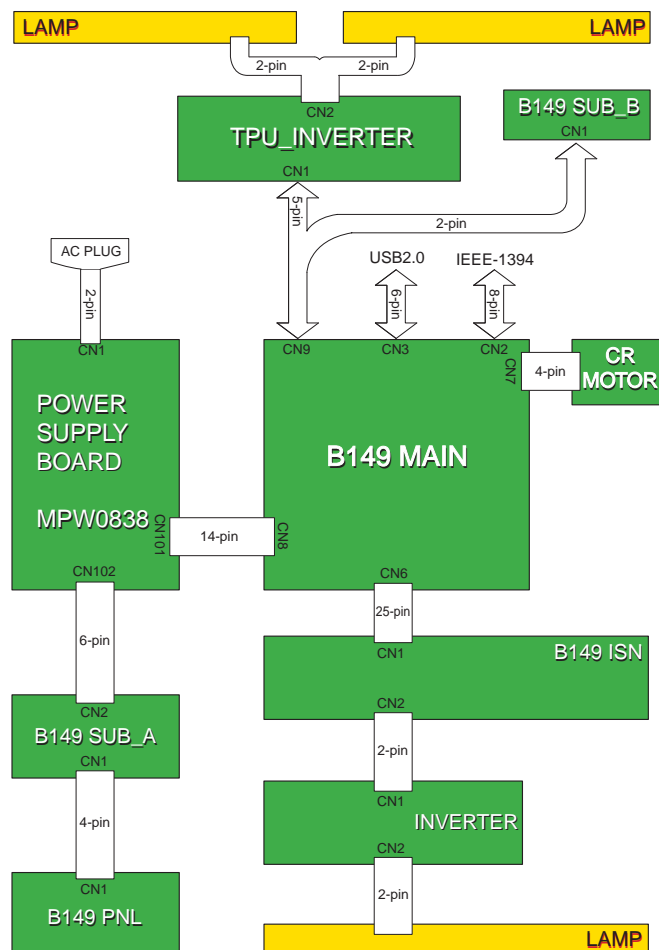


Figure 7-1. Interconnection

7.1.2 Connector Assignment

The connector signal lines for the scanner's main circuit board are as follows.

Table 7-1. Connector Summary

Board	Connector	Connected to	Pin No.	Tables to
Main board (B149 Main)	CN2	IEEE-1394	8	7-2
	CN3	USB2.0	6	7-3
	CN6	CCD board	25	7-4
	CN7	CR motor	4	7-5
	CN8	Power supply board	14	7-6
	CN9	TPU Inverter board	5	7-7
		SUB_B board	2	7-7
Power supply board (MPW0838)	CN1	AC input	2	7-8
	CN101	Main board	14	7-6
	CN102	SUB_A board	6	7-9
SUB_A board (B149 SUB_A)	CN1	Panel board	4	7-10
	CN2	Power supply board	6	7-9
Panel board	CN1	SUB_A board	4	7-10
CCD board (B149 ISN)	CN1	Main board	25	7-4
	CN2	Inverter board	2	7-11
Inverter board	CN1	CCD board	2	7-11
	CN2	Lamp	2	7-12
TPU Inverter board	CN1	Main board	5	7-7
	CN2	Lamp	4	7-13
SUB_B board (B149 SUB_B)	CN1	Main board	2	7-7

7.1.3 Connector

Table 7-2. Main Board CN2

Pin No.	Signal	I/O
1	BUSPOWER	I
2	GP	I/O
3	TPB2–	I/O
4	TPB2	I/O
5	TPA2–	I/O
6	TPA2	I/O
7	CHASSIS_GND	–
8	CHASSIS_GND	–

Table 7-3. Main Board CN3

Pin No.	Signal	I/O
1	VVC	I
2	-Data	I/O
3	+Data	I/O
4	GND	–
01	01	–
02	02	–

Table 7-4. Main Board CN6

Pin No.	Signal	I/O
1	GND	–
2	GND	–
3	12V	O
4	12V	O
5	SCS	O
6	LOAD	O
7	SGK	O
8	3.3V	O
9	SD	O
10	SH	O
11	ADCK	O
12	5V	O
13	5V	O
14	GND	–
15	D0	–
16	D1	–
17	D2	–
18	D3	–
19	D4	–
20	D5	–
21	D6	–
22	D7	–
23	GND	–
24	+24V	O
25	INV_GND	–

Table 7-5. Main Board CN7

Pin No.	Signal	I/O
1	A	O
2	B	O
3	AX	O
4	BX	O

Table 7-6. Main Board CN8

Pin No.	Signal	I/O
1	GND	—
2	OP-LED	I
3	ERR-LED	I
4	PM-SW	I
5	PWA-SW	I
6	PWA-CTAL	O
7	+5	I
8	+5	I
9	GND	I
10	GND	—
11	+24	I
12	+24	I
13	GND	—
14	+12V	I

