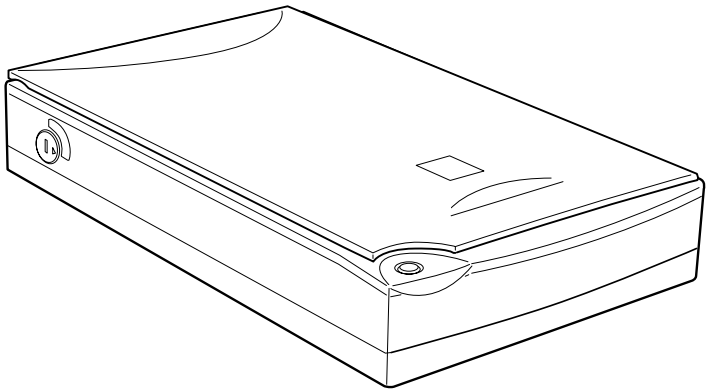
SERVICE MANUAL



Color Image Scanner

EPSON Perfection 610

COLOR IMAGING EPSON

EPSON®

SESC990016

Notice:

- All rights reserved. No part of this manual may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SEIKO EPSON CORPORATION.
- The contents of this manual are subject to change without notice.
- All effort have been made to ensure the accuracy of the contents of this manual. However, should any errors be detected, SEIKO EPSON would greatly appreciate being informed of them.
- The above not withstanding SEIKO EPSON CORPORATION can assume no responsibility for any errors in this manual or the consequences thereof.

EPSON is a registered trademark of SEIKO EPSON CORPORATION.

General Notice: Other product names used herein are for identification purpose only and may be trademarks or registered trademarks of their respective owners. EPSON disclaims any and all rights in those marks.

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. NOWORK 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.

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. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of EPSON Perfection 610. 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. The chapters are organized as follows:

CHAPTER 1. PRODUCT DESCRIPTIONS

Provides a general overview and specifications of the product.

CHAPTER 2. OPERATING PRINCIPLES

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

CHAPTER 3. TROUBLESHOOTING

Provides the step-by-step procedures for troubleshooting.

CHAPTER 4. DISASSEMBLY AND ASSEMBLY

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

CHAPTER 5. ADJUSTMENTS

This product reqires no adjusment.

CHAPTER 6. MAINTENANCE

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

APPENDIX

Provides the following additional information for reference:

- ***Connector Pin Assignments***
- ***Parts List***
- ***Exploded Diagrams***

Revision Status

Revision	Issued Date	Description
A	June 16, 1999	First Release
B	August 2, 1999	Parts list and exploded digrams have been added to Appendix.

Contents

CHAPTER

1

PRODUCT DESCRIPTION

1.1 Features

The major features of the EPSON color image scanner Perfection 610 are as follows.

- Easy to use: USB I/F, Friendly user interface TWAIN
  Start Button (Ease of use with Page Manager)
- High quality:
  - Resolution: 600 dpi (Optical resolution by 3 line CCD with 15300 pixels)
  - Gray scale levels: 12bits (In: 12bits, Out: 8bits)
- Command level: ESC/I-D1

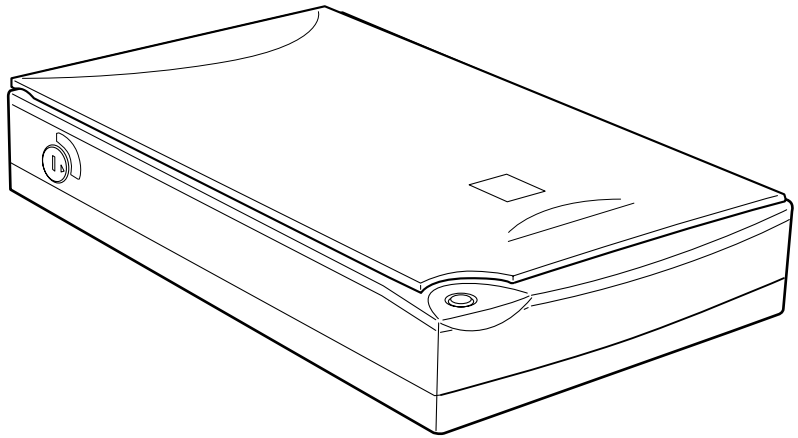


Figure 1-1. Exterior View of the Perfection 610

1.2 Specifications

GENERAL SPECIFICATIONS

- Product type: Flatbed color image scanner
- Sub-scanning method: Movement of the scanning head
- Photoelectric device: Color CCD line sensor
- Maximum read area: 8.5 x 11.7” (216 x 297 mm)
- Maximum effective picture element:
  5100 x 7020 pixels (600 dpi)
- Scanning resolution:
  - Main: 600 dpi (Optical resolution by 3 line CCD with 15300 pixels)
  - Sub: 2400 dpi with micro step
- Output resolution: 75, 150, 300, 600, 1200, 2400 dpi
- Gray scale levels: 12bits/pixel (In: 12bits, Out: 8bits)
- Color separation: By the color filter of CCD
- Scanning speed (600 dpi): Color: 16 msec/line
  Monochrome (bi-level):5.3 msec/line
- Command level: ESC/I-D1
- Gamma correction: User defined 1 level
- Interface: USB (Type-B Receptacle Connector)
- Operating system: Microsoft Windows 98 (pre-install model only)
  Microsoft Windows2000 will be supported.
  iMac (AppleSystem8.5 or later, AppleSystem-8.1 w/iMac Update 1.0)
  PowerMacintosh G3 (AppleSystem8.5 or later)
- USB hosts: All of USB ports work correctly. (The functinality of the USB port(s) must be ensured by the vendor of the Host.)

- ☐ Number of hubs: This device must be in the Tier 1 or 2 with a recommended USB cable. (Tier 1: Host - this device, Tier 2: Host - Hub - this device)
- ☐ Light source: White cold cathode fluorescent lamp
- ☐ Option: None
- ☐ Operate switch: None
- ☐ LED indicator: None
- ☐ Start button: Ease of use with Page Manager
- ☐ Scanning time: Color A4, Pentium 300MHz
  300 dpi: 60 seconds
  600 dpi: 280 seconds

ELECTRICAL SPECIFICATIONS

- ☐ Rated voltage: AC100-120V or AC220-240V
- ☐ Input voltage: AC 100-120V ± 10% or AC 220-240V ± 10%
- ☐ Rated current: 0.5A (Input AC 100V) or 0.3A (Input AC 200V)
- ☐ Rated frequency range: 50-60Hz
- ☐ Input frequency range: 49.5-60.5 Hz
- ☐ Power consumption: Approximately 20 W
- ☐ Insulation resistance: 10 M Ω at 500 VDC (between AC line and chassis)
- ☐ Dielectric strength: AC 1.5kV, 1 min (between AC line and chassis)

SAFETY, EMC, EPA

- ☐ Safety: UL1950 (UL)
  CSA C22.2 No.950 (CSA)
  EN60950 (VDE)
  IEC950 (ROTEST, PSB)
- ☐ EMC: FCC Part15 Subpart B Class B
  CSA C108.8 Class B
  AS/NZS3548 Class B
  CISPR Pub22 Class B
  CNS13438 Class B
- ☐ CE Marking:

Low Voltage Directive 73/23/EEC	EN60950
EMC Directive 89/336/EEC	EN55022 Class B
	EN61000-3-2
	EN61000-3-3
	EN50082-1
	IEC 801-2/801-3/801-4

- ☐ EPA: Energy Star Program

RESISTANCE TO ELECTRIC NOISE

- ☐ Static electricity: Panel: 10kV
  Metal: 7kV / 150pF, 150Ω

ENVIRONMENTAL CONDITIONS

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

RELIABILITY

- ☐ MCBF: 10,000 cycles

OPERATING CONDITIONS

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

DOCUMENT

- ☐ Reflective type: Documents which has a smooth surface such as printing and photograph.

DIMENSION

- ☐ Dimension: 287(W) x 425(D) x 88(H) mm
  Refer to Figure 1-2.
- ☐ Weight: 4.5 Kg

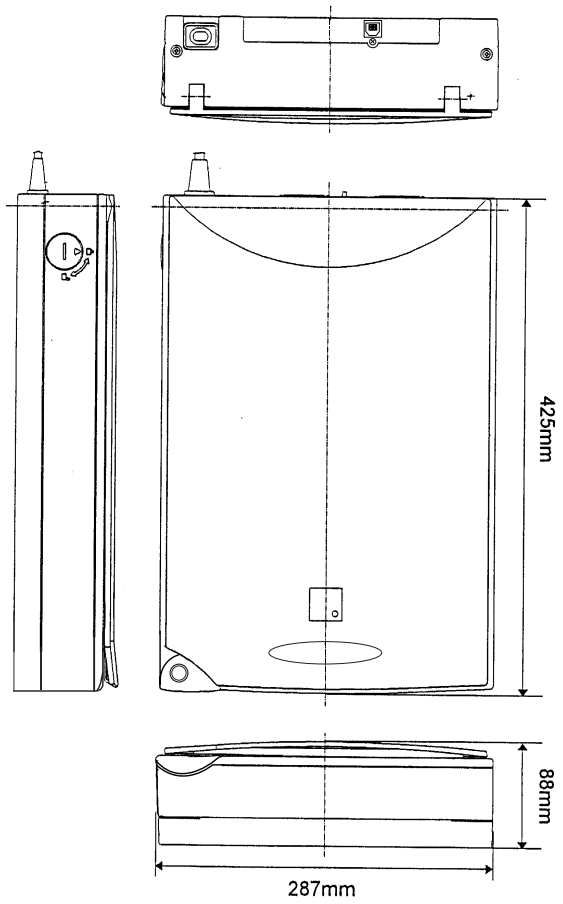


Figure 1-2. Exterior Dimension of the Perfection 610

1.3 Interface Specifications

This section provides specifications of the USB, the only interface supported by the Perfection 610.

1.3.1 USB Specifications

Any items not included in this specification shall be in compliance with Universal Serial Bus Specification Revision 1.0.

- ☐ Configuration: See Table 1-2.
- ☐ Electric specification: Compliant to Full Speed mode (12Mbit/s) of Universal Serial Bus Specification Revision 1.0.
- ☐ Connector: One Receptacle (Series B)
- ☐ Connector Pin Assignment: See the following figure.

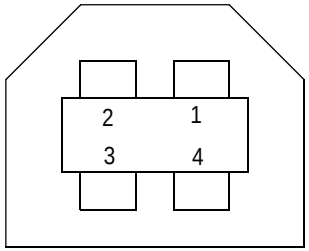


Figure 1-3. Connector Pin Location

Table 1-1. Connector Pin Assignment

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

Table 1-2. Configuration

Element	Description
Device	• Class: Vendor specific • Subclass: Vendor specific • Protocol: Vendor specific • Maximum packet size for endpoint 0: 8byte • Vendor ID: 0x04B8 (Seiko EPSON Corp.) • Product ID: 0x0103 • Number of possible configurations: 1
Configuration	• Number of interfaces supported by this configuration: 1 • Characteristics: Self-powered • Remote wake up feature: Not supported • Maximum of possible consumption: 2mA
Interface	• No Alternate setting • Number of endpoints used by this interface (excluding endpoint 0): 2 • Class: Vendor specific • Subclass: Vendor specific • Protocol: Vendor specific
Endpoint 1	• Bulk IN transfer • Maximum data transfer size: 64 byte
Endpoint 2	• Bulk OUT transfer • Maximum data transfer size: 64 byte
String Descriptor	• iManufacturer: “EPSON” • iProduct: “Scanner GT-6600” or “Perfection610”

1.4 Control Codes

The command level of this scanner is ESC/I-D1. The commands supported are shown in the table below.

Table 1-3. Control Codes

Category	Command Name	Code
Execute Command	Request Identity	ESC I
	Request Identity 2	ESC i
	Request Status	ESC F
	Request Extended Status	ESC f
	Start Scanning	ESC G
	Request Push Button Status	ESC!
Set Data Format	Set Data Format	ESC D i
	Set Resolution	ESC R n1 n2
	Set Scanning Area	ESC A n1 n2 n3 n4
	Set Color	ESC C i
Image Correction	Set Gamma Correction	ESC Z i
	Download Gamma Table	ESC z i d[256]
Auxiliary	Set Color Correction Factor	ESC m d[9]
	Set Threshold	ESC t i
	Set Scanning Mode	ESC g i
	Initialize	ESC @
	Set Line Counter	ESC d i
Control	Normal Response	ACK
	Abnormal Response	NACK
	Abort Scanning	CAN
	Header	STX

1.5 Lamp Descriptions

Since this scanner does not have any LED indicator, it shows the various conditions by turning on/off or blinking the lamp. Conditions indicated by the lamp are as listed below:

- Lamp: On
  - The scanner is in a normal condition.
- Lamp: Blinking
  - The scanner is turned on before the transportation screw is unlocked.
  - Communication error
  - Fatal error except for lamp break has occurred.

