CANOSCAN

N650U/N656U/ N1220U

SERVICE MANUAL

REVISION 0

Canon

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CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

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Use of this manual should be strictly supervised to avoid disclosure of confidential information.

LIST OF SERIAL NUMBER

CanoScan N650U	**F91-4611-200**	**AZJ000001-**
	F91-4631-200	**CZJ000001-**
	F91-4641-200	**DZJ000001-**
	F91-4661-200	**FZJ000001-**
	F91-4671-200	**LZJ000001-**
	F91-4681-200	**JZJ000001-**
	F91-4691-200	**KZJ000001-**
CanoScan N656U	**F91-4612-200**	**AZK000001-**
	F91-4622-200	**MZK000001-**
	F91-4632-200	**CZK000001-**
	F91-4642-200	**DZK000001-**
	F91-4662-200	**FZK000001-**
	F91-4672-200	**LZK000001-**
	F91-4682-200	**JZK000001-**
	F91-4692-200	**KZK000001-**
CanoScan N1220U	**F91-4712-200**	**AZL000001-**
	F91-4722-200	**MZL000001-**
	F91-4732-200	**CZL000001-**
	F91-4742-200	**DZL000001-**
	F91-4762-200	**FZL000001-**
	F91-4772-200	**LZL000001-**
	F91-4782-200	**JZL000001-**
	F91-4792-200	**KZL000001-**

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PREFACE

This service manual contains the basic information necessary for servicing the N650U/N656U/N1220U image scanners.

The service manual consists of the following chapters.

Chapter 1: General Descriptions
Features, specifications, exterior features, installation, customer's daily maintenance

Chapter 2: Operation and Timing
Basic operation, optical system, image processing system, control system, power supply

Chapter 3: Mechanical System
Externals, drive system, optical system, electrical system

Chapter 4: Maintenance and Servicing
Periodical replacement parts, consumable parts durability, periodical servicing, special tools, solvents and lubricants

Chapter 5: Troubleshooting
Introduction, troubleshooting, location of electrical parts, canon scanner test

Chapter 6: Parts Catalog

Appendix: General Circuit Diagram, Main PCB Circuit Diagram, USB Connector PCB Circuit Diagram

The information in this service manual is subject to change as the product is improved.
All relevant information in such cases will be provided by the service information bulletins.

A thorough understanding of the N650U/N656U/N1220U, based on the service manual and service information bulletins, is vital to the serviceman in maintaining the product quality and performance, and in locating and repairing the cause of malfunctions.

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CONTENTS

CHAPTER 1 : GENERAL DESCRIPTIONS

CHAPTER 2 : OPERATION AND TIMING

CHAPTER 3 : MECHANICAL SYSTEM

CHAPTER 4 : MAINTENANCE AND SERVICING

CHAPTER 5 : TROUBLESHOOTING

CHAPTER 6 : PARTS CATALOG

APPENDIX

CHAPTER 1

GENERAL DESCRIPTIONS

 CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

I. FEATURES

CanoScan N650U/N656U with 600 x 1200 dpi resolution, CanoScan N1220U with 1200 x 2400 dpi resolution are flatbed image scanners incorporating the following features.

1. High gradation and high image quality are achieved by employing a highly sensitive contact image sensor with LIDE (LED Indirect Exposure) technology for the scanning unit, and by reading each RGB color by 14 bits and outputting by 8 bits.

2. The scanner is a small size of 256.0(W) x 372.5(D) x 34.0(H) mm, and a light weight of 1.5 kg by using a downsized scanning unit.

3. The scanner can easily be connected to the host computer through a USB interface.

4. Double hinge structure (Z-lid) enables the document cover to hold a thick document.

5. The scanner can be placed vertically to scan by using an optional stand.

6. The scanner draws its power from USB port on the host computer requiring no AC adapter.

II. SPECIFICATIONS

CanoScan N650U/N656U

MAIN UNIT

· Type	: Flat bed image scanner

READING UNIT

· Image sensor	: 5104 pixels contact image sensor
· Light source	: LED indirect exposure (RGB each)
· Max. document size	: A4 or Letter (216 x 297 mm)
· Image output	: RGB 8 bits per channel (input 14 bits)
· Resolution	: 600 x 1200 dpi
· Scan time	: 112 sec. (color, A4, 600 dpi) 37 sec. (grayscale, A4, 600 dpi) 16 sec. (preview)

INTERFACE

· Interface	: USB 1.1 (B plug) x 1

OTHERS

· Operating environment	: Temperature range, 5 to 35˚C Humidity range, 10 to 90% Air pressure range, 613 to 1013 hPa
· Power consumption	: 2.5W (during operation)
· Dimensions	: 256.0(W) x 372.5(D) x 34.0(H) mm
· Weight	: 1.4 kg

  CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

CanoScan N1220U

MAIN UNIT

· Type	: Flat bed image scanner

READING UNIT

· Image sensor	: 10208 pixels contact image sensor
· Light source	: LED indirect exposure (RGB each)
· Max. document size	: A4 or Letter (216 x 297 mm)
· Image output	: RGB 8 bits per channel (input 14 bits)
· Resolution	: 1200 x 2400 dpi
· Scan time	: 449 sec. (color, A4, 1200 dpi) 149 sec. (grayscale, A4, 1200 dpi) 16 sec. (preview)

INTERFACE

· Interface	: USB 1.1 (B plug) x 1

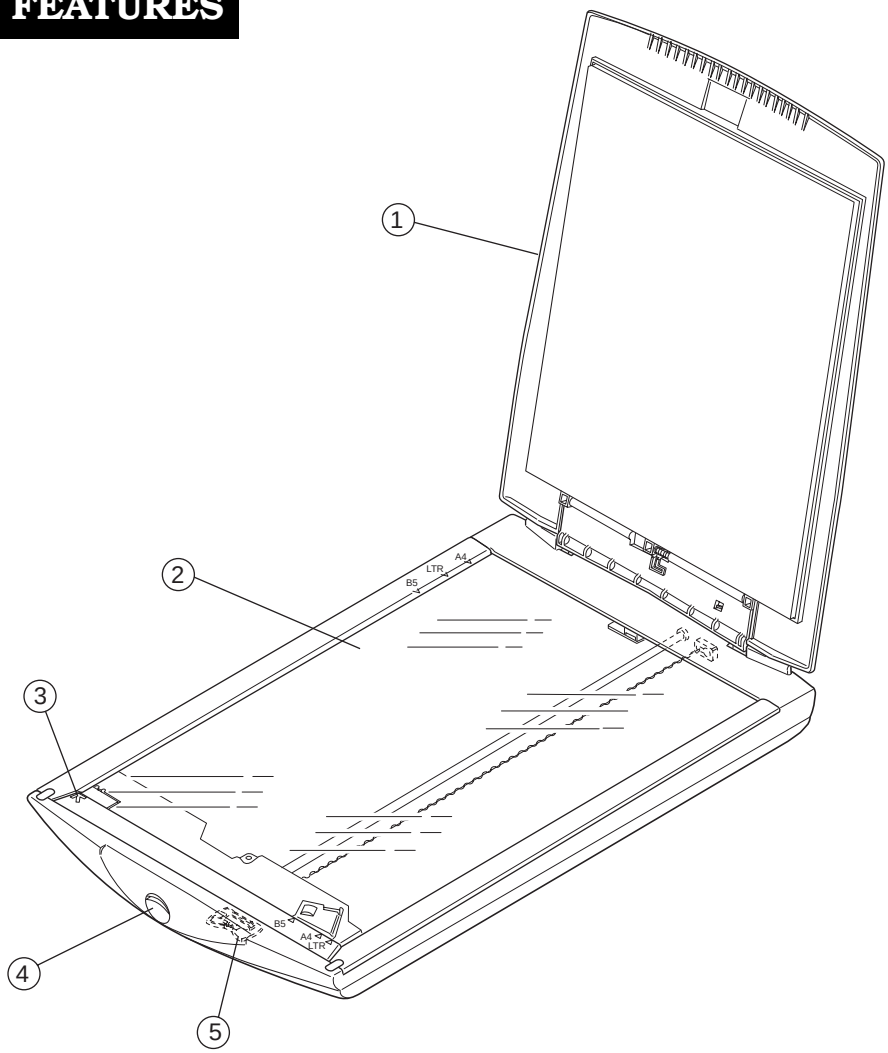
OTHERS

· Operating environment	: Temperature range, 5 to 35˚C Humidity range, 10 to 90% Air pressure range, 613 to 1013 hPa
· Power consumption	: 2.5W (during operation)
· Dimensions	: 256.0(W) x 372.5(D) x 34.0(H) mm
· Weight	: 1.4 kg

Specifications are subject to change with product improvement.

III. EXTERIOR FEATURES

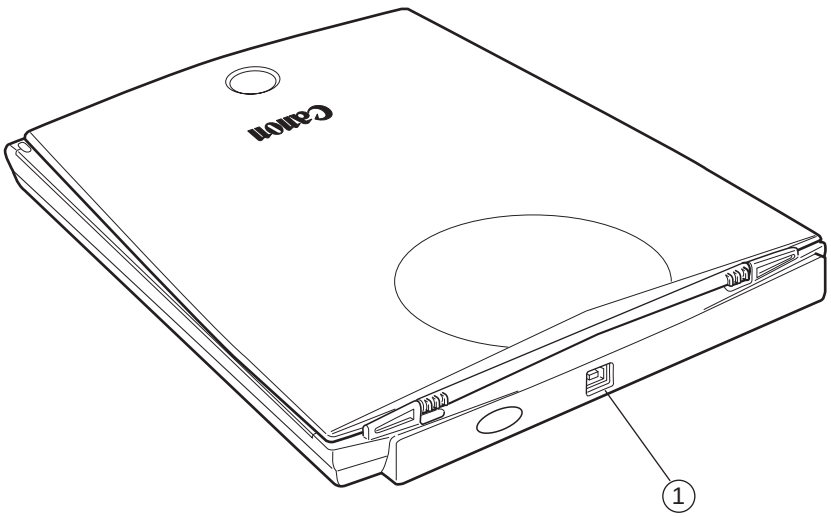
A. Front View



① Document Cover
② Document Glass
③ Alignment Mark
④ Start Button
⑤ Carriage Lock

Figure 1-1

B. Rear View



① USB Port

Figure 1-2

IV. INSTALLATION

A. Preface

The following installation conditions are required.

1. Ambient temperature should be between 5˚C and 35˚C, and humidity between 10% and 90%. Avoid locations near water faucets, boilers, humidifiers, or refrigerators.

2. Avoid locations subject to open flame, dust, or direct sunlight. If it is installed near a window, hang a curtain to block direct sunlight.

3. The room should be well ventilated.

4. Install on a sturdy and level desk, etc.

5. Moving a scanner from a cold place to a warm place can cause condensation on the metal parts, resulting in a faulty operation. Give the scanner at least one hour to adjust to the room temperature before unpacking.

B. Installation

1. Unlocking the carriage lock

The scanner is shipped with the scanning unit locked by the carriage lock to prevent damage during transport. Unlock the scanning unit to use the scanner.

1) Turn the scanner over.

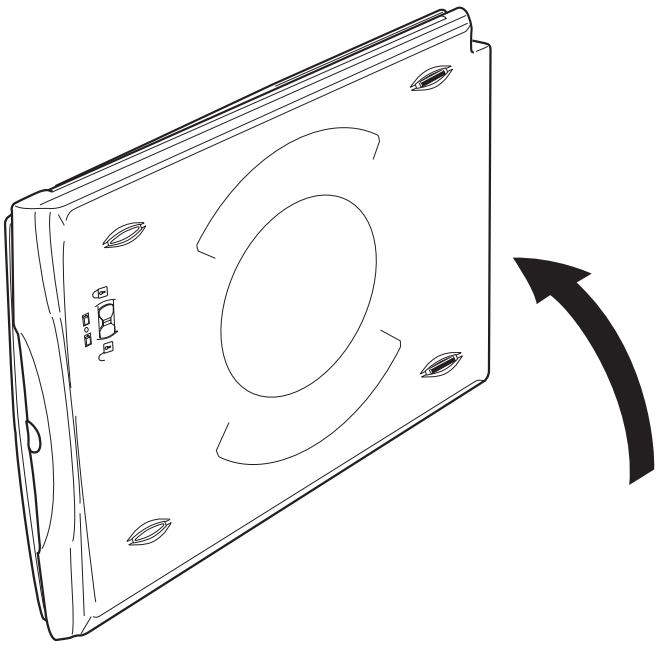
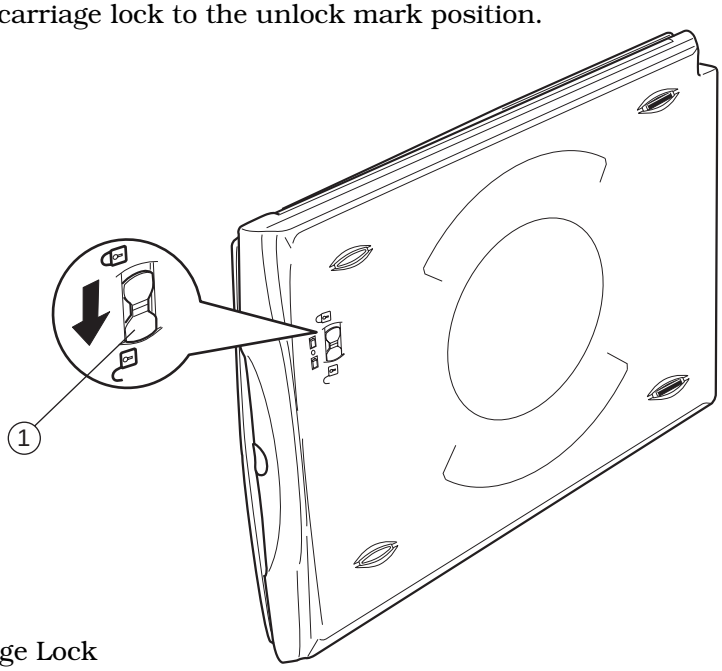


Figure 1-3

2) Push the carriage lock to the unlock mark position.



① Carriage Lock

Figure 1-4

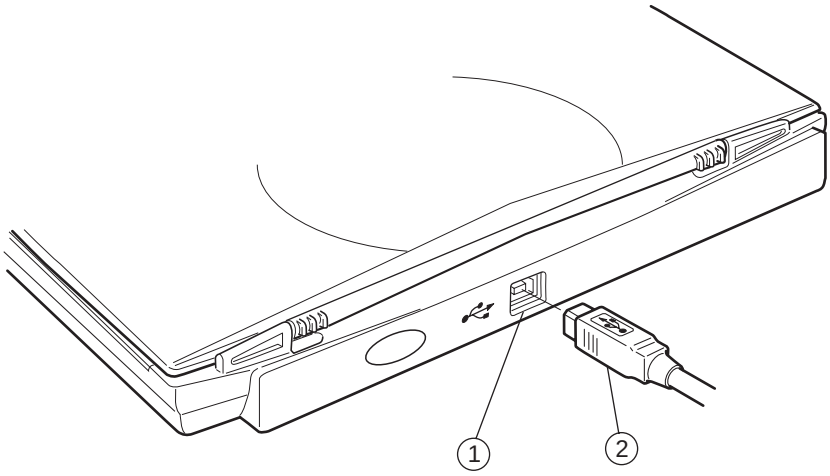
3) Return the scanner to its standard position.

Note: Always lock the scanning unit during transport.

C. Connecting to the Host Computer

The scanner is connected to the USB port on the host computer using a supplied USB cable. Refer to "Getting Started" for details. For connecting/disconnecting the host computer's cables, refer to the manual supplied with the host computer.

1) Connect the flat connector (A plug) of the USB cable to the USB port on the host computer.
2) Connect the square connector (B plug) of the USB cable to the USB port on the scanner.

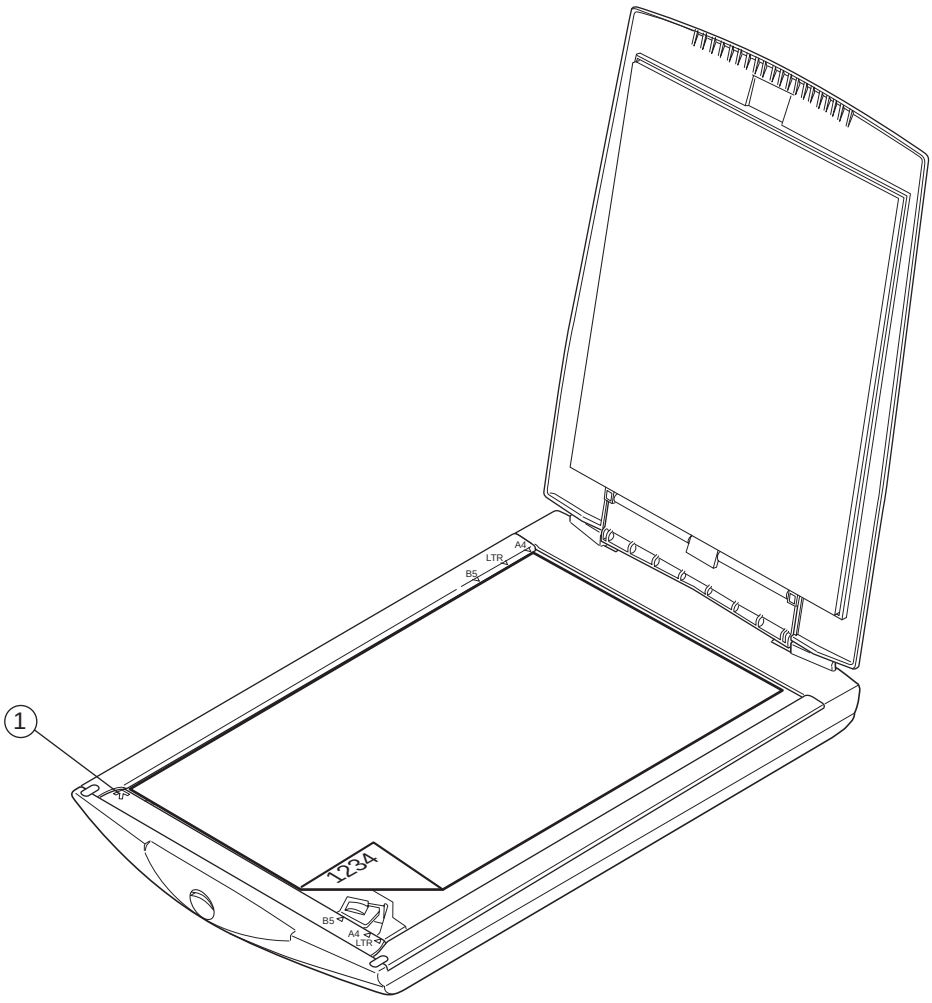


① USB Port
② USB Cable

Figure 1-5

D. Scanning a Document

1) Open the document cover.
2) Place a document on the document glass, orienting the image face down and aligning its top edge with the alignment mark.



① Alignment Mark

Figure 1-6

3) Close the document cover, caring not to dislodge the document.
4) Send the "SCAN" command from the host computer to scan.

V. CUSTOMER'S DAILY MAINTENANCE

Dirt on a document glass or a document cover may cause an unclear image or lines on an image. Clean the document glass and the document cover using the following procedures.

1) Disconnect the USB cable from the scanner.
2) Wipe the dirt or dust off the document cover with a soft clean cloth dampened with water and well wrung, then thoroughly wipe water off with a dry cloth.
3) Wipe the document glass with a dry cloth caring not to leave wiper marks.

CHAPTER 2

OPERATION AND TIMING

 CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

I. BASIC OPERATION

A. Functions

The scanner functions are divided into the three main blocks of optical system, image processing system, and control system.

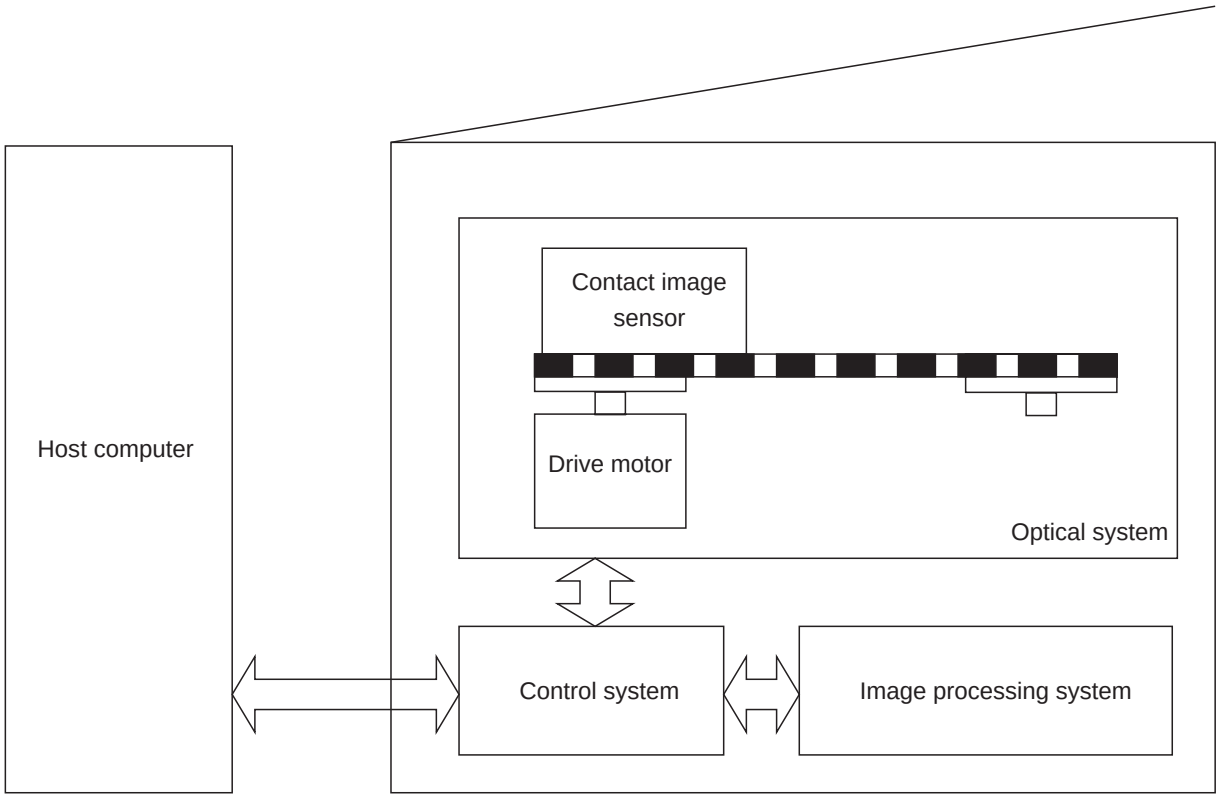


Figure 2-1

B. Outline of Electrical System

Figure 2-2 shows the outline of electrical system. CPU is not equipped in the main PCB. The device driver installed in the host computer includes a control program, which functions as CPU.

Image signals read by the contact image sensor are converted into digital data by the A/D converter in the gate array. The converted image data are image-processed by the gate array, then output to the host computer via USB port.

