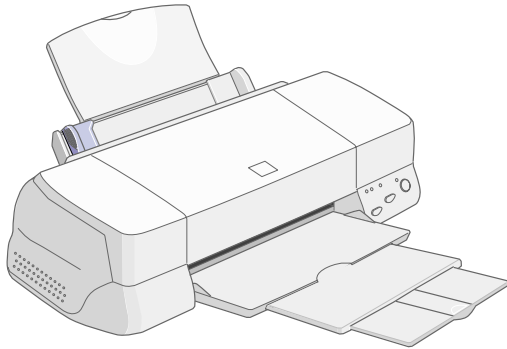
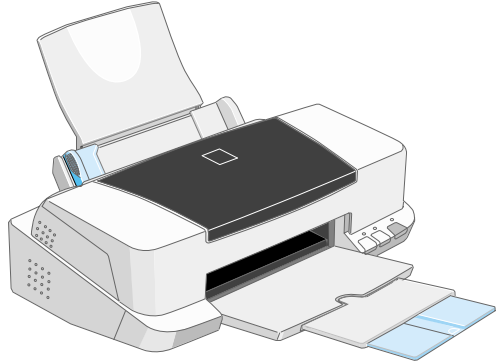


SERVICE MANUAL



Color ink jet printer

Stylus COLOR 860/1160



EPSON®

SEIJ99003

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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 UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGES IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of Stylus COLOR 860/1160. 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:

- *EEPROM Address Map*
- *Connector Pin Assignments*
- *Component Layout*
- *Parts List and Exploded Diagrams*
- *C298MAIN Board Circuit Diagram*

Revision Status

Revision	Issued Date	Description
A	August 19, 1999	First Release
B	October 5, 1999	Second release <ul style="list-style-type: none">• Correction has been made due to overall review of the manual.• Appendix has additional information.
C	November 25, 1999	Third release <ul style="list-style-type: none">• Correction has been made due to overall review of the manual.• Some T.B.D have been made clear.• Appendix has additional information.<ul style="list-style-type: none">- Fig7-3, 7-4 has been mounted.

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CHAPTER

1

PRODUCT DESCRIPTION

1.1 FEATURES

The major features of EPSON color inkjet printers EPSON Stylus COLOR 860/1160 are:

- High Color Print Quality
 - 1440 (H) X 720 (V) dpi printing
 - Four Color Printing (YMCK)
 - Traditional and New Microweave
- Built-in Auto Sheet Feeder
 - Holds 100 cut-sheets (64g/m²)
 - Holds 10 envelopes
 - Holds 30 transparency films
- Two Built-in Interfaces
 - Bi-directional parallel I/F (IEEE-1284 level 1 device)
 - USB
- Windows/Macintosh exclusive

1.2 SPECIFICATIONS

This section covers specifications of the printers.

1.2.1 Physical Specification

- Weight: 6.0kg (without ink cartridges) for Stylus Color 860
8.0kg (without ink cartridges) for Stylus Color 1160
- Dimension:
 - [Stylus Color 860]
Storage: 450 mm (W) x 269 mm (D) x 175 mm (H)
Printing: 450 mm (W) x 628 mm (D) x 303 mm (H)
 - [Stylus Color 1160]
Printing: 609 mm (W) x 766 mm (D) x 414 mm (H)

1.2.2 Printing Specification

- Print Method
 - On demand ink jet
- Nozzle Configuration
 - Monochrome 144 nozzles (48 x 3 staggered)
 - Color 48 nozzles x 3 (Cyan, Magenta, Yellow)
- Print Direction
 - Bi-direction with logic seeking
- Print Speed & Printable Columns

Table 1-1. Character Mode

Model	Character Pitch	Printable Column	LQ Speed
Stylus Color 860	10 CPI (Pica)	80	238 CPS*
Stylus Color 1160	10 CPI (Pica)	127	238 CPS*

*This value is the speed of normal-dot printing.

Table 1-2. Raster Graphics Mode

Model	Horizontal Resolution	Printable Area	Available Dot	CR Speed
Stylus Color 860	180 dpi	8.26 inches	1488	23.8/19 IPS
	360 dpi	8.26 inches	2976	23.8/19 IPS
	720 dpi	8.26 inches	5952	19 IPS
Stylus Color 1160	180 dpi	12.716 inches	2289	23.8/19 IPS
	360 dpi	12.716 inches	4578	23.8/19 IPS
	720 dpi	12.716 inches	9156	19 IPS

- Control Code
 - ESC/P Raster command
 - EPSON Remote command
- Character Tables
 - Two international character sets:
 - PC 437 (US, Standard Europe)
 - PC 850 (Multilingual)
- Typeface
 - Bit map LQ font: EPSON Courier 10 CPI

1.2.3 Paper Feeding

- Feed Method
 - Friction feed with ASF
- Paper Path
 - Cut-sheet ASF (Top entry, Front out)
- Feed Speed
 - 2.36 inch/sec (Normal, Continuous feed)
 - 4.5 inch/sec (Fast, Continues feed)

1.2.4 Input Data Buffer

- 256KB

1.2.5 Electric Specification

[120V Version]

Rated Voltage:	AC120V
Input Voltage Range:	AC99~132V
Rated Frequency Range:	50~ 60Hz
Input Frequency Range:	49.5~ 60.5Hz
Rated Current:	0.4A (for Stylus Color 860) 0.4A (for Stylus Color 1160)
Power Consumption:	Approx. 18W (ISO10561 Letter Pattern) Approx. 3.5W in standby mode (for Stylus Color 860) Approx. 18W (ISO10561 Letter Pattern) Approx. 3.5W in standby mode (for Stylus Color 1160) Energy Star compliant
Insulation Resistance:	10M ohms min. (between AC line and chassis, DC 500V)
Dielectric Strength:	AC 1000V rms. 1 minutes or AC 1200V rms. 1 second (between AC line and chassis)

[220 ~ 240V Version]

Rated Voltage:	AC220V~240V
Input Voltage Range:	AC198~264V
Rated Frequency Range:	50~60Hz
Input Frequency Range:	49.5~60.5Hz
Rated Current:	0.2 A (for Stylus Color 860) 0.2 A (for Stylus Color 1160)
Power Consumption:	Approx. 18W (ISO10561 Letter Pattern) Approx. 3.5W in standby mode (for Stylus Color 860) Approx. 18W(ISO10561 Letter Pattern) Approx. 3.5W in standby mode (for Stylus Color 1160) Energy Star compliant
Insulation Resistance:	10M ohms min. (between AC line and chassis, DC 500V)
Dielectric Strength:	AC 1500V rms. 1 minute (between AC line and chassis)

1.2.6 Environmental Condition

- Temperature
 - Operating: 10 to 35°C (see the figure below for condition)
 - Non-operating: -20 to 60°C (with shipment container)
1 month at 40°C and 120 hours at 60°C
- Humidity
 - Operating: 20 to 80% RH
(without condensation / see the figure below for condition)
 - Non-operating: 5 to 85% RH
(without condensation / with shipment container)
- Resistance to Shock
 - Operating: 1G, within 1 ms
 - Non-operating: 2G, within 2 ms (with shipment container)
- Resistance to Vibration
 - Operating: 0.15G
 - Non-operating: 0.50G (with shipment container)

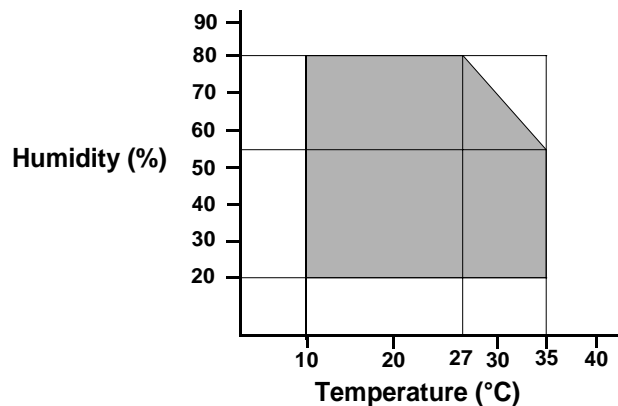


Figure 1-1. Temperature/Humidity Range

1.2.7 Reliability

Total Print Volume: 75,000 pages (A4, Letter)
 Print Head Life: 3 billion dots/nozzle

1.2.8 Safety Approvals

[120V Version]
 Safety Standards: UL1950
 CSA22.2 No.950
 EMI: FCC part 15 subpart B Class B
 CSA C108.8 Class B

[220~240V Version]
 Safety Standards: EN60950 (VDE)
 EMI: EN55022 (CISPR Pub.22) Class B
 AS/NZS 3548 Class B

1.2.9 Acoustic Noise

Level: Approx. 42dB(A) (According to ISO 7779)
 -Used media : Plain Paper
 - Print Quality: Fine

1.2.10 CE Marking

[220~240V Version]
 Low Voltage Directive 73/23/EEC: EN60950
 EMC Directive 89/336/EEC: EN55022 Class B
 EN61000-3-2
 EN61000-3-3
 EN50082-1
 IEC801-2
 IEC801-3
 IEC801-4

1.3 INTERFACE

The EPSON Stylus COLOR 860/1160 provide USB and parallel interface as standard.

1.3.1 Parallel Interface (Forward Channel)

Transmission Mode: 8 bit parallel, IEEE-1284 compatibility mode
 Synchronization: By STROBE pulse
 Handshaking: BY BUSY and ACKNLG signal
 Signal Level: TTL compatible level
 Adaptable Connector: 57-30360 (amphenol) or equivalent

BUSY signal is set high before setting either -ERROR low or PE high, and held high until all these signals return to their inactive state.

BUSY signal is at high level in the following cases:

- During data entry (see data transmission timing).
- When input data buffer is full.
- During -INIT signal is at low level or during hardware initialization.
- During printer error (see -ERROR signal).
- When the parallel interface is not selected.

ERROR signal is at low level when the printer is in one of the following states:

- Printer hardware error (fatal error)
- Paper-out error
- Paper-jam error
- Ink-out error

PE signal is at high level during paper-out error.

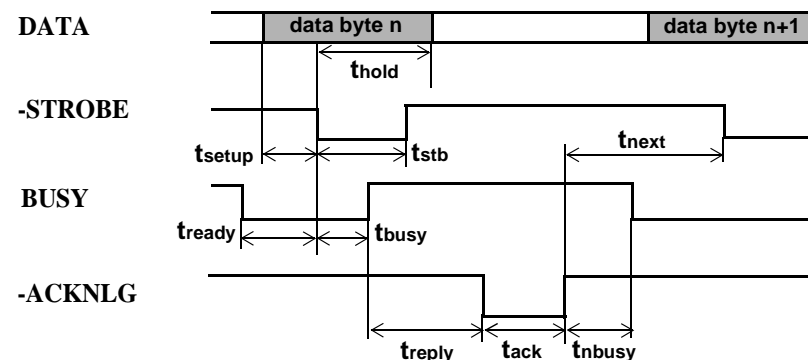


Figure 1-2. Data Transmission Timing

Table 1-3.

Parameter	Minimum	Maximum
tsetup	500ns	-
thold	500ns	-
tstb	500ns	-
tready	0	-
tbusy	-	500ns
tt-out*	-	120ns
tt-in**	-	200ns
treply	0	-
tack	500ns	10us
tnbusy	0	-
tnext	0	-

* Rise and fall time of every output signal.

** Rise and fall time of every input signal.

*** Typical timing for tack is shown on the following page.

Table 1-4. Typical Time of tack

Parallel I/F Mode	Typical Time of tack
High Speed	1us
Normal Speed	3us

Table 1-5. Signal Level: TTL Compatible (IEEE-1284 level 1 device)

Parameter	Minimum	Maximum	Condition
VOH*	-	5.5V	
VOL*	-0.5V	-	
IOH*	-	0.32mA	VOH = 2.4V
IOL*	-	12mA	VOL = 0.4V
CO	-	50pF	
VIH	-	2.0V	
VIL	0.8V	-	
IIH	-	0.32mA	VIH = 2.0V
IIL	-	12mA	VIL = 0.8V
CI	-	50pF	

* A low logic level on the Logic H signal is 2.0V or less when the printer is powered off, and this signal is equal to or exceeding 3.0V when the printer is powered on. The receiver shall provide an impedance equivalent to 7.5K ohm to ground.

Table 1-6. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	-STROBE	19	In	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2	DATA0	20	In	The DATA0 through DATA7 signals represent data bits 0 to 7, respectively. Each signal is at high level when data is logical 1 and low level when data is logical 0.
3	DATA1	21	In	
4	DATA2	22	In	
5	DATA3	23	In	
6	DATA4	24	In	
7	DATA5	25	In	
8	DATA6	26	In	
9	DATA7	27	In	
10	-ACKNLG	28	Out	This signal is a negative pulse indicating that the printer can accept data again.
11	BUSY	29	Out	A high signal indicates that the printer cannot receive data.
12	PE	28	Out	A high signal indicates paper-out error.
13	SLCT	28	Out	Always at high level when the printer is powered on.
14	-AFXT	30	In	Not used.
31	-INIT	30	In	The falling edge of a negative pulse or a low signal on this line causes the printer to initialize. Minimum 50us pulse is necessary.
32	-ERROR	29	Out	A low signal indicates printer error condition.
36	-SLIN	30	In	Not used.

Table 1-6. Connector Pin Assignment and Signals (continued)

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
18	Logic H	-	Out	Pulled up to +5V via 3.9 K ohm resistor.
35	+5V	-	Out	Pulled up to +5V via 3.3K ohm resistor.
17	Chassis GND	-	-	Chassis GND
16,33, 19-30	GND	-	-	Signal GND
15,34	NC	-	-	Not connected

NOTE: In/Out refers to the direction of signal flow seen from the printer side.

1.3.2 Parallel Interface (Reserve Channel)

Transmission Mode: IEEE-1284 nibble mode
 Adaptable Connector: See forward channel.
 Synchronization: Refer to the IEEE-1284 specification
 Handshaking: Refer to the IEEE-1284 specification
 Data Trans. Timing: Refer to the IEEE-1284 specification
 Signal Level: IEEE-1284 level 1 device
 See forward channel.

Table 1-7. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	HostClk	19	In	Host clock signal.
2	DATA0	20	In	The DATA0 through DATA7 signals represent data bits 0 to 7, respectively. Each signal is at high level when data is logical 1 and low level when data is logical 0. These signals are used to transfer the 1284 extensibility request values to the printer.
3	DATA1	21	In	
4	DATA2	22	In	
5	DATA3	23	In	
6	DATA4	24	In	
7	DATA5	25	In	
8	DATA6	26	In	
9	DATA7	27	In	
10	PtrClk	28	Out	Printer clock signal.
11	PtrBusy / DataBit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit 3 or 7.
12	AckDataReq / DataBit-2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag / DataBit-1,5	28	Out	X-flag signal and reverse channel transfer data bit 1 or 5.
14	HostBusy	30	In	Host busy signal.
31	-INIT	30	In	Not used.

Table 1-7. Connector Pin Assignment and Signals (continued)

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
32	-DataAvail / DataBit-0,4	29	Out	Data available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	In	1284 active signal.
18	Logic-H	-	Out	Pulled up to +5V via 3.9K ohm resistor.
35	+5V	-	Out	Pulled up to +5V via 3.3K ohm resistor.
17	Chassis GND	-	-	Chassis GND
16,33, 19-30	GND	-	-	Signal GND
15,34	NC	-	-	Not connected

Note) In/Out refers to the direction of signal flow from the printer's point of view.

Extensibility Request:

The printer responds affirmatively when the extensibility request values are 00H or 04H, which means,

- 00H: Request Nibble Mode Reverse Channel Transfer.
- 04H: Request Device ID;
Return Data Using Nibble Mode Rev Channel Transfer.

Device ID:

The printer sends the following device ID string when requested.

When IEEE1284.4 is enabled,
 [00H] [5AH] (for Stylus Color 860)
 [00H] [5CH] (for Stylus Color 1160)
 MFG: EPSON;
 CMD: ESCPL2, BDC, D4;
 MDL: Stylus[SP]COLOR[SP]860/1160;
 CLS: PRINTER;
 DES: EPSON[SP]Stylus[SP]COLOR[SP]860/1160;

When IEEE1284.4 is disabled,
 [00H] [57H] (for Stylus Color 860)
 [00H] [59H] (for Stylus Color 1160)
 MFG: EPSON;
 CMD: ESCPL2, BDC;
 MDL: Stylus[SP]COLOR[SP]860/1160;
 CLS: PRINTER;
 DES: EPSON[SP]Stylus[SP]COLOR[SP]860/1160;

NOTE 1:[00H] denotes a hexadecimal value of zero.

NOTE 2:MDL value depends on the EEPROM setting.

NOTE 3:CMD value depends on the IEEE1284.4 setting.

1.3.3 USB Interface

Standard: Based on:
 "Universal Serial Bus Specifications Rev. 1.0"
 "Universal Serial Bus Device Class Definition for Printing Devices Version 1.0"

Bit Rate: 12Mbps (Full Speed Device)

Data Encoding: NRZI

Adaptable Connector: USB Series B

Recommended Cable Length: 2 meters

Table 1-8. Connector Pin Assignment and Signals

Pin No.	Signal Name	I/O	Function Description
1	VCC	-	Cable power. Max. power consumption is 2mA.
2	-Data	Bi-D	Data
3	+Data	Bi-D	Data, pull up to +3.3 V via 1.5K ohm resistor.
4	Ground	-	Cable ground

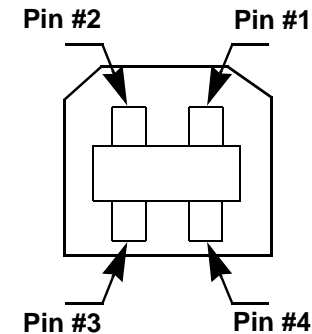


Figure 1-3. USB Pin Assignment

1.3.4 Prevention of Data Transfer Time-out

Generally, hosts abandon data transfer to peripherals when the peripheral is in the busy state for dozens of seconds continuously. To prevent this kind of time-out, the printer receives data very slowly, several bytes per minute, even if the printer is in the busy state. The slowdown starts when the remaining input buffer becomes several hundreds of bytes, and the printer finally gets into the busy state continuously when the input buffer is full.

USB and IEEE1284.4 on the parallel interface do not require such function.

1.3.5 Interface Selection

The printer has two built-in interfaces: the USB and parallel interface. These interfaces are selected automatically.

Automatic Selection

In this automatic interface selection mode, the printer is initialized to the idle state while scanning which interface receives data when it is powered on. Then the interface which received data first is selected. When the host stops data transfer and the printer is in the stand-by state for seconds, the printer is returned to the idle state. As long as the host sends data or the printer interface is in the busy state, the selected interface is let as it is.

Interface State and Interface Selection

When the parallel interface is not selected, the interface gets into the busy state. When the printer is initialized or returned to the idle state, the parallel interface gets into the ready state. Note that the interrupt signal such as the -INIT signal on the parallel interface is not effective while that interface is not selected.

1.3.6 IEEE1284.4 Protocol

The packet protocol described by IEEE1284.4 standard allows a device to carry on multiple exchanges or conversations which contain data and/or control information with another device at the same time across a single point-to-point link. The protocol is not, however, a device control language. It does provide basic transport-level flow control and multiplexing services. The multiplexed logical channels are independent of each other and blocking of one has no effect on the others. The protocol operates over IEEE1284.

Automatic Selection

An initial state is compatible interface and starts IEEE1284.4 communication when magic strings (1284.4 synchronous commands) are received.

On

An initial state is IEEE1284.4 communication and data that received it by the time it is able to take synchronization by magic string (1284.4 synchronous commands) is discarded.

Off

An initial state is compatible interface and never starts IEEE1284.4 communication even if magic strings (1284.4 synchronous commands) are received.

1.4 OPERATOR CONTROLS

1.4.1 Operating Switch

Operating switch is located on the control panel.