Table 7-7. Main Board CN9

Pin No.	Signal	I/O
1	GND	—
2	GND	—
3	+24	O
4	LOD	O
5	GND	—
6	RXD	I
7	TXD	O
8	SCK	O
01	01	—
02	02	—
03	03	—

Table 7-8. Power Supply Board CN1

Pin No.	Signal	I/O
1	AC (H)	I
2	AC (L)	I

Table 7-9. Power Supply Board CN102

Pin No.	Signal	I/O
1	OP-LED	O
2	ERR-LED	O
3	PUSH-SW	I
4	SW-SENS	I
5	PSC	O
6	GND	—

Table 7-10. SUB_A Board CN1

Pin No.	Signal	I/O
1	GND	–
2	PUSHSW	I
3	LED_RED	O
4	LED_GREEN	O

Table 7-11. CCD Board CN2

Pin No.	Signal	I/O
1	+24	O
2	INV_GND	–

Table 7-12. Inverter Board CN2

Pin No.	Signal	I/O
1	LAMP	O
2	LAMP	O

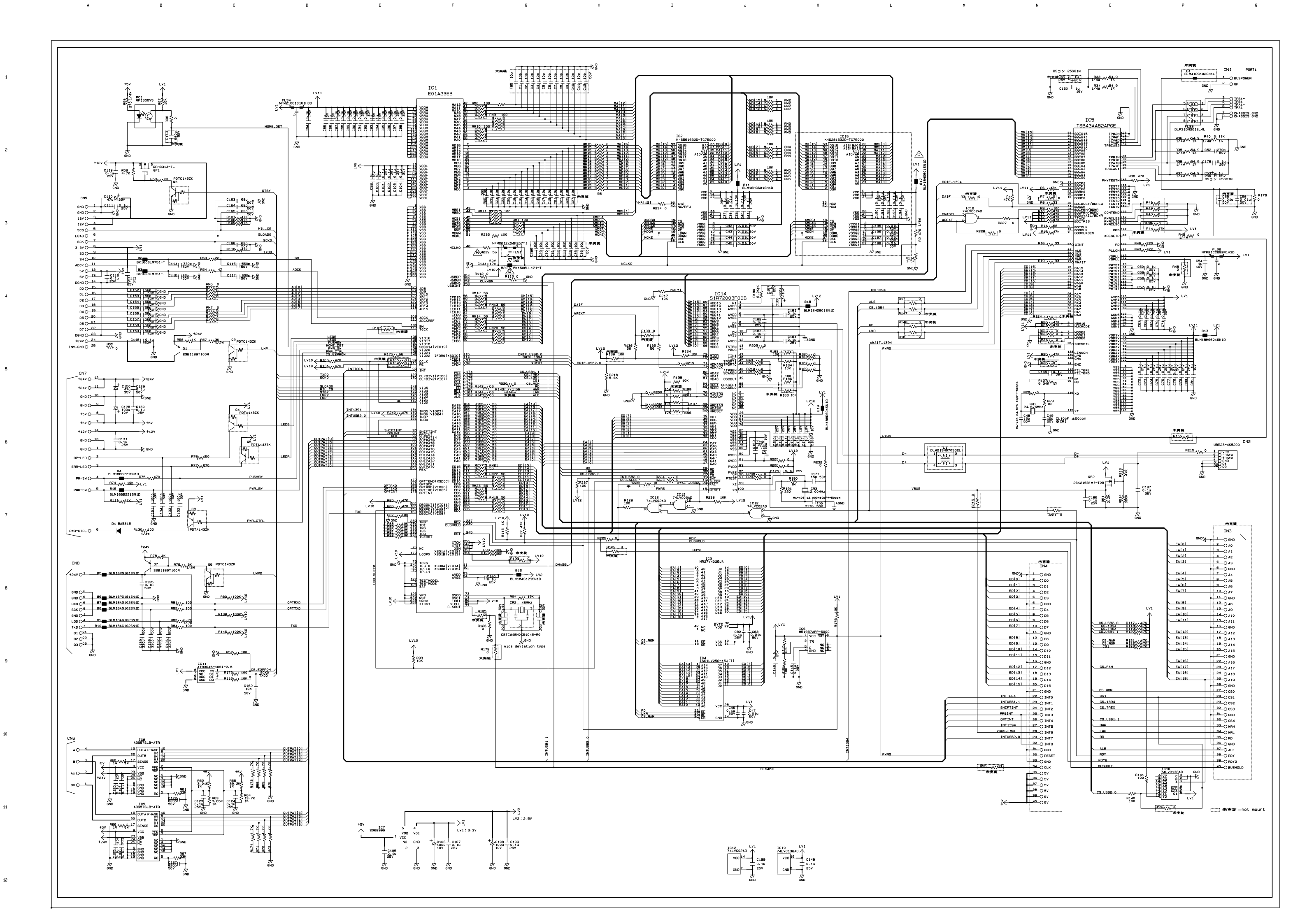
Table 7-13. TPU Inverter Board CN2

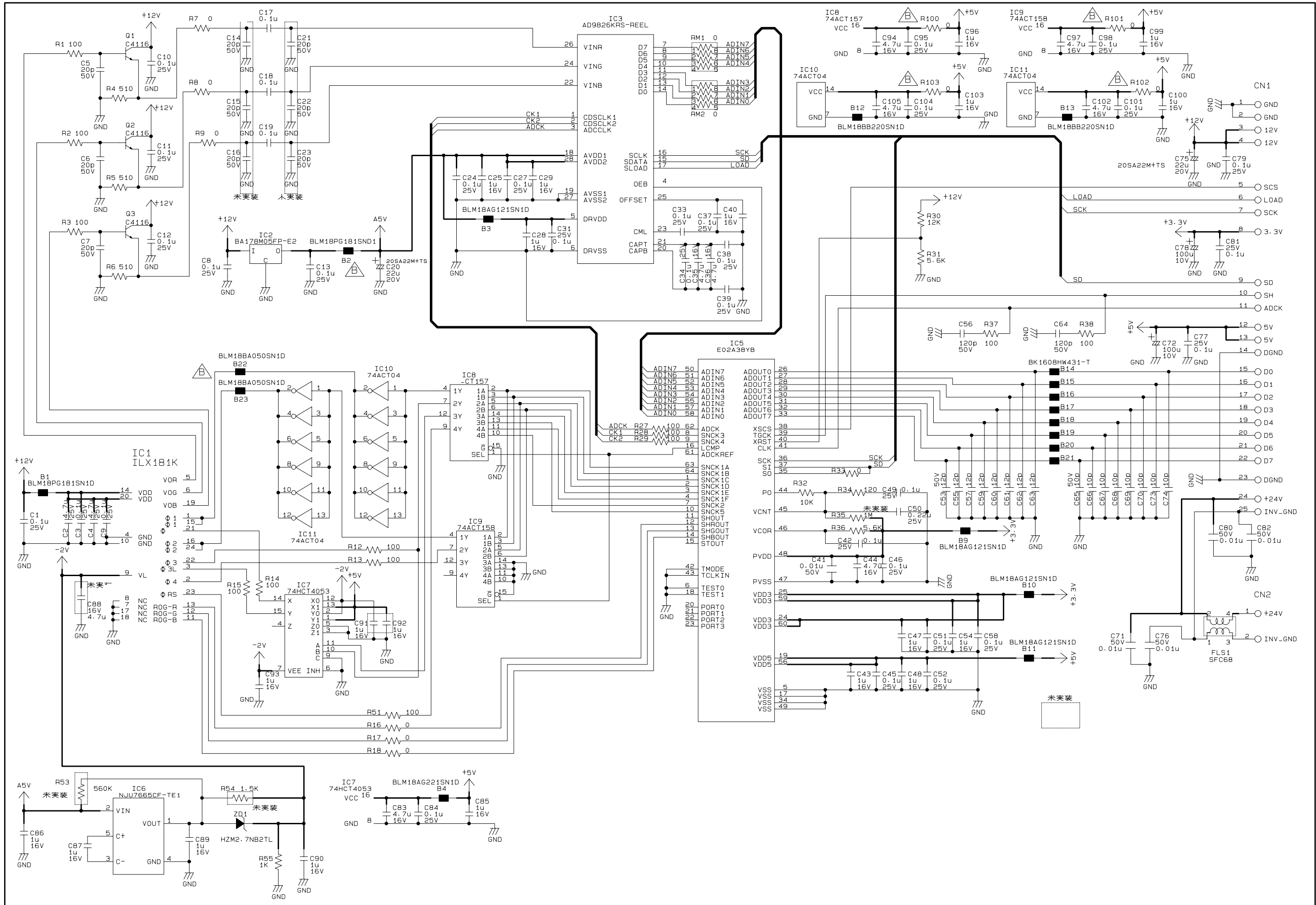
Pin No.	Signal	I/O
1	LAMP	O
2	LAMP	O
3	LAMP	O
4	LAMP	O

