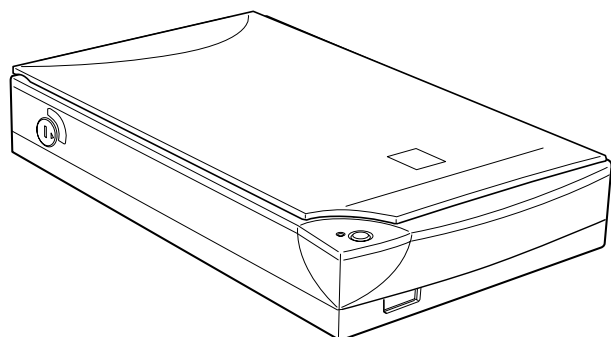


SERVICE MANUAL



Color Image Scanner
EPSON GT-7000



EPSON®

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PRECAUTIONS

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

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

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

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

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
2. NOWORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIER 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 GT-7000. 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

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
- Exploded diagram
- Electrical circuit boards schematics

REVISION STATUS

Rev.	Date	Page(s)	Contents
A	1998/09/21	All	First release

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CHAPTER

1

PRODUCT DESCRIPTION

1.1 Overview

Major feature of GT-7000 is as follows.

- High quality: 600 dpi, 12bit(12bit-in, 8bit-out)
- High speed: Color 8.1 msec/line, Monochrome 2.7msec/line
- Small size: 287(W) x 425(D) x 88(H) mm (4.5Kg)
- Option: Exclusive TPU and ADF available
- Command level: ESC/I-B7
AAS
- I/F: SCSI
USB

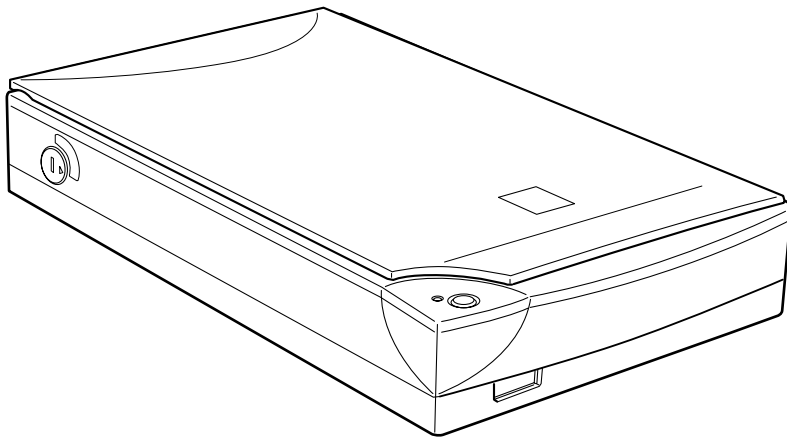


Figure 1-1. Exterior view of GT-7000

1.2 Specification

GENERAL

- 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: 5100x7020 pixels (600 dpi)
- Scanning Resolution: main 600 dpi
sub 1200 dpi
- Output resolution: 50 ~ 4800 dpi(1dpi step)
(4800 dpi reading with 200% makes 9600dpi
reading with 16368 pixel limit in main scan)
- Scanning Speed: Color 8.1 msec/line
(600 dpi, Draft Mode) Monochrome(bi-level)2.7 msec/line
- Color separation: By the color filter of CCD
- Command Level: ESC/I-B7
- Zoom: 50% to 200%(1% step)
- Pixel depth: 8bits/pixel(Input 12bits/pixel, Output 8bits/
pixel)
- Gamma Correction: CRT 2 level(A, B)
PRINTER 3 levels (A,B,C)
User defined 1 level

- ☐ Color Correction: Impact-Dot Printer
Thermal Printer
Ink-jet Printer
CRT Display
User defined
- ☐ Brightness: 7 levels
- ☐ Line Art: Fixed threshold
TET
- ☐ Digital halftoning: AAS
Error Diffusion 3 modes(A,B,C)
- ☐ Bi-level, Quad-level: Dither(Resident)4 modes(A,B,C,D)
Dither(User defined) 2 modes(A,B)
- ☐ Interface(Resident): Either one of them below;
SCSI Model ; 50-pin Half pitch Connectors
USB Model ; Type-B Receptacle Connector
- ☐ Line Source: White Cold cathode Fluorescent Lamp
- ☐ Option: TPU, ADF

ELECTRICAL SPECIFICATION

- ☐ Rated Voltage: AC100-120V
AC220-240V
- ☐ Input Voltage: AC 100-120V \pm 10%
AC 220-240V \pm 10%
- ☐ Rated Current: 0.5A (Input AC 100V)
0.3A (Input AC 200V)
- ☐ Rated Frequency Range: 50-60Hz
- ☐ Input Frequency Range: 49.5-60.5 Hz
- ☐ Power consumption: Approx. 20W

- ☐ Insulation resistance: 10 M Ω at 500VDC
(between AC line and chassis)
- ☐ Dielectric strength: AC 1.5kV, 1 min
(between AC Line and chassis)

SAFETY, EMC

- ☐ Safety: UL1950 (UL)
CSA C22.2 No.950 (CSA)
EN60950 (VDE)
EN60950 + Nordic deviation (NEMKO)
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

RESISTANCE TO ELECTRIC NOISE

- ☐ Static electricity: Panel-10kv
metal-7kv / 150pF, 150 Ω

ENVIRONMENTAL CONDITION

- 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

- Main Unit: MCBF 30,000 cycle

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
- Transparency type: (With transparency unit)
Reversal film
Negative film

DIMENSION

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

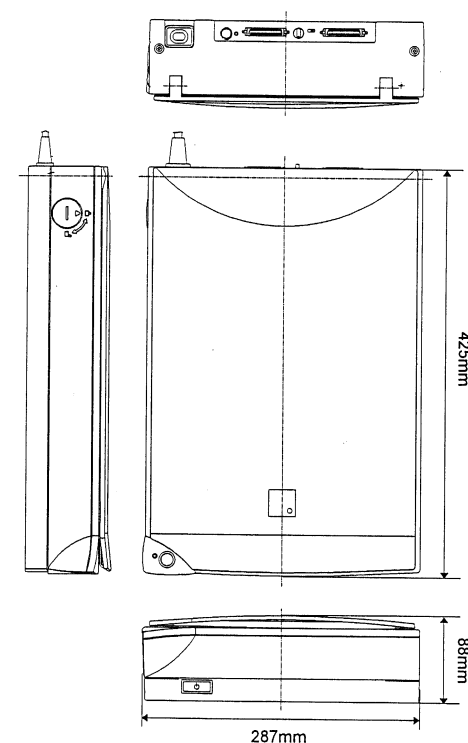


Figure 1-2. Dimension of GT-7000

1.3 Interface Specification

1.3.1 SCSI Model

Any item not included in this specification shall be in compliance with ANSI X3T9.2/375R Revision 10L(SCSI 2).

- Function: Following functions are available, which are included in ANSI X3T9.2/375R Revision 10L(SCSI 2).

1. Bus free phase
2. Arbitration phase
3. Selection/Re-selection phase

4. Command phase
Note) The LUN(Logical Unit Number) is fixed at "0" in this device.
The command Link Function is not supported.

5. Data phase
Data in phase
Data out phase

6. Status phase

7. Message phase
Message in phase
Message out in phase

8. Attention condition

9. Reset condition

- Electric specification
Compliant to ANSI X3T9.2/375R Revision 10L (SCSI 2)
signal ended
- Connector: Two 50-pin connectors (see figure1-3.)
- Terminator: Internal terminator
Enable to control "active" or "inactive" by a switch.
(SW=ON---terminator available)
- SCSI ID The SCSI ID is set with a rotary switch on the rear panel. The switch numbers are corresponded to the available address and can be set from 0 to 7. Others are reserved.
Factory setting ID=2

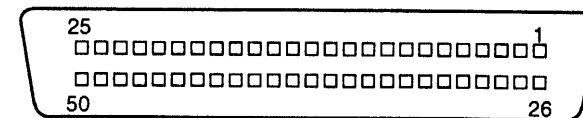


Figure 1-3. SCSI Connector Pin Assignment

Table 1-1. SCSI Connector Pin Assignment

Signal	I/O	Pin No.(50)	Description
GND		1~12 14~25 35~37 39, 40 42	
NC		13	
DB0	I/O	26	Data Bus 0
DB1	I/O	27	Data Bus 1
DB2	I/O	28	Data Bus 2
DB3	I/O	29	Data Bus 3
DB4	I/O	30	Data Bus 4
DB5	I/O	31	Data Bus 5
DB6	I/O	32	Data Bus 6
DB7	I/O	33	Data Bus 7
DBP	I/O	34	Data Bus Parity
TERMPWR		38	Terminator Power
ATN	I	41	Attention
BSY	I/O	43	Busy
ACK	I	44	Acknowledge
RST	I	45	Reset
MSG	O	46	Message
SEL	I/O	47	Select
C/D	O	48	Command/Data
REQ	O	49	Request
I/O	O	50	Input/Output

1.3.2 USB Model

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

■ Configuration

This device supports the following configurations.

Table 1-2. Configuration

Element	Description
Device	Class: Imaging ([TBD] Vendor specific) Subclass: Scanner ([TBD] Vendor specific) Protocol: Pass Through ([TBD] Vendor specific) Maximum packet size for endpoint 0:64 byte Vendor ID:0x04B8 (Seiko EPSON Corp.) Product ID:0x0101 Number of possible configurations:1
Configuration	Number of interfaces supported by this configuration:1 Characteristics: Self-powered Remote wake up feature supported Maximum of possible consumption:0mA
Interface	No Alternate setting Number of endpoints used by this interface(excluding endpoint 0):2 Class:Imaging ([TBD] Vendor specific) Subclass: Scanner ([TBD] Vendor specific) Protocol:Pass Through ([TBD] 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: "Perfection 636"

□ Electric specification

Compliant to Full Speed mode (12Mbit/s) of Universal Serial Bus Specification Revision 1.0

- Connector
- One Receptacle (Series B)

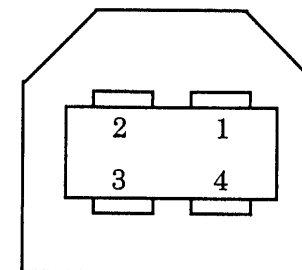


Figure 1-4. Receptacle (Series B)

- Connector Pin Assignment

Table 1-3. Connector Pin Assignment

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

1.4 Control Codes

The command level of this scanner is ESC/IB-8. The commands supported are shown in the table below.

Table 1-4. Control Codes

Category	Command Name	Code
Execute Command	Identity Request	ESC I
	Status Flag Request	ESC F
	Extend Status Flag Request	ESC f
	Parameter Request	ESC S
	Scanning Start	ESC G
	Push Button Status	ESC!
Data Format Setting	Set Data Format	ESC Di
	Set Resolution	ESC R n1 n2
	Set Zooming	ESC Hi1 i2
	Set Read Area	ESC A n1 n2 n3 n4
	Set Color	ESC Ci
	Mirroring	ESC Ki
Image Setting	Set Brightness	ESC Li
	Set Gamma Correction	ESC Zi
	Download Gamma Table	ESC zi d0 d1-d255
	Set Sharpness	ESC Qi
Image Processing	Set Digital Halftoning	ESC Bi
	Set Auto Area Segmentation	ESC si
	Download Dither Pattern	ESC b l l j d (j2)
	Download Color Correction	ESC m d 1 d2-d9
	Set Threshold	ESC ti
	Set Color Correction	ESC Mi

Table 1-5. Control Codes

Category	Command Name	Code
Auxiliary	Set Scanning Mode	ESC gi
	Initialize	ESC @
	Set line Counter	ESC di
	Control Option	ESC ei
	Form Feed	FF
	Set Film Type	ESC Ni
Control	Normal Response	ACK
	Abnormal Response	NACK
	Abort Scanning	CAN
	Header	STX

1.5 Control Specification

1.5.1 Switch Specification

This scanner is equipped with 4 switches. Their functions are described below.

- ☐ OPERATE switch
 - Turns the scanner on and off.
 - Pressing this switch at power on initializes the scanner.
- ☐ PUSH Button
The status of this button can be checked by [EXC!]
- ☐ Rotary Switch (for SCSI Model only)
 - 0-7 : SCSI ID
 - Others: Reserved
- ☐ Terminator Switch (for SCSI model only)
 - On: Terminator on (Default)
 - Off: Terminator Off

1.5.2 LED Indicators

- ☐ Ready: Green on
- ☐ Busy or Initialization: Slow Blinking
- ☐ Error: Fast Blinking
- ☐ Operate on: LED off

1.5.3 Switch Setting

Among the switches equipped with this scanner, SCSI switch and the terminator switch, which are used for SCSI interface, have the following settings.

- ☐ SCSI-ID Setting Switch(Rotary Switch)

Table 1-6. SCSI-ID Setting Switch

ID No.	Setting OK/Not	Note
0	OK	Usually used for host hard disk.
1	OK	Usually used for host hard disk.
2	OK	Factory Setting of the scanner
3	OK	
4	OK	
5	OK	
6	OK	
7		Usually used for SCSI host board.
8,9	No	Invalid/ Not available.



Do not set the SCSI ID to an ID number that is already assigned to another device. Otherwise the computer, scanner, and other devices will not function properly.

- ☐ Terminator Switch

Table 1-7. Terminator Switch

Setting	Note
ON	Connects to the terminal resistor./Factory default setting.
OFF	Disconnects from the terminal register.

Note) Refer to “CHECK POINT” on next page.



Be aware that the terminator switch must be set according to the scanner location on the “daisy-chain”.

1.5.4 Error Indication

When an error occurs, the scanner stops operating and the Operate light show the type of error.