  NOTE: *The lamp goes off after 30 minutes.*
- Lamp: Off
  - Power save mode (Command is not received for 10 minutes.)
  - Power is not supplied.
  - The lamp has blown out.
  - The lamp was left blinking for 30 minutes.

1.6 Error Indications

Refer to Section 1.5 for the error indications.

COMMAND ERROR

- Cause: Undefined command is detected.
- Disposition: The scanner ignores a wrong command and parameter(s), so it keeps the current settings or default value effective. The scanner sends NACK and waits for the next command and parameter(s).
- Indicator: No effect
- Remedy: Error condition is cleared when the scanner receives a correct command.

COMMUNICATION ERROR

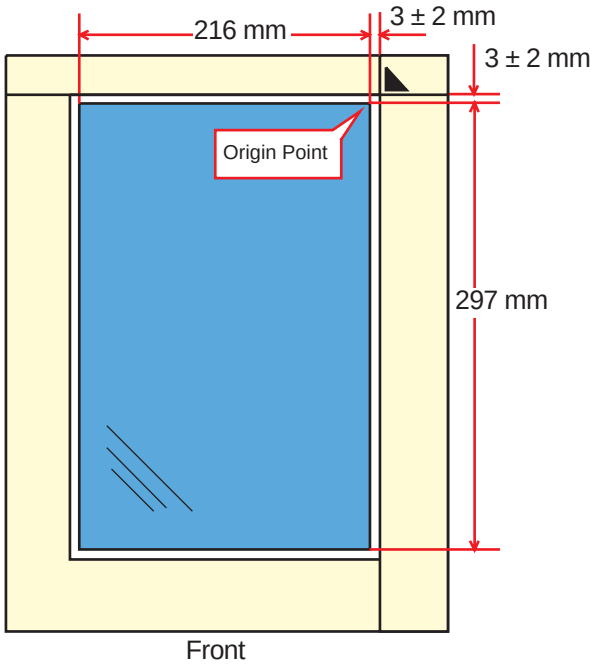
- Cause: Wrong procedure is detected in the interface communication.
  USB cable was removed during communication.
- Disposition: The scanner stops the ongoing job.
- Indicator: The lamp starts blinking. (The lamp goes off in 30 minutes.)
- Remedy: Turn the scanner off and then back on.
  Connect the USB cable again.
- Acceptable command: None

FATAL ERROR

- Cause: The lamp is broken.
  The scanner is turned on before the transportation lock is released.
  System breakdown
- Disposition: The scanner stops the ongoing job.
- Indicator: The lamp starts blinking. (The lamp goes off after 30 minutes.)
  The lamp does not light up when it has blown.
- Remedy: (After the cause of the error is removed)
  Turn the scanner off and then back on.
  Connect the USB cable again.
  Receiving of ESC@
- Acceptable command: [ESC F, ESC f, ESC @]

1.7 Manuscript Table

☐ Dimension: 216 mm (Horizontal) x 297 mm (Vertical)



CHAPTER

2

OPERATING PRINCIPLES

2.1 Engine Mechanism

This section explains the engine functions and operating principles of the EPSON Perfection 610. The engine mechanism has the two major parts; the carriage unit (=scanning head) and the carriage move mechanism.

2.1.1 Carriage Unit

The carriage unit is composed of the following:

- CCD sensor board (containing the CCD sensor)
- Inverter board
- Lamp (the light source)
- Mirror and lens mechanism

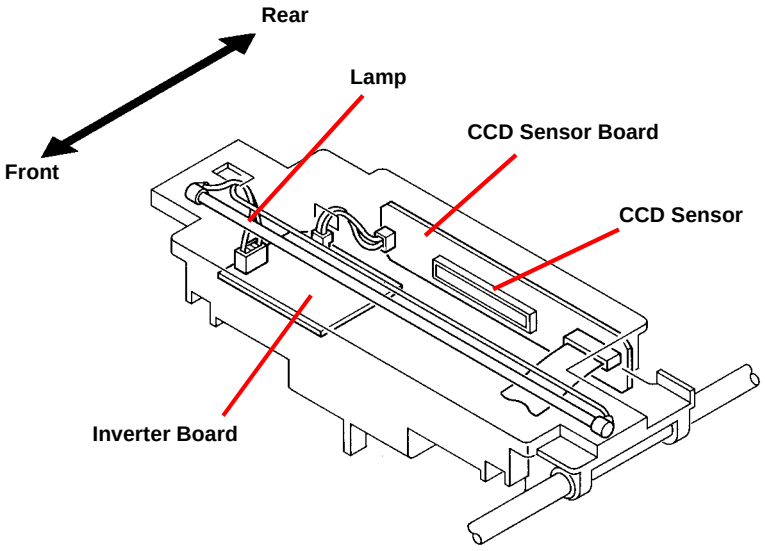


Figure 2-1. Carriage Unit Component

- ☐ CCD Sensor Board
  This board includes the Color CCD line sensor (independent R,G,B) and the sensor's control and driver circuits.
- ☐ Inverter Board
  This board generates voltage used to drive the lamp. The board pressures up +24VDC and converts it from direct current to alternating current.
- ☐ Lamp
  A white cold fluorescent lamp is used as the light source.
- ☐ Mirror and Lens Mechanism
  Light emitted to the document reaches the CCD sensor via the mirror and lens mechanism in the carriage unit, where the light's optical axis is corrected. Note other scanners separates R/G/B components by switching the light source between R, G, and B. In this scanner, however, it is performed by the CCD sensor itself.

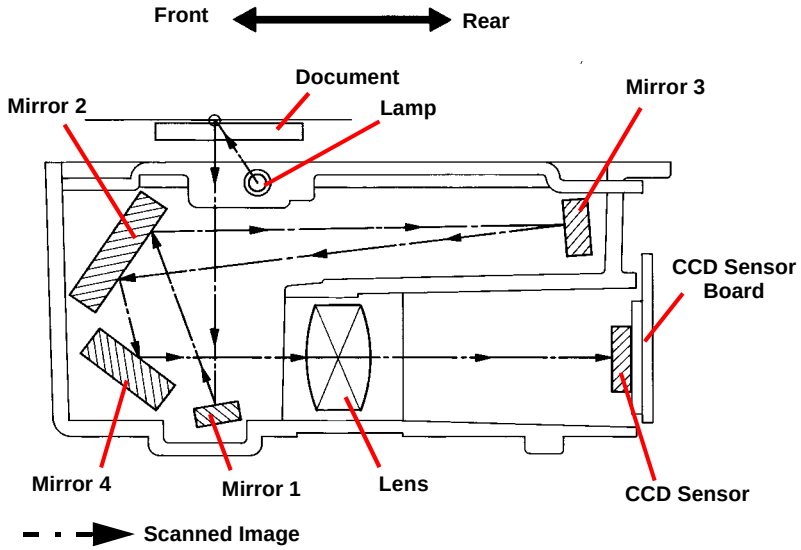


Figure 2-2. Mirror, Lens Mechanism

2.1.2 Carriage Drive Mechanism

A line-type color CCD sensor, which is included in the carriage unit, scans one line at a time in the main scan direction (parallel to the carriage unit). To scan next lines in the sub-scan direction after the first line, the scanner moves the carriage unit with the CCD sensor in it along the sub-scan direction. The scanned data is sent to the control board. Reading image for “n” line and processing data for “N-1” line are simultaneously performed one after another.

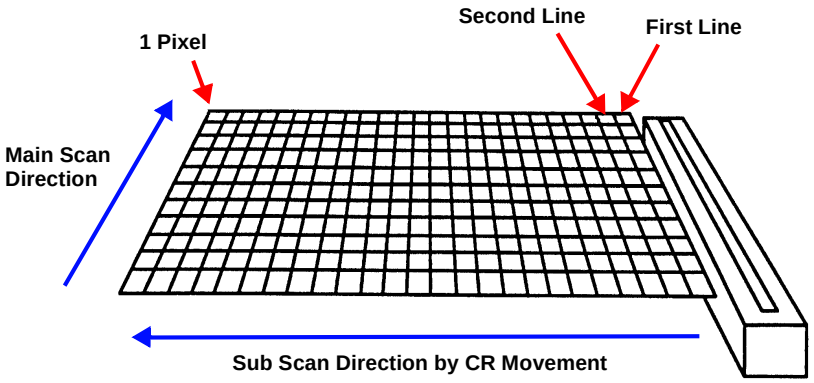


Figure 2-3. Carriage Movement

The carriage unit slides in the sub-scan direction along the guide rail. To slide the carriage, the carriage (CR) motor drives the timing belt attached to the carriage unit by conveying torque via the drive pulley and transmission gear. Scanning start position is determined by CR HP sensor, which is located on the control board. Since the CR motor is a stepping motor, it is controlled under the open loop system. (See Figure 2-4.)

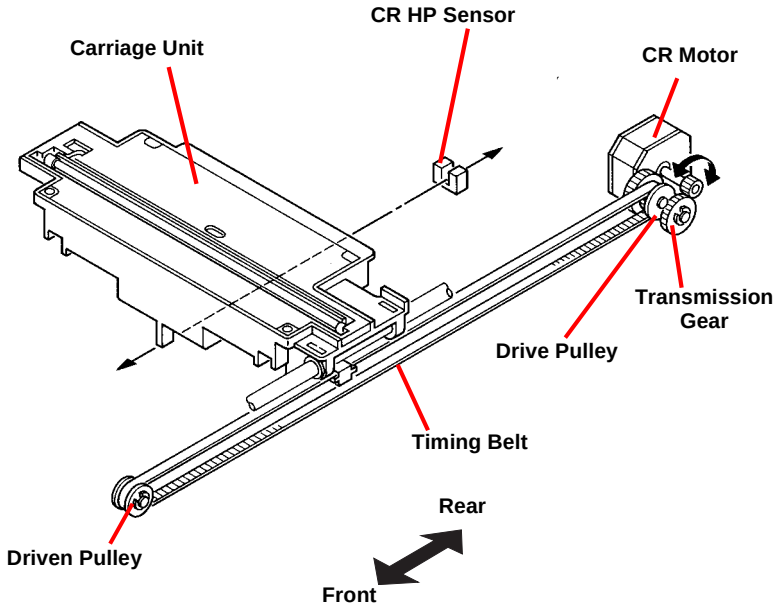


Figure 2-4. Carriage Operation

2.1.3 Power Supply Circuit

Power supply circuit board in this scanner generates direct current necessary for driving the controller board and scanner engine.

See Table 2-1 and Table 2-2 for the power supply circuit board specifications and the protection circuits for each output voltage/current, respectively. Figure 2-5 shows the power supply circuit diagram.

Table 2-1. Power Supply Circuit Board Specifications for Each Destination

Specification	Unit Part No.	Fuse
100 -120 VAC Range	2031592	2.5 A / 125 VAC
220 -240 VAC Range	2031593	T2.5AH / 250 VAC

Table 2-2. Protection Circuits for Output Voltages/Currents

Output Voltage	Output Current	Over Current Protection	Over Voltage Protection
5 VDC	1.2A	• The current is held 1A or less by the fold-back characteristic. • Recovers automatically*.	• Shut down. • To restore, turn the scanner off and then back on. • The protection circuit becomes active when the voltage rises to 5.5 - 7.5 VDC.
12 VDC	0.2A	• The current is held 0.5 or less by the fold-back characteristic of the generator. • Recovers automatically*.	• Shut down. • To restore, turn the scanner power off and then back on. • The protection circuit becomes active when the voltage rises to 14 -17 VDC.
24 VDC	0.7A	• Shut down. • To restore, turn the scanner power off and then back on.	• Shut down. • To restore, turn the scanner power off and then back on. • The protection circuit becomes active when the voltage rises to 28 -33 VDC.