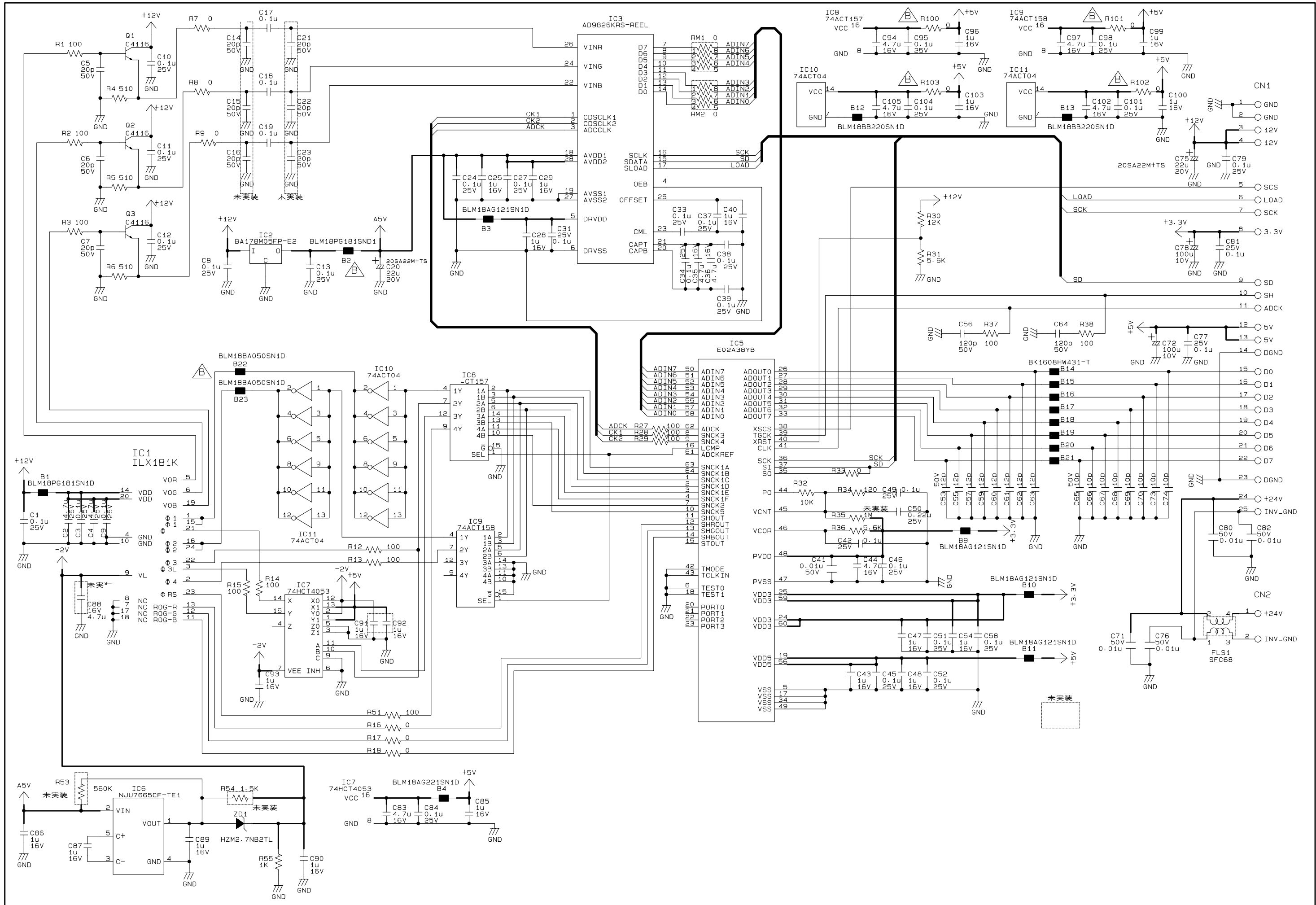
7.2 Circuit Diagram

The following pages show the circuit diagrams for the scanner's control circuits.