Table 1-8. Error Indications

Light	Error Type
Nothing	Command Error <ul style="list-style-type: none"> • Cause: Unidentified command is detected. • Disposition: The scanner ignores the wrong command or parameter. (Therefore, the current settings or the default value remain effective) Scanner sends NACK, and waits next command or parameter. • Remedy: The error condition is cleared when the scanner received a correct command.
Red LED blinking (short interval)	Interface Error <ul style="list-style-type: none"> • Wrong procedure is detected in the interface communication. In the case of SCSI, a transmission is frozen more than 30 seconds except BUS FREE phase. • Disposition: The lamp goes off and the scanner stops operation. • Turn off the scanner and then back on. RST signal in SCSI turns active. • Acceptable command: Nothing
Red LED blinking	Fatal Error <ul style="list-style-type: none"> • Cause: The lamp is broken. Power is turned on before removing the transportation screw. System break down. • Disposition: The lamp goes off and the scanner stops operation. The bit 7 of the status is set. • Remedy: Turn the scanner off and then back on. Send ESC@ codes to the scanner. RESET signal in SCSI turns active. Complete BUS DEVICE RESET message in SCSI. • Acceptable command: [ESC F, ESC f, ESC @]

Table 1-9. Error Indications

Light	Error Type
Red + Green LED blinking (short interval)	<i>Option Error</i> (Only when the optional unit is installed and operation is available by [ESC e].) <ul style="list-style-type: none">• Cause: Unit cover open, or paper Empty• Disposition: The bit 7 of the status byte is set to "1".• Remedy: Remove the error condition.• Acceptable command: [ESC F, ESC f, ESC @]

CHAPTER

2

OPERATING PRINCIPLES

2.1 Engine Mechanism

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

2.1.1 Carriage Unit

Carriage Unit is mainly composed of CD sensor board, Inverter board, Lamp (light source), Mirror and Lens mechanism. (See figure 2-1, 2-2)

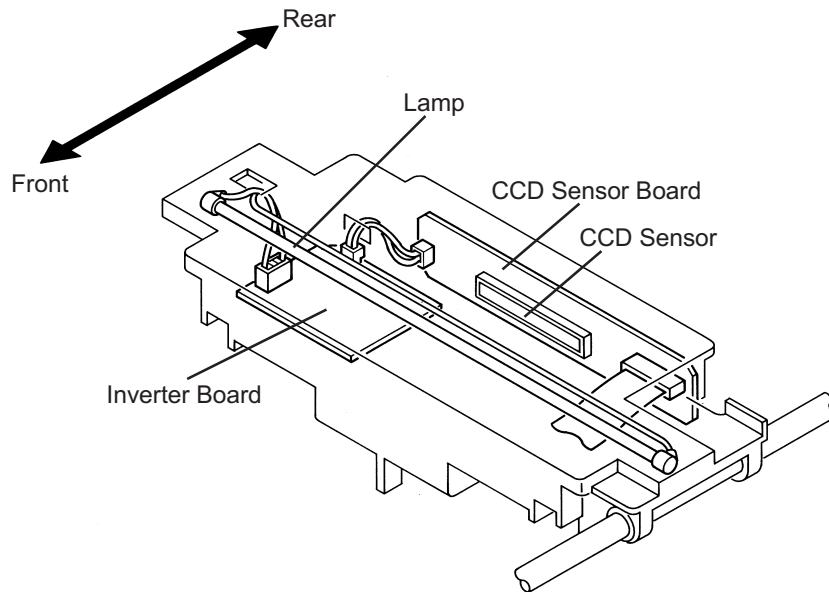


Figure 2-1. Carriage Unit Component

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

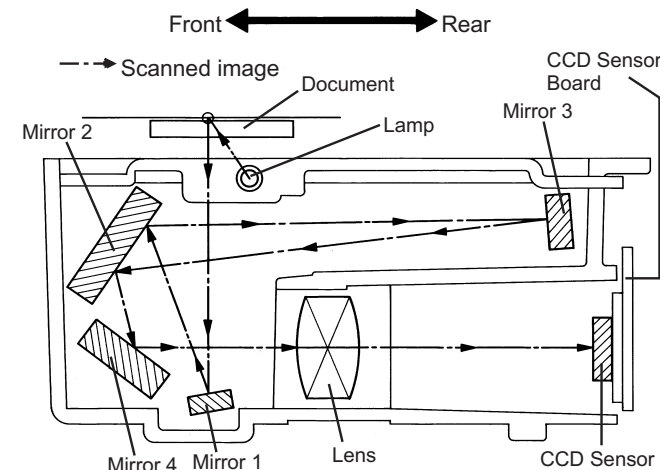


Figure 2-2. Mirror, Lens Mechanism

2.1.2 Carriage Move Mechanism

Scanning image is performed in the main scan direction(=1 line) by the CCD sensor and in the sub-scan direction(=several lines)combined with carriage unit movement. (See figure2-3)

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

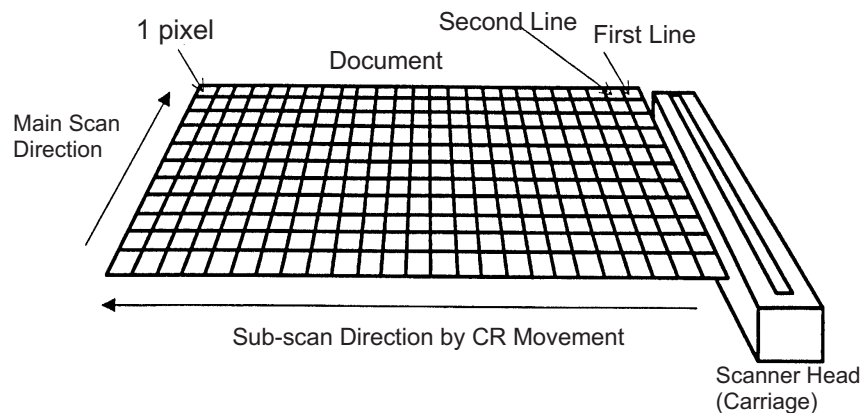


Figure 2-3. Carriage Movement

Carriage Unit slides into sub-scan direction along with the guide rail. For this sliding operation, the carriage motor drives the timing belt attached to the carriage unit by conveying the driving force through the driven pulley and reduction gear. Scanning start position is determined by CR HP sensor, which is located on the control board. Since the stepping motor is used for CR motor, carriage head position is controlled under the open loop system. (See figure2-4)

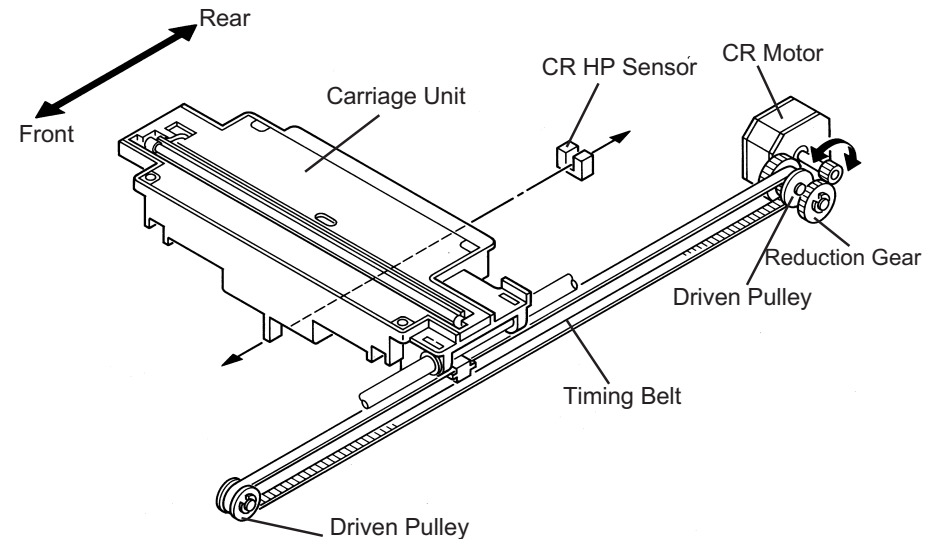


Figure 2-4. Carriage Operation

2.1.3 Power Supply Circuit

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

Table 2-1. Power Supply Circuit Board for Destination

Specification	Unit Part No.	Fuse
100-120 VAC Range	2027699	2.5 A/125 VAC
220-240 VAC Range	2027700	T2.5AH/250 VAC

Figure 2-5 shows diagram of power supply circuit.

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

Table 2-2. Output and Protection Function

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

Note1) If a part of out is shut down, all the other output are also shut down.

Note2) Off time required to recover is maximum 5 minutes.

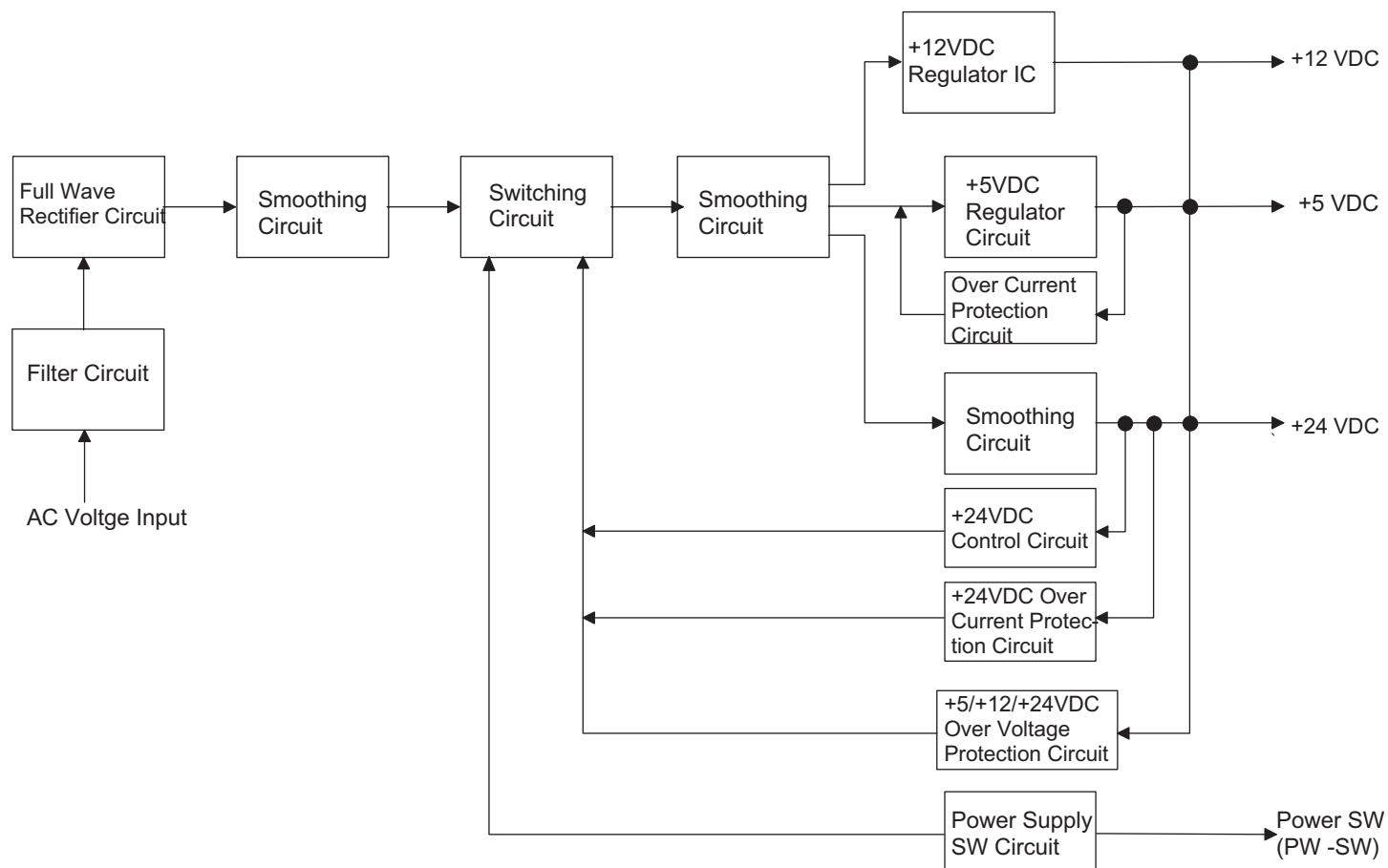


Figure 2-5. Power Supply Circuit Block Diagram

2.1.4 Control Circuit

There are 2 types of control circuit boards due to the interface specification.

- SCSI Model: B071 Main Board
- USB Model: B071 Main-B Board

The difference is the only interface part with host.

2.1.4.1 Control Circuit Overview

Figure 2-6 is SCSI control circuit block diagram, and Figure 2-7 is for USB. This scanner uses the one-tip 16-bit bus CPU(IC22) at 20MHz frequency. Image data processing, correction, CCD sensor board, A/D converter control are operated at ASIC(IC21). Table 2-3 shows major IC functions.

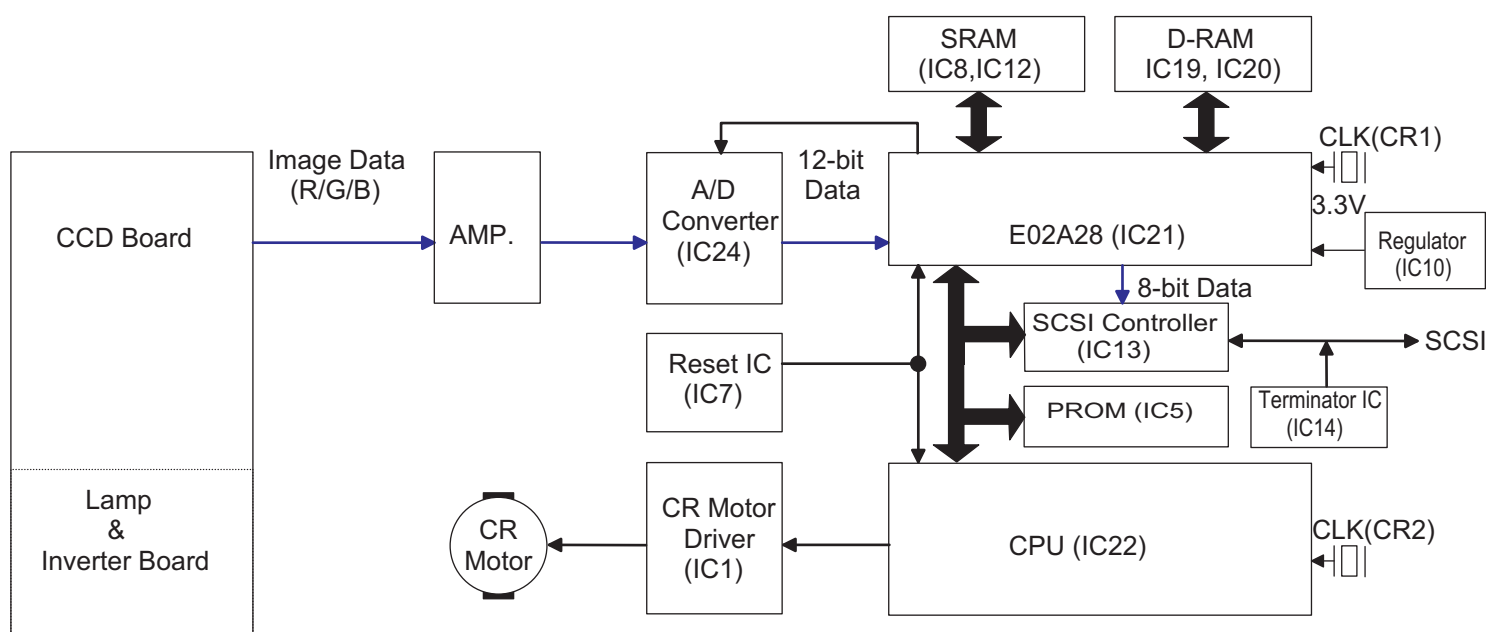


Figure 2-6. Control Circuit Block Diagram (SCSI)

