# Service Manual

*Color Image Scanner*

## EPSON Perfection 4490 Photo Automatic Document Feeder

EPSON

SESC05004

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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 INJURIER 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 VOLTAGES 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.
6. WHEN USING COMPRESSED AIR PRODUCTS; SUCH AS AIR DUSTER, FOR CLEANING DURING REPAIR AND MAINTENANCE, THE USE OF SUCH PRODUCTS CONTAINING FLAMMABLE GAS IS PROHIBITED.

# 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 four chapters and Appendix.

**CHAPTER 1. PRODUCT DESCRIPTION**
Describes the features and basic specifications of the product.

**CHAPTER 2. OPERATING PRINCIPLES**
Describes the electrical and mechanical basic operating principles of the product.

**CHAPTER 3. TROUBLESHOOTING**
Describes the step-by-step procedures for the troubleshooting.

**CHAPTER 4. DISASSEMBLY/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:

- Connector pin assignments
- Electric circuit boards components layout
- Electrical circuit boards schematics
- Exploded diagram
- Parts List
- Optional part: ADF

## *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 a product reassembly procedure, practice or condition that must be executed in accordance with the specified standards to keep the product's quality.

# Revision Status

| Revision | Date of Issue | Description |
|---|---|---|
| A | May 31, 2005 | First release |
| B | August 31, 2005 | CHAPTER 4 DISASSEMBLY AND ASSEMBLY<br>• 4.2.15 Removing Torsion Spring *(p49)*<br>A caution is added.<br>CHAPTER 7 APPENDIX<br>• 7.3 Exploded diagram *(p73)* is updated.<br>• 7.4 Parts List *(p78)* is updated.<br>• 7.8 ADF; Exploded diagram *(p98)* is added.<br>• 7.9 ADF; Parts List *(p104)* is added. |
| | | |

# Contents

## *Chapter 5 ADJUSTMENT*



## *Chapter 6 Maintenance*



## *Chapter 7 APPENDIX*

CHAPTER

1

# PRODUCT DESCRIPTION

## 1.1 Features

The main features of the EPSON Perfection 4490 Photo are as follows.

- ☐ High Quality
  - ■ Optical Resolution
    4800 dpi (with 6-line color CCD, 124200 pixels)
  - ■ Pixel Depth
    16 bits per pixel (input and output)
- ☐ High-Speed Scanning
  - ■ 11 seconds for monochrome
  - ■ 12 seconds for color

    *When scanning a film at A4 300 dpi.
- ☐ Easy-To-Use
  - ■ EPSON Creativity Suites
    - Supports for a wide variety of file types; BMP, JPEG, TIFF, RAW, PICT, PDF
    - Thumbnail view support
    - Link indicator function for easy scanning
  - ■ EPSON Scan
    - Graphic user interface:
      Full Auto Mode, Home Mode and Professional Mode
    - Stand-alone application:
      In addition to TWAIN driver function, saving images without using a graphic application such as Photoshop is available
    - Additional image editing tools:
      histogram, multi-level unsharp mask, de-screening and tone-curve editor
    - Image enhancement functions:
      dust remover, photo restoration and grain reduction
    - Full automatic mode (flatbed and film)
    - Thumbnail view support
    - Supports both positive and negative monochrome films
    - Multiple exposure levels from Natural to Vivid are preset for Auto Exposure
- ☐ Digital ICE for Film
  Dust and scratch removal with hardware
- ☐ Built-in 2.7" x 9.3" transparency unit (TPU)
  - 35 mm (135) strip film: 12 frames
  - 35 mm (135) mounted film: 4 frames
  - Medium format film (120/220): 1 frame
- ☐ High-Speed USB 2.0
- ☐ Option
  A4 and legal size document can be scanned with the optional ADF unit

## 1.2 Specifications

### BASIC SPECIFICATIONS

- Scanner type
  Flatbed, color
- Scanning method
  Moving carriage, stationary document
- Photoelectric device
  6-line color CCD (2.2 µm) with micro lens
- Effective pixels
  40,800 x 56,160 pixels at 4800 dpi
- Maximum document size and type
  Flatbed: US letter or A4 size
  8.5 x 11.7 inches (216 x 297 mm)
  (Paper type for ADF: Fine quality paper, Bond paper, Check paper, Recycled paper)
  TPU: 35 mm (135) strip film x 12 frames (positive and negative films)
  35 mm (135) mounted film x 4 frames (positive films)
  Medium format film (120/220) x 1 frame (positive and negative films)
- Optical resolution
  4800 dpi
- Maximum resolution*
  4800 dpi (main scan) x 9600 dpi hardware (sub scan)

Note *: The maximum hardware resolution of 4800 x 9600 dpi is achieved using EPSON's Micro Step Drive technology. The motor basic step is 2400 dpi.

- Output Resolution
  50 to 6400 dpi in 1 dpi increments, 9600 dpi, 12,800 dpi
- Speed (color)
  16.832 msec/line at 4800 dpi in Draft mode
- Pixel depth
  16 bits per pixel (input and output)
- Command level
  ESC/I-D2, FS
- Interfaces
  USB 1.1/2.0
- Light source
  White cold cathode fluorescent lamp
- Reliability (MCBF)
  36,000 cycles of carriage movement
- Option
  ADF unit
- Operation buttons
  4 push buttons
- Power Supply
  AC adaptor
- Document setting position
  Rear-side right corner on the document glass ( Scanning home position )

### ELECTRICAL

- Main Unit
  - Rated voltage 24 VDC
  - Input voltage 24 to 26.4 VDC
  - Power consumption
    - Operation: 20 W
    - Standby mode: 13.5 W
    - Sleep mode: 3.8 W
  - Rated current 1.1 A
- AC Adaptor
  - Rated input voltage 100 - 120 VAC (100 V Model)
    220 - 240 VAC (220 V Model)
  - Rated input frequency 50 - 60 Hz (100 V, 200 V)
  - Rated input current 0.7 A at 100 VAC
    0.4 A at 200 VAC
  - Output voltage 24 - 26.4 VDC

- Rated output current 1.1 A
- Current resistance 500 VDC: > 100 MΩ (AC input terminal and DC output terminal)
- Voltage resistance 3000 VAC for 1 min. (AC input terminal and DC output terminal)

☐ TPU

- Rated voltage 24 VDC
- Input voltage 24 - 26.4 VDC
- Input current 0.3 A at 24 V<br>0.07 A at 5 V

☐ ADF

- Rated voltage 24 VDC, 5 VDC
- Input voltage 24 - 26.4 VDC, 5 VDC
- Input current 0.8 A at 24 V<br>0.2 A at 5 V

☐ Energy conservation International Energy Star™ Program compliant

☐ Static electricity Contact discharge: 4.5 kV<br>Air discharge: 8.5 kV

## ENVIRONMENTAL

☐ Temperature

- Operation: 41 to 95 °F (5 to 35 °C)
- Storage: -13 to 140 °F (-25 to 60 °C)

☐ Humidity (non-condensing)

- Operation: 10% to 80% (ADF: 20% to 80%)
- Storage: 10% to 85%

## OPERATING CONDITIONS

Ordinary office or home conditions; avoid extreme dust, direct sunlight, and strong light sources

## EMC AND SAFETY STANDARDS COMPLIANCE

| | | |
|---|---|---|
| Scanner | 100 V | • FCC15B Class B (USA)<br>• CSA108.8 Class B (Canada) (FCC represents) |
| | 200 V | • EN55022 (CISPR Pub22) Class B<br>• EN61000-3-2<br>• EN61000-3-3<br>• EN55024<br>• AS/NZS3548 Class B (Australia)<br>• Korea EMC<br>• Russia consumer protection law<br>• CCC (China) |
| AC Adaptor<br>USB 2.0 I/F | 100 V | • UL1950/CSA C22.2 No.950 (North American, UL/CSA Obtain by each other)<br>• UL1310/CSA C22.2 No.223 (As above)<br>• NOM (Mexico) |
| | 200 V | • IEC60950 (Get CB report)<br>• GS (German)<br>• AS/NZS3260 (Australia)<br>• GOST (Russia)<br>• Singapore safety standard (Singapore)<br>• Russia consumer protection law<br>• Korea safety regulation (Korea)<br>• Polish safety (Poland)<br>• Argentina safety (Argentina)<br>• SASO (Saudi Arabia)<br>• CCC (China) |

## 1.3 Detailed Specifications

**IMAGE PROCESSING FUNCTION**

- ☐ Gamma Correction 1 User defined level
- ☐ Color Correction 1 User defined level
- ☐ Line Art Fixed threshold
- ☐ Operating System Compatibility

| Interface | Operating System |
|---|---|
| USB 1.1 I/F | • Microsoft® Windows® 98SE/Me/2000 Professional/XP Home Edition/ XP Professional(Pre-installed model or upgrade of Windows® 98/Me/2000 Professional pre-installed model)<br>• Mac OS X 10.2 or later<br>• Mac OS 9.1 or later (Only EHC) |
| USB 2.0 I/F | • Microsoft® Windows® 2000 Professional/XP Home Edition/XP Professional*<br>(Pre-installed model or upgrade of Windows® 2000 Professional pre-installed model)<br>• Mac OS X 10.2.7 or later |

Note *: USB2.0 Host Driver by Microsoft is required

## 1.4 Interface

The interfaces of this scanner are shown below.

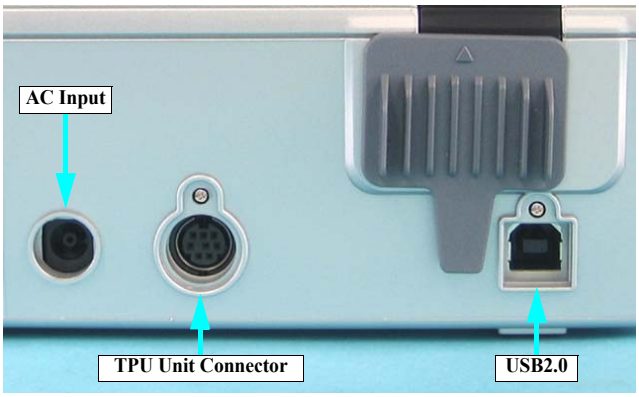



**Figure 1-1. Interface**

**USB INTERFACE**

- ☐ Interface type: Universal Serial Bus Specification Revision 2.0
  - ■ Vendor ID: 04B8h
  - ■ Product ID: 0119h
- ☐ Connector type: One self-powered receptacle, Type B. Must be connected directly to the host or to tier 1 in a hub with a recommended USB cable.

## 1.5 Exterior Specifications

### 1.5.1 Explanation of Switches

- Start Button
  Starts the EPSON Smart Panel.
- Copy Button
  Prints photos and makes prints from films.
- Scan to E-mail Button
  Sends the scanned image by an e-mail.
- Scan to PDF Button
  Starts scanning and stores the sccanned data.

### 1.5.2 Explanation of LED Indicators

- Status LED

Located to the left of the Start Button. Indicates scanner statuses with a green or red light as shown in the table below.

| LED Indication | Status |
|---|---|
| Lit Green | Ready |
| Flashing green slowly | Busy*1 |
| Flashing red fast | Error*2 |
| Off | Operate off: |

Note *1: Warm up, scanning, initializing, etc.

*2: Certain error conditions, such as Option Error, may not cause the Status LED to turn red.

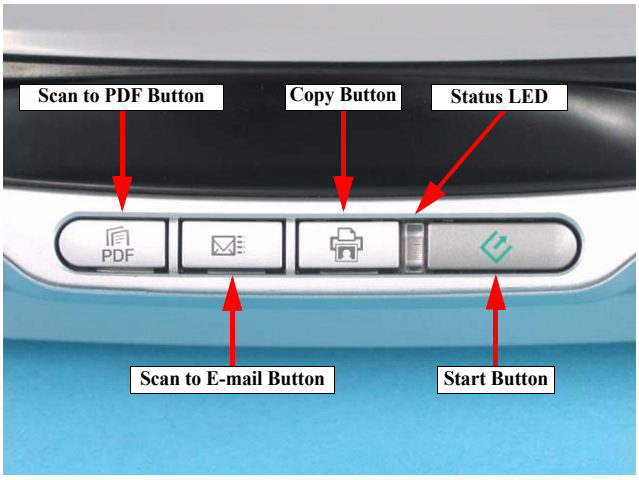
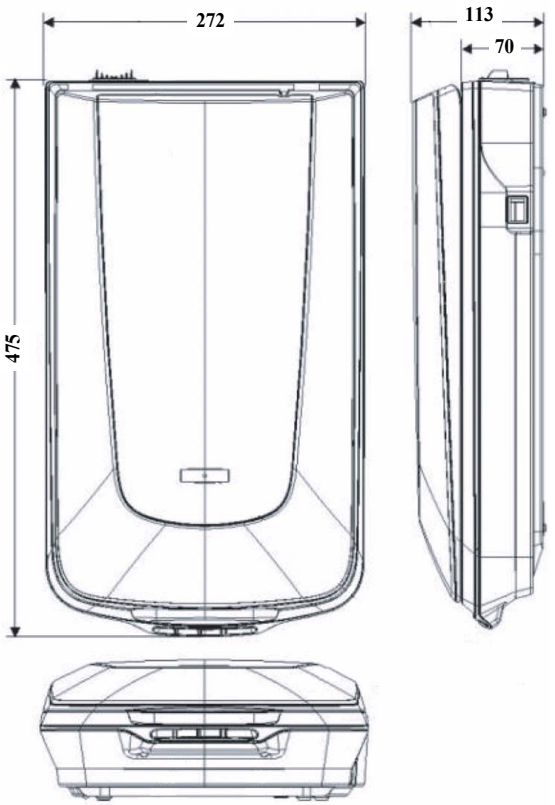



**Figure 1-2. Switches and LEDs**

## 1.5.3 Dimensions

- Dimensions and Weight
  - Dimensions 272 x 475 x 113mm (W x D x H)
  - Weight Approx. 4.0 kg (without AC adaptor)
    4.113 kg (with AC adaptor)

- External Drawing




**Unit: mm**

**Figure 1-3. External Dimensions of Perfection 4490 Photo**

## 1.5.4 Maximum Document Size and Placement

**REFLECTIVE DOCUMENT**

Size : 8.5 in (216 mm) W x 11.7 in (297 mm) H

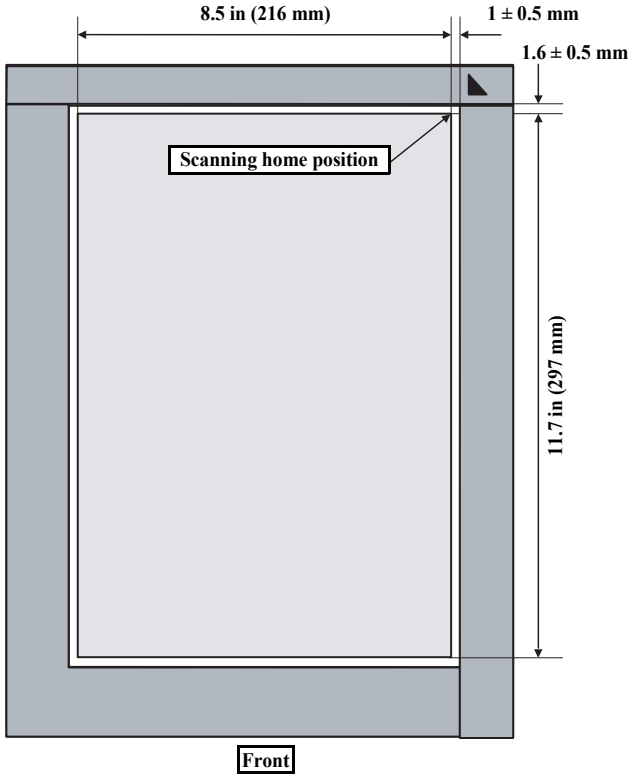



**Figure 1-4. Reflective Document Scanning Range**

**TRANSPARENT DOCUMENT**

Size : 2.72 in (68 mm) W x 9.44 in (236 mm) H

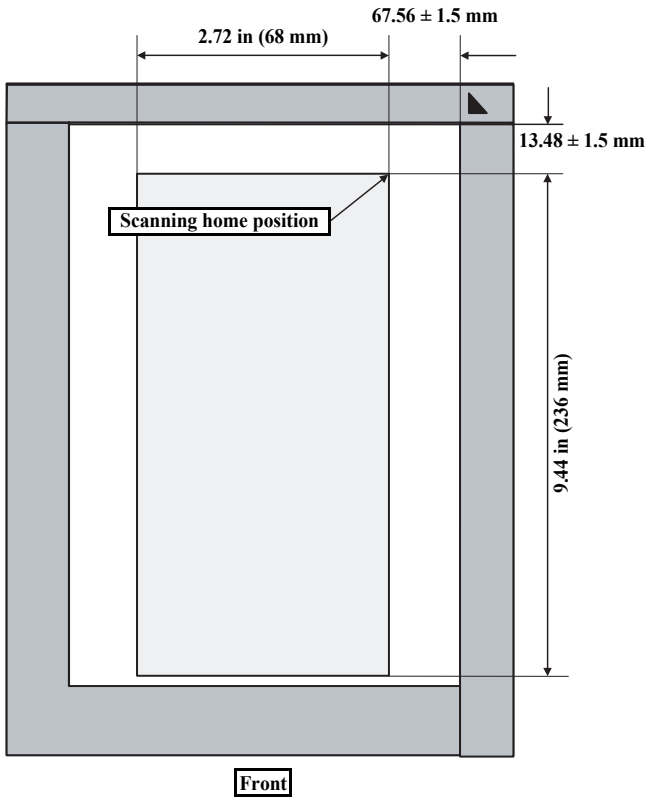



**Figure 1-5. Transparent Document Scanning Range**

## 1.6 Control Codes

The following table is the list of control codes by the scanner.

| Category | Command Name | Code |
|---|---|---|
| Execution command | ID request | ESC I |
| | Status request | ESC F |
| | Extended status request | ESC f |
| | Status setting request | ESC S |
| | Scan start | ESC G |
| | Push button status request | ESC ! |
| | Extended ID request | FS I |
| | Scanner status request | FS F |
| | Scanning parameter request | FS S |
| | New scan start | FS G |
| Data form setting | Data format setting | ESC D i |
| | Resolution setting | ESC R n1 n2 |
| | Scanning area setting | ESC A n1 n2 n3 n4 |
| | Color setting | ESC C i |
| | Parameter setting | FS W |
| Correction Processing | Gamma correction setting | ESC Z i |
| | Gamma correction table setting | ESC z i d [256] |
| Image Processing | Threshold value setting | ESC t I |
| Support and Miscellaneous | Scan mode setting | ESC g i |
| | Initialization | ESC @ |
| | Line counter setting | ESC d i |
| | Option control | ESC e i |
| | Film type designation | ESC N i |
| | Paper exit | FF |
| | Paper loading | PF |
| | Warm-up cancel | ESC w |

| Category | Command Name | Code |
|---|---|---|
| Control | Normal response | ACK |
| | Abnormal response | NACK |
| | Scanning stop | CAN |
| | Header | STX |

## 1.7 Error-Time Processing

**Table 1-1. Error Definition and Remedy List**

| Category | LED Indication | Cause | Scanner response | Recovery |
|---|---|---|---|---|
| Command error | None | An invalid command or invalid command parameter was detected. | • The scanner (interpreter) ignores the incorrect command or parameter. Current setting maintained.<br>• The Scanner (interpreter) returns NACK, and waits for the next command parameter. | The error condition is cleared when the scanner (interpreter) receives a valid command. |
| Fatal error | Red LED flashes rapidly | • The lamp is burnt out.<br>• The main unit is faulty.<br>• Firmware downloading failed. | • The Scanner turns the carriage lamp off and stops the operation.<br>• The Scanner sets Bit 7 of the status bit. | Turn the scanner off and then back on. |

CHAPTER

# 2

# OPERATING PRINCIPLES

## 2.1 Engine Operation Outline

This section explains the functions and operating principles of the Perfection 4490 Photo Engine. The Engine is roughly divided into the Carriage Unit and Carriage Moving Mechanism.

### 2.1.1 Carriage Unit outline

The Carriage Unit can be divided into the CCD Sensor Board, Inverter Board, Lamps (light source), and Mirror/Lens Mechanism. (Refer to Fugure 2-1, 2-2.)

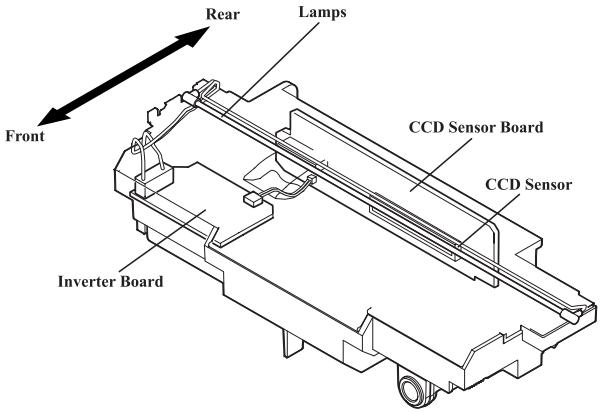



**Figure 2-1. Carriage Unit Configuration**

- ☐ CCD Sensor Board — Forms an alternative six-lines color CCD (R, G, B independent) and its control and drive circuits.
- ☐ Inverter Board — Boosts +24VDC and converts DC to AC to generate the voltage for driving the Lamps (white cool cathode fluorescent lamps).
- ☐ Lamps — White cool cathode fluorescent lamps are used as a light source. When the amount of light is not stable, the Panel LED flashes and enter the standby mode until it becomes stable.
- ☐ Mirror/Lens Mechanism — The beam applied to the scanned document is reflected, passes through the Mirror/Lens Mechanism in the Carriage Unit for correction of the beam axis, and then reaches the CCD Sensor. The light components R, G, B are extracted by the Color CCD Sensor itself, not by switching between R, G and B of the light source as previously.

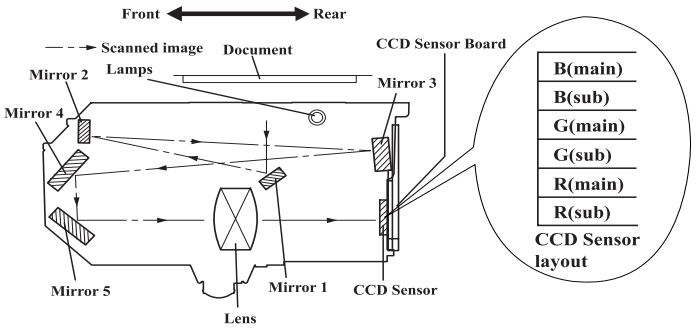



**Figure 2-2. Mirror/Lens Mechanism**

## 2.1.2 TPU Carriage Unit Outline

The TPU Carriage Unit consists of TPU Inverter Board, Lamps (light source), SUB_C Board, and SUB_D Board. (Refer to Fugure 2-3.)

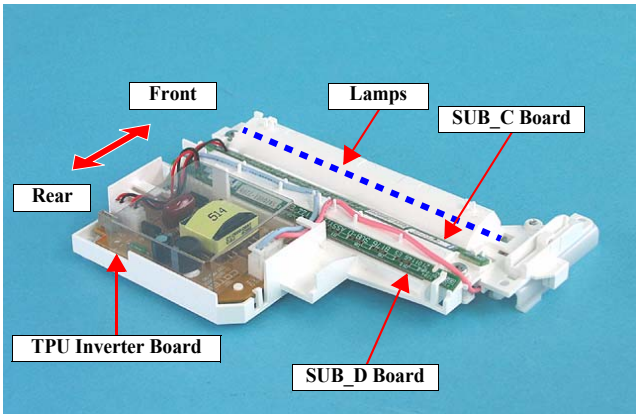



**Figure 2-3. TPU Carriage Unit Configuration**

**Inverter Board** converts DC to AC and boosts the voltage to generate the current necessary to power the Lamps.

**Lamps** used as the primary light source are white cool-cathode fluorescent lamps. If the light output becomes unstable, the Panel LED flashes and the scanner enters standby mode until it becomes stable.

**SUB_C Board and SUB_D Board** each contain LEDs to generate infrared light.

## 2.1.3 Carriage Moving Mechanism Operation

The image data of a document are scanned in the combination of the main scanning direction (one line: CCD Sensor) and sub scanning direction (multiple lines: Carriage Unit movement). (Refer to Fugure 2-4.)

The line type color CCD Sensor can only scan the data of one line in the main scanning direction (in parallel with the Carriage Unit) at one time. To scan the data of the second and latter lines in the sub scanning direction, the Carriage Unit having a built-in CCD Sensor is moved by CR drive. The scanned data are sent to the Control Board. The scanning of Line n data and the processing of Line n-1 image data are performed consecutively at the same time.

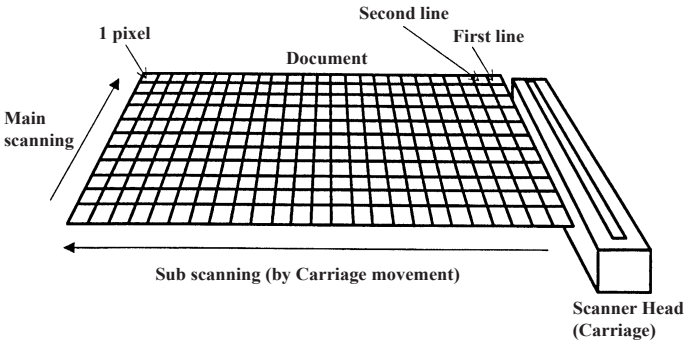



**Figure 2-4. Carriage Movement**

The Carriage Unit slides along the guide rail in the sub scanning direction. To perform this sliding operation, the CR (Carriage) Motor transmits its drive power to the Timing Belt, which is fixed to the Carriage Unit, via the Drive Pulley and Deceleration Gear. The image data scanning start position is determined by the CR HP Sensor located on the Control Board. A stepping motor used as the CR Motor is driven under open loop control. (Refer to Fugure 2-5.)

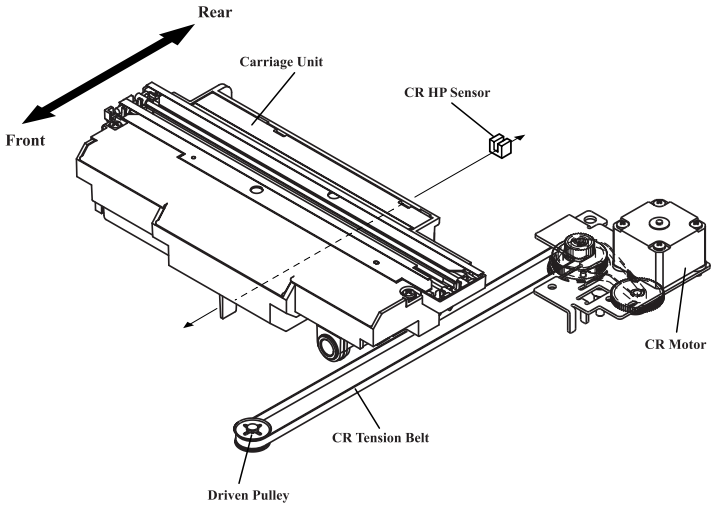



**Figure 2-5. Carriage Operation**

## 2.1.4 TPU Carriage Drive Mechanism Operation

The TPU Carriage Unit slides along the guide shaft in the secondary scanning direction as the TPU CR (Carriage) Motor transmits its drive power to the TPU CR Drive Belt connected to the TPU Carriage Unit, via the Idle Pulley and Drive Pulley. (Refer to Fugure 2-6.) The TPU CR Motor uses a stepper motor and is driven under open loop control.