1.4.2 Control Panel

1.4.2.1 Switches

There are two non-lock type push switches, one lock-type push switch, and four LED lights.

1.4.2.2 Indicators

- (1) **Power**
Lights when the operating switch is "ON" and AC power is supplied.
- (2) **Paper Out**
Lights during the paper-out condition, and blinks during the paper-jam condition.
- (3) **Ink Out (Black)**
Lights during no black ink condition, and blinks during the black ink low condition.
- (4) **Ink Out (Color)**
Lights during no color ink condition, and blinks during the color ink low condition.

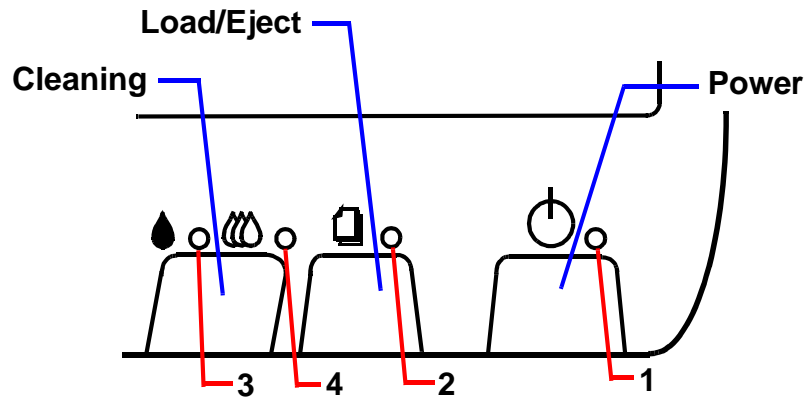


Figure 1-4. Control Panel

1.4.3 Panel Functions

Table 1-9. Panel Functions

Switch	Function
Load / Eject (Push for less than 2 sec.*)	<ul style="list-style-type: none"> Loads or ejects a paper. When the carriage is on the ink cartridge replacement position, return the carriage to the capping position.
Load / Eject (Push for 2 sec.*)	<ul style="list-style-type: none"> Starts the ink cartridge replacement sequence.** Moves the carriage to the cartridge replacement position.
Cleaning (Push for 2 sec.*)	<ul style="list-style-type: none"> Starts cleaning of the printhead. In the condition of "Ink Low", "Ink Out", or "No Ink Cartridge", starts the ink cartridge replacement sequence.**
Cleaning (Push for less than 2 sec.*)	<ul style="list-style-type: none"> When the carriage is on the ink cartridge replacement position, return the carriage to the capping position.

* It is described in the user's manual that three seconds are required.

**This function is not available in printing status.

Table 1-10. Panel Function with Power On

Switch	Pressing with Power On Function
Load / Eject	<ul style="list-style-type: none"> 1) Starts status printing. *1
Cleaning	<ul style="list-style-type: none"> Changes code pages / Select IEEE1284.4 mode for parallel I/F. *2
Load/Eject + Cleaning	<ul style="list-style-type: none"> Enters the special settings mode. (Factory use only). *3

*1: One of the following actions is carried out according to the content of 1BH of EEPROM.

Content of 1BH of EEPROM, [bit7] [bit6]	Action
00	Print firmware version, ink counter, selected code page and nozzle check pattern.
11	
01	Start hex-dump printing.
10	Start self test printing.

*2: Not described in the user's manual.

*3: See the table below.

Table 1-11. Special Setting Mode

Switch	Function
Load / Eject	<ul style="list-style-type: none"> Initialize EEPROM and reset timer IC.
Cleaning (Push for 10 seconds)	<ul style="list-style-type: none"> Reset the ink overflow counter in EEPROM.

1.4.4 Printer Condition and Panel Status

Table 1-12. Printer Condition and LED Status

Printer Status	Indicators				Priority
	Power	Ink Out (Black)	Ink Out (Color)	Paper Out	
Power On Condition	On	-	-	-	9
Ink Sequence	Blink	-	-	-	6
Ink Cartridge Replacement Mode	Blink	-	-	-	5
Data Processing	Blink	-	-	-	8
Paper Out	-	-	-	On	4
Paper Jam Condition	-	Off	Off	Blink	3
No Ink Cartridge / Ink End (Black)	-	On	-	-	7
Ink Level Low (Black)	-	Blink	-	-	7
No Ink Cartridge or Ink End (Color)	-	-	On	-	7
Ink Level Low (Color)	-	-	Blink	-	7
Enter EEPROM and Timer IC Reset	-	ON (for 1 second only)			-
Maintenance Request	Blink	Blink	Blink	Blink	2
Fatal Error	Blink	On	On	Blink	1

1.4.5 Printer Initialization

There are three kinds of initialization methods, and the following explains each initialization.

1. Power-on Initialization
This printer is initialized when turning the printer power on, or printer recognized the cold-reset command (remote RS command).

When printer is initialized, the following actions are performed:
(a) Initializes printer mechanism.
(b) Clears input data buffer.
(c) Clears print buffer.
(d) Sets default values.
2. Operator Initialization
This printer is initialized when turning the printer power on again within 10 seconds from last power off, or printer recognized the -INIT signal (negative pulse) of parallel interface.

When printer is initialized, the following actions are performed:

- (a) Cap the printer head.
- (b) Eject a paper.
- (c) Clears input data buffer.
- (d) Clears print buffer.
- (e) Sets default values.

3. Software Initialization
The ESC@ command also initialize the printer.

When printer is initialized, the following actions are performed:

- (a) Clears print buffer.
- (b) Sets default values.

1.4.6 Errors

Ink Out

When the printer runs out most of the ink of any color, it indicates ink-low and keeps printing. When the printer runs out the whole ink of any color, it stops printing and indicates ink-out error. User is then requested to install a new ink-cartridge in this state. An ink-cartridge that has been taken out once should never be used again. Re-installation of the cartridge not filled fully upsets the ink level detection and may eventually cause a serious problem in the print head.

Paper Out

When the printer fails to load a sheet, it goes into a paper out error.

Paper Jam

When the printer fails to eject a sheet, it goes into a paper jam error.

No Ink-Cartridge

When the printer detects that ink-cartridge comes off, it goes into this error mode.

Maintenance Request

When the total amount of ink wasted through cleanings and flushing reaches to the limit, printer indicates this error and stops. In such a case, the absorber in the printer enclosure needs to be replaced with new one by service personnel.

Fatal Errors

Carriage control error or CG access error.

1.5 PAPER

1.5.1 Paper Handling

Do not perform reverse feed more than 9.5mm (0.38").

1.5.2 Paper Specification

1.5.2.1 Cut Sheet

[Size]

For Stylus Color 860/1160:

A4:	Width 210mm (8.3") x Length 297mm (11.7")
Letter:	Width 216mm (8.5") x Length 279mm (11.0")
B5:	Width 182mm (7.2") x Length 257mm (10.1")
Legal:	Width 216mm (8.5") x Length 356mm (14.0")
Statement:	Width 139.7mm (5.5") x Length 215.9mm (8.5")
Executive:	Width 184.2mm (7.25") x Length 266.7mm (10.5")
Photo Paper:	Width 101.6mm (4") x Length 152.4mm (6")

For Stylus Color 1160 only:

A3:	Width 297mm (11.7") x Length 420mm (16.5")
A3+:	Width 329mm (13.0") x Length 483mm (19.0")

[Thickness]

0.08mm (0.003") - 0.11mm (0.004")

[Weight]

64g/m² (17lb.) - 90g/m² (24lb.)

[Quality]

Exclusive paper, Bond paper, PPC

1.5.2.2 Transparency, Glossy Paper

[Size]

For Stylus Color 860/1160:

A4:	Width 210mm (8.3") x Length 297mm (11.7")
Letter:	Width 216mm (8.5") x Length 279mm (11.0")

For Stylus Color 1160 only:

A3+:	Width 329mm x Length 483mm (Glossy Paper)
------	---

[Thickness]

0.075mm (0.003") - 0.085mm (0.0033")

**Transparency printing is available only at normal temperature.*

1.5.2.3 Envelope

[Size]

No.10:	Width 241mm (9 1/2") x Length 104.8mm (4 1/8")
DL:	Width 220mm (8.7") x Length 110mm (4.3")
C6:	Width 162mm (6.4") x Length 114mm (4.5")

[Thickness]

0.16mm (0.006") - 0.52mm (0.02")

[Weight]

45g/m² (12lb.) - 75g/m² (20lb.)

[Quality]

Bond paper, Plain paper, Air mail

Note 1: Envelope printing is available only at normal temperature.

Note 2: Keep the longer side of the envelope horizontally at setting.

1.5.2.4 Index Card

[Size]

A6 Index Card:	Width 105mm (4.1") x Length 148mm (5.8")
A5 Index Card:	Width 148mm (5.8") x Length 210mm (8.3")
5 x 8" Index Card:	Width 127mm (5.0") x Length 203mm (8.0")
10 x 8" Index Card:	Width 127mm (5.0") x Length 203mm (8.0")

[Thickness]

Less than 0.23mm (0.0091")

1.5.3 Printing Area

1.5.3.1 Cut Sheet

See the figure below and tables on the right for printable areas for Raster Graphics mode and Character mode.

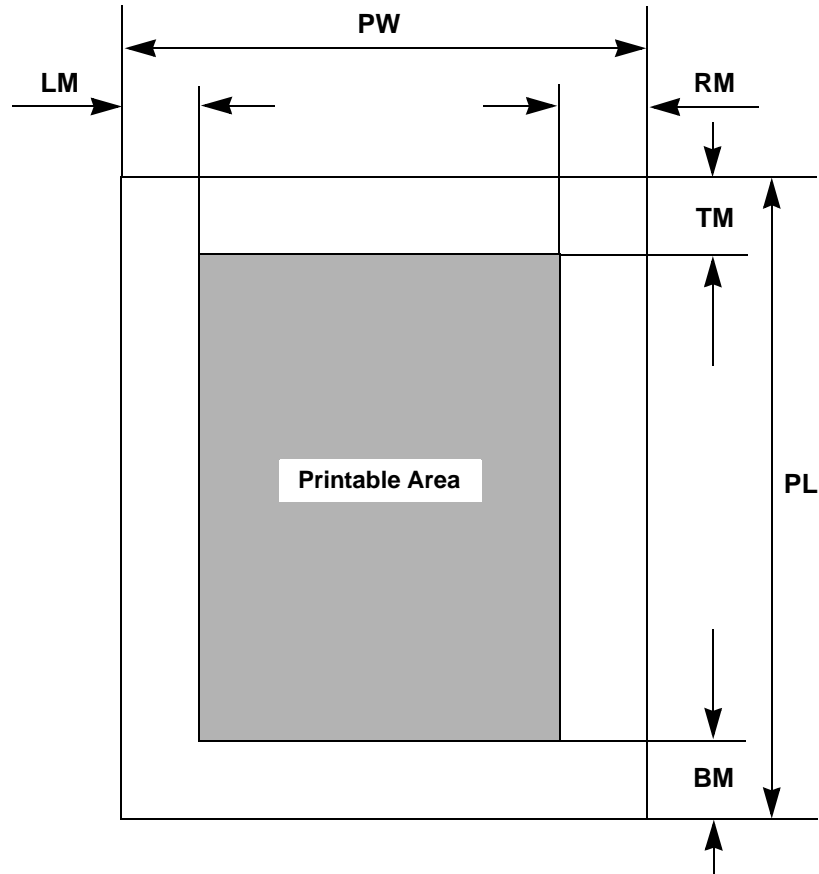


Figure 1-5. Printable Area for Cut Sheet

Table 1-13. Character Mode

Paper Size	Left Margin (min.)	Right Margin (min.)	Top Margin (min.)	Bottom Margin (min.)
A3 (*1)	3mm (0.12")	3mm (0.12")	3mm (0.12")	14mm (0.54") / 3mm (0.12") (*2)
A4	3mm (0.12")	3mm (0.12")	3mm (0.12")	14mm (0.54") / 3mm (0.12") (*2)
Letter	3mm (0.12")	9mm (0.35")	3mm (0.12")	14 mm (0.54") / 3mm (0.12") (*2)
B5	3mm (0.12")	3 m (0.12")	3mm (0.12")	14 mm (0.54") / 3mm (0.12") (*2)
Legal	3mm (0.12")	9mm (0.35")	3mm (0.12")	14 mm (0.54") / 3mm (0.12") (*2)
Statement	3mm (0.12")	3mm (0.12")	3mm (0.12")	14 mm (0.54") / 3mm (0.12") (*2)
Executive	3mm (0.12")	3mm (0.12")	3mm (0.12")	14 mm (0.54") / 3mm (0.12") (*2)

Table 1-14. Raster Graphics Mode

Paper Size	Left Margin (min.)	Right Margin (min.)	Top Margin (min.)	Bottom Margin (min.)
A3*	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **
A3+*	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **
A4	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **
Letter	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **
B5	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **
Legal	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **
Statement	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **
Exclusive	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") **

* For Stylus Color 1160 only.

** Bottom margin can be reduced to 3mm when paper dimension is defined by using command, otherwise it is not reduced (14mm). As for an area between 3mm and 14mm margin, printing quality may decline.

*** Refer to 1.5.2 Paper Specification for PW (paper width) and PL (paper length).

1.5.3.2 Envelopes

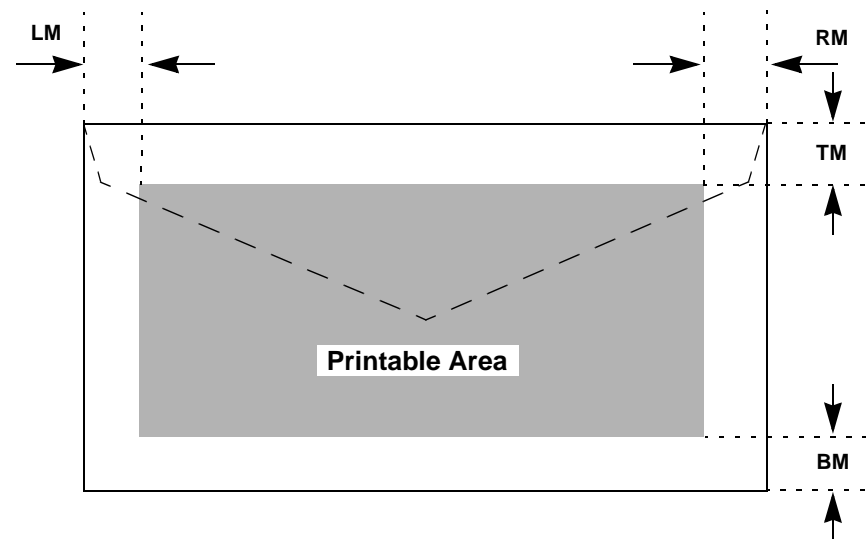


Figure 1-6. Printable Area for Envelopes

Table 1-15. Envelope Margin

Size	Left Margin (min.)	Right Margin (min.)	Top Margin (min.)	Bottom Margin (min.)
#10	3 mm (0.12")	28 mm (1.10")	3 mm (0.12")	14 mm (0.55")
DL	3 mm (0.12")	7 mm (0.28")	3 mm (0.12")	14 mm (0.55")
C6	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.55")

1.6 INK CARTRIDGE

1.6.1 Black Ink Cartridge

Type:	Exclusive Cartridge
Color:	Black
Print Capacity:	900 pages/A4 (ISO/IEC 10561 Letter Pattern at 360 dpi)
Ink Life:	2 years from date of production
Storage Temperature:	
Storage:	-20 °C to 40 °C (within a month at 40 °C)
Packing:	-30 °C to 40 °C (within a month at 40 °C)
Transit:	-30 °C to 60 °C (within 120 hours at 60 °C and within a month at 40 °C)
Dimension:	27.8 mm (W) x 52.7 mm (D) x 38.5 mm (H)

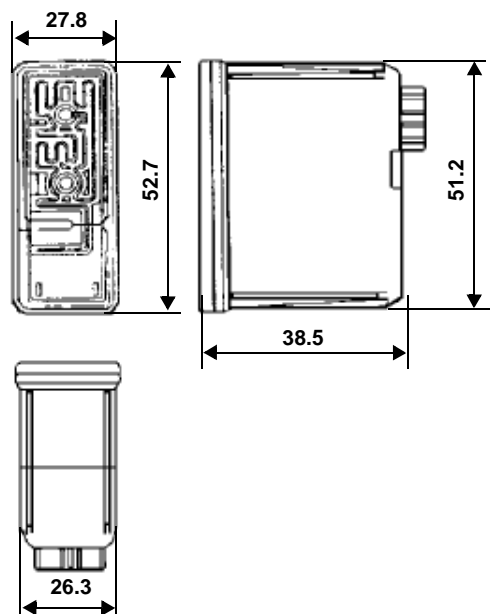


Figure 1-7. Black Ink Cartridge

1.6.2 Color Ink Cartridge

Type:	Exclusive Cartridge
Color:	Magenta, Cyan, Yellow
Print Capacity:	300 pages / A4 (360 dpi, 5% duty each color)
Ink Life:	2 years from date of production
Storage Temperature:	
Storage:	-20 °C to 40 °C (within a month at 40 °C)
Packing:	-30 °C to 40 °C (within a month at 40 °C)
Transit:	-30 °C to 60 °C (within 120 hours at 60 °C and within a month at 40 °C)
Dimension:	42.9 mm (W) x 52.7 mm (D) x 38.5 mm (H)

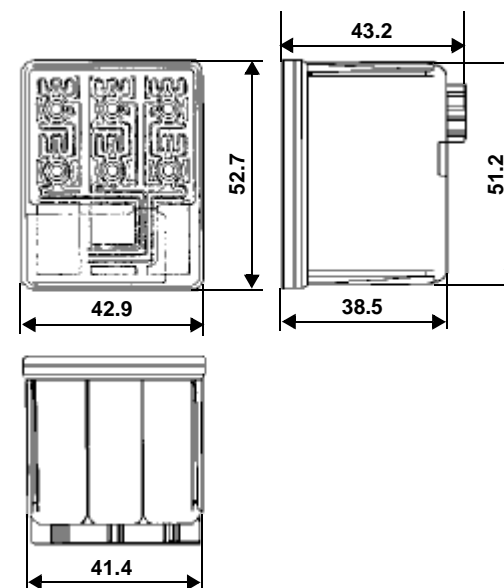


Figure 1-8. Color Ink Cartridge

Note 1: Ink cartridge can not be refilled. The ink cartridge is prepared only for article of consumption.

Note 2: Do not use the ink cartridge which contains life-expired ink.

Note 3: Ink will be frozen under -4 °C environment; however, it will be usable after being left at room temperature for more than three hours.

CHAPTER

2

OPERATING PRINCIPLES

2.1 Overview

This section describes the operating principles of the printer mechanism and electrical circuit boards. The EPSON Stylus COLOR 860/1160 has the following boards:

- Main board: C298MAIN Board (Stylus COLOR 860/1160)
- Power supply board: C298PSB/PSE Board (Stylus COLOR 860/1160)
- Panel board: C298PNL Board (Stylus COLOR 860)
C304PNL Board (Stylus COLOR 1160)

2.1.1 Printer Mechanism

Unlike other EPSON ink jet printers, the Stylus COLOR 860/1160 uses DC motor for power source. Use of the DC motor enable the printer to lower noise during printing to a great extent. Table 2-1 shows the various motor types used in the printer and their applications.