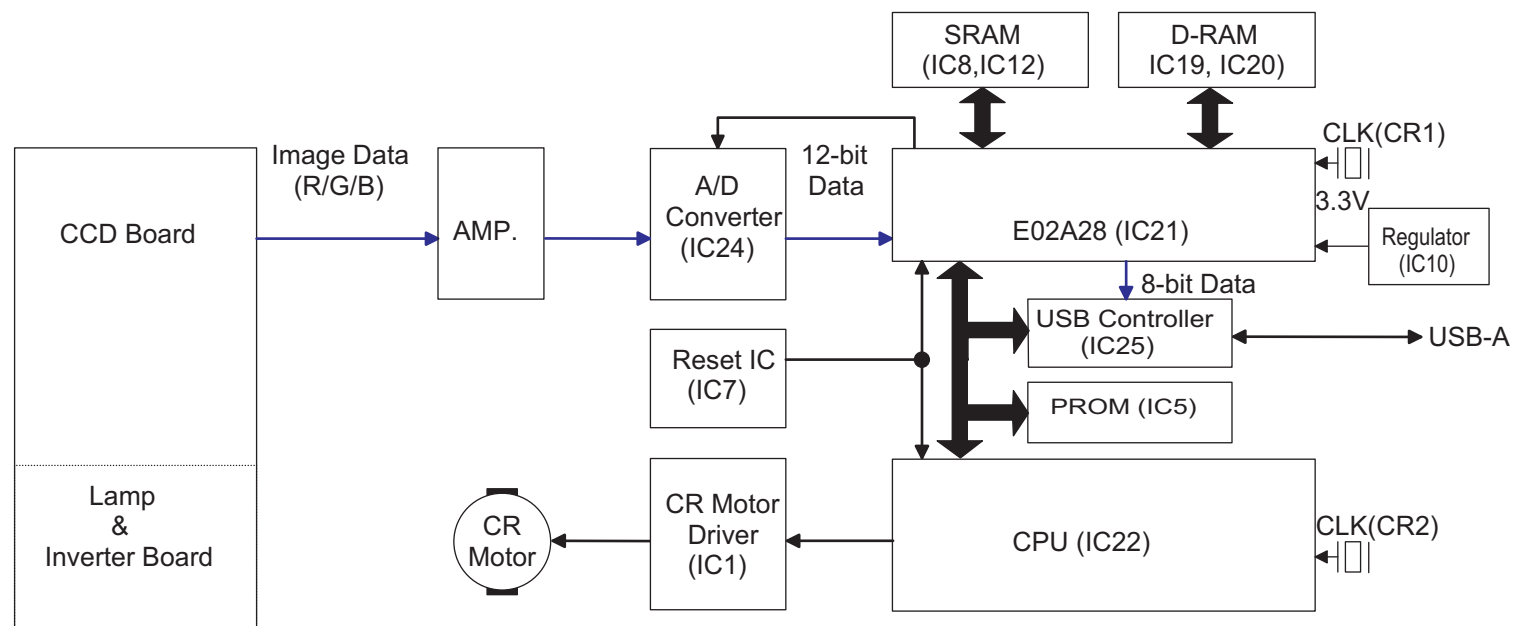


Figure 2-7. Control Circuit Block Diagram(USB)

Table 2-3. Major ICs

IC	Location	Function
M37920	IC22	CPU 24-bit Address Bus 16-bit Data Bus
SRAM 256K 15ns	IC8, IC12	E02A28 Peripheral Memory For Image Processing(for enlargement and minification buffer)
HM514260	IC19, IC20	E02A2B Peripheral Memory IC20: For Image Processing (Correction between lines) IC19:Output Buffer
PC29M33T	IC10	Regulator IC(3.3VDC)
E02A28	IC21	ASIC <ul style="list-style-type: none"> • CCD Control • A/D Converter • Reading Position Control • Image Processing • Memory Control • Data Output Control • Intervention Control
AD9816JS	IC24	12-bit A/D converter
M54670P	IC1	CR motor driver IC
M51953A	IC7	Reset IC
P-ROM 1M-bit, 100ns	IC5	Program ROM
BH9596FP-Y	IC14	Terminator (SCSI mode only)
M64154FP	IC13	SCSI Controller (SCSI model only)
E02A29	IC25	USB Controller(USB model only)
CSTCV24.00	CR1	24MHz clock for E02A28
SCTCS20.00	CR2	20MHz clock for CPU

CHAPTER

3

TROUBLESHOOTING

3.1 Overview

This chapter explains the troubleshooting of this scanner.

3.2 Self-Diagnostic Function

The self-diagnostic function of this scanner lets the scanner to check the condition of each component automatically. If it detects a faulty component, it indicates the status using the Operate light. See Table3-1.

Table 3-1. Self-Diagnostic Indication

Light	Error Type
Nothing	Command Error <ul style="list-style-type: none"> • Cause: Unidentified command is detected. • Disposition: The scanner ignores the wrong command or parameter. (Therefore, the current settings or the default value remain effective) Scanner sends NACK, and waits next command or parameter. • Remedy: The error condition is cleared when the scanner received a correct command.
Red LED blinking (short interval)	Interface Error <ul style="list-style-type: none"> • Wrong procedure is detected in the interface communication. In the case of SCSI, a transmission is frozen more than 30 seconds except BUS FREE phase. • Disposition: The lamp goes off and the scanner stops operation. • Turn off the scanner and then back on. RST signal in SCSI turns active. • Acceptable command: Nothing
Red LED blinking	Fatal Error <ul style="list-style-type: none"> • Cause: The lamp is broken. Power is turned on before removing the transportation screw. System break down. • Disposition: The lamp goes off and the scanner stops operation. The bit 7 of the status is set. • Remedy: Turn the scanner off and then back on. Send ESC@ codes to the scanner. RESET signal in SCSI turns active. Complete BUS DEVICE RESET message in SCSI. • Acceptable command: [ESC F, ESC f, ESC @]

Table 3-2. Self-Diagnostic Indication

Light	Error Type
Red + Green LED blinking (short interval)	Option Error (Only when the optional unit is installed and operation is available by [ESC e].) <ul style="list-style-type: none"> • Cause: Unit cover open, or paper Empty • Disposition: The bit 7 of the status byte is set to "1". • Remedy: Remove the error condition. • Acceptable command: [ESC F, ESC f, ESC @]

3.3 Troubleshooting

This section describes troubleshooting from the abnormal phenomenon. You can isolate the faulty unit based on the abnormal phenomenon. See Table 3-3 to find the closest phenomenon and the corresponding table to refer to.

Table 3-3. Abnormal Phenomenon and corresponding Tables

Phenomenon	Description	Ref, Table
Scanner does not operate even its power is On.	<ul style="list-style-type: none"> • Operate Light on the control panel does not come On. • Scanner does not operate the initialization. 	3-4 3-5
Fatal Error occurs and is not cleared after turning off and back on the scanner.	<ul style="list-style-type: none"> • Carriage Unit does not operate. • Carriage Unit crashes into the front or rear frame and then the error is indicated. • The lamp does not light up. 	3-6 3-7 3-8
Scanned image is unclear.	---	3-9
"Interface Error" is indicated.	<ul style="list-style-type: none"> • SCSI Interface Error • USB Interface Error 	3-10 3-11
"Option Error" occurs. Optional unit(ADF/TPU) do not operate.	<ul style="list-style-type: none"> • Optional unit does not operate correctly. 	3-12

Table 3-4. "OPERATE" Light does not come on.

Cause	Step	Checkpoint	Finding	Solution
Connector CN1 on the power board is disconnected.	1	Is the connector CN1 on the power board disconnected?	Yes	Connect CN1 properly.
Connector CN101 or CN102 on the power board disconnected.	2	Is the connector CN101 or CN102 on the power board disconnected?	Yes	Connect CN101 or 102 properly.
Fuse on the power board has blown out.	3	Has the fuse on the power board blown out?	Yes	Replace the fuse.
The power board is broken.	4	With the scanner On, check the voltage output level between pins 8/9(+) and pins 6/7(-) on the power board. Is the voltage +5VDC?	No	Replace the power board.
Connector CN4 on the power board is disconnected.	5	Is the connector CN4 on the control board disconnected?	Yes	Connect CN4 properly.
The control board is broken.	6	---	---	Replace the control board.

Table 3-5. Scanner is not initialized.

Cause	Step	Checkpoint	Finding	Solution
Connector CN1 on the power board is disconnected.	1	Is the connector CN1 on the power board disconnected?	Yes	Connect CN1 properly.

Table 3-6. Carriage Unit does not operate

Cause	Step	Checkpoint	Finding	Solution
Power board is broken.	1	With the scanner power on, check the voltage output level between the Pins 4/5(+) and Pins 6/7 (-) for CN101 on the power board. Is it +24VDC?	No	Replace the power board.
Carriage Unit (or CR move mechanism) is broken.	2	<ul style="list-style-type: none"> With the scanner upper case removed, does CR motor move? With the CR motor removed, does the carriage unit move smoothly? 	No	Check the carriage move mechanism and replace the corresponding parts or disassemble and assemble the part.
CR Motor is broken	3	Disconnect the connector CN6 on the control board, then using the tester, check the coil resistance between Pin2 and 4 and between Pin1 and 3. Is the resistance of 2 points about 6.2Ω?	No	Replace the CR motor.
		If any motor coil is shorted, check the CR motor drive circuit in the order below. 1.)Set the tester on Ohms. 2.)Place the (-) lead of the tester on any of Pins 1,2, 3 or 4 for CN1 on the control board. 3.)Place the (+) lead of the tester on Pin 6/7 for CN4 on the control board. With the scanner off, does the meter show "∞"?	No	Replace the power board.
Control board is broken.	4	---	---	Replace the control board.

Table 3-7. Carriage moves but Error indication appears

Cause	Step	Checkpoint	Finding	Solution
CR home position sensor is broken.	1	Check the signal level. • Check the signal/status level between C(+) and E(-) for PC2. H(about 4.5V)/when PC1-PC2 is closed. L(0.3V)/when PC1-PC2 is opened.	--	Replace the CR home position sensor(PC1/PC2) on the control board.

Table 3-8. Lamp does not light up.

Cause	Step	Checkpoint	Finding	Solution
Connector CN5 on the control board is disconnected.	1	Is the connector CN5 on the control board disconnected?	Yes	Connect CN5 properly.
Connector CN1 or CN2 on the CCD board disconnected.	2	Is the connector CN1 or CN2 on the CCD board disconnected?	Yes	Connect CN1 or 2 properly.
Lamp is not connected properly on the inverter board.	3	Is the lamp connected properly on the inverter board?	No	Connect the lamp properly.
Lamp is broken.	4	Does the lamp light after it is replaced?	Yes	Replace the lamp.
Inverter board is broken.	5	Does it operate properly after replacing it?	Yes	Replace the inverter board.
Control board is broken.	6	---	---	Replace the control board.

Table 3-9. Scanned image is unclear.

Cause	Step	Checkpoint	Finding	Solution
Mirror in the carriage unit is dirty.	1	Is the image scanned clearly after cleaning the mirror?	No	Clean the lamp surface.
CCD sensor board is broken.	2	---	--	Replace the CCD board.
Control board is broken.	3	---	---	Replace the control board.

Table 3-10. SCSI Interface Error(SCSI Model Only)

Cause	Step	Checkpoint	Finding	Solution
Terminator switch is set wrong.	1	Check the user's guide for the correct setting. Is the setting correct?	No	Set the terminator correctly.
SCSI setting is wrong.	2	Check the user's guide for the correct setting. Is the setting correct?	No	Set the SCSI correctly.
SCSI cable is defective.	3	Replace the SCSI cable. Is the operation normal?	Yes	Replace the SCSI cable.
Control board is broken.	4	---	---	Replace the control board.

Table 3-11. USB Interface Error(USB Model Only)

Cause	Step	Checkpoint	Finding	Solution
Host and O/S (Windows95/98) does not support the USB.	1	On the Windows, go to "My Computer"→"Property"→"Device Manager", then, check if "Universal serial bus controller" is effective.	No	Replace the host.
USB cable is broken.	2	Replace the USB cable. Is the operation normal?	Yes	Replace the USB cable.
Control board is broken.	3	---	---	Replace the control board.

Table 3-12. Option TPU/ADF do not operate

Cause	Step	Checkpoint	Finding	Solution
The cable of the optional unit is disconnected.	1	Is the connector CN1 on the control board disconnected?	Yes	Connect the CN1 properly.
Control board is broken.	2	---	---	Replace the control board.
Optional unit is broken.	3	+24V line:Lamp, Motor +5V line:Sensor, logic circuit.	---	Replace the defective part of the optional unit.

CHAPTER

4

DISASSEMBLY AND ASSEMBLY

4.1 Overview

This chapter describes for disassembling GT-7000 and precaution to take during transportation.

4.1.1 Precaution



Before servicing, make sure that the power cable is disconnected from the AC power socket and the interface cable is removed.



- Use the stable and level table which has enough strength for disassembling and assembling the scanner.
- Get yourself enough room for servicing, considering the size of the scanner.

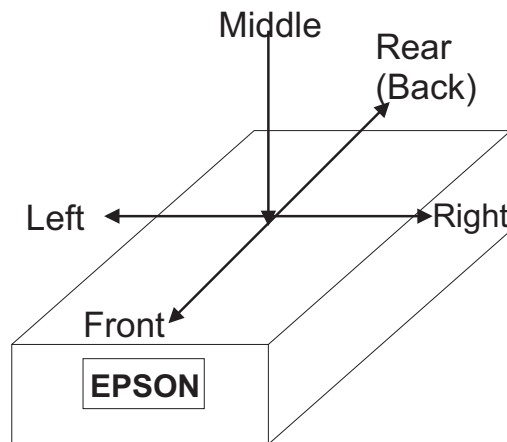


Figure 4-1. Notations

4.1.2 Tools

Tools used for servicing are as listed in the table below.

Table 4-1. Tools

Description	Availability	SE Part No.
(+) Screw Driver	O	B743800200
(-) Screw Driver	O	B743000100
A pair of Tweezers	O	B641000100
Cutting Plier	O	B740400100

4.1.3 Screws




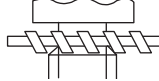




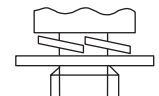
Screws used in this scanner are listed in the table below. Be sure to use the correct types and numbers of screws for each part when assembling the scanner.

Table 4-2. Abbreviation for Screws

Abbreviation	Name
CP	Cross-recessed Pan head screw
CBS	Cross-recessed Binding head S-tite screw
CCP	Cross-recessed Cup head P-tite

Note) Refer to Table 4-3 for screw shapes.

Table 4-3. Screws

Head Shape		Type	Washer
Hole	Appearance		
	Cross-recessed	Standard -----	With Outside toothed lock washers
	Pan 	S-Tite 	
	Cup 	B-Tite 	With Spring lock washers
		P-Tite 	

4.2 Disassembly Procedures

4.2.1 Carriage Lock Release

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



When you need to lock again for transportation, lock it while letting the carriage be at home position.