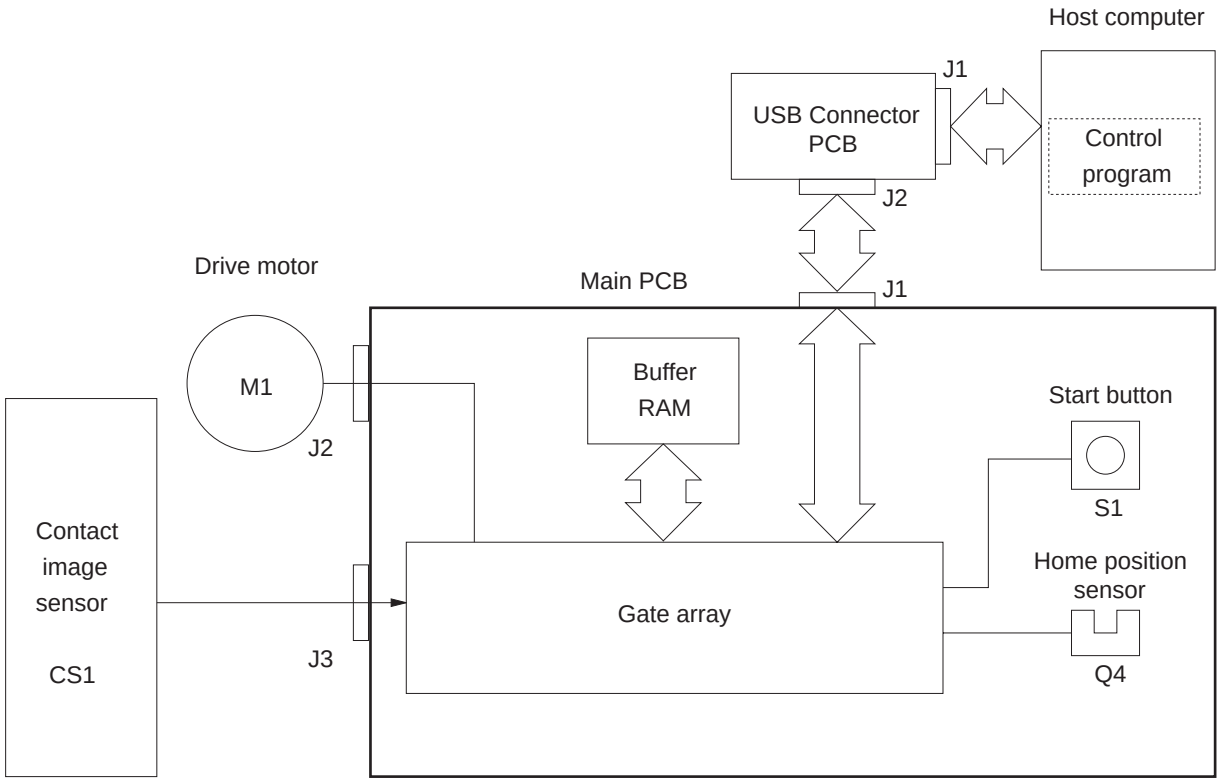


Figure 2-2

C. Main PCB Input and Output

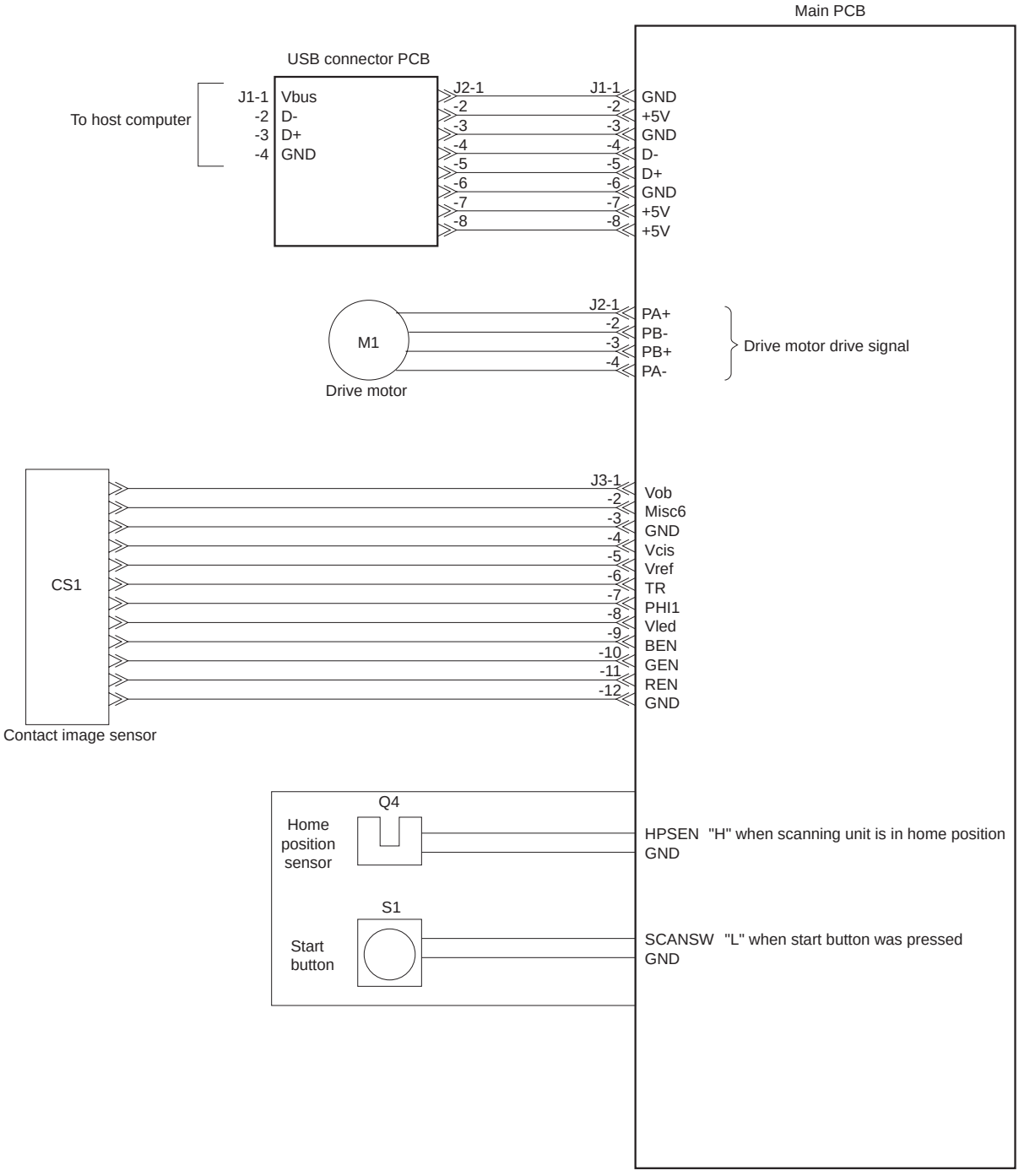


Figure 2-3

D. Basic Sequences

The basic sequences of the scanner are divided into power ON sequence, calibration sequence, and document scanning sequence.

1. Power ON sequence

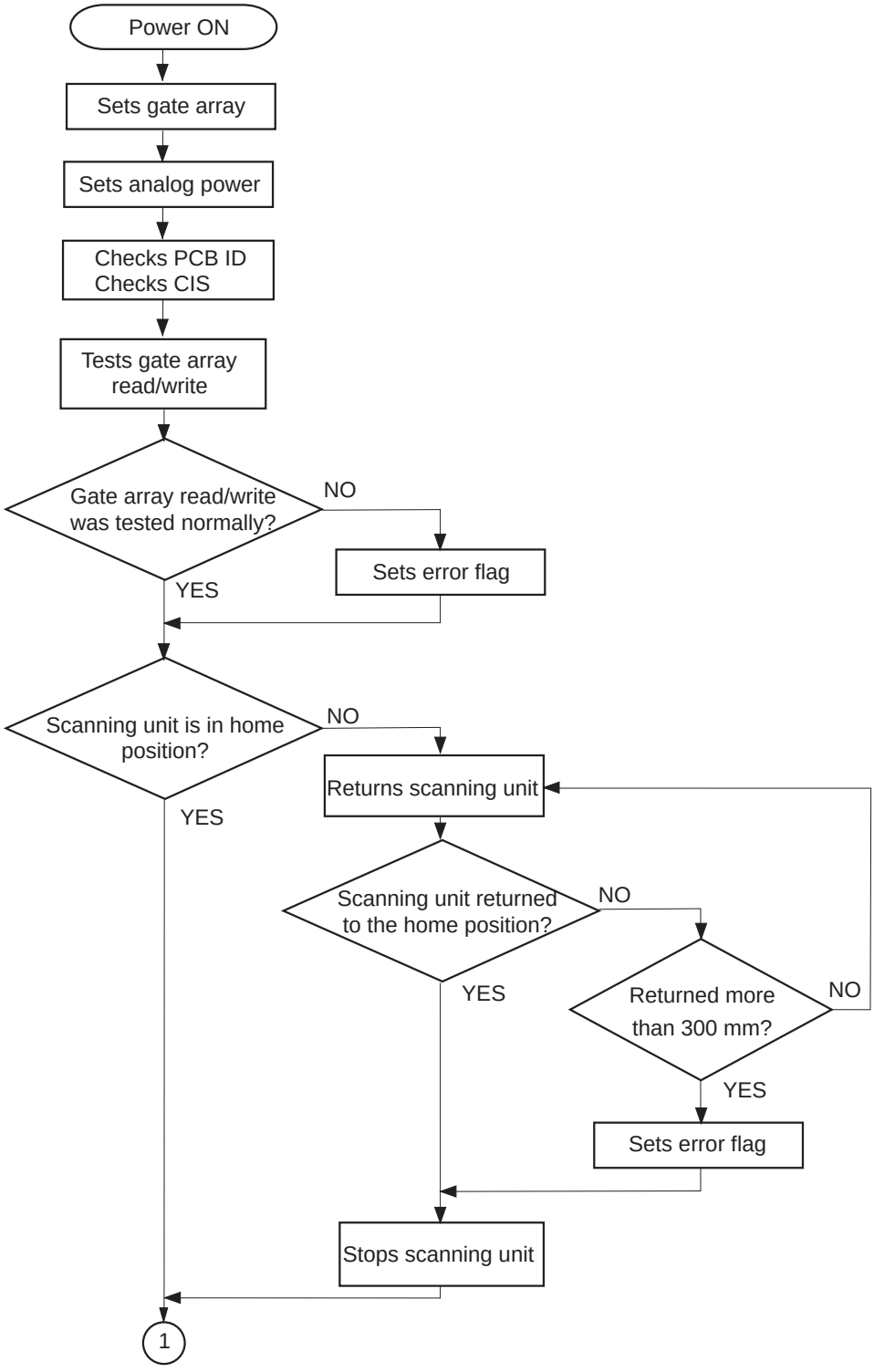


Figure 2-4-1

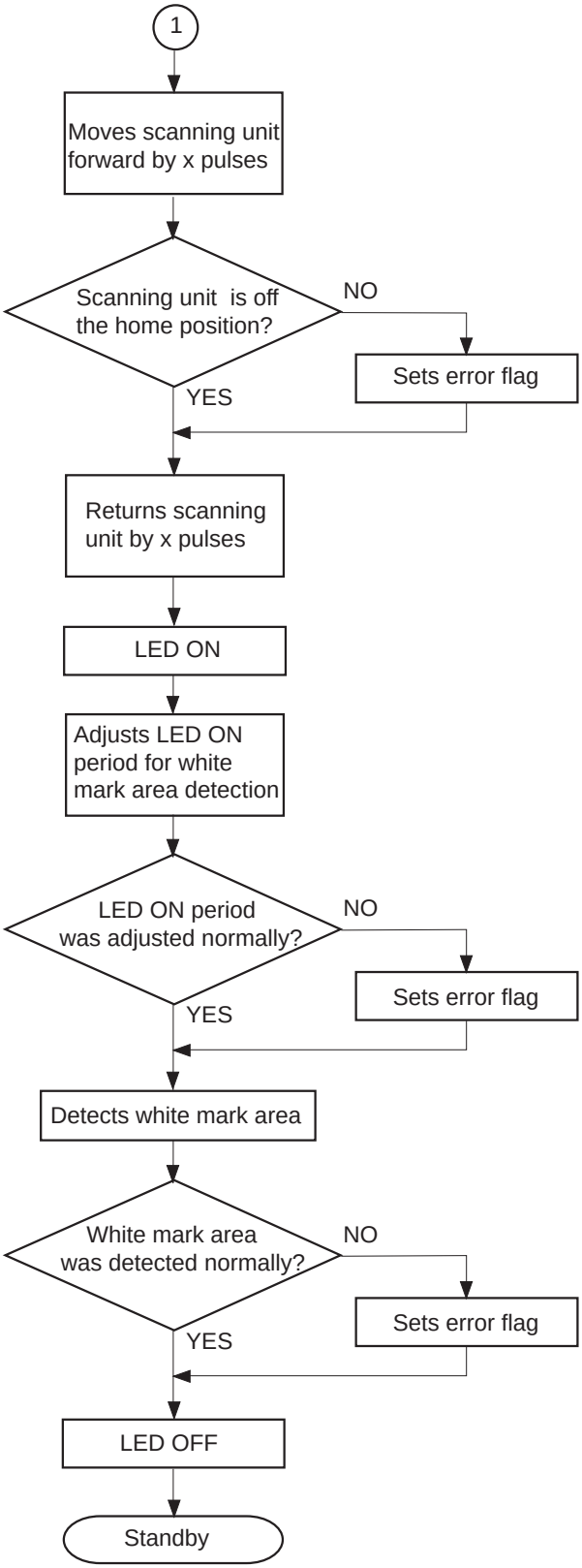

1
Moves scanning unit forward by x pulses
Scanning unit is off the home position?
NO
Sets error flag
YES
Returns scanning unit by x pulses
LED ON
Adjusts LED ON period for white mark area detection
LED ON period was adjusted normally?
NO
Sets error flag
YES
Detects white mark area
White mark area was detected normally?
NO
Sets error flag
YES
LED OFF
Standby

Figure 2-4-2

When the scanner is powered ON, it performs hardware setting, home position detection, and border detection between black and white according to the flowchart shown in Figure 2-4.

1) Hardware setting
Gate array and buffer RAM in the main PCB are checked if they function normally.

2) Home position detection/Border detection between black and white
The scanner detects the home position by the home position sensor by using a black mark area and white mark area in the rear of the document glass.
Firstly the home position sensor defines the home position, where the scanning unit reads a black mark area.
Secondly, the border between a white mark area and black mark area is detected. The scanning unit moves forward reading image signals with the LED of the contact image sensor turned ON. When the scanning unit has reached the white mark area, and the peak value of the light intensity to the scanning unit has reached a white level, the scanning unit stops to define there as the border between a black mark area and white mark area. The number of steps of the drive motor is calculated to define the distance from the home position to the white mark area.

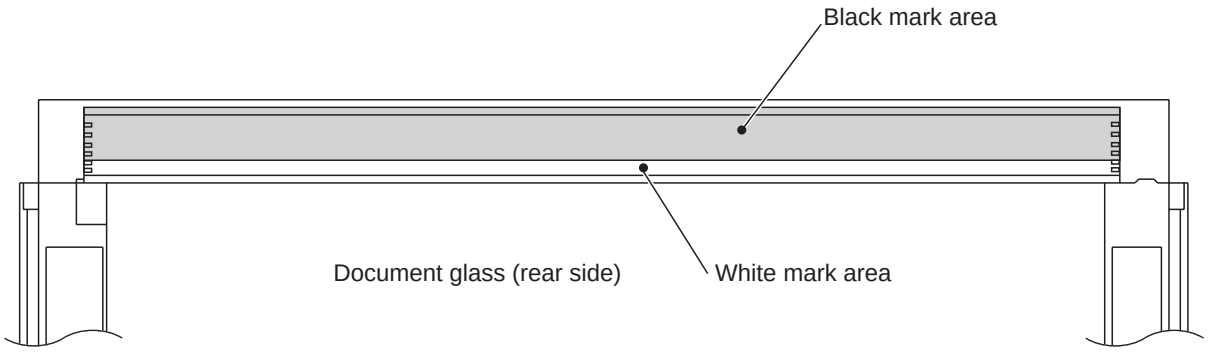


Figure 2-5

When the hardware setting, home position detection and border detection between black and white have completed, the scanner is on standby to wait for a command from the host computer.

2. Calibration sequence

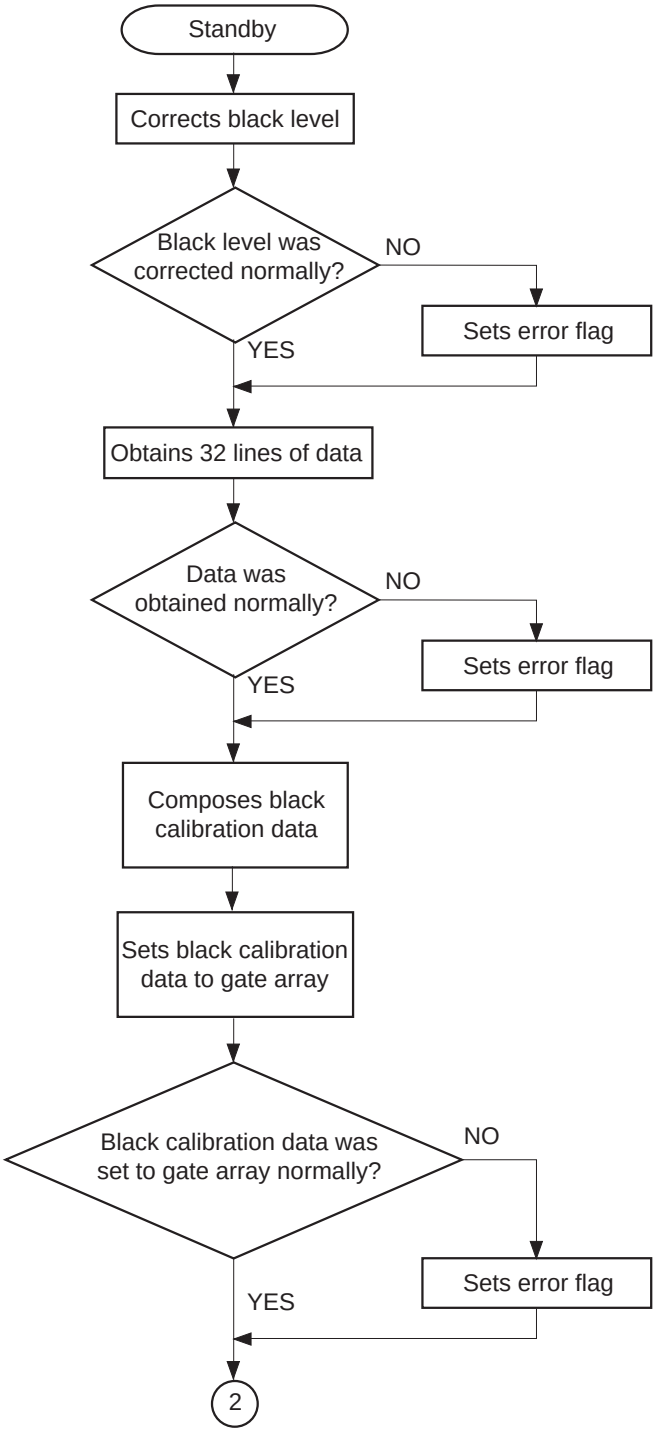


Figure 2-6-1

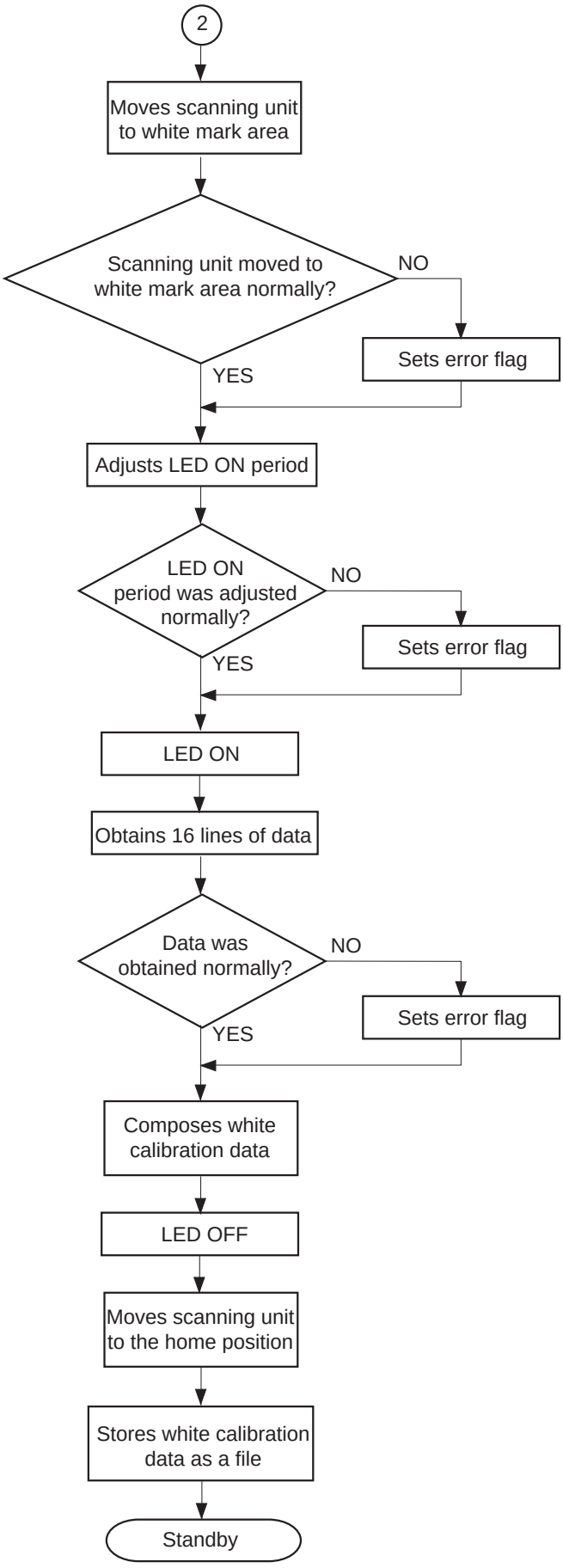


Figure 2-6-2

When the host computer sends a calibration command, the scanner performs the calibration. Calibration is to compose black calibration data and white calibration data by reading the black mark and white mark in the rear of the document glass as color references for the proper color reading.

1) Black calibration data composition

Black calibration data is composed by reading and averaging 32 lines of output from the scanning unit with the LED turned OFF.

2) White calibration data composition

White calibration data is composed by reading 16 lines of each red, green and blue of the white mark, and averaging the highest 8 lines of output.

Above procedure is performed at high image quality color 600 dpi, color 600/300 dpi, and grayscale 600/300 dpi and the data is stored as a file in the host computer. For grayscale 600/300 dpi, only green data is processed.

3. Document scanning sequence

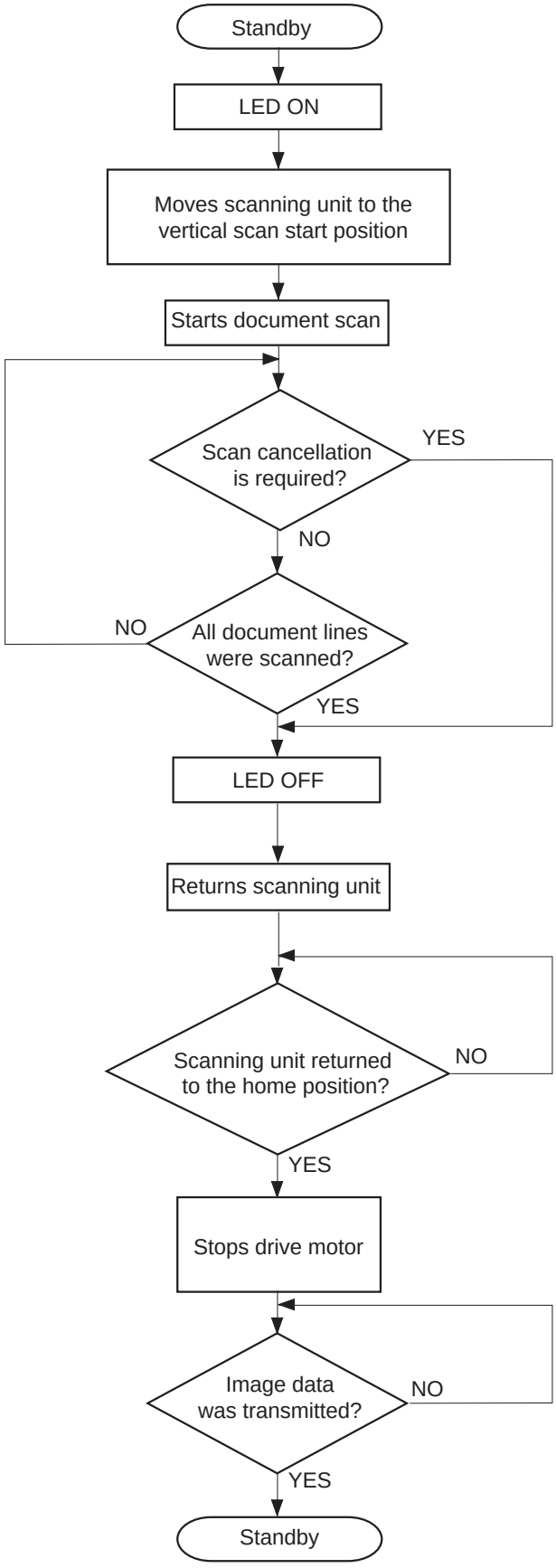


Figure 2-7

II. OPTICAL SYSTEM

A. Outline

The optical system includes the functions of moving the scanning unit by the drive motor, exposing a document by the LED, and collecting the reflected light to the phototransistor array. Contact image sensor is adopted for the scanning unit, which is a module combined with the LED for light exposing, the lens array for light collecting, and the phototransistor array for light receiving to read per line. The drive motor runs by the drive signal sent from the main PCB and drives the scanning unit via the drive pulley and drive wire.