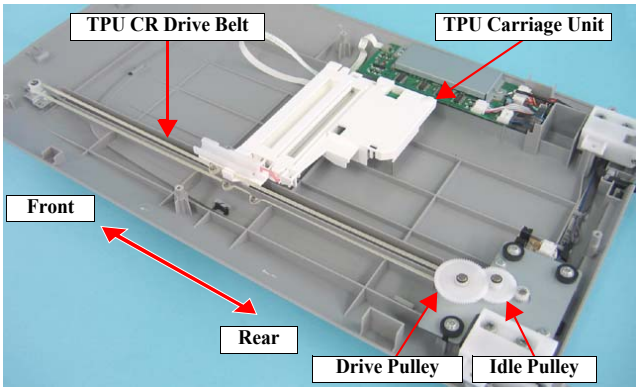



**Figure 2-6. TPU Carriage Operation**

## 2.2 Digital ICE Function Operation

This scanner features Digital ICE for Film, an image correction process that uses a combination of hardware and software to detect and eliminate physical flaws, dust or dirt, either on the Film or the scanner itself. (Film includes color or monochrome negative, and color positive.)

### 2.2.1 Digital ICE for Film Overview

Because of its longer wavelength, infrared light normally passes completely through film media, such as negatives or slides, during a scan. Physical flaws or dust, however, do block infrared light. When a film document with dust or physical flaws is scanned using infrared light, the light is physically blocked by the flaw or dust, and the resulting image clearly shows only the dust and/or flaws present. By superimposing the images scanned with infrared light and visible light, the Film-ICE software is able to detect the inconsistency in the digitized data caused by the flaw and automatically remove it using interpolated image data to overwrite and correct the image. Because of the difference in wavelength between infrared light and visible light, a secondary lens ("Glass Plate" in the images below) must be employed during the Film-ICE visible-light scan to compensate for the resulting difference in the size of the images so that they can be superimposed accurately. The Glass Plate is moved into and out of position by a solenoid.

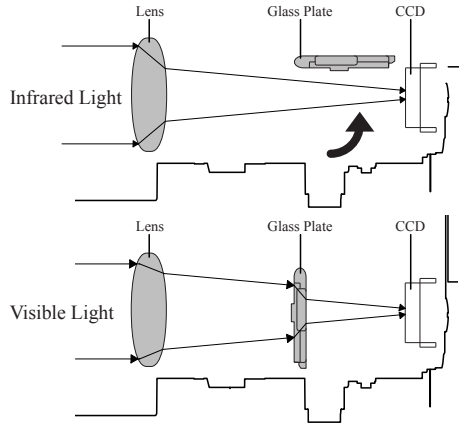
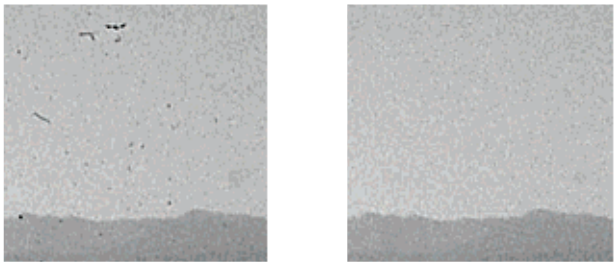



**Figure 2-7. Refraction of Infrared Light and Visible Light**

- Digital ICE for Film Process Sequence

1. Read the visible light position. Two holes in the upper housing are scanned with visible light in order to register the home position of image being scanned.
2. Move the secondary lens (Glass Plate) into position and scan the film in visible-light.
3. Retract the secondary lens and scan the film in infrared-light.
4. Electronically superimpose the images obtained from each light source and identify the physical flaws and/or foreign matter.
5. Replace the "flaw" image data with image data interpolated from adjacent areas.



Dirt on the Slide After Correction

**Figure 2-8. Extraction/Correction of Dust by Film-ICE Function**

## 2.3 Operation Principle of Electric Circuit

The following electric circuits are used in the scanner.

☐ Main Board

**Table 2-1. Main Board IC**

| Name | Location | Details |
|---|---|---|
| S1R77001F00A2 | IC4 | ASIC: Host base scanner controller |
| S1R720G0F00A0 | IC6 | ASIC: UTM (USB2.0 interface) |
| EDS6416AHTA-75-E | IC3 | SDRAM 1M x16bit x4bank |
| TB62205F | IC1 | Motor Driver + DC-DC converter CR Motor Drive +24V IN, +12V/+5V OUT |
| AP1120SLA | IC2 | DC-DC converter +5V IN, +3.3V/+2.5V OUT |
| M74HC595AM13TR | IC5 | Serial-Parallel converter |

☐ CCD Board

**Table 2-2. CCD Board IC**

| Name | Location | Details |
|---|---|---|
| ILX580K | IC1 | CCD |
| AK8415 | IC4 | 16bit A/D converter |
| E02A41YA | IC5 | ASIC: CCD/AFE drive signal generator |
| SN74ACT244NSR | IC2, IC3 | CCD drive buffer |
| KIA78M05F-RTF/P | IC6 | DC-DC converter +12V IN, +5V OUT |

☐ Panel Board

This board has four buttons (Start/Copy/Scan to E-mail/Scan to PDF) and LED lamp.

☐ Power supply

The scanner is powered with 24 VDC voltage from the AC adapter.

■ AC adapter rated voltage

- Rated output DC24 1.1A
- Input Voltage AC100-120V ± 15% (100V)
  AC220-240V ± 10% (200V)
- Rated Input Current 0.7A (AC 100V system)
  0.4A (AC 200V system)
- Input Frequency Range 50 to 60Hz ± 0.3Hz
- Output Voltage DC24 to 26.4V

The 24 VDC voltage is supplied to CN4 on the Main Board. A power switch is located between the DC jack and the Main Board.

☐ DRV Board (TPU Unit)

**Table 2-3. DRV Board IC**

| Name | Location | Details |
|---|---|---|
| M74HC595RM13TR | IC1, IC2 | 8bit Shift Register |
| LB11847L-E | IC3 | TPU CR Motor Driver |
| CD74HC75M96 | IC5 | Lamp/LED controller |

☐ ADF Board (Option)

**Table 2-4. ADF Board IC**

| Name | Location | Details |
|---|---|---|
| M54670P | IC2 | ADF Motor driver |
| MM74HC165M | IC3 | Parallel-Serial Converter |
| M66311FP-250D | IC1 | Serial-Parallel Converter |
| MM74HCT04M | IC4 | Buffer IC |

CHAPTER

3

# TROUBLESHOOTING

# 3.1 Overview

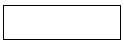
This chapter explains the remedies for errors detected by the scanner's self-diagnostic function, and provides a troubleshooting guide based on observed ploblems.

## 3.1.1 Self-Diagnosing

This scanner has a self-diagnostic function that automatically diagnoses the operating status of major components, and uses an LED indication to show the error status. This function detects the following error statuses shown in the table below. The corrective action is also listed.

### COMMAND ERROR

**Table 3-1. Command Error**

| LED Indication | Cause | Disposition |
|---|---|---|
|  (None) | • Unidentifed command is detected. | • The scanner (interpreter) ignores the incorrect command or parameter. The current settings are maintained.<br>• Scanner (interpreter) returns NACK, and waits for the next command or parameter. |
| Recovery | The error condition is canceled upon receipt of a valid command. | |

### FATAL ERROR

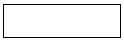
**Table 3-2. Fatal error**

| LED Indication | Cause | Disposition |
|---|---|---|
|  (Rapid flashing, red) | • The lamp is burnt out.<br>• The main unit is faulty.<br>• Firmware downloading failed. | • The Scanner turns the carriage lamp off and stops the operation.<br>• The Scanner sets Bit 7 of the status bit. |
| Recovery | Turn the scanner off and then back on. | |

### OPTION ERROR

(Only when the Option Unit is fitted and the scanner is ready to operate under the control command (ESC e))

**Table 3-3. Option Error**

| LED Indication | Cause | Disposition |
|---|---|---|
|  (None) | • The cover is open.<br>• Document is not loaded. | • The Scanner sets Bit 7 of the status bit. |
| Recovery | Remove the error cause to recover.<br>Receivable command [ESC F, ESC f, ESC @] | |

## 3.2 Troubleshooting

This section provides troubleshooting procedures based on observed faults.

Refer to Table 3-4, and choose the table describes the general fault indication. Within the table, find the Problem that most closely matches what you observe and follow the procedures given in the table cross referenced in the right-hand column.

**Table 3-4. Trouble Phenomenon, Cause and Troubleshooting Table**

| Problem | Definition | Troubleshooting Table |
|---|---|---|
| Scanned image quality error. | Scanned image is not clear. | 3-5 |
| The main unit does not operate when powered-on. | The Main Unit does not perform initialization operation. | 3-6 |
| | The host does not recognize the scanner when power is switched on. | 3-7 |
| Fatal error. (The LED flashes red.) | The Carriage Unit does not operate. | 3-8 |
| Recovery cannot be made when power is switched on again. | The Fluorescent Lamps are not lit. | 3-9 |
| The TPU does not work at all. | The TPU does not operate. | 3-10 |
| | The TPU Carriage Unit does not operate. | 3-11 |
| | The Fluorescent Lamps of the TPU do not light up. | 3-12 |

**Table 3-5. Scanned Image Quality Error.**

| Step | Possible Cause | Corrective Action |
|---|---|---|
| 1 | The Document Glass is not clean. (Image has white spots) | Clean the glass. (Refer to 6.1.1 Cleaning) |
| 2 | The mirror in the Carriage is not clean. (Vertical bands appear on the image.) | Clean the mirror. (Refer to 6.1.1 Cleaning) |
| 3 | Upper Housing failure (The white document mat is deformed or is not clean.) | Replace the Upper Housing. |
| 4 | CCD Sensor Board failure | Replace the Carriage Unit. |
| 5 | Main Board failure | Replace the Main Board |
| 6 | Carriage mechanism failure | Replace the Carriage mechanism. |

**Table 3-6. The Main Unit does not perform initialization operation.**

| Step | Possible Cause | Corrective Action |
|---|---|---|
| 1 | There are some connectors that are not connected correctly | Connect them correctly. |
| | | Replace the Main Board |
| 2 | CR Motor failure | Replace the CR Motor. |
| 3 | Main Board failure | Replace the Main Board |

**Table 3-7. The host does not recognize the scanner when power is switched on.**

| Step | Possible Cause | Corrective Action |
|---|---|---|
| 1 | The host computer does not support USB. | Replace or modify the host computer. |
| 2 | The TWAIN Driver supplied with the scanner has not been installed correctly. | Install (reinstall) the TWAIN Driver for the Perfection 4490 Photo. |
| 3 | The USB cable is damaged. | Replace the USB cable. |
| 4 | Main Board failure | Replace the Main Board |

**Table 3-8. The Carriage Unit does not operate.**

| Step | Possible Cause | Corrective Action |
|---|---|---|
| 1 | The Carriage Lock has not been released. | Release the Carriage Lock. |
| 2 | The Upper Housing is not installed correctly. | Install it normally. |
| 3 | Connector CN1 on the Main Board is not connected. | Connect it correctly. |
| 4 | The Carriage FFC is not connected correctly. | Connect the FFC correctly. |
| 5 | Carriage Mechanism failure | Replace the Main Board |
| | | Does the CR Motor operate normally? |
| | | ↓ |
| | | Yes → Disassemble and reassemble the scanner, or replace the corresponding part(s).<br>No → Replace the CR Motor. |

**Table 3-9. The Fluorescent Lamps are not lit.**

| Step | Possible Cause | Corrective Action |
|---|---|---|
| 1 | Connector CN1 on the Main Board is not connected.<br>Connector CN1 and CN2 on the CCD Board are not connected. | Connect the disconnected connectors. |
| 2 | The lamp is not set on the Inverter Board correctly. | Set the lamp on the board correctly. |
| 3 | Carriage Unit failure ( The Carriage FFC is not connected to the Main Board and the Carriage.) | Replace the Carriage Unit. |
| 4 | Main Board failure | Replace the Main Board |

**Table 3-10. The TPU does not operate.**

| Step | Possible Cause | Corrective Action |
|---|---|---|
| 1 | The TPU Unit Cable is not connected to the main unit. | Connect the Cable to the main unit. |
| 2 | Connector CN5 is not connected to the Main Board. | Connect it correctly. |
| 3 | Main Board failure | Replace the Main Board |

**Table 3-11. The TPU Carriage Unit does not operate.**

| Step | Possible Cause | | Corrective Action |
|---|---|---|---|
| 1 | The TPU Unit Cable is not connected to the main unit. | | Connect the TPU Cable to the main unit. |
| 2 | The TPU Carriage Lock has not been released. | | Release the TPU Carriage Lock. |
| 3 | The TPU Lower Housing is not installed correctly. | | Reinstall it correctly. |
| 4 | The TPU Carriage Mechanism Failure. | The three torsion springs are not attached to the TPU CR Drive Belt correctly. | Attach them to the belt correctly. |
| | | • The TPU CR Motor does not move normally when powered-on with the TPU Lower Housing removed.<br>• The TPU Carriage Unit does not move normally with the TPU CR Motor removed. | Replace the TPU Carriage Unit. |
| 5 | TPU CR Motor failure | | Replace the TPU CR Motor. |
| 6 | DRV Board failure | | Replace the DRV Board. |
| 7 | Main Board failure | | Replace the Main Board |

**Table 3-12. The Fluorescent Lamps of the TPU do not light up**

| Step | Possible Cause | Corrective Action |
|---|---|---|
| 1 | The DRV Inverter FFC is not connected to CN1 on the TPU Inverter Board and CN3 on the DRV Inverter Board. | Connect the FFC to CN1 and CN3 Connectors. |
| 2 | CN2, CN3, and CN4 on the TPU Inverter Board are not connected. | Connect the connectors. |
| 3 | Failure of the SUB_C Board and the SUB_D Board | Replace the SUB_C Board and the SUB_D Board. |
| 4 | DRV Board failure | Replace the DRV Board. |
| 5 | Main Board failure | Replace the Main Board |

CHAPTER

# 4

# DISASSEMBLY / ASSEMBLY

## 4.1 Overview

This chapter explains the procedures for disassembling the major units and parts of the product. Unless otherwise explained, reassembly should be carried out in the reverse order of the disassembly procedure. When you have to remove any parts or components that are not described in this chapter, refer to the exploded diagram in the Appendix.

Before starting disassembly, always read the precautions described in the next section.

### 4.1.1 Precautions

Before starting the disassembly or reassembly of the product, read the following precautions given under the headings WARNING and CAUTION.


- **Before disassembling or reassembling this product, always disconnect the Power Cable and Interface Cable. When you have to work with power on for voltage measurement, etc., use extreme care not to get an electric shock and do the work in accordance with the procedures given in this manual.**
- **To prevent your hands from being cut by sharp edges, always wear gloves before starting disassembly or reassembly.**


- **When touching any internal components, use static electricity discharge equipment such as anti-static wrist straps.**
- **Provide sufficient work space for disassembling and reassembling.**
- **Always use only the recommended tools for disassembly, reassembly and adjustment.**
- **Be sure to tighten the screws to the specified torque.**
- **Use the specified grease for lubrication. Refer to Chapter 6 for details.**
- **Since a prototype was used to illustrate these disassembly and assembly procedures, the appearance of some parts may differ from those on an actual product. The procedures themselves, however, are accurate for the retail model.**
- **When using compressed air products; such as air duster, for cleaning during repair and maintenance, the use of such products containing flammable gas is prohibited.**

### 4.1.2 Recommended Tools

To protect this product from damage, use the tools indicated in the following table.

**Table 4-1. Specified Tools**

| Name | Epson Part Number |
|---|---|
| Phillips screwdriver, No. 2 | 1080532 |
| Flat-blade screwdriver | 1080527 |
| Tweezers | 1080561 |
| Long-nose pliers | 1080561 |

### 4.1.3 Recommended Screws

The following table indicates the screws used in the EPSON Perfection 4490 Photo Scanner.

**Table 4-2. Recommended Screws**

| No. | Name | Type |
|---|---|---|
| 1 | C.B.P. 3 x 6 | Phillips Bind P-tite Screw, size M3, 8 mm length |
| 2 | C.B.P. 3 x 8 | Phillips Bind P-tite Screw, size M3, 8 mm length |
| 3 | C.B.P. 3 x 12 | Phillips Bind P-tite Screw, size M3, 8 mm length |
| 4 | C.P. 3 x 8 | Phillips Pan Head Screw, size M3, 4 mm length |
| 5 | C.B. 3 x 3 | Phillips Bind Screw, size M3, 3 mm length |
| 6 | C.B.P. 4 x 12 | Phillips Bind P-tite Screw, size M3, 8 mm length |
| 7 | C.B.S. 3 x 5 | Phillips Bind S-tite Screw, size M3, 5 mm length |
| 8 | C.P.F.P. 3 x 8 | Phillips Pan Flange Head P-tite Screw, size M3, 8 mm length |

## 4.2 Disassembly Procedure

This section illustrates how to remove the main components of this product. Unless otherwise specified, the reassembly procedure is the reverse of the disassembly procedure. For additional assembly illustrations, refer to the exploded diagrams in the Appendix.

The following flowchart shows the disassembly procedure step-by-step, and the section and page number where the procedure is described.

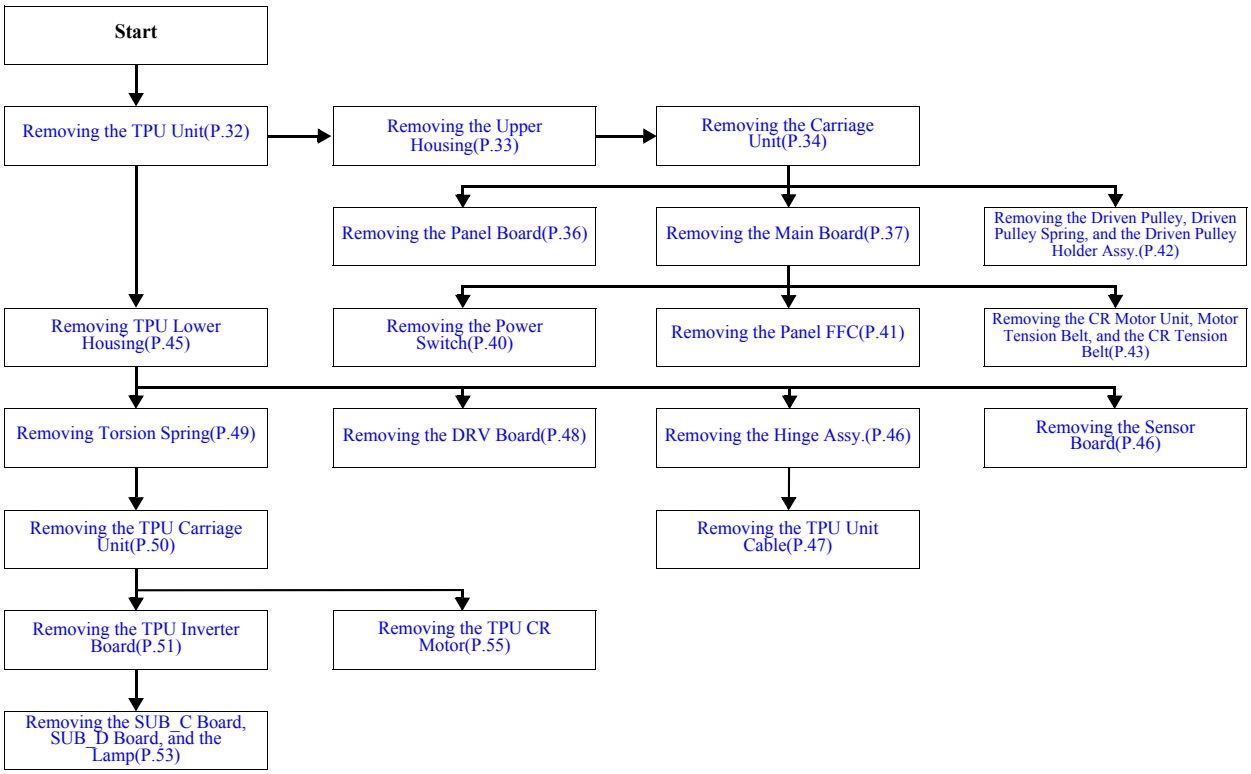



**Figure 4-1. Disassembly Flowchart**

### 4.2.1 Removing the TPU Unit

1. Disconnect the TPU Unit cable from the Main Unit.

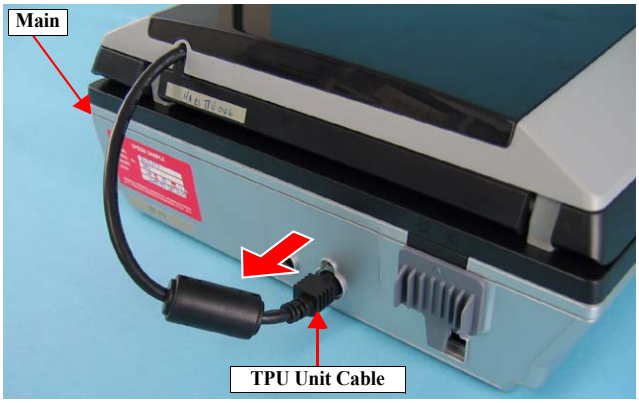



**Figure 4-2. Removing the TPU Unit (1)**

2. Open the TPU Unit.
3. Hold both ends of the TPU Unit and then lift and remove it.

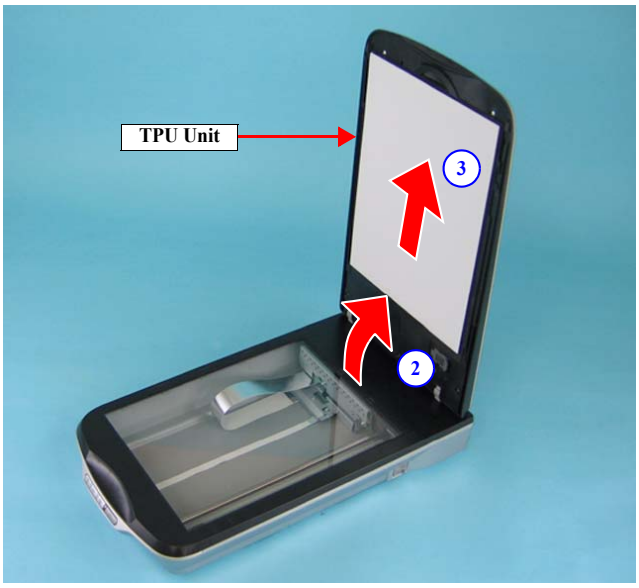



**Figure 4-3. Removing the TPU Unit (2)**

### 4.2.2 Removing the Upper Housing

1. Remove the TPU Unit. See Section 4.2.1 on page 32.
2. Remove the four C.B.P. M3 x 8 screws that secure the Upper Housing to remove it.

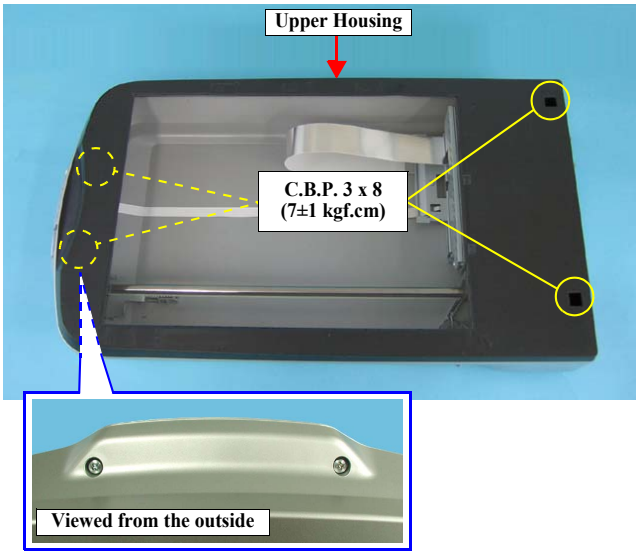



**Figure 4-4. Removing the Upper Housing**

### 4.2.3 Removing the Carriage Unit

1. Release the Carriage Lock at the rear of the main unit.

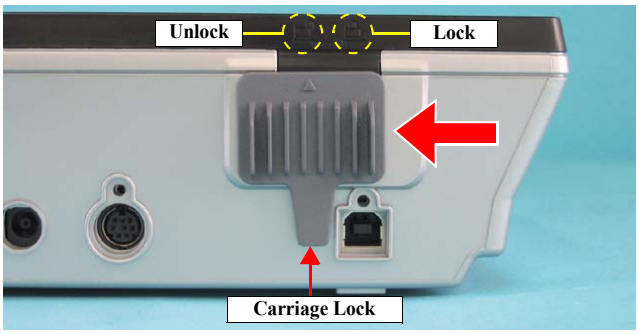



**Figure 4-5. Releasing the Carriage Lock**

2. Remove the Upper Housing. See Section 4.2.2 on page 33.
3. Move the Carriage Unit to the front of the main unit.

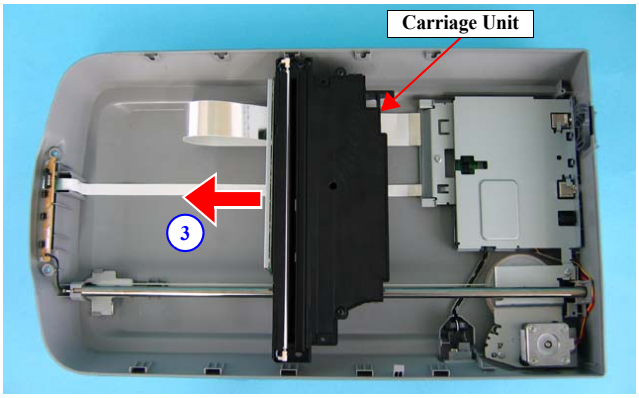



**Figure 4-6. Moving the Carriage Unit**

4. Disconnect the Carriage FFC from the Main Board. See Section 4.2.5 Step 5 - Step 7
5. Remove the two-sided tape that secure the Carriage FFC to the Upper Housing.
6. Remove the Ferrite Core from the Carriage FFC.

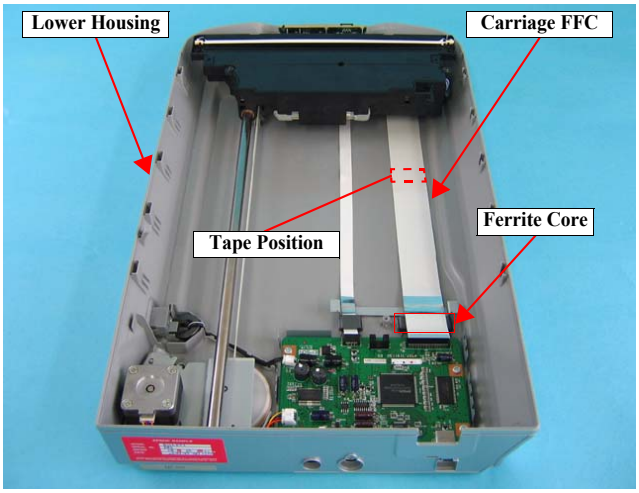



**Figure 4-7. Removing the Carriage FFC**


**Secure the Carriage FFC with a piece of two-sided tape at the position shown in Figure 4-7.**

7. Move the A part on the Driven Pulley Holder Assy. in the direction of the arrow and remove the CR Tension Belt from the Driven Pulley.