Table 2-1. Motor Types and Corresponding Applications

Motor Name	Type	Application / Feature
CR Motor	DC with brush	Used to drive the carriage making little noise. A linear scale is used to monitor the motor's operating condition.
PF Motor	DC with brush	<ul style="list-style-type: none"> • Drives paper feeding rollers used to send paper at specified speeds and load/eject paper. • CR lock lever operation • To monitor paper feeding pitch, a loop scale is attached beside the high-precision gear.
Pump/ASF	4-Phase 48-pole stepping motor	<p>Like the Stylus COLOR 800 and Stylus Pro 5000, this motor manages pump drive and paper loading from ASF.</p> <p>Since this is a stepping motor, it has no scales or photo sensors that are used to monitor the motor's operating condition.</p>

The basic structure of the printer mechanism is mostly common to the Stylus COLOR 400/600/440/640/740, except that the Stylus COLOR 860/1160 uses a Pump/ASF motor. With this motor equipped, the paper loading mechanism and the pumping mechanisms are independently driven, which allows the printer to offer higher throughput as a result.

Figure 2-1 shows the printer mechanism block diagram for the Stylus COLOR 860/1160.

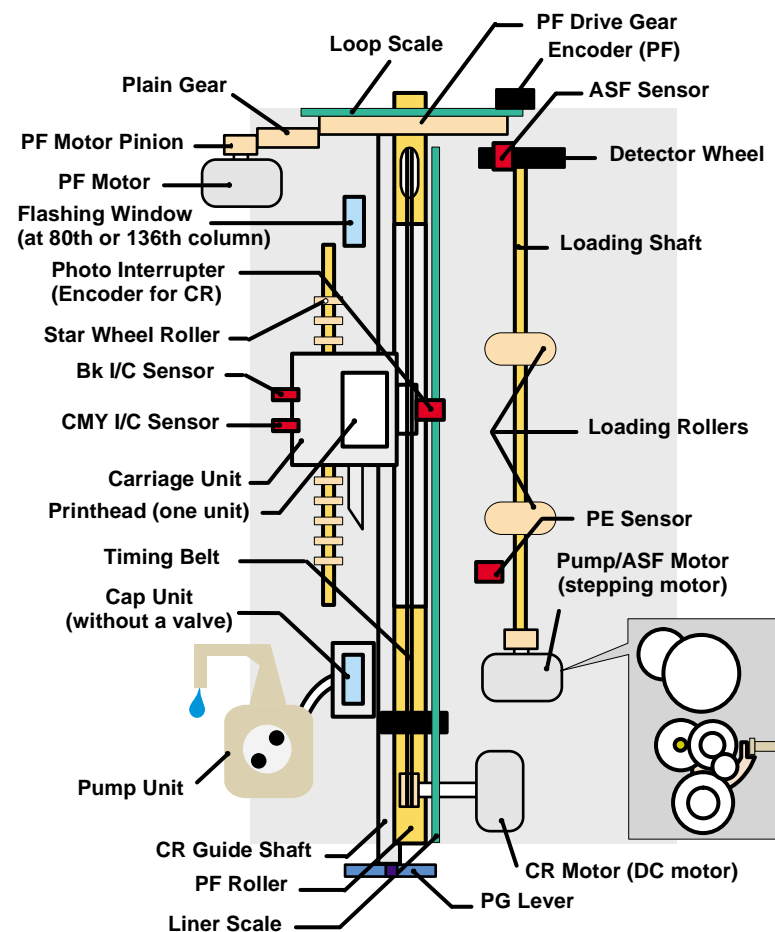


Figure 2-1. Printer Mechanism Block Diagram

2.1.1.1 Printing Mechanism

The basic operating principles of the printhead, which plays a major role in printing, are the same as previous models; ones that use a on-demand type U-CHIP head method. (Refer to Figure1-1.)

Also, unlike the Stylus Color IIs, 820 and 200, the Stylus COLOR 860/1160 is not an automatic correction type. So, in order to correct dispersion of multi layer piezo electric element that drives each nozzle, you are required to input a VH value written on the top surface of the printhead by using an exclusive program when you replace the printhead, control board, or printer mechanism. (Note there are no resistor arrays to determine the VH voltage on the main control board.) Following explains printhead.

- PZT
PZT is an abbreviation of Piezo Electric Element. Print signals from the Main board are sent through the driver board on the printhead unit to the PZT. Then, the PZT pushes the top cavity which has ink stored to discharge the ink from each nozzle on the nozzle plate.
- Cavity Set
The ink absorbed from the ink cartridge goes through the filter and then is stored temporarily in this tank called "cavity" until PZT is driven.
- Nozzle Plate
The board with nozzle holes on the printhead surface is called Nozzle Plate.
- Filter
When the ink cartridge is installed, if any dirt or dust around the cartridge needle is absorbed into the head, there is a great possibility of causing nozzle clog and disturbance of ink flow, and finally causing alignment failure and dot missing. To prevent this problem, a filter is set below the cartridge needle, where ink is filtered.

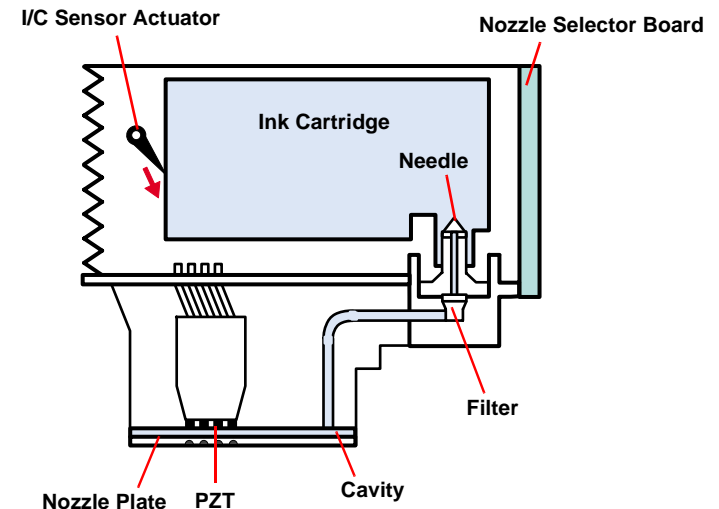


Figure 2-2. Printing Mechanism

2.1.1.2 Printing Process

Figure 2-3 and Figure 2-4 show the normal state and ejecting state of the printhead, respectively.

1. **Normal State:**

When the print signal is not output, PZT also does not move from a waiting state (normal state). (Refer to Figure 2-3.)

2) **Ejecting State:**

When the print signal is output from the C298MAIN board, IC (IR4C463S: Nozzle Selector) located on the printhead unit latches data once by 1-byte unit. An appropriate PZT latched by the nozzle selector is pushed into the cavity by the common voltage applied from the main board. By this operation, ink stored in the cavity spurts out from nozzles. (Refer to Figure 2-4.)

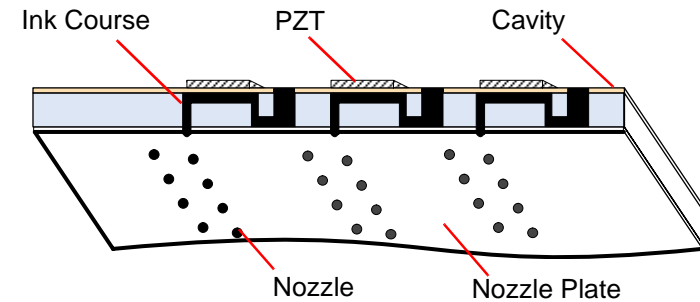


Figure 2-3. Print Head Normal State

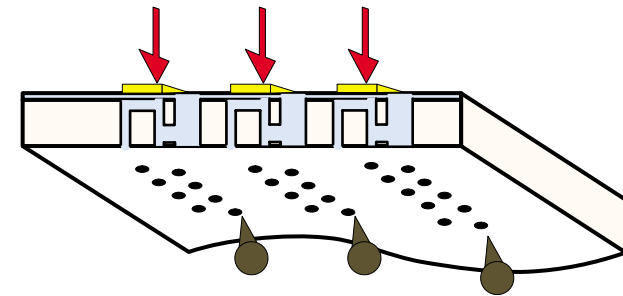


Figure 2-4. Print Head Ejecting State

2.1.1.3 Carriage Mechanism

The carriage mechanism for the Stylus COLOR 860/1160 is mostly the same as for other ink jet printers except it is driven by a DC motor. See the table below for the carriage motor specifications.

Table 2-2. Carriage Motor Specification

Items	Specifications
Type	DC Motor with brush
Drive Voltage	+42 V +/- 5%(DRV IC voltage)
Internal Resistance	29.2 ohms +/- 25%
Inductance	30.8 mH +/- 25%
Drive Method	Constant Current Chopping
Driver IC	LB1947

Unlike a stepping motor, the DC motor that drives the carriage can not detect the current carriage position by referring to the pulses given. Therefore, a linear scale is attached along the carriage operation range to enable the printer to mechanically detect the carriage position. The linear scale is also used to produce the print timing signal (PTS signal), to which the printer refers to for a correct ink ejection timing.

For detailed information on the CR motor control circuit, see Section 2.2.

The printhead, a core of the printing mechanism, is stored in the carriage unit. When the adjustment lever is moved up and down, this printhead is maintained tilt in a flexible and adjustable structure by the tilt adjustment mechanism. Also, the parallelism adjustment levers, mounted on the left and right sides of the carriage guide shaft, are used to set the carriage guide shaft parallel to the platen when the shaft has been installed to the printer mechanism. After this adjustment is completed, moving the PG adjustment lever sets the distance between the platen surface and the printhead surface to one of two possibilities: 1.14 mm or 1.84 mm. Moving the PG lever, you can rotate the shafts of the carriage guide shaft which itself is decentralized to change the distance. This is the mechanism that the user can use to adjust the appropriate PG value according to the printing result or any other environmental conditions such as thick paper.

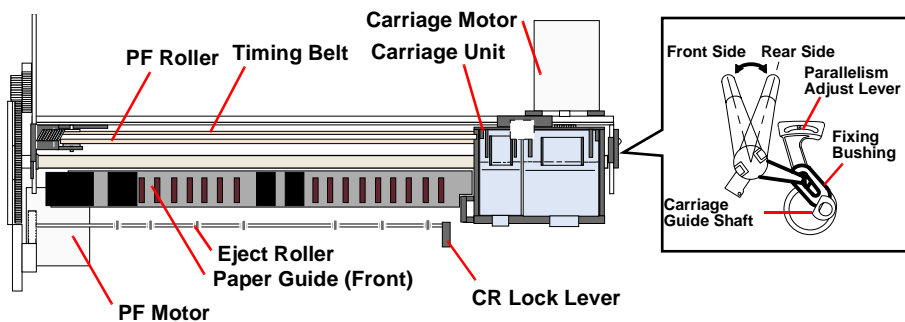


Figure 2-5. Carriage Mechanism (Top view)

2.1.1.4 Platen Gap (PG) Adjust Mechanism

The PG adjustment, at the left of the printer mechanism, consists of the PG lever, PF support lever, right/left parallelism adjustment levers, and CR guide shaft. The PG adjustment mechanism is designed to keep the platen gap correct for the paper thickness to prevent ink from smearing. The PG lever joins the CR guide shaft, which has an eccentricity via PG sub lever. Switching the lever from “0” to “+” rotates the CR shaft and changes the platen gap from narrow to wide.

Table 2-3. Platen Gap Adjust Lever Setting

Paper	Lever Position	PG adjustment value
All Media	Front	0 mm (1.14 mm between head and platen)
If you find any print problems or use thick paper.	Rear	0.7mm (1.84 mm between head and platen)

2.1.1.5 Paper Feeding Mechanism

The paper feeding mechanism transports paper loaded from ASF using the PF rollers and paper eject rollers. A new type of DC motor is used for the PF motor. See the table below for the DC motor specifications.

Table 2-4. PF Motor Specifications

Item	Description
Motor type	DC Motor with Brush
Drive voltage	+42V +/- 5% (DRV IC voltage)
Coil Resistance	31.1 ohm +/- 25%
Drive frequency [Hz]	26.6mH +/- 25%
Control method	A3958

Unlike a stepping motor, the DC motor that drives the paper feeding mechanism can not measure the paper feeding amount by referring to the pulses given. For this reason, the loop scale and encoder sensor are directly attached to the left end of the PF roller shaft to mechanically control paper feed amount. See Section 2.2 for detailed information on the PF motor control circuit.

Drive from the PF motor is sent to the PF rollers and paper eject rollers as described below.

- To the PF rollers:
PF motor pinion gear → Spur gear (76) → PF rollers
- To the eject rollers:
PF motor pinion gear → Spur gear (76) → Combination gear (13.5, 308) → Spur gear (28) → Paper eject rollers

Figure 2-6 in the next page gives the paper feeding mechanism block diagram, showing the parts along the PF motor drive transmission paths.

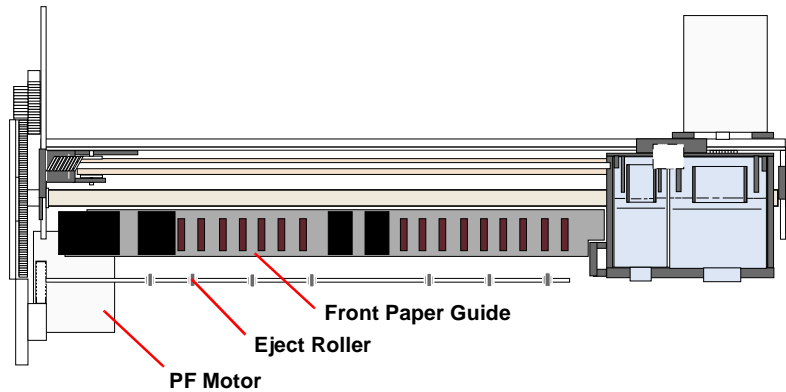


Figure 2-6. Paper Feeding Mechanism

The printer loads paper at the ASF, which is detected by the PE sensor attached to the right side of the top frame, and advances it to send the paper's leading edge to the halfway of the front paper guide. Then, to correct deflection, the printer feeds the paper back specified steps toward ASF, and advances the paper again toward the front paper guide and stops it at the specified TOF (Top Of Form) position. Once the printer starts printing, it transports paper using the PF rollers and sub rollers, and as the printer transports or printing on the tailing 14 mm, it uses a star wheel gear and paper eject rollers. Like the Stylus COLOR 440/640/740, this printer also provides this extra printable range of 14 mm from the bottom edge, excluding the bottom margin of 3mm, by changing the position of the star wheel gear; it has been shifted by 5° from the top of the eject roller toward the front paper guide. Due to this change, the tailing edge of paper is suppressed, and the printer can advance paper steadily when printing around the bottom area. See Figure 2-7 next page that shows how paper is transported and parts involved.

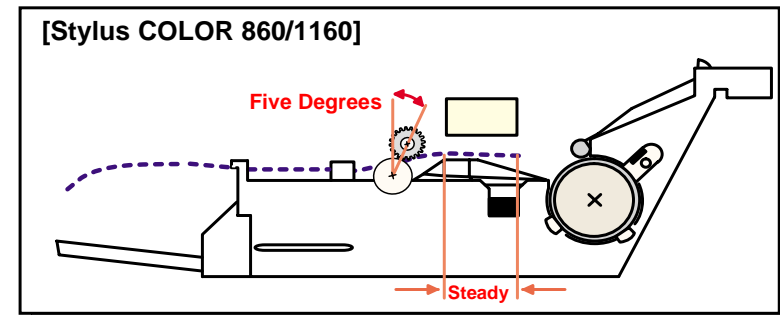
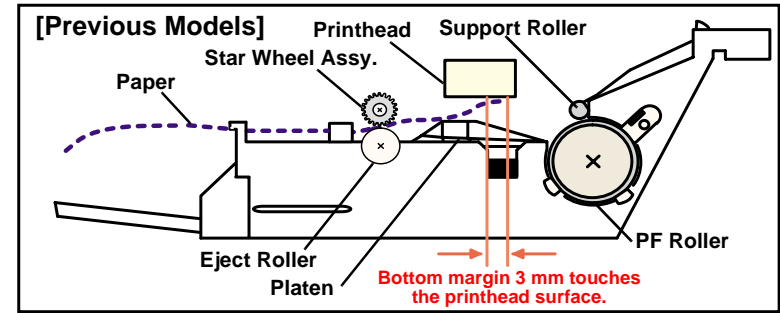


Figure 2-7. Paper Transportation

2.1.1.6 CR Lock Mechanism

The carriage lock mechanism prevents the carriage from being left at an uncapped position for a long time, which is usually caused by vibration during printer transportation, user's mishandling of the printer, and so on.

The CR Lock mechanism is driven with the DC PF motor. For the motor specifications, refer to the Table 2-4 . The PF motor drive is used for the Paper Feed Mechanism also and the CR lock mechanism is controled depends on the direction of the PF motor rotationa. The CR lock mechanism is assembled on the right tip of the Paper Eject Roller as shown in the folloiwng figure.

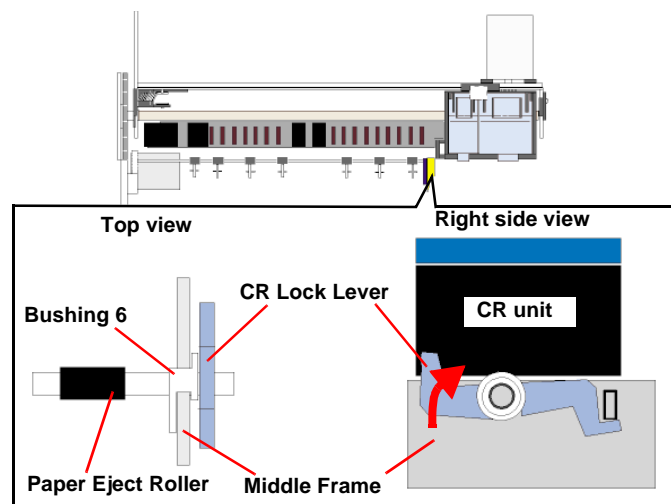


Figure 2-8. CR Lock mechanism

While the PF motor drive is used for paper feeding (PF motor rotation: CCW), the CR Lock lever is set under the Paper Eject Frame, but the CR Lcok lever rises up with clockwise rotation of the PF motor and locks the CR unit. Drive from the PF motor is sent to the CR Lock lever via Papaer Eject Roller as described below.

To the CR lock lever
 PF motor pinion gear (CW rotation)→ Spur gear (76) → Combination gear (13.5, 30.8) → Spur gear (28) → Paper eject rollers→ CR lock lever

The carriage lock mechanism prevents the carriage from being left at an uncapped position for a long time, that is usually caused by vibration during printer transportation, user's mishandling of the printer, and so on. If the carriage is left uncapped for a long time, ink on its surface will become gradually thick and not spurt from the nozzles as a result.

To make matters worse, the holes (crater) of the nozzles may be completely clogged by the thick ink, and they may not be able to return to a normal condition just by a cleaning operation. To prevent this, the printer enters a carriage lock condition in the following conditions.

- After Power-off operation:**
 If the printer power is turned off in the middle of printing or any other performances, carriage lock takes place in the end after an initialization operation.
- After Power-on operation:**
 After the printer power is turned on and an automatic power-on cleaning is completed, carriage lock is performed. The power-on cleaning is an automatic head cleaning that runs when the printer power is turned on. The timer IC always calculates printer's power off time using power from a lithium battery mounted on the C298MAIN board. The power-on cleaning function automatically selects a correct cleaning level according to the length of time which the printer has been turned off.
- After ejecting paper:**
 After the Load/Eject button is pressed and the paper is ejected, if the printer does not receive any data, it performs carriage lock and goes to a standby state. However, if paper is loaded by pressing the Load/Eject button, the printer does not perform the carriage lock operation.

PF motor torque is always transmitted to the CR lock lever side, but the operation of the CR lock mechanism varies depending on the rotational direction of the PF motor, as shown in the table below.

Table 2-5. CR lock mechanism & PF rotational direction

Directions	Corresponding Functions
Counterclockwise	<ul style="list-style-type: none"> • Release the CR lock lever.
ckwise	<ul style="list-style-type: none"> • Sets the CR lock lever.