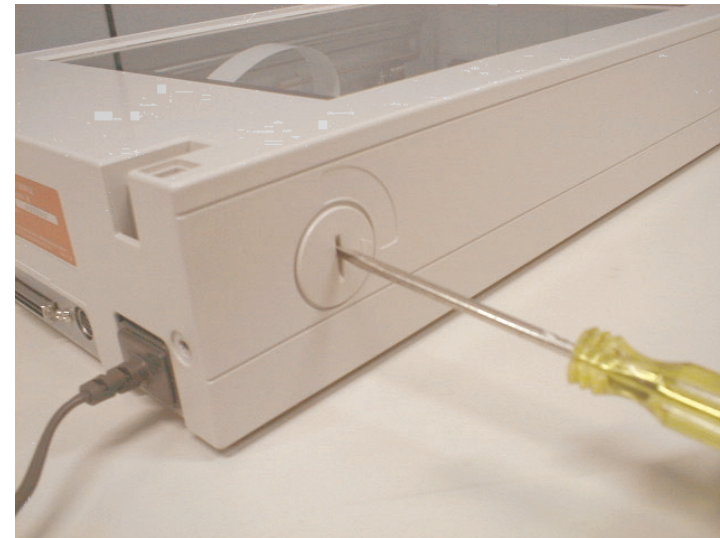


Figure 4-2. Carriage lock position

4.2.2 Document Cover Removal

1. Open the document cover.
2. Hold edges of the cover, then release two hooks backward.

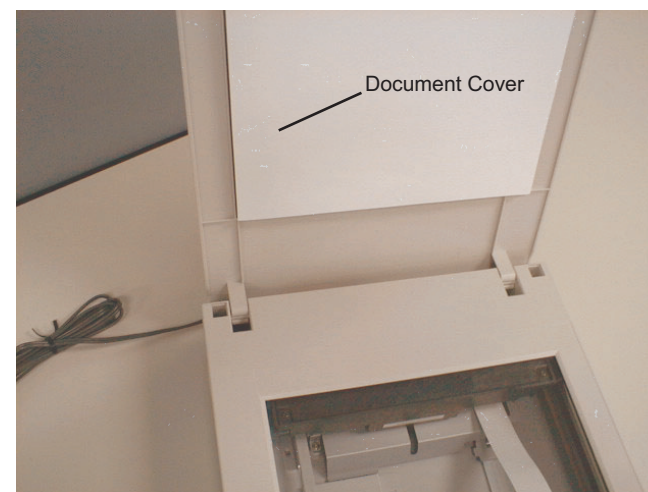


Figure 4-3. Document Cover Removal (1)

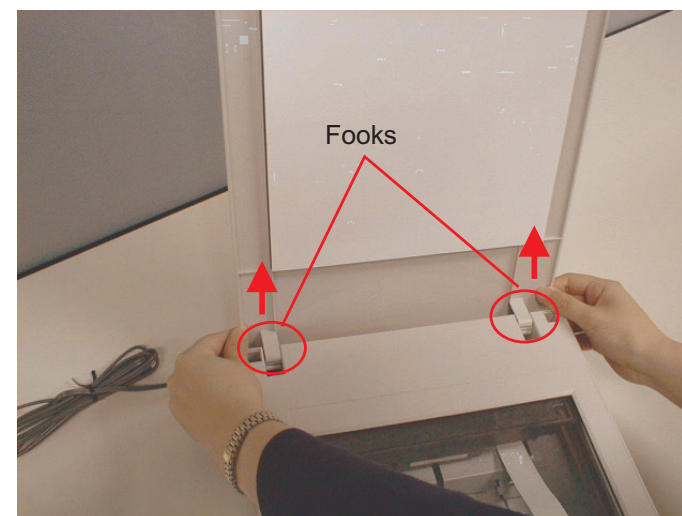


Figure 4-4. Document Cover Removal (2)

4.2.3 Upper Cover Removal

1. Release the carriage lock. (see Section 4.2.1)
2. Remove the document cover. (see Section 4.2.2)
3. Release two silver screws(CBS, 3x6) from the back of the scanner.
4. Lift up the rear side of the upper cover and release three hooks securing the upper cover. Then, remove the upper cover toward yourself.

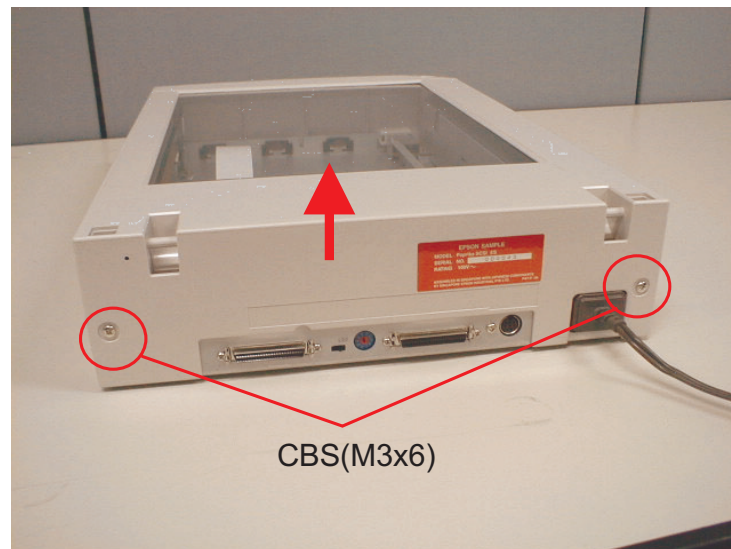


Figure 4-5. Upper Cover Removal (1)

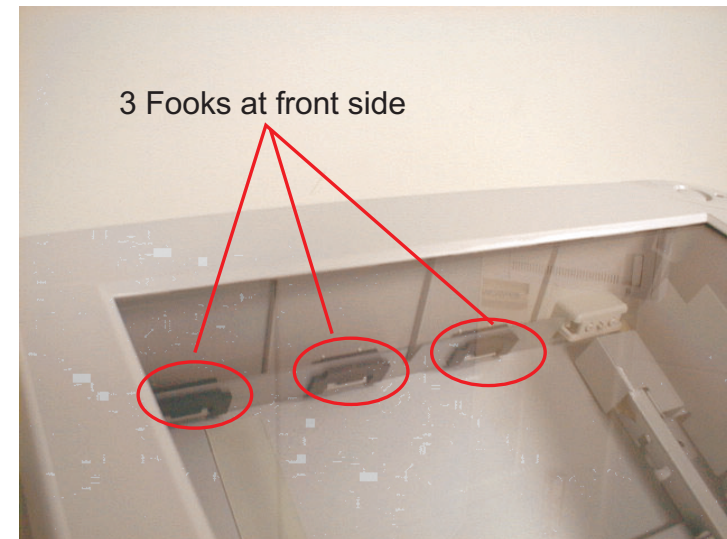


Figure 4-6. Upper Cover Removal (2)

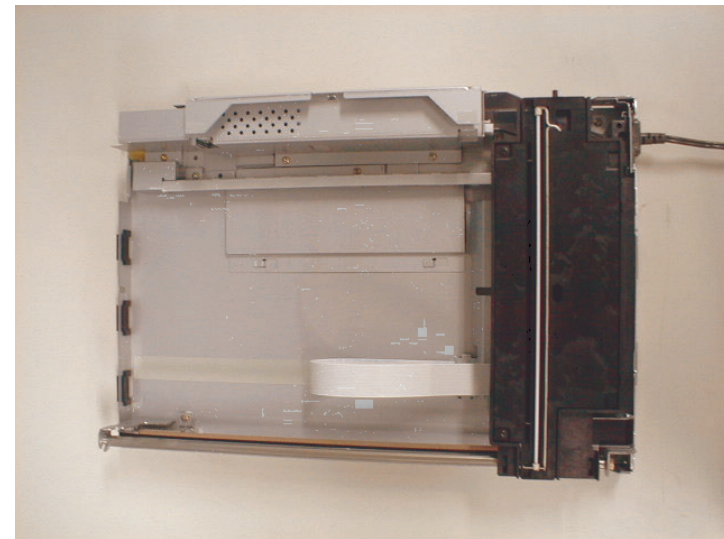


Figure 4-7. After removing the Upper Cover

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 cover. (see Section 4.2.3)
4. Remove 2 black screws(CCP,3x8) on the carriage unit.
5. Remove the carriage unit upper cover by lifting it up by screw driver.

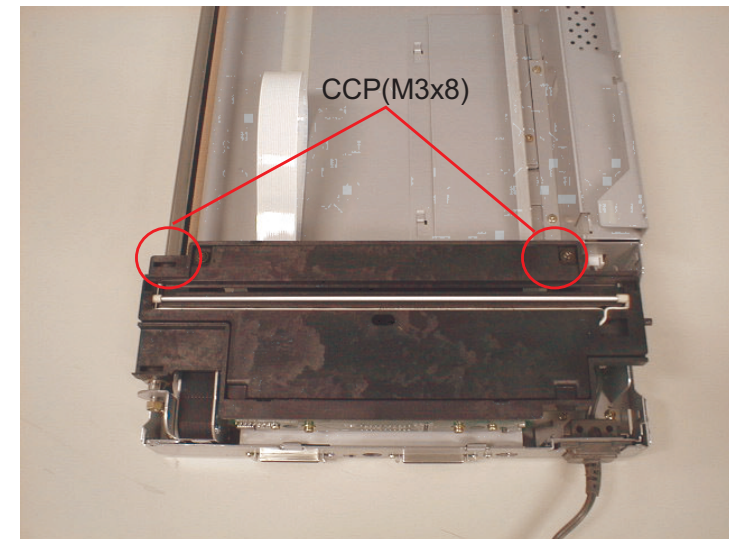


Figure 4-8. Disassembly of the Carriage Unit (1)

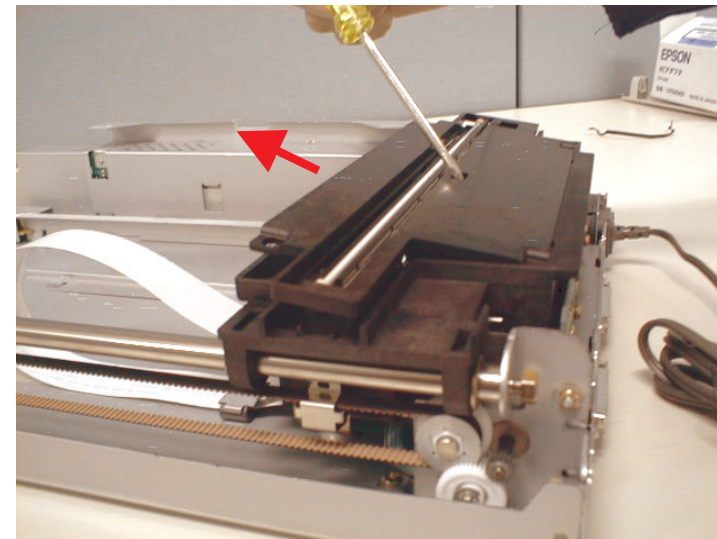


Figure 4-9. Disassembly of the Carriage Unit (2)

6. Remove the inverter lamp connector from the inverter board.
7. Remove one black screw and a connector(2-pin) for CCD sensor, then remove the inverter board.
8. Remove the inverter lamp from the upper cover.



When installing the inverter lamp, locate the wire as it is shown in figures 4-10 and 4-11.

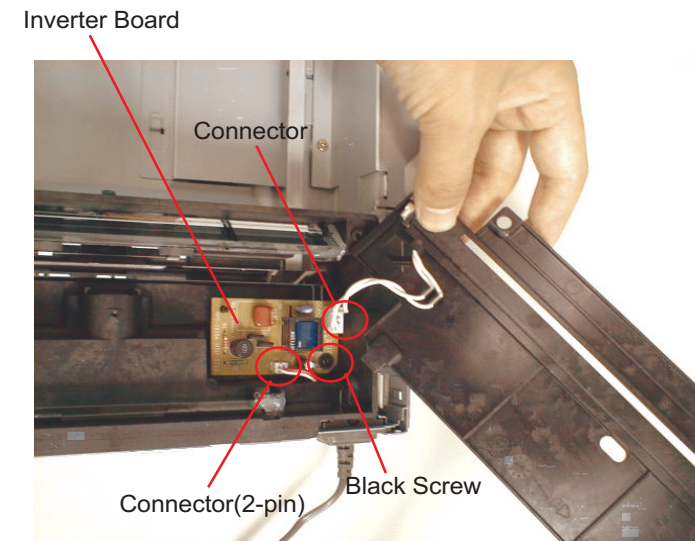


Figure 4-10. Disassembly of the Carriage Unit (2)

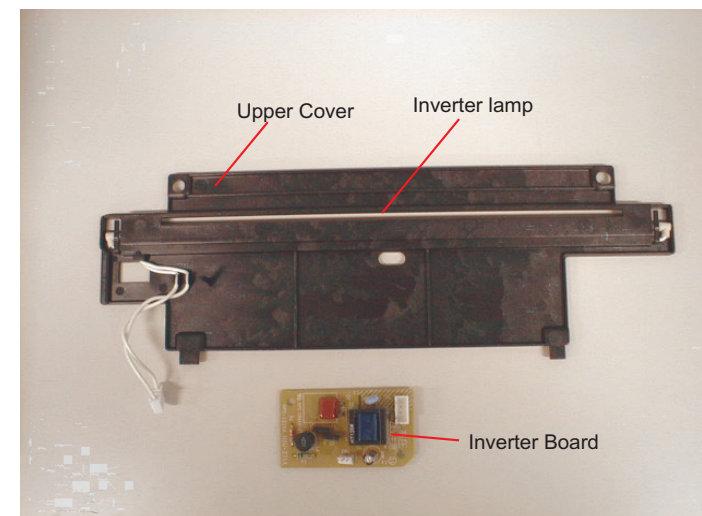


Figure 4-11. Inverter Lamp Removal

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 cover. (See Section 4.2.3)
4. Remove the metal clamp securing the carriage and the timing belt by using the (-) screw driver.

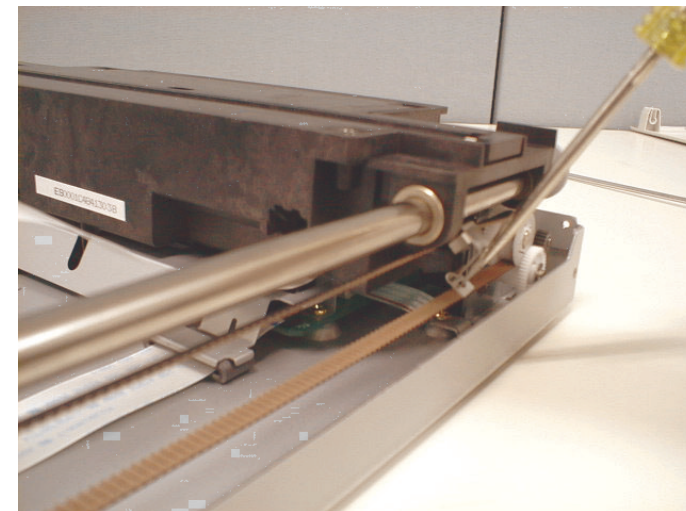
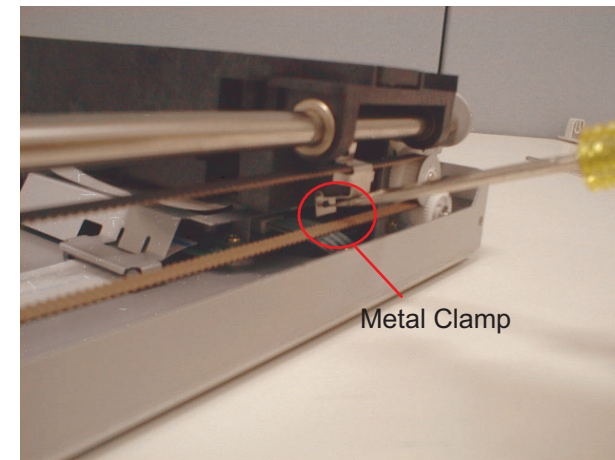


Figure 4-12. Metal Clamp Removal

5. Remove the hexagon nut located back of the carriage guide shaft.
6. Remove a spring and one gold screw(CBS, 3x4) securing the carriage driven pulley.