**: Recovers within 5 minutes.*

NOTE: *If any of the outputs is shut down, all the other outputs are also shut down.*

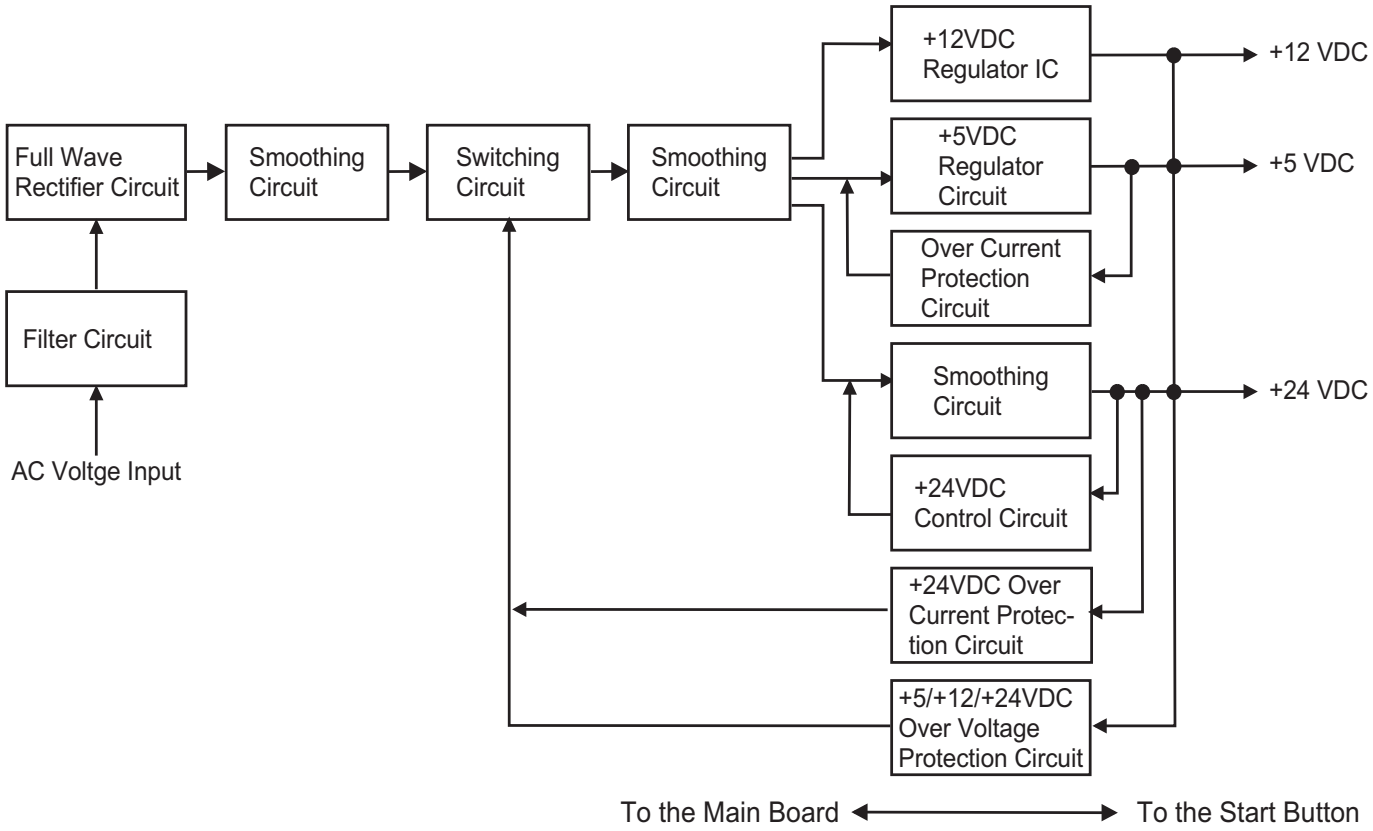


Figure 2-5. Power Supply Circuit Block Diagram

2.1.4 Control Circuit

The CPU (IC11) of this scanner is a one-tip 16-bit bus CPU operating at 20MHz. ASIC (IC7) manages input signal correction, image processing, and controlling the CCD sensor board and USB interface. Table 2-3 shows the major IC functions.

Table 2-3. Major ICs

IC	Location	Functions
M37920	IC11	CPU 24-bit Address Bus 16-bit Data Bus
SDM4260CLU-6S	IC3	DRAM 256k x 16bit
BA033FP-E2	IC9	Regulator IC (3.3 VDC)
NJM78M05DLA-TE1	IC12	Regulator IC (5 VDC)
E02A32SA	IC7	ASIC: Manages the following: • Input image signal correction • CCD control • USB interface control • Image processing • Memory control • Data in/output control
A3957SLBTR	IC1, 2	CR motor driver IC
M51953A	IC8	Reset IC
AD9816JS	IC24	12-bit A/D converter
M27C1001-10F1	IC5	Program ROM (128k x 8bit)
SG-8002PHC	CR1	48MHz clock for E02A32SA
CSTCS20.00	CR2	20MHz clock for CPU.
EE-SX1041	PC1	CR home position sensor

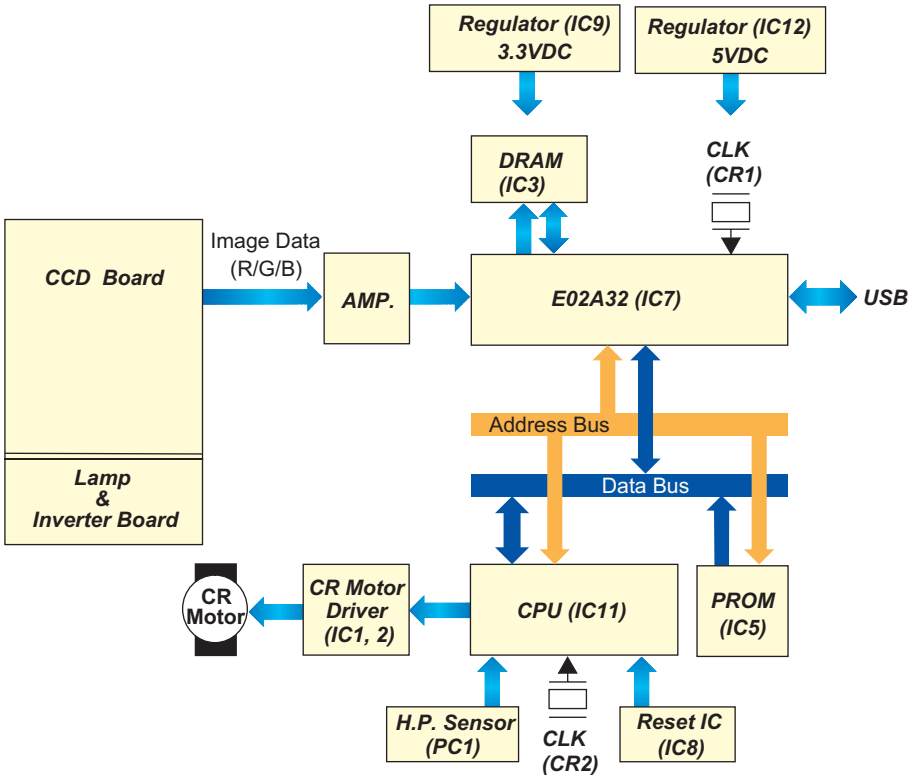


Figure 2-6. Control Circuit Diagram

CHAPTER

3

TROUBLESHOOTING

3.1 Overview

This chapter describes troubleshooting procedures for this scanner.

3.2 Self-Diagnostic Function

The self-diagnostic function of the scanner lets the scanner itself detect abnormal conditions. When the scanner detects an abnormality, it shows an error using the lamp. See Table 3-1 for the errors detected by the self-diagnostic function.

Table 3-1. Errors Detected by the Self-Diagnostic Function

Lamp Condition	Error Type (Cause Remedy)
No effect	***Command Error*** **Cause:** Undefined command **Disposition:** The scanner ignores the wrong command and parameters, and returns NACK and waits for the next command and parameters. **Remedy:** The scanner clears the error when it receives a correct command and parameters.
Blinking (Goes off after 30 minutes.)	***Communication Error*** **Cause:** ● Wrong communication procedure is detected. ● USB is disconnected during communication. **Disposition:** The scanner turns the lamp off and stops operating. **Remedy:** ● Turn the scanner off and back on. ● Disconnect the USB cable and then connect it properly. **Acceptable command:** None
Off (=the lamp has blown out.) Blinking (=error except the lamp has blown out.)	***Fatal Error*** **Cause:** ● The lamp has blown out. ● The scanner is turned on or receives a command with the transportation screw locked. ● The scanner is broken. **Disposition:** The scanner turns the lamp off and stops operating. **Remedy:** After removing the cause of the problem, ● Turn the scanner off and back on. ● Send a ESC@ command. ● Disconnect the USB cable and connect it again. **Acceptable command:** [ESC F, ESC f, ESC @]

3.3 Troubleshooting

This section describes how to troubleshoot problems according to exhibited phenomenons.
See Table 3-2 that enables you to find the defective part to the unit level. Then refer to the corresponding table for checkpoints and solutions.

Table 3-2. Problems and Corresponding Tables to Refer to

Phenomenon	Problem	Refer to:
The scanner is turned on but does not operate.	The scanner is not initialized.	Table 3-3
"Fatal Error" occurs. The scanner is turned off and back on but still shows the same error.	The carriage unit does not operate.	Table 3-4
	The carriage unit operates but the error is indicated.	Table 3-5
	The lamp does not light up.	Table 3-6
Image is not read clearly.	Image is not read clearly.	Table 3-7
"Communication Error" occurs. Communication with the host is attempted again, but the same error occurs.	USB interface error	Table 3-8

Table 3-3. The scanner is not Initialized.

Cause	Step	Checkpoints	Finding	Remedy
CN1 on the power supply board is disconnected.	1	Is CN1 on the power supply board disconnected?	Yes	Connect CN1 to the power supply board.

Table 3-4. The carriage unit does not operate.

Cause	Step	Checkpoints	Finding	Remedy
The PS (Power Supply) board is defective.	1	With scanner power on, check CN101 for the output voltage at the pins below. • Pins: 8/9 (+) and 6/7 (-) • Voltage: +24VDC	No	Replace the PS board.
The carriage drive mechanism is defective.	2	Is grease (G-26) properly applied? (See Chapter 6.)	No	Apply grease to the specified points properly.
	3	• With the upper housing removed, turn the scanner on, and check that the CR motor is live. • Remove the CR motor, and check that the carriage unit moves smoothly.	No	Check the carriage unit, and replace any defective part or disassemble and assemble the scanner again.
The CR motor is defective.	4	Disconnect CN6 on the main board. Then, using a tester, check that the coil resistance at each point below is 6.2Ω. 1. Between Pins 2 and 4 2. Between Pins 1 and 3	No	Replace the CR motor and go to step 4.
	5	Follow the steps below to check for the CR motor driver circuit. 1. Set the meter to Ω. 2. Place the (-) terminal of the tester on Pins 1, 2, 3, and then 4 of the CN6 on the main board. 3. Place the (+) terminal of the tester on Pin 6 or 7 of the CN4 on the main board. 4. Turn the scanner off, and check that the meter shows "∞"for each pin.	No	Replace the main board.
The main board is defective.	6	---	---	Replace the main board.

Table 3-5. The carriage unit operates but the error is indicated.

Cause	Step	Checkpoints	Finding	Remedy
The CR home position sensor is defective.	1	Check the signal levels between the collector (+) and emitter (-) of PC1. The signal level should change depending on the condition below: •HIGH (4.5V) = Light is blocked in PC1. •LOW (0.3V) = Light passes in PC1.	---	Replace the CR home position sensor (PC1) on the main board.

Table 3-6. The lamp does not light up.

Cause	Step	Checkpoints	Finding	Remedy
CN5 on the main board is disconnected.	1	Check that CN5 is disconnected.	Yes	Connect CN5 on the main board properly.
CN1 or CN2 on the CCD sensor board is disconnected.	2	Check that CN1 or CN2 on the CCD sensor board is disconnected.	Yes	Connect CN1 or CN2 on the CCD sensor board properly.
The connector for the lamp is not properly connected to the inverter board.	3	Check that the connector is properly connected to the inverter board.	No	Connect the connector properly.
The lamp is defective.	4	After replacing the lamp, check that the lamp lights up.	Yes	Replace the lamp.
The inverter board is defective.	5	After replacing the inverter board, check that the lamp lights up.	Yes	Replace the inverter board.
The main board is defective.	6	---	---	Replace the main board.

Table 3-7. Image is not read clearly.

Cause	Step	Checkpoints	Finding	Remedy
Any mirror in the carriage unit or the surface of the lamp is dirty.	1	After cleaning the mirror(s), check that image is read clearly.	No	Clean the surface of the lamp.
The CCD sensor board is defective.	2	---	---	Replace the CCD sensor board.
The main board is defective.	3	---	---	Replace the main board.