2.1.1.7 Paper Loading Mechanism

The paper loading mechanism loads paper at the ASF unit and feeds paper to the PF rollers. The ASF unit, the same as in the Stylus COLOR 440/640/740, uses a 4-phase 48-pole PM type stepping motor for the ASF/Pump motor. Drive sent from this motor is switched between the ASF unit side and pump unit by the disengage mechanism. See Figure 2-6 for the ASF/Pump motor specifications.

Table 2-6. ASF/Pump Motor Specifications

Items	Description
Motor type	4 Phase/ 48-pole /PM type pulse motor
Drive method	Bipolar drive
Drive voltage	+42V +/- 5% (DRV IC voltage)
Coil Resistance	10.4 ohm +/- 10%
Drive frequency [Hz]	15mH
Control method	A3958

The rotational directions and their functions are shown in the table below:

Table 2-7. ASF/Pump Motor Rotation

Directions	Corresponding Functions
Clockwise	<ul style="list-style-type: none"> • Sets the paper return lever. • Switches torque to the ASF side.
Counterclockwise	<ul style="list-style-type: none"> • Loads paper at ASF.

Torque from the ASF/Pump motor is transmitted to the ASF as described below:

- Torque transmission to the ASF unit
 - 1) When the CR unit moves to the right end of the CR shaft, the DE lock lever is pushed to the right end.
 - 2) The ASF-Pump motor rotates clockwise specified steps (viewed from the motor pinion gear side).
 - 3) With the rotation of step 2), the planetary gear set in the disengage unit shifts to the combination gear (12, 22.4) side.
 - 4) The CR unit moves specified steps from the right end of the CR shaft to the left. With this movement, the DE lock lever fixes the planetary gear unit.
 - 5) Torque from the ASF/Pump motor is transmitted as described below.
 Motor pinion gear → Planetary gear (15.2) → Combination gear (12, 22.4) → Combination gear (14, 28) → Spur gear (32) in ASF

Figure 2-9 shows the disengage mechanism and the parts involved.

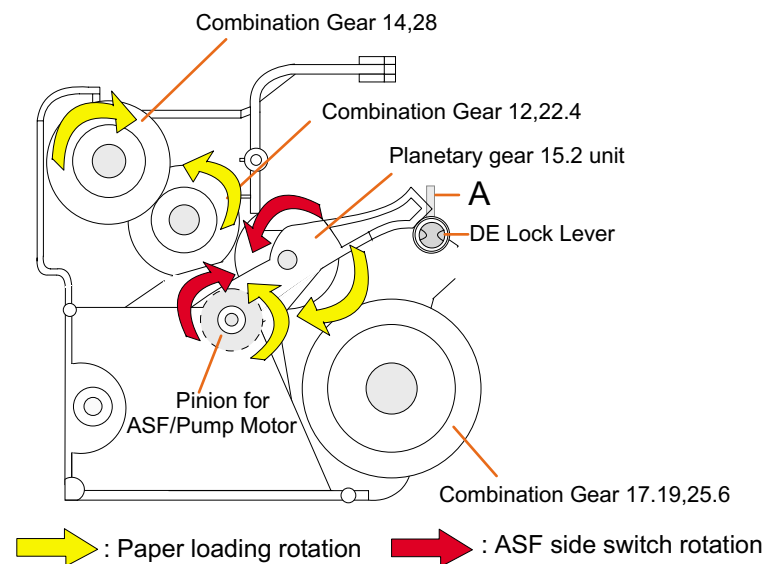


Figure 2-9. Disengage Mechanism

Torque sent from the ASF/Pump motor to the ASF unit via the disengage mechanism is used for the following operation.

□ Paper loading operation

Like the Stylus COLOR 440/640/740, ASF of this printer has the multiple paper loading prevention mechanism to provide steady paper loading. This mechanism prevents a sheet of paper from falling from the paper set position into the paper path. A paper return lever in the mechanism pushes paper that may have fallen off back onto the hopper. After this motion is completed, the LD roller starts loading paper. The paper loading mechanism, including the multiple paper loading prevention mechanism, is described in the following steps.

1. When the printer power is turned on, the ASF/Pump motor rotates counterclockwise to detect ASF home position. Then the motor rotates clockwise specified steps to set the LD roller and paper turn lever in place. (See "Standby State" in Figure 2-10.)
2. When the paper loading signal is sent from the PC and the Load/Eject button is pressed, ASF/Pump motor turns counterclockwise to let the LD roller load paper. (See "Paper Pick Up State" in Figure 2-10.)
3. When the paper is transported to the PF roller, the LD roller stops where it loses friction. (See "PF Roller Paper Feed State" in Figure 2-10.)
4. When the next print signal is sent and Load/Eject button is pressed, the ASF/Pump motor rotates clockwise specified steps to set the LD roller and the paper return lever in place. (See "Standby State" in Figure 2-10.)

NOTE: If no print signal is sent for several seconds in step 4, the LD roller and the paper return lever automatically return to the standby state.

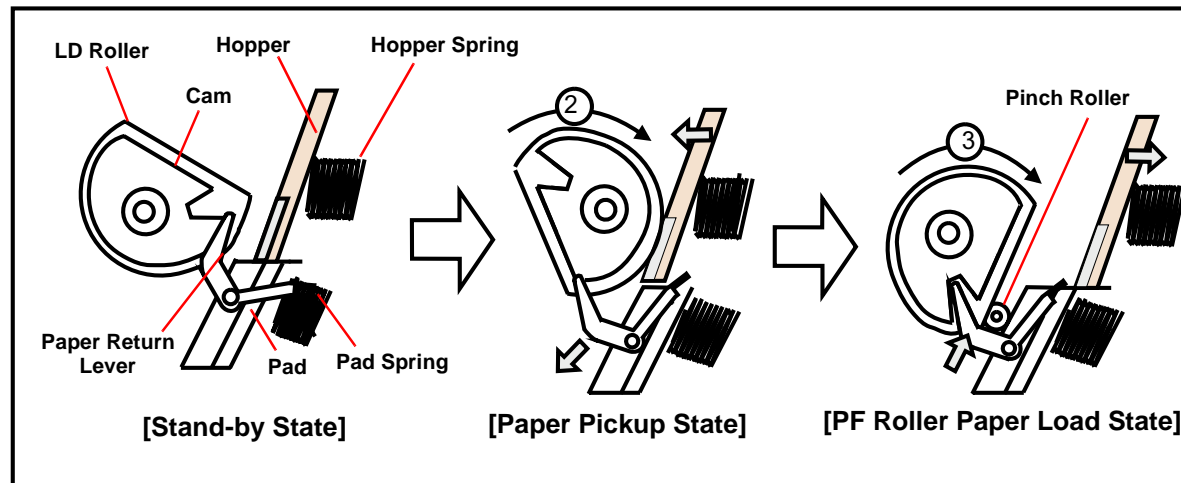


Figure 2-10. Multiple Paper Loading Prevention Mechanism

2.1.1.8 Pump Mechanism

The pump mechanism absorbs ink from the printhead or the cap assembly. The wiper for head cleaning is attached in the cap assembly. The pump mechanism is driven by the ASF/Pump motor, a 4phase 48-pole PM type stepping motor. See Table 2-6 for the ASF/Pump motor specifications. Torque from the ASF/Pump motor is sent to the pump unit by the switching operation of the planetary gear in the disengage mechanism. The ASF/Pump motor torque is transmitted to the pump mechanism as described below.

□ Torque transmission to the pump unit

- 1) When the CR unit moves to the right end of the CR shaft, the DE lock lever) is pushed to the right end.
- 2) The ASF-Pump motor rotates specified steps counterclockwise (viewed from the motor pinion gear side).
- 3) With the rotation of step 2), the planetary gear set in the disengage unit moves to the combination gear (17.19, 25.6) side.
- 4) The CR unit moves specified steps from the right end of the CR shaft to the left. With this motion, the DE lock lever fixes the planetary gear set.
- 5) Torque from the ASF/Pump motor is transmitted as described below.
 Motor pinion gear → Planetary gear (15.2) → Combination gear (17.19, 25.6) → Tension belt → Spur gear → Pump unit

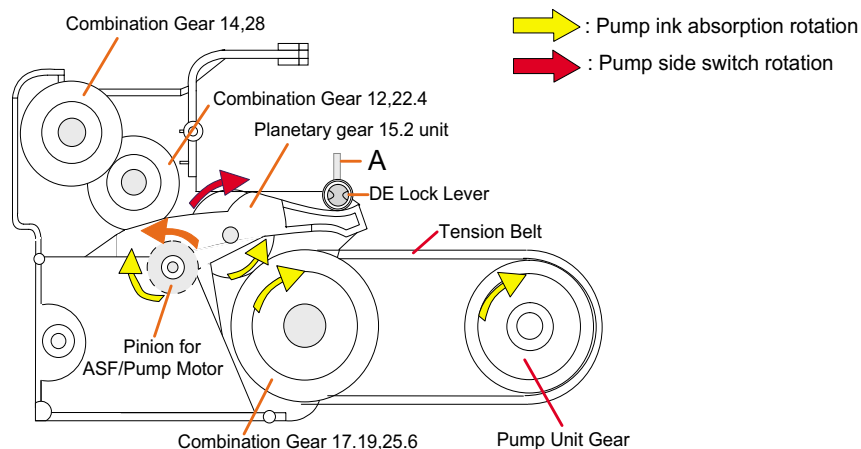


Figure 2-11. Torque to the Pump Mechanism

When the ASF/Pump motor torque is switched to the pump unit side by the disengage mechanism, the function of the pump mechanism varies depending on the rotational direction of the motor, as shown in the table below.

Table 2-8. ASF/Pump Motor Functions

Directions	Corresponding Functions
Counterclockwise	<ul style="list-style-type: none"> • Switches torque to the ASF side. • Ink absorption by the pump • Sets the wiper.
Clockwise	<ul style="list-style-type: none"> • Releases the pump. • Resets the wiper.

Figure 2-12 shows the operating principles of the pump mechanism.

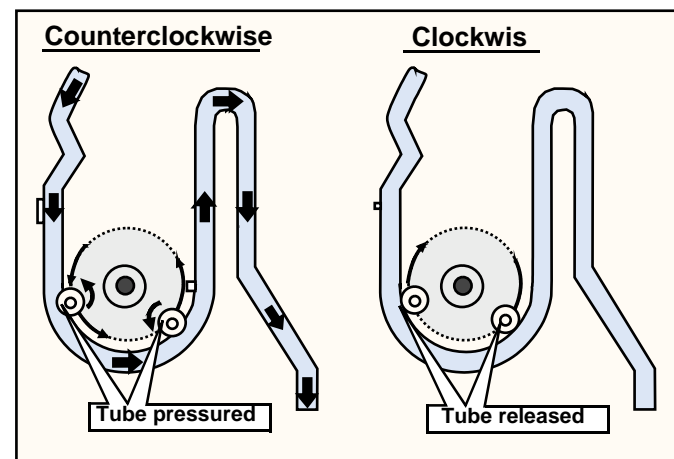


Figure 2-12. Pump Mechanism

2.1.1.9 Capping Mechanism

The capping mechanism, which is driven by the pump unit, caps the printhead closely to maintain air tightness of the cap. This operation is required to vacuum ink from the ink cartridges, printhead, cavity, and cap. Also, to moisten the inside of the cap while the printer power is off, this mechanism works to keep the cap and the printhead surface in a tight contact. This function prevents ink from clogging while the printer is not in use.

For a specific feature of the Stylus COLOR 860/1160, it has a newly designed valveless capping mechanism instead of other printers' capping mechanism that integrates an air valve. An air valve is usually equipped to remove bubbles created inside the cap by releasing the negative pressure. However, due to change in the ink sequence, the new valveless capping mechanism enables this printer to maintain the initial ink charge and cleaning effects at the same level as before. Figure 2-13 outlines the valveless capping mechanism.

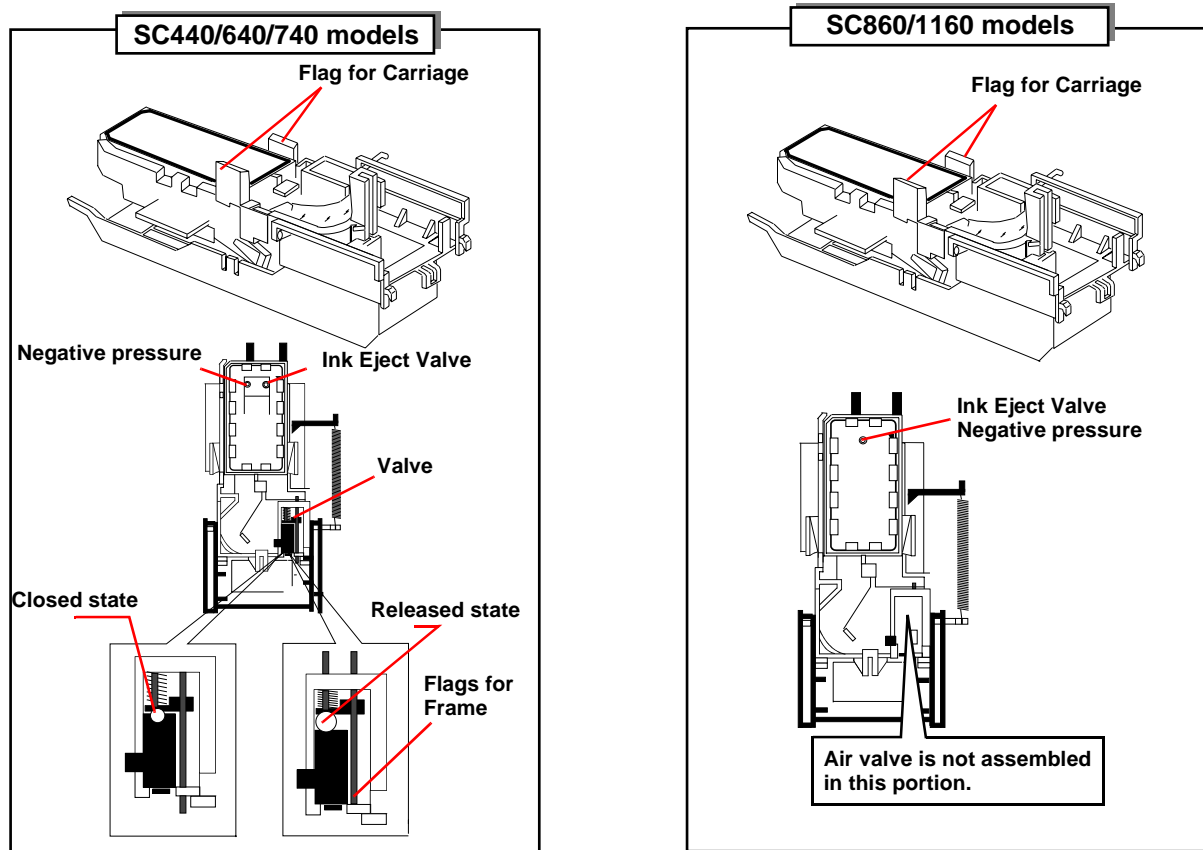


Figure 2-13. Valveless Capping Mechanism

2.2 Electrical Circuit Operating Principles

The electric circuit of the Stylus COLOR 860/1160 is composed of the following boards.

- Main board: C298MAIN (Stylus COLOR 860/1160)
- Power supply board: C298PSB/PSE (Stylus COLOR 860/1160)
- Panel board: C298PNL (Stylus COLOR 860)
C304PNL (Stylus COLOR 1160)

Refer to Figure 2-13 for the major connection of the three boards and their roles.

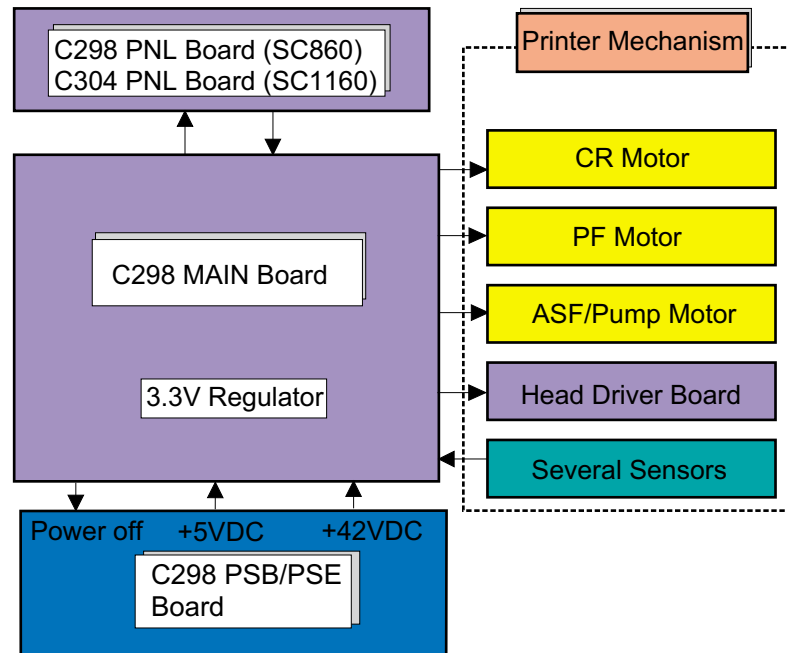


Figure 2-14. Electric Circuit of Stylus COLOR 860/1100

2.2.1 C298PSB/PSE Board

The Stylus COLOR 860 and Stylus COLOR 1160 are equipped with the C298PSB/PSE, the common power supply board for the both products. The basic structure of the circuit is the same as for the C257PSB/PSE board used in the Stylus COLOR 740. The power supply boards of these printers use a RCC switching regulator, which generates +42VDC for drive line and +5VDC for logic line to drive the printer. For one of the major characteristics of the C298PSB/PSE, it uses the secondary switch that is also used in the Stylus Color series. Use of the secondary switch enable the circuit to keep supplying voltage to 5 V line and 24 V line for approximately 30 seconds if the printer power is turned off through the panel switch. This extra time allows the printer to perform the following operations when the printer is turned off through the panel switch while it is in operation.

- When the printer is in a printing state, if the CR unit is away from the home position, the CR unit can return to the home position to be locked before the printer power shuts down.
- When the printer is not in a printing state, if paper fed from ASF remains in the printer, the paper is ejected before the printer power shuts down.

Table 2-9 in the right column shows the application of each voltage generated by C298PSB/PSE board.

NOTE: The 5VDC is only applied to the parts and locations shown in the Table 2-9. The C298MAIN, like the C267MAIN-B board*, uses the 3.3V drive chips for most of the logic line chips (CPU, ASIC, ROM, DRAM). For this reason, those chips are not driven by the +5VDC but 3.3VDC that is reduced by the IC9 (3.3VDC regulator) on the C298Main Board.

* Used in the minor changed models of the Stylus COLOR 740, Stylus Pro 750, and Stylus Pro 1200.

Figure 2-15 in the right column shows the block diagram for the C298PSB/PSE board. The process from the input of AC voltage to the output of 42 V DC and 5 V is explained in the following page.