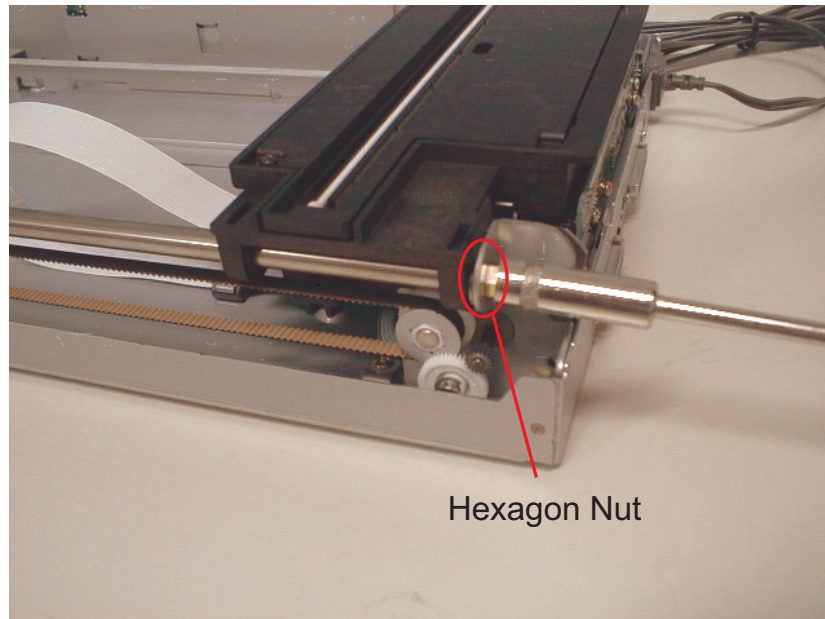


Figure 4-13. Hexagon Nut Removal

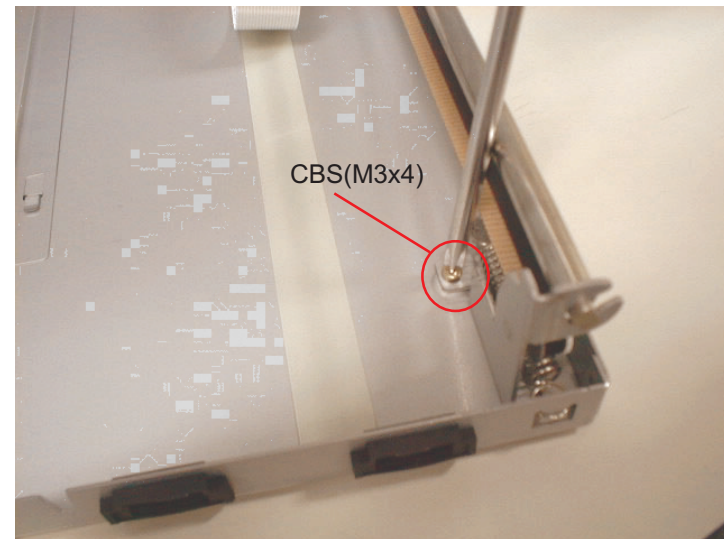


Figure 4-14. Driven Pulley Assembly Removal (1)

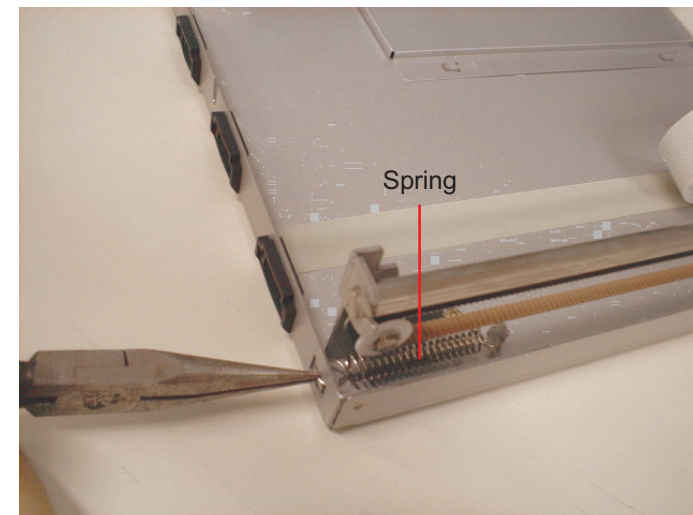


Figure 4-15. Driven Pulley Assembly Removal(2)

7. Remove the timing belt from the carriage driven pulley.
8. Remove the carriage guide shaft from the carriage unit.

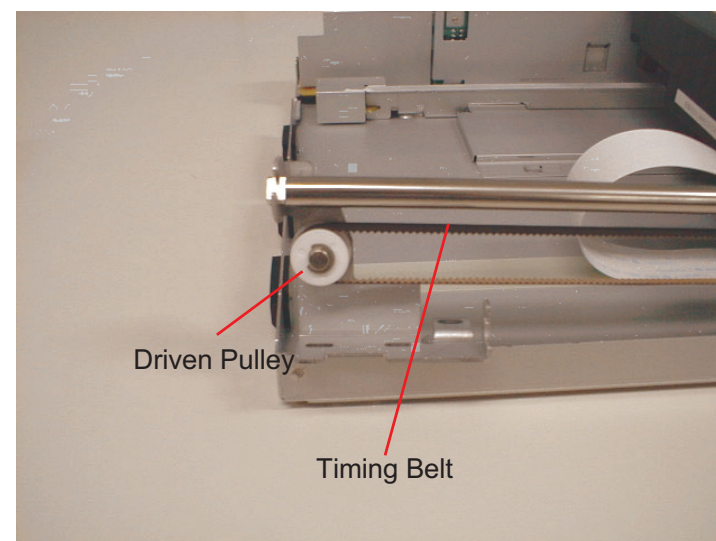


Figure 4-16. Timing Belt Removal

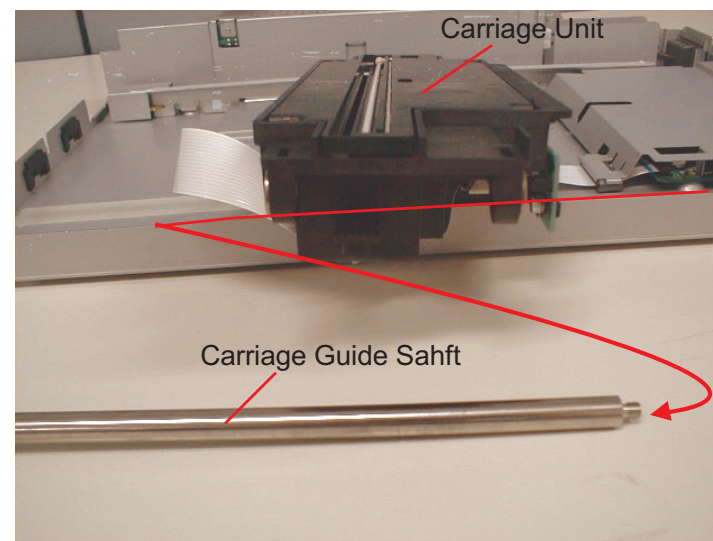


Figure 4-17. Carriage Guide Shaft Removal

9. From the back of the carriage unit, remove FFC metal clamp by using (-) driver.

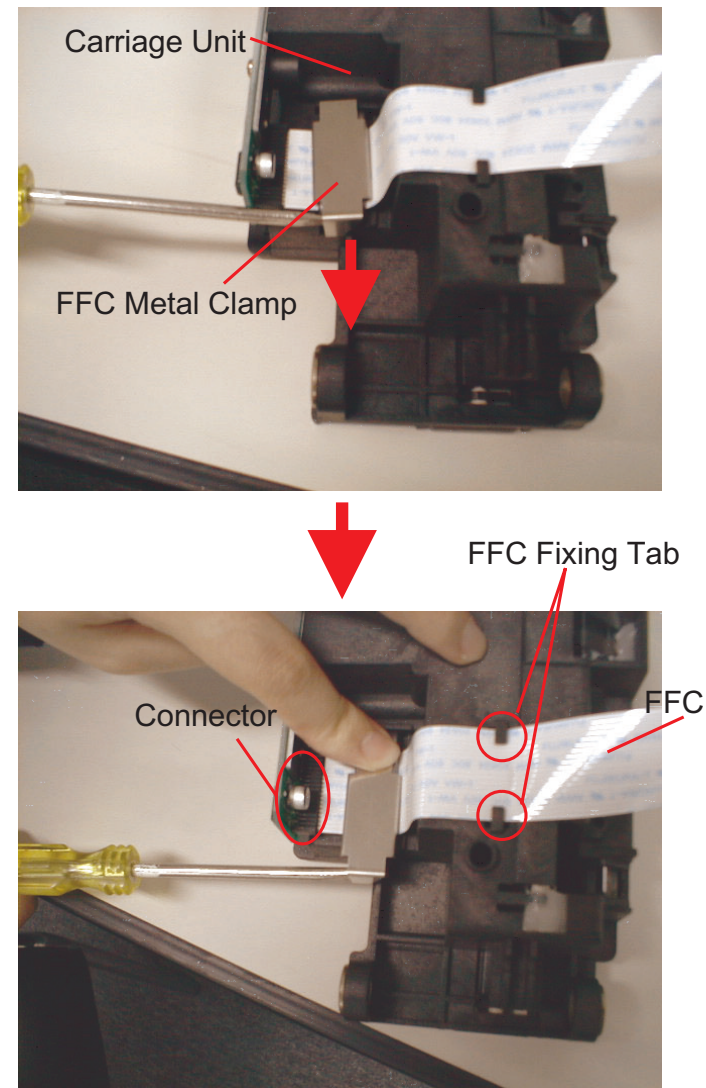


Figure 4-18. FFC Metal Clamp/FFC Removal

10. Remove FFC from the carriage unit by releasing a connector and 2 guide tabs, and also remove the carriage unit.

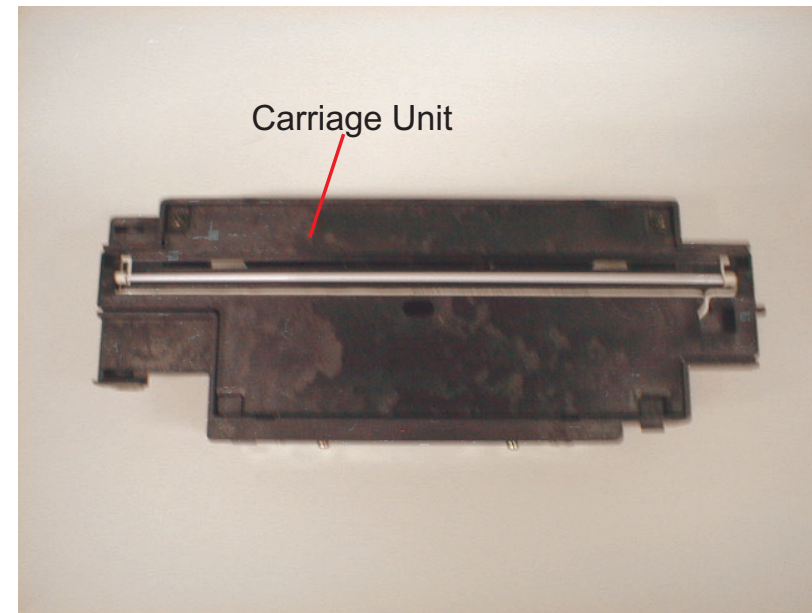


Figure 4-19. Carriage Guide Unit

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 cover. (See section 4.2.3)
4. Remove the carriage unit. (See section 4.2.5)
5. Remove 2 gold screws(CBS, 3x8) and 2 rear hooks, and remove the shield board for the main board.
6. Remove 2 gold screws(CBS, 3x4) fixing the CR motor unit, and slide the CR motor unit into the inside of the scanner body.

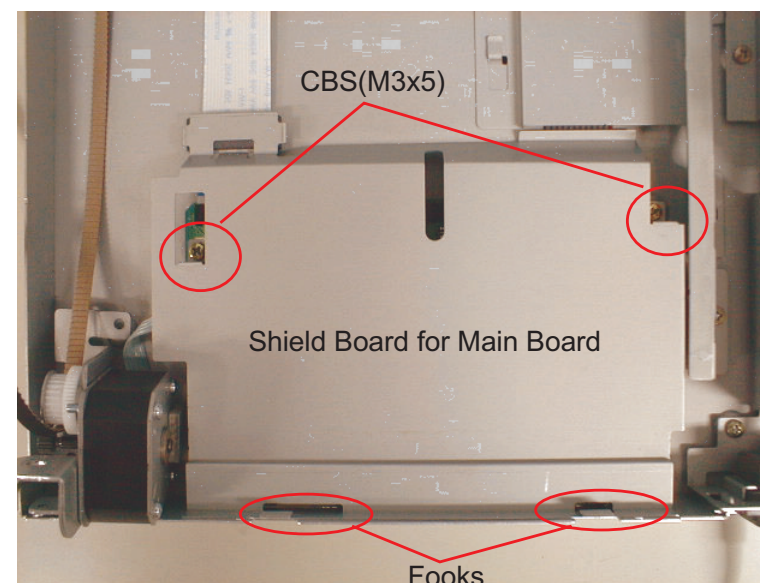


Figure 4-20. Shield Board Removal

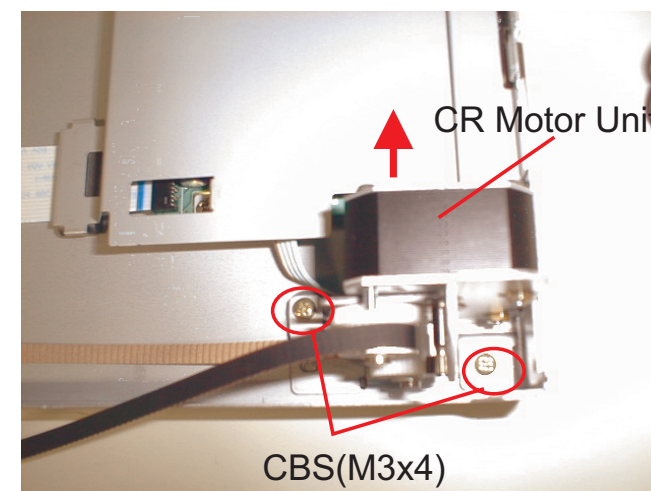


Figure 4-21. CR Motor Unit Removal(1)

7. Disconnect the CR motor unit cable from the main board connector, and remove the CR motor unit.
8. Remove the timing belt from the CR motor unit.
 1. Remove "E" shaped ring.
 2. Remove transmission gear.
 3. Remove the timing belt from the driven pulley.