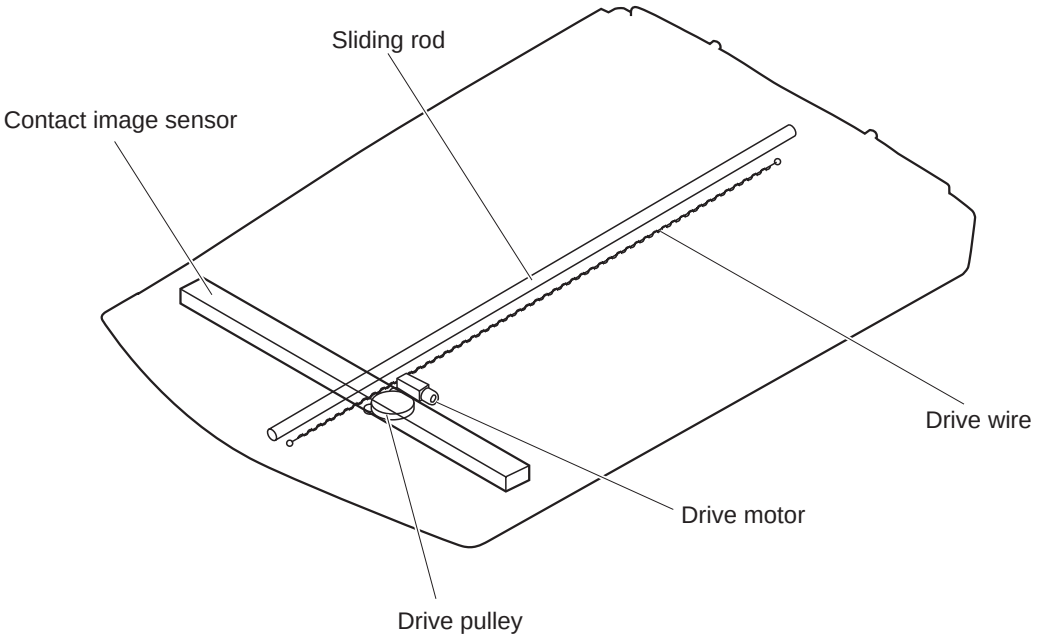
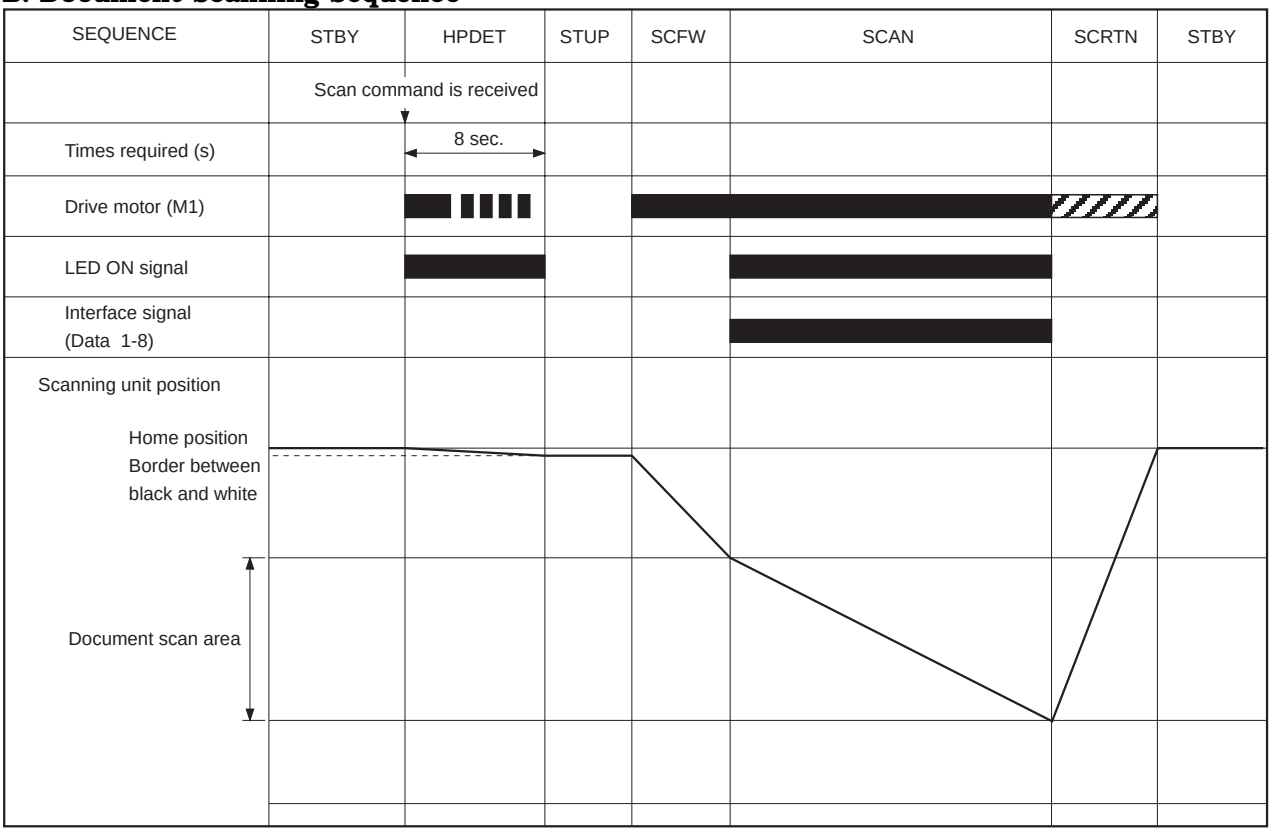


Figure 2-8

B. Document Scanning Sequence



(A4, 1200dpi, 100%, 24bit color)

: Reverse

Figure 2-9

Sequence		Purpose	Remarks
STBY (Standby)	After a power on sequence is completed until the scanner receives a scan command from the host computer.	To maintain the scanner ready for scan.	
HPDET (Home position detection)	After the scanner received a scan command until the home position is detected.	To detect the home position and a border between black and white.	If the border detection between black and white is failed, the scanning unit stops there and proceeds to the next step.
STUP (Setup)	After the home position is detected until document scan starts.	To make a gate array setting, buffer RAM initialization, etc. as a preparation for scan.	
SCFW (Scanning unit forward)	After the scanning unit starts moving forward until it reaches the starting position of the scan area specified by the host computer.	To move the scanning unit with a uniform speed to the vertical scanning position specified by the host computer.	
SCAN (Document scan)	After the scanning unit starts scanning until all area specified by the host computer are scanned.	To perform various image processing according to the command from the host computer and transmit the image data during scan.	
SCRTN (Scanning unit return)	After the scanning unit starts moving backward until it returns to the home position.	To return the scanning unit to the home position to ready for the next scan.	The home position is detected by the home position sensor.

Table 2-1

C. Contact Image Sensor

1. Structure of the contact image sensor

Figure 2-10 shows an overview of the contact image sensor with LIDE technology. The contact image sensor has the LED for exposing a document on the end of glass part called the light conductor section. When the LED is turned ON, the LED light is supplied to the light conductor section which exposes a document. That is, the LED light indirectly exposes a document through the light conductor section. This is called LIDE (LED Indirect Exposure). The light reflected from the document is collected by the phototransistor array through the rod lens array and is read as an image signal.

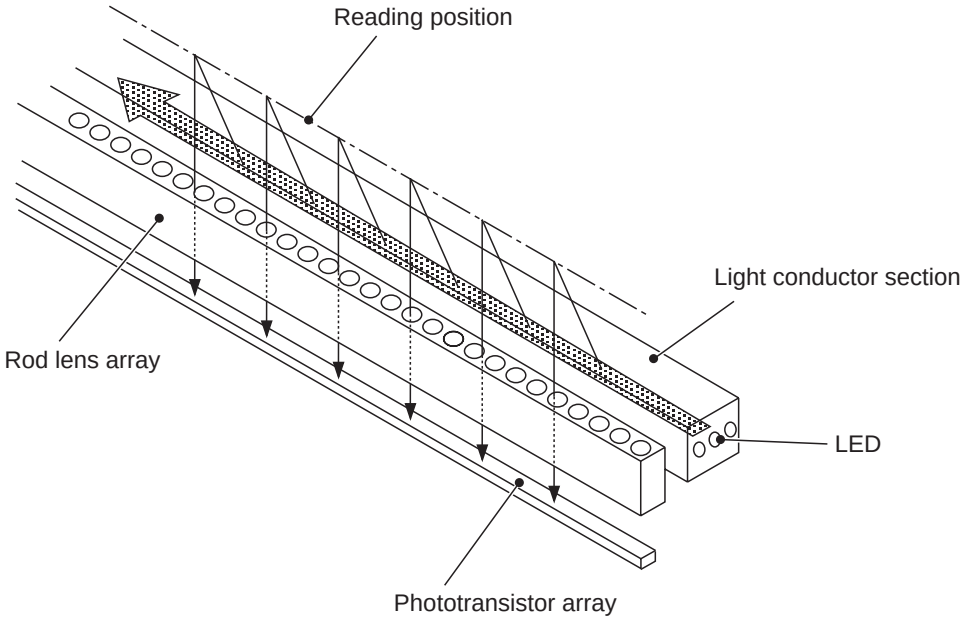


Figure 2-10

Figure 2-11 shows a cross-sectional view of the contact image sensor.

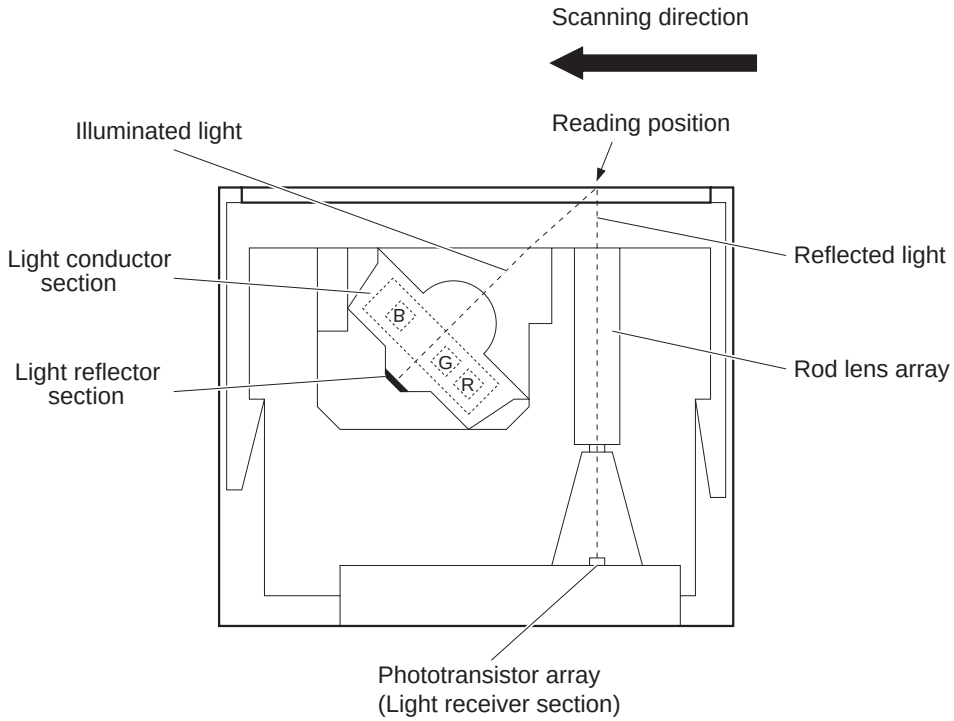


Figure 2-11

The contact image sensor for CanoScan N650U/N656U places 15 phototransistor arrays of 344 light phototransistors each in line, and the contact image sensor for CanoScan N1220U places 15 phototransistor arrays of 688 light phototransistors each in line. Each phototransistor converts the received light into an image signal and outputs the data per line in series.

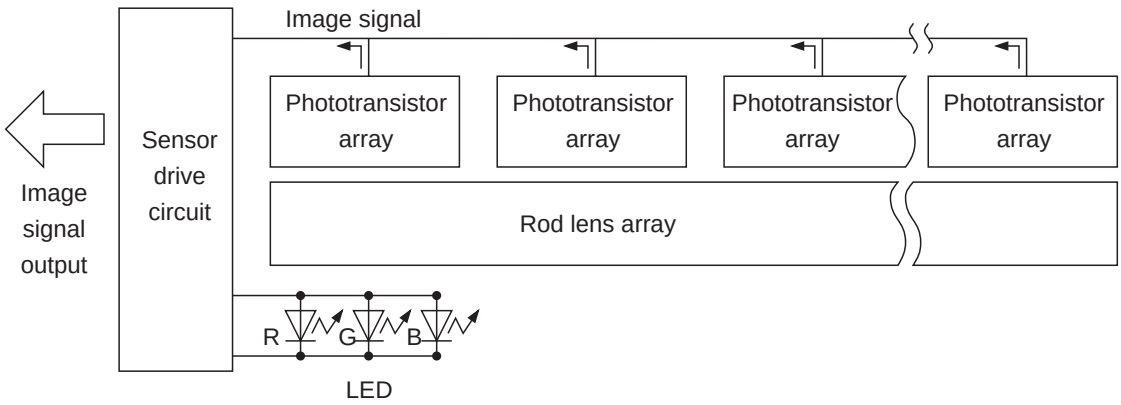


Figure 2-12

2. Image scanning operation

When the contact image sensor moves to the image scanning position, the control program turns the SP signal to "L" three times per line to light the LED in order of red, green and blue, and reads the image signal corresponding to each red, green and blue lights. The reading cycle of 1 line is 15.48 msec.

When scanning a grayscale image, only green LED is ON and the image signal is processed.

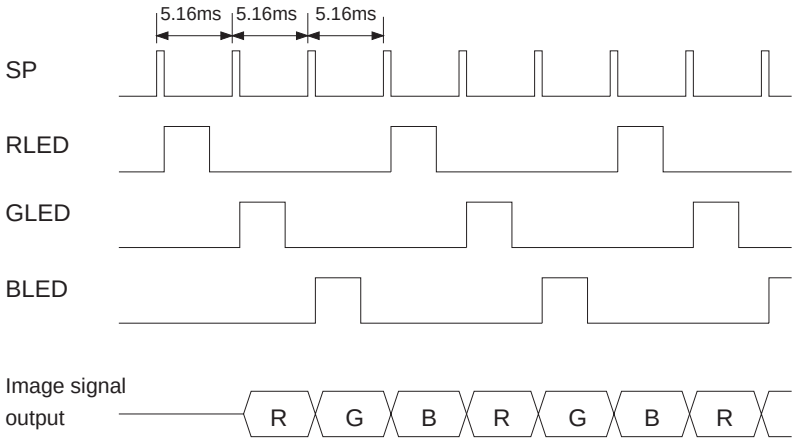


Figure 2-13

D. Drive Motor Control Circuit

Figure 2-14 shows a block diagram of the drive motor control circuit. The control program analyzes each command sent from the host computer and sends a command to generate motor clock to the gate array. The gate array generates the four phase motor drive pulse signals (MA+, MA-, MB+, MB-), which are sent to the drive motor via the motor driver.

When the host computer changes the resolution, the control program sets to change the frequency of the motor drive pulse signals for the gate array, then changes the rotating speed of the drive motor.

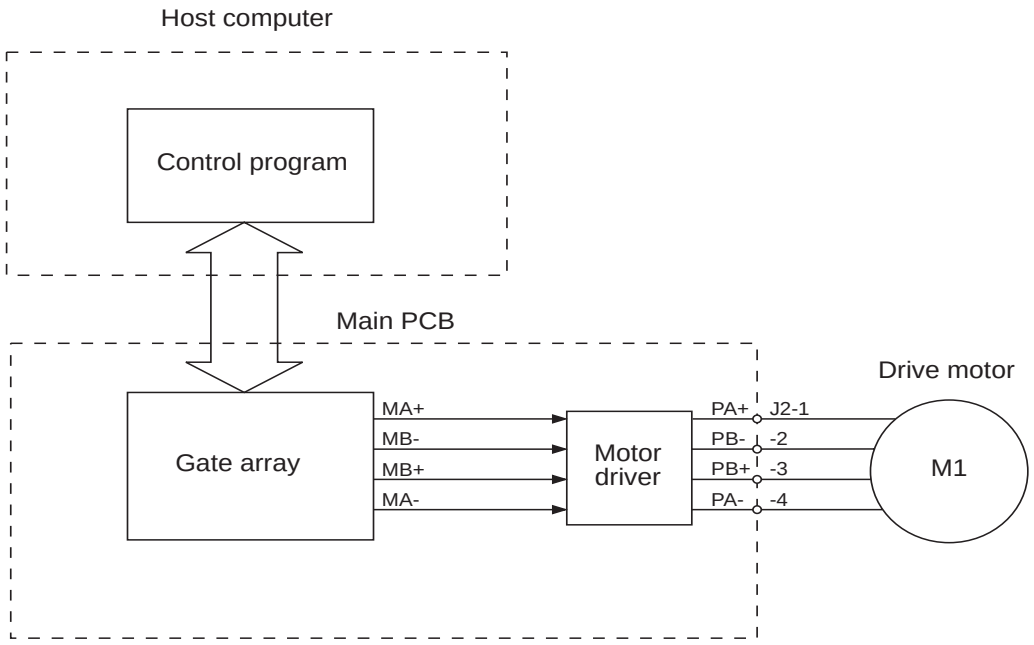


Figure 2-14

III. IMAGE PROCESSING SYSTEM

A. Outline

Figure 2-15 shows a block diagram of the main functions of the image processing system. The image processing system converts the signals read by the contact image sensor into digital data, performs various image processing, and outputs the data to the host computer via USB port.

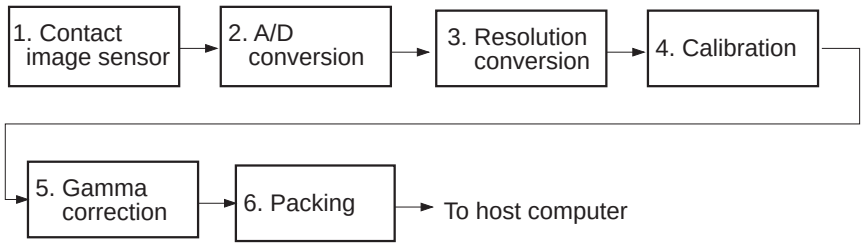


Figure 2-15

B. Image Processing Functions

1. Contact image sensor

The gate array outputs clock signals based on the command from the control program to the contact image sensor. The contact image sensor lights the LED in order of red, green and blue according to the clock signals, then outputs 1 line of image signal proportional to the light intensity received by the phototransistor.

2. A/D conversion

Analog image signals output from the contact image sensor are converted into the digital image data of 14 bits each by A/D converter in the gate array in order of red image signal, green image signal, and blue image signal.

3. Resolution conversion

1) Resolution conversion in the horizontal scanning direction

Basic resolution of CanoScan N650U/N656U is 600 dpi, and selective at 600 dpi, 300 dpi, 150 dpi, 75 dpi. Basic resolution of CanoScan N1220U is 1200 dpi, and selective at 1200 dpi, 600 dpi, 300 dpi, 150 dpi, 75 dpi. Resolution conversion in the horizontal scanning direction is performed by averaging the thinned data and output data.

Example: To change the resolution to 1/2, image data is converted as shown in Figure 2-16.

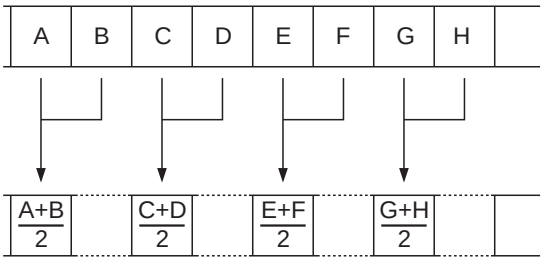


Figure 2-16

2) Resolution conversion in the vertical scanning direction

The control program changes the scanning unit moving speed to change the resolution in the vertical scanning direction. When increasing the resolution, the scanning unit moves at a low speed to read more lines as shown in Figure 2-18.

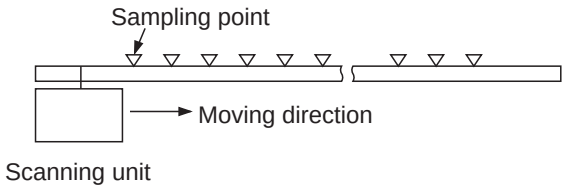


Figure 2-17

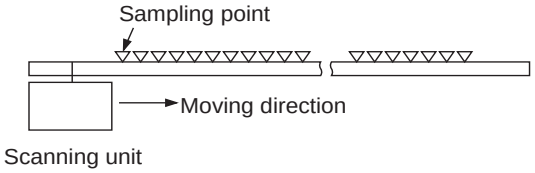


Figure 2-18

When decreasing the resolution, the scanning unit moves at a fast speed to read less lines.

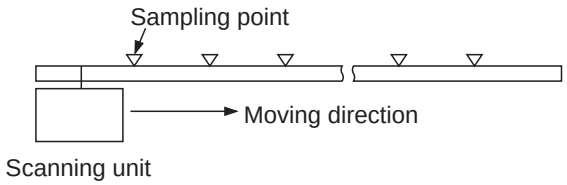


Figure 2-19

4. Calibration

When the contact image sensor reads a document of an even density, the image signal corresponding to each pixel is not uniform for the following reasons.

1) Light intensity of LED is not uniform.

2) There is variation in the sensitivity of the phototransistors.

3) There is a slight output from the phototransistors even when there is no input.

These variations are corrected by the calibration. Calibration data is used as standard density data when scanning a document. Scanned image data is compared to the standard density data for the image data correction. The calibration converts the image data from 14 bits to 12 bits each color.

5. Gamma correction

Calibrated red, green and blue image data are divided uniformly into 4096 gradations according to the document density. The contrast and density of this image data are adjusted by the gamma correction. The gate array writes gamma curve specified by the control program into the buffer RAM before scanning a document. Image scan starts and the image data input to the buffer RAM is converted to 8 bits by the gamma curve data and is output.

6. Packing

Processed image data is temporarily stored in the buffer RAM before sent to the host computer. The buffer RAM is divided into the writing block and reading block. While data is written into the writing block, the data is read from the reading block. When fixed volume has been written, the writing switches to the reading.

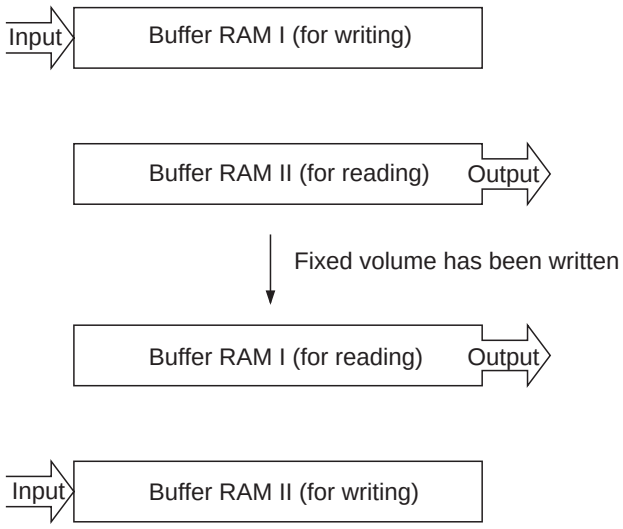


Figure 2-20

IV. CONTROL SYSTEM

A. Outline

The control system consists of the gate array, buffer RAM (4Mbit), and ROM (2Mbit). The CPU is not equipped with the scanner. The control program in the device driver installed on the host computer controls the scanner operation by setting a comand directly to the gate array register. Buffer RAM is used as a work memory for image processing.

The scanner communicates with the host computer via USB interface in the gate array.

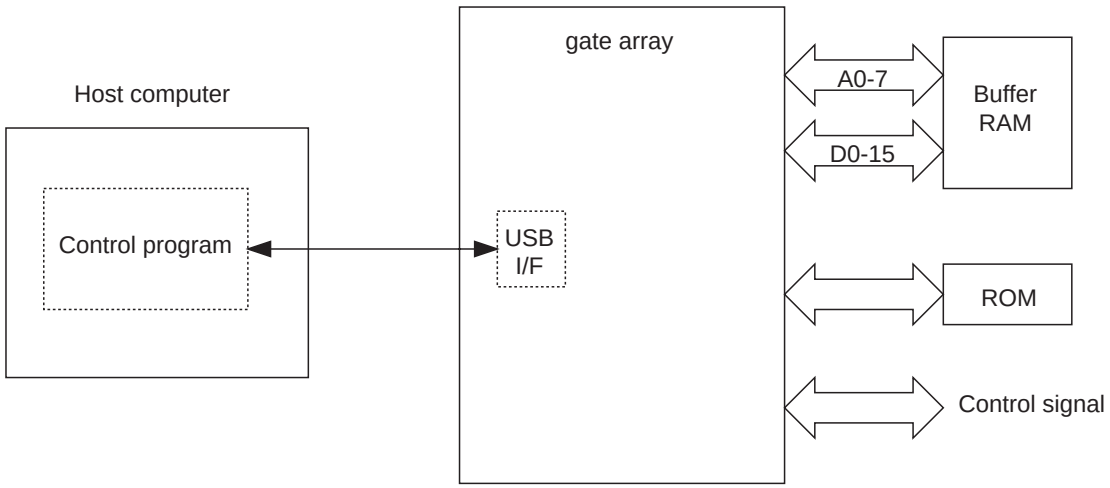


Figure 2-21

B. Outline of USB

The scanner is connected to the host computer via USB. USB (Universal Serial Bus) is the next generation general-purpose input-output interface to connect the computer peripheral devices.