- ☐ B156 MAIN BOARD
- ☐ B156 ISN BOARD
- ☐ B156 Power BOARD







7.3 Exploded Diagram

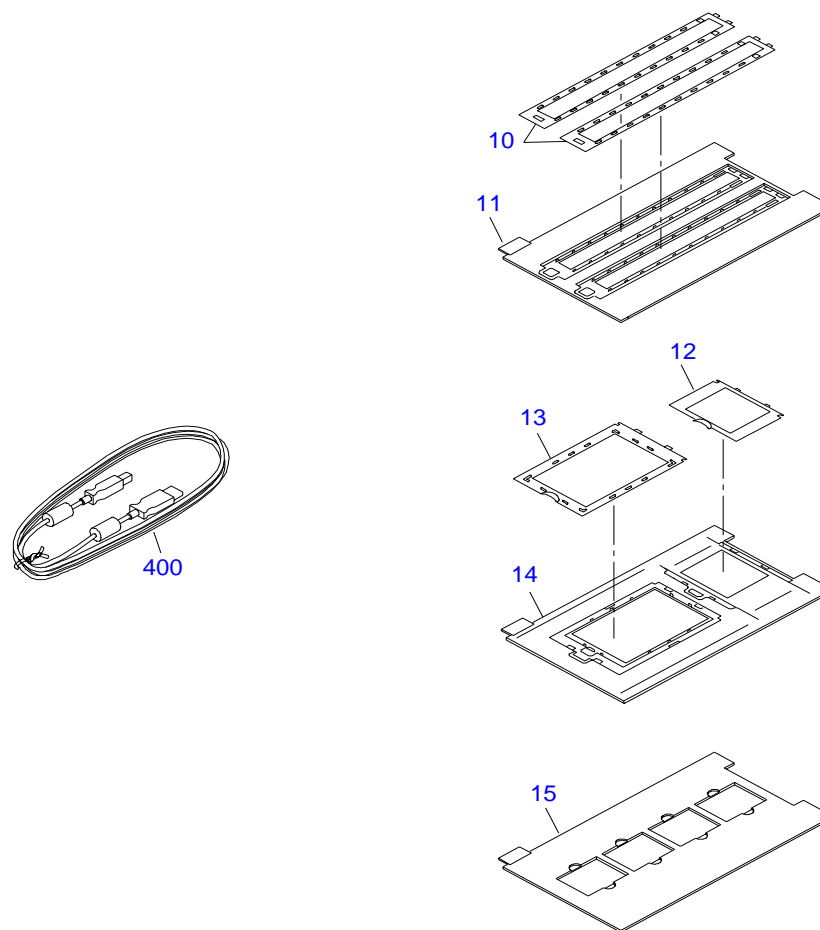