Table 3-8. USB Interface Error

Cause	Step	Checkpoints	Finding	Remedy
The host or O/S (Windows'98/ NT) does not support USB.	1	On the Windows, access My Computer > Property > Device Manager, and check that Universal Serial Bus Controller is effective.	No	Replace the host.
The TWAIN driver attached for the scanner is not properly installed.	2	Check that the driver for the scanner is installed properly.	No	Instal the correct driver properly.
The USB cable is defective.	3	After replacing the USB cable, check that the error is not indicated.	No	Replace the USB cable.
The main board is defective.	4	---	---	Replace the main board.

CHAPTER

4

ASSEMBLY AND DISASSEMBLY

4.1 Overview

This chapter describes procedures for disassembling the EPSON Perfection 610. Unless otherwise specified, the scanner can be disassembled by reversing the disassembly procedures.

4.1.1 Precautions

WARNING

Disconnect the power cable before disassembling or assembling the scanner.

CAUTION

When servicing, note the points below:

- **Consider the size of the scanner and make enough room for servicing.**
- **Since this scanner is a precision equipement, service it on a flat, level, heavy-duty table.**

The directions used in this chapter are defined as shown in Figure 4-1.

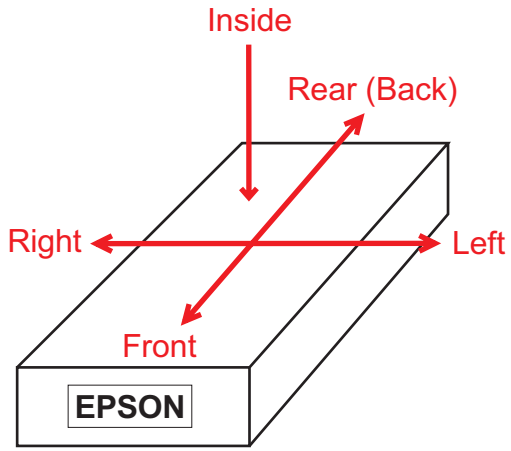


Figure 4-1. Directions

4.1.2 Tools

Use the tools specified in Table 1-1.

Table 4-1. Tools

Names	Availability	Part Number
Phillips screw driver (#2)	O	B743800200
Standard screw driver	O	B743000100
Pliers	O	B740400100
Tweezers	O	B641000100

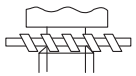
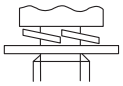
4.1.3 Screws

The screws used in the scanner are as shown in Table 4-2. Make sure you always use the correct type and number of screws for the assembling part. See Table 4-3 for the screw appearances.

Table 4-2. Screw Specifications

Abbreviation	Description
CP	Cross-recessed Pan Head screw
CBS	Cross-recessed Binding Head S-tite screw
CCP	Cross-recessed Cup Head P-tite screw

Table 4-3. Screw Appearances

Head appearance		Type	Washer
Top	Side		
Cross-recessed 	Binding  Pan  Cup 	Standard - - - - S-tite  B-tite  P-tite 	With Outside Toothed lock washer  With Spring lock washer 

4.2 Disassembly Procedures

4.2.1 Releasing the Carriage Lock

1. Using a standard screw driver, release the Carriage Lock located at the left side of the scanner body.

—: Released	|: Locked

CAUTION

When locking the carriage for transporting the scanner, make sure the carriage is at the home position.

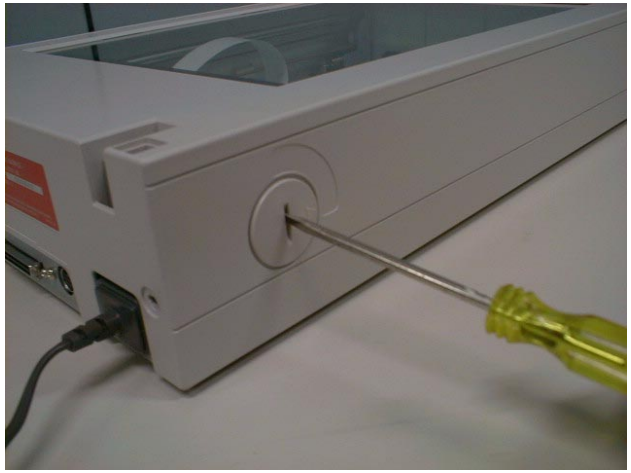


Figure 4-2. Carriage Lock Location

4.2.2 Document Cover Removal

1. Open the Document Cover.

2. Holding the Document Cover by the edges, release the two hooks by pushing the cover to the rear as shown in Figure 4-4.

Figure 4-3. Document Cover Removal (1)

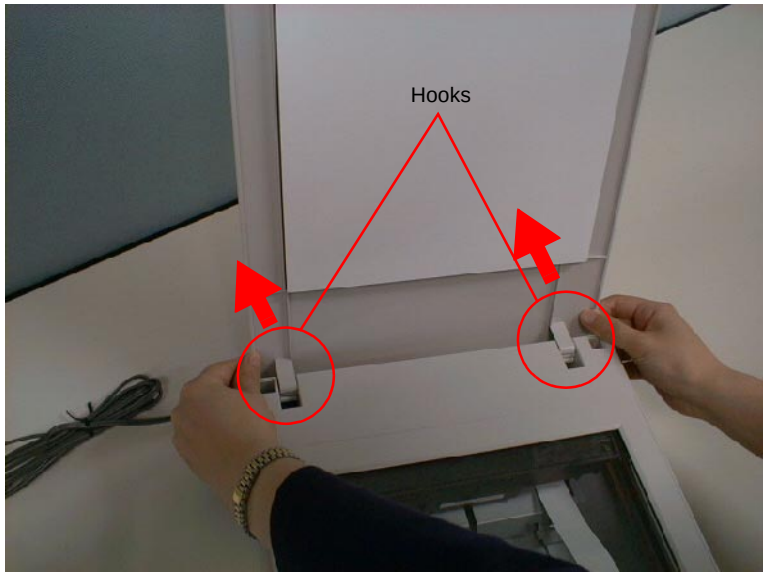


Figure 4-4. Document Cover Removal (2)

4.2.3 Upper Housing Removal

1. Release the Carriage Lock. (See Section 4.2.1.)
2. Remove the Document Cover. (See Section 4.2.2.)
3. Remove the two screws (gold, CBS, M3x6) at the back of the scanner body.
4. Lifting up the rear end of the Upper Housing, release the three hooks at the front end, and then remove the Upper Housing toward the front.

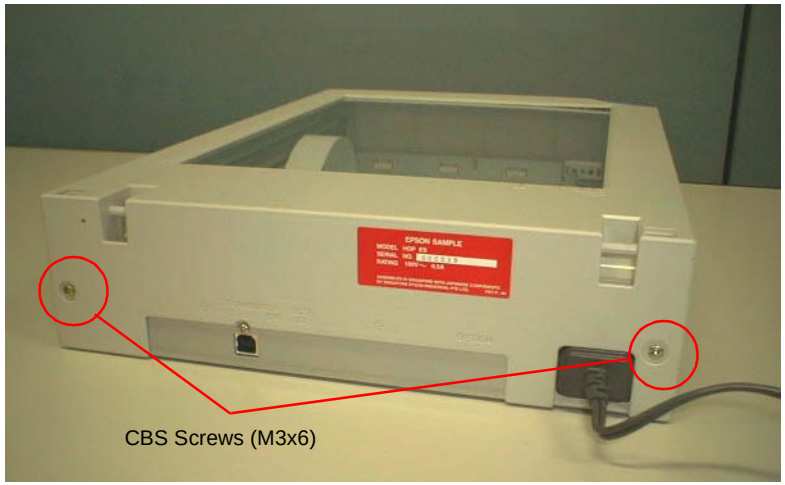


Figure 4-5. Upper Housing Removal (1)

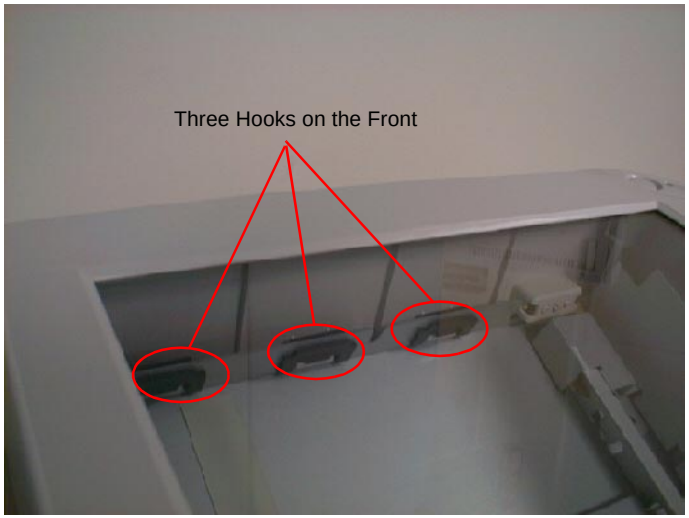


Figure 4-6. Upper Housing Removal (2)

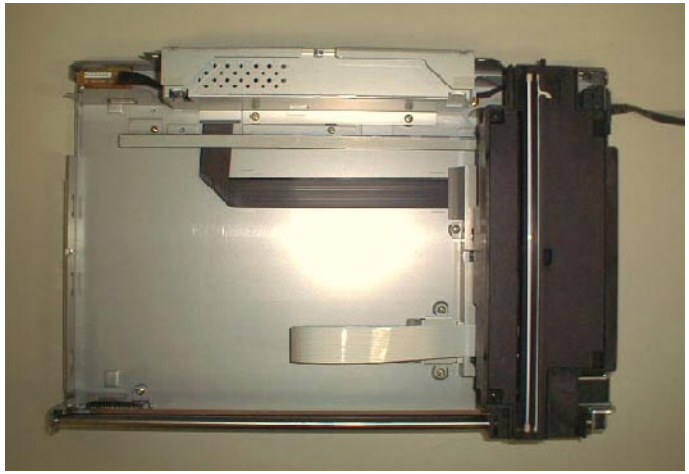


Figure 4-7. After Removing the Upper Housing

4.2.4 Inverter Lamp / Inverter Board Removal

1. Release the Carriage Lock. (See Section 4.2.1.)
2. Remove the Document Cover. (See Section 4.2.2.)
3. Remove the Upper Housing. (See Section 4.2.3.)
4. Remove the two screws (CCP, M3x8) on the Carriage Unit. (See Figure 4-8.)
5. Using a standard screw driver, lift up the carriage cover in the Carriage Unit, and then move it to the front to remove it. (See Figure 4-9.)

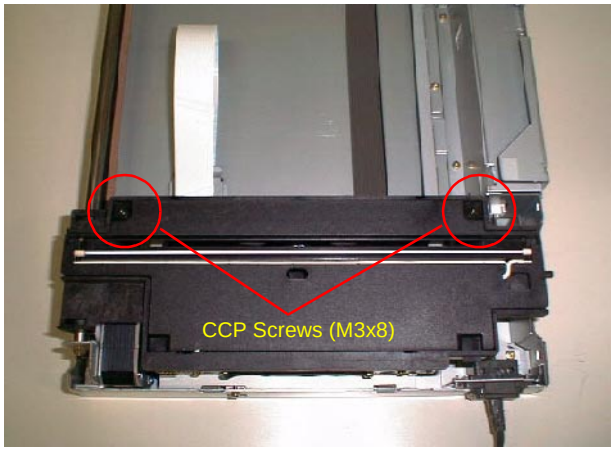


Figure 4-8. Carriage Unit Disassembly (1)

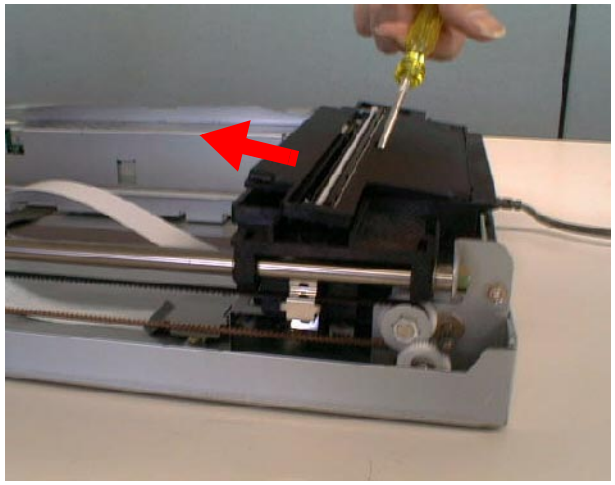


Figure 4-9. Carriage Unit Disassembly (2)

6. Disconnect the connector for the Inverter Lamp from the Inverter Board.

7. Remove the black screw and disconnect the 2-pin connector for the CCD sensor, and then remove the Inverter Board.

8. Remove the Inverter Lamp from the carriage cover.

CHECK POINT

When installing the Inverter Lamp, locate the connectors correctly as shown in the following figures.