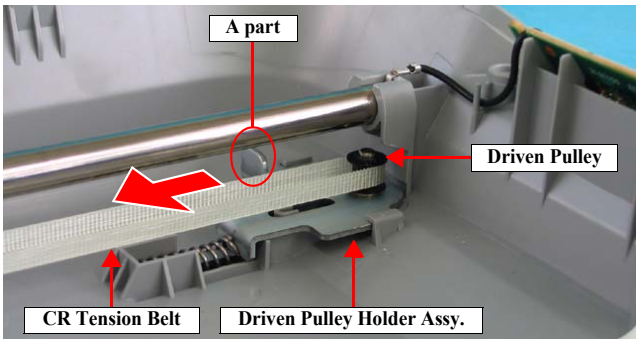



**Figure 4-8. Removing the CR Tension Belt**

8. Hold the Carriage Unit and release one end of the Carriage Shaft from the rear bushing of the Lower Housing, then pull the other end out of the front bushing of the Lower Housing.
9. Remove the Carriage Shaft from the Carriage Unit.

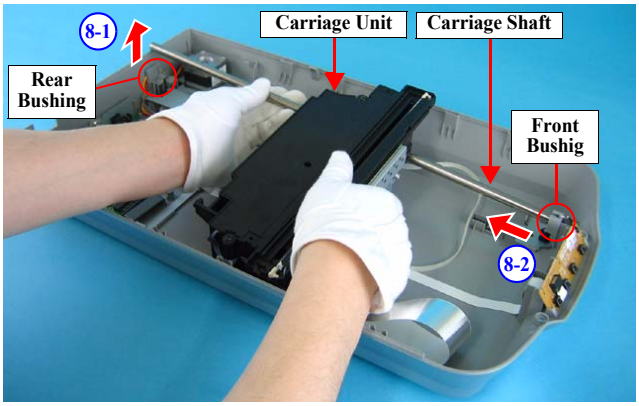



**Figure 4-9. Removing the Carriage Shaft**

10. Push up the B part of the Lock Plate attached on the rear of the Carriage Unit to remove the Lock Plate from the Carriage Unit.

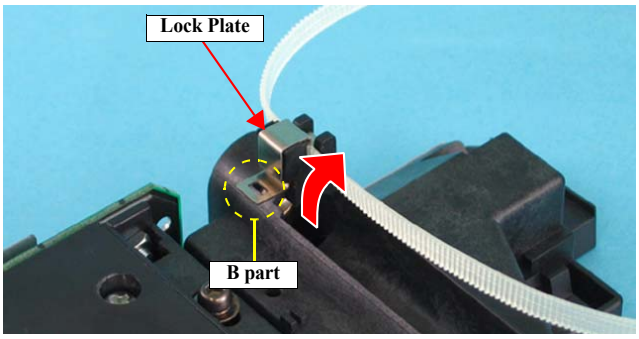



**Figure 4-10. Removing the Carriage Unit**

### 4.2.4 Removing the Panel Board

1. Remove the Carriage Unit. See Section 4.2.3 on page 34.
2. Pull the ground terminal out of the front bushing of the Lower Housing.
3. Lift the Panel Board and disconnect the Panel FFC Connector CN1, then remove the Panel Board.

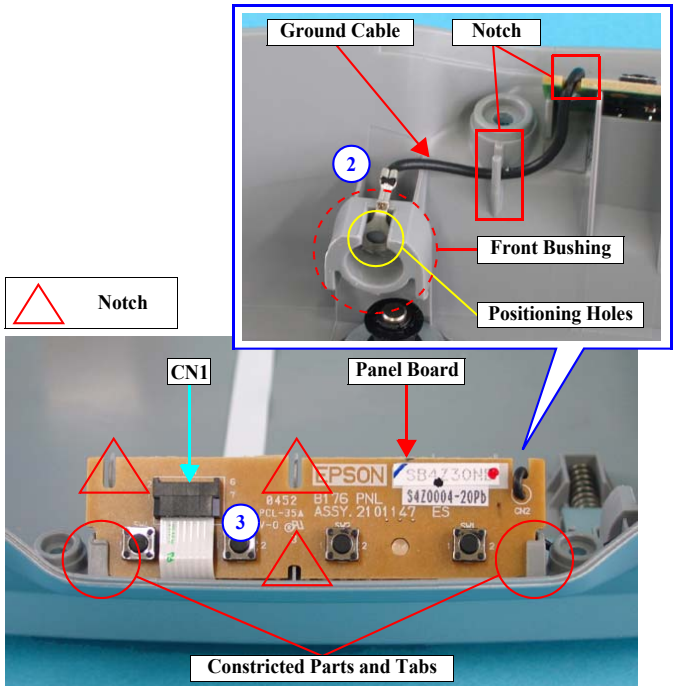



**Figure 4-11. Removing the Panel Board**

**When reinstalling the Panel Board, pay attention to the followings.**

- **Put the ground terminal into the front bushing of the Lower Housing as shown in Figure 4-11.**
- **Route the ground cable through the notches as shown in Figure 4-11.**
- **Insert the two constricted parts on both left and right ends of the Panel Board into the tabs of the Lower Housing and match the three notches of the board with the three tabs of the Lower Housing as shown in Figure 4-11.**

### 4.2.5 Removing the Main Board

1. Release the Carriage Lock. See Section 4.2.3 Step 1
2. Remove the Upper Housing. See Section 4.2.2 on page 33.
3. Move the Carriage Unit to the front of the main unit. See Section 4.2.3 Step 3
4. Remove the Carriage Lock from the Lower Housing.

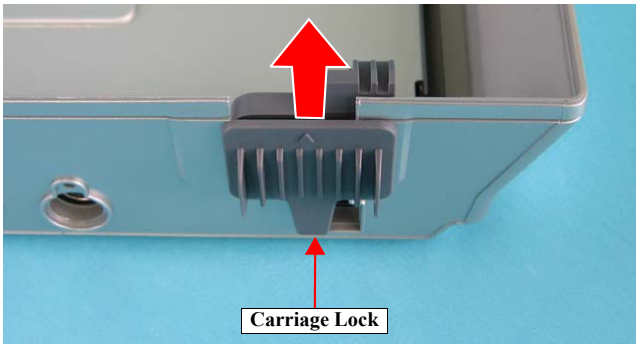



**Figure 4-12. Removing the Carriage Lock**

5. Remove the Main Board Cover in the following procedure.
   1. Remove the C.B.P. M3 x 8 screw and C.B.P. M3 x 12 screws that secure the Main Board Cover.
   2. Remove the two C.B.P. M3 x 8 screw that secure the Main Board from the rear of the main unit.

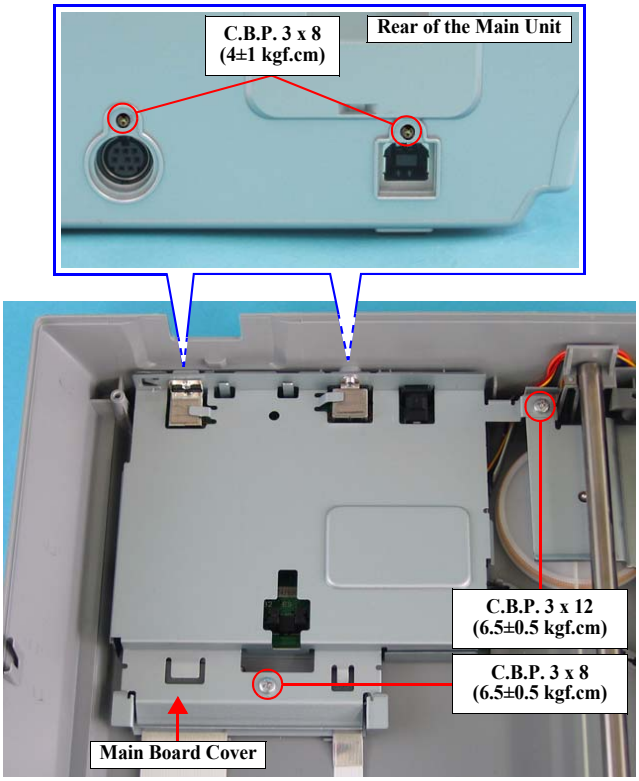



**Figure 4-13. Removing the Main Board Cover (1)**

3. Release the tab of the Main Board Cover with a flat-blade screwdriver and lift one side (tab side) of the Main Board Cover.
4. Slide the Main Board Cover in the direction of the arrow to release it from the two tabs and remove the Main Board Cover.

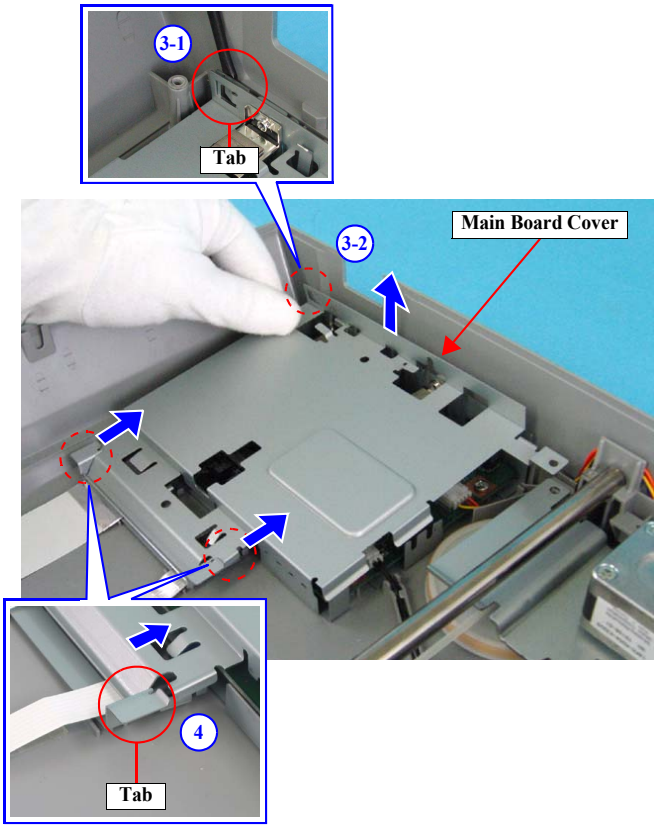



**Figure 4-14. Removing the Main Board Cover (2)**

**When reinstalling the Main Board Cover, match the two tabs and two interfaces with the holes of the Main Board Cover as shown below.**

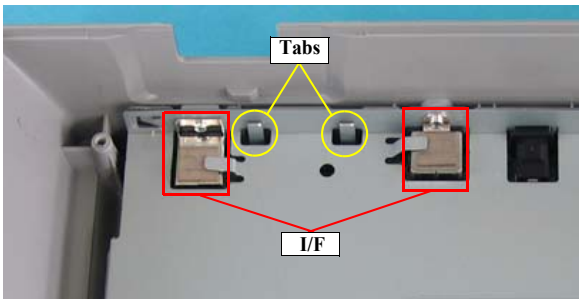



**Figure 4-15. Installing the Main Board Cover**

6. Remove the four C.B.P. M3 x 8 screws that secure the Main Board.
7. Disconnect the all connectors on the Main Board and remove the Main Board.
   CN1: Carriage FFC
   CN2: CR Motor Cable
   CN3: Power Switch Connector
   CN6: Panel FFC

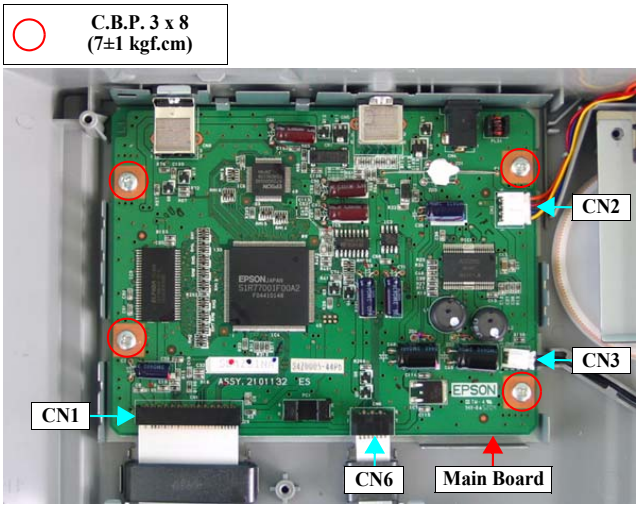



**Figure 4-16. Removing the Main Board**

### 4.2.6 Removing the Power Switch

1. Move the Carriage Unit to the front of the main unit. See Section 4.2.3 Step 1 - Step 3
2. Disconnect the Power Switch Connector CN3 from the Main Board. See Section 4.2.5 Step 5 - Step 7
3. Remove the Power Switch Connector Cable from the cable trench.

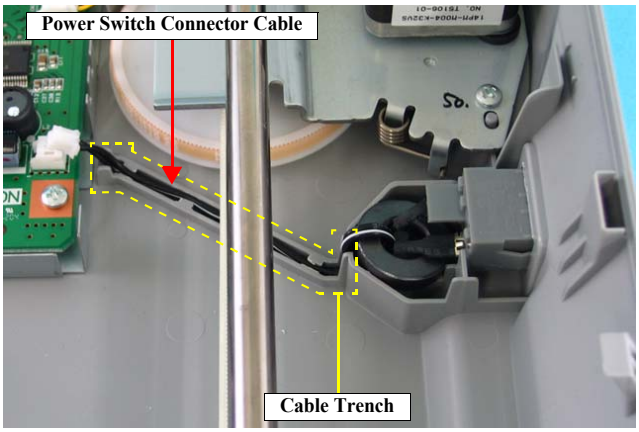



**Figure 4-17. Removing the Power Supply Cable Cover**

REASSEMBLY

**When reinstalling the Power Switch, route the Power Switch Connector Cable through the cable trench as shown in Figure 4-17.**

4. Push the Power Switch toward the outside while releasing the two tabs, and remove the Power Switch by pushing it out through the hole on the Lower Housing.

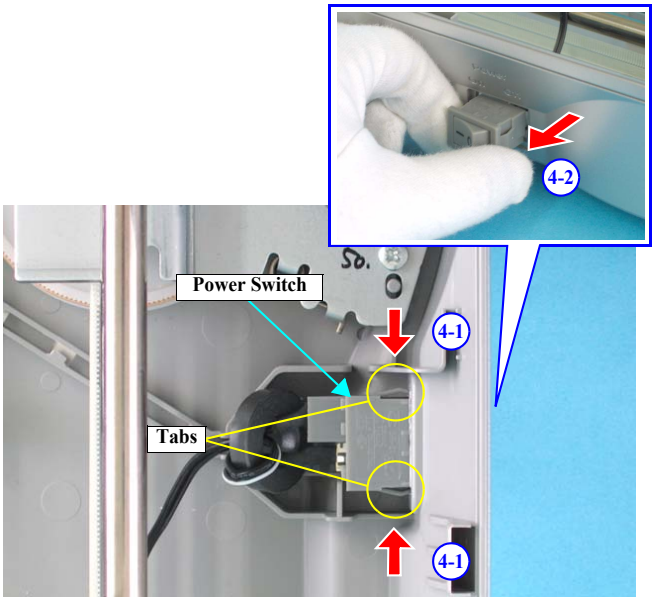



**Figure 4-18. Removing the Power Switch**

### 4.2.7 Removing the Panel FFC

1. Move the Carriage Unit to the front of the main unit. See Section 4.2.3 Step 1 - Step 3
2. Disconnect the Panel FFC from the Main Board. See Section 4.2.5 Step 1 - Step 7
3. Move the Carriage Unit to its home position, and remove the two-sided tape that secure the Panel FFC.
4. Disconnect the Panel FFC from CN1 Connector on the Panel Board.

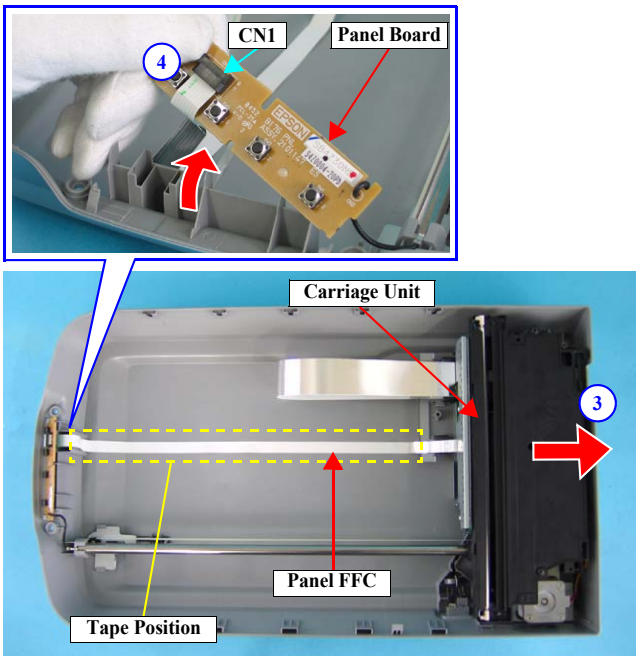



**Figure 4-19. Removing the Panel FFC**

REASSEMBLY

- **When installing the Panel FFC, attach the Ferrite Core as shown in the figure below.**

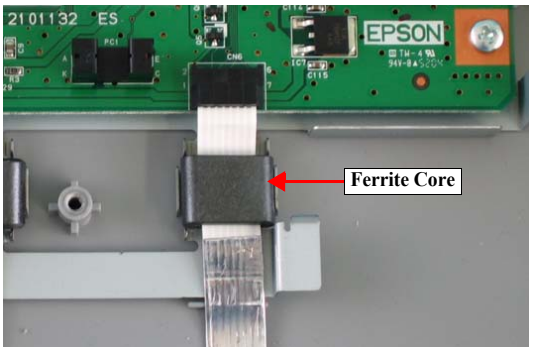



**Figure 4-20. Installing the Ferrite Core**

- **Secure the Panel FFC with a piece of two-sided tape at the position shown in Figure 4-19.**

### 4.2.8 Removing the Driven Pulley, Driven Pulley Spring, and the Driven Pulley Holder Assy.

1. Remove the Carriage Unit. See Section 4.2.3 on page 34.
2. Hold the A part of the Driven Pulley Holder Assy. and slide it in the direction of the arrow to remove the assy. from the two tabs on the Lower Housing.

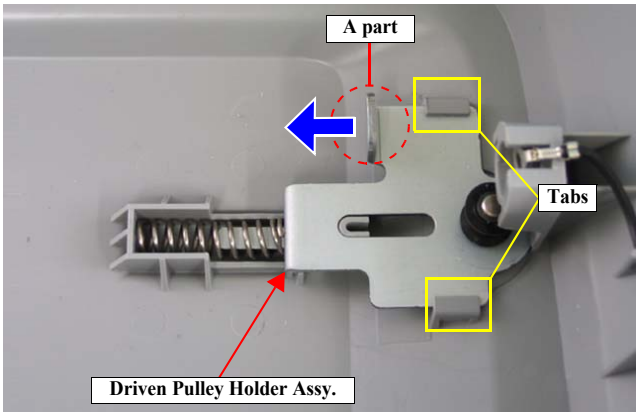



**Figure 4-21. Removing the Driven Pulley Holder Assy.**

3. Remove the Driven Pulley Spring from the Driven Pulley Holder Assy.
4. Remove the washer and remove the Driven Pulley from the shaft of the Driven Pulley Holder Assy.

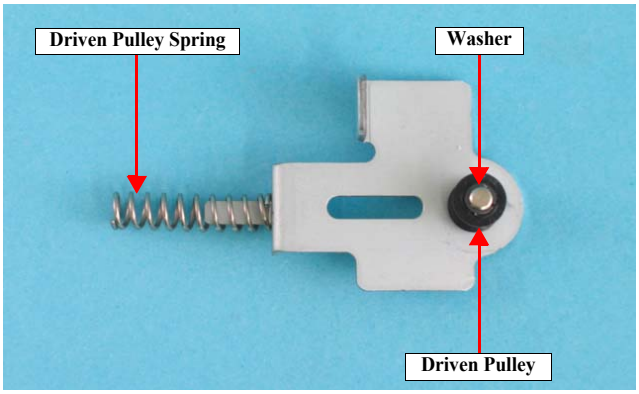



**Figure 4-22. Removing the Driven Pulley and the Driven Pulley Spring**

### 4.2.9 Removing the CR Motor Unit, Motor Tension Belt, and the CR Tension Belt

1. Remove the Carriage Unit. See Section 4.2.3 on page 34.
2. Disconnect the CR Motor Connector CN2 from the Main Board. See Section 4.2.5 Step 1 - Step 5
3. Remove the two C.B.P. M3 x 8 screws that secure the CR Motor Unit and remove it together with the ground plate.

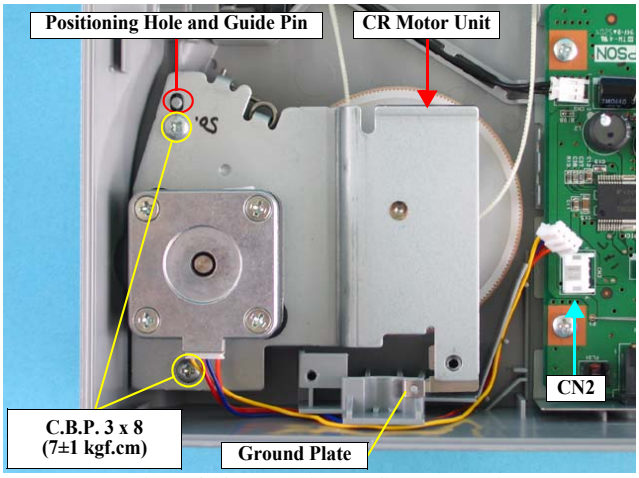



**Figure 4-23. Removing the CR Motor Unit**

REASSEMBLY

- **Install the ground plate in the following procedure.**
1. **Match the positioning hole of the ground plate with the guide pin of the Lower Housing.**
2. **Place the CR Motor Unit as shown in the figure below and secure the CR Motor Unit and the ground plate to the Lower Housing.**

- **When installing the CR Motor Unit, match the positioning hole and the guidepin as shown in Figure 4-23.**
- **Route the CR Motor Cable through the tabs and slot as shown in the figure below.**

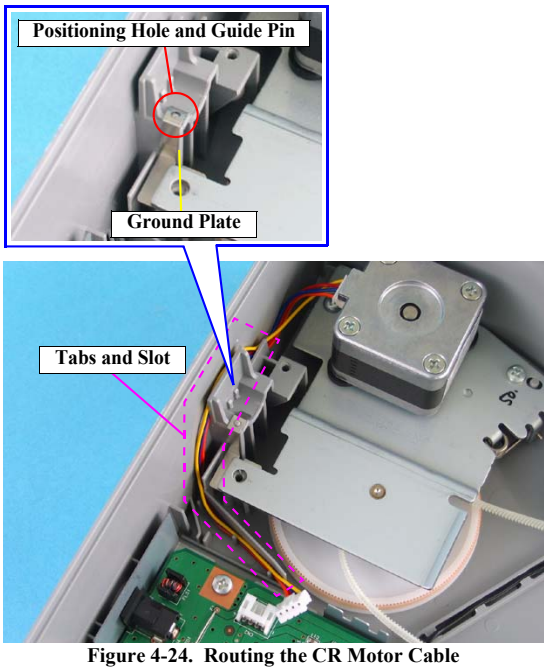



**Figure 4-24. Routing the CR Motor Cable**

3. Remove the torsion spring and the C.B. M3 x 3 screw that secure the Tensioner, and remove the Pulley.

ADJUSTMENT REQUIRED

**When installing the Tensioner, make sure to perform the Tensioner Adjustment.** **See Section 5.1.2.1 on page 58.**

4. Remove the Motor Tension Belt and the CR Tension Belt from the CR Motor Unit in that order.

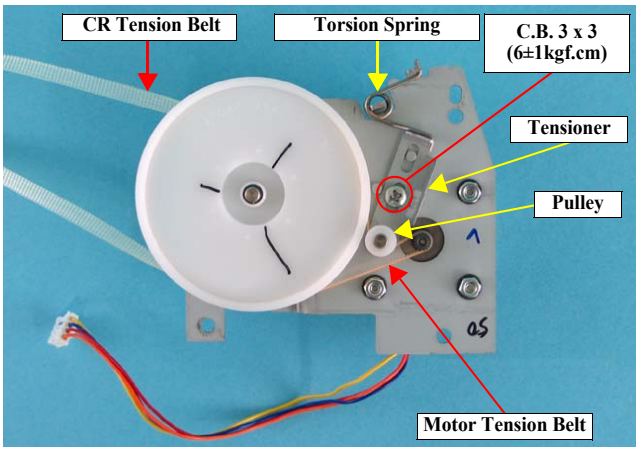



**Figure 4-25. Removing the Motor Tension Belt and the CR Tension Belt**

## 4.2.10 Removing TPU Lower Housing

1. Remove the TPU Unit. See Section 4.2.1 on page 32.
2. Slide the Housing Mat (Document Cover) to the front of the main unit and remove it from the four slots of the TPU Unit.
3. Release the TPU Carriage Lock.

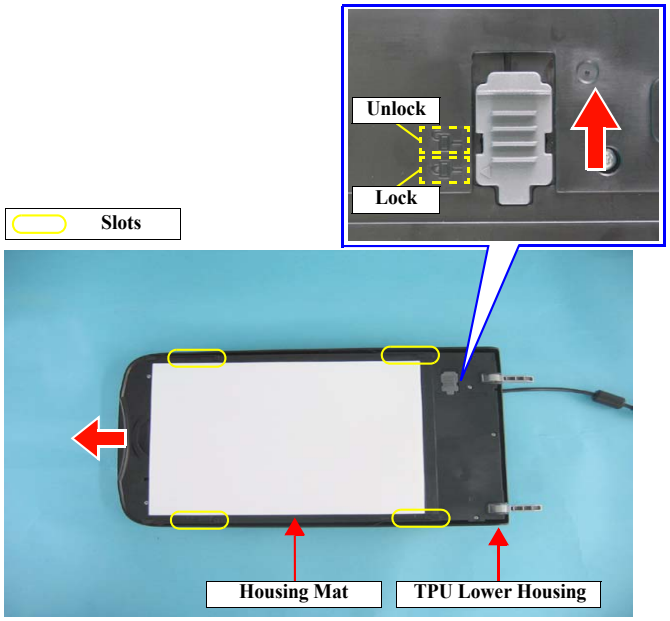



**Figure 4-26. Removing the Housing Mat (Document Cover)**

4. Remove the six C.B.P. M3 x 12 screws and the two C.B.P. M3 x 8 screws that secure the TPU Lower Housing.

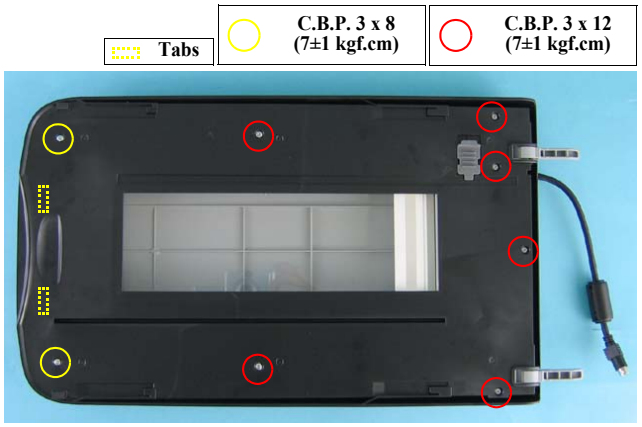



**Figure 4-27. Removing the TPU Lower Housing (1)**

5. Lift the rear (hinge side) of the TPU Lower Housing and slide it in the direction of the arrow to release the two tabs and remove the TPU Lower Housing.