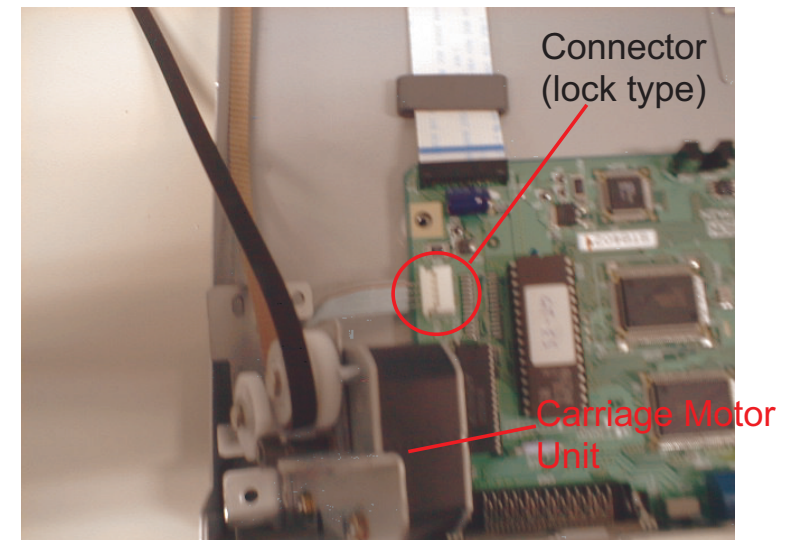


Figure 4-22. CR Motor Unit Removal(2)

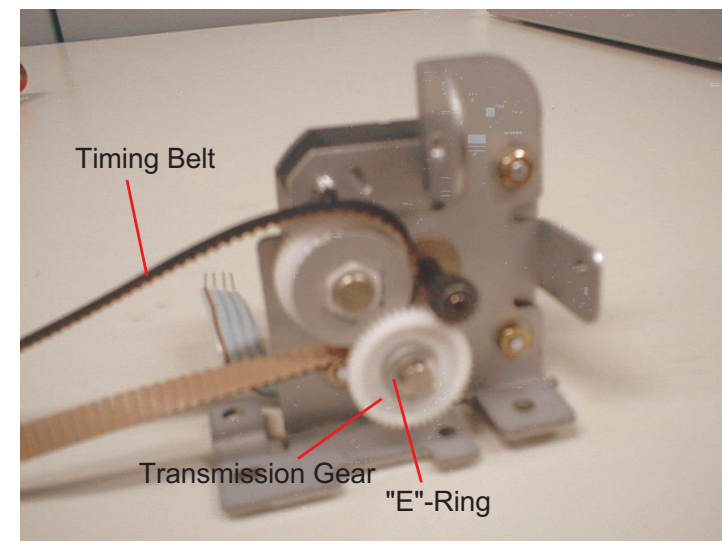


Figure 4-23. Timing Belt Removal

4.2.7 Main Board Removal

Note 1) SCSI is used as model in this section. The difference between SCSI and USB is the number of the screw at Step6.

1. Release the carriage lock. (See Section 4.2.1)
2. Remove the document cover. (See Section 4.2.2)
3. Remove the upper cover. (See Section 4.2.3)
4. Move the carriage unit until the shield board of the main board can be seen.
5. After removing 2 gold screws(CBS,3x5) and 2 rear hooks securing the shield board for the main board, remove that shield board.

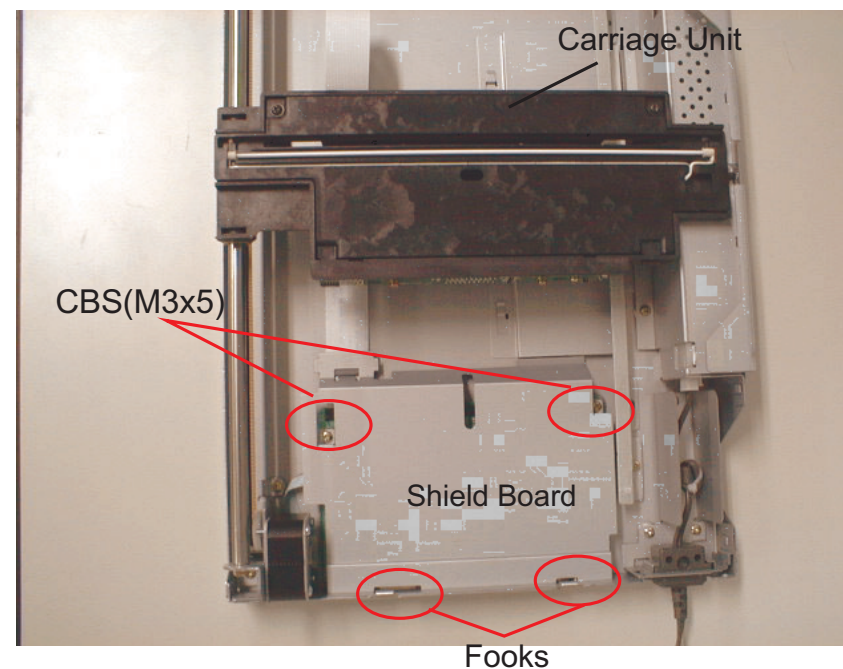


Figure 4-24. Main Board Removal (1)

6. Remove 4 screws(CP, 2.5x6) located around the I/F connector behind the scanner body and one screw(CP, 3x5).
7. Remove each cable from the carriage connector(lock type; pull and release), carriage FFC connector and power unit connector(lock type; push and release).
8. Lift up the front part of the main board, pulling it toward you, and remove the connector from the scanner body. Then, remove the main board.

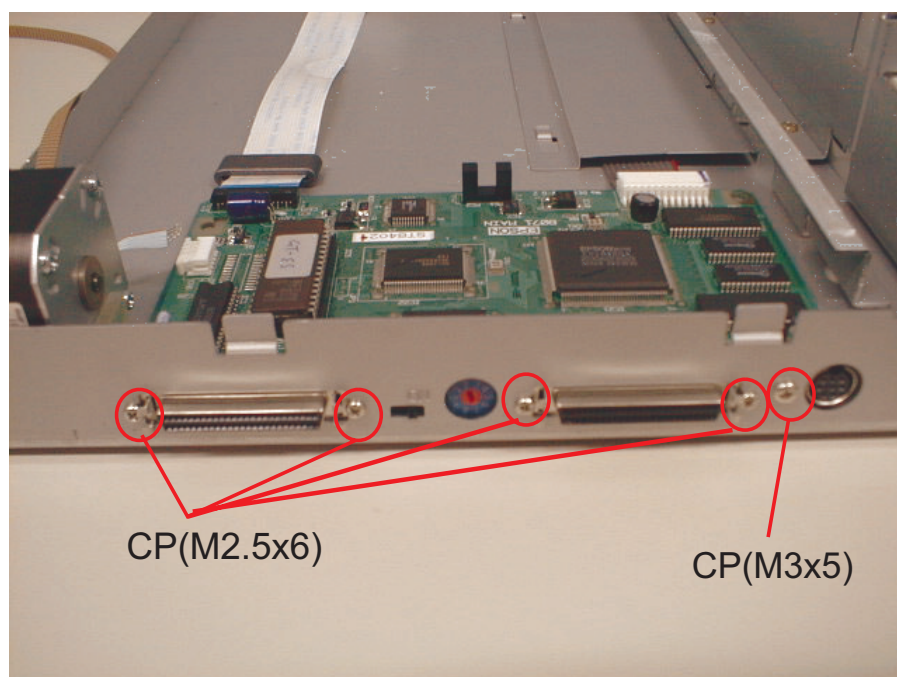


Figure 4-25. Main Board Removal (2)

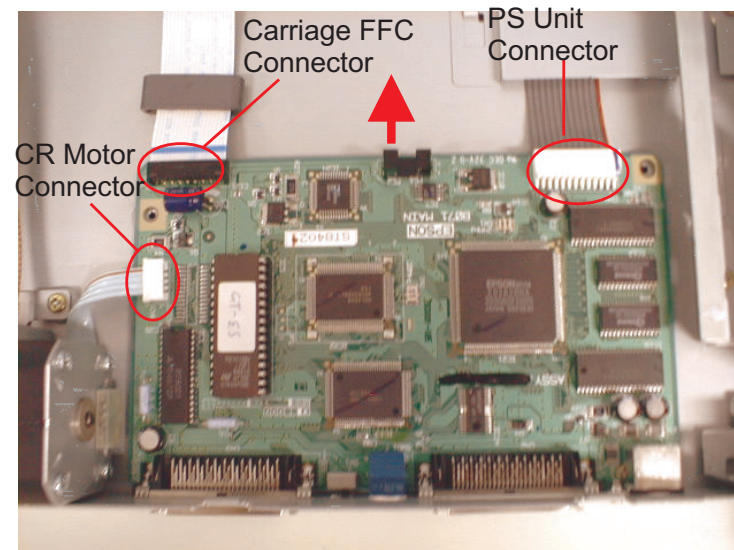


Figure 4-26. Remove the Main Board (3)

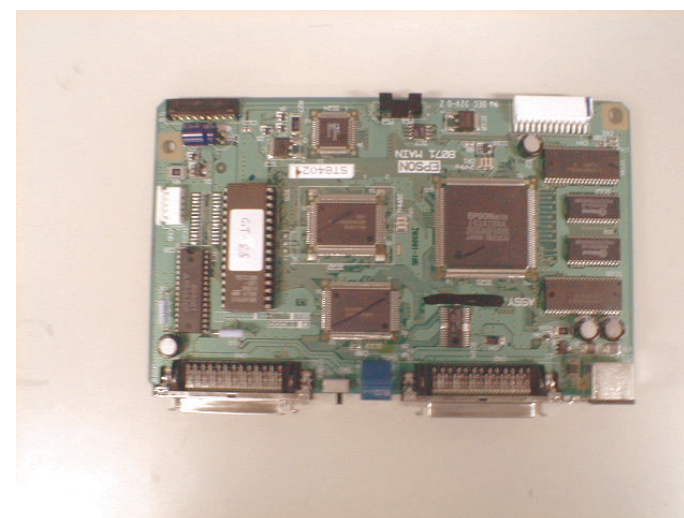


Figure 4-27. Main Board

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 cover. (See Section 4.2.3)
4. Remove one gold screw(CBS, 3x5), and the shield board for the panel board.



In the next steps, move the carriage back and forth slowly by hand, according to your necessity.

5. Remove the panel board from the scanner body.
6. Disconnect the connector(lock type; pull and release) of the panel board from the power unit, then remove the panel board.

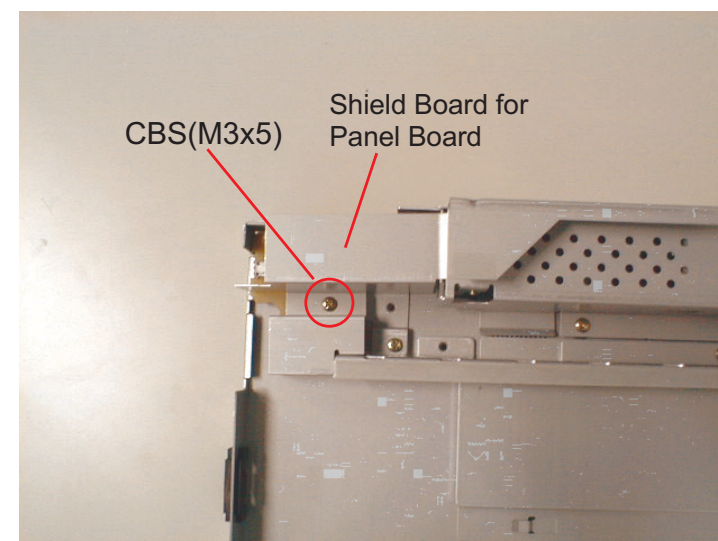


Figure 4-28. Panel Board Removal(1)

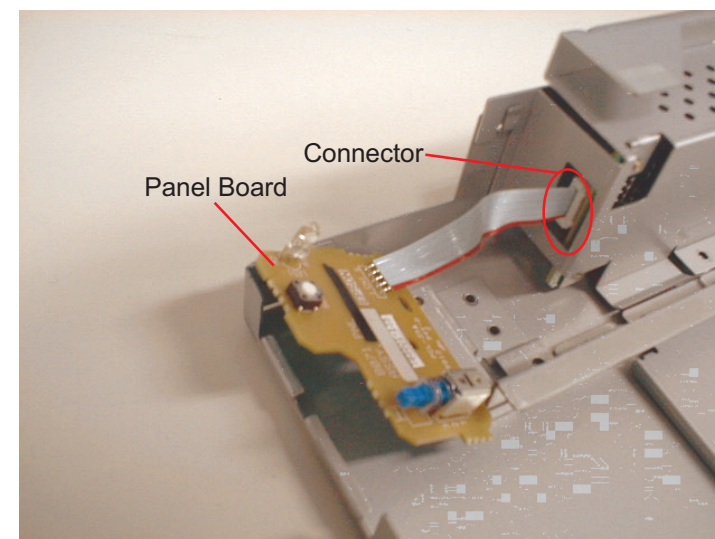


Figure 4-29. Panel Board Removal

4.2.9 Power board Removal

1. Release the carriage lock. (See Section 4.2.1)
2. Remove the document cover. (See Section 4.2.2)
3. Remove the upper cover. (See Section 4.2.3)



In the next steps, move the carriage back and forth slowly by hand, according to your necessity.

4. Remove one gold screw(CBS, 3x5) and the shield board of the panel board. (See figure 4-28)
5. Remove the cable of the panel board from the power board connector(lock type; Pull and release) (See figure 4-29)
6. Remove AC cable connector(lock type;Pick and release) from the power board.

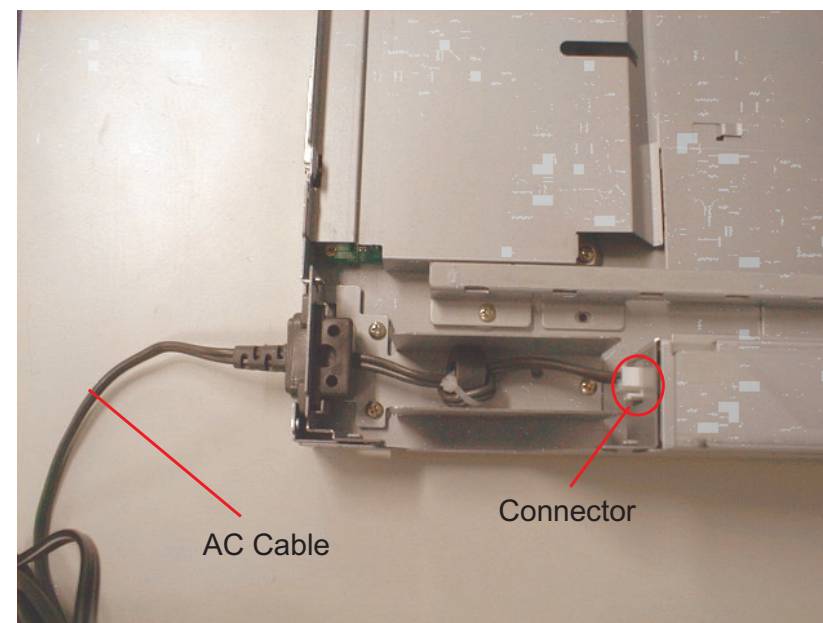


Figure 4-30. Power Board Removal

7. Remove 2 gold screws(CBS, 3x4) securing the shield board of the power board, and remove the shield board toward inside of the body.
8. Disconnect the connector(lock type; push and release) and remove 5 gold screws(CBS, 3x4) and power board from the shield board.