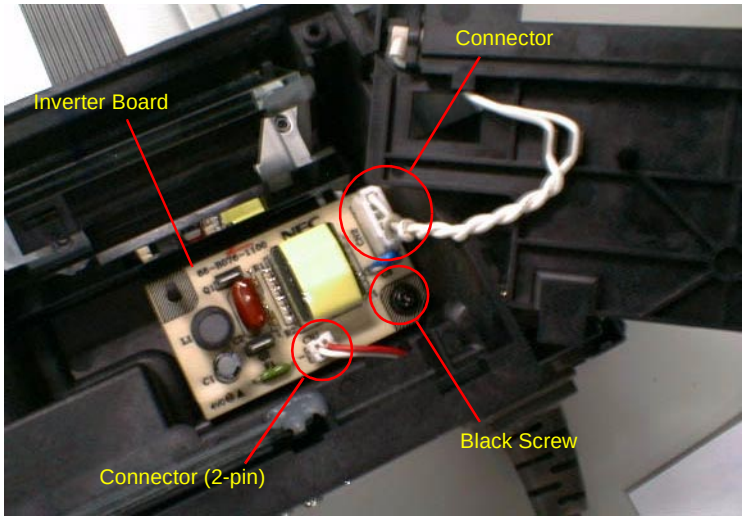


Figure 4-10. Inverter Board Removal

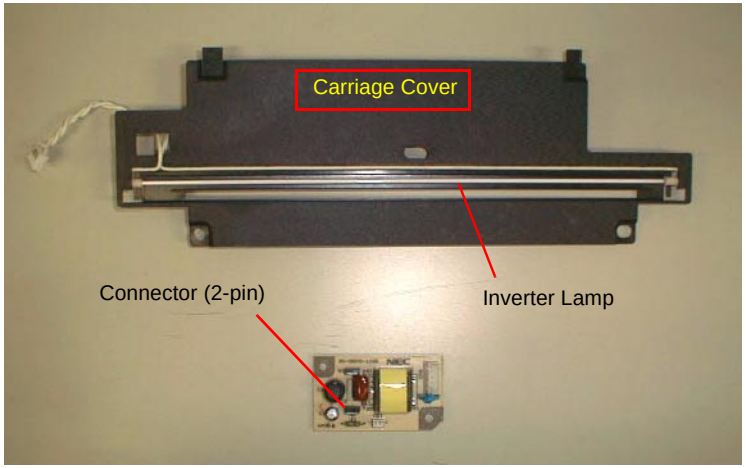


Figure 4-11. Inverter Lamp Removal

4.2.5 Carriage Unit Removal

1. Release the Carriage Lock. (See Section 4.2.1.)
2. Remove the Document Cover. (See Section 4.2.2.)
3. Remove the Upper Housing. (See Section 4.2.3.)
4. Using a standard screw driver, remove the timing belt clamp securing the timing belt and the carriage.

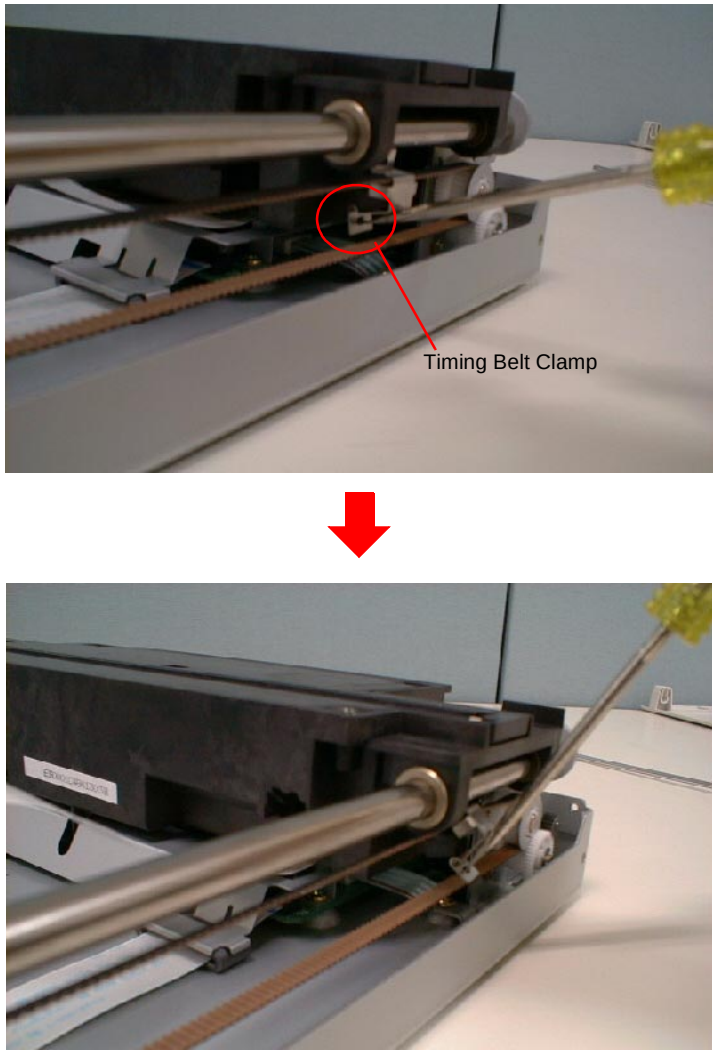


Figure 4-12. Metal Clamp Removal

5. Remove the hexagon nut at the rear end of the carriage guide shaft.

6. Remove the tension spring and the screw (gold, CBS, M3x4) securing the driven pulley assembly.

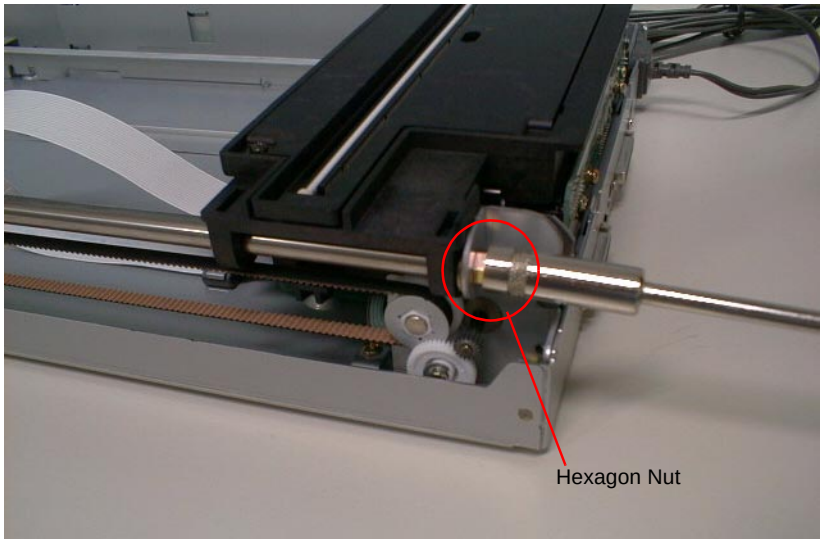


Figure 4-13. Hexagon Nut Removal

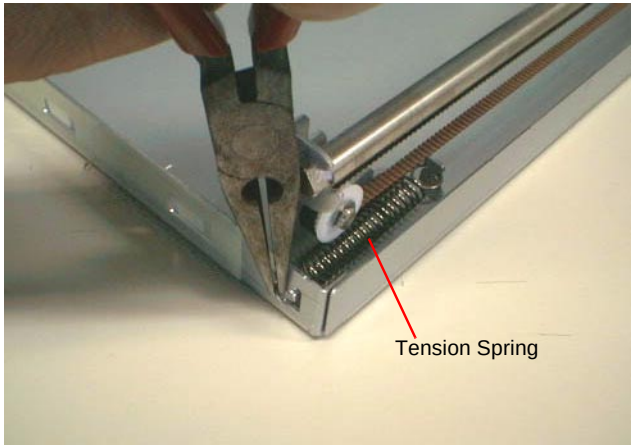


Figure 4-14. Driven Pulley Assembly Removal (1)

Figure 4-15. Driven Pulley Assembly Removal (2)

7. Release the timing belt from the driven pulley.
8. Remove the driven pulley assembly by pushing it in the direction indicated with the arrow. (See Figure 4-17.)
9. Remove the CR shaft from the Carriage Unit.

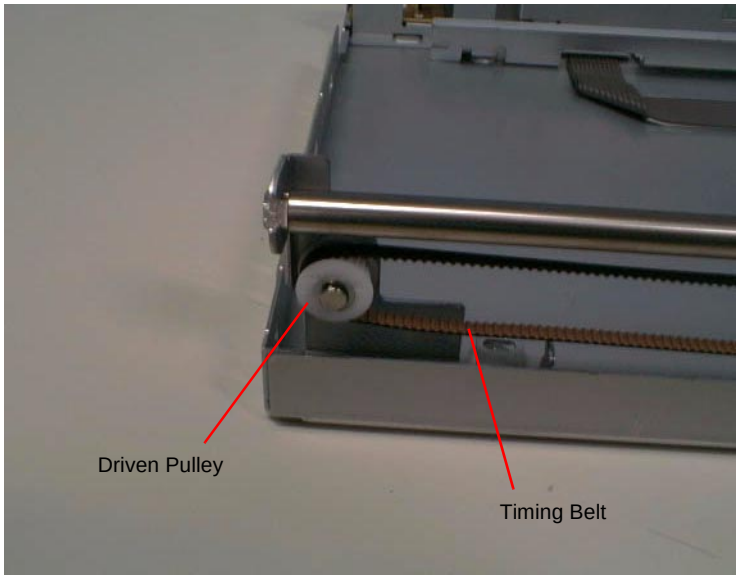


Figure 4-16. Timing Belt Removal

Figure 4-17. Driven Pulley Assembly Removal (3)

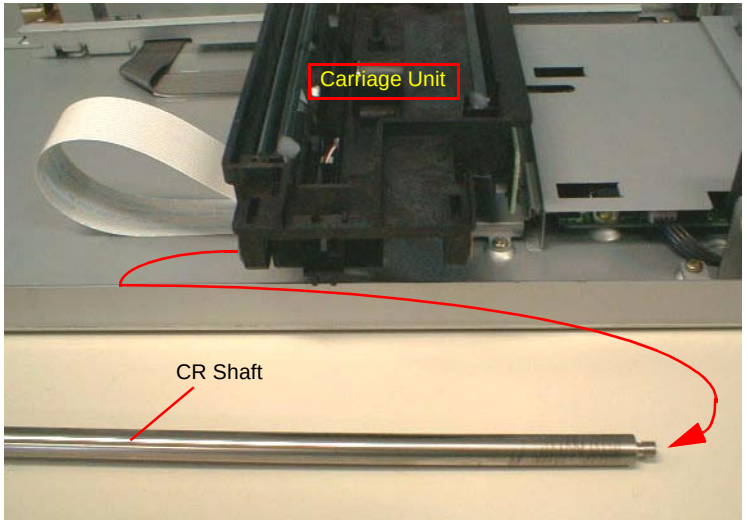


Figure 4-18. Carriage Guide Shaft Removal

10. Inserting a standard screw driver from the back, remove the FFC metal clamp.

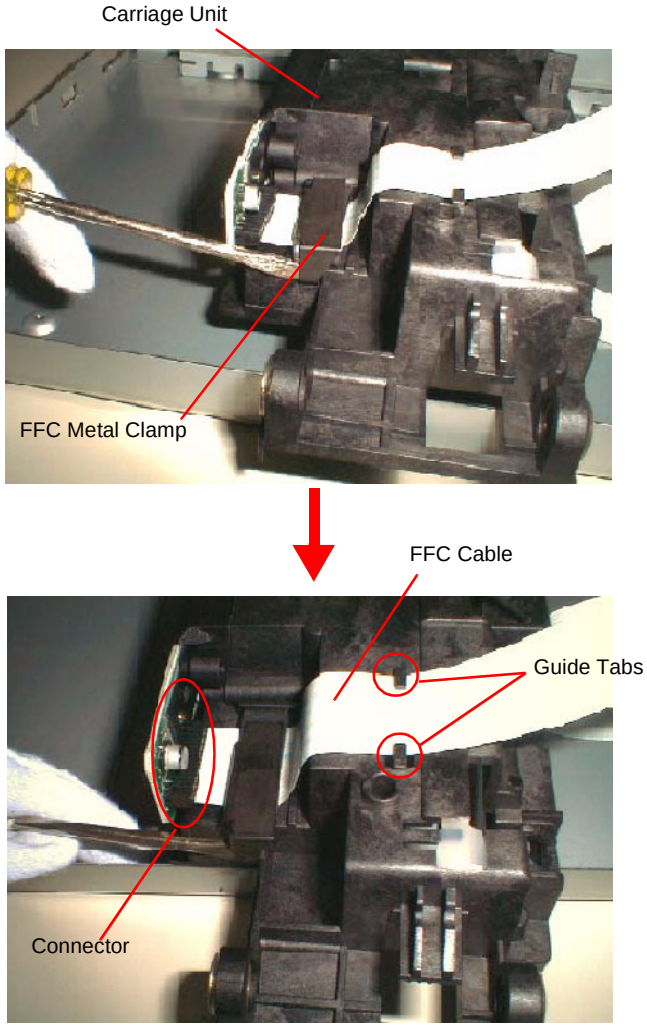


Figure 4-19. FFC Metal Clamp and FFC Removal

11. Release the FFC (white) from the connector and the two guide tabs in the Carriage Unit, and then remove the Carriage Unit.