**Figure 4-28. Removing TPU Lower Housing (2)**

## 4.2.11 Removing the Sensor Board

1. Remove the TPU Lower Housing. See Section 4.2.10 on page 45.
2. Remove the C.B.P. M3 x 8 screw that secures the Sensor Board.
3. Disconnect the Sensor Connector CN1 while lifting the Sensor Board, and remove the Sensor Board.

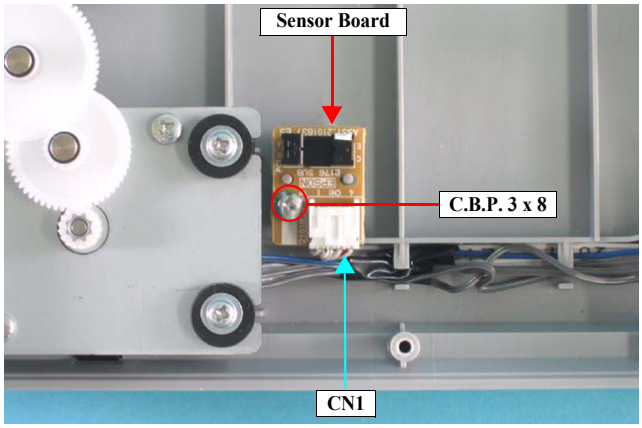



**Figure 4-29. Removing the Sensor Board**

## 4.2.12 Removing the Hinge Assy.

1. Remove the TPU Lower Housing. See Section 4.2.10 on page 45.
2. Remove the four C.B.P. M4 x 12 screws that secure the left and right Hinge Assy.s and remove them.

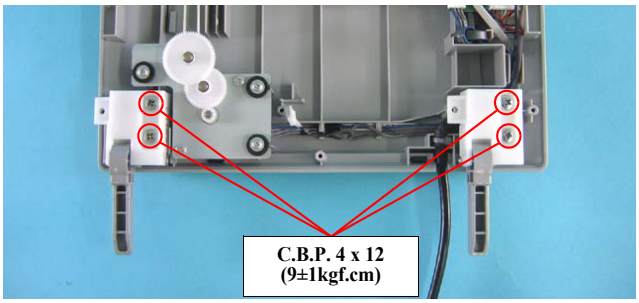



**Figure 4-30. Removing the Hinge Assy.**

## 4.2.13 Removing the TPU Unit Cable

1. Remove the TPU Lower Housing. See Section 4.2.10 on page 45.
2. Remove the left and right Hinges. See Section 4.2.12 on page 46.
3. Remove the C.B.P. M3 x 8 screw that secures the TPU Unit Cable.
4. Disconnect the TPU Unit Connector CN1 from the DRV Board.
5. Release the TPU Unit Cable from the notches shown in the figure below.

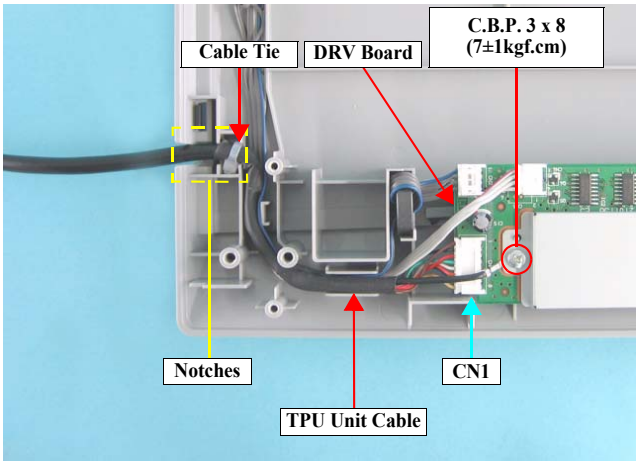



**Figure 4-31. Removing the TPU Unit Cable (2)**

REASSEMBLY

- **When installing the TPU Unit Cable, put the cable and the cable tie into the notches as shown in Figure 4-31.**
- **When connecting the TPU Unit Cable to the DRV Board, route the cable as shown in the figure below.**

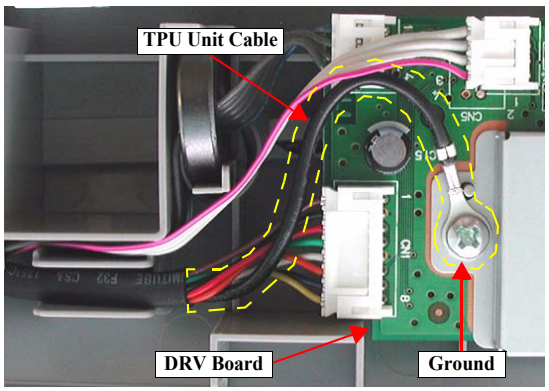



**Figure 4-32. Routing the TPU Unit Cable**

## 4.2.14 Removing the DRV Board

1. Remove the TPU Lower Housing. See Section 4.2.10 on page 45.
2. Remove the two C.B.P. M3 x 8 screws that secure the DRV Board Cover and remove the ground to remove the DRV Board Cover.

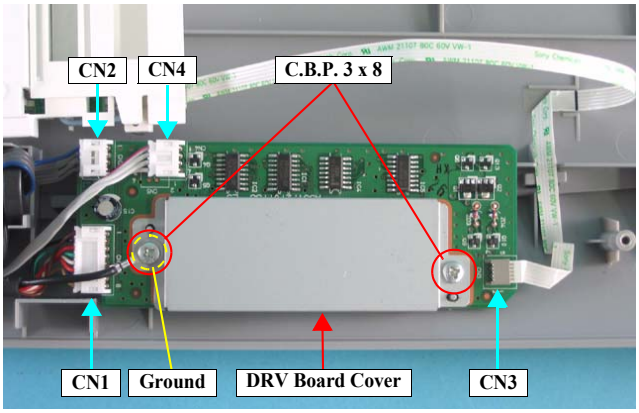



**Figure 4-33. Removing the DRV Board (1)**

3. Disconnect the all connectors on the DRV Board and remove the DRV Board.
   CN1: TPU Unit Cable
   CN2: TPU Motor Connector
   CN4: Sensor
   CN3: DRV Inverter FFC

## 4.2.15 Removing Torsion Spring

CAUTION

- **When performing the procedure given below, be careful not to lose the three torsion springs that apply tension to the TPU CR Drive Belt .**
- **The size of a torsion spring and the length of a timing belt have been modified in the middle of the mass production for reducing costs.**
  **Because of that, the number of the torsion springs to be installed and how they are attached differ for the late products. Make sure to read the technical information (TE05-0371) before performing the following work.**

1. Remove the TPU Lower Housing. See Section 4.2.10 on page 45.
2. Remove the TPU CR Drive Belt from the TPU Driven Pulley.

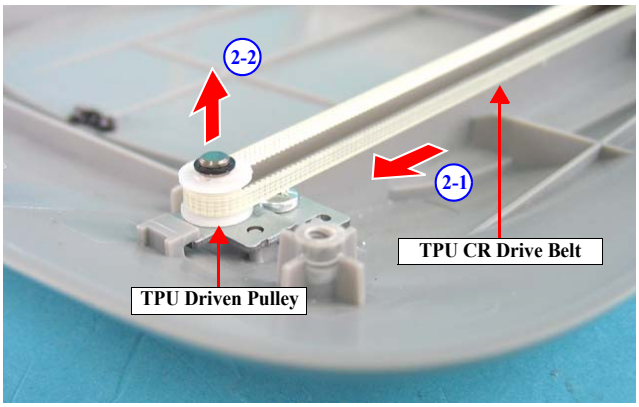



**Figure 4-34. Removing the TPU CR Drive Belt (2)**

3. Remove the two torsion springs attached to the outer TPU CR Drive Belt.

ADJUSTMENT REQUIRED

**To adjust the tension of the TPU CR Drive Belt, attach the three torsion springs in the following procedure.**

1. **Move the TPU Carriage Unit to the center.**
2. **Attach the three torsion springs orienting each as shown in the figure below.**
3. **Loop the TPU CR Drive Belt over the TPU Driven Pulley.**
4. **Slide the three torsion springs to the positions shown in the figure below.**

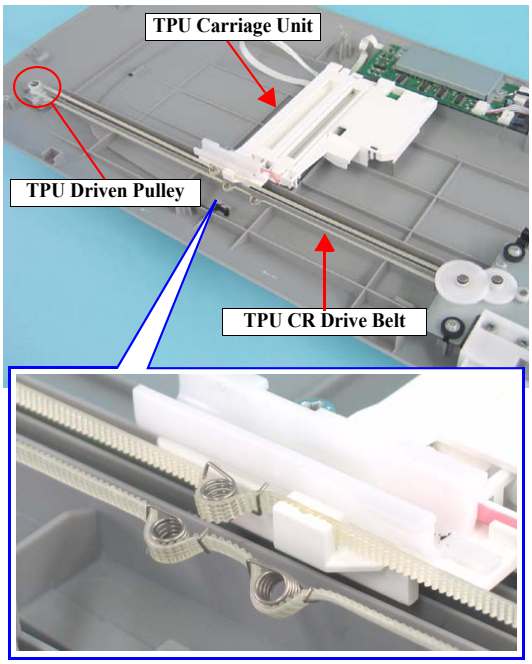



**Figure 4-35. Installing the Torsion Springs**

## 4.2.16 Removing the TPU Carriage Unit

**CAUTION**

**When performing the procedure given below, be careful not to lose the three torsion springs that apply tension to the TPU CR Drive Belt .**

1. Remove the TPU Lower Housing. See Section 4.2.13 on page 47.
2. Remove the torsion springs. See Section 4.2.15 on page 49.

**CAUTION**

**When performing the next step, be careful not to lose the flat washer that secures the Driven Pulley.**

3. Remove the flat washer that secures the Driven Pulley of the TPU CR Motor Assy. and remove the Driven Pulley and TPU CR Drive Belt in that order.

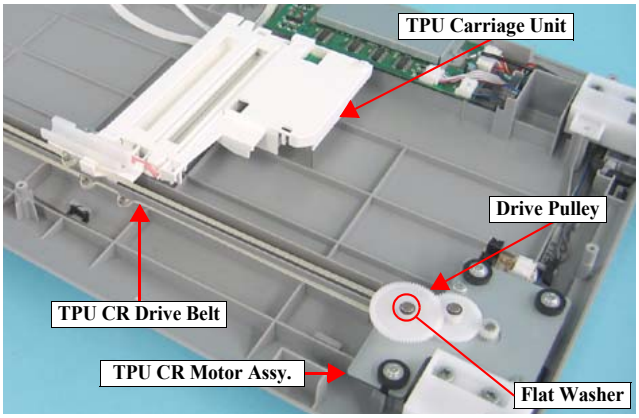



**Figure 4-36. Removing the TPU CR Drive Belt**

4. Remove the CN3 Connector from the DRV Board, and remove the two-sided tape to remove the TPU Carriage Unit.

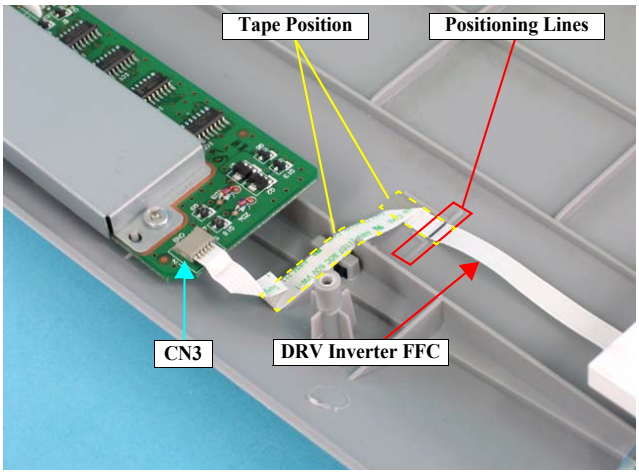



**Figure 4-37. Removing the DRV Inverter FFC**

**REASSEMBLY**

- **When installing the DRV Inverter FFC, make sure to align the positioning lines both on the FFC and the TPU Upper Housing as shown in Figure 4-37 before attaching the FFC with the two-sided tape.**
- **See Section 4.2.15 on page 49 for information how to attach the torsion springs.**

## 4.2.17 Removing the TPU Inverter Board

1. Remove the TPU Carriage Unit. See Section 4.2.16 on page 50.
2. Disconnect the Connector CN1 from the TPU Inverter Board.
3. Release the DRV Inverter FFC from the DRV Inverter FFC Tab of the TPU Carriage Frame and remove the acetate tape that secures the DRV Inverter FFC.

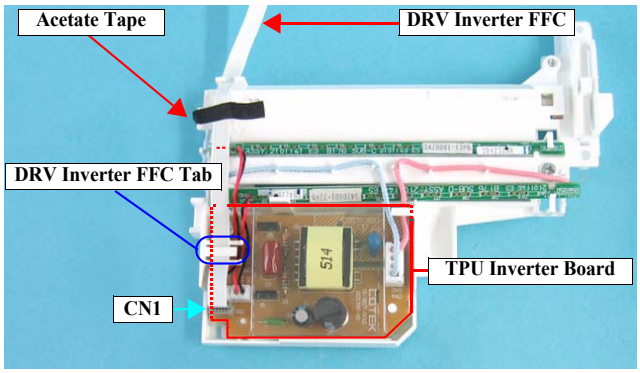



**Figure 4-38. Removing the DRV Inverter FFC**

4. Release Connector Cables from the tabs of the Carriage Frame shown in the figure below.
5. Disconnect the all connectors (CN2, CN3, CN4) from the TPU Inverter Board.
6. Remove the C.B.P. M3 x 8 screw that secures the TPU Inverter Board.
7. Lift the TPU Inverter Board to release it from the tab of the TPU Carriage Frame, and remove the TPU Inverter Board.

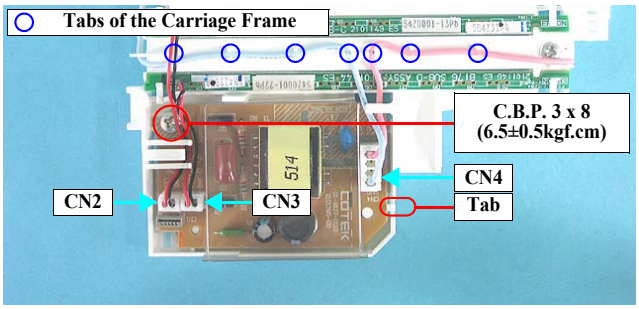



**Figure 4-39. Removing the TPU Inverter Board (1)**

8. Remove the Protective Cover from the TPU Inverter Board.

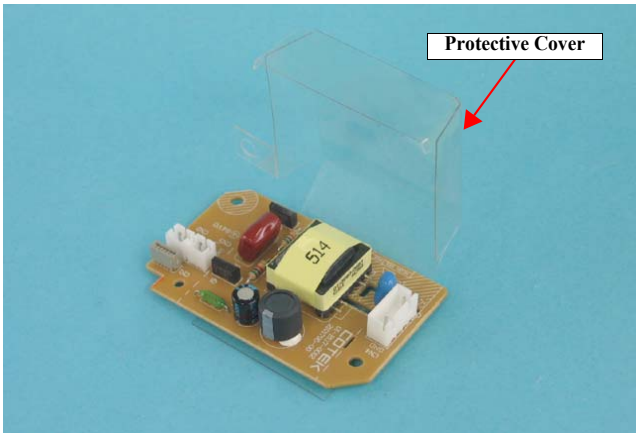



**Figure 4-40. Removing the TPU Inverter Board (2)**

REASSEMBLY

- **When installing the TPU Inverter Board to the TPU Carriage Frame, match the positioning holes and the guide pins as shown in the figure below.**
- **When connecting CN2 and CN3 Connector Cables, route them under the tab (DRV Inverter FFC Tab) as shown in the figure below.**

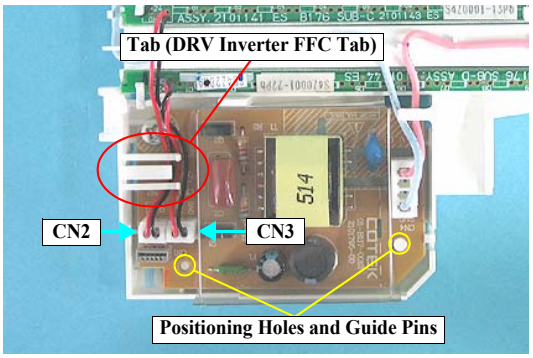



**Figure 4-41. Routing the DRV Inverter Cables**

- **When connecting the DRV Inverter FFC to the TPU Inverter Board, put the FFC through the tab (DRV Inverter FFC Tab) as shown in Figure 4-38.**
- **Secure the DRV Inverter FFC with a piece of acetate tape at the position shown in Figure 4-38.**

## 4.2.18 Removing the SUB_C Board, SUB_D Board, and the Lamp

1. Remove the TPU Carriage Unit. See Section 4.2.16 on page 50.
2. Remove the TPU Inverter Board. See Section 4.2.17 on page 51.
3. Remove the SUB_C and SUB_D Boards in the following procedure.
   1. Pull up the A tabs and slide each of the SUB_C and SUB_D Boards in the direction of the arrows (3-1).
   2. Slide the SUB_C and SUB_D Boards in the direction of the arrows (3-2) and release them from the B tabs to remove the boards.

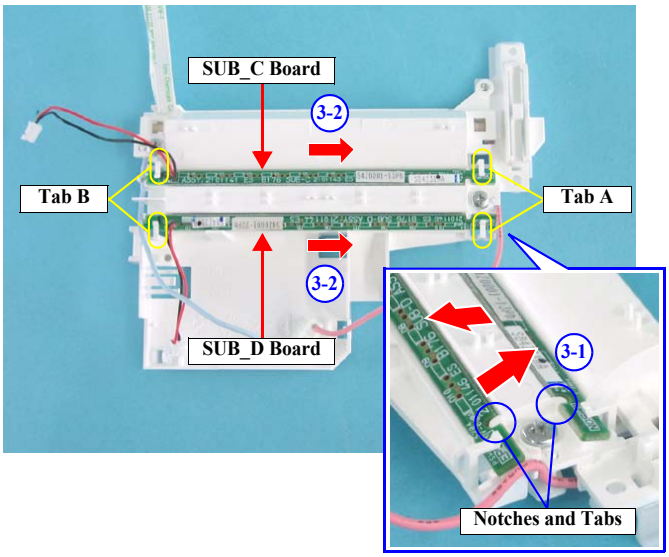



**Figure 4-42. Removing the SUB_C Board and SUB_D Board**

4. Remove the two C.B.P. M3 x 6 screws that secure the TPU Lamp Cover to remove it.

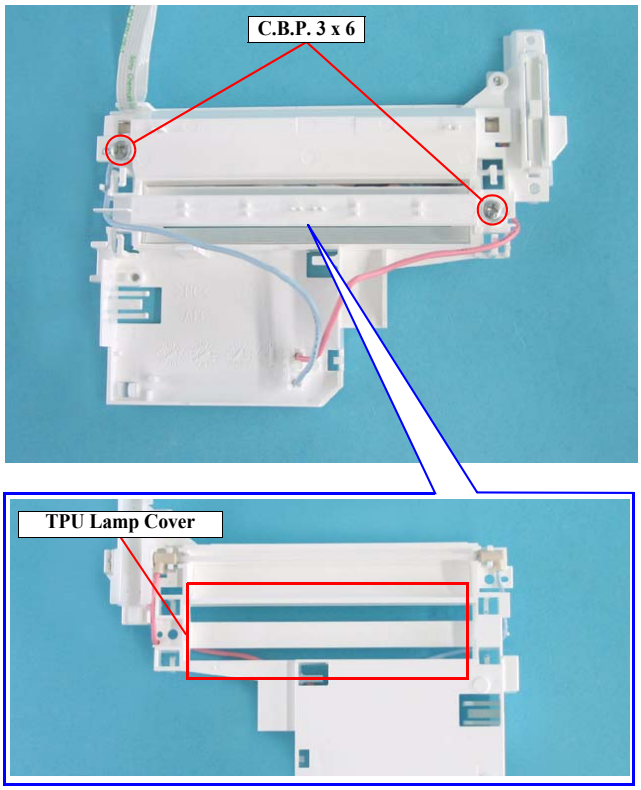



**Figure 4-43. Removing the TPU Lamp Cover**

5. Remove the Lamp from the two tabs on each end of the TPU Carriage Unit.

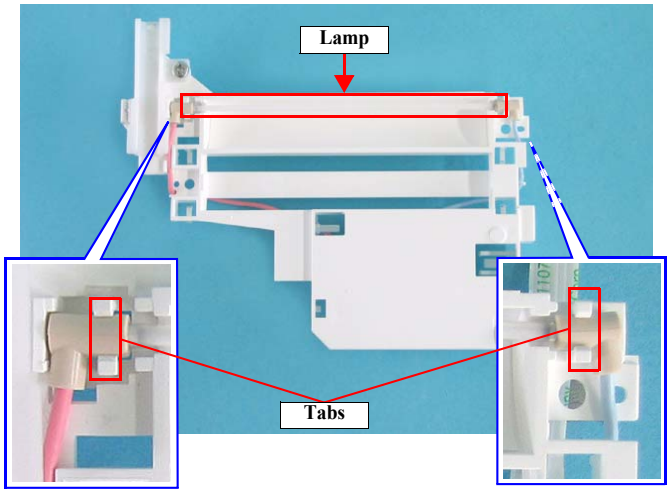



**Figure 4-44. Removing the Lamp**

REASSEMBLY

- **When installing the SUB_C Board and SUB_D Board, match the notches and tabs as shown in Figure 4-42.**
- **When installing the TPU Lamp Cover, match the positioning holes and the guide pins as shown in the figure below.**
- **Route the Lamp cables as shown in the figure below.**

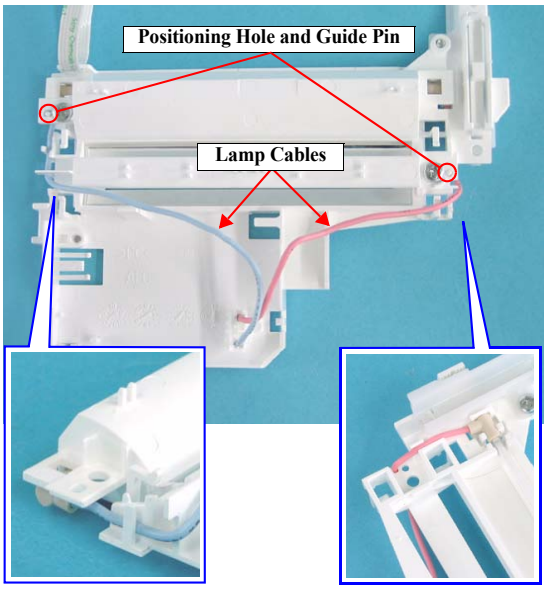



**Figure 4-45. Routing the Lamp Cables**

## 4.2.19 Removing the TPU CR Motor

**CAUTION**

**When performing the procedure given below, be careful not to lose the three torsion springs that apply tension to the TPU CR Drive Belt .**

1. Remove the Hinge Assy.s. See Section 4.2.12 on page 46.
2. Remove the TPU Carriage Unit. See Section 4.2.16 on page 50.
3. Disconnect the TPU CR Motor Connector CN2 from the DRV Board.
4. Release the Ferrite Core and CN2 Connector Cable from the notch and tabs shown in Figure 4-46.

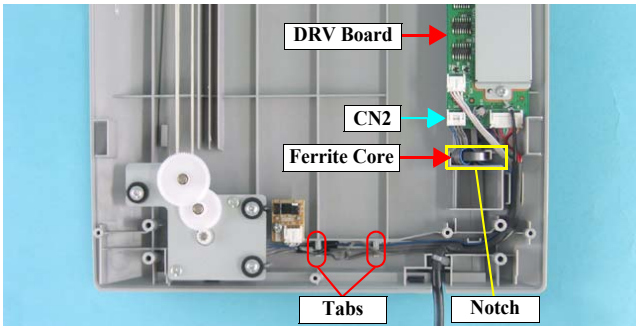



**Figure 4-46. Removing the TPU CR Motor Connector**

5. Remove the three C.P.F.P. M3 x 8 screws that secure the TPU CR Motor Unit and remove it.

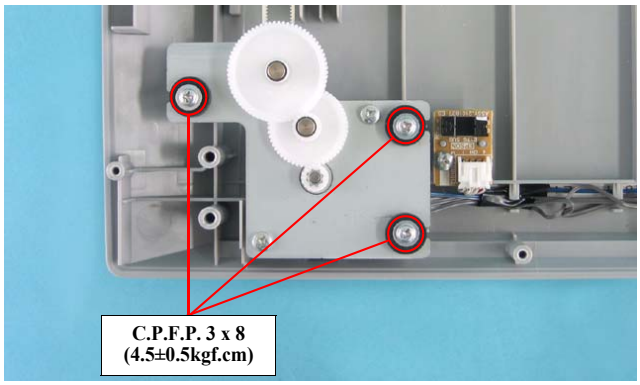



**Figure 4-47. Removing the TPU CR Motor Unit (1)**

6. Remove the TPU CR Drive Belt from the TPU Driven Pulley and remove the TPU CR Motor Unit.

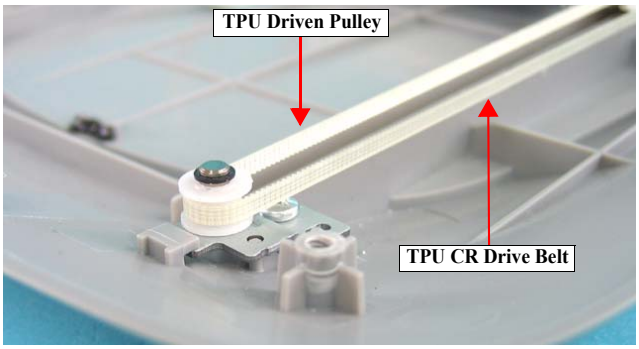



**Figure 4-48. Removing the TPU CR Motor Unit (2)**

7. Remove the three TPU CR Motor Dampers.
8. Remove the flat washer and remove the Driven Pulley, TRU CR Drive Belt, and the Idle Pulley in that order.