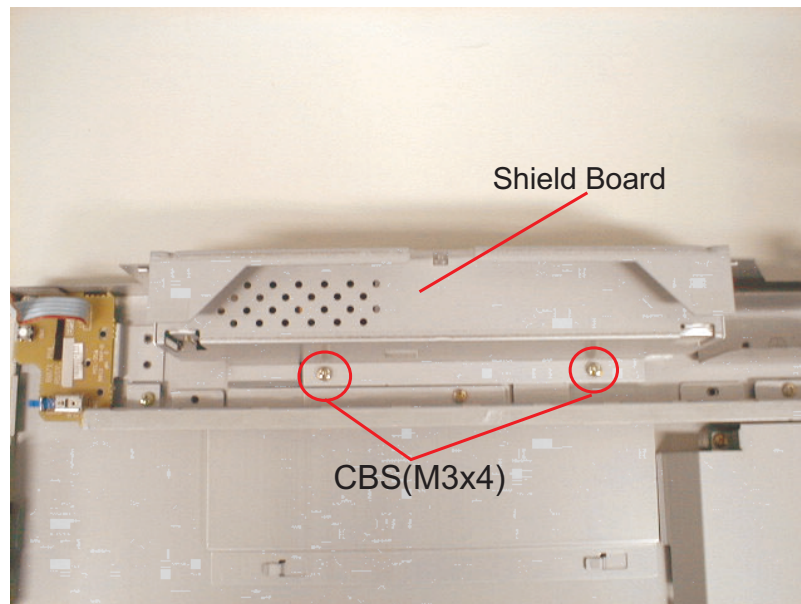


Figure 4-31. Power Board Removal(1)

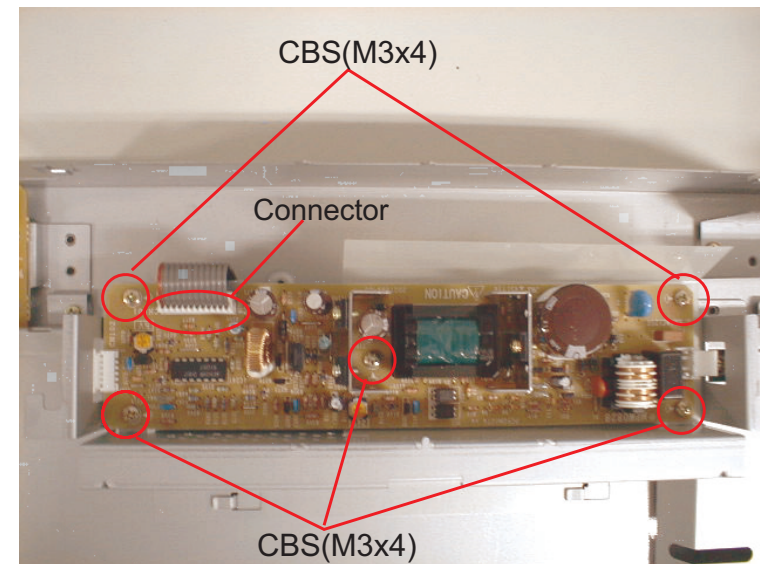


Figure 4-32. Power Board Removal(2)

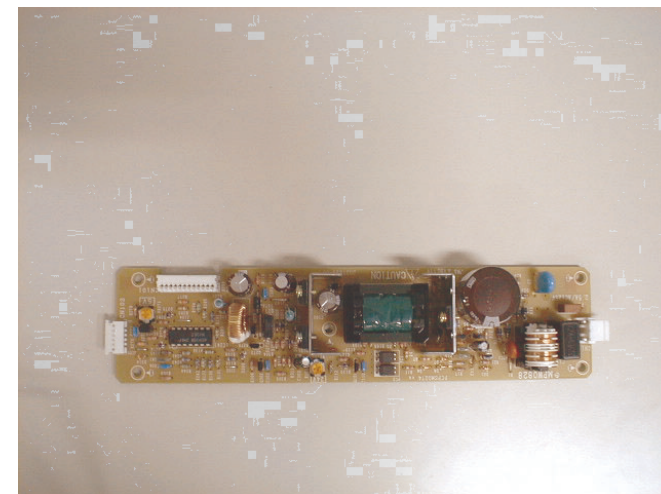


Figure 4-33. Power Board

CHAPTER

5

ADJUSTMENT

This scanner requires no adjustment for any service such as disassembling and assembling the scanner including part replacement is provided within the specification 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 direct effect on the scanned image. Therefore, be sure to clean the glass well to remove stain thoroughly.



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

□ Outer Cases

Wipe stain off with a clean cloth which is moistened with water and then squeezed tightly. To remove sever stain, use neutral detergent.

□ Document Glass

Remove dust and paper debris with a dry clean cloth. If stain is severe or foreign object is stuck, use a cloth absorbed with neutral detergent. If trace is left, wipe it off well with a dry, clean cloth again.

6.1.2 Lubrication

When the carriage unit needs to be replaced, or the operation sound of the carriage movement becomes noisy, it is necessary to apply lubrication. Following tables show the recommended grease type and lubrication points.

Table 6-1. Recommended Grease

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

Note)* "E" means exclusive product for EPSON. (Not available on the market)

Table 6-2. Lubrication Points

Figure	Lubrication Points	Lubrication
6-1	Transmission Gear Shaft of the CR motor and Driven pulley shaft.	G-26 (1x3mm)
6-1	Driven Pulley Shaft	G-26(1x3mm)



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

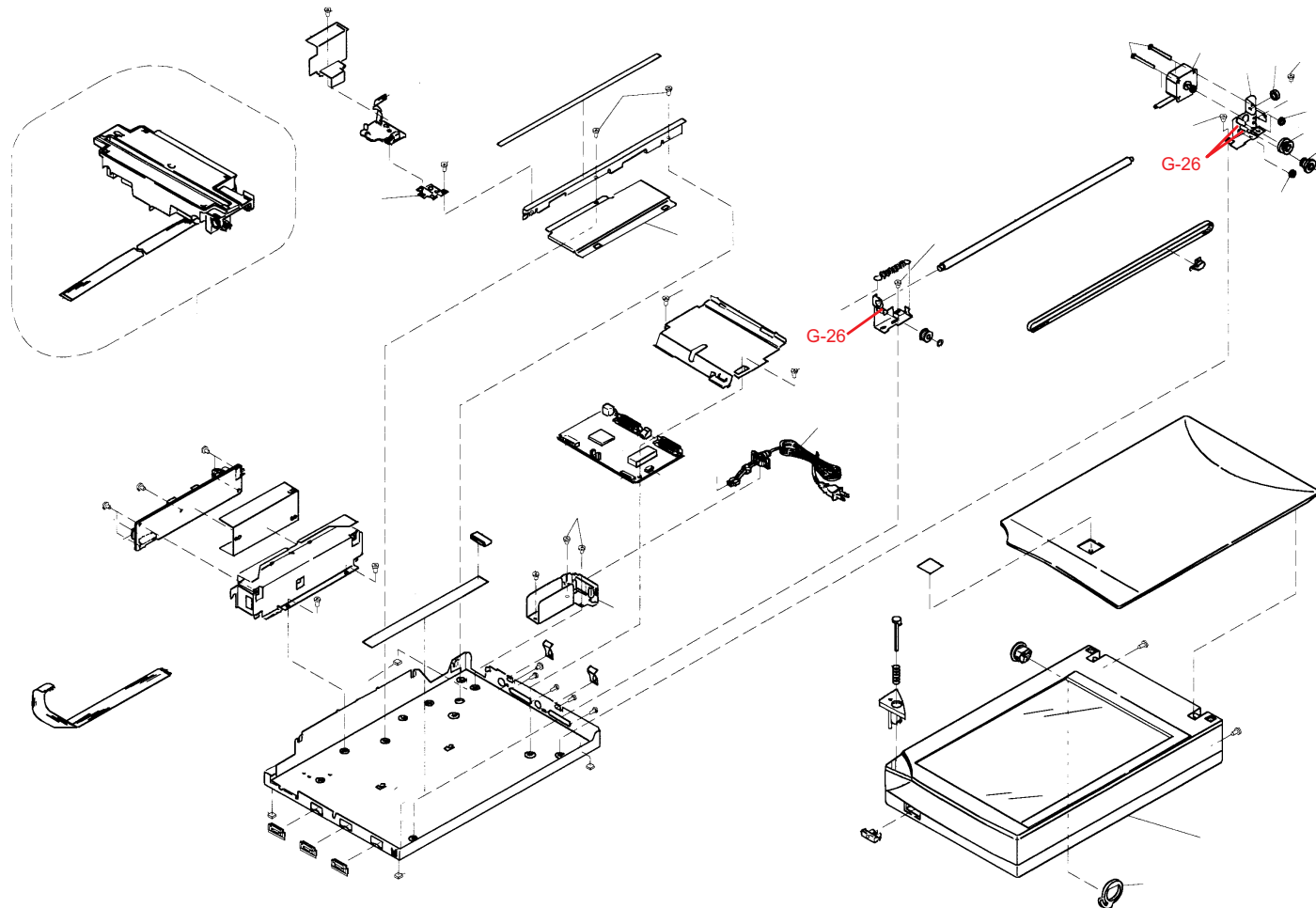


Figure 6-1. Lubrication Points

CHAPTER

7

APPENDIX

7.1 Overview

This section provides useful information for servicing to this scanner.

7.1.1 Interconnection

Following figures shows interconnection of the scanner.

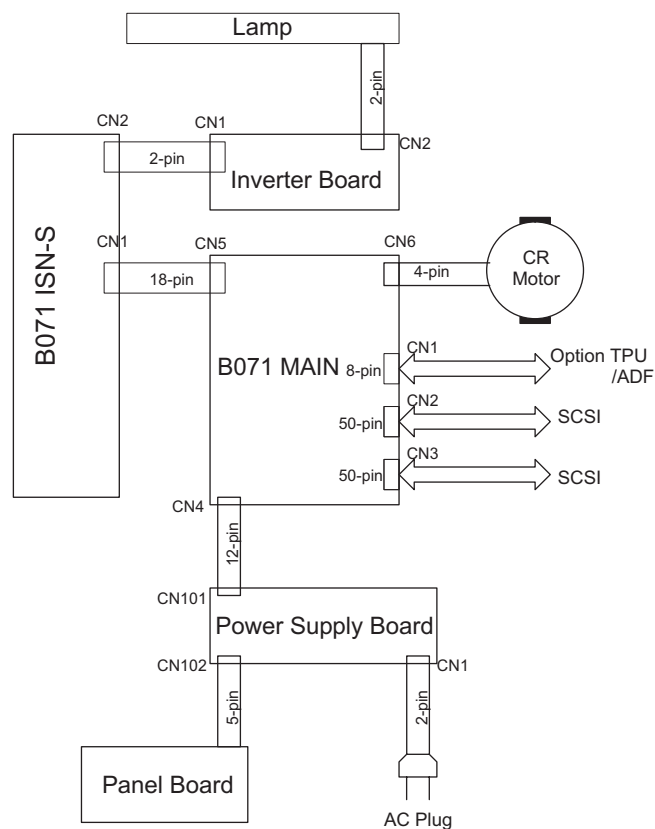


Figure 7-1. Interconnection(SCSI)

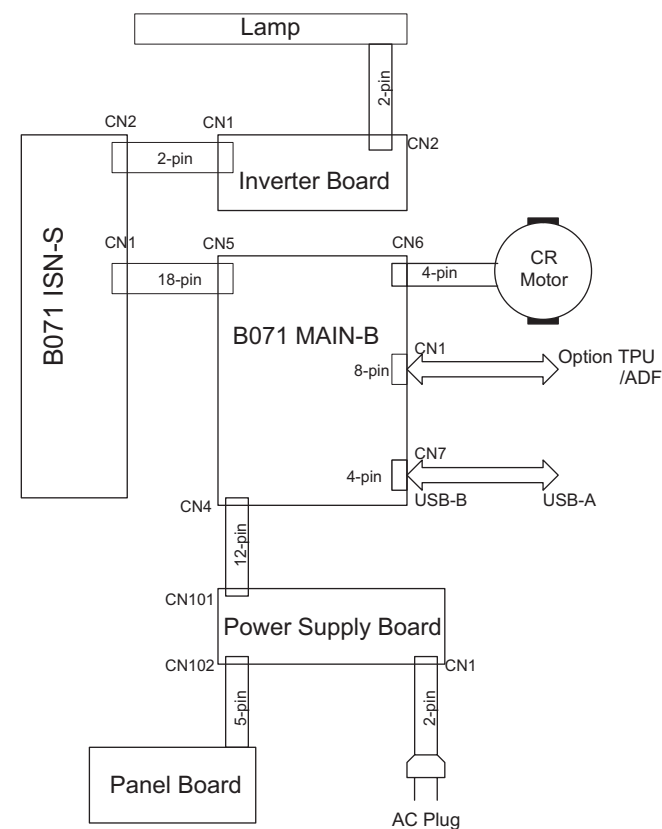


Figure 7-2. Interconnection(USB)

7.1.2 Connector Assignment (SCSI)

Table 7-1. Connector Summary (for SCSI)

Connector	Description	Pin	Table to refer
Control Board (B071 MAIN)			
CN1	Connector for option TPU(Transparency Unit)	8	7-3
CN2	SCSI Connector	50	7-1
CN3	SCSI Connector	50	7-1
CN4	To power supply board	12	7-4
CN5	To CCD board	18	7-5
CN6	To CR motor	4	7-6
Power Supply Board			
CN1	AC Input	2	7-7
CN101	To Control Board	12	7-4
CN102	To Panel Board	5	7-8
CCD Board (B0A1 ISN)			
CN1	To Control Board	18	7-5
CN2	To Inverter Board	2	7-9
Inverter Board			
CN1	To CCD Board	2	7-9
CN2	To Lamp	4	7-10

Table 7-2. Connector Summary (for USB)

Connector	Description	Pin	Table to refer
Control Board (B071 MAIN-B)			
CN1	Connector for option TPU(Transparency Unit)	8	7-3
CN4	To power supply Board	12	7-4
CN5	To CCD Board	18	7-5
CN4	To CR Motor	4	7-6
CN6	USB Connector	4	7-2
Power Supply Board			
CN1	AC Input	2	7-7
CN101	To Control Board	12	7-4
CN102	To Panel Board	5	7-8
CCD Board (B0A1 ISN)			
CN1	To Control Board	18	7-8
CN2	To Inverter Board	2	7-9
Inverter Board			
CN1	To CCD Board	2	7-9
CN2	To Lamp	4	7-10