Figure 7-2. Exploded Diagram 1

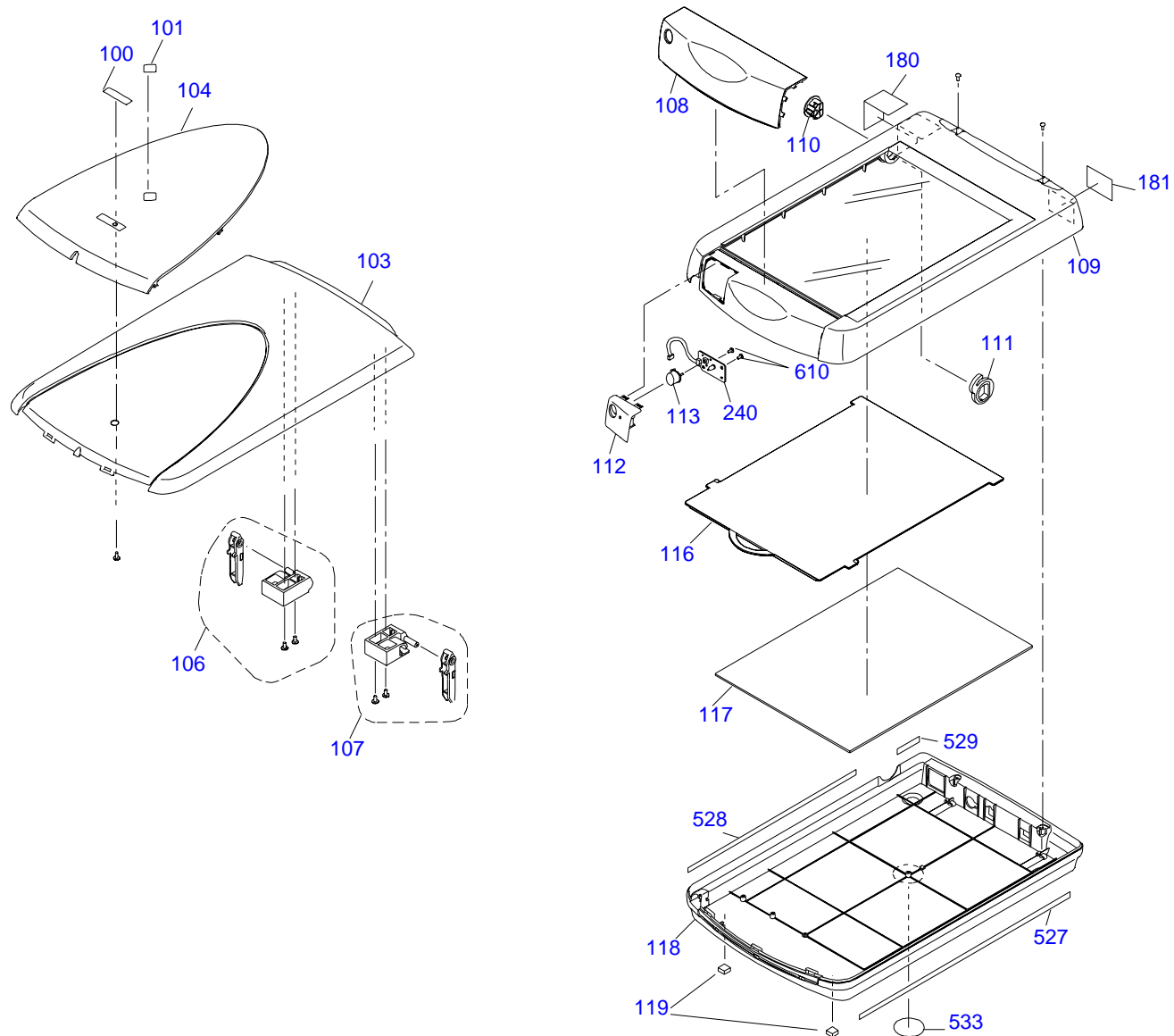


Figure 7-3. Exploded Diagram 2

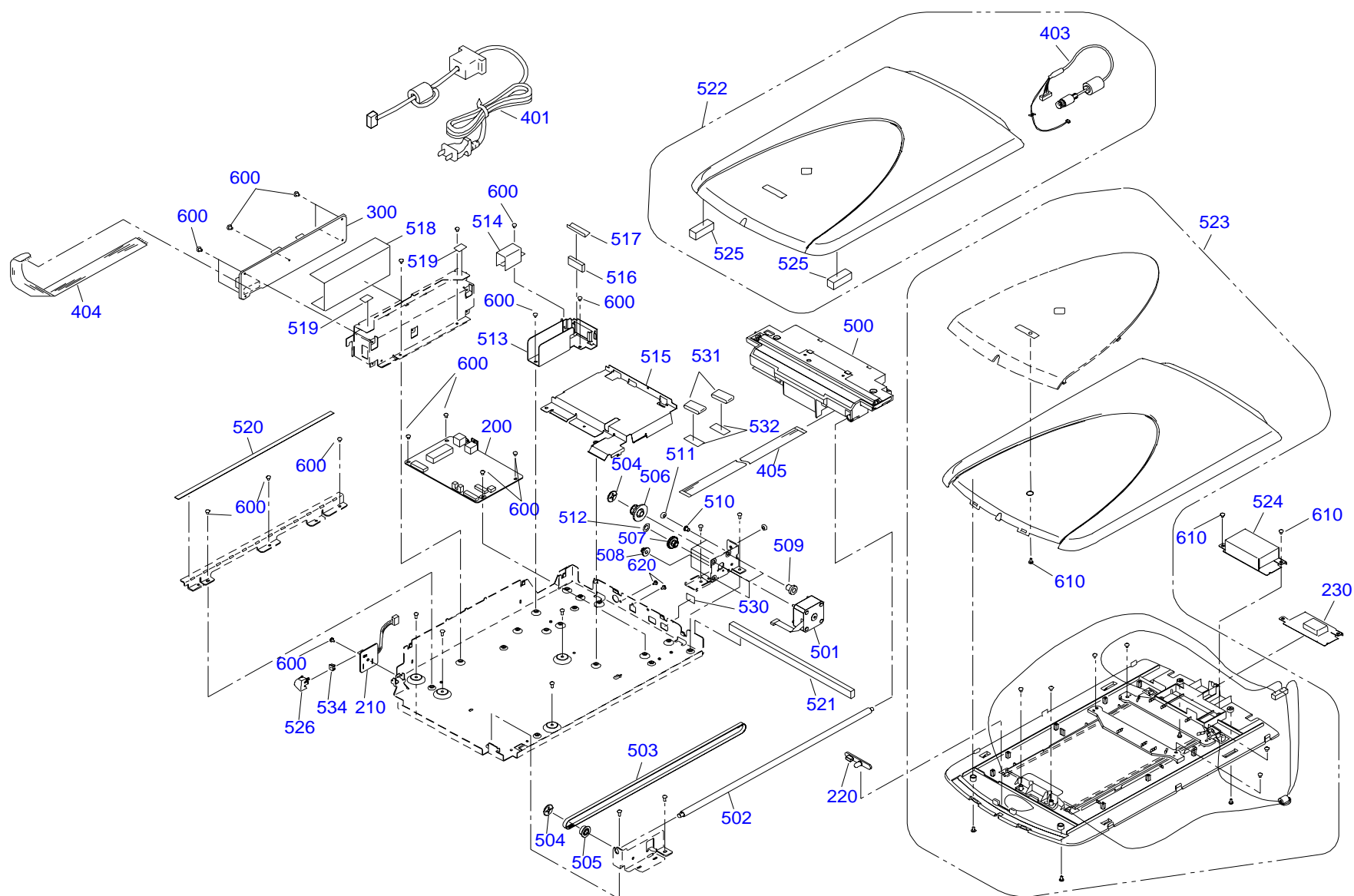