CAUTION

**When performing the next step, be careful not to lose the flat washer that secures the Driven Pulley and Idle Pulley.**

9. Remove the two C.B. M3 x 5 screws that secure the TPU CR Motor and remove it.

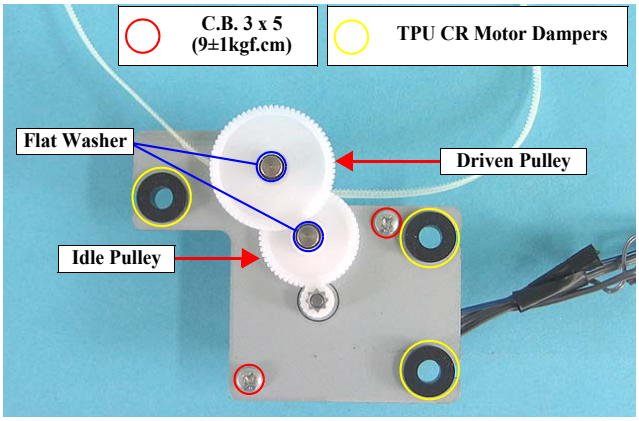



**Figure 4-49. Removing the TPU CR Motor Dampers and TPU CR Motor**

REASSEMBLY

- **Route the TPU CR Motor Cables through the groove and notches as shown in the figure below.**

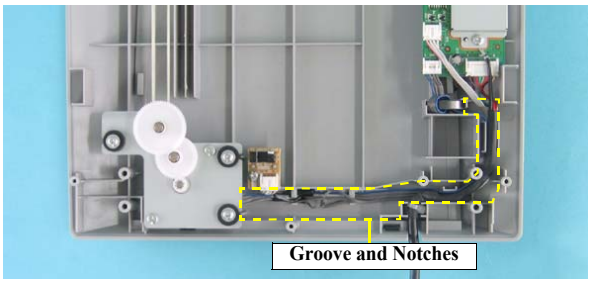



**Figure 4-50. Routing the TPU CR Motor Cables**

- **If the torsion springs come off, be sure to reattach them correctly.** **See Section 4.2.15 on page 49.**

CHAPTER

5

# ADJUSTMENT

# 5.1 Overview

This section explains the adjustment required when this product is disassembled.

## 5.1.1 Adjustment item

The adjustment item necessary for this product is as indicated below.

**Table 5-1. Adjustment Item**

| Adjustment Item | Condition |
|---|---|
| Adjustment of Motor Tension Belt tension | When the Motor Tension Belt is removed or loosened |
| Adjustment of the torsion springs on the TPU CR Drive Belt | After removing and reinstalling the springs which apply tension to the TPU CR Drive Belt. |

## 5.1.2 Adjustment method

### 5.1.2.1 Motor Tension Belt tension adjustment

1. Press the Pulley against the Motor Tension Belt, and temporarily fit the Tensioner.
2. Install the Torsion Spring as shown in Figure 5-1 to secure the Tensioner under tension.

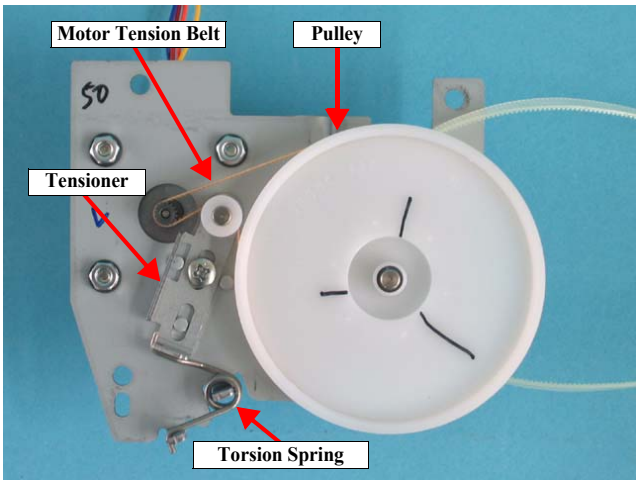



**Figure 5-1. Tension Adjustment**

## 5.1.3 Adjustment of Torsion Springs on the TPU CR Drive Belt

See Section 4.2.15 on page 49 for information on how to adjust the torsion springs.

CHAPTER

6

# MAINTENANCE

# 6.1 Overview

This chapter explains the maintenance work necessary to keep this product in the best condition and to prevent problems.

## 6.1.1 Cleaning

Clean the outside of the product with a neutral detergent, and clean its inside with a vacuum cleaner. Special care must be taken when cleaning the Document Glass since it affects the quality of image scanning. If it is dirty, wipe it with a clean, soft and dry cloth.

CAUTION

- **Never use organic solvents, such as thinner and benzene, because they may deteriorate or degrade the plastic and rubber parts.**
- **When using compressed air products; such as air duster, for cleaning during repair and maintenance, the use of such products containing flammable gas is prohibited.**

- ☐ Exterior
  After wetting a clean cloth with water and then completely squeezing water out of it, wipe the exterior with that close. If the exterior is extremely dirty, wipe it with a cloth moistened with a small amount of detergent.
- ☐ Document Glass
  Clean it with a clean, dry cloth. When the Document Glass is especially dirty or has foreign matter on its surface, wipe it with a cloth moistened with a small amount of pure water. If the Document Glass has traces of wiping after cleaning, completely wipe it with a dry, clean cloth again.
- ☐ Scanner inside
  Before reinstall the Upper Housing after it had been removed, make sure to remove the dust inside of the scanner and the Upper Housing. Squirt them with plenty of air.

## 6.1.2 Lubrication

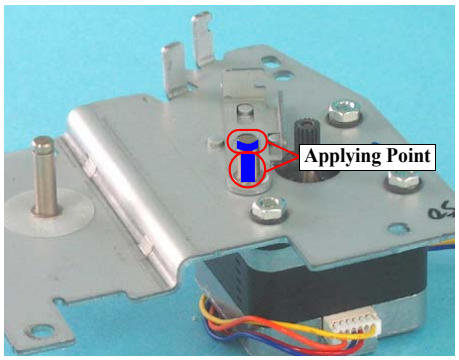
Lubrication is required when any part of the Carriage Unit of the scanner has been replaced or the Carriage moves with noticeably large operation noise. The specified grease is indicated in Table 6-1, and the lubrication points are shown in Figure.

**Table 6-1. Specified Grease**

| Type | Name | Part Number | Supplier |
|---|---|---|---|
| Grease | G-26 | 1080614 | EPSON |

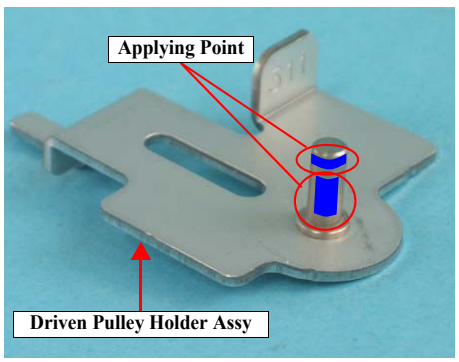
CAUTION

- **Note that a failure to strictly observe the specified amount of application will contaminate the mechanisms or lead to a malfunction.**
- **If the oil contaminate components, wipe it off with a cloth impregnated with alcohol and let the component dry completely before reassembling.**



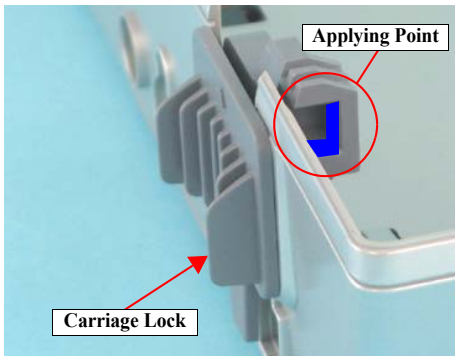

| |
|---|
| [Lubrication Point]<br>Pulley shaft of the CR Motor Unit |
| [Lubrication Type]<br>G-26 |
| [Lubrication Amount]<br>Adequate dose |
| [Remarks]<br>Use a brush to apply it |

**Figure 6-1. Lubricating the CR moter Unit**



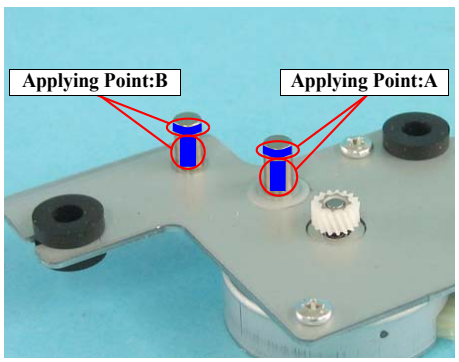

| |
|---|
| [Lubrication Point]<br>Shaft of the Driven Pulley |
| [Lubrication Type]<br>G-26 |
| [Lubrication Amount]<br>Adequate dose |
| [Remarks]<br>Use a brush to apply it |

**Figure 6-2. Lubricating the Driven Pulley Holder Assy**



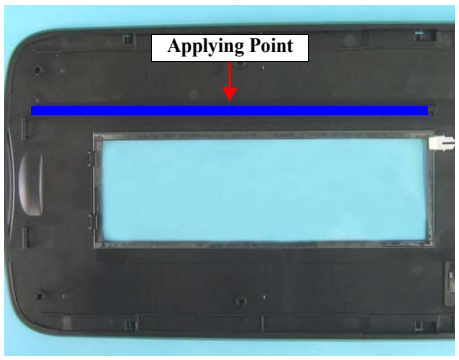

| |
|---|
| [Lubrication Point]<br>Concave portion of the Carriage Lock |
| [Lubrication Type]<br>G-26 |
| [Lubrication Amount]<br>Adequate dose |
| [Remarks]<br>Use a brush to apply it |

**Figure 6-3. Lubricating the Carriage Lock**



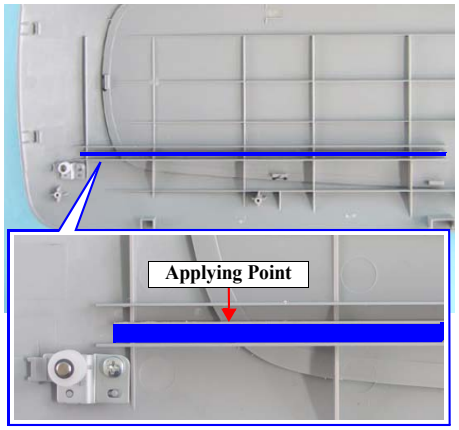

| |
|---|
| [Lubrication Point]<br>A: Idle Pulley shaft on the TPU CR Motor Assy.<br>B: Driven Pulley shaft on the TPU CR Motor Assy. |
| [Lubrication Type]<br>G-26 |
| [Lubrication Amount]<br>Adequate dose |
| [Remarks]<br>Use a brush to apply it |

**Figure 6-4. Lubricating the TPU CR Moter Assy**




| |
|---|
| [Lubrication Point]<br>Carriage guide rail on the TPU Lower Housing |
| [Lubrication Type]<br>G-26 |
| [Lubrication Amount]<br>Adequate dose |
| [Remarks]<br>Use a brush to apply it |

**Figure 6-5. Lubricating the TPU Lower Housing**




| |
|---|
| [Lubrication Point]<br>Carriage guide rail on the TPU Upper Housing |
| [Lubrication Type]<br>G-26 |
| [Lubrication Amount]<br>Adequate dose |
| [Remarks]<br>Use a brush to apply it |

**Figure 6-6. Lubricating the TPU Upper Housing**

CHAPTER

7

# APPENDIX

## 7.1 Connectors

The following table indicates the connector signal wiring on the electrical circuit boards of this product.

### 7.1.1 Connector Reference Table

| Board | Connector | Description | Number of Pins |
|---|---|---|---|
| Main Board | CN1 | CCD Board | 29 |
| | CN2 | CR Motor | 4 |
| | CN3 | Power Switch | 2 |
| | CN4 | AC Input | 3 |
| | CN5 | DRV Board | 8 |
| | CN6 | Panel Board | 7 |
| | CN8 | USB2.0 | 4 |
| Panel Board | CN1 | Main Board | 7 |
| | CN2 | GND | - |
| CCD Board | CN1 | Main Board | 29 |
| | CN2 | Inverter Board | 2 |
| | CN3 | Sensor Board | 2 |
| Inverter Board | CN1 | CCD Board | 2 |
| | CN2 | Fluorescent Lamp | 4 (2)*1 |
| DRV Board | CN1 | Main Board | 8 |
| | CN3 | TPU Inverter Board | 5 |
| | CN4 | TPU CR Motor | 4 |
| | CN5 | Sensor Board | 4 |
| Sensor Board | CN1 | DRV Board | 4 |
| TPU Inverter Board | CN1 | DRV Board | 5 |
| | CN2 | SUB_C Board | 2 |
| | CN3 | SUB_D Board | 2 |
| | CN4 | Fluorescent Lamp | 4 (2)*1 |

Note *1: Using two of the four pins.

### 7.1.2 Connector Configuration

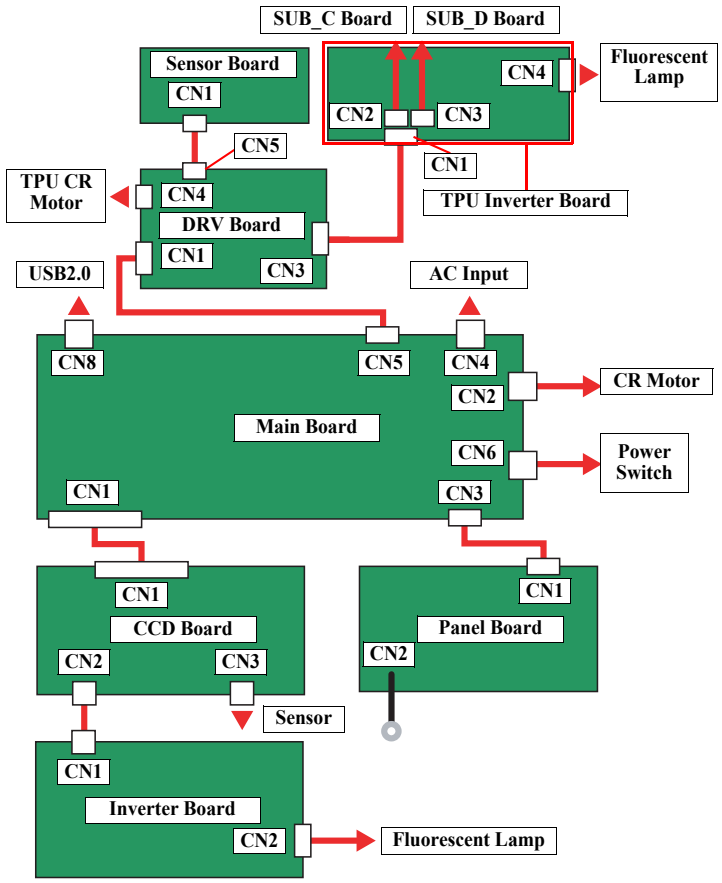
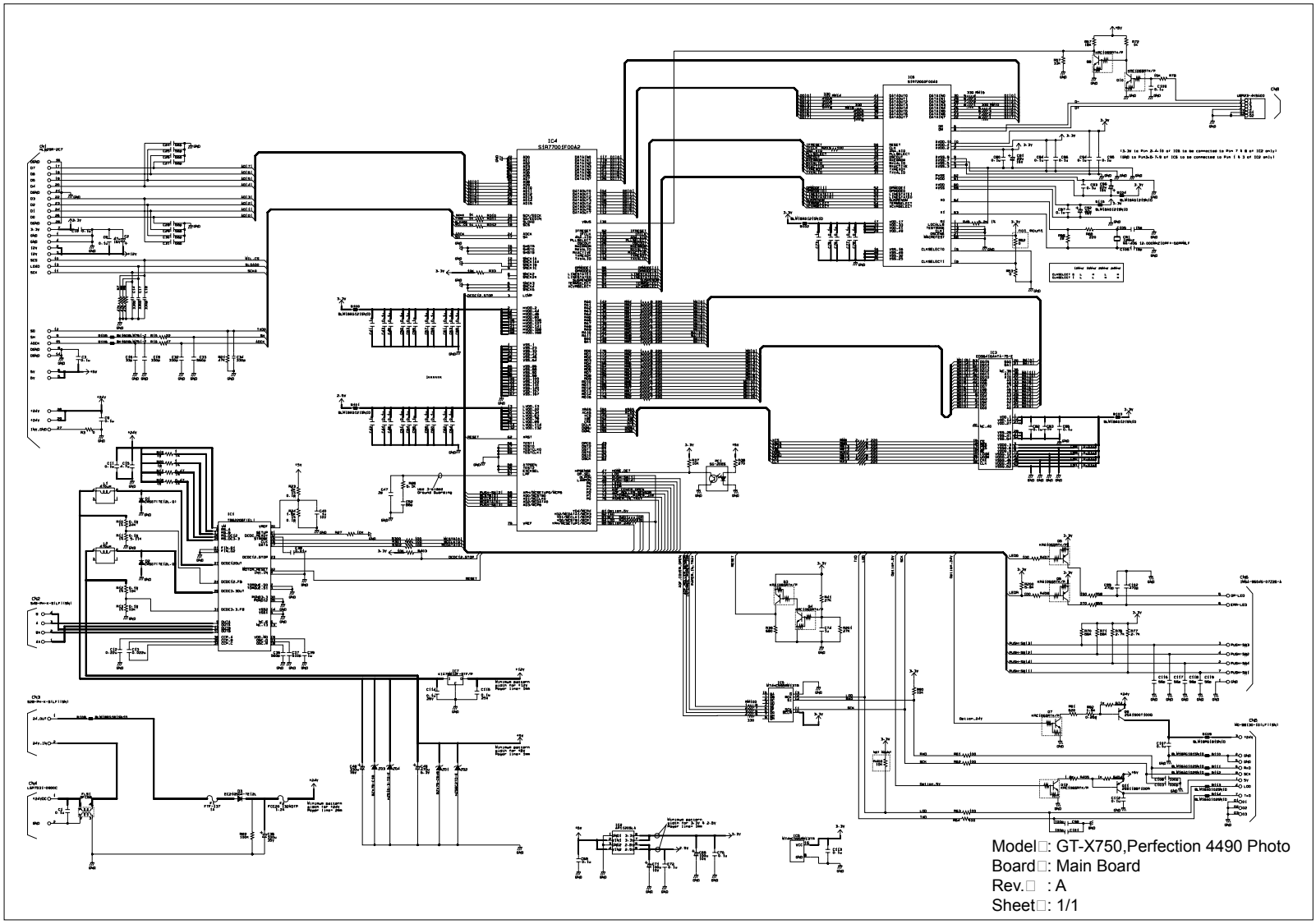



Figure 7-1. Diagram of Wiring Connectors

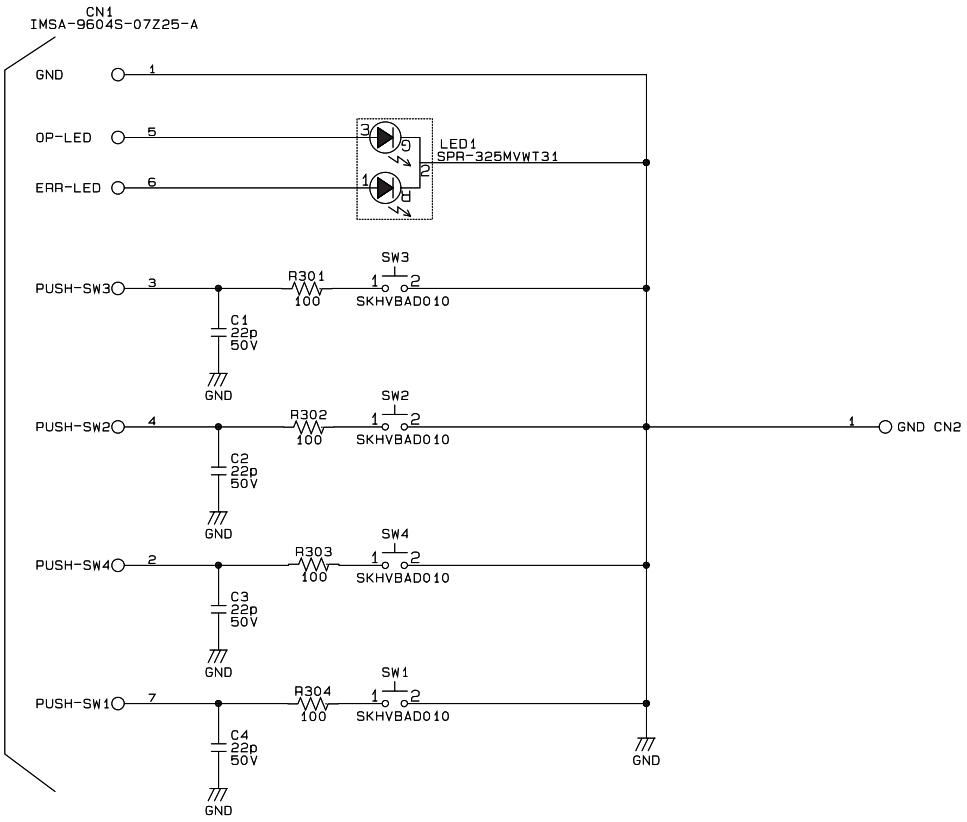
## 7.2 Circuit Diagrams

The control electrical circuit diagrams of this product are shown on the following pages.

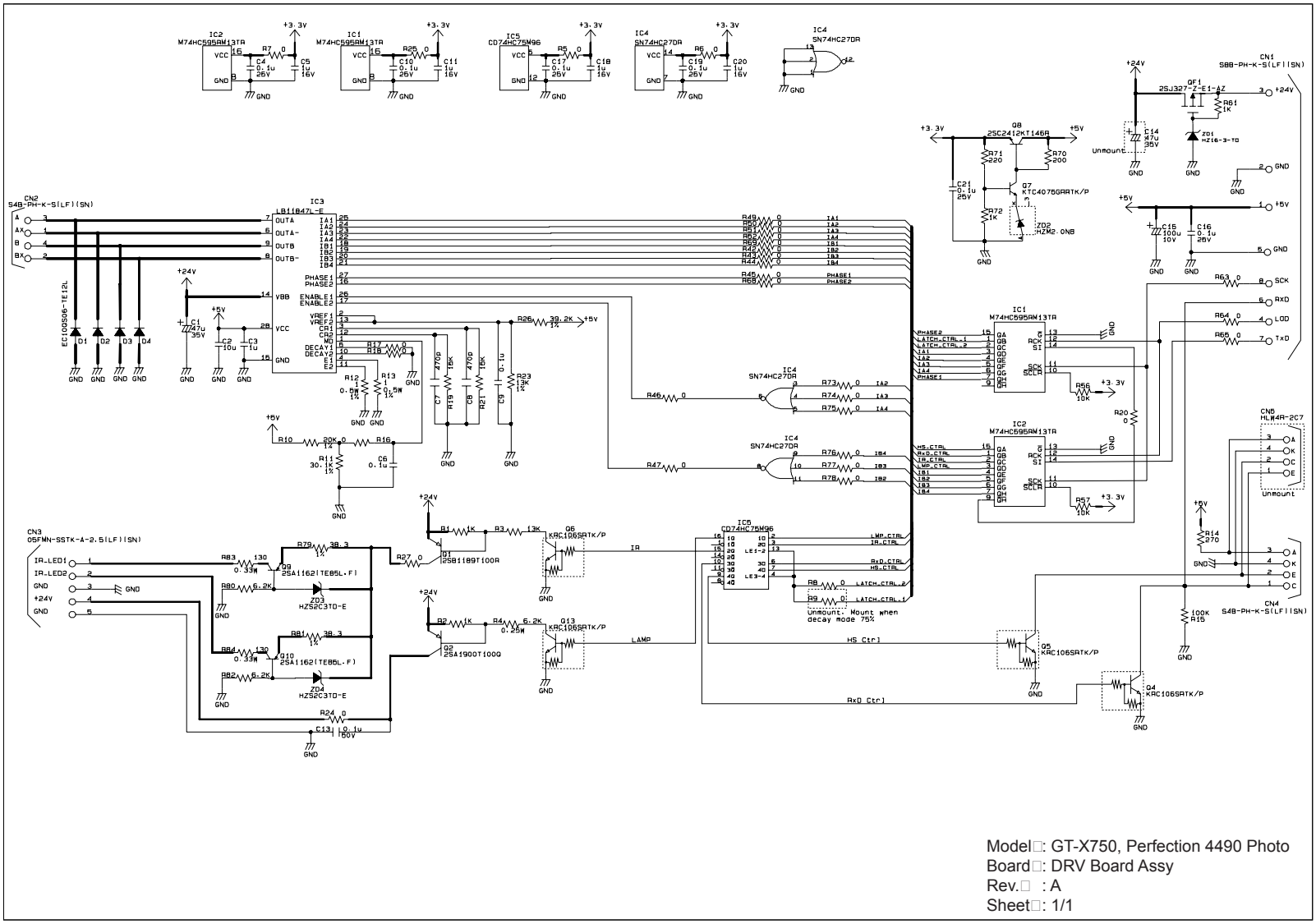
- ☐ Main Board
- ☐ Panel Board
- ☐ DRV Board
- ☐ Image Sensor Board
- ☐ SUB Board
- ☐ SUB_C Board
- ☐ SUB_D Board



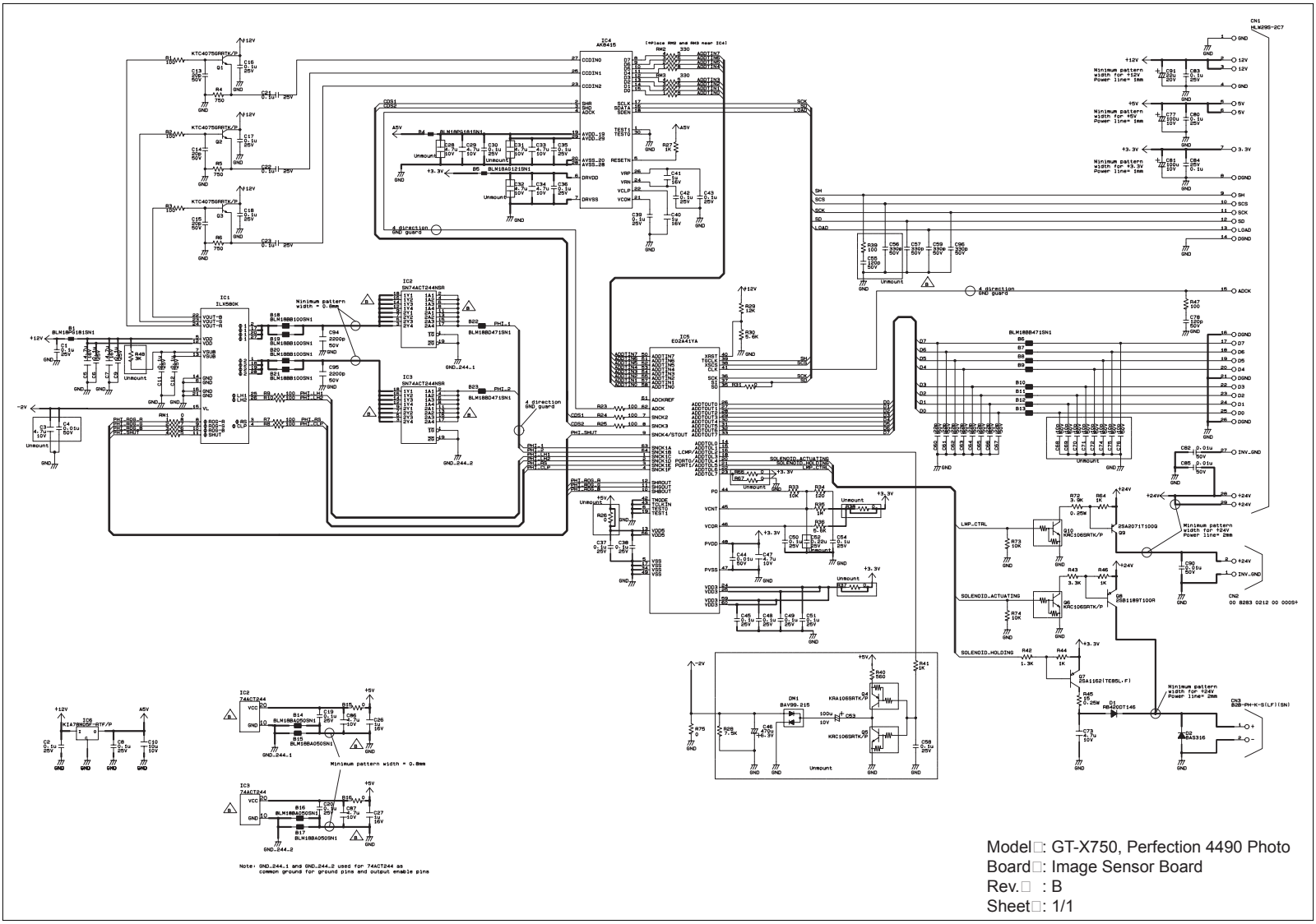
Model□: GT-X750,Perfection 4490 Photo
Board□: Main Board
Rev.□ : A
Sheet□: 1/1