Figure 4-20. Carriage Unit

4.2.6 Carriage Motor / Timing Belt Removal

1. Release the Carriage Lock. (See Section 4.2.1.)
2. Remove the Document Cover. (See Section 4.2.2.)
3. Remove the Upper Housing. (See Section 4.2.3.)
4. Remove the Carriage Unit. (See Section 4.2.5.)
5. Remove the two screws (CBS, M3x4) securing the FFC fixing plate, and then remove the FFC fixing plate.
6. Remove the three screws (gold, CBS, M3x4/M3x6) and the two hooks at the rear edge, and then remove the main board cover.
7. Remove the two screws (gold, CBS, M3x4) securing the CR Motor Unit, and then shift the CR Motor Unit inward.
8. Disconnect the cable for the CR Motor Unit from the connector on the main board, and then remove the CR Motor Unit.

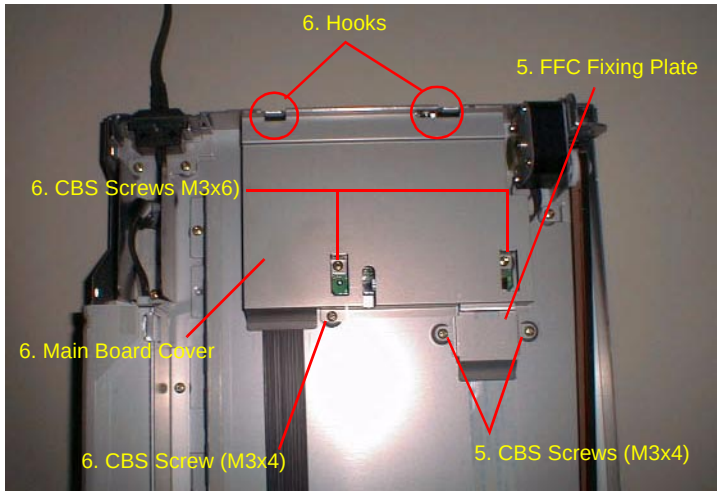


Figure 4-21. Shield Plate Removal

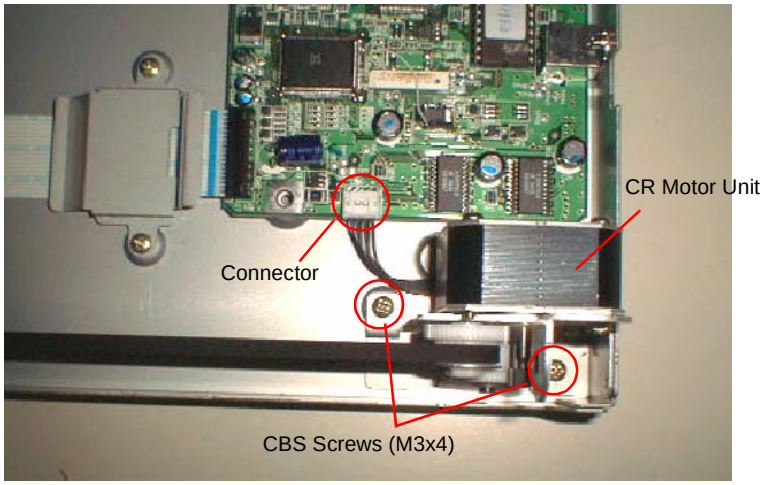


Figure 4-22. CR Motor Unit Removal (1)

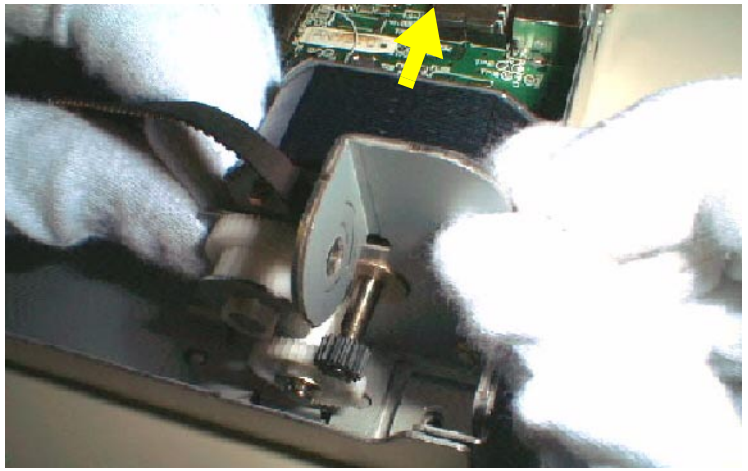


Figure 4-23. CR Motor Unit Removal (2)

9. Follow the steps below to remove the Timing Belt from the CR Motor Unit.

    1) Remove the E-ring.

    2) Remove the transmission gear.

    3) Disengage the timing belt from the drive pulley.

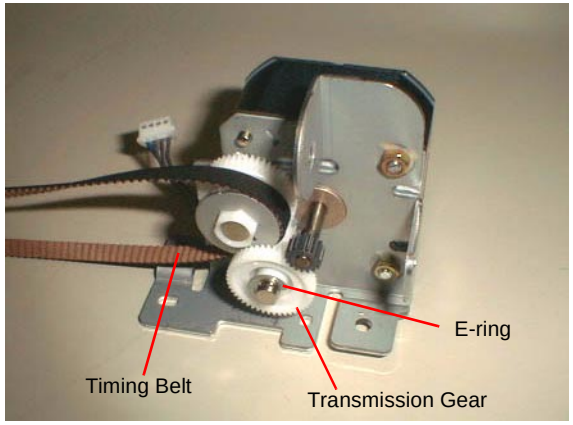


Figure 4-24. Timing Belt Removal

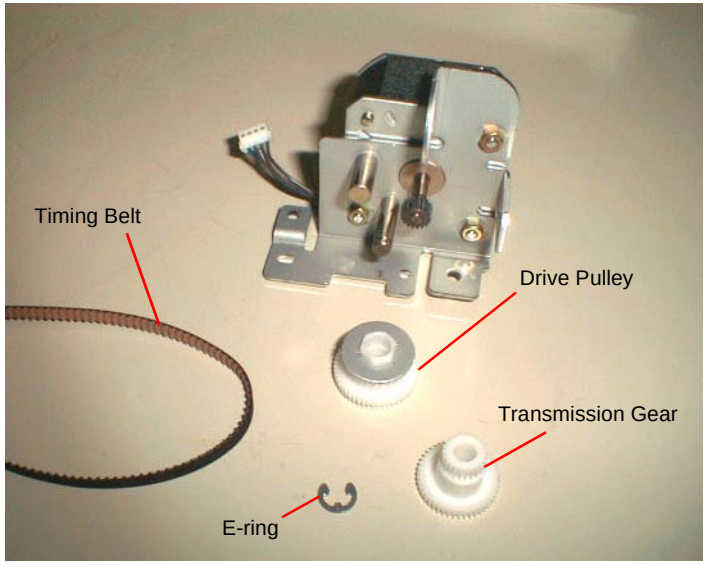


Figure 4-25. Parts in the CR Motor Unit

4.2.7 Main Board Removal

1. Release the Carriage Lock. (See Section 4.2.1.)
2. Remove the Document Cover. (See Section 4.2.2.)
3. Remove the Upper Housing. (See Section 4.2.3.)
4. Slide the Carriage Unit slowly until you see the whole main board cover.
5. Remove the two screws (CBS, M3x4) securing the FFC fixing plate, and then remove the FFC fixing plate.
6. Remove the three screws (gold, CBS, M3x4/M3x6), release the two hooks at the rear edge, and then remove the main board cover.

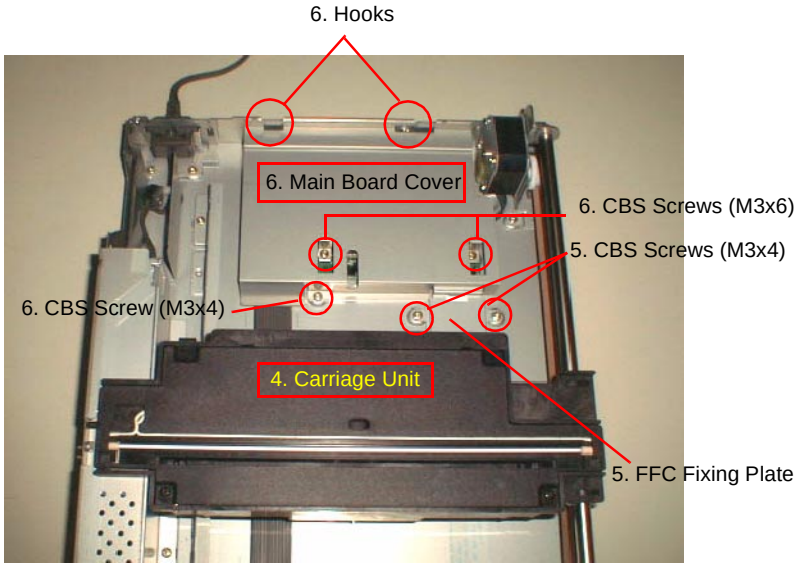


Figure 4-26. Main Board Removal (1)

7. Remove the screw (CP, M3x5) near the I/F connector and the one (CBS, M3x5) securing the Main Board.

8. Disconnect the following cables from the corresponding connectors; CR Motor - CN6, carriage FFC, Power Supply Board - CN4.

9. Remove the Main Board.

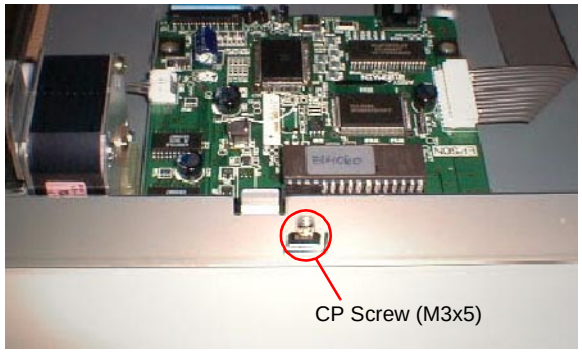


Figure 4-27. Main Board Removal (2)

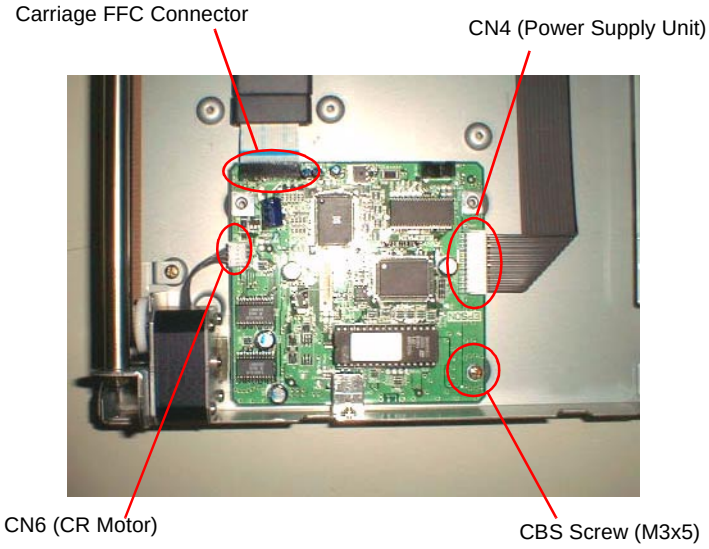


Figure 4-28. Main Board Removal (3)

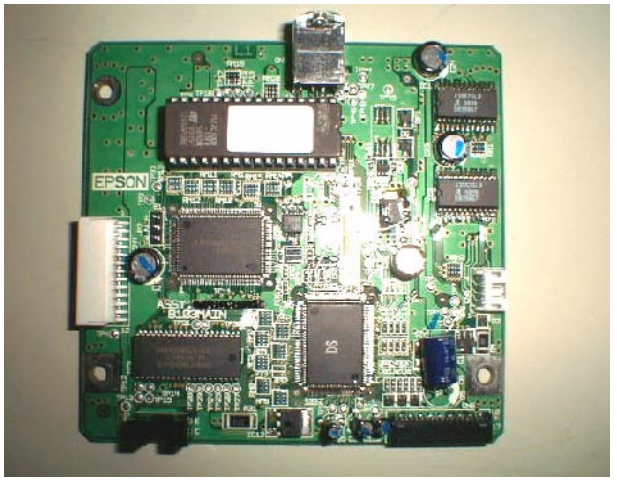


Figure 4-29. Main Board

4.2.8 Panel Board Removal

1. Release the Carriage Lock. (See Section 4.2.1.)
2. Remove the Document Cover. (See Section 4.2.2.)
3. Remove the Upper Housing. (See Section 4.2.3.)
4. Remove the screw (gold, CBS, M3x4).