Figure 7-4. Exploded Diagram 3

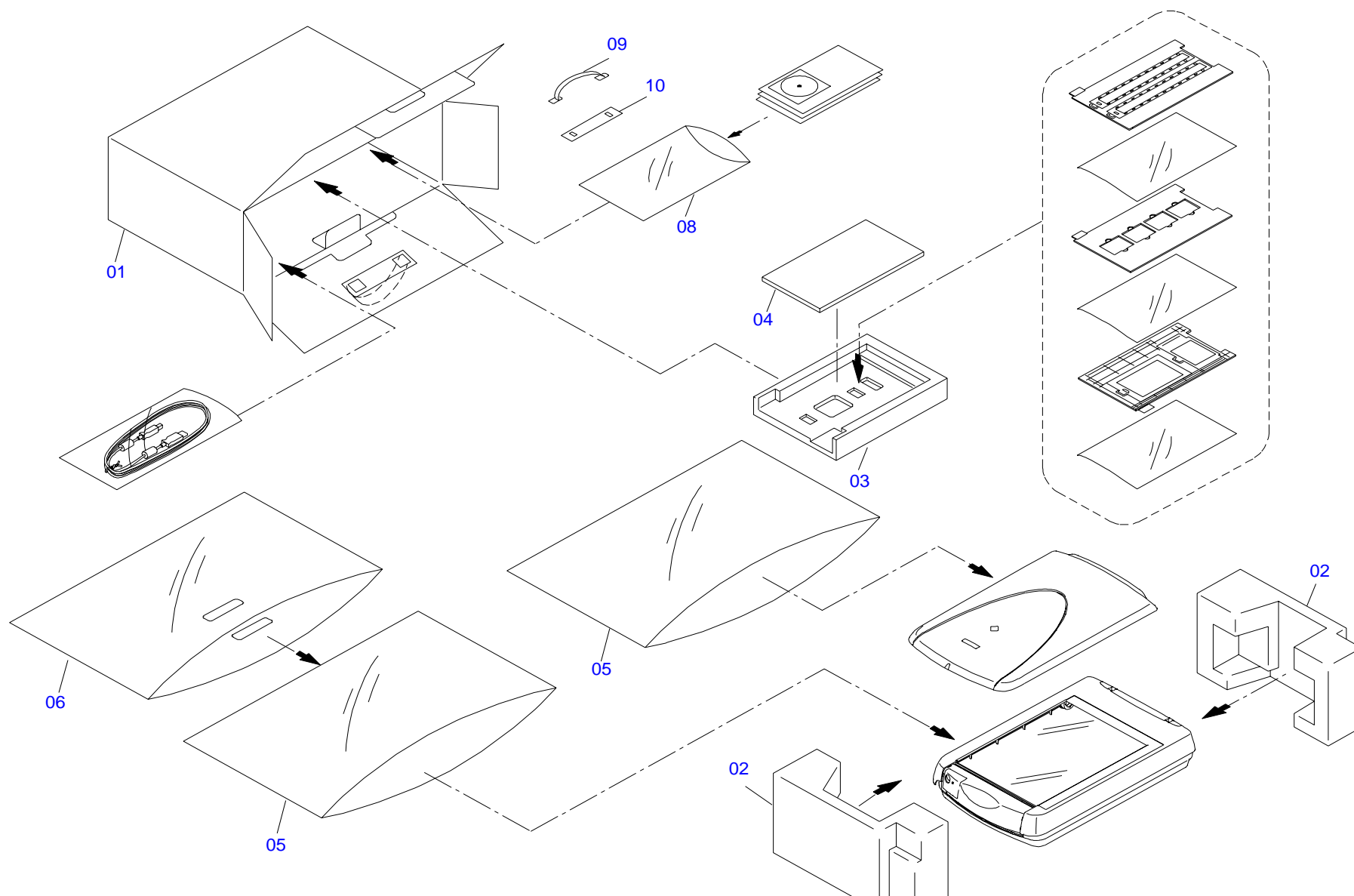


Figure 7-5. Exploded Diagram 4

7.4 Parts List

Table 7-14.