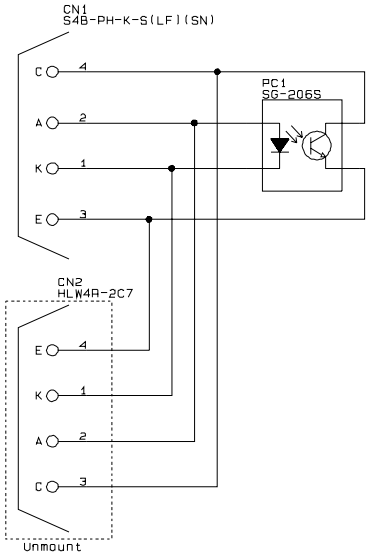

Model□: GT-X750, Perfection 4490 Photo
Board□: PNL Board
Rev.□ : A
Sheet□: 1/1



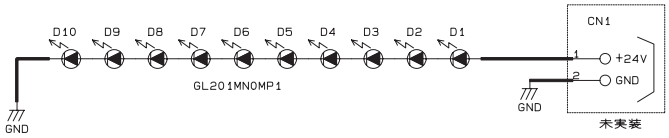
Model□: GT-X750, Perfection 4490 Photo
Board□: DRV Board Assy
Rev.□ : A
Sheet□: 1/1



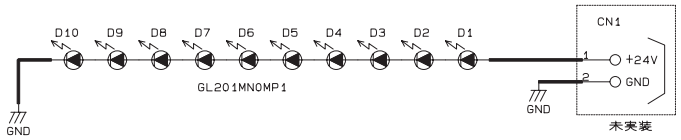
Model□: GT-X750, Perfection 4490 Photo
Board□: Image Sensor Board
Rev.□ : B
Sheet□: 1/1




Model□: GT-X750, Perfection 4490 Photo
Board□: SUB Board
Rev.□ : A
Sheet□: 1/1




Model□: GT-X750, Perfection 4490 Photo
Board□: SUB-C Board
Rev.□ : A
Sheet□: 1/1

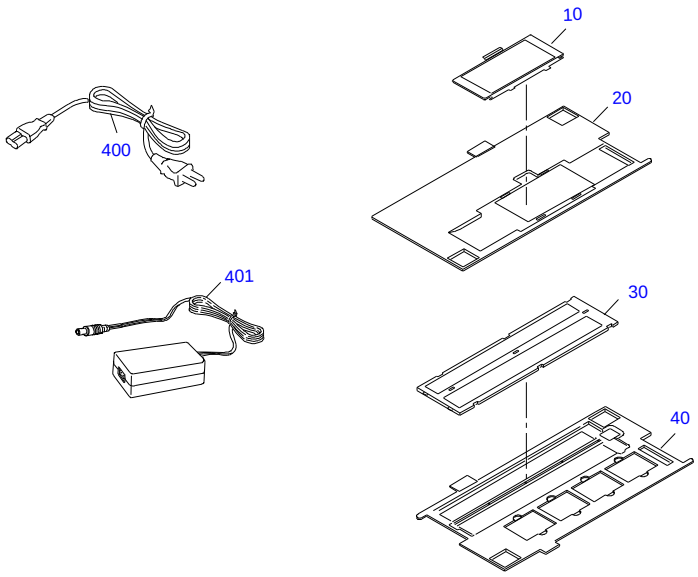



Model□: GT-X750, Perfection 4490 Photo
Board□: SUB-D Board
Rev.□ : A
Sheet□: 1/1

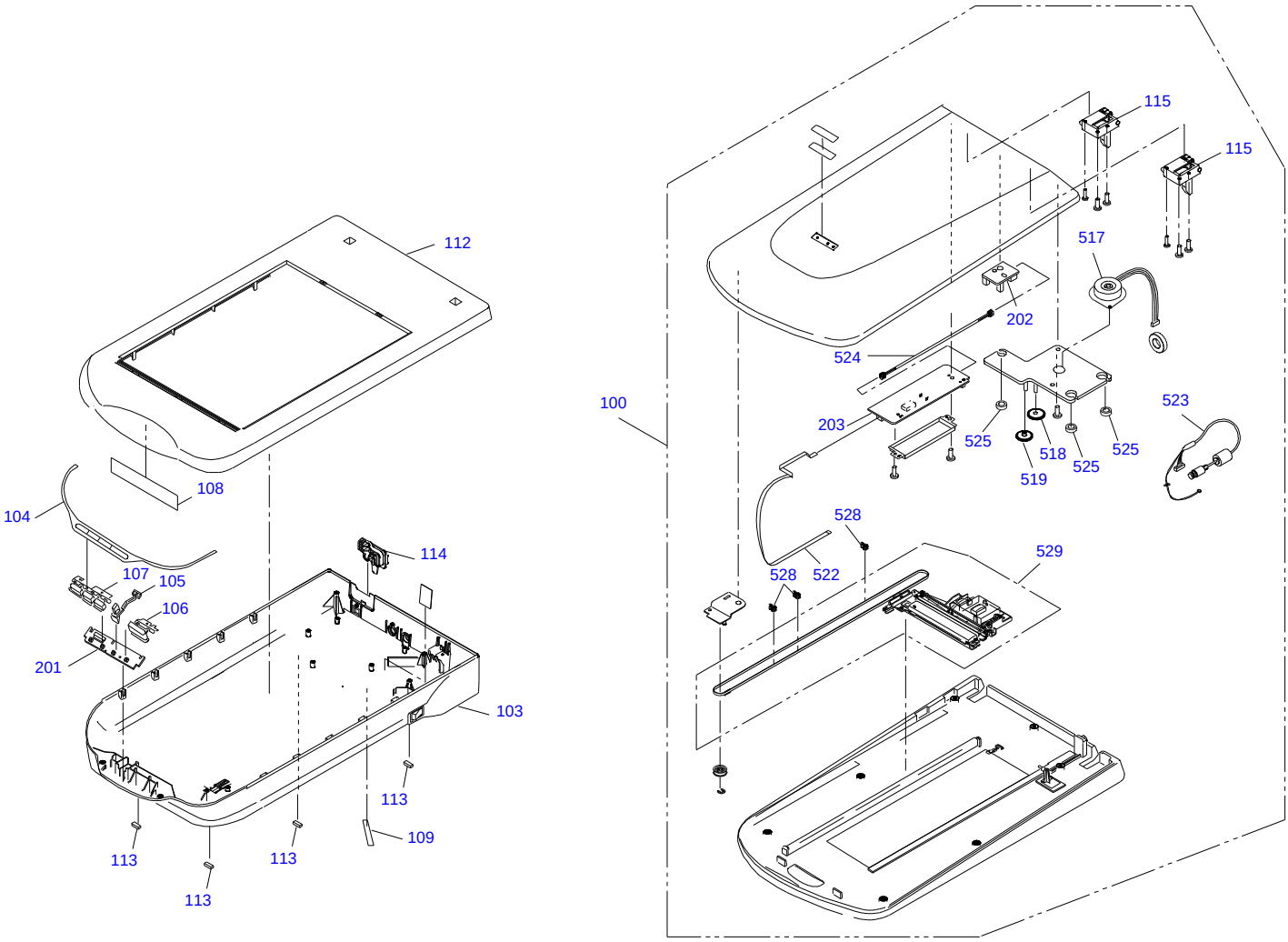
## 7.3 Exploded diagram

The exploded diagrams of this product are shown on the following pages.

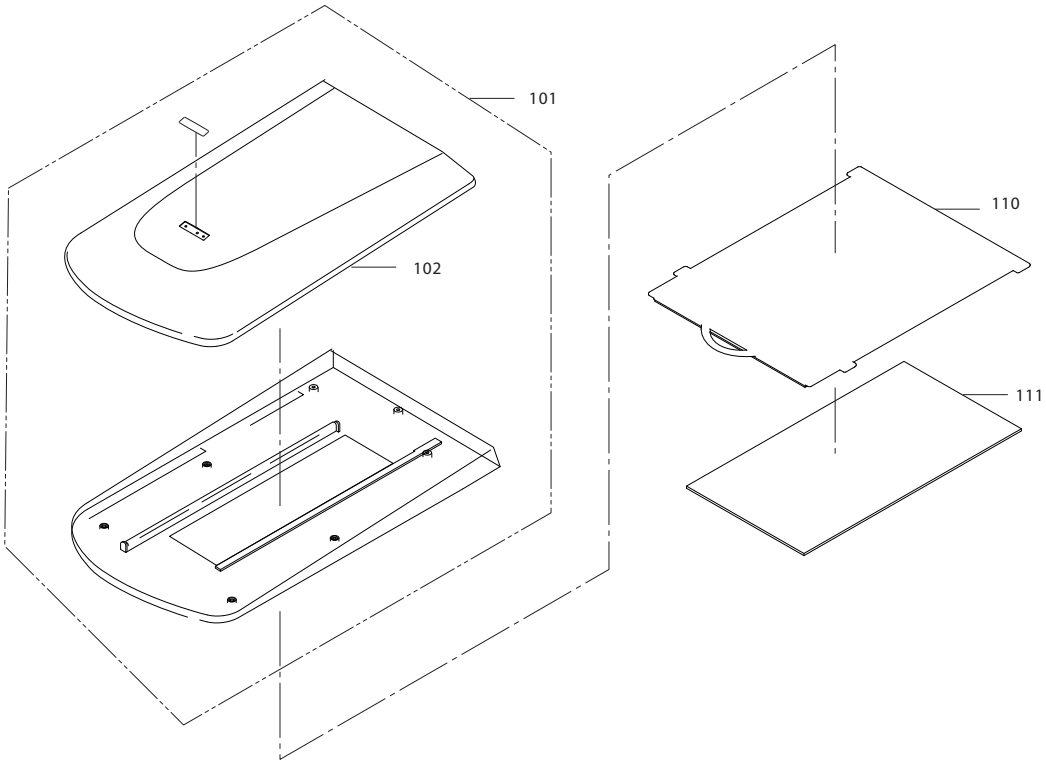
- ☐ B176-ACCE-0012
- ☐ B176-CASE-0012
- ☐ B176-CASE-002
- ☐ B176-MECH-001



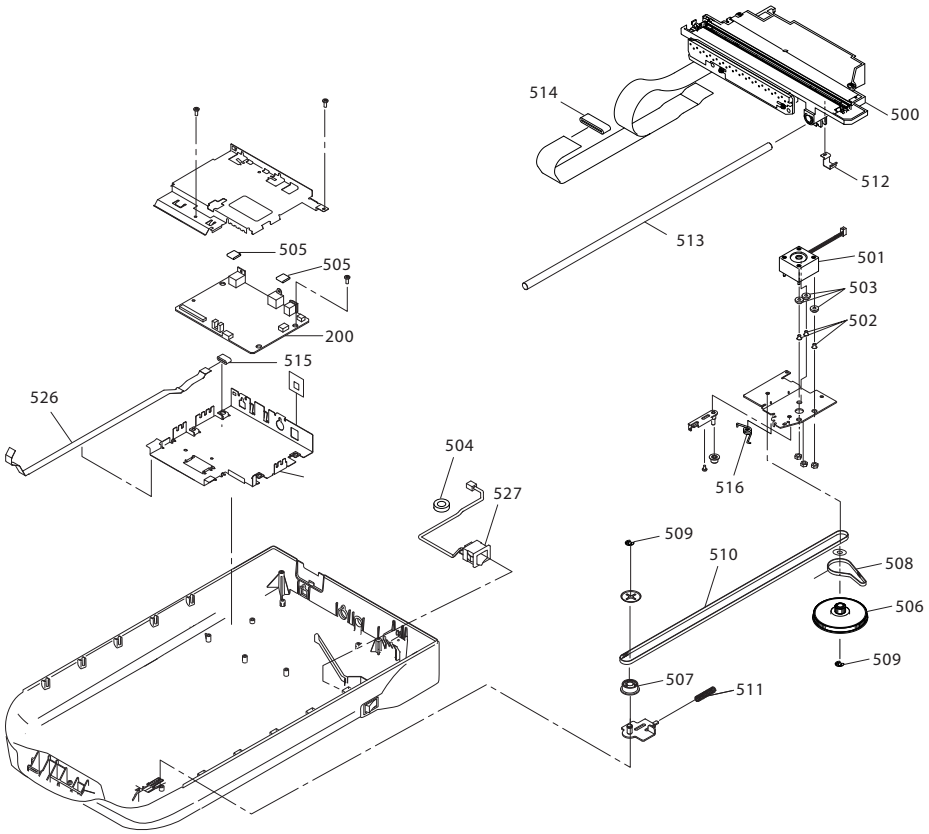

GT-X750 / Perfection 4490 Photo NO.1 Rev.02 B176-ACCE-0012




GT-X750 / Perfection 4490 Photo NO.2 Rev.02 B176-CASE-0012




GT-X750 / Perfection 4490 Photo NO.3 Rev.01 B176-CASE-002




GT-X750 / Perfection 4490 Photo NO.4 Rev.01 B176-MECH-001

## 7.4 Parts List

**Table 7-1. Perfection4490 Photo Parts List**

| Ref No. | Part Name | Remarks |
|---|---|---|
| NON FIG | HARNESS,USB 2.0 ASSY. | |
| NON FIG | APPLICATION CD-ROM | |
| NON FIG | SOFTWARE CD,A | |
| NON FIG | SETTING UP MANUAL | |
| 400 | POWER CABLE | |
| 401 | AC ADAPTER | |
| 10 | COVER,FILM,BROWNIE | |
| 20 | HOLDER,FILM,BROWNIE | |
| 30 | COVER,FILM,35 | |
| 40 | HOLDER ASSY.,FILM,SLIDE,35,ASP | |
| 100 | TPU ASSY.,Lid,ASP | |
| 101 | CASE,TPU,ASP | |
| 102 | HOUSING ASSY.,UPPER,TPU,ASP | |
| 103 | HOUSING,LOWER | |
| 104 | COVER,PANEL | |
| 105 | OPTICAL PLATE | |
| 106 | BUTTON,SCAN | |
| 107 | BUTTON,FUNCTION SWITCH | |
| 108 | DUST COVER;B | |
| 109 | TAPE,BOTTOM | |
| 110 | HOUSING,MAT | |
| 111 | MAT,COVER,DOCUMENT | |
| 112 | HOUSING ASSY.,UPPER,ASP | |
| 113 | FOOT | |
| 114 | LOCK,CARRIAGE | |
| 115 | HINGE ASSY. | |
| 200 | BOARD ASSY., MAIN | |
| 201 | BOARD ASSY.,PANEL | |
| 202 | BOARD ASSY., SUB | |
| 203 | BOARD ASSY., DRV | |
| 526 | HARNESS,MAIN-PNL | |

**Table 7-1. Perfection4490 Photo Parts List**

| Ref No. | Part Name | Remarks |
|---|---|---|
| 527 | HARNESS,POWER SWITCH ASSY | |
| 500 | CARRIAGE ASSY.,ASP | |
| 501 | MOTOR,CR | |
| 502 | INSULATOR,MOTOR,CR | |
| 503 | SPACER,INSULATOR | |
| 504 | FERRITE CORE | |
| 505 | GASKET | |
| 506 | PULLEY,DRIVE | |
| 507 | PULLEY,DRIVEN | |
| 508 | TIMING BELT,DRIVE | |
| 509 | PLANE WASHER,3X0.5X5.4,L/NA | |
| 510 | TIMING BELT | |
| 511 | SPRING,PULLEY,DRIVEN | |
| 512 | CLAMP,TIMING BELT | |
| 513 | SHAFT,CR | |
| 514 | FERRITE CORE | |
| 515 | FERRITE CORE | |
| 516 | TORSION SPRING,104 | |
| 517 | MOTOR,TPU | |
| 518 | PULLEY,IDLE,TPU | |
| 519 | PULLEY,DRIVE,TPU | |
| 522 | HARNESS,DRV-INV | |
| 523 | HARNESS,TPU | |
| 524 | HARNESS,DRV-SUB | |
| 525 | DAMPER,MOTOR,TPU | |
| 528 | TORSION SPRING,11.9 | previous parts* |
| | TORSION SPRING,19.8 | new parts* |
| 529 | CARRIAGE,TPU,ASP | Including timing belt (337.82 mm).* |

Note *: Refer to technical information TE05-0371 for details.

# 7.5 Optional Part; Auto Document Feeder

## 7.5.1 Overview

- Features
  - Compact, lightweight (319(W) x 539(D) x 137(H)mm,2.4Kg)
  - Up to 30 sheets can be set.
  - Scanning speed 3PPM (scanning conditions of A4 size, line chart, 300dpi and draft mode)
  - Scanning film is used in the scan section.
    The user can replace the scanning film. (About 10,000 sheets of paper can be scanned with one scanning film.)
    One replacement scanning film is supplied as standard.
- Connectivity
  - This ADF Unit can be connected to the Perfection 4490 Photo.

## 7.5.2 Basic specifications

### 7.5.2.1 General specifications

- FormSheet-through type auto document feeder
- FeedingFace-up, top pickup
- ExitFace down
- Paper separation systemFrictional separation by separation roller
- Paper transfer resolution600dpi/step
- Number of set sheets of paper30 sheets (55g/m$^2$ paper, max. overall thickness within 6mm)
- Home positionOpposite to home position relative to the Main Unit§
- Scan sectionScanning film used
- Document setting position
  Match the left end of a document with the left end of the ADF document tray and restrict the right end of the document with the right side edge guide.

### 7.5.2.2 Basic performance

| | |
|---|---|
| Noise | Within 54dB without abnormal noise and offensive noise. |
| Mis-feed ratio | Within 1% |
| Jam ratio | Within 1% (within 0.1%: Xerox P paper, normal temperature) |
| Multi-sheet feed ratio | Within 1% |
| Skew | Within ±0.5° |
| Access position accuracy | 0.5±3mm from paper left end, 0±3mm from paper leading edge |
| Cumulative feed error | Within ±1% |
| Color shift | Within 1 dot (within 2 dots in the top and bottom 5cm areas of the document for 600dpi scanning) |

### 7.5.2.3 Supported documents

| | |
|---|---|
| Applicable document color | Color, monochrome |
| Paper type | High-quality paper, bond paper, check paper (recycled paper) |
| Paper thickness | Thickness : 0.07 – 0.16mm<br>Ream weight : 50 – 105Kg/m$^2$ |
| Document size | Minimum width : 100mm<br>Maximum width : 216mm<br>Minimum length : 127mm<br>Maximum length : 356mm |

- Inapplicable document
  Transparent paper, coated paper, cut/pasted paper, label paper (with glue on back), transparency film, carbon paper, Japanese or similar special paper, catalog paper, stapled or clipped document, broken or loose-leaf or similar multi-hole document, curled or folded document

### 7.5.2.4 Electrical characteristics

- Rated input voltage: DC 24 – 26.4V<br>DC 5 ± 5%V
- Rated input current: 24V : 0.8A<br>5V : 0.2A

### 7.5.2.5 Environmental conditions

- Temperature: Operating : 10 to 32°C<br>Storage : -20 to 60°C
- Humidity: Operating : 20 to 80% (non-condensing)<br>Storage : 10% to 85% (non-condensing)

### 7.5.2.6 Reliability

- Feed and exit: MCBF 20,000 sheets (MCBF 10,000 sheets with scanning film)
- Hinge durability: MCBF 12,000 times

### 7.5.2.7 Operating conditions

- Dust: General offices, general houses (Except abnormally dusty places)
- Luminous intensity: Avoid direct sunlight and vicinity of light source.

### 7.5.2.8 Compliant Standards (Electromagnetic interference resistance, electrical noise resistance)

- Electromagnetic interference resistance: VCCI Class 2

### 7.5.2.9 Static electricity noise

- Static electricity: Case section 10kV<br>Metal section 7kV/150pF, 150Ω

### 7.5.2.10 Weight and dimensions

- Weight Approx. 2.4kg
- Dimensions 319 x 539 x 137mm (outline shown below)

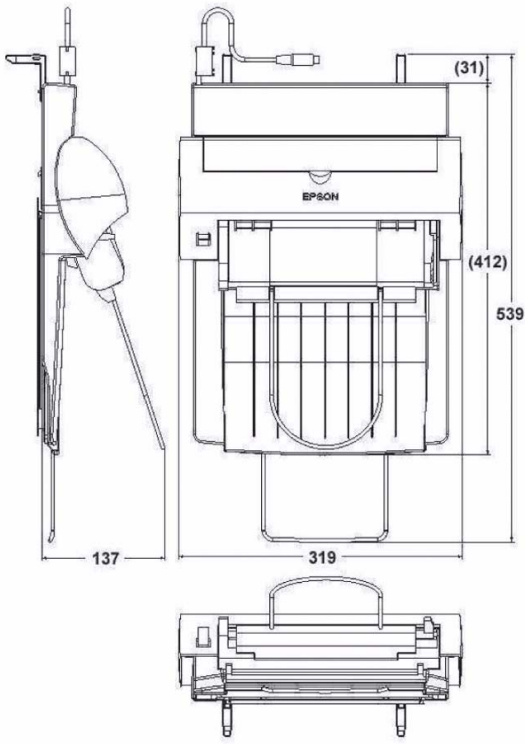



**Figure 7-2. ADF Overview Drawing**

## 7.5.3 Interface

- Connector shape8-pin mini-DIN (male)

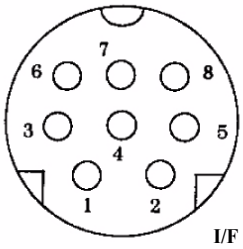



**Figure 7-3. Connector Shape**

**Table 7-2. Pin Assignment**

| Pin No. | Signal | I/O | Explanation |
|---|---|---|---|
| 1 | +5V | PWR | |
| 2 | GND | PWR | |
| 3 | +24V | PWR | |
| 4 | LOD | IN | Serial data latch |
| 5 | GND | PWR | |
| 6 | SO | OUT | Serial output data |
| 7 | SI | IN | Serial input data |
| 8 | SCK | IN | Serial clock |

## 7.6 ADF; Disassembly

This section explains the disassembling procedure of the main component units and parts of the optional part ADF. Unless otherwise explained, reassemble the ADF in the reverse procedure of disassembling.

### 7.6.1 Removal of B81334 Main Board

1. Remove the screws that are securing the Main Board Cover at the bottom, and remove the Main Board Cover.
2. Disconnect the six cables from the B81334 Main Board, and remove the three screws (gold, P-TITE).
3. Remove the B81334 Main Board.

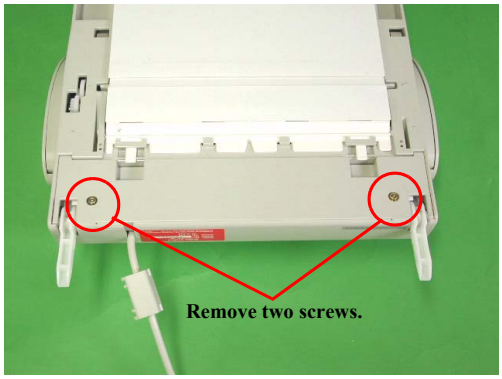



**Figure 7-4. ADF Rear Screw Removal**

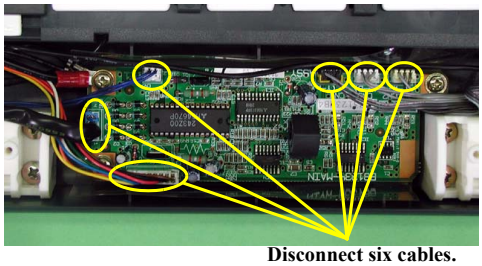



**Figure 7-5. Board Removal 1**

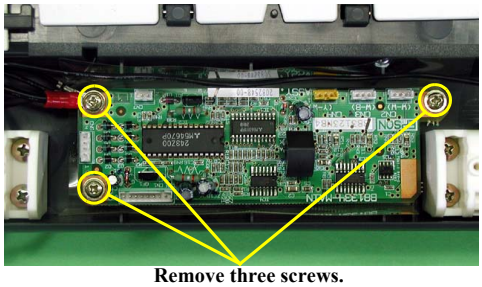



**Figure 7-6. Board Removal 2**

### 7.6.2 ASF Part

1. Disconnect the six cables from the Main Board.
2. Remove the Top Cover.
3. Open the Cover and remove the Guides (black). Release the engagement with the internal paper guide, and remove the Cover from the Case Shaft.
4. Open the ASF Release Lever.
5. Remove the two screws (gold, P-TITE) and two metal fittings.

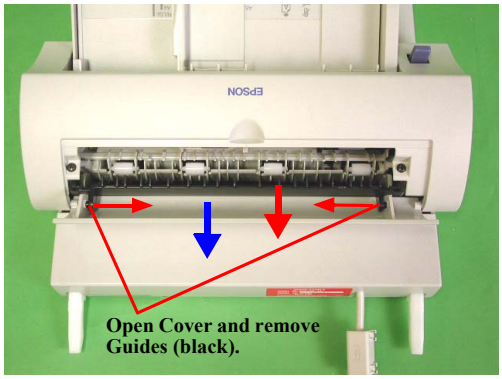



**Figure 7-7. Guide Removal**

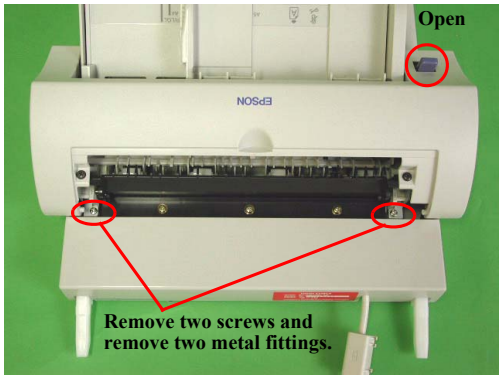



**Figure 7-8. Screw and Metal Fitting Removal**

### 7.6.2.1 ASF Part Disassembly

1. Remove the two screws (black, CB + flat washers) at both ends of the Cover.
2. Remove the two screws (gold, P-TITE + flat washers) from the bottom, and remove the Cover.