Table 2-9. Application of the DC Voltages

Voltage	Application
+42VDC	CR Motor, ASF/Pump Motor, PF Motor Head driving power supply
+5VDC	Sensor circuit power supply voltage LED panel drive power supply Nozzle selector control signal voltage I/F Control Circuit Slave CPU for DC motor control

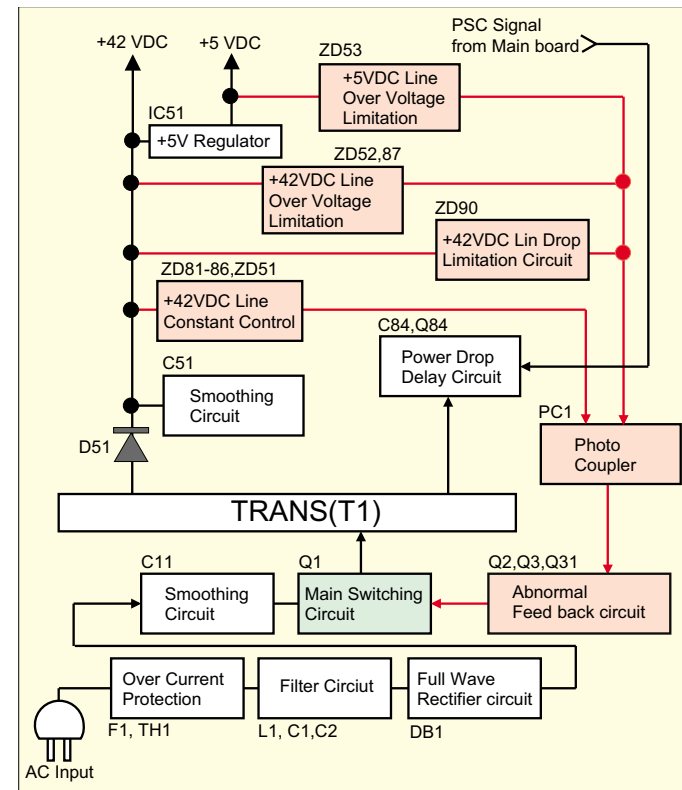


Figure 2-15. C298PSB/PSE Board Block Diagram

1. Regardless of the state of the power switch (On or OFF), the voltage is always applied to the primary side of the power supply board from the moment or at the state that AC-plug is plugged in. At this time, F1 plays a role of preventing AC100V from coming into the F1.
L1 also prevents high harmonic wave noise generated in the RC circuit filter which consists of C1,C2 from going out, and eliminates the noise from outside here.
- 2) The AC is full-wave rectified by the diode bridge DB1, and converted to $\sqrt{2}$ x AC in voltage by the smoothing electrolytic capacitor C11.
- 3) The pressured up direct current turns Q1 on through the starting resistor R31 and starts the primary side of the circuit.
- 4) When the primary side is On, the energy (current) led by the electromagnetic induction through the trans (T1) does not flow to the secondary side since the diode (D51) on the secondary side is installed in the opposite direction.
- 5) When the energy which is charged in the trans is reaching the saturated state, the voltage which makes Q1 on becomes weak gradually. At the point that this voltage drops at the certain voltage, C13 absorbs the current in the opposite direction and Q1 is quickly shut off by the resulting sharp drop.
- 6) When the primary side is turned off, the energy charged in the T1 is opened according to the diode(D51) direction which is installed on the secondary side. Basically, 42 V DC is output by these circuit operations and the number of T1 spiral coil.
- 7) +5VDC is generated by pressured down this +42VDC as power supply. IC51 pressures down the +42VDC and generates precise +5VDC by chopping off the output, forming the standard sawtooth wave form by the outer RC integration circuit.

The C298PSB/PSE board has the various control circuits to stop voltage output if a malfunction occurs on the power supply board or the main board or while the printer mechanism is on duty. Following explains each control and protection circuit.

- +42V Line Constant Voltage Control Circuit:
The output level of the +42V line is monitored by a detection circuit composed of the seven Zener diodes. This circuit prevents the voltage from dropping for a constant level of the output voltage.

- +5V line over voltage protection circuit:
This protection circuit is in the same line as the +42V over voltage protection circuit is located. The output voltage level of the +5V line is monitored by a Zener diode. This circuit shuts down the +5V line forcefully when the voltage level exceeds +9V.
- +42VDC line drop limitation circuit:
This protection circuit is in the same line as +42V over voltage protection circuit is located. The output voltage level of the +42V line is monitored by a Zener diode. This circuit shuts down the +42V line forcefully when the voltage level drops to +36V.
- +42VDC line over voltage circuit:
This circuit is in the same line as +5V line over voltage protection circuit is located. The output level is monitored by two Zener diodes. If the voltage level exceeds +48VDC, this circuit shuts down the +42V line forcefully.
- +5V line constant voltage/constant current control circuit:
The output current is monitored by the +5VDC generation switching control IC (IC51), which also monitors the output voltage. This information is input to the internal comparator and stabilizes +5V line. The operations of the secondary side switch are explained below.
 - When the power is turned on, Q1 repeats on/off automatically along with the increase and decrease of energy on the trans coil at the primary side. While the power is on, the PSC signal is input to the power supply board from the C298MAIN board.
 - This signal turns Q84 on and it becomes possible to discharge energy between the terminals 8 and 9 of T1. At this time, even if the power is turned off, the electrolytic capacitor keeps Q84 on for a while, and by this electrolytic capacitor, voltage output is held at least 30 seconds. This time helps the printer to complete a power-off operation.

2.2.2 C298MAIN Board

The logic circuit of the C298MAIN is composed of the following:

- Logic line (CPU, ASIC, DRAM, EEPROM, and so on)
- Various motor control/driver circuits (CR motor, PF motor, and ASF/Pump motor)
- Head control/driver circuits
- Interface control (parallel I/F, USB I/F)
- Sensor circuits
- Timer circuits
- Reset circuits

This main board is mainly different from other models in the following two points.

- Use of the 3.3V chips in the logic circuit
 The 3.3 V regulator (IC9) on the C298MAIN produces 3.3 V by pressing down the 5.5 VDC, also generated on this board, to drive several chips. See the table below that separately shows the chips driven by the +5V and +3V.

Table 2-10. 3.3V Drive Chips & 5.5V Drive Chips

+5V	3.3V
Sensors	CPU
I/F Circuit	ASIC
PNL Board	P-ROM
Slave CPU	D-RAM

- Use of the slave CPU
 Since the CR motor and PF motor of this printer are DC motors, the slave CPU is attached on the main board in addition to the CPU and ASIC. This slave CPU, serving to control the DC motors only, reduces duty of the CPU and ASIC for faster data processing.

See Figure 2-16 for the C298MAIN board block diagram.

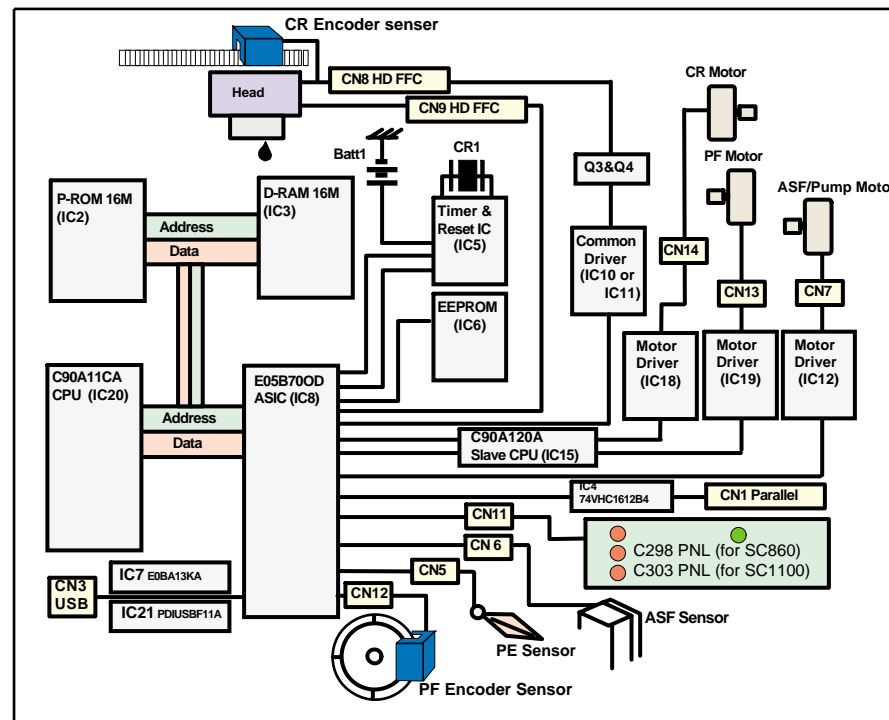


Figure 2-16. Block Diagram for the C298MAIN Board

Table 2-11 shows the functions of the CPU, ASIC, and slave CPU.

Table 2-11. Functions of the CPUs and ASIC

IC	Location	Function
CPU	IC20	<ul style="list-style-type: none"> • Sets the current value for the ASF/Pump motor. • Measures the printhead temperature. • Several interrupting functions • Outputs the system clock signal.
ASIC	IC8	<ul style="list-style-type: none"> • Controls interfaces. • Controls the printhead drive waveform circuit. • Transfers serial data to the printhead. • Controls the ASF/Pump motor • Receives panel control signals and sensor signals • EEPROM • Controls detection of the signals output from the encoder.
Slave CPU for DC motors	IC15	<ul style="list-style-type: none"> • Sets the current value for the PF motor and CR motor. • Controls the PF motor and CR motors.

2.2.2.1 Printhead Driver Circuit

The printhead driver circuit consists of the following two components:

- Common driver IC (IC10: E09A14RA) directly attached to the C298MAIN board.
- Nozzle selector IC (Sharp IR2C95F or EPSON SED6125T0A) on the head board.

The common driver (IC10: E09A14RA) generates a reference drive waveform according to the output signals from the C298MAIN board. The reference drive waveform is amplified by the transistors Q3 and Q4 and then transferred to the nozzle selector IC on the head board. Print data is converted to serial data by the ASIC (IC8 E05B70CD) and then sent to the nozzle selector IC on the head board. Based on the serial data, the nozzle selector IC determines the nozzles to be actuated. The selected nozzles are driven by the drive waveforms produced by the common driver. See Figure 2-17 for the printhead driver circuit block diagram.

Head common driver circuit

The reference head drive waveform is produced in the common driver (IC10: E09A14RA) based on the following 12 signal lines output from the ASIC (IC8 E05B70CD); A0-A4, CLK1, CLK2, RST, FLOOR, DATA, DCLK, and E.

By the DATA signal output from the ASIC (IC8 E05B70CD), the original data for the head drive waveform is written in the memory in the IC10. The addresses for the written data are determined by the A0 - A4 signals, and, of among, data used to determine the waveform angles is selected. Then, setting the selected data, producing trapezoid waveform value, and canceling the data are performed by the rising edges of the CLK1 and CLK2 signals.

Head nozzle selector circuit

Printing data is converted into serial data by the ASIC (IC8 E05B70CD). Then the converted data is allocated to the six rows, the number of the head nozzle rows, to be transferred to the nozzle selector (Sharp IR2C95F) through the six signal lines (HS01 to HS06). Data transmission from the ASIC (IC8 E05B70CD) to the nozzle selector synchronizes with the LAT signal and SCK clock signal. Referring to the transferred data, nozzles to be activated are selected, and the PZTs of the selected nozzles are driven by the drive waveform output from the head common driver.

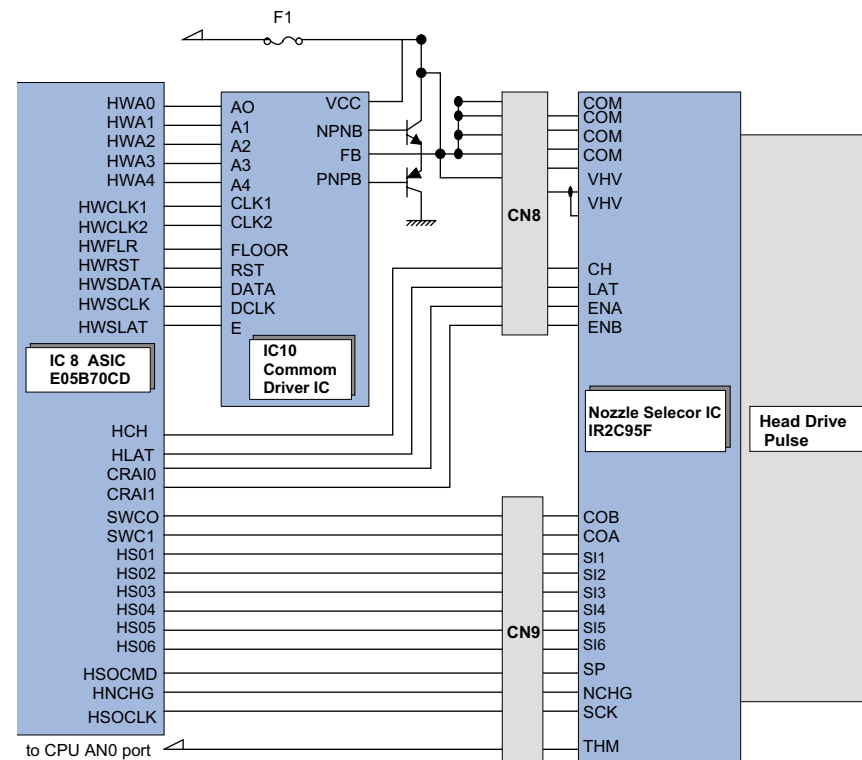


Figure 2-17. Printhead Driver Circuit

2.2.2.2 Reset Circuit

Reset circuits are attached on the C298MAIN board to monitor the two voltages: +5V for the logic line and +42V for the drive line. When each circuit detects abnormality on the corresponding line, it outputs a reset signal to reset CPU and ASIC. This function is necessary to prevent the printer from operating abnormally. IC5 RTC-9820SA, a reset circuit IC, is attached directly on the main board. This IC monitors both the +5V and +45 lines but can reset them independently. See Figure 2-18 for the block diagram for the reset circuits.

- +5V line reset circuit
The VDD port of the IC5 reset IC monitors the +5V line. When the IC detects an abnormal voltage level (4.3 V or lower), it outputs a reset signal from the RST port to CPU and ASIC.
- +42V line reset circuit
The VIN port of the IC5 reset IC monitors the +45V line. When the IC detects an abnormal voltage level (35.5V or lower), it outputs a reset signal from the VDT port to CPU and ASIC.

NOTE: IC5, also serving as RIC (Real Time Clock), manages timer control when the printer power is turned off. Power for this operation is supplied from the BAT1.

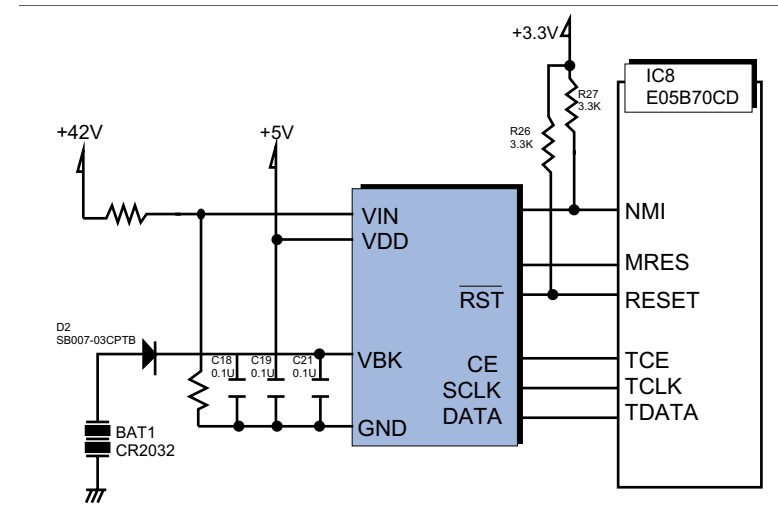


Figure 2-18. Reset Circuit Block Diagram

2.2.2.3 CR Motor Driver Circuit

The Stylus COLOR 860/1160 is equipped with a DC motor for the CR motor. In addition to the CPU and ASIC, a slave CPU is mounted on the C298MAIN board. Since the slave CPU is exclusively used to control DC motors, it reduces duty of CPU and ASIC to offer faster data processing.

□ CR motor driver circuit

The internal equivalent circuit of the CR motor driver IC (LB1947) is as shown below.

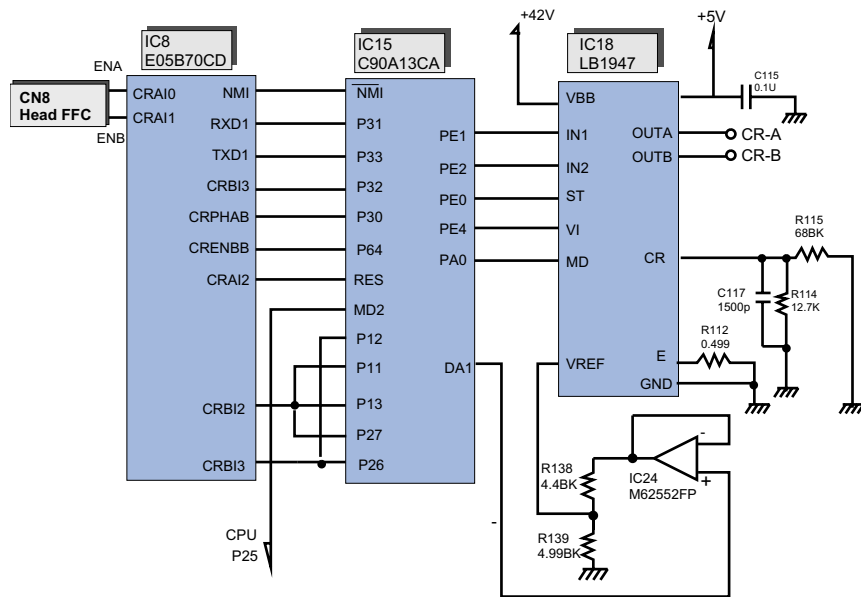


Figure 2-19. Internal Equivalent Circuit of the CR Motor Driver IC

The IC15 slave CPU controls the CR position by referring to the pulses sent from the linear encoder via IC8 ASIC. The CPU also sets an appropriate drive current value for the CR position and the direction in which the CR moves based on the data transmitted from the ASIC. So the slave CPU outputs specified control signals to the motor driver. The motor driver IC18 then outputs the CR motor drive current to the CR motor based on the signals sent from the IC15 slave CPU.

Unlike a stepping motor, the DC motor that drives the carriage can not detect the current carriage position by referring to the pulses given. For this reason, a linear scale is attached along the carriage operation range to detect the carriage position. The linear encoder sensor outputs two kinds of TTL level pulses Phase A and Phase B to IC8 ASIC.

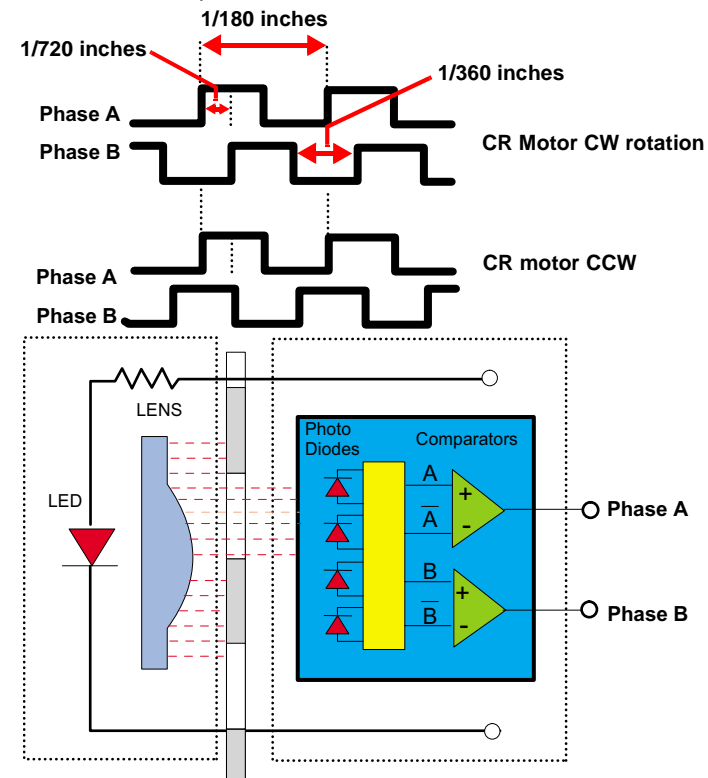


Figure 2-20. CR Linear Scale Encoder Pulse

Direction for the current CR's movement is detected based on the waveforms of the Phase A and Phase B that are out of phase, while carriage position is controlled by using the waveforms output from Phase A on a cycle basis (1 cycle: 1/180 inches). Phase between the output waveforms A and B is as shown in Figure 2-20. Note all edges in Phase A, Phase B output waveforms (1/720-inch cycle) are used to control the CR position while it is in the home position for ink system.