RefNo	Part Name
'10'	"COVER,FILM,35"
'11'	"HOLDER,FILM,35"
'12'	"COVER,FILM,BROWNIE"
'13'	"COVER,FILM,4X5"
'14'	"HOLDER,FILM,4X5,BROWNIE"
'15'	FILM HOLDER;B
'400'	"HARNESS,USB 2.0"
'NON FIG'	OTP-ROM
'NON FIG'	APPLICATION CD-ROM
'NON FIG'	SOFTWARE CD-ROM
'NON FIG'	WARRANTY CARD;B
'NON FIG'	REGISTRATION CARD
'NON FIG'	UPGRADE INFORMATION
'NON FIG'	UPGRADE INFORMATION
'NON FIG'	USER INFORMATION CARD
'NON FIG'	USER'S GUIDE
'100'	LOGO PLATE 10X40;F
'101'	"LABEL,PHOTO"
'103'	"HOUSING ASSY.,UPPER,TPU"
'104'	"HOUSING,TOP,TPU"
'106'	"HINGE ASSY.,L"
'107'	"HINGE ASSY.,R"
'108'	"COVER,FRONT"

Table 7-14.

RefNo	Part Name
'109'	"HOUSING ASSY.,UPPER,ASP"
'110'	"KNOB,MOUNT,CARRIAGE"
'111'	"LEVER,MOUNT,CARRIAGE"
'112'	"HOLDER,FSW BOARD"
'113'	"KEYTOP,FUNCTION SWITCH"
'116'	"HOUSING,MAT"
'117'	"MAT,COVER,DOCUMENT"
'118'	"HOUSING,LOWER"
'119'	FOOT
'180'	"LABEL,CARRIAGE LOCK"
'181'	"LABEL,CAUTION,SOFTWARE;B"
'240'	"BOARD ASSY.,PANEL"
'527'	"SHEET,SLIDE,L"
'528'	"SHEET,SLIDE,M"
'529'	"SHEET,SLIDE,S"
'533'	"SHEET,COVER,35"
'200'	"BOARD ASSY., MAIN"
'210'	"BOARD ASSY., SUB"
'220'	"BOARD ASSY., SUB"
'230'	"BOARD ASSY.,INVERTOR"
'300'	"BOARD ASSY.,POWER SUPPLY"
'401'	POWER CABLE ASSY.
'403'	"HARNESS,TPU"
'404'	"HARNESS,PS"
'405'	"HARNESS,MAIN-ISN"

Table 7-14.

RefNo	Part Name
'500'	"CARRIAGE ASSY.,ASP"
'501'	"MOTOR,CR"
'502'	"SHAFT,CR"
'503'	TIMING BELT
'504'	"FLANGE,PULLEY"
'505'	"PULLEY,DRIVEN"
'506'	"PULLEY,DRIVE"
'507'	"PULLEY,IDLE,A"
'508'	"PULLEY,IDLE,B"
'509'	"INSULATOR,MOTOR,CR"
'510'	"SPACER,INSULATOR"
'511'	"6N,3,F/ZN"
'512'	"PLANE WASHER,4.5X0.5X8,L/NA"
'513'	"COVER,INLET"
'514'	"COVER,COVER INLET"
'515'	"COVER,MAIN BOARD"
'516'	"CUSHION,45X6"
'517'	"SHEET,DUST COVER"
'518'	"SHEET,P/S BOARD"
'519'	"SHEET,COVER,P/S BOARD"
'520'	"SHEET,SLIDE"
'521'	"CUSHION,160X5"
'522'	"TPU ASSY.,LID, ASP"
'523'	"TPU ASSY.,BACKLIGHT,ASP"
'524'	"COVER,BOARD ASSY.,INVERTOR"

Table 7-14.

RefNo	Part Name
'525'	FOOT
'526'	"KEYTOP,POWER SWITCH"
'530'	"FOAM,DUSTPROOF"
'531'	FERRITE CORE
'532'	"DOUBLE SIDE TAPE,22X10"
'534'	"SUPPORT,P-SW"
'600'	"C.B.S-TITE,3X5,F/ZN(B043700511)"
'610'	"C.B.P-TITE SCREW,3X8,F/ZN"
'620'	"C.P.SCREW,3X4,F/NI"
'01'	INDIVIDUAL CARTON BOX
'02'	"PAD SET,SCANNER"
'03'	"PAD,FILM HOLDER"
'04'	"PAD,FILM HOLDER;B"
'05'	"PLASTIC BAG,600X500X0.04T"
'06'	"PLASTIC BAG,HANDHELD,600X450X0.1T"
'08'	"PLASTIC BAG,230X340X0.04T"
09'	HANDLE
10'	"BASE, HANDLE"