1. Features of USB

1) Connects peripheral devices to a computer.
2) Connects up to 127 devices by a tree structure.
3) Connects by 12 Mbps of "full speed mode" or 1.5 Mbps of "low speed mode". This scanner is conforming to "full speed mode".
4) Supports hot plug (connectable/disconnectable with the power ON).
5) The scanner power is supplied through USB.

2. Connection of USB Devices

USB devices are connected to a host computer by a tree structure consisting of device called "node" and "hub" which is a group of "node" as shown in Figure 2-22. The tree structure has the following conditions.

1) Able to connect up to 127 "node" and "hub" in total.
2) Limited up to 6 layers.
3) USB cable must be 5 meters or shorter.

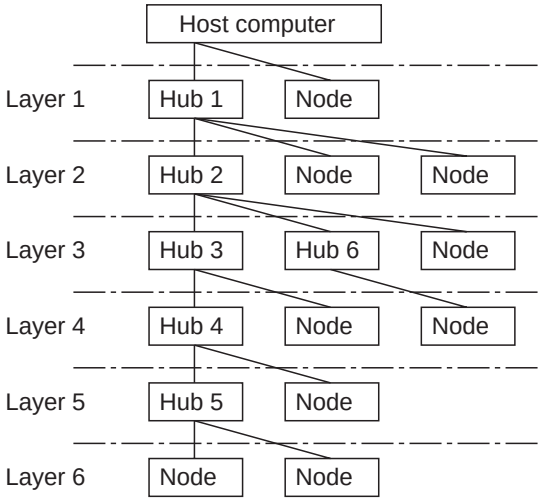


Figure 2-22

USB connector has A plug for connecting to upper stream and B plug for connecting to lower stream.

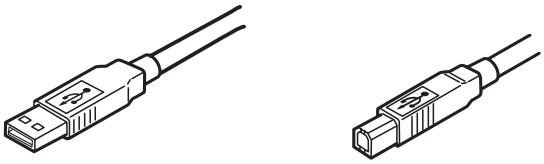


Figure 2-23

3. USB Data Transfer

USB data is transferred in the following four data structures called "packet".

1) Token packet : Used to start a data transfer
2) Handshake packet : Used to report the status of a data transfer
3) Data packet : Used to send and receive data
4) Special packet : Used for other transfer

USB device may support multiple data transfer endpoints, so there are four types of data transfer protocols.

1) Isochronous transfer : Allocates a data transfer time to a device. Highest priority is give but any error is not corrected.
2) Interrupt transfer : Periodically transfers data within a specified waiting time. Second priority is given.
3) Control transfer : Used to configure the host computer when USB device is attached/ removed.
4) Bulk transfer : Lowest priority is given but larger amounts of data is sequentially transferred to a free bus.

This scanner uses control transfer and bulk transfer.

V. POWER SUPPLY

The scanner draws its power +5V from USB interface. +5V is used for the digital circuit in the main PCB.

Power supply to the analog circuit is ON/OFF controlled by the gate array. Drive motor, contact image sensor, and analog circuit are supplied with power as necessary. 5.5V step up circuit in the main PCB is used for the analog circuit and for driving the contact image sensor.

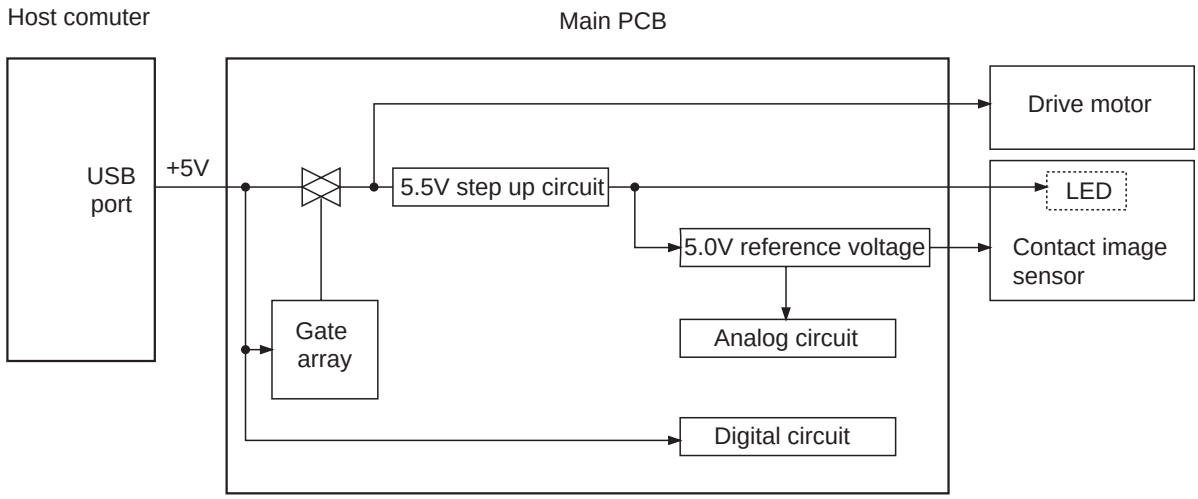


Figure 2-24

CHAPTER 3

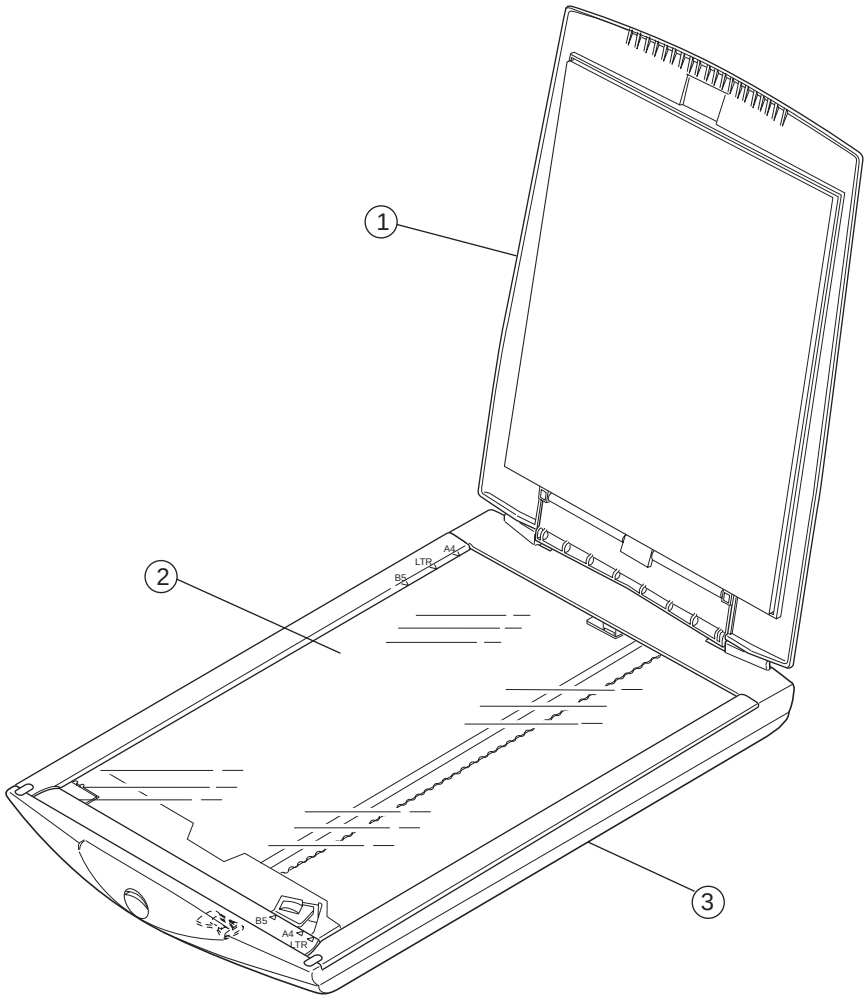
MECHANICAL SYSTEM

 CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

I. EXTERNALS

When cleaning, checking or repairing inside the scanner, remove the necessary covers using the following procedures.

A. Covers

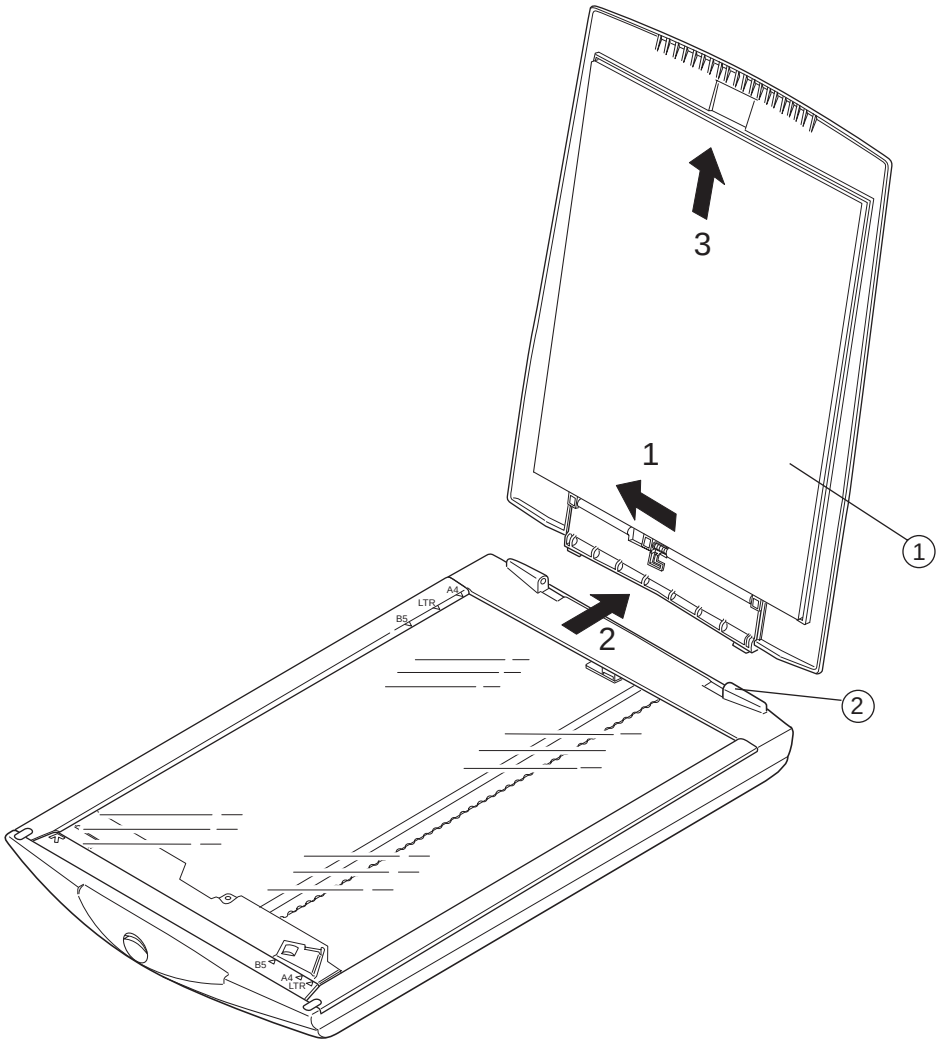


① Document Cover
② Document Glass Unit
③ Base Frame

Figure 3-1

1. Removing the document cover

1) Pull the hinge unit of the document cover to the left, remove the right hinge unit, then warp the document cover to remove.

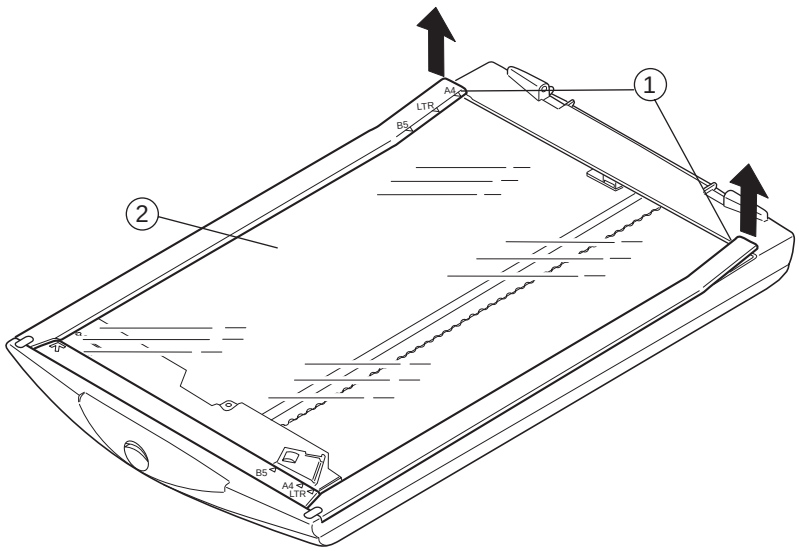


① Document Cover
② Hinge

Figure 3-2

2. Removing the document glass unit

1) Remove the document cover.
2) Unhook the hook in the end of the document glass unit, then lift the hook part.

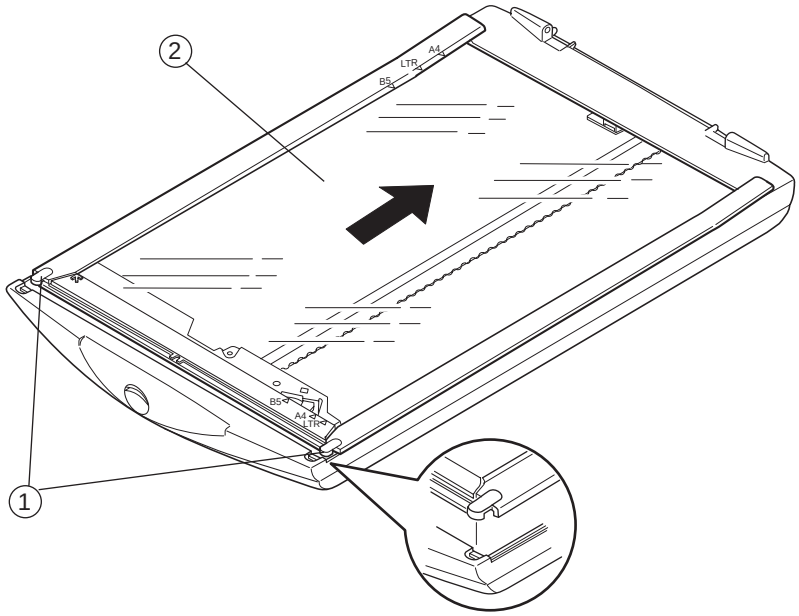


① End Hook
② Document Glass Unit

Figure 3-3

Note: Do not lift the hook part excessively since it is attached to the document glass with a double-sided tape.

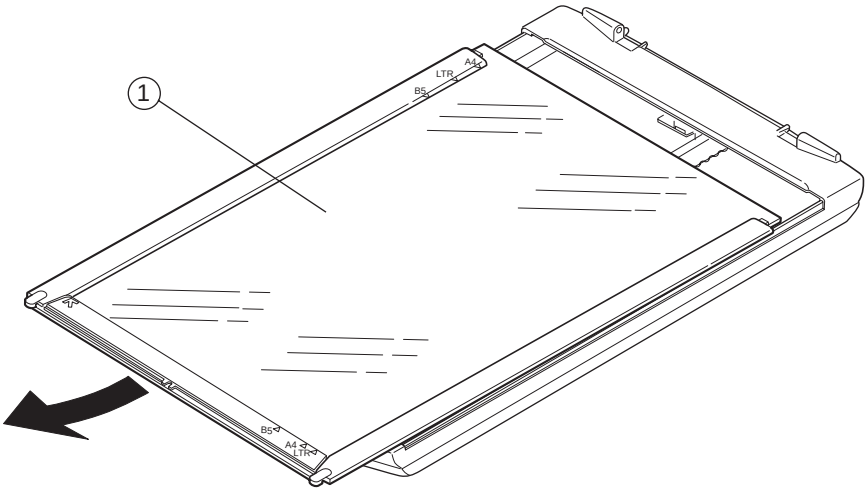
3) Unhook the hook in the front of the document glass unit, then slide the document glass unit backward.



① Front Hook
② Document Glass Unit

Figure 3-4

4) Lift the front of the document glass unit, then pull forward to remove it.



① Document Glass Unit

Figure 3-5

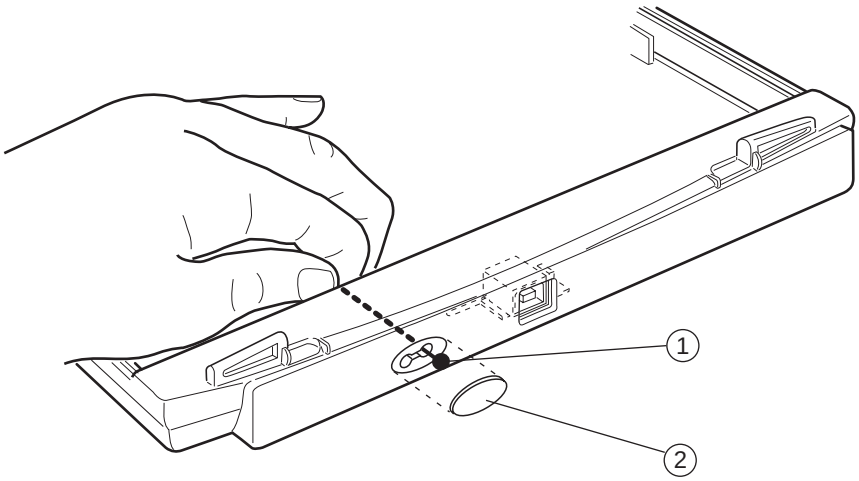
Note: Take care not to smear the rear side of the document glass unit (especially the spacer sliding surface).

II. DRIVE SYSTEM

A. Drive Unit

1. Removing the drive unit

1) Remove the document cover.
2) Remove the document glass unit.
3) Remove the seal from the back of the scanner, push the wire stopper backward to remove it from the base frame through the left hole.

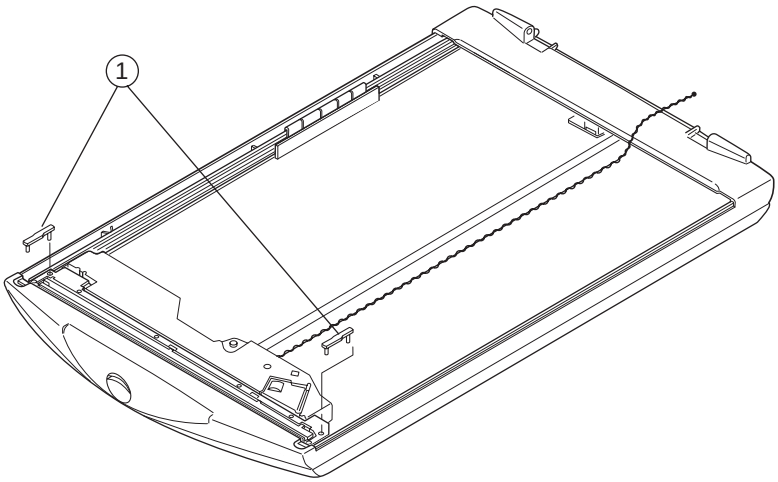


① Wire Stopper
② Seal

Figure 3-6

Note: Do not damage or lose the seal to reuse it.

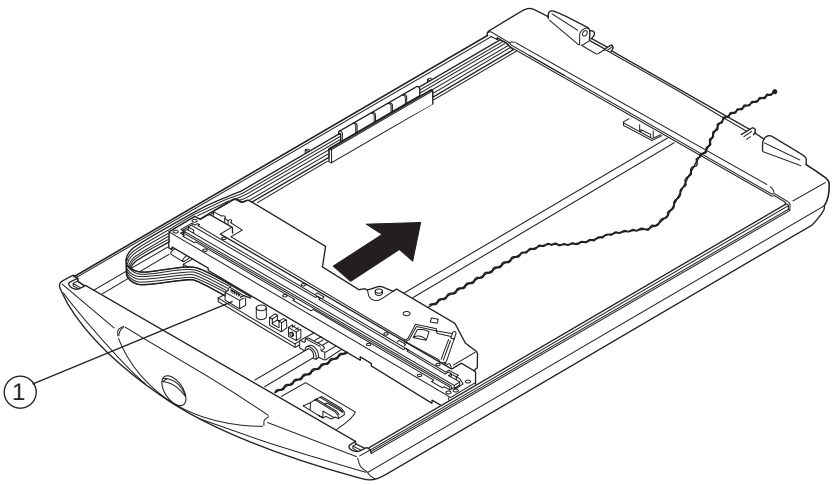
4) Remove two spacers on both ends of the contact image sensor.



① Spacer

Figure 3-7

5) Lift the drive unit end part, then remove the drive wire from the gear.
6) Move the drive unit to the center, then disconnect the connector J3.



① Connector J3

Figure 3-8

7) Remove the contact image sensor (refer to III-A-1).
8) Lift the drive unit to remove it.

2. Precautions when attaching the drive unit

1) Apply appropriate amount of grease to the positions marked with net in the figure 3-9.

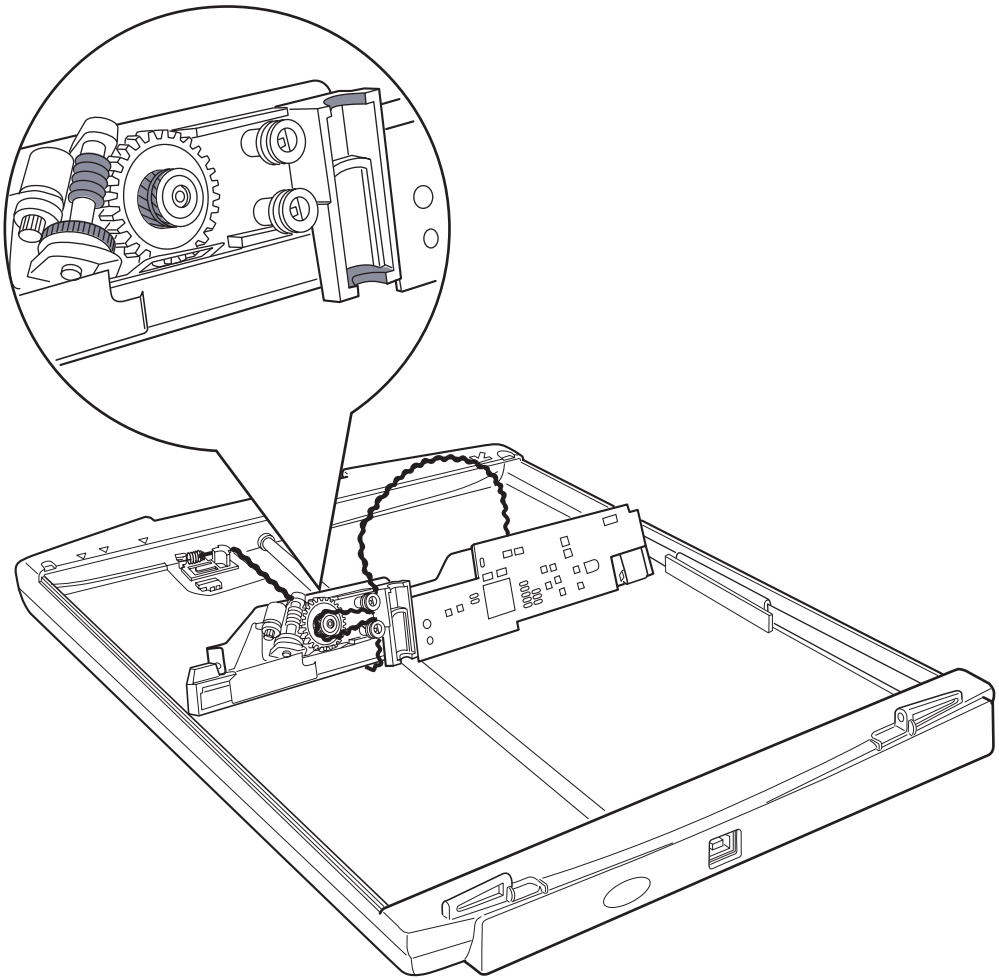


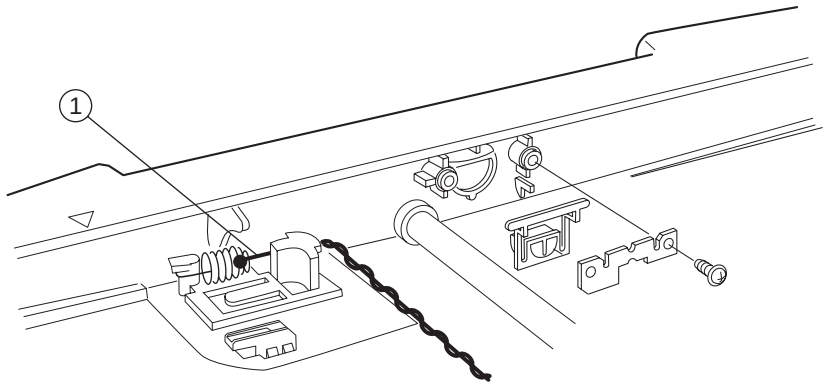
Figure 3-9

2) Locate the drive wire referring to II-B-2.