CHECK POINT

In the following steps, manually move the carriage back and forth slowly if necessary.

5. Disconnect the locking connector (pull and release) for the Panel Board from the Power Supply Board, and then remove the Panel Board.

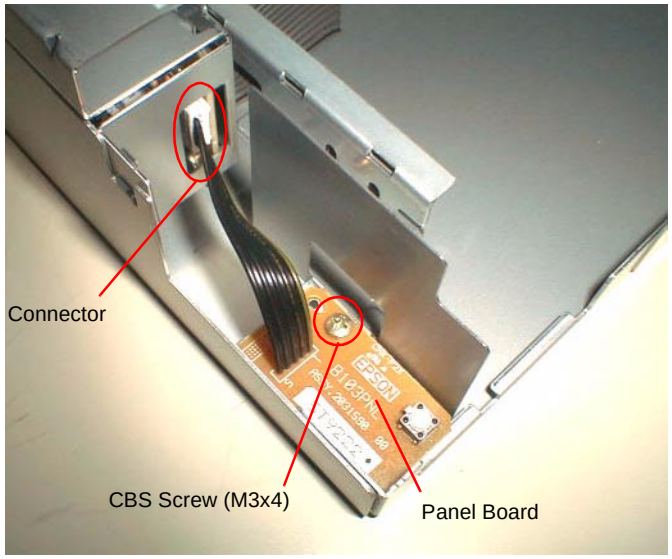


Figure 4-30. Panel Board Removal

4.2.9 Power Supply Board Removal

1. Release the Carriage Lock. (See Section 4.2.1.)
2. Remove the Document Cover. (See Section 4.2.2.)
3. Remove the Upper Housing. (See Section 4.2.3.)

CAUTION

In the following steps, manually move the carriage back and forth slowly if necessary.

4. Release the locking connector (pull and release) for the Panel Board, and then disconnect the cable from the Power Supply Board. (Refer to Figure 4-30.)
5. Disconnect the locking connector (pick and release) for the AC cable from the Power Supply Board.

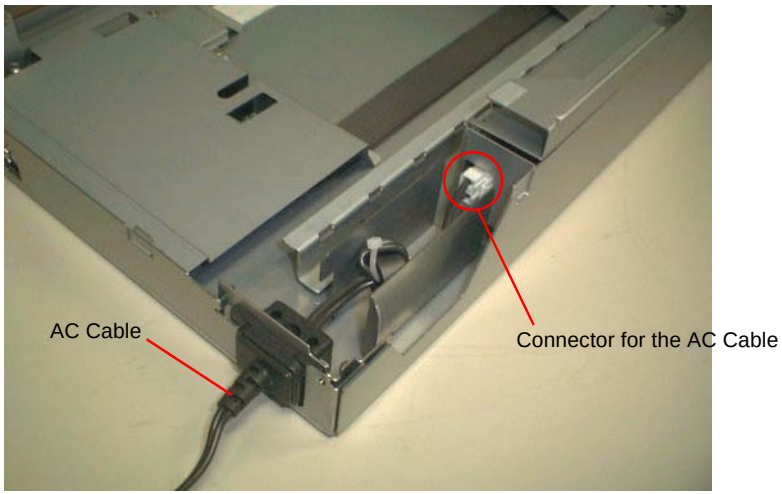


Figure 4-31. Connectors for the Power Supply Board

6. Remove the two screws (gold, CBS, M3x4) securing the shield plate, and then remove it toward the inside.

7. Disconnect the cable from the locking connector (push and release), remove the five screws (gold, CBS, M3x4), and then remove the Power Supply Board from the shield plate.

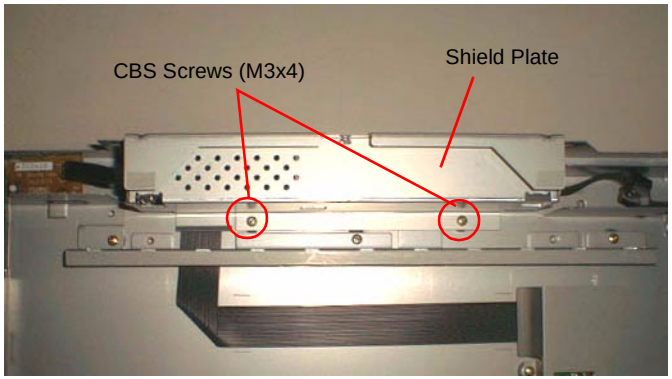


Figure 4-32. Power Supply Board Removal (1)

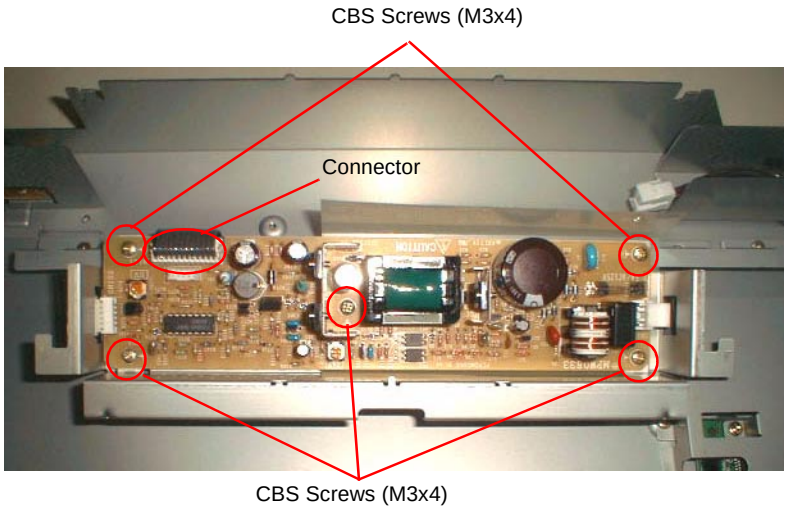


Figure 4-33. Power Supply Board Removal (2)

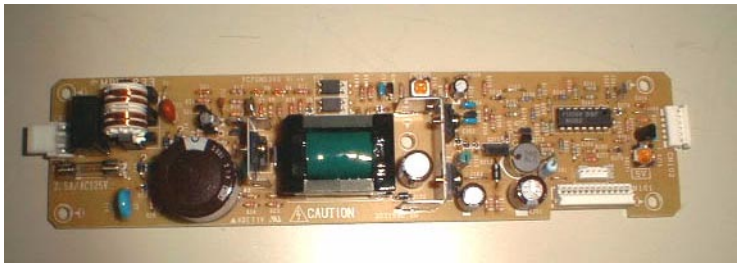


Figure 4-34. Power Supply Board

CHAPTER

5

ADJUSTMENT

This scanner needs no adjustment at the level of the service, including part replacement, specified in Chapter 4 “Disassembly and Assembly”.

CHAPTER

6

MAINTENANCE

6.1 Overview

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

6.1.1 Cleaning

Perform cleaning when stain is noticeable. Stain on the document glass, particularly, has a direct effect on scanned images. Therefore, be sure to clean the glass well to remove stain thoroughly.

CAUTION

Never apply any organic solvents such as thinner or benzene, since these may deteriorate plastic and rubber parts.

- ☐ Outer Cases
  Wipe dirt off with a clean cloth, moistened with water and squeezed tightly. To remove severe stains, use a neutral detergent.
- ☐ Document Glass
  Remove dust and paper debris with a dry, clean cloth. If the dirt is severe or foreign matter is stuck on the glass, use a cloth soaked with neutral detergent. If any trace is left, wipe it off with a dry, clean cloth again.

6.1.2 Lubrication

You need to lubricate the carriage unit if you have replaced it or notice it making abnormal noise. See the following tables for the recommended grease type and points to apply it.

Table 6-1. Recommended Grease

Grease Type	Contents	Part Number	Availability
G-26	40g	B702600001	E *

**: EPSON exclusive (Not on the market)*

Table 6-2. Lubrication Points

Figure	Lubrication Points	Lubrication
Table 6-1	Transmission gear shaft of the CR motor and drive pulley shaft.	G-26 (1x3 mm) for each
Figure 6-1	Driven pulley shaft	G-26 (1x3 mm)

CAUTION

Excessive lubrication may cause the carriage mechanism to be damaged or operate abnormally.

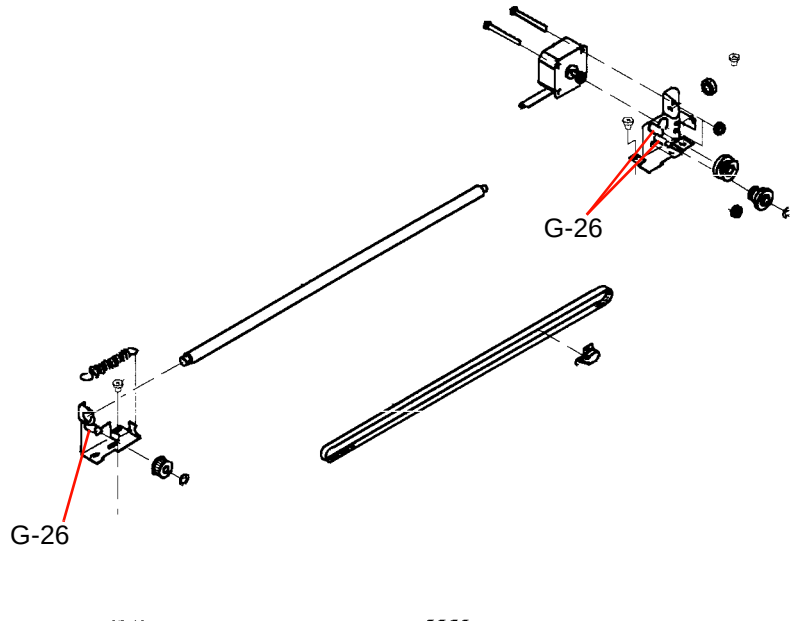


Figure 6-1. Lubrication Points

CHAPTER

7

APPENDIX

7.1 Overview

This section provides useful information for servicing this scanner.

7.1.1 Interconnection

Following figures shows interconnection of the scanner.