- Home position detection (capping position detection)
Home position is detected based on the pulses output from the linear scale sensor and CD motor control current value. The basic home position detection sequence is as described below:

1) The linear encoder pulse counter in the IC15 slave CPU is reset during a power-on sequence.

2) The CR motor moves clockwise and the CR moves from left to right. IC15 slave CPU once assumes that the CR comes in contact with the right frame when the following conditions are satisfied:

- The slave CPU detects the motor control current value 720mA
- P1 (= number of pulses output for the above CR movement) is 30* or less.

* Specified value that indicates CR is movable in the home position.
(All edges in the waveform are used in this condition.)

3) The CR motor rotates counterclockwise and the CR moves from right to left, and the IC15 slave CPU assumes that it detects the CR lock lever position when the following conditions are satisfied:

- IC15 slave CPU detects the motor control current value 500 mA.
- Difference X between P1 and P2 (= number of pulses output while the CR moves from the right frame) is 30 or less.

4) The CR motor rotates counterclockwise and the CR moves from left to right again, and if IC15 slave CPU detects the motor control current value 720 mA, it assumes that the CR comes in contact with the right frame again.

5) Difference between P1 and P3 (= number of pulses output for the CR's movement from the CR lock lever to the right frame) is 4 or less.

When all conditions in the sequence are satisfied, the printer detects the CR is in the home position.

- PTS (Print Timing Signal) production
The circuit produces PTS signal (cycle: 1/360 inches) by dividing waveform cycles for Phase A (cycle: 1/180 inches). The print timing signal is used to eject ink at a correct timing.

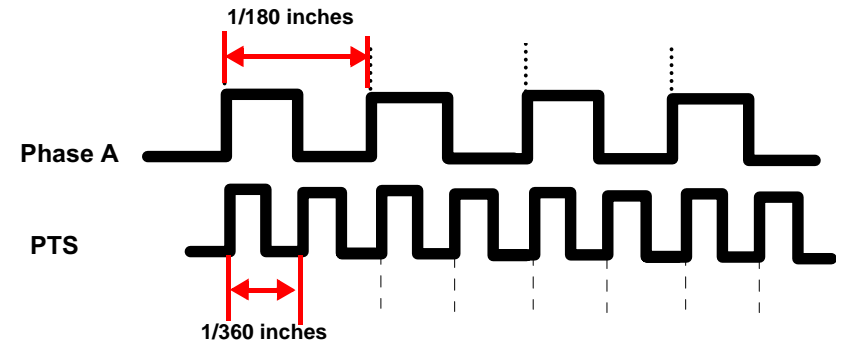


Figure 2-21. Print Timing Signal and Linear Encoder Phase A

NOTE: If the drive voltage for the CR motor reaches 800mA, a fatal error occurs.

2.2.2.4 PF Motor Driver Circuit

The Stylus COLOR 860/1160 is equipped with a DC motor for the PF motor. In addition to the CPU and ASIC, a slave CPU is mounted on the C298MAIN board. Since the slave CPU is exclusively used to control DC motors, it reduces duty of CPU and ASIC to offer faster data processing. The block diagram for the PF motor driver circuit is as shown below:

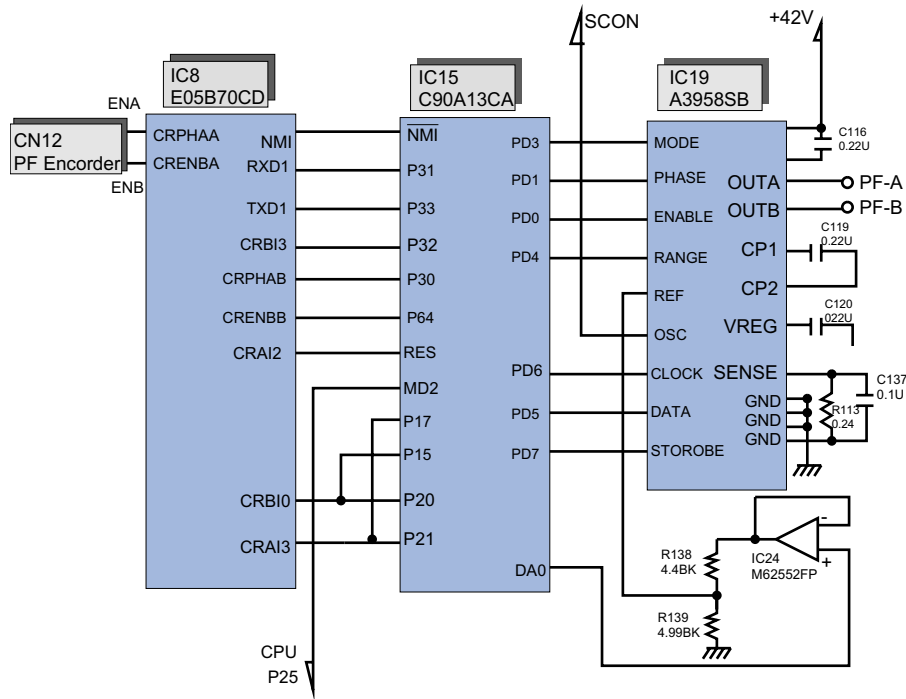


Figure 2-22. PF Motor Driver Circuit Block Diagram

IC15 slave CPU controls paper feeding amount by referring to the encoder pulses sent from IC8 ASIC. It also sets a proper drive current value according to the paper feeding amount and direction. So it outputs specified control signal to the motor driver. The motor driver IC19 outputs PF motor drive current to the PF motor according to the control signals from the IC15 slave CPU.

Unlike a stepping motor, the DC motor that drives the PF motor can not detect a paper feeding amount by referring to the pulses given. For this reason, a loop scale is attached on the Gear 76 to mechanically detect a paper feeding amount.

The loop scale encoder sensor outputs two kinds of TTL level pulses Phase A and Phase B to IC8 ASIC.

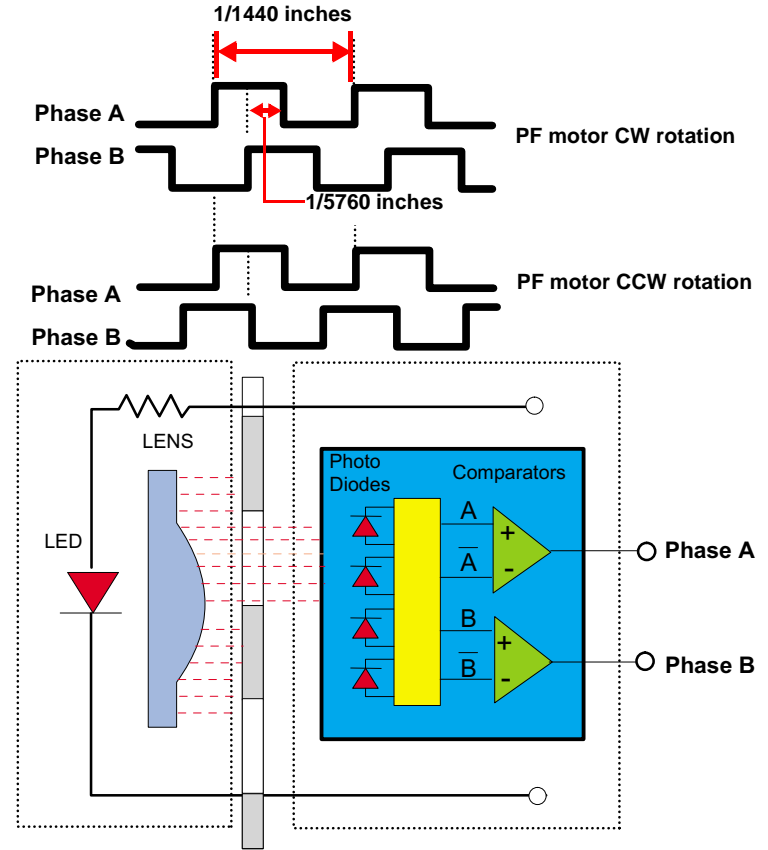


Figure 2-23. Loop Scale Encoder Pulse

Rotational direction of the PF motor is determined by the phase between the output waveforms of Phase A and Phase B. Refer to Figure 2-23 for different phase for each direction.

NOTE: If the drive voltage for the PF motor reaches 1A, a fatal error occurs.

2.2.2.5 ASF/Pump Motor Driver Circuit

The block diagram for the ASF/Pump motor is as shown below:

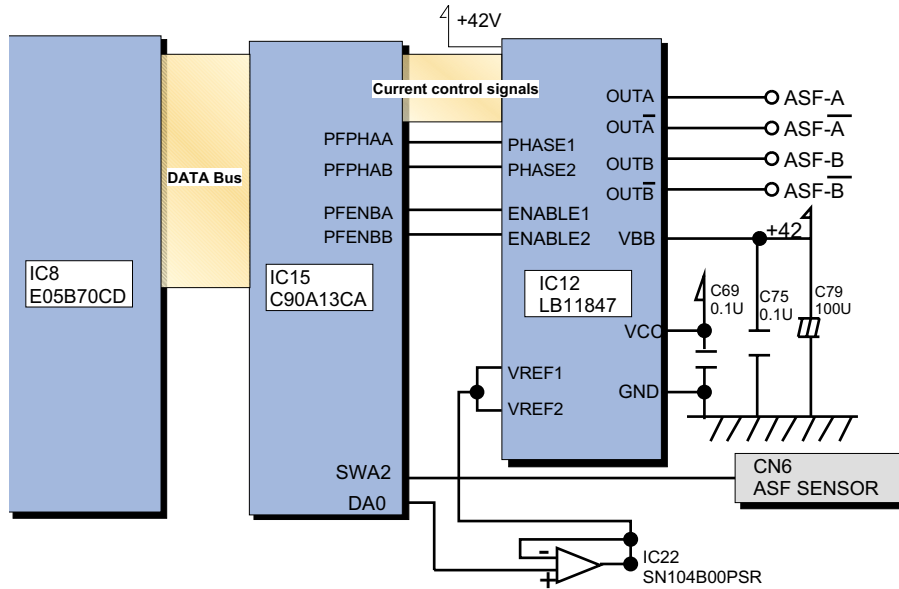


Figure 2-24. ASF/Pump Motor Circuit Block Diagram

2.2.2.6 EEPROM Control Circuit

Since EEPROM is nonvolatile memory, it keeps information written if the printer power is turned off. Information stored in EEPROM is various adjustment values, factory values, and printer status values. See Appendix for EEPROM Address Map that provides detailed information on the values stored in EEPROM.

EEPROM is connected to ASIC with 4 lines and each line has the following function.

- CS: Chip selection signal
- CK: Data synchronism clock pulse
- DI: Data writing line (serial data) at power off.
- DO: Data reading line (serial data) at power on.

The EEPROM control circuit is as shown below:

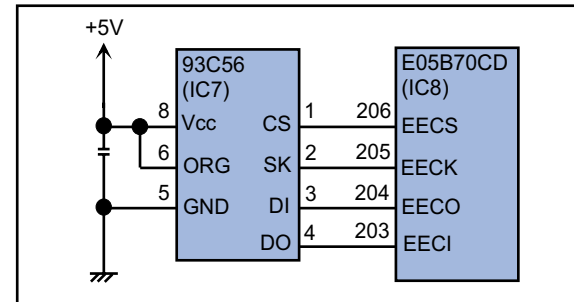


Figure 2-25. EEPROM Circuit Block Diagram

2.2.2.7 Sensor Circuit

The Stylus COLOR 860/1160 is equipped with the following five sensors to detect the status of the printer.

- I/C detection sensor
- Head Thermistor sensor
- PE sensor
- ASF home position sensor
- PF motor encoder sensor
- CR unit encoder sensor

The block diagram for the sensor circuit is as shown below:

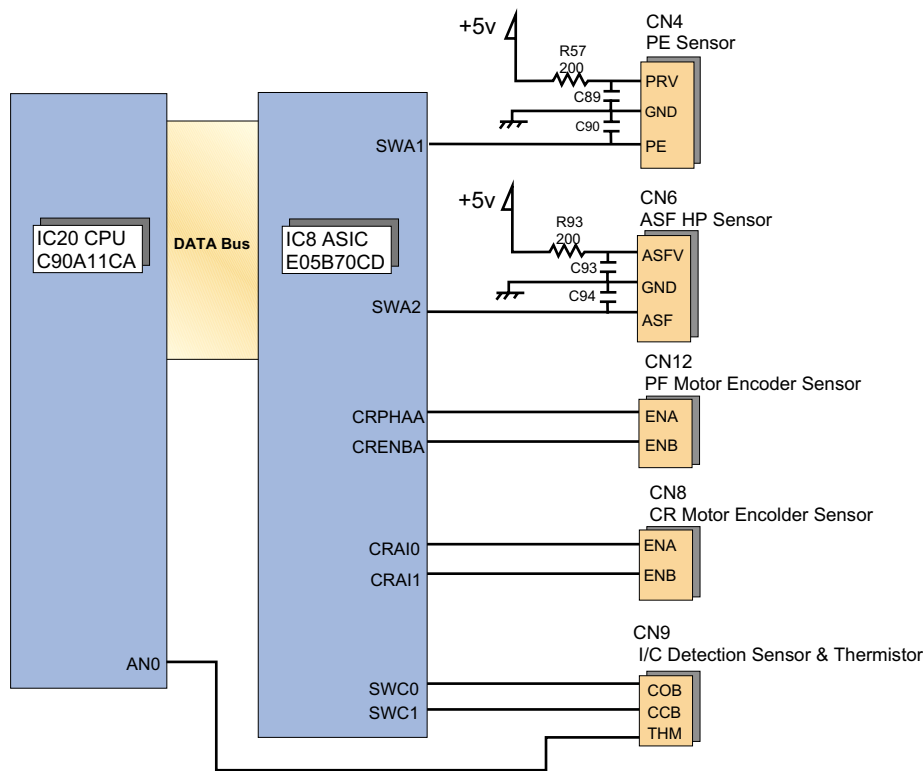


Figure 2-26. Sensor Circuit Block Diagram

Function and detection method of each sensor is as described below.

- I/C detection sensor (for black I/C and color I/C)
The I/C detection sensor included in the CR unit determines whether a black or color ink cartridge is installed. When an I/C is installed, this sensor detects a mechanical contact with the cartridge and outputs a LOW signal to the ASIC. If no cartridge is installed, it outputs a HIGH signal to the ASIC.
- Head thermistor
The head thermistor is attached directly on the head driver board. It monitors the temperature around the printhead and feeds back the temperature to the CPU analog port. The printer refers to this information to control head driver voltage based on the ink viscosity.
- PE sensor
The PE sensor is located at the bottom right edge of the top frame in the printer mechanism. This sensor detects paper on the rear paper guide, using a photo sensor and PE sensor lever that are included in the sensor. When paper passes, the PE sensor does not interrupt the photo sensor terminals. So a LOW signal is output to the ASIC. If there is no paper, on the other hand, the lever cuts in between the photo sensor terminals, which outputs a HIGH signal to the ASIC.
- ASF HP sensor
The ASF HP sensor, located at the left edge of the ASF, detects the ASF home position. This sensor consists of the ASF HP detector wheel and a photo sensor. A small portion of the ASF HP sensor has a cutout, and when the cutout comes into position between the photo diode terminals, ASF home position is detected. In this status, the photo diode terminals are not blocked, and a LOW signal is output to the ASIC. Referring to the ASF home position detected by this sensor, the printer drives the ASF/Pump motor to set the LD roller and paper return lever ready for paper loading.
- PF motor encoder sensor
The PF motor encoder sensor includes the loop scale attached to the left end of the PF roller and the linear encoder. The minimum resolution of the sensor is 1/1440 inches (minimum 1/5760 inches with all edges of Phase A and Phase B), and the sensor outputs HIGH signals for the black lines and LOW signals for the transparent parts to the ASIC. The printer controls the PF motor based on the signals output from this sensor.

- CR unit encoder sensor
CR unit encoder sensor includes the linear encoder in the CR unit and the scale plate attached along the CR scanning direction. The minimum resolution of the sensor is 1/180 inch, (minimum 1/720 inches with all edges of Phase A and Phase B) and outputs HIGH signals for the black bands of the scale and LOW signals for the transparent parts to the ASIC. The printer controls the CR motor based on the signals output from this sensor. The sensor also detects the CR home position.

CHAPTER

3

TROUBLESHOOTING

3.1 Overview

This chapter describes how to troubleshoot problems. It consists of the sections shown in the flowchart below. When identifying and troubleshooting problems, be sure to proceed to the correct section specified in the flowchart.

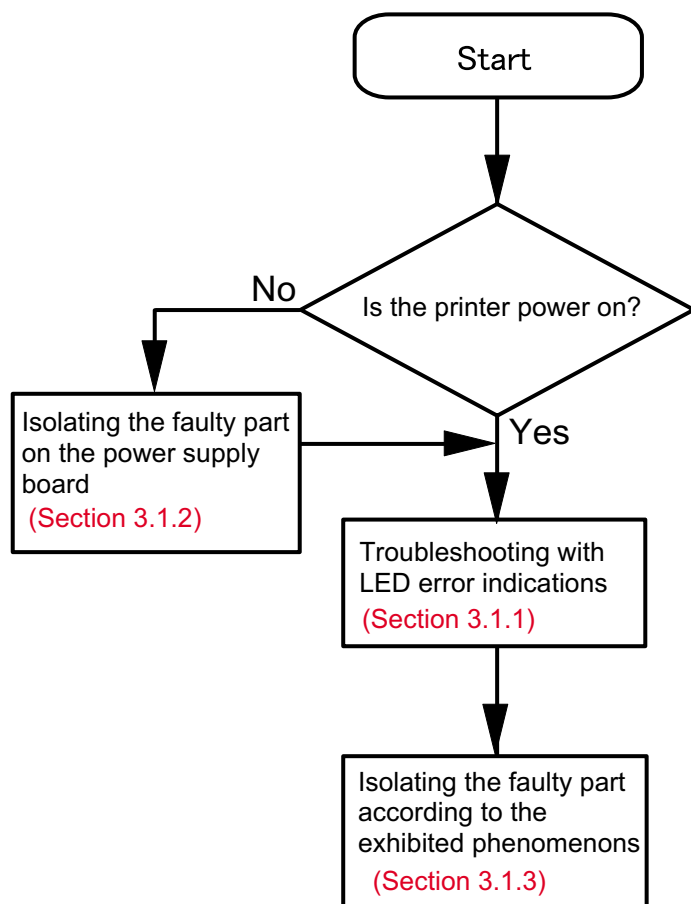


Figure 3-1. Troubleshooting Flowchart

Following sections show detailed information on each step in the flowchart. Be sure to perform troubleshooting without neglecting the correct order specified in each section.

First of all, following tables show you the Motor Resistance and the sensor check informations.

Table 3-1. Motor Resistance and Measurement Procedure

Motor Name	Location	Check Point	
CR Motor	• CN14 (Main board)	Pin 1 & 2,	31.1 OHM +/- 25%
PF Motor	• CN13 (Main Board)	Pin 1 & 2,	31.1 OHM +/- 25%
ASF/Pump Motor	• CN7 (Main Board)	Pin 1 & 3, Pin 2 & 4,	10.4 OHM +/- 10%

Table 3-2. Sensor Check an Measurement Procedure

Sensor	Connector No.	Measurement value	Status
PE Sensor	CN4 Pin 1 & 2	• 0V • 5V	Detect the Paper No Paper
ASF/HP Sensor	CN6 Pin 1 & 2	• 0V • 5V	Detect the ASF HP Not detect ASF HP
PF Motor Encoder Sensor	CN12	• 0V • 5v	Transparency slit Black Slit
CR Motor Encoder Sensor	CN8	• 0V • 5v	Transparency slit Black Slit
Black I/C Detection Sensor	CN9 Pin 15 & Pin 18	• 5V • 0V	I/C is not installed I/C is installed
Color I/C Detection Sensor	CN9 Pin 15 & Pin 17	• 5V • 0V	I/C is not installed I/C is installed

3.1.1 Troubleshooting with LED Error Indications

This section describes how to troubleshoot the problem when the printer indicates an error at power on and can not print. The Stylus COLOR 860/1160 can detect the following six errors and seven status, and indicates them with the LEDs, as shown below.