B. Drive Wire

1. Removing the drive wire

1) Remove the document cover.
2) Remove the document glass unit.
3) Remove the drive unit.
4) Remove the wire spring to remove the drive wire.



① Drive Wire

Figure 3-10

2. Precautions when attaching the drive wire

1) When the drive wire is twisted, untwist it to a natural condition. Otherwise a twisted drive wire can affect an image.
2) Locate the drive wire as shown in Figure 3-11.

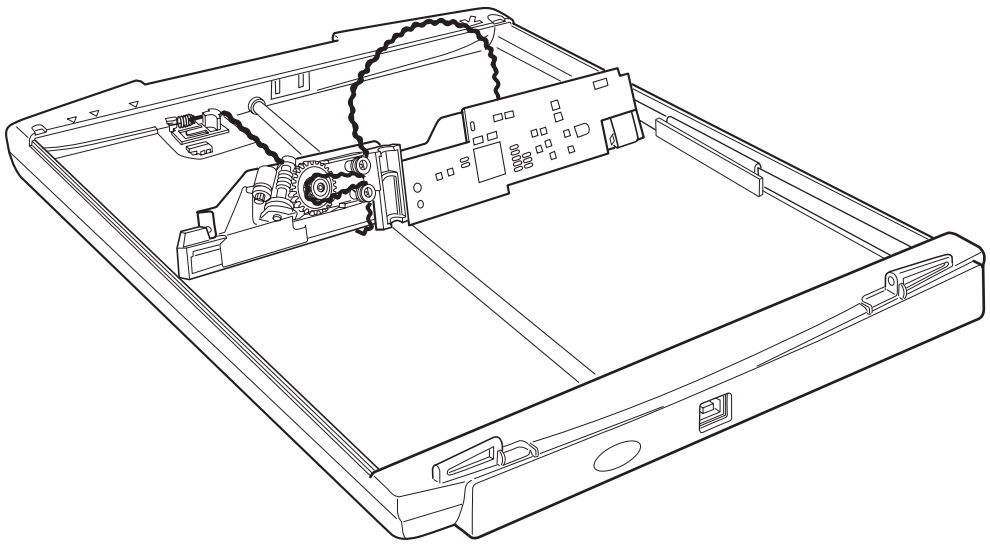


Figure 3-11

III. OPTICAL SYSTEM

A. Contact Image Sensor

1. Removing the contact image sensor

Note: Take care not to touch the phototransistor of the contact image sensor.

1) Remove the document cover.
2) Remove the document glass unit.
3) Remove the seal from the back of the scanner unit, push the wire stopper backward to remove it from the base frame through the left hole as shown in Figure 3-6.
4) Remove two spacers on both ends of the contact image sensor.
5) Lift the drive unit end part, then remove the drive wire from the gear.
6) Move the drive unit to the center.
7) Hold up the front of the contact image sensor, slide it to the right, then lift it to remove.

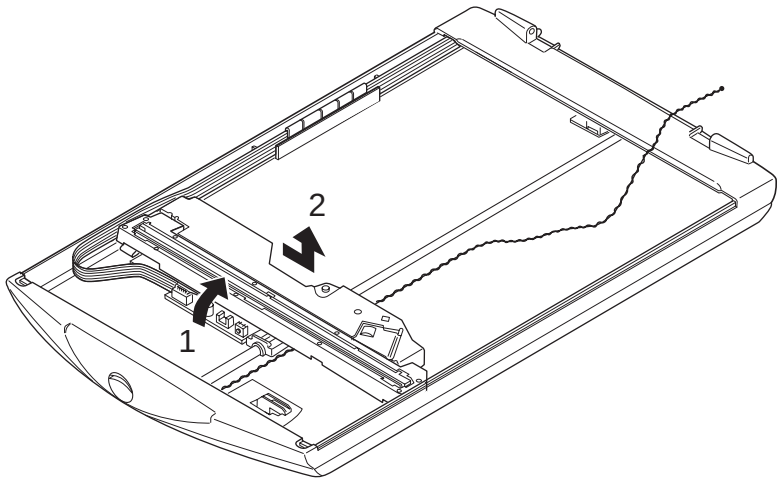
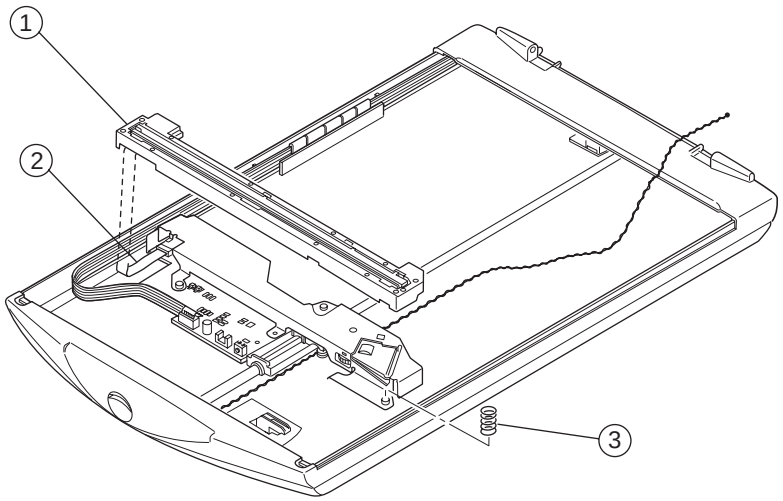


Figure 3-12

8) Remove the sensor cable from the ontact image sonsor, then remove the contact image sensor.



① Contact Image Sensor
② Sensor Cable
③ Spring

Figure 3-13

Note: Do not lose the spring under the contact image sensor.

IV. ELECTRICAL SYSTEM

A. USB Connector PCB

1. Removing the USB connector PCB

1) Remove the document cover.
2) Remove the document glass unit.
3) Insert flat-blade screw drivers into both sides of the USB connector PCB to push it forward.

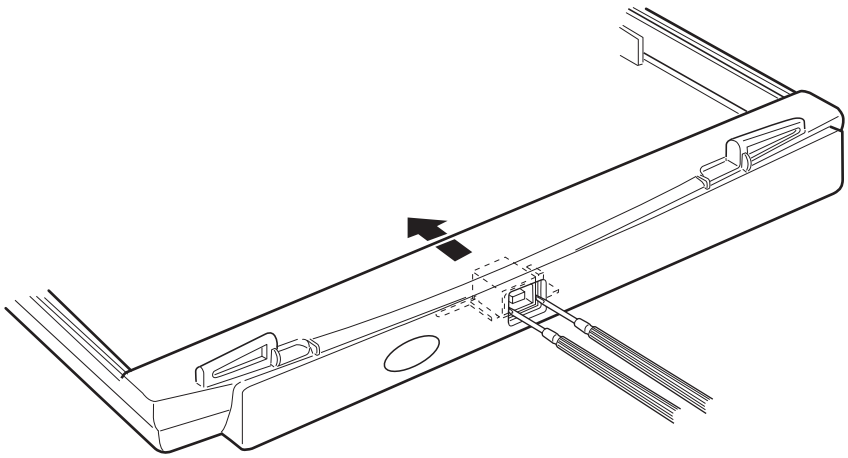
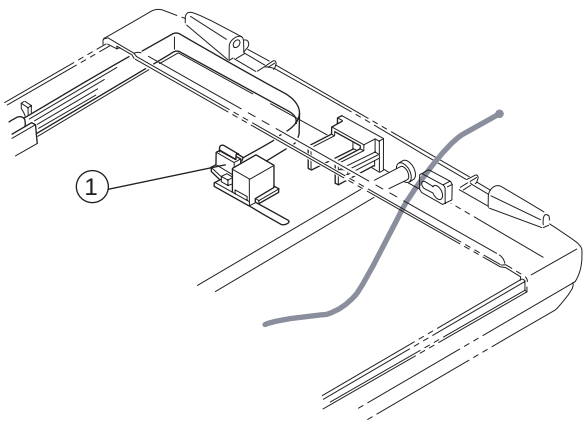


Figure 3-14

4) Disconnect the connector J2 to remove the USB connector PCB.

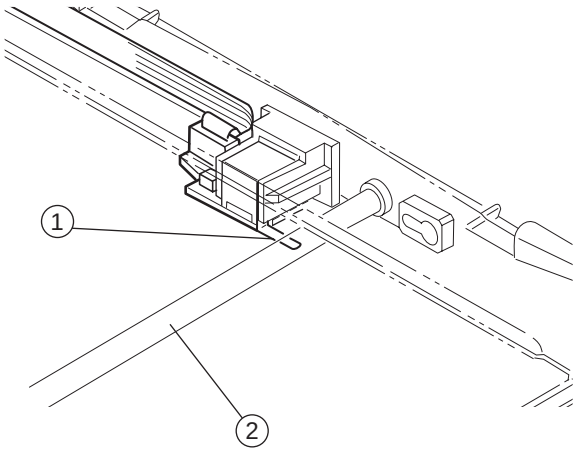


① Connector J2

Figure 3-15

2. Precautions when attaching the USB connector PCB

1) Make sure to contact the ground of the USB connector PCB with the sliding rod.



① Ground
② Sliding Rod

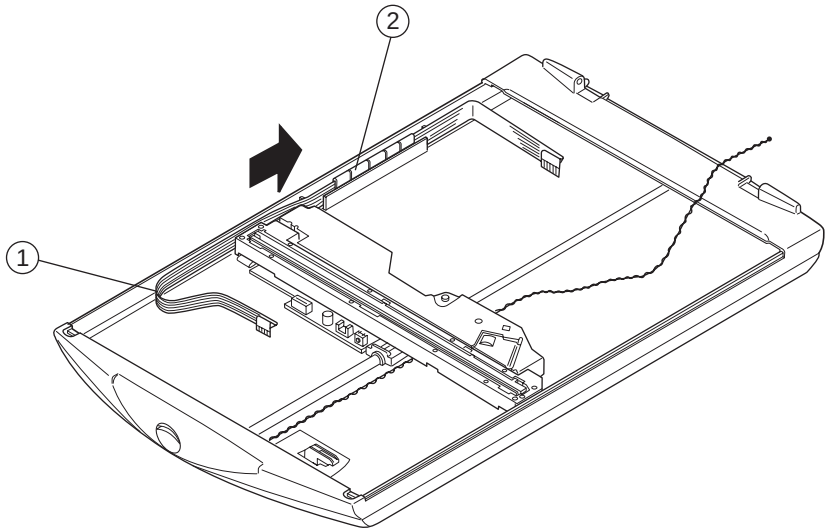
Figure 3-16

B. Flat Cable

1. Removing the flat cable

Note: Do not bend or deform the flat cable when removing the flat cable.

1) Remove the document cover.
2) Remove the document glass unit.
3) Remove the seal from the back of the scanner unit, push the wire stopper backward to remove it from the base frame through the left hole as shown in Figure 3-6.
4) Remove two spacers on both ends of the contact image sensor.
5) Lift the drive unit end part, then remove the drive wire from the gear.
6) Move the drive unit to the center, and disconnect the connector J3.
7) Remove the USB connector PCB, and disconnect the connector J2.
8) Pull to remove the flat cable from the ferrite core.



① Flat Cable
② Ferrite Core

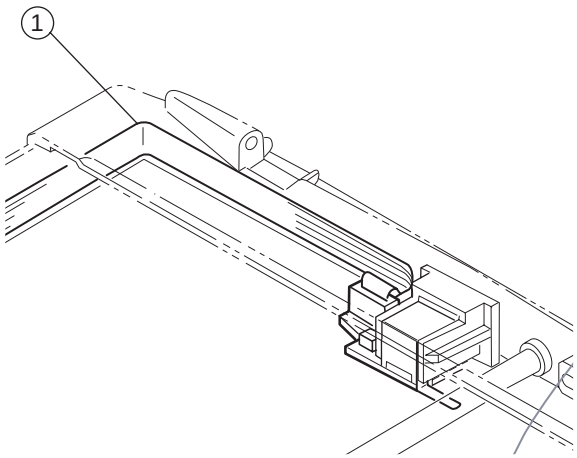
Figure 3-17

2. Precautions when atttaching the flat cable

1) Take care not to bend or deform the flat cable.

2) Locate the flat cable as follows.

a. The flat cable on the USB connector PCB side is attached with a double-sided tape. Align the bend in the flat cable with the left end corner of the base frame.



① Bend

Figure 3-18

b. Straighten the bent end of the flat cable on the driver unit side and pass it through the ferrite core.

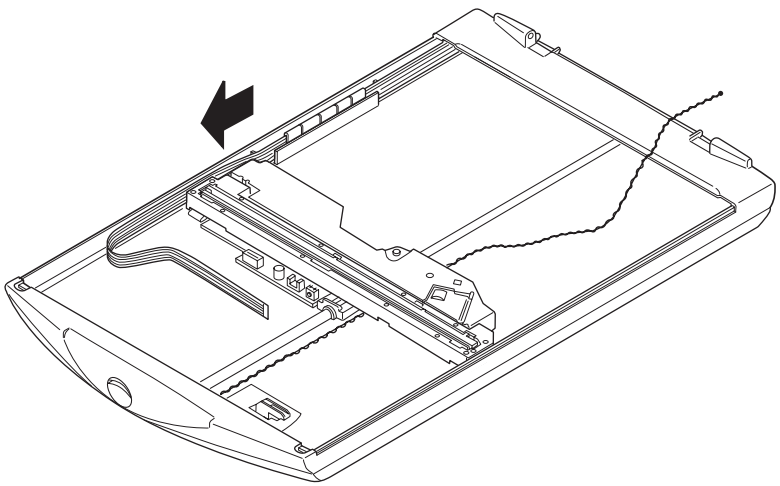


Figure 3-19

3) Re-bend the flat cable as shown in Figure 3-20 and connect it to the connector J3.

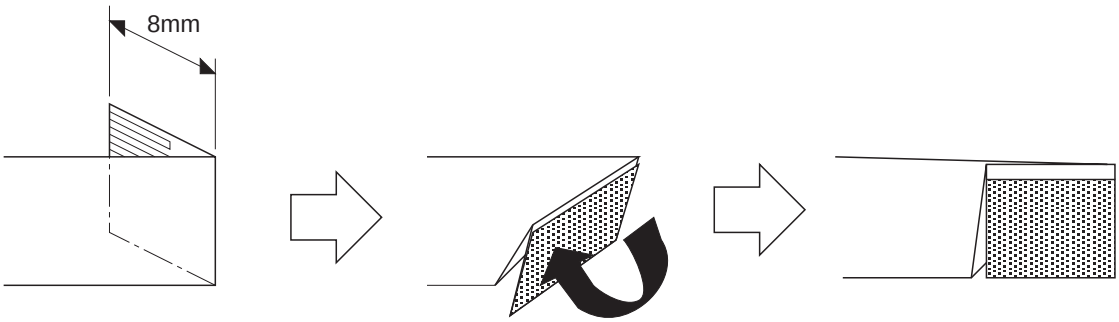
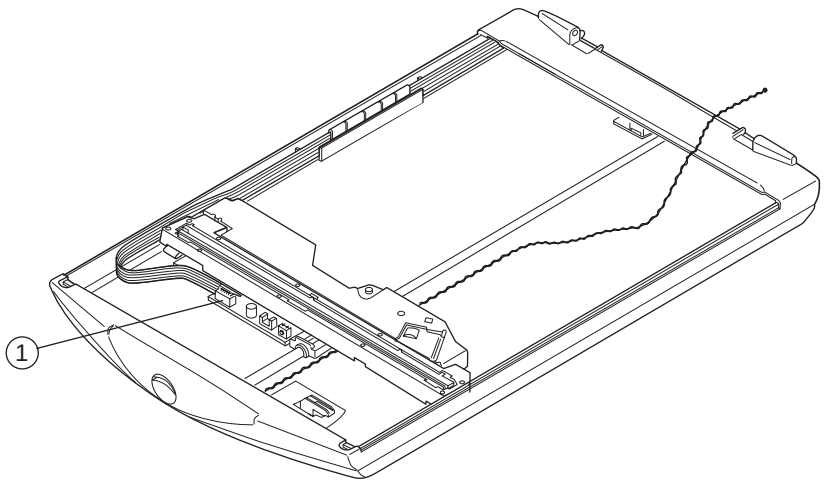


Figure 3-20



① Connector J3

Figure 3-21

CHAPTER 4

MAINTENANCE AND SERVICING

 CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

I. PERIODICAL REPLACEMENT PARTS

None

II. CONSUMABLE PARTS DURABILITY

None

III. PERIODICAL SERVICING

None

IV. SPECIAL TOOLS

None

V. SOLVENTS AND LUBRICANTS

Lubricants used for disassembly and assembly of the scanner.

No.	Name	Tool No.	Usage / Remarks
1	Grease	TKC-0955	To be applied to the sliding part between the scanning unit and sliding rod. MOLYKOTE EM-50L

Table 4-1

CHAPTER 5

TROUBLESHOOTING

 CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

I. INTRODUCTION

A. Initial Check

Check if the operating environment conforms to the following conditions.

1. Line voltage is within ±10% of the rated value.
2. Ambient temperature and humidity conform to the operating environment. (Refer to CHAPTER 1, II. SPECIFICATIONS)
3. The scanner is not installed near a water faucet, boiler, humidifier, open flame, or in dusty place.
4. The scanner is not exposed to direct sunlight. If it must be installed by a window, hang a curtain to block direct sunlight.
5. The scanner is installed in a well-ventilated place.

B. Others

Moving a scanner from a cold place to a warm place can cause condensation on the metal parts, resulting in a faulty operation.

II. TROUBLESHOOTING

Causes and corrective actions for possible image defects and malfunctions during operation are described below.

A. Troubleshooting Image Defects

1. Image not output

Cause 1 : Faulty connection of the USB cable
Corrective action : Securely connect the USB cable.

Cause 2 : Faulty contact image sensor
Corrective action : Replace the contact image sensor.

Cause 3 : Faulty main PCB
Corrective action : Replace the drive unit.

2. Uneven image density or lines

Cause 1 : Dirt on the document cover or document glass
Corrective action : Clean the document cover or document glass.

Cause 2 : Faulty calibration data
Corrective action : Perform the calibration.

Cause 3 : External light is entering into the scanner. External light entering into the contact image sensor can cause uneven image density.
Corrective action : Fully close the document cover. If it is impossible, cover with a sheet etc. to prevent external light.

Cause 4 : Faulty contact image sensor
Corrective action : Replace the contact image sensor.

Cause 5 : Faulty main PCB
Corrective action : Replace the drive unit.

B. Troubleshooting Malfunctions

1. Host computer not detecting the scanner

Cause 1 : Faulty installation of the device driver
Corrective action : Uninstall the device driver and reinstall it.

Cause 2 : Faulty connection of the USB cable
Corrective action : Securely connect the USB cable to the scanner and host computer.

Cause 3 : Faulty main PCB
Corrective action : Replace the drive unit.

2. Scanner not operating

Cause 1 : Carriage lock is locked.
Corrective action : Unlock the carriage lock.

Cause 2 : Faulty connection of the flat cable
Corrective action : Securely connect the flat cable to the contact image sensor and main PCB.

Cause 3 : Faulty contact image sensor
Corrective action : Replace the contact image sensor.

Cause 4 : Faulty main PCB
Corrective action : Replace the drive unit.

3. Drive motor not running

Cause 1 : Faulty connection of the connector J2
Corrective action : Securely connect the connector J2.

Cause 2 : Faulty drive motor
Corrective action : Replace the drive unit.

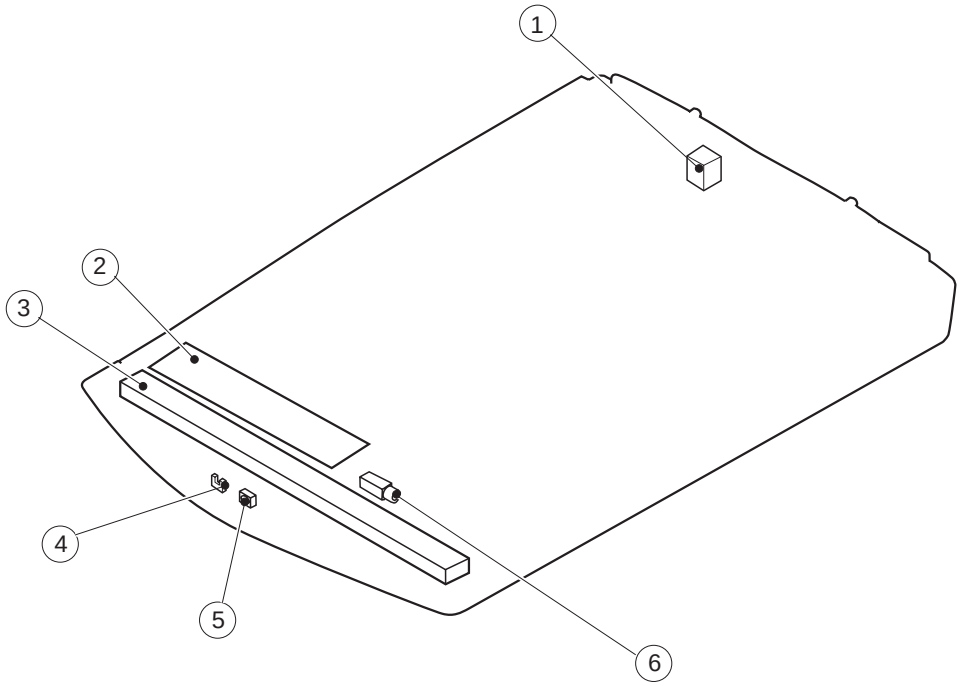
Cause 3 : Faulty main PCB
Corrective action : Replace the drive unit.

4. LED of the contact image sensor not lighting

Cause 1 : Faulty connection of the connector
Corrective action : Securely connect the flat cable.

Cause 2 : Faulty contact image sensor
Corrective action : Replace the contact image sensor.

III. LOCATION OF ELECTRICAL PARTS



① USB Connector PCB
② Main PCB
③ Contact Image Sensor
④ Home Position Sensor
⑤ Start Button
⑥ Drive Motor

Figure 5-1

IV. CANON SCANNER TEST

A. Outline

Canon Scanner Test is utility software to check if faulty scanner operation is due to hardware or communication with a host computer.

Windows : ScanTest.exe (English/Japanese is switched according to the language to be used in Windows.)
Macintosh : ScantestHMe

B. How To Use Canon Scanner Test

1. Operating environment

Windows platform

1) CanoScan N650U/N656U/N1220U
2) PC/AT Compatibles (Pentium or faster is recommended.)
3) Windows 98 Operating System
4) Scanner Device Driver

Macintosh platform

1) CanoScan N650U/N656U/N1220U
2) Power Macintosh
3) Macintosh OS (Version 8.5 or later)
4) Scanner Device Driver

Note: Install the scanner device driver before using the Canon Scanner Test.

2. Functions

Canon Scanner Test has the following functions.

1) USB Information (Windows only)

Scanner information recognized by Windows.

2) Scanner Information

Product ID, ROM version, etc. are shown when the scanner is properly communicated with the host computer.

3) Scanner Self Test

Scanner self test is performed.

4) Calibration

Scanner calibration is performed.

5) Scan

Any image is scanned and saved as an image file in the same folder with the Canon Scanner Test.

3. Functions descriptions

1) USB Information (Windows only)

Select "USB Information" from the "Function" menu to display as shown in Figure 5-2.