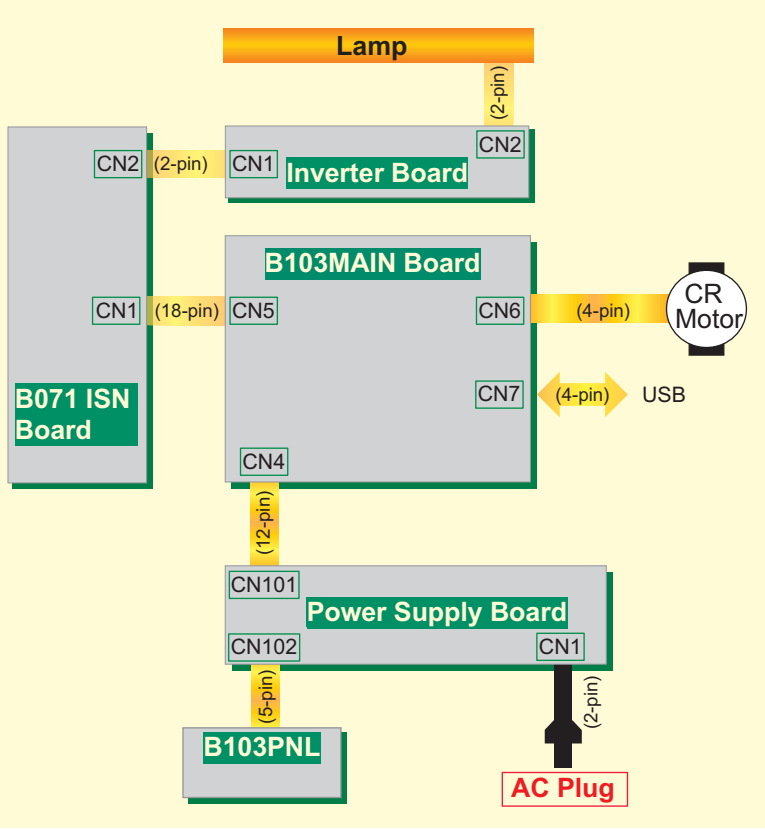


Figure 7-1. Interconnection (USB)

7.1.2 Connector Assignment

Table 7-1. Connector Summary- B103MAIN

Connector Number	Description	Number of Pins	Refer to:
B103MAIN Board			
CN4	To the Power Supply Board	12	Table 7-2
CN5	To the CCD Sensor Board	18	Table 7-3
CN6	To the CR Motor	4	Table 7-4
CN7	To the USB Cable	4	Table 1-1
Power Supply Board			
CN1	AC Input	2	Table 7-5
CN101	To the Control Board	12	Table 7-2
CN102	To the Panel Board	5	Table 7-6
CCD Sensor Board			
CN1	To the Control Board	18	Table 7-3
CN2	To the Inverter Board	2	Table 7-7
Inverter Board			
CN1	To the CCD Sensor Board	2	Table 7-7
CN2	To the Lamp	4	Table 7-8

Table 7-2. Main Board - CN4

Pin No.	Signal	I/O
1, 2, 6, 7, 11, 12	GND	-
3	+12V	I
4, 5	+5V	I
8, 9	+24V	I
10	PM-SW	I

Table 7-3. Main Board - CN5

Pin No.	Signal	I/O
1, 3, 5, 7, 8, 9, 10, 18	GND	-
2	B	I
4	R	I
6	G	I
11	SH	O
12	12V	O
13	F1X	O
14	F2X	O
15	RS	O
16	5V	O
17	24V	O

Table 7-4. Main Board - CN6

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

Table 7-5. Power Supply Board - CN1

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

Table 7-6. Power Supply Board - CN102

Pin No.	Signal	I/O
1	NC	-
2	NC	-
3	Push-SW	I
4	NC	-
5	GND	-

Table 7-7. CCD Sensor Board - CN2

Pin No.	Signal	I/O
1	24V	O
2	GND	I

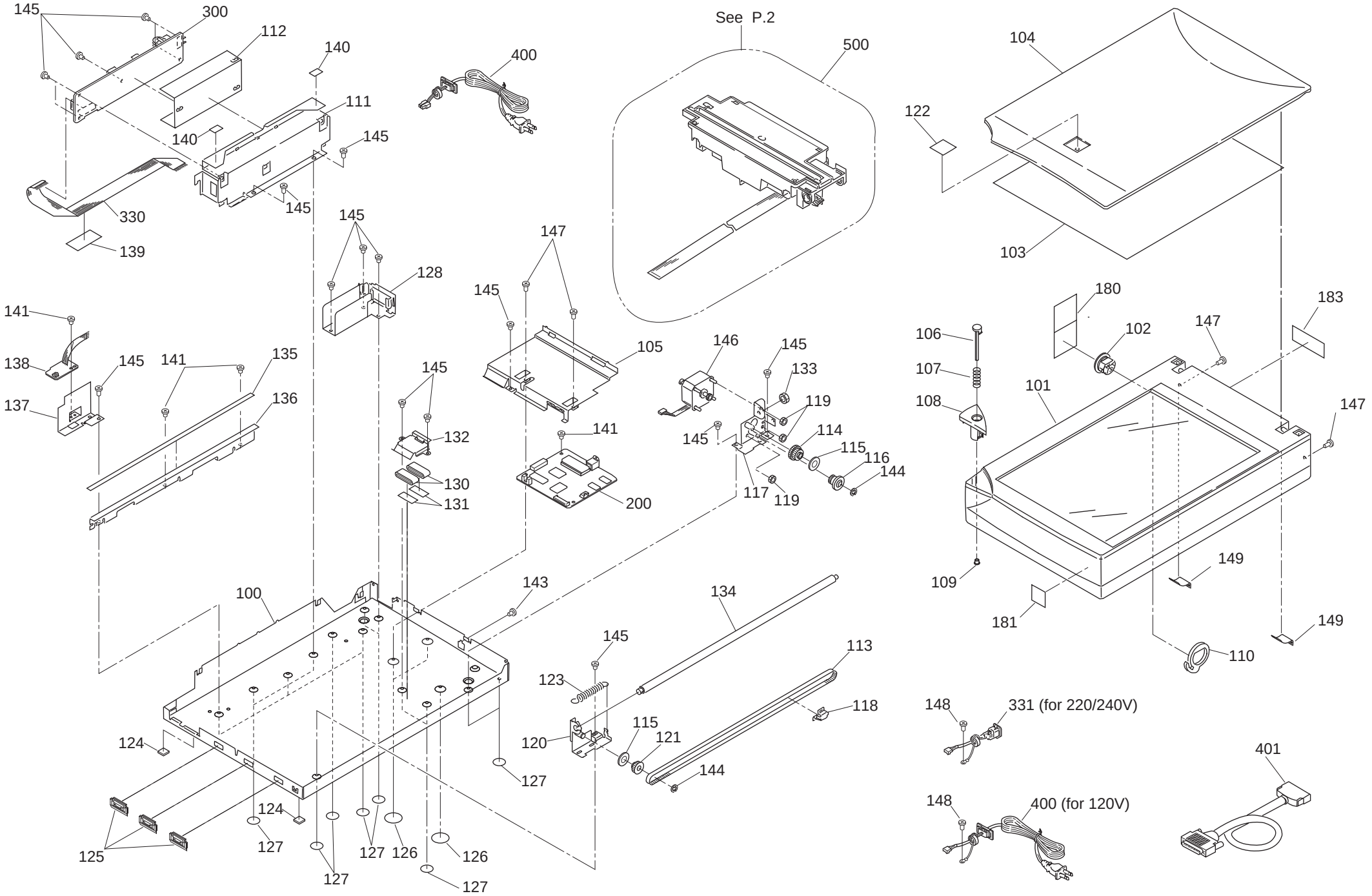
Table 7-8. Inverter Board - CN2

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

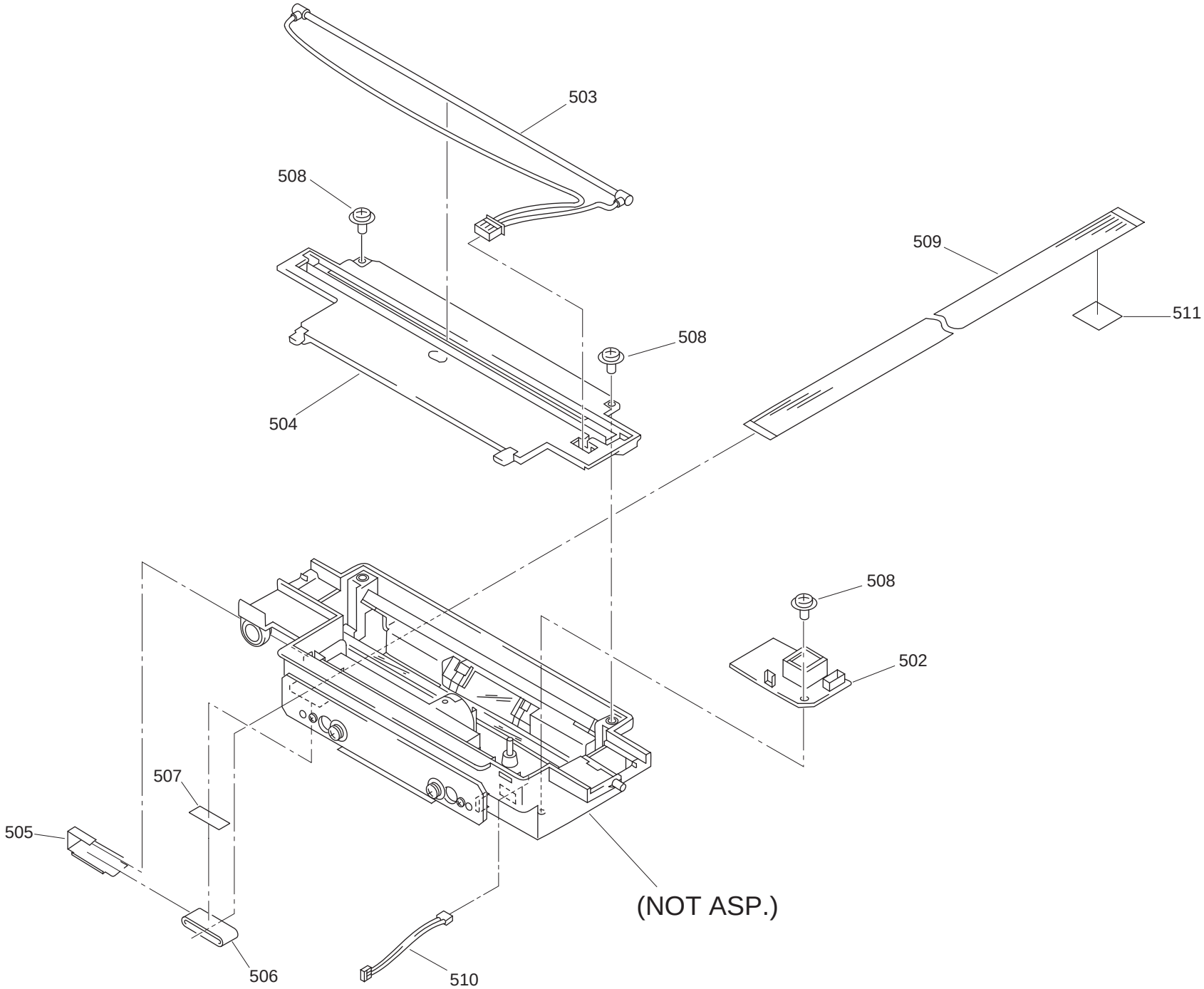
7.2 Parts List and Explode Diagrams

Table 7-9. Parts List

Ref. #	Description	Ref. #	Description	Ref. #	Description
100	FRAME,BASE	122	LOGO PLATE;E	146	MOTOR ASSY.,CR
101	HOUSING ASSY.,UPPER;ASP	123	EXTENSION SPRING,18.4	147	C.B.S. SCREW
102	KNOB,MOUNT,CARRIAGE	124	FOOT	148	C.B.(O) SCREW,4X4,F/ZG
103	MAT,COVER,DOCUMENT	125	BUSHING,HOUSING	149	TAPE,HOUSING
104	COVER,DOCUMENT	126	SHEET,COVER,25	180	LABEL,CARRIAGE LOCK
105	COVER,MAIN BOARD	127	SHEET,COVER,18	200	BOARD ASSY.,MAIN
106	KEYTOP,FUNCTION SWITCH	128	COVER,INLET	331	HARNESS
107	COMPRESSION SPRING,1.32	130	FERRITE CORE	300	BOARD ASSY.,POWER SUPPLY
108	HOUSING,PANEL	131	DOUBLE SIDE TAPE,28X10	330	HARNESS
109	SUPPORT,F-SW	132	COVER,FERRITE	400	POWER CABLE
110	LEVER,MOUNT,CARRIAGE	133	6N,5,F/ZN	401	I/F CABLE
111	COVER,P/S BOARD	134	SHAFT,CR	500	CARRIAGE ASSY.
112	SHEET,P/S BOARD	135	SHEET,SLIDE	502	BOARD ASSY.,INVERTER
113	TIMING BELT	136	RAIL,CR	503	LAMP ASSY.
114	PULLEY,DRIVE	137	COVER,SWITCH BOARD	504	COVER,CARRIAGE
115	FRANGE,PULLEY	138	BOARD ASSY.,PANEL	505	CLAMP,FERRITE CORE
116	PULLEY,IDLE	139	DOUBLE SIDE TAPE,22X50	506	FERRITE CORE
117	HOLDER ASSY.,PULLEY,DRIVE	140	SHEET,COVER,P/S BOARD	507	DOUBLE SIDE TAPE,28X10
118	CLAMP,TIMING BELT	141	C.B.S. SCREW	508	C.C.P-TITE,3X8,F/ZB
119	6N,3,F/ZN	143	C.P.SCREW	509	HARNESS
120	HOLDER ASSY.,PULLEY,DRIVEN	144	RETAINING RING	510	HARNESS
121	PULLEY,DRIVEN	145	C.B.S. SCREW	511	TAPE,HOUSING



GT-6600/PERFECTION 610 No.1 Rev.01 10123



GT-6600/PERFECTION 610 No.2 Rev.01 10123