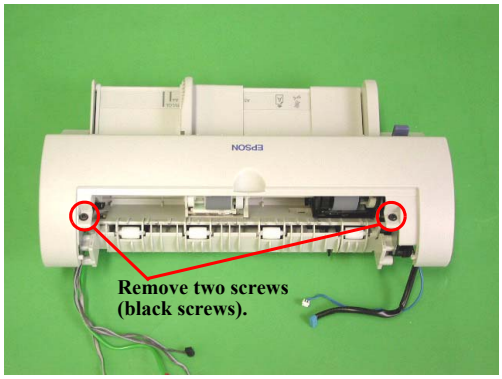



**Figure 7-9. Screw Removal**

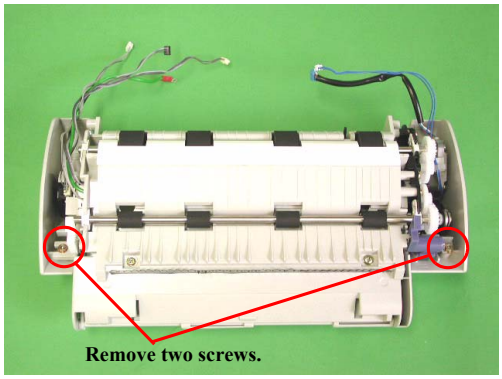



**Figure 7-10. Screw Removal**

3. Remove the four screws (gold, P-TITE + flat washers), and remove the Motor/ Solenoid Assembly.

**CAUTION**

**When removing the screws shown in Figure 7-12, be careful since the gear will pop out.**

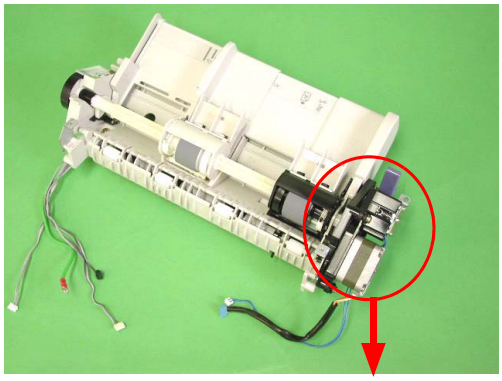


**Figure 7-11. Removal of Motor/Solenoid Assembly**

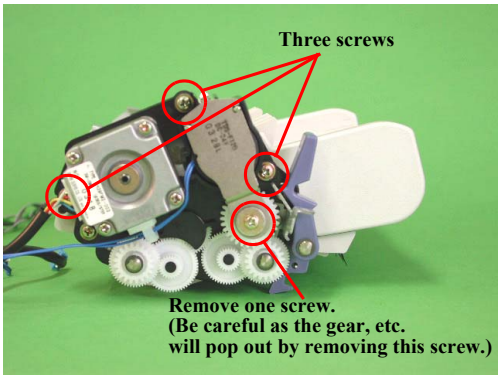



**Figure 7-12. Removal of Motor/Solenoid Assembly**

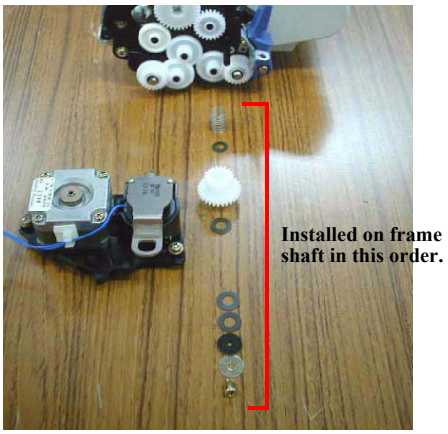



**Figure 7-13. Installed Screws and Gear**

### 7.6.2.2 Gear Frame

1. Release the Locks of the two Bushings (white plastic parts on both sides).
2. Remove the Roller Shaft (front).
3. Insert and push a flat-blade screwdriver into the gap shown below. Push up the White Reference Plate forcibly in the direction of an arrow to disengage the Hook.

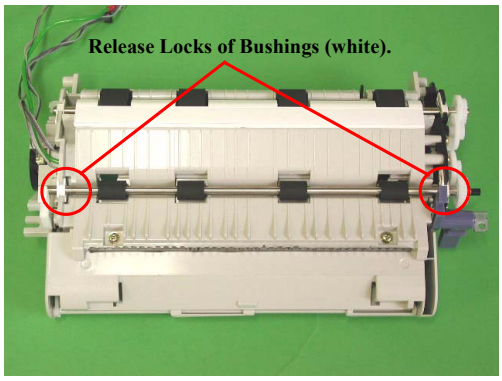



**Figure 7-14. Roller Removal 1**

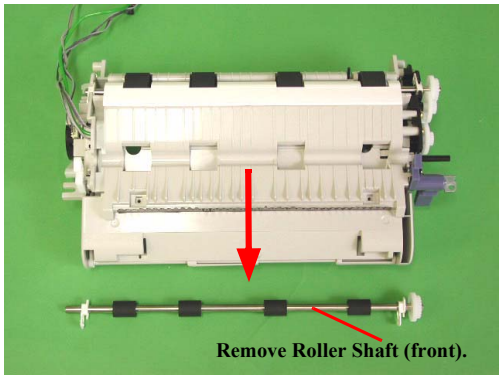



**Figure 7-15. Roller Removal 2**

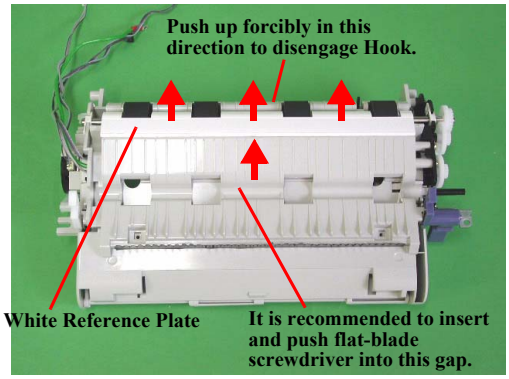



**Figure 7-16. White Reference Plate Removal 1**

4. Release the Locks of both Bushings, and remove the Roller Shaft (rear).
5. Remove the three screws that are securing the metal fittings, and remove the metal fittings. When removing the screw nearest to the Lever, push the Release Lever in the direction of an arrow.
6. Remove the four gears. (One gear is secured to the PF Roller Shaft.)

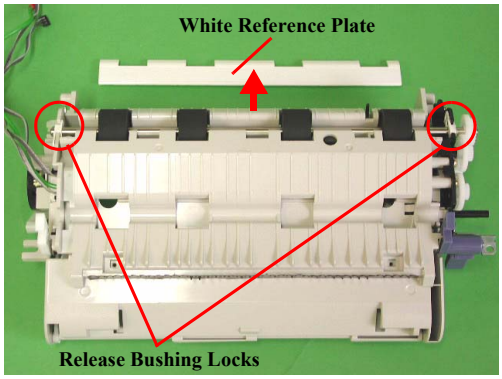



**Figure 7-17. White Reference Plate Removal 2**

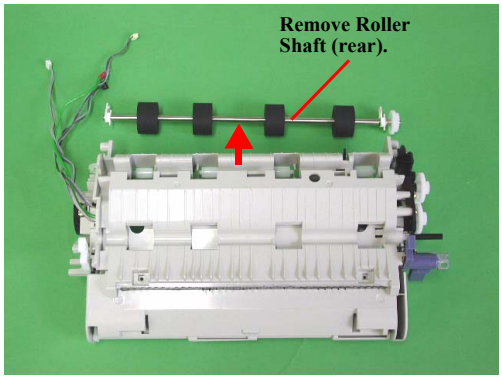



**Figure 7-18. Roller Removal**

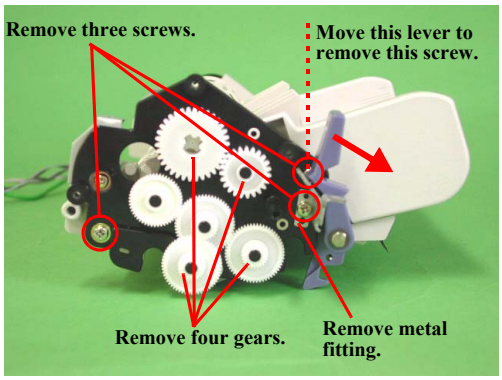



**Figure 7-19. Gear Removal**

7. Remove the two screws (gold, P-TITE), and remove the black Plastic Frame.

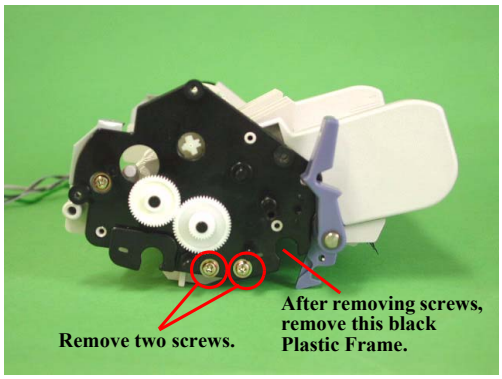



**Figure 7-20. Removal of Plastic Frame**

### 7.6.3 Disassembly of ASF and Frame

1. After moving the Paper Edge Guide in the direction of an arrow, remove the one screw (silver, P-TITE + flat washer).
2. Separate the ASF Assembly and Frame Part.

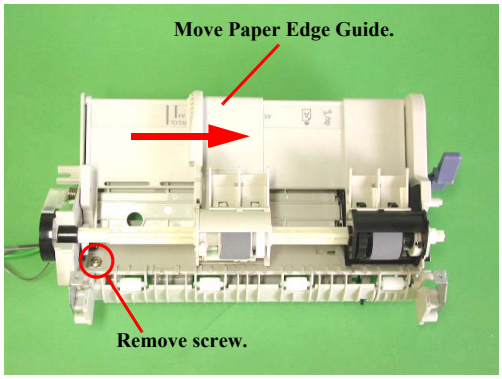



**Figure 7-21. Disassembly of ASF and Frame 1**

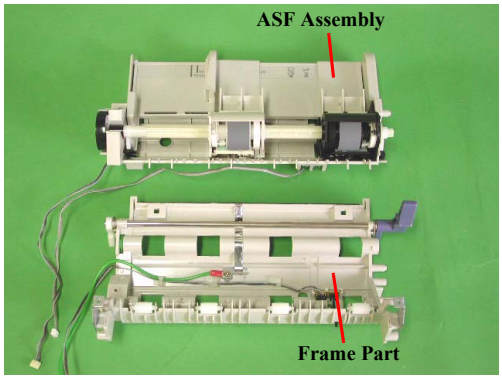



**Figure 7-22. Disassembly of ASF and Frame 2**

3. Remove the Actuator and PE Board Assembly.

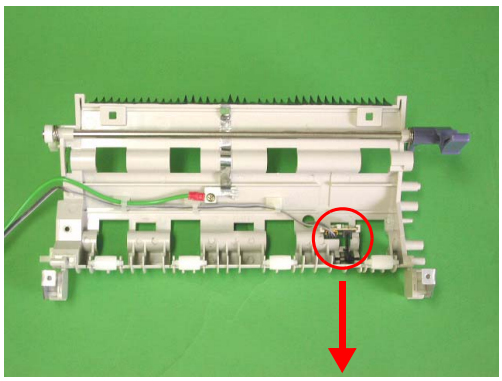


**Figure 7-23. Removal of Actuator and PE Board Assembly 1**

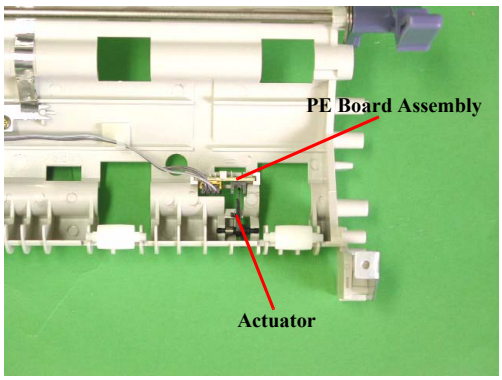



**Figure 7-24. Removal of Actuator and PE Board Assembly 2**

## 7.6.4 Disassembly of ASF Assembly

### 7.6.4.1 Removal of ASF Feed Roller Assembly

1. Remove the Right Hopper Release Lever from the right end of the ASF Feed Roller Shaft.
2. Move the left side ASF Feed Assembly part to the center, and remove the Left ASF Feed Roller Shaft Securing Bush (color: white).
3. Push out the ASF Feed Roller Shaft to the left, and remove the ASF HP Detection Wheel from the Shaft end.

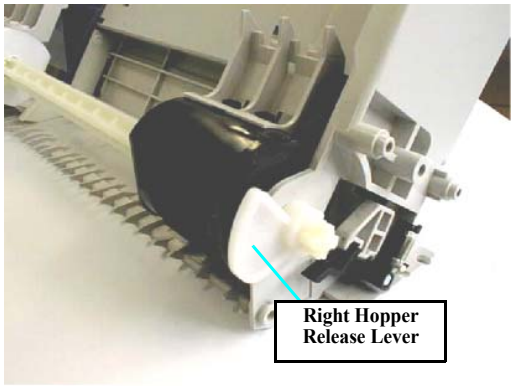



**Figure 7-25. Removal of Right Hopper Release Lever**

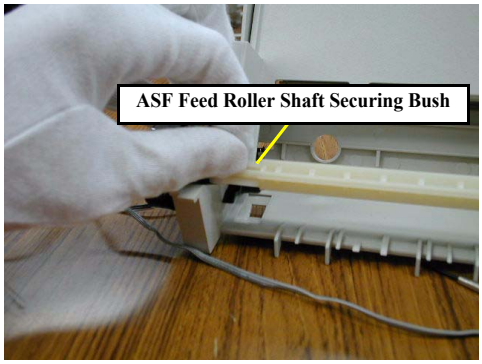



**Figure 7-26. Removal of ASF Feed Roller Securing Bush**

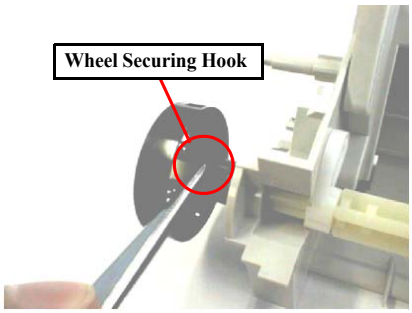



**Figure 7-27. Removal of ASF HP Detection Wheel**

4. Remove the projection of the ASF Frame from the top left mounting hole of the ASF Hopper Assembly.
5. Fit the cam on the right of the ASF Hopper Assembly in the notch (rectangular) of the ASF Frame Assembly, and while lifting the left part of the ASF Hopper Assembly, remove the ASF Hopper Assembly carefully.

**When removing the ASF Hopper Assembly from the ASF Frame Assembly, be careful not to damage the Compression Springs 1.66 and transparent Plastic Film in the Feed Roller Assembly.**

6. Carefully remove the left and right Compression Springs 1.66 from between the ASF Hopper Assembly and left and right ASF Feed Roller Assemblies.
7. Slide the ASF Feed Roller Shaft to the left, and remove the ASF Feed Roller Shaft from the ASF Feed Roller Shaft hole of the ASF Frame right part.
8. Remove the Feed Roller Assembly from the Feed Roller Shaft.

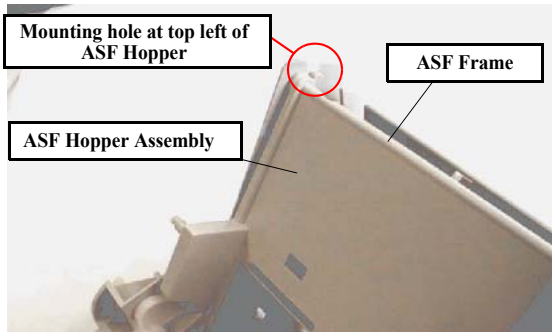



**Figure 7-28. ASF Hopper Assembly Removal**

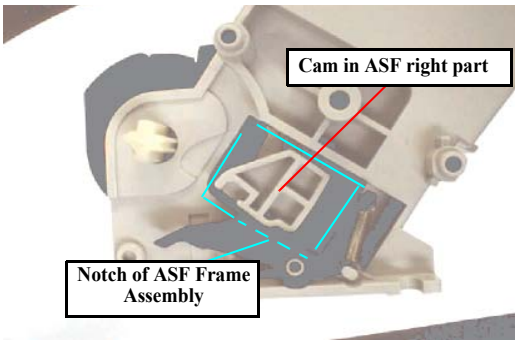



**Figure 7-29. ASF Hopper Assembly Cam Matching Position**

The following shows the parts development diagram of the ASF Assembly.

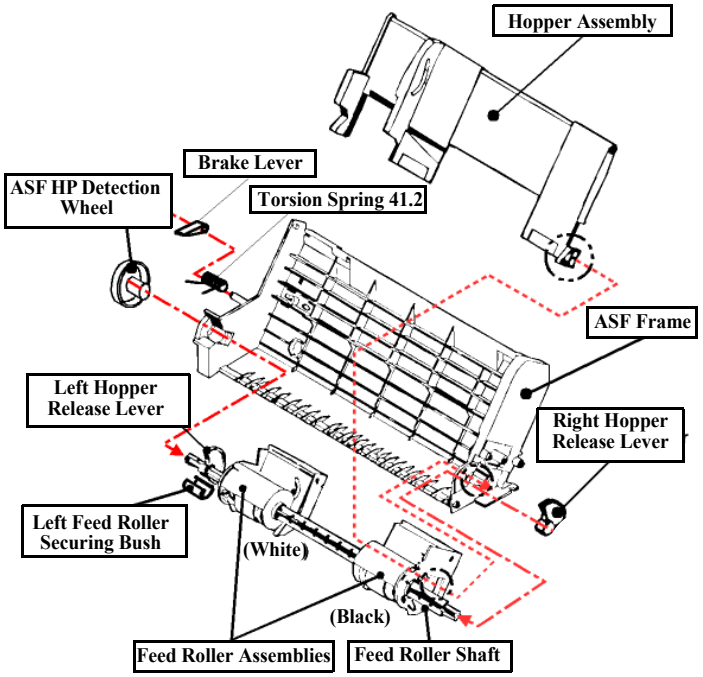



**Figure 7-30. Disassembly of ASF Assembly**

CHECK POINT

- **When removing or reinstalling the ASF Hopper Assembly, use care so that the grease on the Cam will not adhere to any other parts. If it has adhered, wipe it completely.**
- **When reinstalling the Hopper Release Levers, note the assembling orientation.**
- **The Feed Roller Assemblies should be set securely to the rail in the ASF Frame.**
- **The left Frame part of the left Feed Roller Assembly should be set securely to the notch of the Paper Edge Guide.**
- **After reinstalling the Feed Roller Securing Bush, make sure that it does not come off. Also, the black Feed Roller Assembly should be set on the right side.**

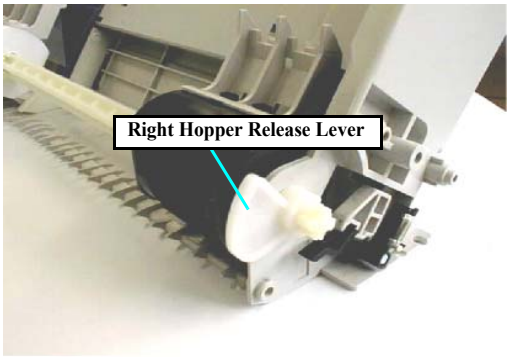



**Figure 7-31. Hopper Release Lever Installing Orientation**

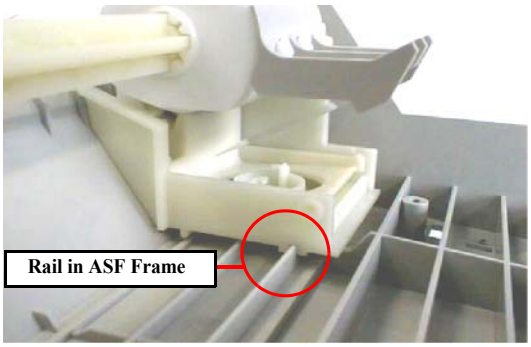



**Figure 7-32. Feed Roller Assembly Installation Point**

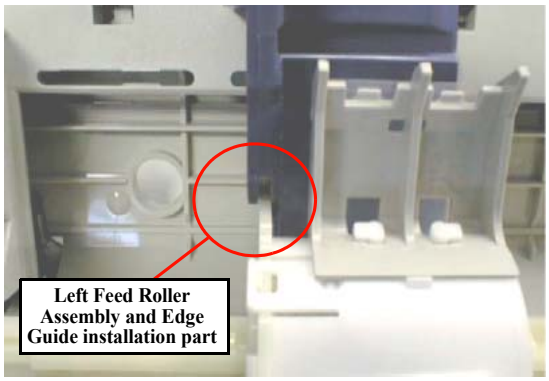



**Figure 7-33. Left Feed Roller Assembly Installation Point**

CHECK POINT

- **After reinstalling the right Feed Roller Assembly to the ASF Frame, make sure that the right Feed Roller Assembly is securely locked by the Hook in the right side rear part of the ASF Frame.**
- **Before reinstalling the ASF Hopper Assembly to the Feed Roller Assemblies, set and temporarily secure the Compression Springs 1.66 to the Spring Mounting Hooks of the Feed Assembly. After assembling, move the Feed Roller Assemblies to the hole positions in the rear of the ASF Frame, and release the Compression Springs 1.66 from the temporarily securing Hooks through the holes.**

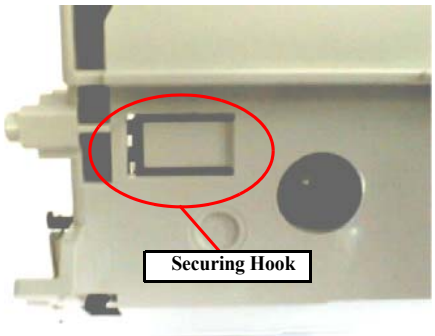



**Figure 7-34. Right Feed Roller Assembly Securing Hook Position**

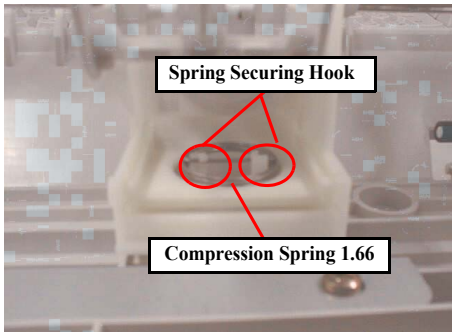



**Figure 7-35. Compression Spring 1.66 Temporarily Securing Position**

### 7.6.4.2 Disassembly of Feed Roller Assembly

1. Remove the two hooks that are used to install the Feed Roller Cover to the Feed Roller Assembly.
2. Remove the two Hooks that are used to install the Feed Roller Assembly to the Frame part in the circumference of the Feed Roller Assembly shaft hole.
3. Remove the Feed Roller Assembly.

CHECK POINT

- **Before reinstalling the ASF Hopper Assembly to the Feed Roller Assemblies, set and temporarily secure the Compression Springs 1.66 to the Spring Mounting Hooks of the Feed Assembly. After assembling, move the Feed Roller Assemblies to the hole positions in the rear of the ASF Frame, and release the Compression Springs 1.66 from the temporarily securing Hooks through the holes.**
- **Do not touch the roller surface of the Feed Roller Assembly.**

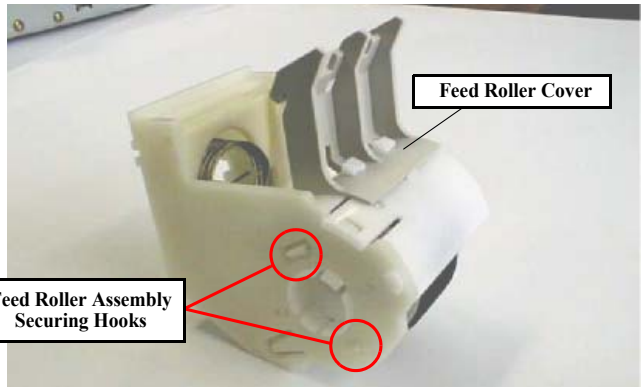



**Figure 7-36. Feed Roller Assembly Removal Hook Position**

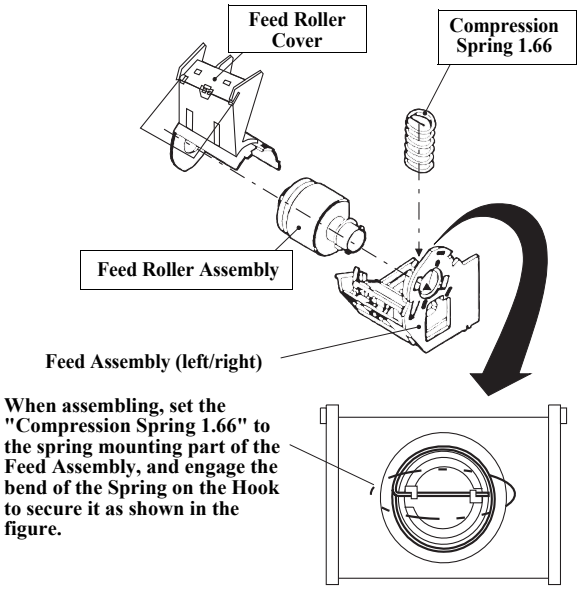


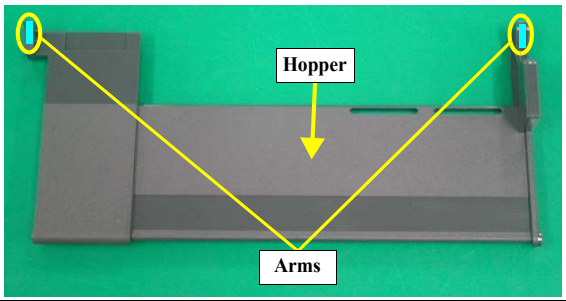

**Figure 7-37. Disassembly of Feed Roller Assembly**

## 7.7 ADF; Lubrication

Lubrication is required when any part of the Carriage Unit of the scanner has been replaced or the Carriage moves with noticeably large operation noise. The specified grease is indicated in Table 7-3, and the lubrication points are shown in Figure 7-38.