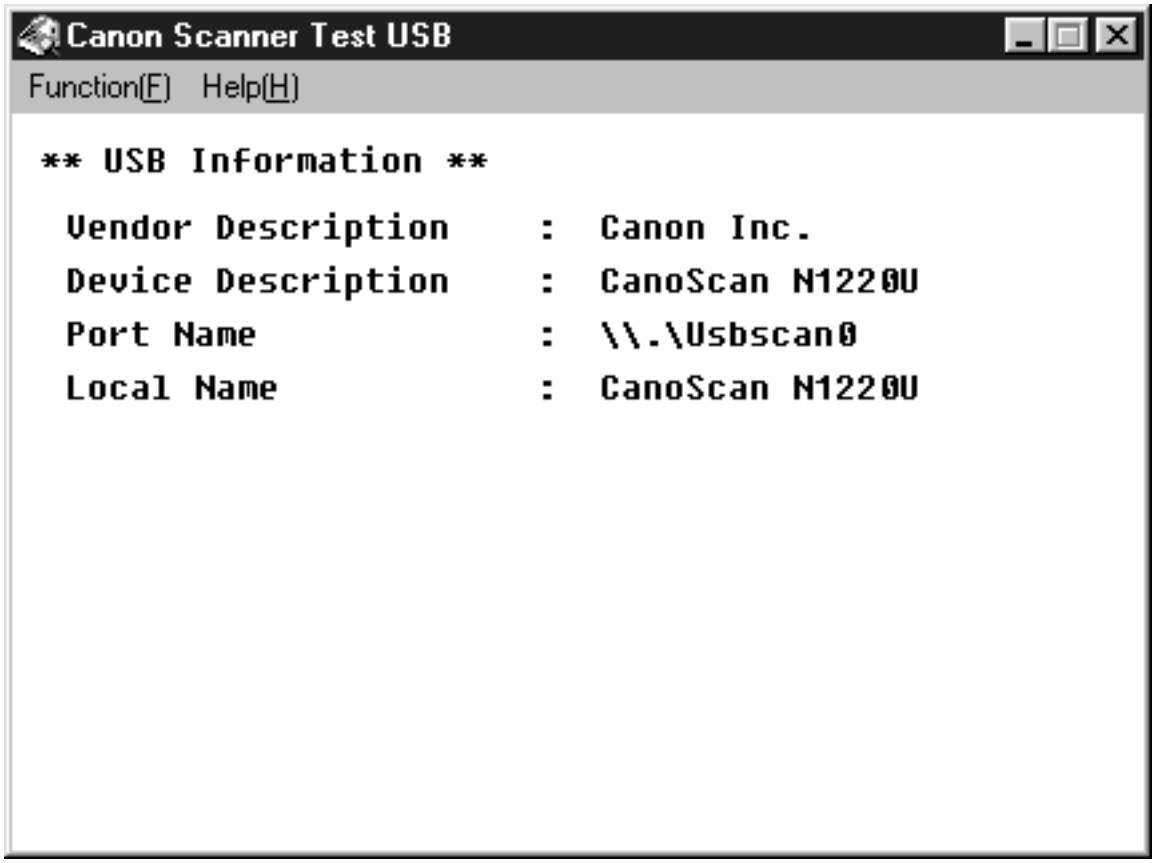


Figure 5-2

- Vendor Description : Manufacturer name (Canon) of the scanner connected.
- Device Description : Product name of the scanner connected.
- Port Name : Port name of the scanner recognized by Windows.
- Local Name : Product name of the scanner connected.

2) Scanner Information

Select "Scanner Information" from the "Function" menu to display as shown in Figure 5-3 (Windows) or Figure 5-4 (Macintosh).

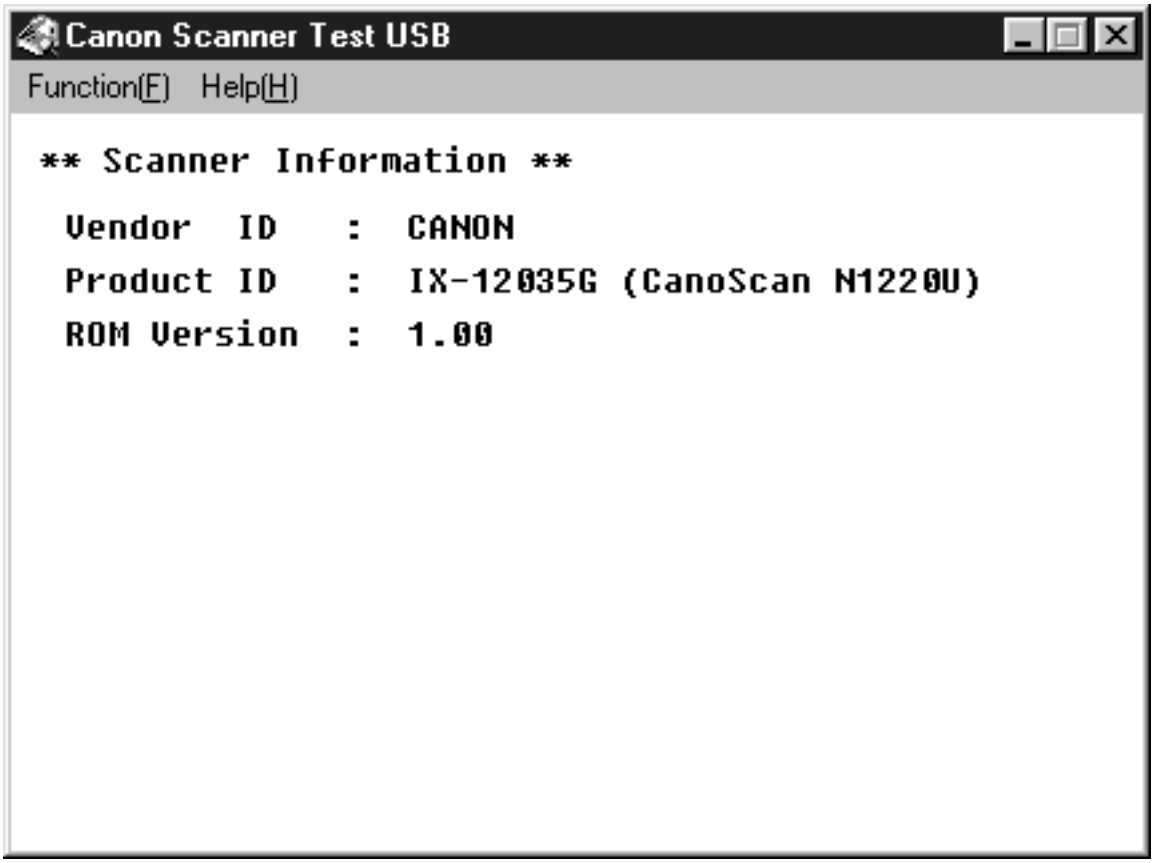


Figure 5-3

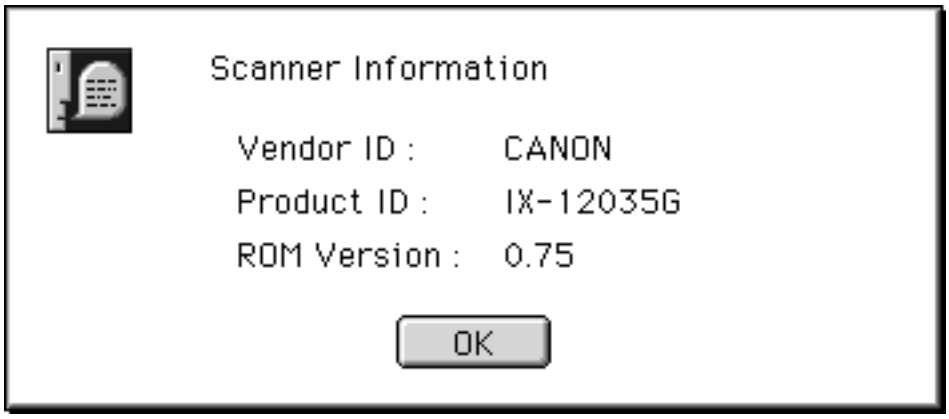


Figure 5-4

· Vendor ID : Manufacturer name (Canon) of the scanner connected.
· Product ID : Product name of the scanner connected.
· ROM Version : Scanner controller version.

3) Scanner Self Test

Select "Scanner Self Test" from the "Function" menu to display a dialog as shown in Figure 5-5 (Windows) or Figure 5-6 (Macintosh).

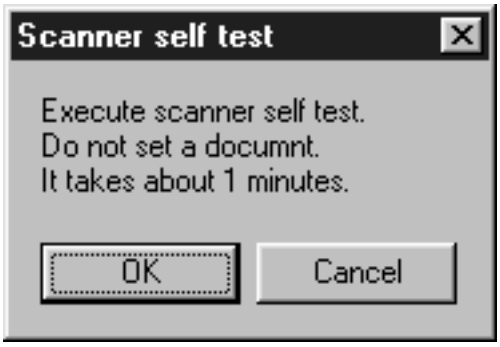


Figure 5-5

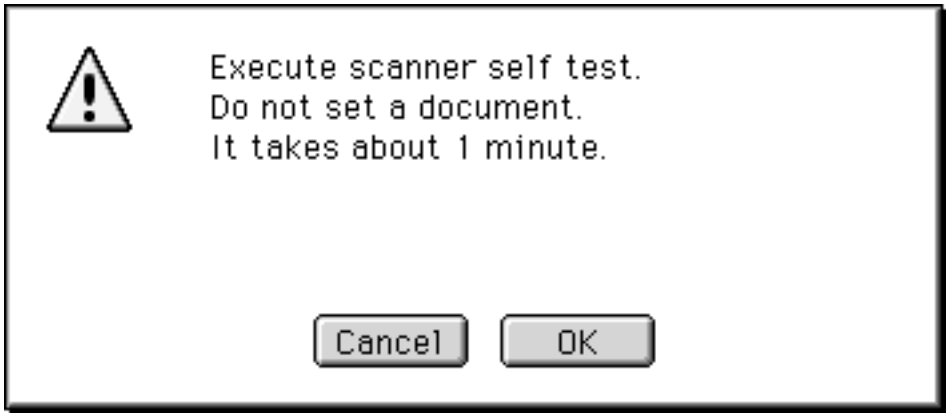


Figure 5-6

Click "OK" to perform Scanner Self Test. When it has completed normally, a dialog as shown in Figure 5-7 (Window) or Figure 5-8 (Macintosh) is displayed.

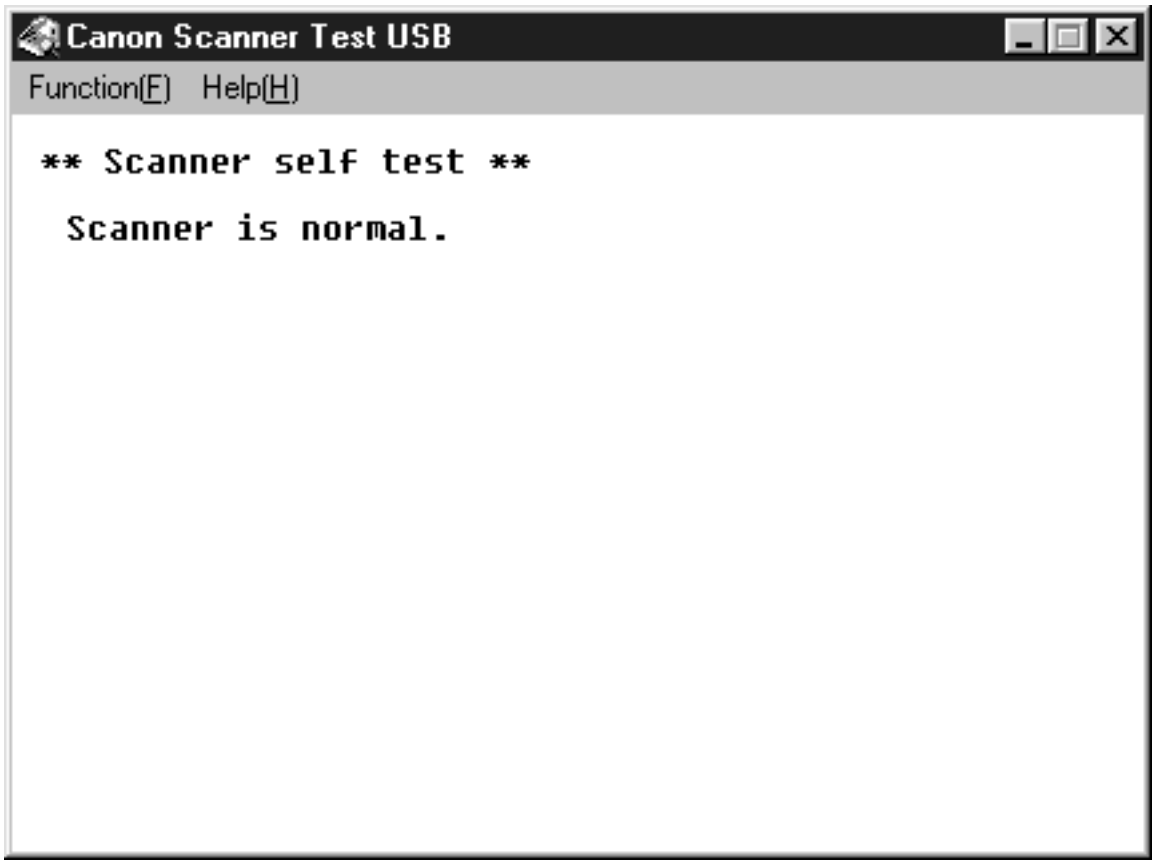


Figure 5-7

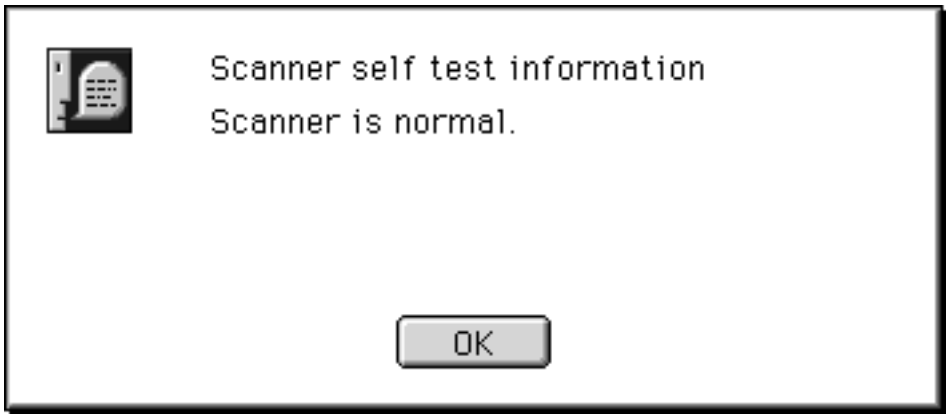


Figure 5-8

4) Calibration

Select "Calibration" from the "Function" menu to display a dialog as shown in Figure 5-9 (Windows) or 5-10 (Macintosh).

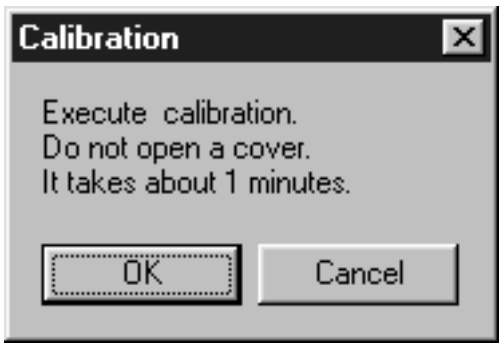


Figure 5-9

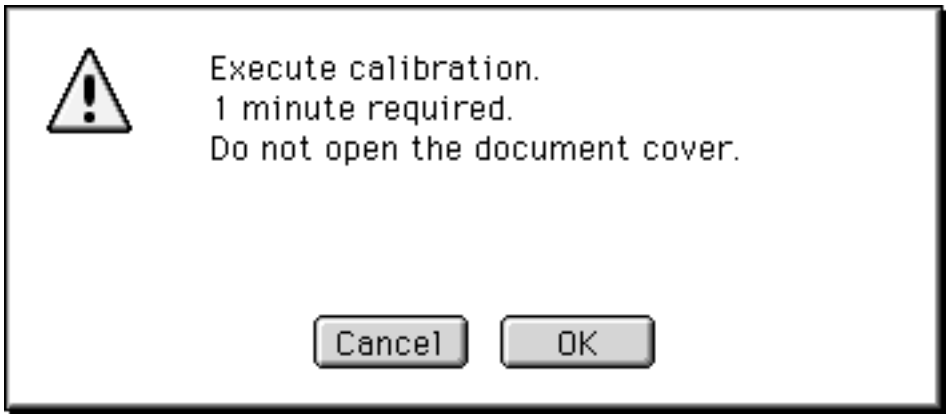


Figure 5-10

Click "OK" to perform Calibration. When it has completed normally, a dialog as shown in Figure 5-11 (Windows) or Figure 5-12 (Macintosh) is displayed.

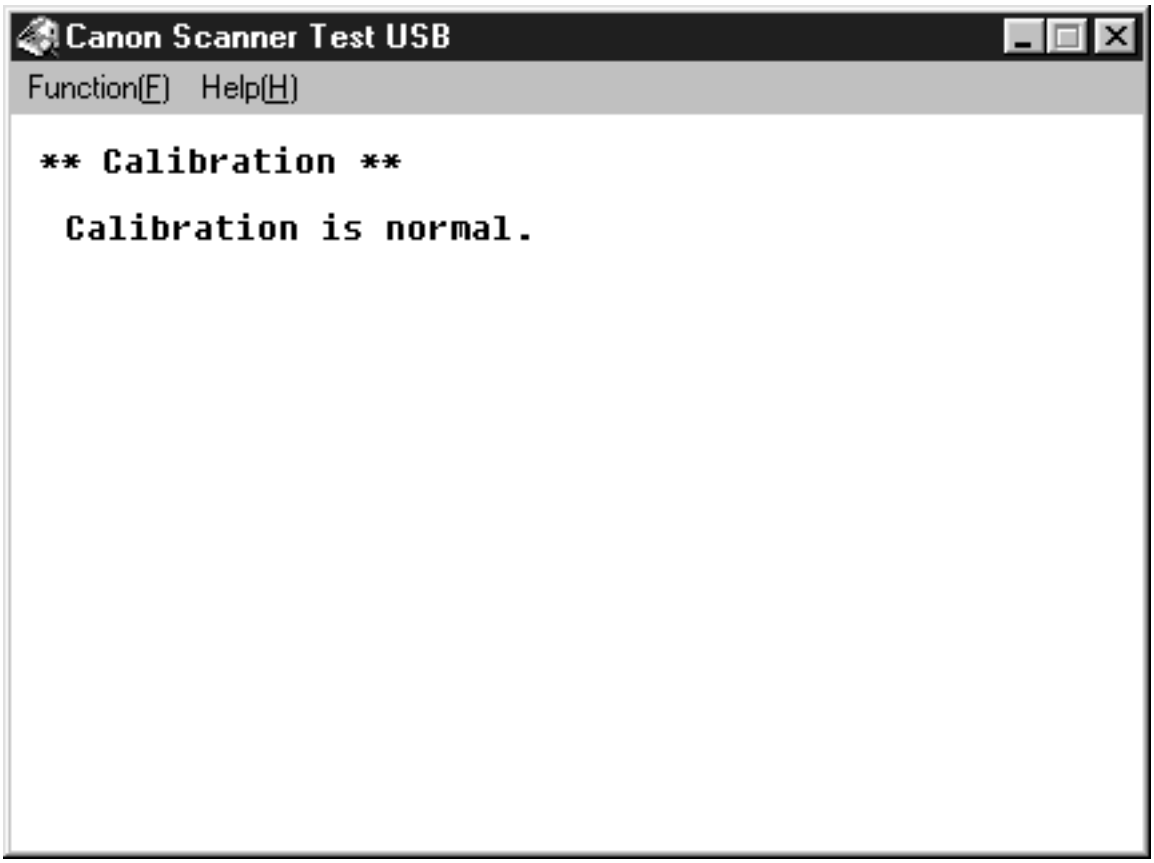


Figure 5-11

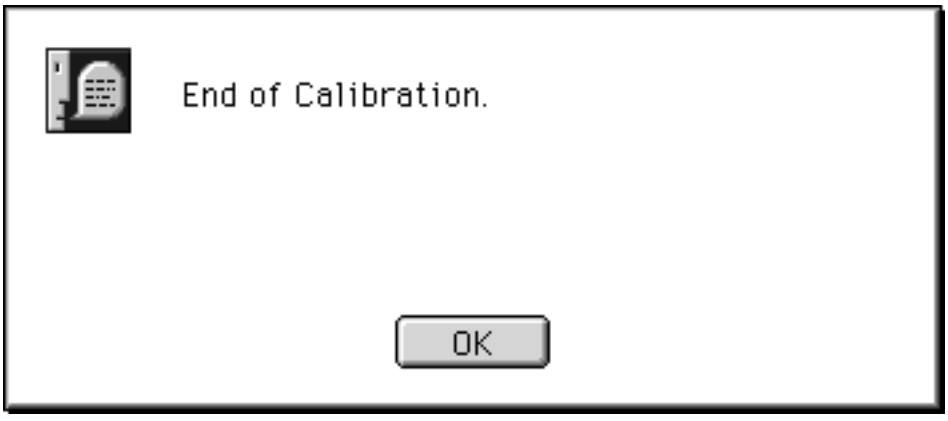


Figure 5-12

5) Scan

Select "Scan" from the "Function" menu to display a dialog as shown in Figure 5-13 (Windows) or Figure 5-14 (Macintosh).

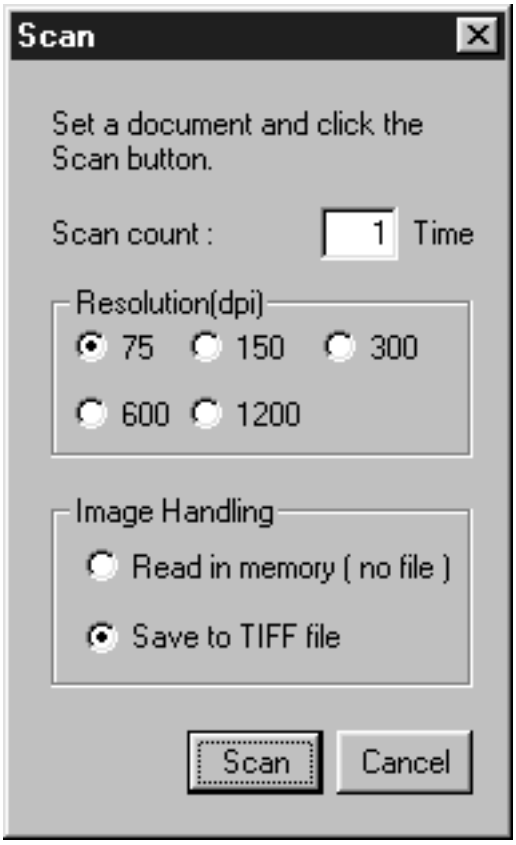


Figure 5-13

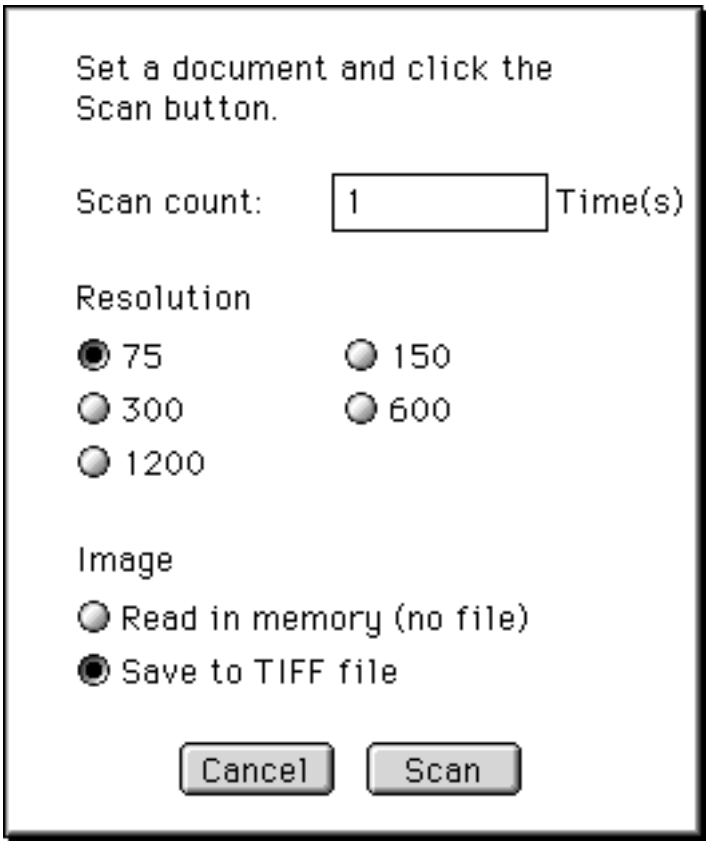


Figure 5-14

* Scan count : Specify the number of scan.
* Resolution : Select a resolution for the image to be scanned.
* Image : Select a processing method of the scanned image. When "Read in memory (no file)" is selected, scanned image is read into the memory, then abandoned after readout. When "Save to TIFF file" is selected, the file of "img0.tif" is set up in the same folder with the Canon Scanner Test.

File capacity is as follows.
75 dpi : Approx. 1.6 MByte
150 dpi : Approx. 6.5 MByte
300 dpi : Approx. 26.2 MByte
600 dpi : Approx. 104.9 MByte
1200 dpi : Approx. 15.0 MByte

Note: Confirm before scanning that the available disk space on the HDD in which the Canon Scanner Test is installed exceeds above file capacity.

4. Error Message

Causes and corrective actions for error messages which may occur during Canon Scanner Test are described below.

1) When Canon Scanner Test is started, "Unable to find USB scanner" is displayed.

Cause 1 : Device driver for the scanner is not installed in the host computer.
Corrective action : Install the device driver.

Cause 2 : Scanner is not detected by the host computer.
Corrective action : Properly detect the scanner by the host computer.

2) Scanner Information is not displayed or Scanner Self Test terminates without scan operation.

Cause 1 : Carriage lock is locked.
Corrective action : Unlock the carriage lock.

Cause 2 : Scanner is not detected by the host computer.
Corrective action : Properly detect the scanner by the host computer.