Table 3-3. Error Indication of Operation Panel

Printer Status	Indicators				Priority
	Power	Ink Out (Black)	Ink Out (Color)	Paper Out	
Power On Condition	On	-	-	-	9
Ink Sequence	Blink	-	-	-	6
Ink Cartridge Replacement Mode	Blink	-	-	-	5
Data Processing	Blink	-	-	-	8
Paper Out	On	Off	Off	On	4
Paper Jam Condition	On	Off	Off	Blink	3
No Ink Cartridge / Ink End (Black)	-	On	-	-	7
Ink Level Low (Black)	-	Blink	-	-	7
No Ink Cartridge or Ink End (Color)	-	-	On	-	7
Ink Level Low (Color)	-	-	Blink	-	7
Enter EEPROM and Timer IC Reset	-	ON (for 1 second only)			-
Maintenance Request	Blink	Blink	Blink	Blink	2
Fatal Error	Blink	On	On	Blink	1

See the following tables which show the error conditions and corresponding possible causes:

Table 3-4. Error Condition and the Possible Causes

No.	Error Condition	Possible Causes
1	Paper Out Error (Refer to Section 3.1.1.1.)	1. Failure in paper feeding
		2. Connector for the PE sensor is disconnected.
		3. The PE sensor actuator is acting improperly. The sensor base is not fixed properly.
		4. The PE sensor is defective.
		5. ASF dose not move correctly
2	Paper Jam Error (Refer to Section 3.1.1.2.)	1. The paper in use is longer than specified.
		2. The PE sensor remains on because it is covered with paper debris or dust.
		3. The PE sensor actuator is not acting properly. The sensor base is not fixed properly.
		4. The PE sensor is defective
		5. The Hopper Release Lever is not assembled correctly.
3	NO I/C or Ink Out Error (Refer to Section 3.1.1.3)	1. The counter is not showing the actual remaining ink level.
		2. Ink cartridge sensor actuator is not acting properly.
		3. The micro switch is not mounted correctly. The connector (green) is disconnected.
		4. The connector (green, 3-pin) on the small board directly attached to the printhead surface side is disconnected. Note the connector (green, 4-pin) is irrelevant as it is for the encoder.
		5. The micro switch is defective.
		6. The value for the ink consumption counter in the EEPROM is destroyed.
4	Maintenance Error (Refer to Section 3.1.1.4))	Usual waste ink over-flow is requested. Note this error can be cleared by the special function through the control panel operation and the Adjustment program.

Table 3-4. Error Condition and the Possible Causes (continued)

No.	Error Condition	Possible Causes
5	Fatal Error (Refer to Section 3.1.1.5)	1. The CR Encoder FFC has come off from the CR Encoder Sensor board. The CR Encoder sensor is not mounted in the CR Assy.
		2. The CR liner scale has come off. The CR liner scale is not placed through the encoder located at the back of the carriage.
		3. The ASF sensor has come off. The connector for the ASF sensor is not disconnected.
		4. The ASF sensor is defective or dose not detect the ASF HP position caused by any factor.
		5. The PF or CR Encoder Sensor is defective or dose not detect the slite pattern on the each scale.
		6. The coil for the CR motor has burnt.
		7. The coil for the PF motor has burnt.
		8. Coil for the ASF/Pump motor has burnt
		9. ASF Gear 32 is disengaged to the Combination Gear 14,28 which is assembled in the DE unit.
		10. Torsion Spring 0.618 comes off from the DE Lock Lever and the hook of DE unit.

3.1.1.1 Remedies for Paper Out Error

This section provides check points and corresponding actions which are necessary when the Paper Out Error problem has occurred because of either of the following reasons:

- Paper is set in the ASF hopper but not fed.
- Paper is fed but not detected by the PE sensor actuator.

Be sure to follow the steps in the order described in the tables.

NOTE: If the finding the detail phenomenon which fits the defective printer, take the Check & Action described in the right column. If "No", proceed to the next step. Remedies for Paper Error.

Table 3-5. Remedies for Paper Out Error

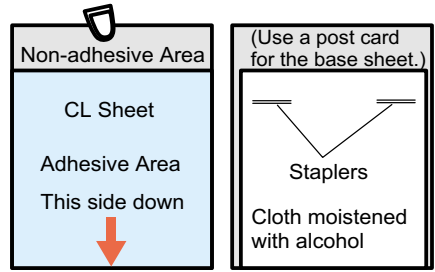
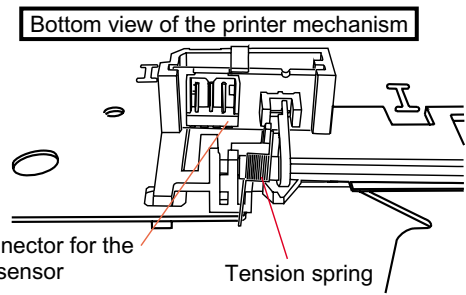
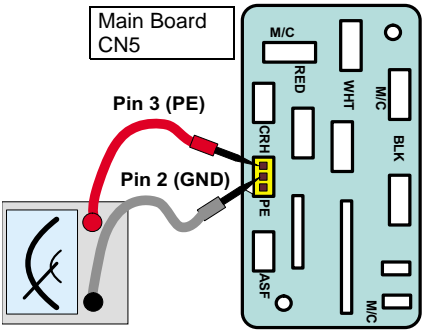
Step	Detail Phenomenon	Check & Actions
1	When the Paper Feed SW is pressed, the ASF LD roller attempts to feed the paper. But the paper is not loaded. After that, the Panel LED indicates the Paper Out Error.	Set a cleaning sheet in the ASF up side down. Then holding the top edge, press the Load/Eject button, and the micro pearl on the paper load roller (a semicircular roller) surface is removed. To remove severe smear, staple a cloth moistened with alcohol to a post card and clean the roller in the same manner. <div style="text-align: center;">  </div>
2	When the Paper Feed SW is pressed, the ASF LD roller feeds the paper to the PF roller. But, ASF LD roller rotates again and the PF roller advances the paper over the TOF position. After that, the Panel LED indicates the Paper Out Error.	Check if the connector (yellow, 3-pin) for the PE sensor is connected to PE sensor or CN5 on the Main Board. <div style="text-align: center;">  </div>
3	Ditto	<ul style="list-style-type: none"> • Using your hand, try activating the actuator in the same condition as it is detecting incoming paper. Then release the actuator and check if the actuator automatically returns to its original position with the tension of the spring. • Referring to the illustration above, check that the sensor base is securely installed to the frame. If the sensor base is floating or installed insecurely, instal it securely.

Table 3-5. Remedies for Paper Out Error (continued)

Step	Detail Phenomenon	Check & Actions
4	<p>When the Paper Feed SW is pressed, the Paper is ASF LD roller feed the paper to the PF roller. But, ASF LD roller rotate again and the PF roller advances the paper over the TOF position. After that, the Panel LED indicates the Paper Out Error.</p>	<p>Check if the PE sensor is defective. Measure the voltage at the yellow 3-pin connector CN5 on the Main Board by activating the actuator manually to check that the voltage is correct as follows. The actuator is in terminals: 5V The actuator is out of terminals: 0V</p>  <p>The diagram shows a green PCB connector labeled 'Main Board CN5'. It has several pins with labels: M/C, RED, WHT, M/C, BLK, M/C, CRH, PE, ASF, M/C. A red wire is connected to Pin 3 (PE) and a grey wire is connected to Pin 2 (GND). The wires lead to a small grey sensor unit with a lens.</p>
5	<p>When the Paper is feed with the Load/Eject SW, it seems that the Hopper is moving correctly. But, the paper is not loaded and the Paper Out Error is indicated on the Operation Panel.</p>	<p>Hand-rotate the shaft in the ASF in the paper feed direction and check if the hopper hops out every time you rotate the shaft.</p> <p>NOTE: <i>Even though the ASF HP sensor is in the proper condition for detecting the ASF home position, If the hopper is not operating at the correct timing for paper feeding, paper is not loaded. Therefore, if the ASF sensor is working without this correct combination, reassembly or replace the ASF.</i> <i>In case the ASF HP sensor detect the ASF HP in the paper feed sequence, the Panel LED indicates the Fatal Error.</i></p>

3.1.1.2 Remedies for the Paper Jam Error

This section includes the check points and corresponding actions which are necessary when the Paper Jam Error constantly occurs when the printer is turned on or feeding paper.

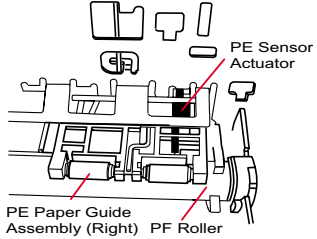
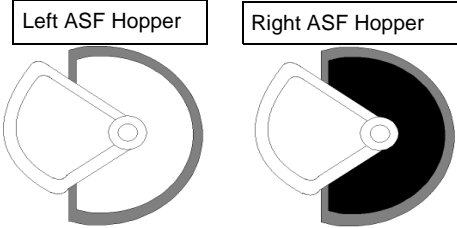
The printer detects the Paper Jam Error in the following Conditions.

- When the printer is turned on, the PE sensor detects the paper and attempt to eject it by rotating the PF roller. But, the Low signal (paper detect status) is not removed.

Be sure to follow the steps in the order described in the tables.

NOTE: If the finding for the question is Yes, take the action described in the right column. If “No”, proceed to the next step.

Table 3-6. Remedies for Paper Jam Error

Step	Detail Phenomenon	Check & Actions
1	When the Paper is ejected, the PF roller advance the paper. But, the Paper is not ejected completely. And, Paper Jam is indicated.	Make sure if the paper length is beyond the specifications is used.
2	When the printer is turned on, the PF roller rotates continuously about 10 sec. After that, Panel LED indicates the Paper Jam.	<p>Make sure that any paper dust or material push up the tip of the PE sensor Actuator. Viewing the PE sensor from the front, check that the actuator is the correct position: the actuator falls in the cutout without any paper.</p> 
3	• Ditto	Referring to Step 3 in Section 3.1.1.1 “Remedies for Paper Out Error”, check the sensor condition.
4	• Ditto	Referring to Step 4 in Section 3.1.1.1 “Remedies for Paper Out Error”, Check the sensor function.
5	<p>• When the Paper is loaded from the ASF, the Top of the Paper is loaded to the PF roller. But it dose not reach to the Paper Guide Front. And Panel LED indicates the Paper Jam.</p> <p>If Paper Feed Operation is repeated, Fatal Error is indicate.</p>	<p>Make sure if the ASF Hopper Release Lever is assembled properly to the LD roller shaft in the ASF.unit. Refer the following figure.</p> 

3.1.1.3 Remedies for No I/C and Ink Out Errors

This section includes the check points and corresponding actions which are necessary when the black ink (or color ink) LED comes on or blinks at power on despite the ink cartridge has been replaced with a new one. Be sure to follow the steps in the order described in the tables.

NOTE: If the finding for the question is Yes, take the action described in the right column. If “No”, proceed to the next step.

Table 3-7. Remedies for No I/C and Ink Out Errors

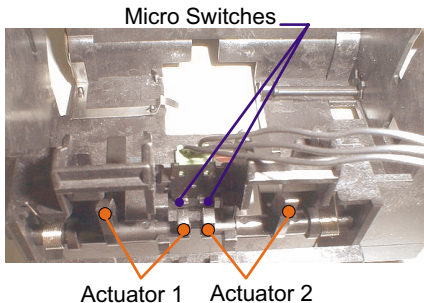
Step	Detail Phenomenon	Check & Actions
1	<p>Dot missing occurs despite the Ink end condition is not indicated. And the dot missing number is increased every printing.</p> <p style="text-align: center;">or</p> <p>Enough ink is remaining in the cartridge, but the printer shows the Ink low or Ink end condition and can not continue to print.</p>	<p>Make sure the I/C was replaced with the new one in the I/C replacement sequence. If not, explain the situation to the user well and replaced the I/C with new one in the I/C replacement sequence.</p> <p>The ink consumption counter, separately set for black and color ink, adds up points according to ink weight used to form one dot. This counter is reset (the value returns to zero) when the I/C replacement sequence is performed and I/C is replaced. If the I/C is replaced with the used I/C in the I/C replacement sequence, the following adversities will occur.</p> <ul style="list-style-type: none"> • Ink has run out but the printer continues to print and starts false firing, which damages the print head. <p>If the new I/C is installed without entering the I/C replacement sequence, the ink consumption counter is not reset and the following adversities will occur.</p> <ul style="list-style-type: none"> • Enough ink is remaining in the cartridge, but the printer shows the Ink low or Ink end condition and can not continue to print.
2	<p>If the I/C is removed and reset into the CR unit, the Ink Out LED is not turn on and off.</p>	<p>Turn the both actuators (right and left) manually and check that they properly push the micro switches. Then, also check that the actuators return to their normal conditions shown in the figure below automatically.</p> <div style="text-align: center;">  <p>The diagram shows a close-up of the printer's internal mechanism. Two actuators, labeled 'Actuator 1' and 'Actuator 2', are shown at the bottom. Arrows point from these labels to the actuators. Above the actuators, two micro switches are visible, with arrows pointing from the label 'Micro Switches' to them.</p> </div>

Table 3-7. Remedies for No I/C and Ink Out Errors (continued)

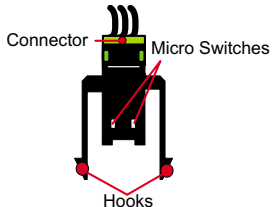
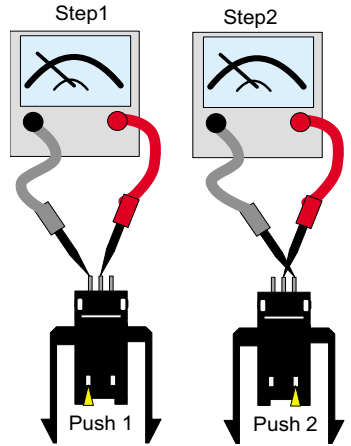
Step	Detail Phenomenon	Check & Actions
3	If the I/C is removed and reset into the CR unit, the Ink Out LED is not turn on and off.	<p>If the micro switch is not properly attached, the actuators possibly fail to touch the micro switch. Therefore, check that the micro switch is securely attached to the carriage by the hooks.</p>  <p>The diagram shows a top-down view of the carriage assembly. A green 3-pin connector is at the top. Below it are two micro switches. At the bottom, two red hooks are shown. Red arrows point from the labels 'Connector', 'Micro Switches', and 'Hooks' to their respective parts in the diagram.</p>
4	Ditto	Remove the I/C Detector holder from the CR unit and check if the connector (green, 3-pin) is disconnected from the head circuit board.
5	Ditto	<ol style="list-style-type: none"> Keeping the left micro switch pressed down, place the probes of the tester to the middle and left pins to check for electrical continuity. Keeping the right micro switch pressed down, place the probes of the tester to the middle and right pins to check for electrical continuity.  <p>The diagram illustrates two testing steps. Step 1 shows a multimeter with its probes connected to the middle and left pins of the connector. A red arrow points to the left micro switch with the label 'Push 1'. Step 2 shows the multimeter probes connected to the middle and right pins. A red arrow points to the right micro switch with the label 'Push 2'. Both steps show the multimeter display with a needle deflection, indicating continuity.</p> <p>See table 3.2 about the measurement value.</p>

Table 3-7. Remedies for No I/C and Ink Out Errors (continued)

Step	Detail Phenomenon	Check & Actions
6	Ditto	<p>If the address for the ink consumption information in the EEPROM is garbled and the printer shows the Ink Out (Ink End) error constantly, the printer sets the interface signal "BUSY" to High and stops communication with any other peripheral devices. Therefore, it is effective to replace the I/C with a new one to forcibly overwrite the address with 00H.</p>

3.1.1.4 Remedies for the Maintenance Error

While the printer is in this error condition, it disables all operations including data communication except for the panel operation specified to clear the error. Therefore, follow the steps described in Table 3-8 to solve the problem.

Table 3-8. Remedies for the Maintenance Error

Step	Actions	Correct LED condition
1	Turn the printer on while pressing the Load/Eject and the Cleaning buttons, and the Paper Out LED starts blinking. (Blinks for three seconds.)	The Paper Out LED is blinking.
2	While the Paper Out LED is blinking (for three seconds), press the Cleaning button for ten seconds.	The following three red LEDs blink and turn off. Ink Out LED (Black), Ink Out LED (Color), and Paper Out LED.

NOTE: During the Step 2, if the Load/Eject button is pressed, the Maintenance Error is not cleared but the EEPROM initialization mode is activated instead. The EEPROM initialization can be used to recover from conditions such as the printer does not accept any data from the PC. The EEPROM initialization mode initializes the following items:

- Accumulated power-off time: The value for the Timer IC is reset.
- CL Timer: The CL timer, which is also called fire-waiting timer, secures the printer specific period of time so bubbles formed around the printhead during a cleaning vanish.
- I/F selection: Selects "Auto", the factory default, from 3 I/F selection items: Auto, Parallel, USB.

3.1.1.5 Remedies for Fatal Error

A fatal error is basically caused by any of the following conditions:

- The printer does not detect the carriage in the home position.
- The printer does not detect signals from the linear scale.
- The ASF sensor does not detect the ASF home position.

The following tables show various causes of the error and corresponding solutions. Be sure to follow the steps correctly to solve the problems.

NOTE: If the finding the detail phenomenon which fit the defective printer, take the Check & Action described in the right column. If “No”, proceed to the next step. Remedies for Fatal Error

Table 3-9. Remedies for Fatal Error

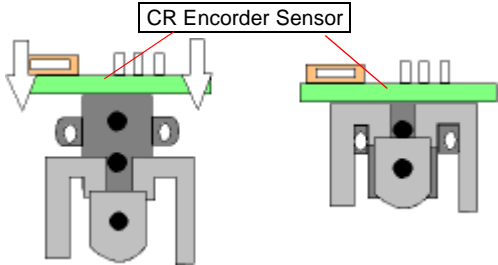
Step	Detail Phenomenon	Check & Actions
1	When the Printer is powered on: <ul style="list-style-type: none"> The CR unit moves in the capping area. (CR unit is fixed with CR lock lever.) The CR unit moves and strikes the left frame because it is not fixed with the CR lock. After that, the Panel LED indicates the Fatal Error.	Check the CR Encoder sensor board visually. <ul style="list-style-type: none"> In case the CR Encoder sensor board is not mounted in the sensor mounting position, mount it in the CR mounted position securely. In case the CR Encoder FFC is disconnected from the connector on the CR Encoder sensor board, connect it securely. 
2	Ditto	Referring to step 2 in Section 4.2.4.7 and Figure 4-49, check that the CR liner scale is set between the sensor parts. Also check that the sensor is free from dust and paper debris.