**Table 7-3. Specified Grease**

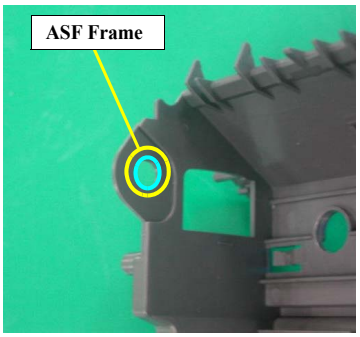
| Type | Name | Part Number | Supplier |
|---|---|---|---|
| Grease | G-26 | 1080614 | EPSON |




<Lubrication point>
Arms

<Oil type>
G-26

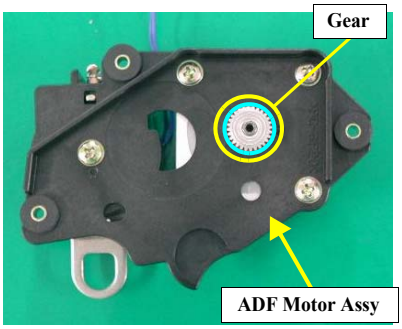
<Amount of application>
A little




<Lubrication point>
Inner side

<Oil type>
G-26

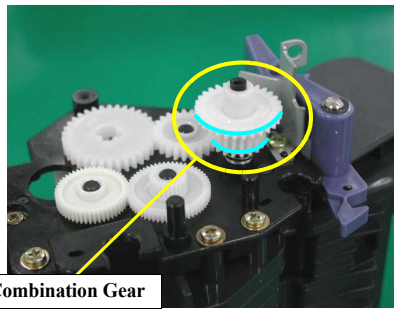
<Amount of application>
A little




<Lubrication point>
Pinion

<Oil type>
G-26

<Amount of application>
A little




<Lubrication point>
Gear teeth

<Oil type>
G-26

<Amount of application>
A little

**Figure 7-38. Lubrication Points**

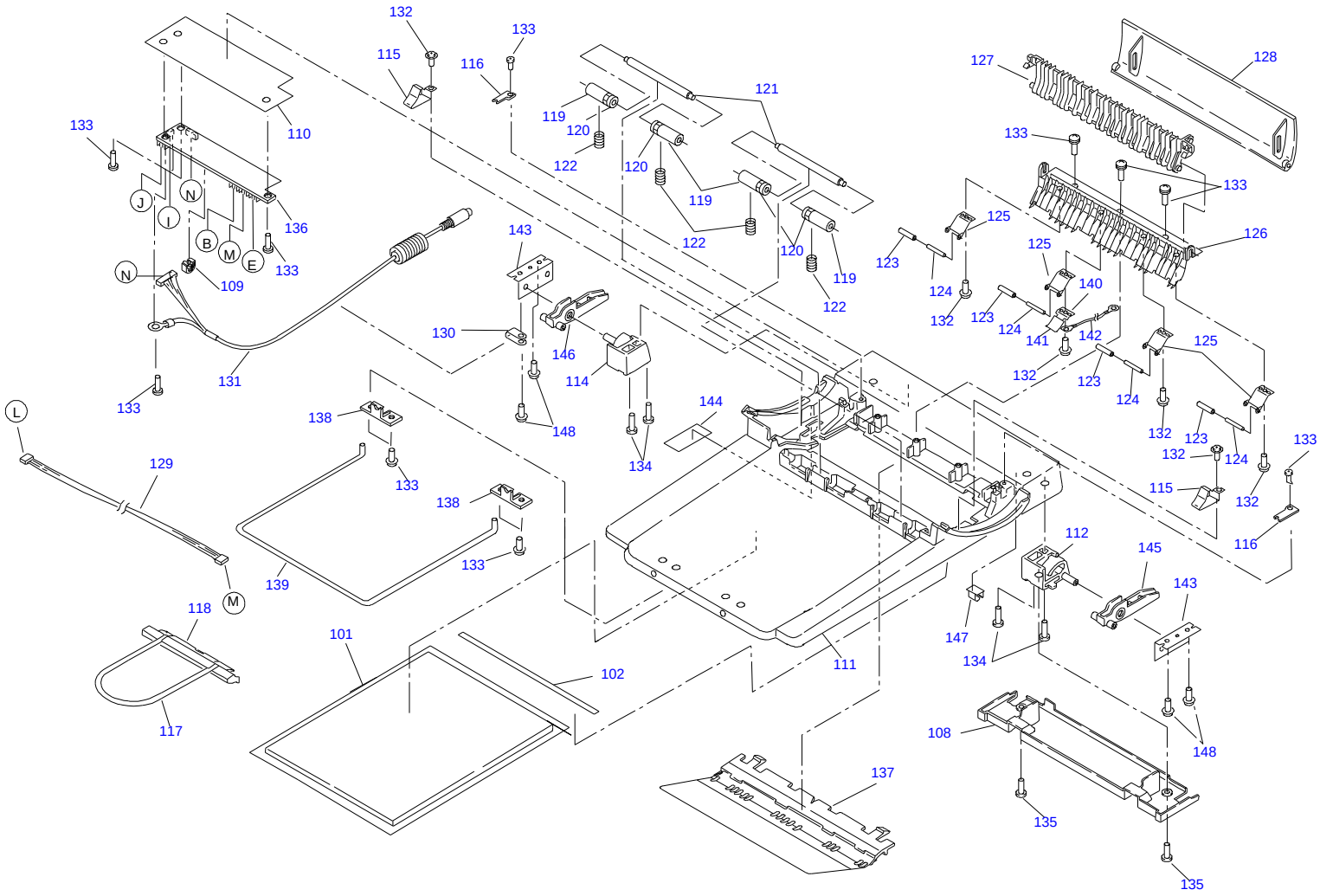
CAUTION

**Note that over lubrication will contaminate the mechanisms or lead to a malfunction.**

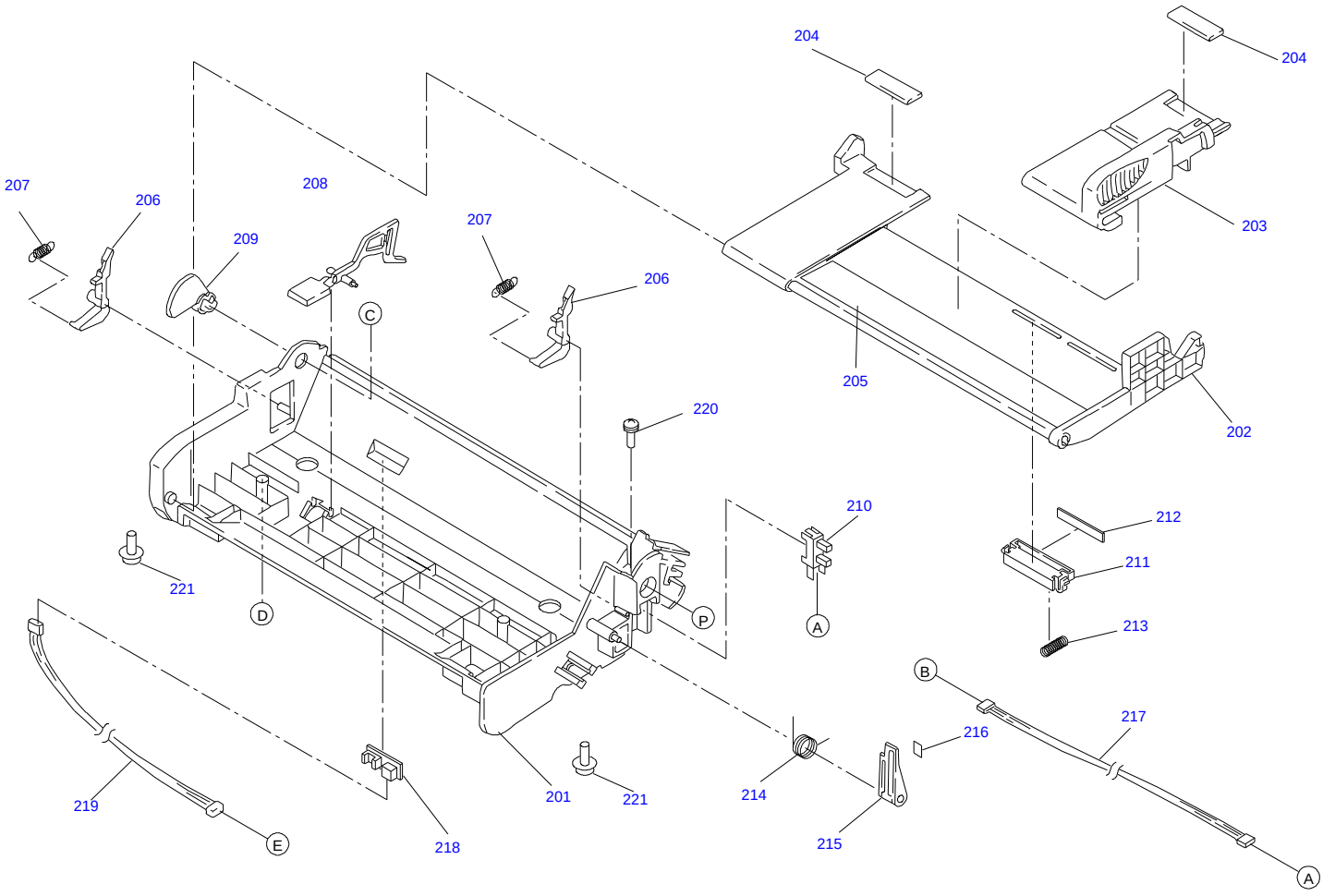
## 7.8 ADF; Exploded diagram

The exploded diagrams of this product are shown on the following pages.

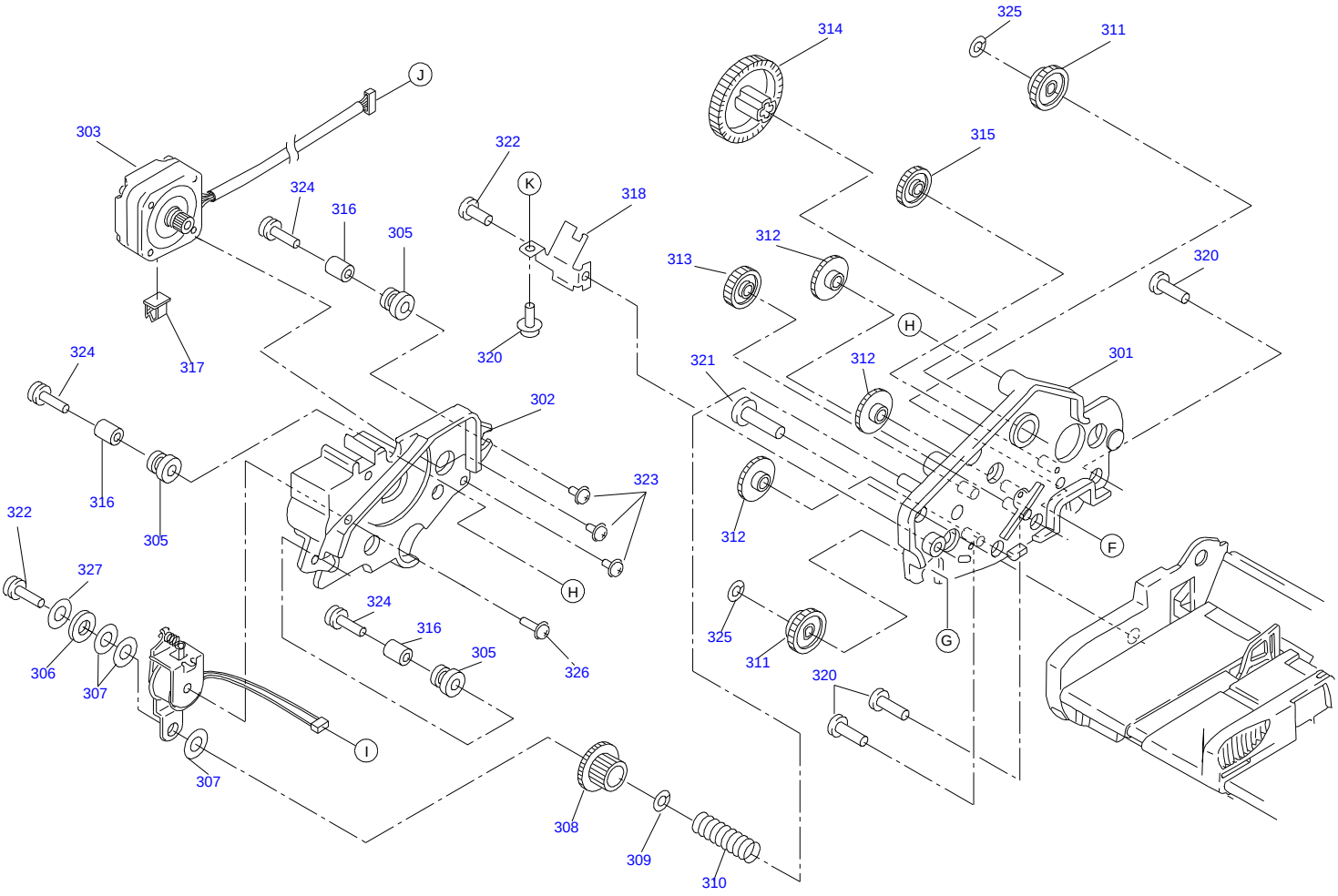
- ☐ B813-OPTI-1
- ☐ B813-OPTI-2
- ☐ B813-OPTI-3
- ☐ B813-OPTI-4
- ☐ B813-OPTI-5



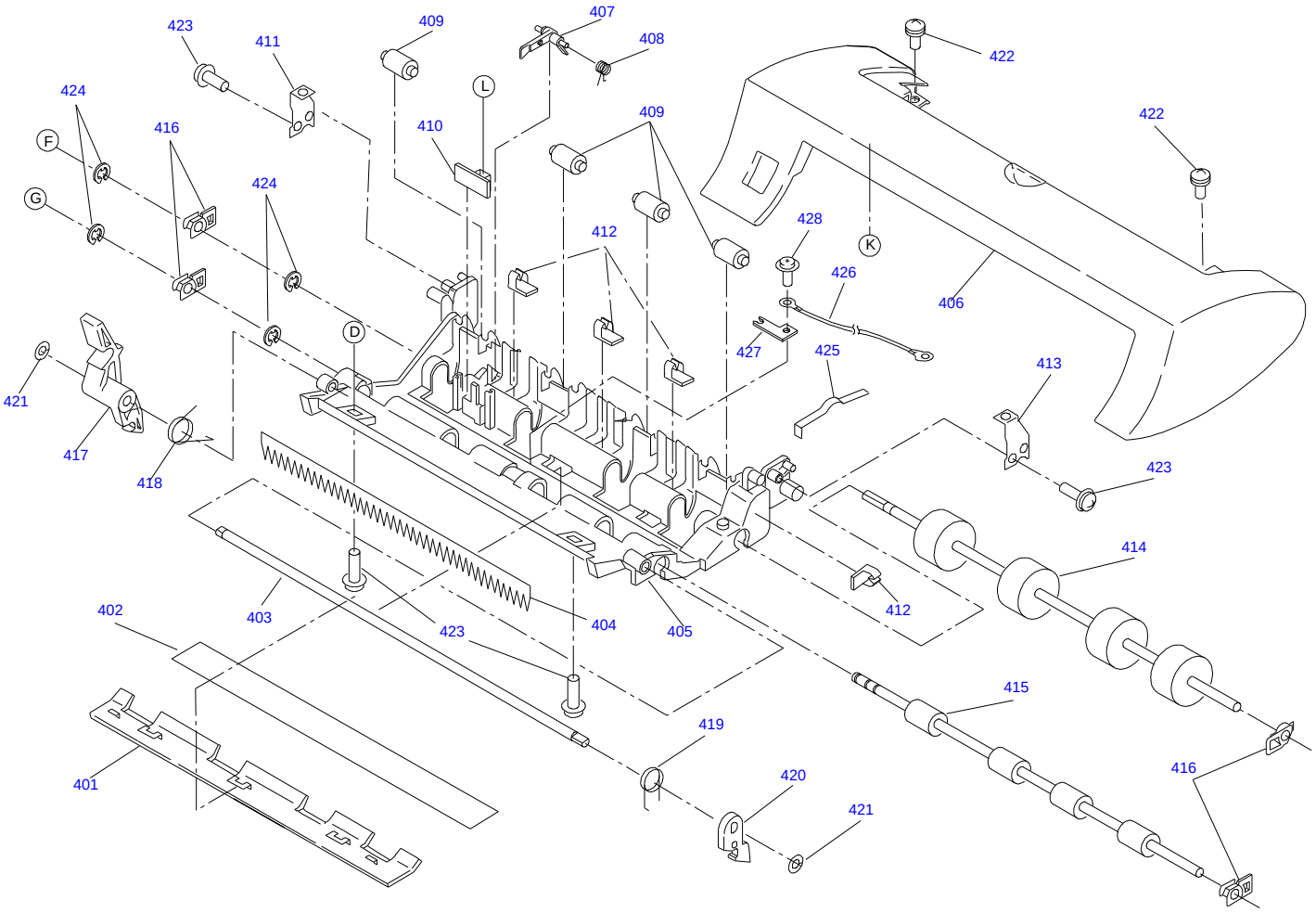

Automatic Document Feeder for GT-X750 / Perfection 4490 No.01 Rev.01 B813-OPTI-1



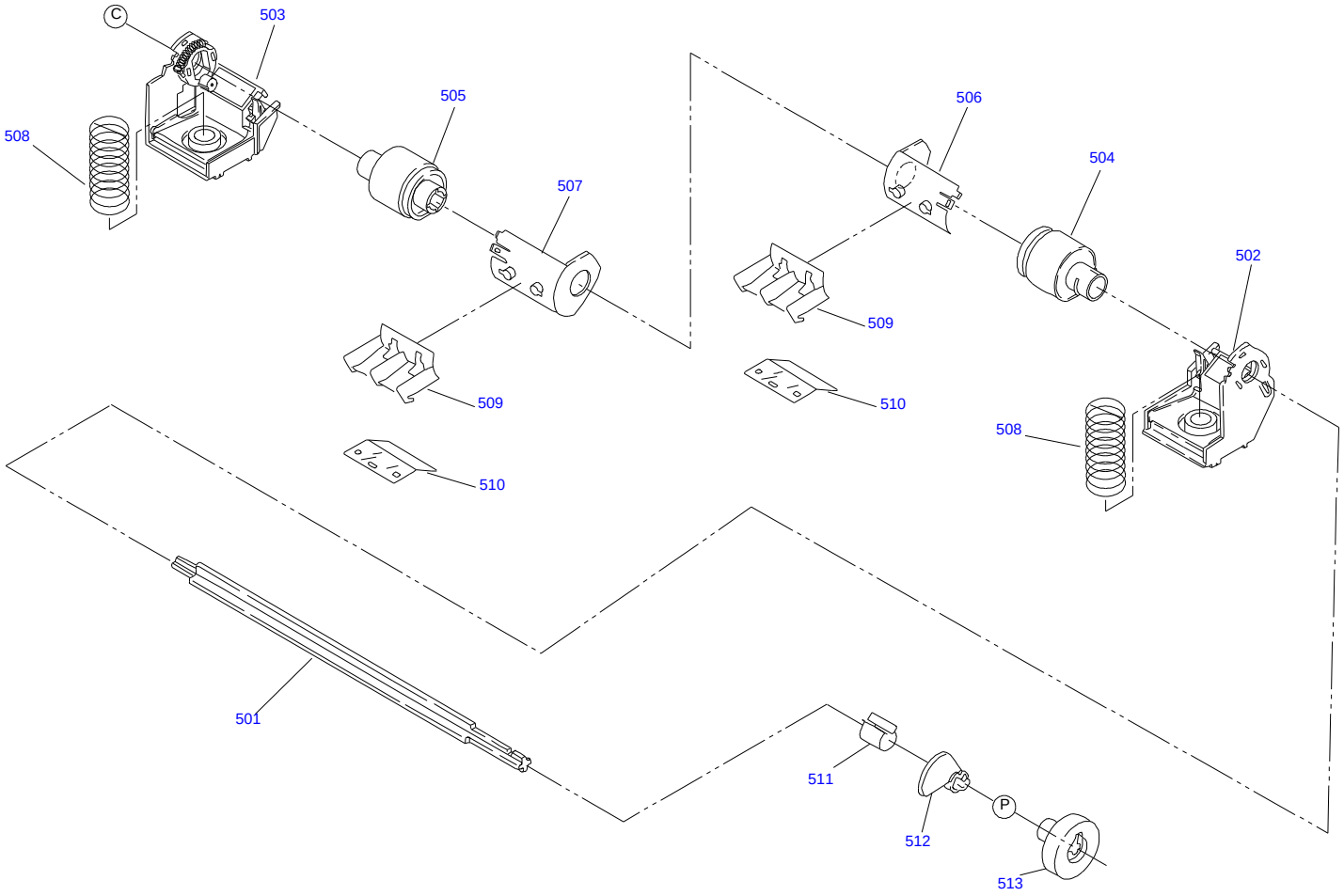

Automatic Document Feeder for GT-X750 / Perfection 4490 No.02 Rev.01 B813-OPTI-2




Automatic Document Feeder for GT-X750 / Perfection 4490 No.03 Rev.01 B813-OPTI-3




Automatic Document Feeder for GT-X750 / Perfection 4490 No.04 Rev.01 B813-OPTI_4




Automatic Document Feeder for GT-X750 / Perfection 4490 No.05 Rev.01 B813-OPTI_5

## 7.9 ADF; Parts List

**Table 7-4. Automatic Document Feeder Parts List**

| Ref No. | Part Name |
|---|---|
| 101 | MAT |
| 102 | DOUBLE SIDE TAPE,215X5 |
| 108 | COVER,LOWER |
| 109 | LEVER,OPEN |
| 110 | SHEET,INSULATION |
| 111 | FRAME BASE |
| 112 | HOLDER,HINGE,R |
| 114 | HOLDER,HINGE,L |
| 115 | METAL FITTINGS,RELEASE |
| 116 | MOUNTING PLATE,PAPER GUIDE |
| 117 | SHEET GUIDE;C |
| 118 | SHEET GUIDE,ADAPTER |
| 119 | ROLLER,DRIVEN,EJ |
| 120 | ROLLER,EJ,SUPPORT |
| 121 | SHAFT,ROLLER,EJ |
| 122 | COMPRESSION SPRING,3.91 |
| 123 | ROLLER,DRIVEN,PF |
| 124 | SHAFT,ROLLER,PF |
| 125 | PRESSING PLATE,PF |
| 126 | PAPER GUIDE,PF |
| 127 | PAPER GUIDE,LD |
| 128 | COVER,TOP |
| 129 | HARNESS,ASF |
| 130 | CLAMP,CABLE |
| 131 | HARNESS,OPT |
| 132 | C.B.P(P1),3X8,F/ZN |
| 133 | C.B.P-TITE(P2)SCREW,3X10,F/ZN |
| 134 | C.B.P.SCREW,4X12,F/ZN |
| 135 | C.B.P-TITE,3X10,F/NI |
| 136 | BOARD ASSY., MAIN |
| 137 | SHEET ADAPTER ASSY.,SUPPORT;ASP UNIT |

**Table 7-4. Automatic Document Feeder Parts List**

| Ref No. | Part Name |
|---|---|
| 138 | WIRE,STOPPER |
| 139 | SHEET GUIDE;B |
| 140 | GROUNDING PLATE |
| 141 | ANTI-STATIC BRUSH;B |
| 142 | EARTH WIRE,A |
| 143 | BRACKET,HINGE |
| 144 | SHEET,COVER GEAR |
| 145 | GUIDE,HINGE;L |
| 146 | GUIDE,HINGE;R |
| 147 | CLIP |
| 148 | C.B.P-TITE SCREW,3X12,F/ZN |
| 201 | FRAME,ASF |
| 202 | HOPPER |
| 203 | EDGE GUIDE;B |
| 204 | CORK |
| 205 | LABEL,EDGEGUIDE |
| 206 | LEVER,FASTEN,EDGEGUIDE;B |
| 207 | EXTENSION SPRING,0.088 |
| 208 | LEVER,PE,FRONT |
| 209 | LEVER,HOPPER,RELEASE |
| 210 | DETECTOR,HP;C |
| 211 | SLIDER,EDGEGUIDE |
| 212 | PAD,BREAK,EDGE GUIDE |
| 213 | COMPRESSION SPRING,3.23 |
| 214 | TORSION SPRING,41.2 |
| 215 | LEVER,BRAKE |
| 216 | PAD,BREAK |
| 217 | HARNESS,HP |
| 218 | CIRCUIT ASSY,PE |
| 219 | HARNESS,PE,FRONT |
| 220 | C.B.P.SCREW,4X12,F/ZN |
| 221 | C.B.P-TITE(P2)SCREW,3X10,F/ZN |
| 301 | FRAME,GEAR |
| 302 | FRAME,MOTOR |
| 303 | MOTOR ASSY.,ADF |

**Table 7-4. Automatic Document Feeder Parts List**

| Ref No. | Part Name |
|---|---|
| 304 | SOLENOID ASSY. |
| 305 | DAMPER,CR |
| 306 | SPACER,SOLENOID |
| 307 | FLANGE |
| 308 | COMBINATION GEAR,15.2,24 |
| 309 | U-TYPE SPRING WASHER,5.2X0.4X10,S/NA |
| 310 | COMPRESSION SPRING,0.39 |
| 311 | COMBINATION GEAR,17.6,22 |
| 312 | COMBINATION GEAR,9.6,22.8 |
| 313 | SUPR GEAR,18.4 |
| 314 | SPUR GEAR,27.2 |
| 315 | SUPR GEAR,20 |
| 316 | SPACER,3X6.5,ZMC |
| 317 | CLIP |
| 318 | MOUNTING PLATE,FRONT |
| 320 | C.B.P-TITE(P2)SCREW,3X10,F/ZN |
| 321 | C.B.P.SCREW,4X12,F/ZN |
| 322 | C.B.P(P1),3X8,F/ZN |
| 323 | C.B.(P2)SCREW,3X5,F/ZN |
| 324 | C.B.B(P2),2.9X12,F/ZN |
| 325 | PLANE WASHER,4.5X0.5X8,L/NA |
| 326 | C.B.(P2)SCREW,3X8,F/ZN |
| 327 | PLAIN WASHER |
| 401 | BASE,WHITE |
| 402 | SHEET,WHITE |
| 403 | SHAFT,RELEASE |
| 404 | ANTI-STATIC BRUSH;C |
| 405 | PAPER GUIDE,MAIN |
| 406 | HOUSING |
| 407 | LEVER,PE,REAR |
| 408 | TORSION SPRING,0.22 |
| 409 | ROLLER,GUIDE |
| 410 | CIRCUIT ASSY,PE |
| 411 | MOUNTING PLATE,REAR,L |
| 412 | CLIP |

**Table 7-4. Automatic Document Feeder Parts List**

| Ref No. | Part Name |
|---|---|
| 413 | MOUNTING PLATE,REAR,R |
| 414 | ROLLER ASSY.,PF;B |
| 415 | ROLLER ASSY.,EJ |
| 416 | BUSHING,6 |
| 417 | LEVER,RELEASE |
| 418 | TORSION SPRING,125.17,L |
| 419 | TORSION SPRING,125.17,R |
| 420 | LEVER,RELEASE;B |
| 421 | PLANE WASHER,4.5X0.5X8,L/NA |
| 422 | C.B.S.(P2),3X6,F/ZB |
| 423 | C.B.P-TITE(P2)SCREW,3X10,F/ZN |
| 424 | E-RING,4,F/UC |
| 425 | ALUMINUM FOIL TAPE,80X7 |
| 426 | EARTH WIRE,B |
| 427 | MOUNTING PLATE,PAPER GUIDE |
| 428 | C.B.P-TITE SCREW,3X6,F/ZN |
| 501 | SHAFT,ROLLER,LD |
| 502 | PAPER LOADING ASSY.,LEFT |
| 503 | PAPER LOADING ASSY.,RIGHT |
| 504 | ROLLER,ASSY.,LD,LEFT |
| 505 | ROLLER,ASSY.,LD,RIGHT |
| 506 | COVER,ROLLER,LD,LEFT |
| 507 | COVER,ROLLER,LD,RIGHT |
| 508 | COMPRESSION SPRING,1.66 |
| 509 | HOLDER,SHEET,PAPER FEED;B |
| 510 | SHEET,PF |
| 511 | BUSHING,FASTEN,SHAFT,LEFT |
| 512 | LEVER,HOPPER,RELEASE |
| 513 | WHEEL,DETECT |