Cause 3 : Faulty flat cable.
Corrective Action : Check the flat cable connector. If it is normal, replace the flat cable.

Cause 4 : Faulty contact image sensor.
Corrective Action : Replace the contact image sensor.

Cause 5 : Faulty main PCB.
Corrective Action : Replace the drive unit.

3) "Carriage lock is locked" is displayed.

Cause 1 : Carriage lock is locked.
Corrective Action : Unlock the carriage lock.

Cause 2 : Faulty drive motor/faulty home position sensor.
Corrective Action : Replace the drive Unit.

4) "Unable to open file" is displayed.

Cause : Canon Scanner Test is started from a CD-ROM or write-protect HDD.
Corrective Action : Copy the Canon Scanner Test on a writable HDD to use.

CHAPTER 6

PARTS CATALOG

 CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

(Brank Page)

FIGURE U01 ACCESSORY

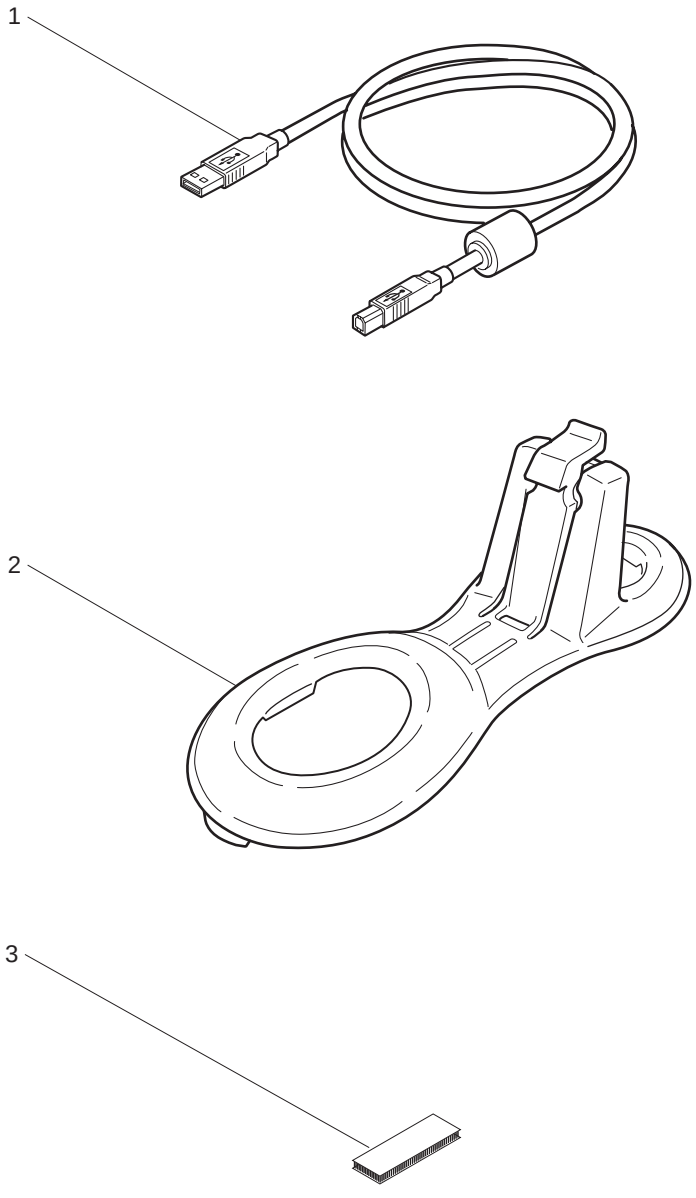


FIGURE & KEY NO.	PART NUMBER	RANK	Q'TY	DESCRIPTION	SERIAL NUMBER/REMARKS
U01-01	104-0138-0SP		1	CABLE, USB	
02	002-0827-0SP		1	STAND ASSEMBLY	
03	003-7204-0SP		1	TAPE	

FIGURE U10

N650U

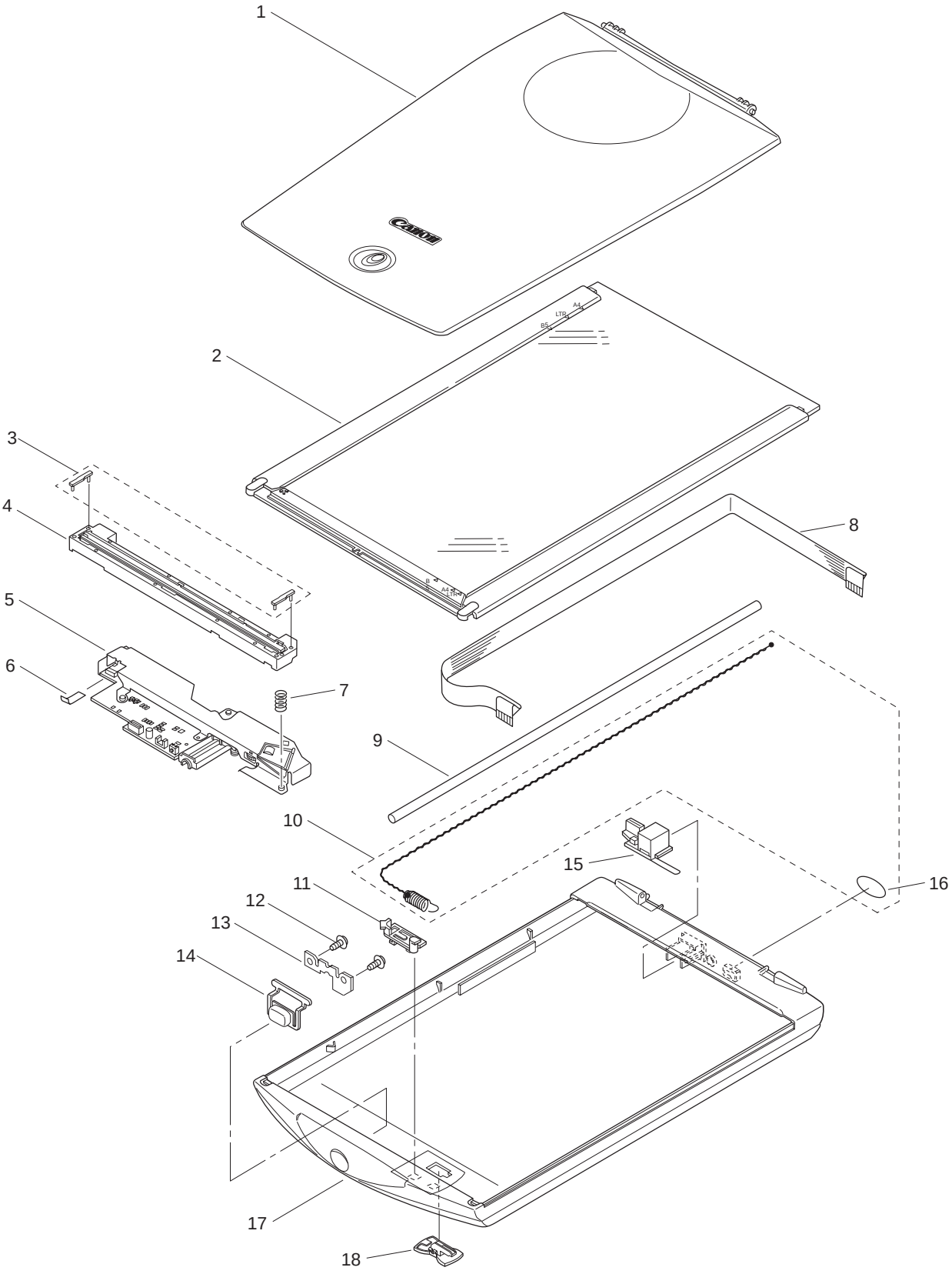


FIGURE & KEY NO.	PART NUMBER	RANK	Q'TY	DESCRIPTION	SERIAL NUMBER/REMARKS
U10-01	002-0820-0SP		1	DOCUMENT COVER ASSEMBLY	
02	002-0821-0SP		1	PLATEN GLASS ASSEMBLY	
03	051-0508-0SP		1	SPACER	
04	060-0121-000		1	CONTACT IMAGE SENSOR	
05	003-5248-0SP		1	SENSOR DRIVE ASSEMBLY	
06	104-0152-000		1	CABLE, FLAT, 12P	
07	056-0032-000		1	SPRING	
08	104-0151-000		1	CABLE, FLAT, 8P	
09	NPN		1	SLIDING ROD	
10	003-5250-0SP		1	WIRE	
11	051-0506-000		1	HOOK	
12	077-0632-000		2	SCREW	
13	054-0231-000		1	PLATE, BUTTON	
14	051-0505-000		1	BUTTON, FUNCTION	
15	004-0393-000		1	USB I/F PCB ASSEMBLY	
16	084-5505-0SP		1	SEAL	
17	NPN		1	BASE FRAME	
18	051-0574-000		1	LOCK, CARRIAGE	

FIGURE U11

N656U

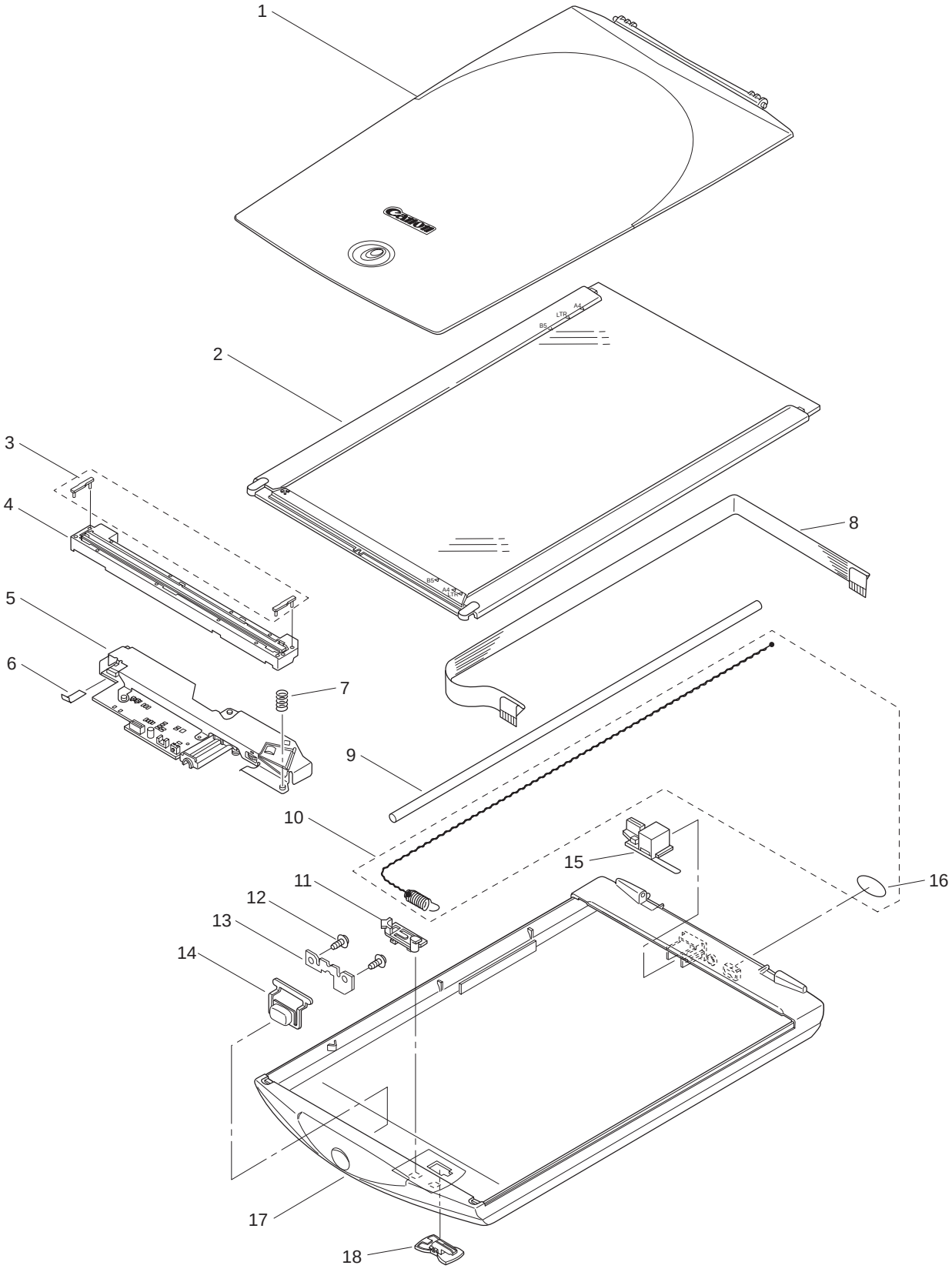


FIGURE & KEY NO.	PART NUMBER	RANK	Q'TY	DESCRIPTION	SERIAL NUMBER/REMARKS
U11-01	002-0883-0SP		1	DOCUMENT COVER ASSEMBLY	
02	002-0896-0SP		1	PLATEN GLASS ASSEMBLY	
03	051-0508-0SP		1	SPACER	
04	060-0121-000		1	CONTACT IMAGE SENSOR	
05	003-5248-0SP		1	SENSOR DRIVE ASSEMBLY	
06	104-0152-000		1	CABLE, FLAT, 12P	
07	056-0032-000		1	SPRING	
08	104-0151-000		1	CABLE, FLAT, 8P	
09	NPN		1	SLIDING ROD	
10	003-5252-0SP		1	WIRE	
11	051-0506-000		1	HOOK	
12	077-0632-000		2	SCREW	
13	054-0231-000		1	PLATE, BUTTON	
14	051-0505-000		1	BUTTON, FUNCTION	
15	004-0393-000		1	USB I/F PCB ASSEMBLY	
16	084-5509-0SP		1	SEAL	
17	NPN		1	BASE FRAME	
18	051-0620-000		1	LOCK, CARRIAGE	

FIGURE U20

N1220U

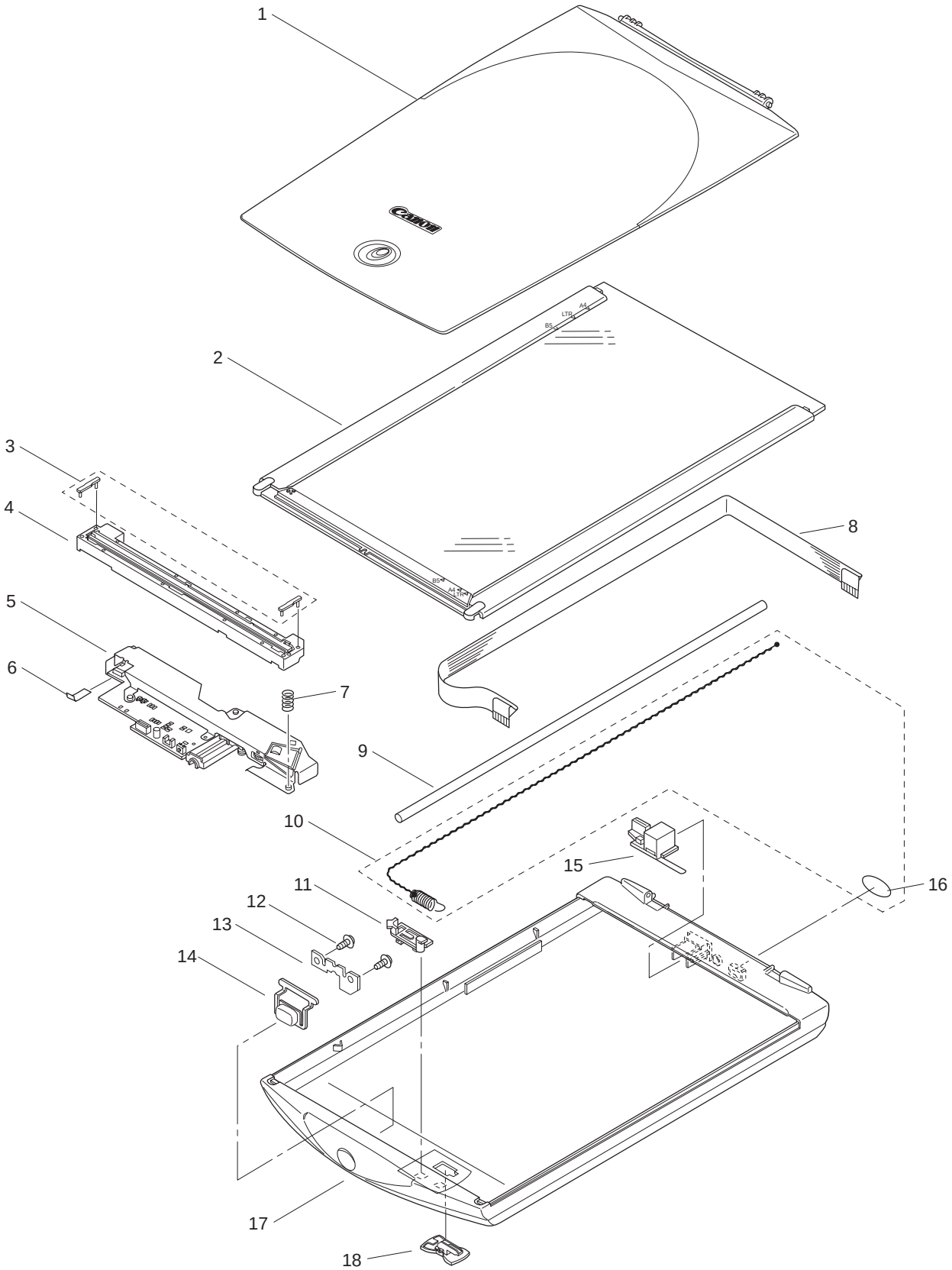
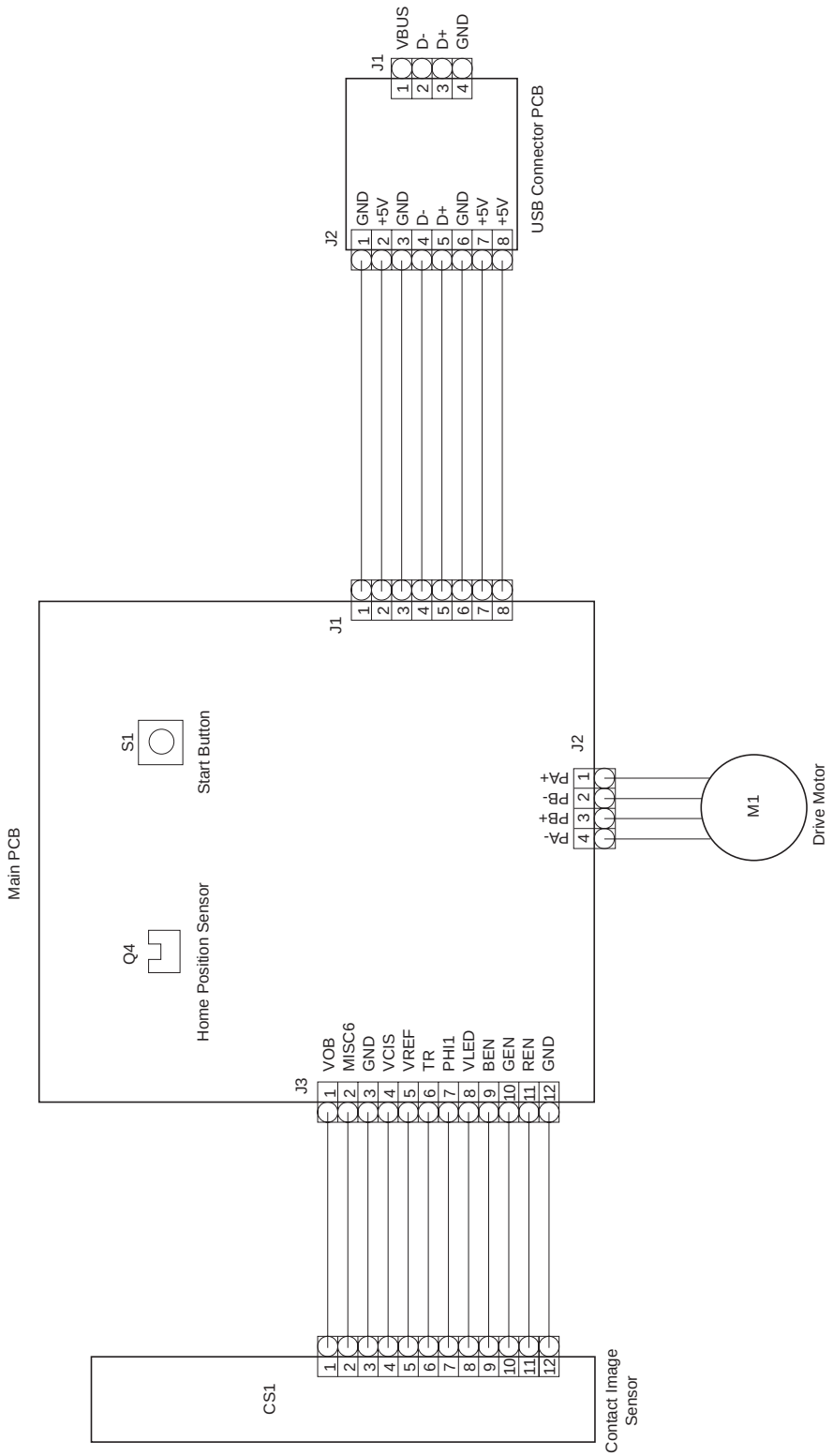


FIGURE & KEY NO.	PART NUMBER	RANK	Q'TY	DESCRIPTION	SERIAL NUMBER/REMARKS
U20-01	002-0884-0SP		1	DOCUMENT COVER ASSEMBLY	
02	002-0893-0SP		1	PLATEN GLASS ASSEMBLY	
03	051-0508-0SP		1	SPACER	
04	060-0122-000		1	CONTACT IMAGE SENSOR	
05	003-5249-0SP		1	SENSOR DRIVE ASSEMBLY	
06	104-0152-000		1	CABLE, FLAT, 12P	
07	056-0032-000		1	SPRING	
08	104-0151-000		1	CABLE, FLAT, 8P	
09	NPN		1	SLIDING ROD	
10	003-5251-0SP		1	WIRE	
11	051-0506-000		1	HOOK	
12	077-0632-000		2	SCREWS	
13	054-0231-0SP		1	PLATE, BUTTON	
14	051-0625-000		1	BUTTON, FUNCTION	
15	004-0393-000		1	USB I/F PCB ASSEMBLY	
16	084-5506-0SP		1	SEAL	
17	NPN		1	BASE FRAME	
18	051-0617-000		1	LOCK, CARRIAGE	

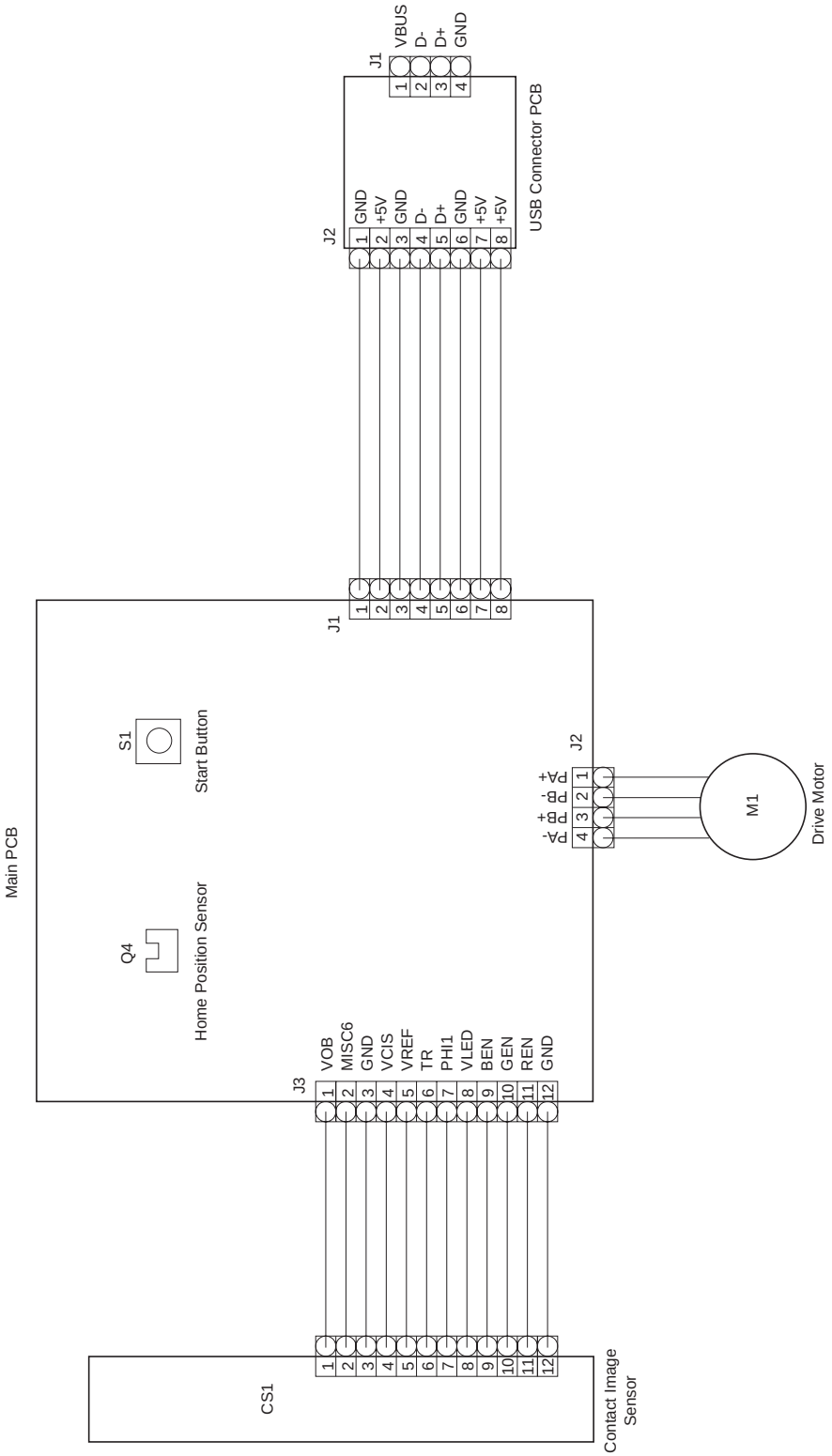
APPENDIX

 CANOSCAN N650U/N656U/N1220U REV.0 JUNE 2000 PRINTED IN JAPAN (IMPRIME AU JAPON)