Table 7-3. Control Board CN1

Pin No.	Signal	I/O
1	+5V	O
2,5	GND	--
3	+24V	O
4	LCD	O
5	SCK	O
6	RXD	I
7	TXD	O

Table 7-4. Control Board CN4

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

Table 7-5. Control Board CN5

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

Table 7-6. Control Board CN6

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

Table 7-7. Power supply Board CN1

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

Table 7-8. Power supply Board CN102

Pin No.	Signal	I/O
1	OP-LED	O
2	ERR-LED	O
3	PW-SW	O
4	PW-SW	I
5	GND	---

Table 7-9. CCD Board CN2

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

Table 7-10. Inverter Board CN2

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

7.2 Parts List

The table below shows the parts list of GT-7000. (Refer to Figure7-3 and 7-4 for numbers in the table)

Table 7-11. Parts List

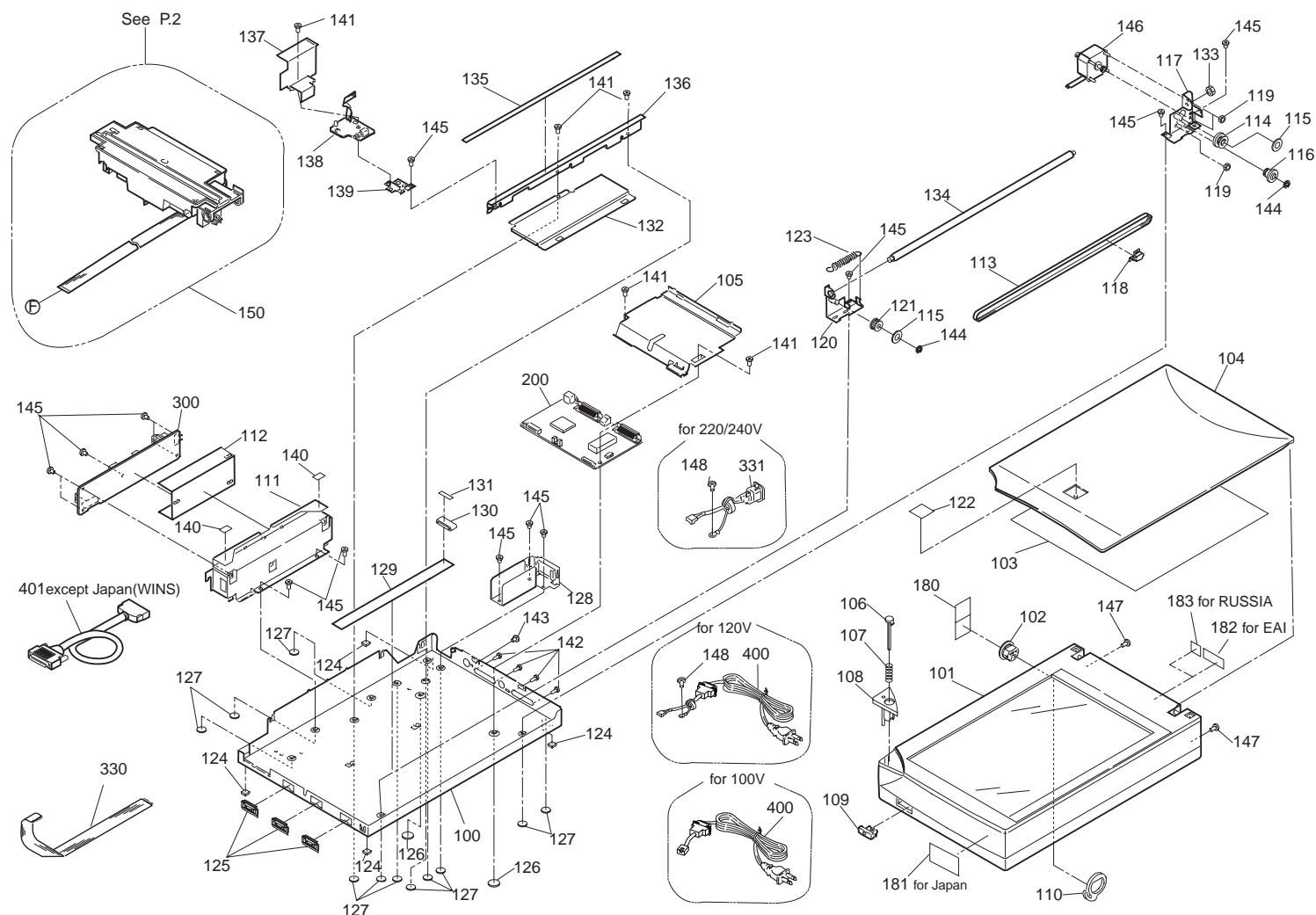
Number	Parts Name
100	Frame, Base
101	Housing Assembly, Upper;ASP
102	Nob, Fixing, Carriage
103	Mat, Cover, Document
104	Cover, Document
105	Cover, Main Board
106	Key Top, Function Switch
107	Compression Spring, 1.32
108	Housing Assembly, Panel
109	Key Top, Power Switch
110	Lever, Fixing, Carriage
112	Sheet, Power Supply Board
113	Timing Belt
114	Pulley, Driven
115	Flange, Pulley
116	Pulley, Idle
117	Holder Assembly, Pulley, Driven
118	Clamp, Timing Belt
119	6N, 3, F/Zn
120	Holder Assembly, Pulley, Driven
121	Pulley, Driven
122	Logo Plate
123	Tension spring, 18.4
124	Foot
125	Push, Housing

Table 7-12. Parts List

Number	Parts Name
126	Sheet, Cover, 25
127	Sheet, Cover, 18
128	Cover, Inlet
129	Sheet Spacer FFC
130	Ferrite-Core
131	Double side tape, 28x10
132	Cover, Harnest
133	6 N, 5, F/Zn
134	Shaft, CR
135	Sheet, Slide
136	Rail, CR
137	Cover, Switch Board
138	Board Assembly, Panel
139	Holder, Switch Board
140	Sheet, Cover, Power Supply Board
141	Cross recessed, S-tite Binding Small Screw
142	Cross recessed(+), Pan head screw
143	Corss recessed Pan Small Screw
144	"E" shaped ring
145	Cross-recessed(+), Binding S -tite Screw
146	Motor Assembly, CR
147	Cross recessed(+) Binding S -tite Screw
150	Carriage Assembly
151	Carriage Guide Shft Holder
152	Board Assembly, Inverter
153	Lamp Assembly
154	Cover Carriage
155	Clamp Ferrite-Core
156	Ferrite-Core

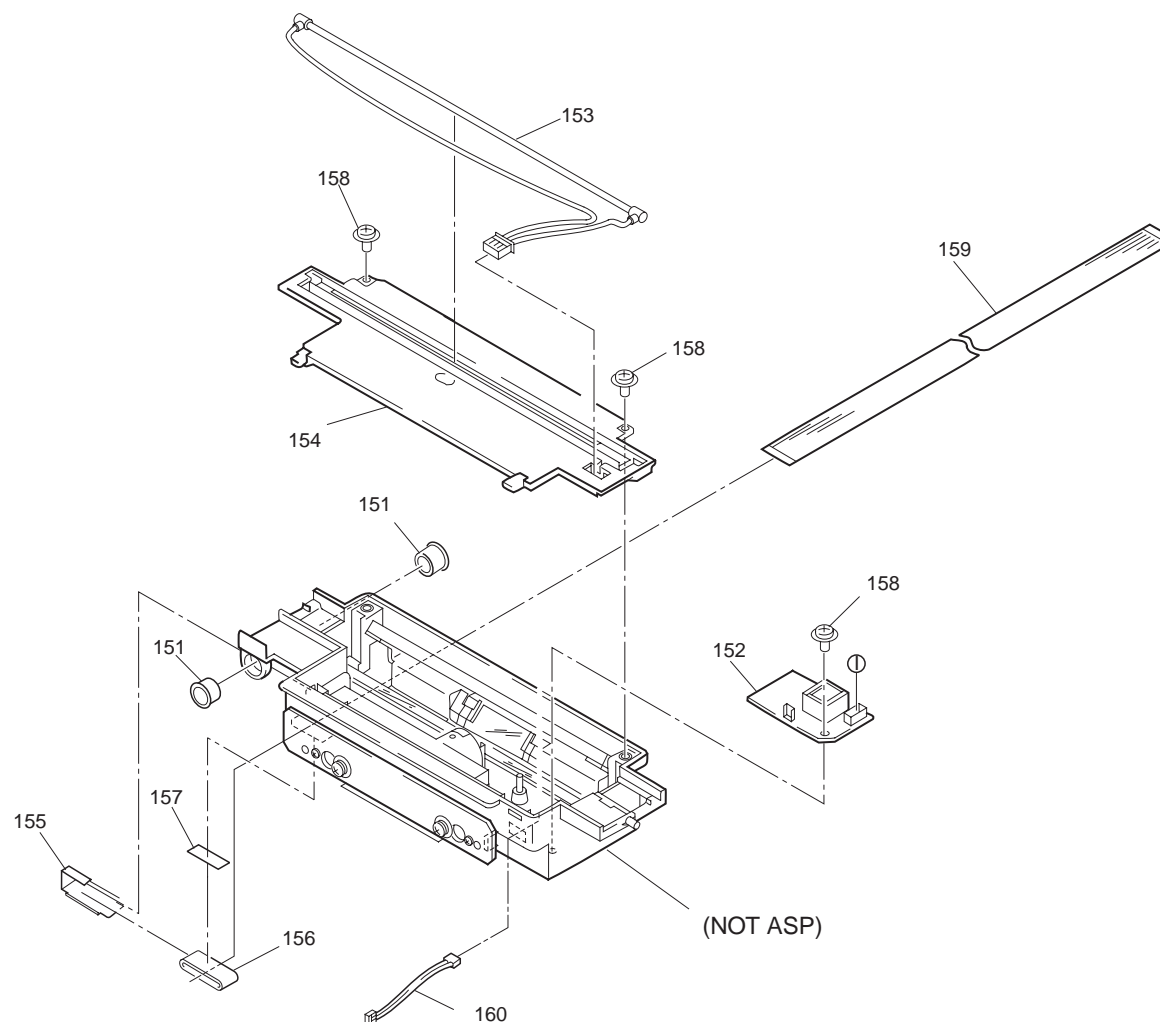
Table 7-13. Parts List

Number	Parts Name
157	Double side tape, 28x10
158	Cross-recessed(+), Cup P-tite, 3x8, F/ZB
159	Harness
160	Harness



EXPLODED DIAGRAM FOR GT-7000/GT-7000PHOTO/PERFECTION 636U (1) Rev.01 10010

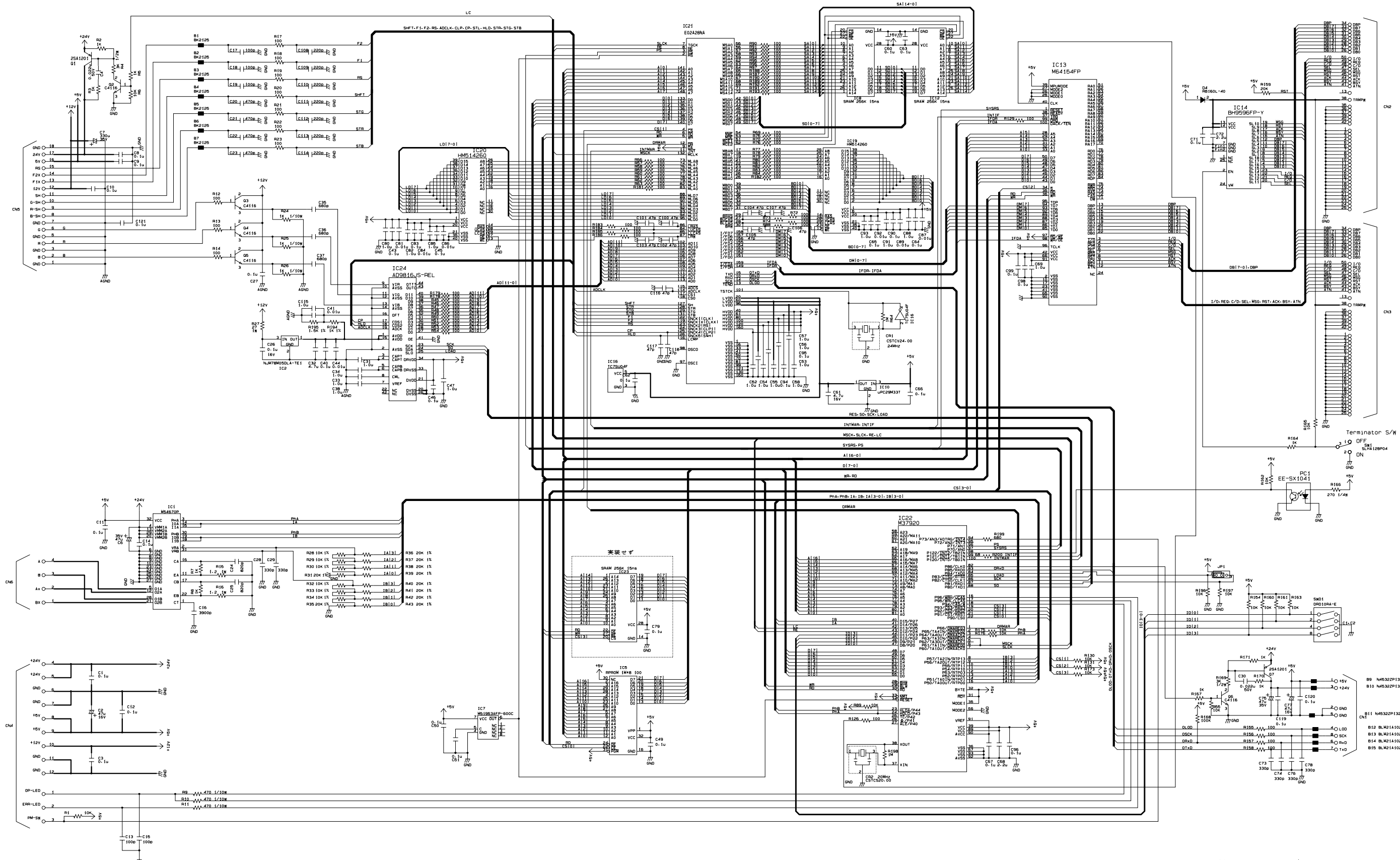
Figure 7-3. Exploded Diagram (1)



EXPLODED DIAGRAM FOR GT-7000/GT-7000PHOTO/PERFECTION 636U (2)

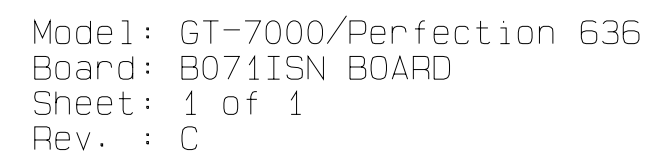
Rev.01 10010

Figure 7-4. Exploded Diagram (2)



注) 未実装部品: C79-IC23
Not installed: C79- IC23

Model: GT-7000/Perfection 636
Board: B071MAIN BOARD
Sheet: 1 of 1
Rev.: C



Model: GT-7000/Perfection 636
Board: B071ISN BOARD
Sheet: 1 of 1
Rev. : C