I. GENERAL CIRCUIT DIAGRAM (CanoScan N650U/N656U)

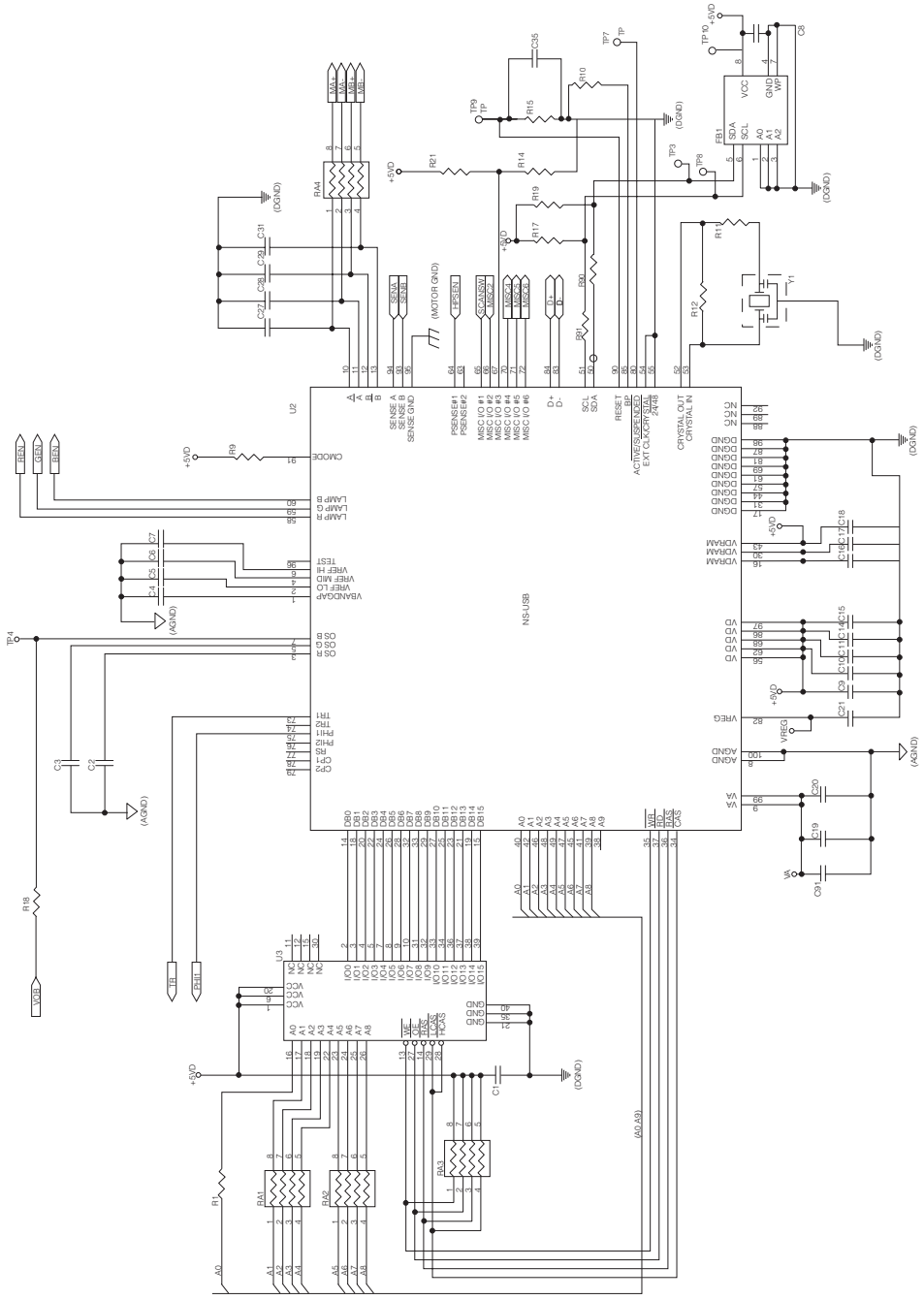


II. GENERAL CIRCUIT DIAGRAM (CanoScan N1220U)

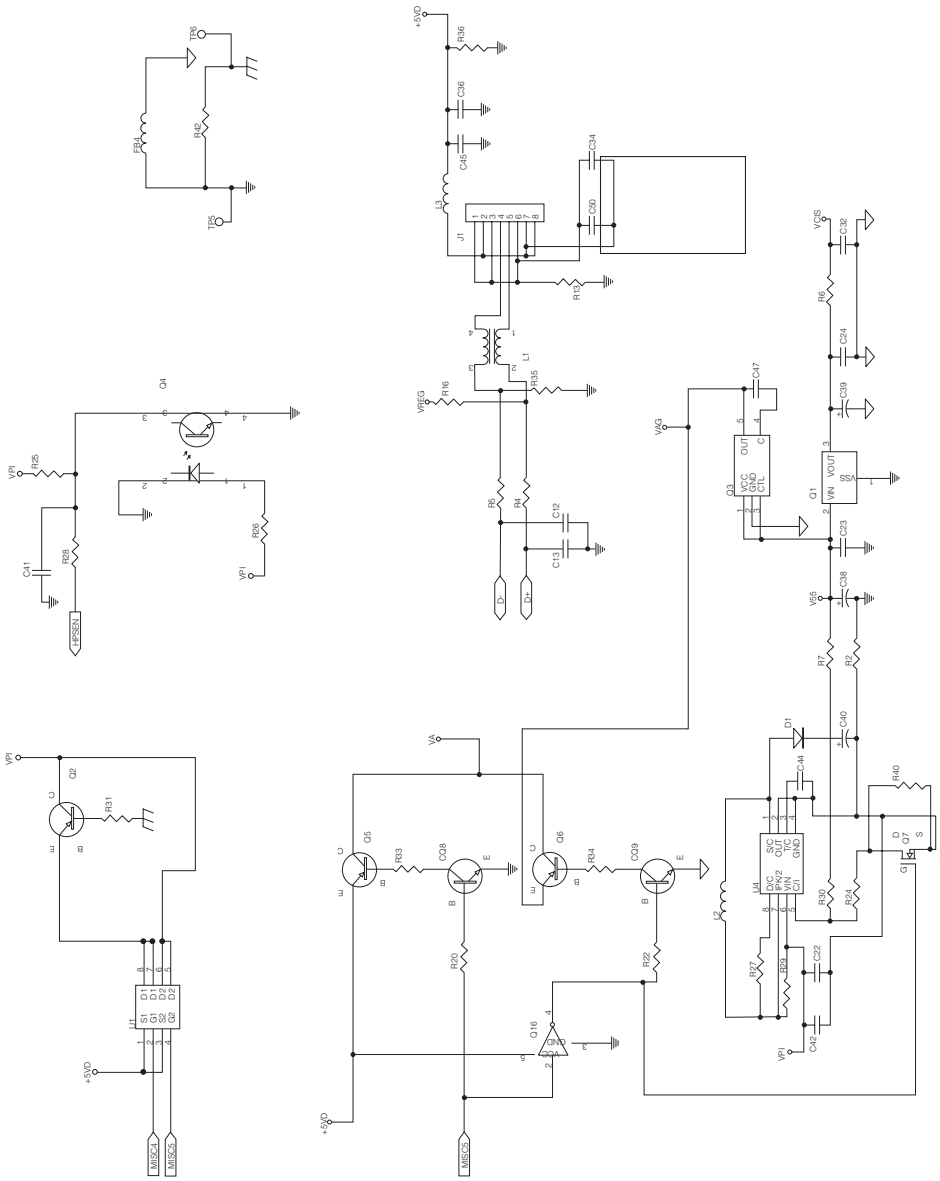


III. MAIN PCB CIRCUIT DIAGRAM (CanoScan N650U/N656U)

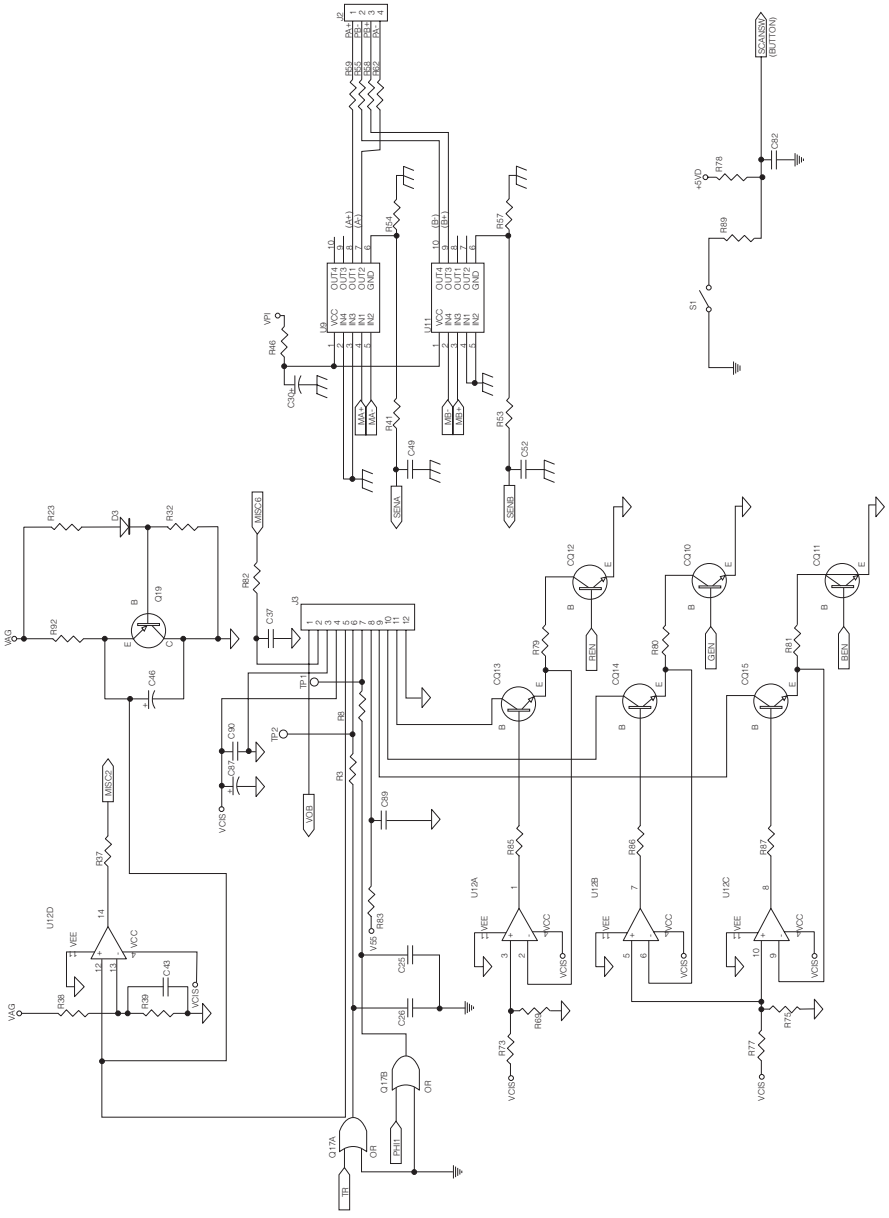
(1/3)



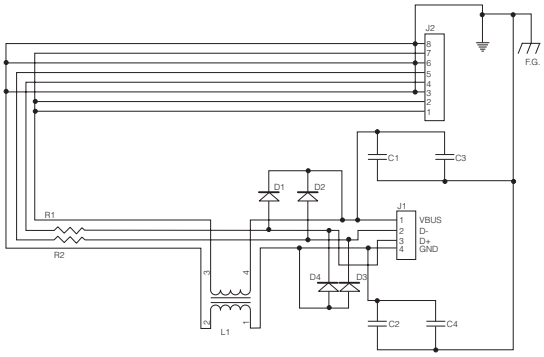
(2/3)



(3/3)

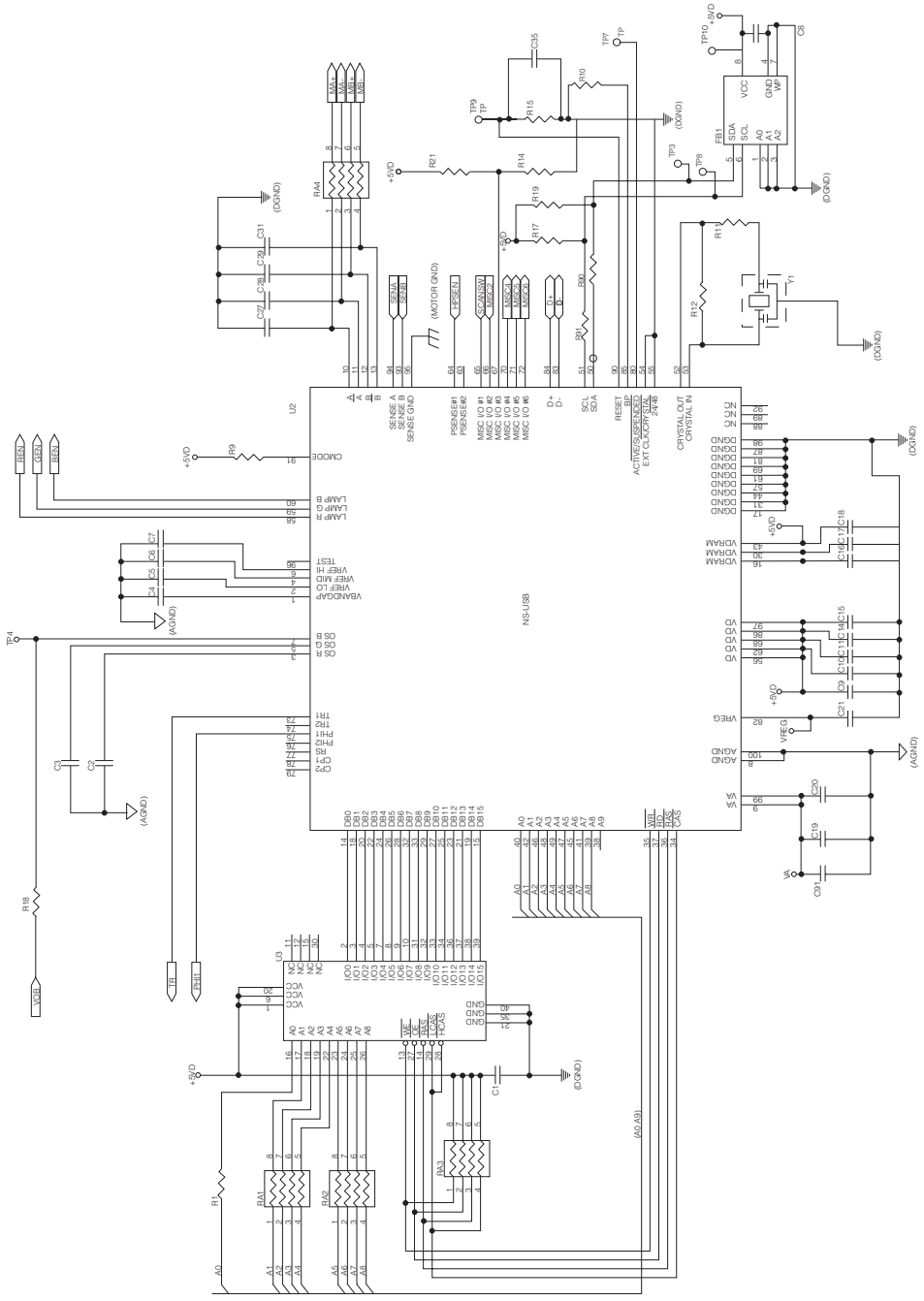


IV. USB CONNECTOR PCB CIRCUIT DIAGRAM (CanoScan N650U/N656U)

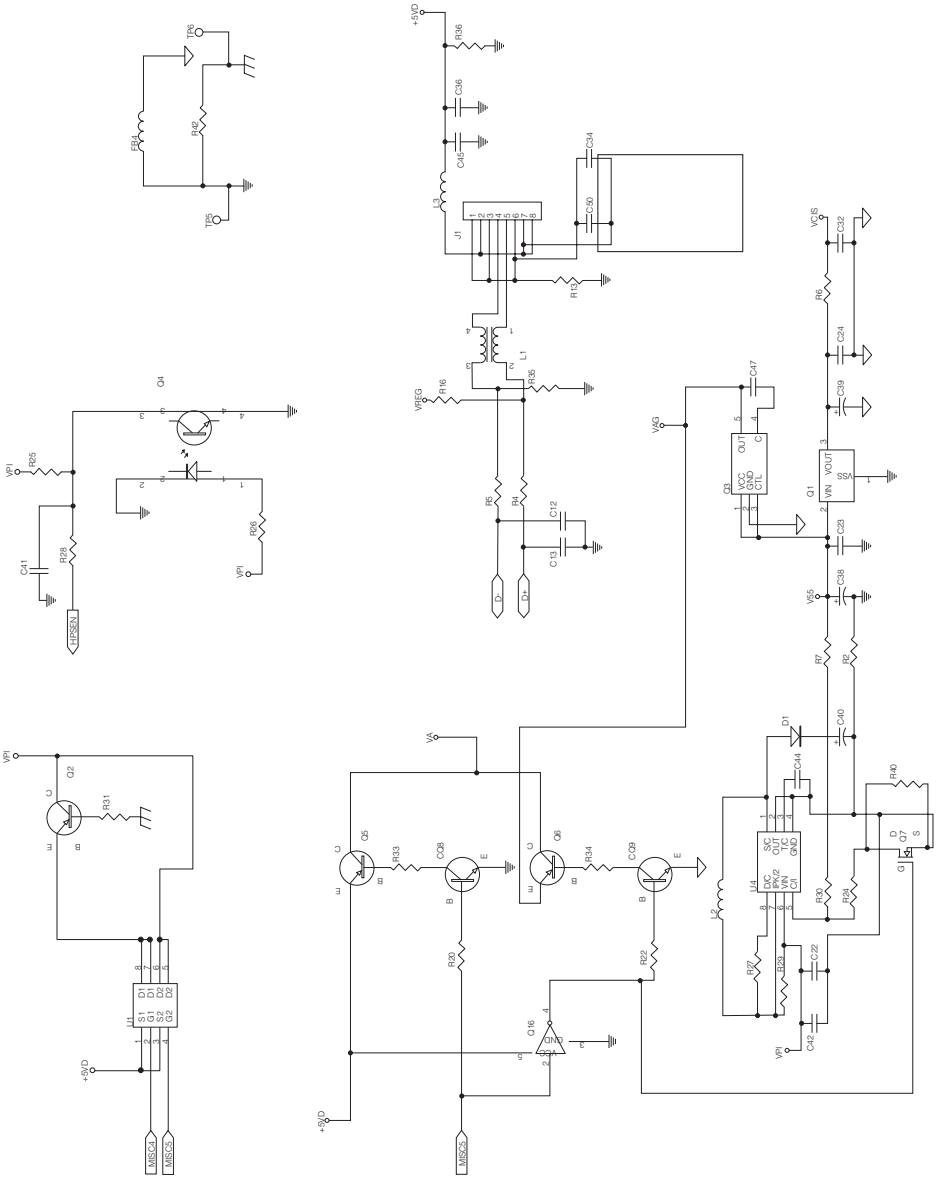


V. MAIN PCB CIRCUIT DIAGRAM (CanoScan N1220U)

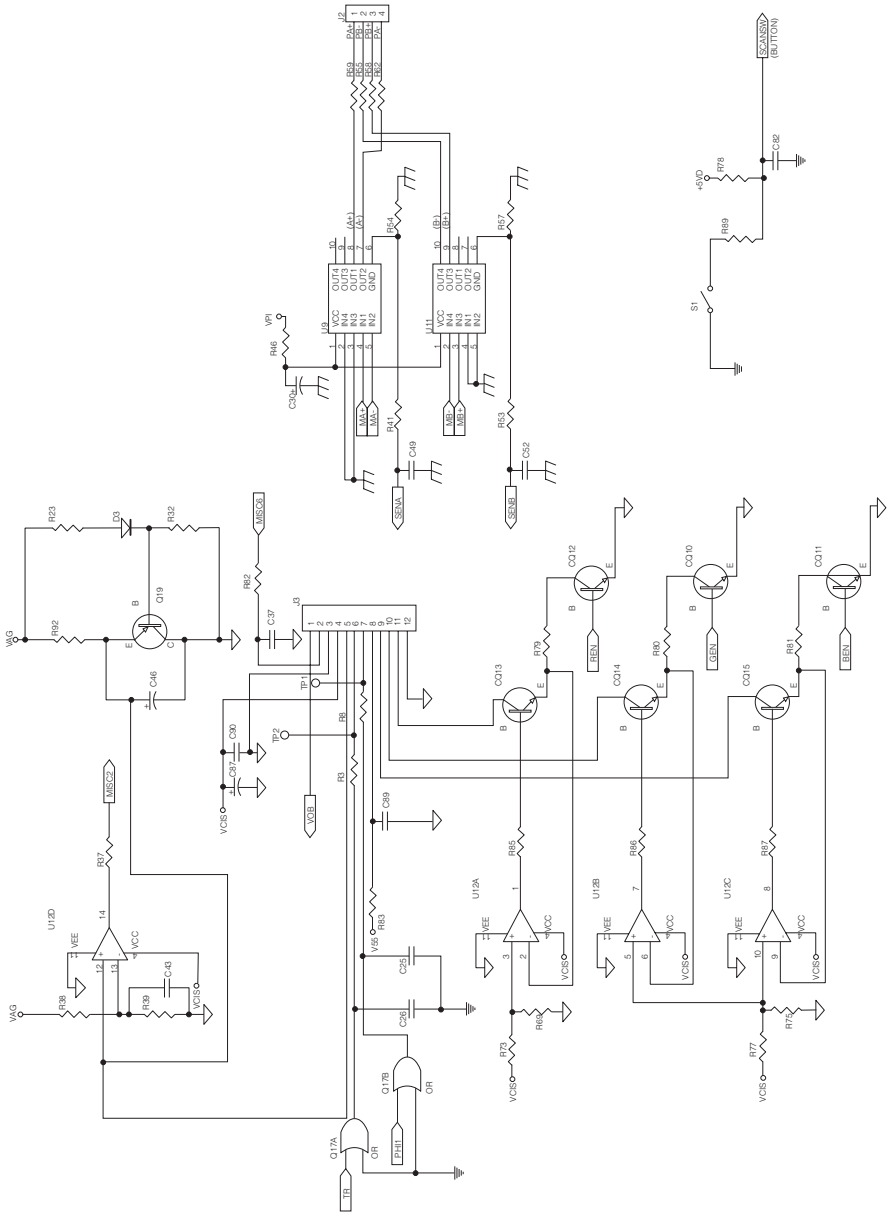
(1/3)



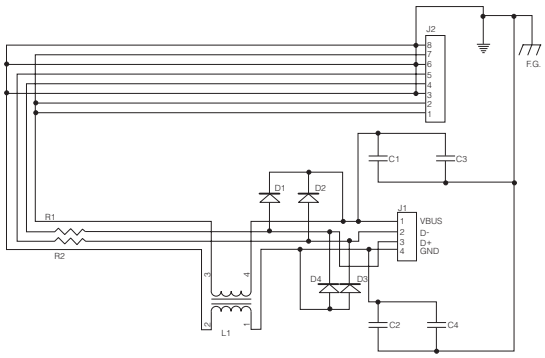
(2/3)



(3/3)



VI. USB CONNECTOR PCB CIRCUIT DIAGRAM (CanoScan N1220U)



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