Table 3-9. Remedies for Fatal Error (continued)

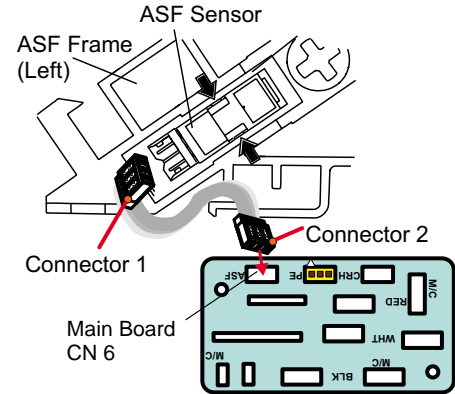
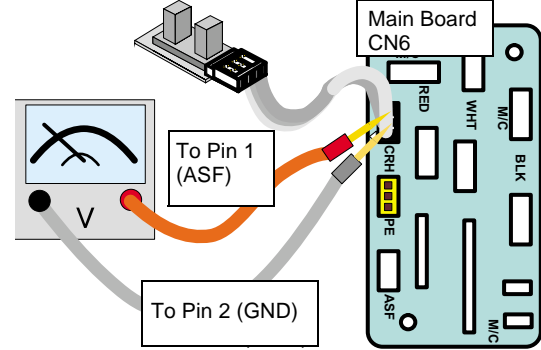
Step	Detail Phenomenon	Check & Actions
3	When the Printer is turned on, the CR moves a little and it sounds the ASF Hopper moving. After that, the Panel LED indicates the Fatal Error.	Referring to the figure below, check that the ASF sensor is attached to the correct position. Check that both connectors 1 and 2 are securely connected. 
4	Ditto	Check for the correct voltages at 3-pin connector shown in the figure below. Turn the printer on and check the voltage is correct as follows: <ul style="list-style-type: none"> When the ASF HP Wheel is in the HP, the voltage is 0 VDC. When the ASF HP Wheel is out of the HP, the voltage raises to 5 VDC. 

Table 3-9. Remedies for Fatal Error (continued)

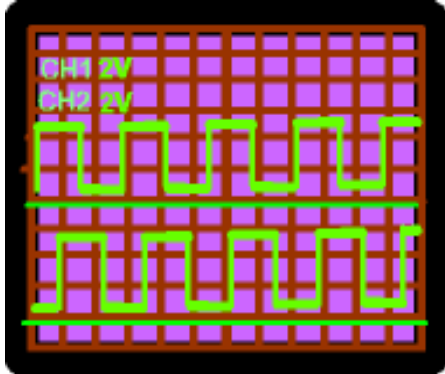
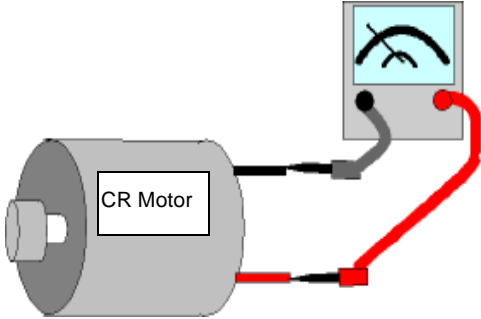
Step	Detail Phenomenon	Check & Actions
5	When the Printer is turned on, the CR move a little and the PF motor also moves little. After that, the Panel LED indicates the Fatal Error.	<ul style="list-style-type: none"> Check for the correct waveform at 5 pins of FFC. The PF Motor Encoder Sensor FFC is connected to CN12 on the C298 Main Board. Check that both connectors Pin 1 & 4 or Pin 1 & 2.  <ul style="list-style-type: none"> Check for the correct waveform at 21pins of Head FFC. The Head FFC is connected to CN8 on the C298 Main Board. Check that both connectors Pin 2 & GND or Pin 4& GND.
6	When the Printer is turned on, the CR motor dose not move at all. (PF motor moves.) After that, the Panel LED indicates the Fatal Error	<p>Since the CR motor is DC motor, measure the coil resistance using the tester as following figure <Resistance: 31.1 Ω ± 25%></p> 

Table 3-9. Remedies for Fatal Error (continued)

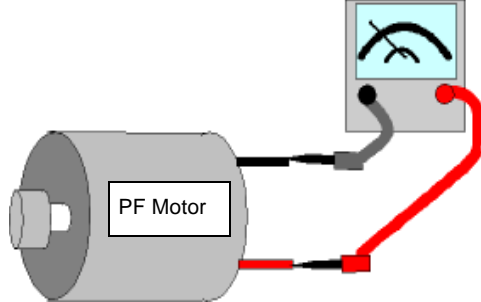
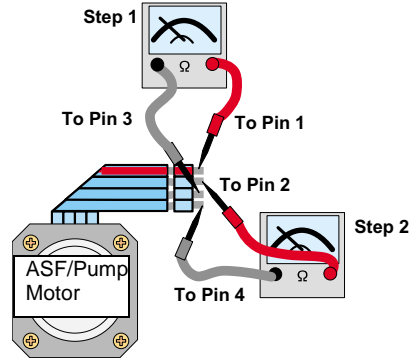
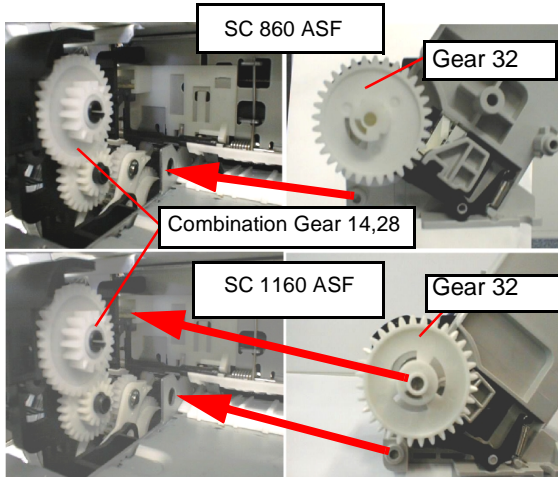
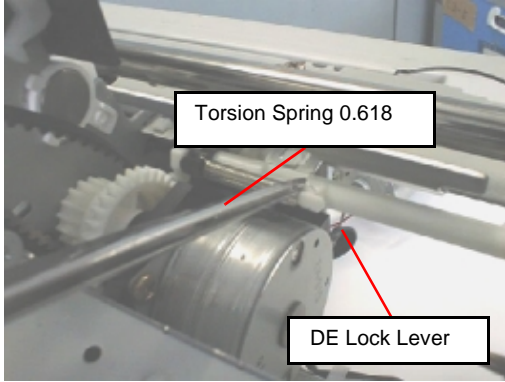
Step	Detail Phenomenon	Check & Actions
7	When the Printer is turned on, the PF motor dose not move. After that, the Panel LED indicates the Fatal Error.	<p>Since the PF motor is DC motor, measure the coil resistance using the tester as following figure <Resistance: 31.1 Ω ± 25%></p> 
8	When the Printer is turned on, it dose not sound the ASF Hopper moving. After that, the Panel LED indicates the Fatal Error	<p>Since the Pump/ASF motor is controlled by the Bipolar system, measure the coil resistance using the tester as shown below. <Resistance: 10.4 Ω ± 10%></p> <p>Note: Be sure to measure the resistance at two points shown in the figure below.</p> 

Table 3-9. Remedies for Fatal Error (continued)

Step	Detail Phenomenon	Check & Actions
9	<p>When the Printer is turned on,</p> <ul style="list-style-type: none"> • it dose not sound the hopper moving. • it sounds as if the gear tooth strike noisy and the ASF Hopper dose not move. <p>After that, the Fatal Error is indicated on the Panel LED.</p>	<ul style="list-style-type: none"> • Make sure if the ASF unit is not assembled to the suitable position as following figures 
10	<p>When the Printer is turned on, the ASF dose not move at all. After that, the Panel LED indicates the Fatal Error</p>	<p>Make sure that the Torsion Spring 0.618 is hung to between the DE lock lever and the hook on the DE unit as following figure.</p> 

3.1.2 Isolating the Faulty Part on the Power Supply Board

This section explains how to troubleshoot the following problems:

- ❑ The printer is turned on, but the initialization is not performed and LED on the control panel do not come on.
- ❑ Problems after power on

Be sure to perform troubleshooting in the order specified, because the parts involved are mentioned in the disassembly procedure to facilitate servicing.

Table 3-10. Isolating the Faulty Part on the Power Supply Board

Step	Check Point	Action
1	Is the Panel FFC disconnected from the connector on the panel board?	The power switch for this printer is in the secondary side. Therefore, if the FFC does not transfer signals, the printer does not operate despite the power supply board and the main board are properly connected.
2	Is the Panel FFC disconnected from the CN11 (black, 12-pin) on the Main Board.	This printer uses the power switch on the secondary side. Therefore, if the FFC does not transfer signals, the printer does not operate despite the power supply board and the main board are properly connected.
3	Is the 3pin of the Panel FFC breaking wire condition?	Check the 3pin's line on the Panel FFC with the circuit tester.
4	Has the fuse (F1) on the power supply board blown?	Check if the line in the F1 located beside the CN1 on the power supply board has blown.
5	Is CN1 on the power supply board disconnected?	Check that the connectors CN1, which are used to apply AC power to the primary side on the PS board, are properly connected.
6	Is CN10 on the Main Board disconnected?	Check that the connector CN10, which are used to apply the DC voltage to the Main board, are properly connected.

Table 3-10. Isolating the Faulty Part on the Power Supply Board

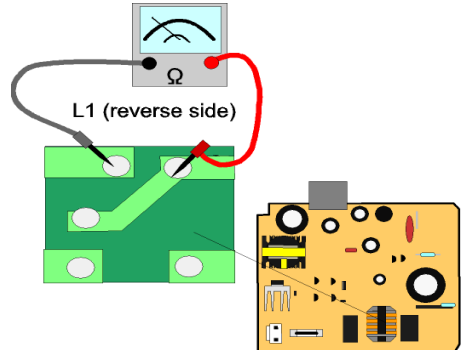
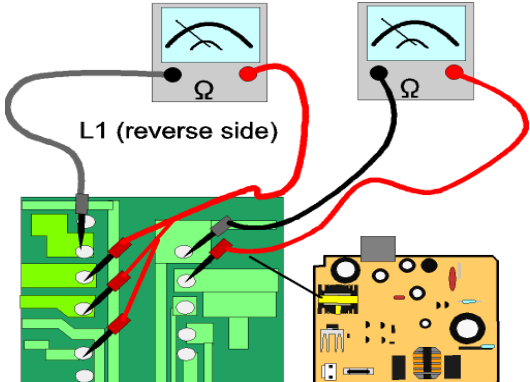
Step	Check Point	Action
7	Is the choke coil L1 broken?	Viewing the reverse side of the power supply board, check for the proper continuity at the two points indicated in the figure below. 
8	Is the transformer (T1) broken?	Referring to the figure below, check if the transformer is disconnected between the poles. Try every combination in each group marked with a blue box. 

Table 3-10. Isolating the Faulty Part on the Power Supply Board

Step	Check Point	Action
9	Is the main switching FET (Q1) defective?	<p>Check the electrical continuity of the switching FET by trying four patterns below. Be sure to pay attention to the polarity. If the main switching FET is good, the findings should be as shown under the figure.</p> <p>Step 1: Off, Step 2: On, Step 3: Off, Step 4: Off</p>
10	Is the NPN connection transistor defective?	<p>Check the electrical continuity of the NPN connection transistor on the C298 PSB/SE board by trying four patterns below. Be sure to pay attention to the polarity. If the NPN contact transistor is good, the findings should be as shown under the figure. Note the NPN connection transistor is shown in the circuit diagram as described below.</p> <p>Step 1: On, Step 2: Off, Step 3: Off, Step 4: On</p>

Table 3-10. Isolating the Faulty Part on the Power Supply Board

Step	Check Point	Action
11	Is the PNP connection transistor defective?	<p>Check the PNP connection transistor on the C298 PSB/SE board in the same manner described in the previous step.</p> <p>Step 1: Off, Step 2: On, Step 3: Off, Step 4: On</p>
12	Is the +5 V regulator (IC51) defective?	<p>Check the IC51 for the oscillation waveform (measured by using a oscillo scope) output from the Pin 2. If the output waveform is as shown below, it means the IC51 is working properly.</p> <p>Oscillation waveform</p> <p>5-pin(OSC)</p>

3.1.3 Isolating the Faulty Part according to the Phenomenon

Refer to this section if you could not solve the problem in Section 3.1.1 or Section 3.1.2 or need more information to isolate the cause according to the exhibited phenomenon. The contents mostly cover the problems relating to the C298 and their remedies.

Table 3-11. Phenomenons Exhibited

No.	Phenomenon Exhibited	Table to refer to
1	CR motor does not rotate.	Table 3-12
2	PF motor does not rotate.	Table 3-13
3	pump/ASF motor does not rotate.	Table 3-14
4	Cleaning does not solve the print problem.	Table 3-15

Table 3-12. CR Motor does not Operate

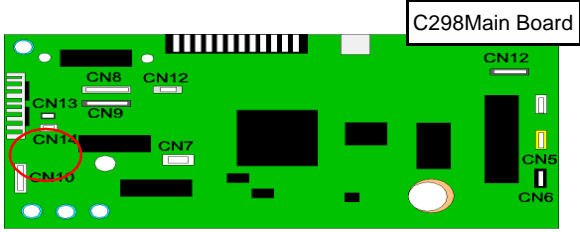
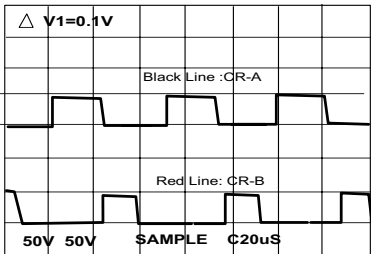
Step	Check Point	Action
1	Getting ready for inspecting waveforms.	<p>The connector CN14 used to control the CR motor is indicated in the figure below. Using the oscillo scope, check for the waveform for each phase at the indicated connector.</p> <p>To check the waveform, press the Load/Eject button to attempt to move the carriage. Be sure to leave the cable for the CR motor connected.</p>  <p>NOTE: The GND can be output by placing the probe of the oscillo scope to the tapped hole in the bottom plate on the board with a screw. Note the connector has no ground line since this printer drives the motor with the bipolar system.</p>
2	Check of the waveform and remedies	<p>While trying to drive the CR motor, the waveform output from each phase should be as shown in the figure. If the waveform output from each phase is as shown below, replace the CR motor. If not, replace the IC18 (CR motor driver IC) or C298 Main Board.</p>  <p>NOTE: The GND can be output by placing the probe of the oscillo scope to the tapped hole in the bottom plate on the board with a screw.</p>

Table 3-13. PF Motor does not Operate

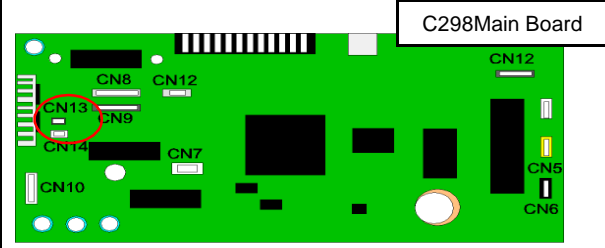
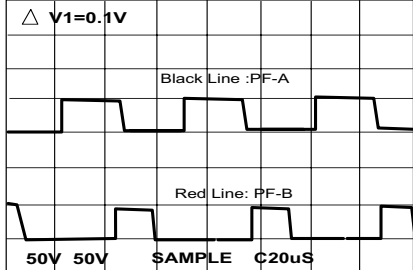
Step	Check Point	Action
1	Getting ready for inspecting waveforms.	<p>The CN13 connector used to control the PF motor is indicated in the figure below. Using the oscillo scope, check for the waveform for each phase output from the indicated connector. To check the waveform, press the Load/Eject button to attempt the ASF paper feeding. Be sure to leave the cable for the PF motor connected.</p>  <p>NOTE: The GND can be output by placing the probe of the oscillo scope to the tapped hole in the bottom plate on the board with a screw. Note the connector has no ground line since this printer drives the motor with the bipolar system.</p>
2	Check of the waveform and remedies.	<p>While trying to drive the PF motor, the waveform output from each phase should be as shown in the figure. If the waveform output from each phase is as shown in the figure, replace the PF motor. If not, replace the IC19 (PF motor driver IC) or C298 Main Board.</p>  <p>NOTE: The GND can be output by placing the probe of the oscillo scope to the tapped hole in the bottom plate on the board with a screw.</p>

Table 3-14. Pump/ASF Motor does not Operate

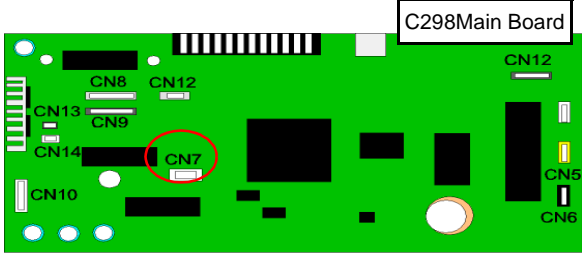
Step	Check Point	Action
1	Getting ready for inspecting waveforms.	<p>The CN7 for the Pump/ASF motor is located on the Main Board. Using the oscillo scope, check the waveform for each phase output from the indicated connector. To check the waveform, press the Load/Eject button to attempt the ASF paper feeding. Be sure to leave the cable for the Pump/ASF motor connected.</p>  <p>NOTE: The GND can be output by placing the probe of the oscillo scope to the tapped hole in the bottom plate on the board with a screw. Note the connector has no ground line since this printer drives the motor with the bipolar system.</p>

Table 3-14. Pump/ASF Motor does not Operate (continued)

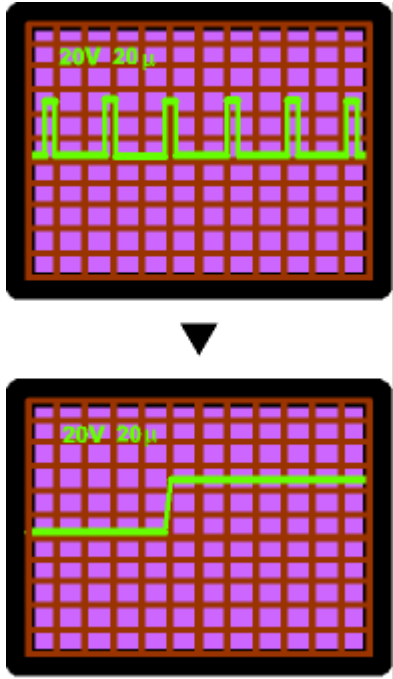
Step	Check Point	Action
2	Check of the waveform and remedies.	<p>While trying to drive the Pump/ASF motor, the waveform output from each phase should be as shown below. If the waveforms output from each phase are as shown below, replace the Pump/ASF motor. If not, replace the IC12 (Pump/ASF motor driver IC) or C298 Main Board.</p>  <p>The GND can be output by placing the probe of the oscillo scope to the tapped hole in the bottom plate on the board with a screw.</p>

Table 3-15. Cleaning does not Solve the Print Problem

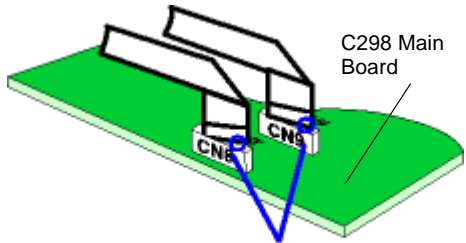
Step	Check Point	Action
1	Repeat the cleaning 7 or 8 times.	Unlike the previous products, the Stylus Color 860/1160 is not equipped with the CL3 (dummy cleaning). Therefore, you can repeat the cleaning every time you press the Cleaning button without running a self-test nor any printing.
2	Trying the initial ink charge operation.	You can repeat the initial ink charge operation in the way described below: 1. Using the exclusive program, reset the initial ink charge flag in the EEPROM. 2. Turn the printer back on. (Refer to Chapter 5 for details.)
3	Reinstalling the printhead FFC.	Remove the upper case and check if the FFCs are properly connected to the CN8 and CN9 on the C298 Main Board. Even though they are not installed aslant as shown below, disconnect the FFC once and connect them again, then run a print check.  Check that the connectors are not connected aslant.

Table 3-15. Cleaning does not Solve the Print Problem (continued)

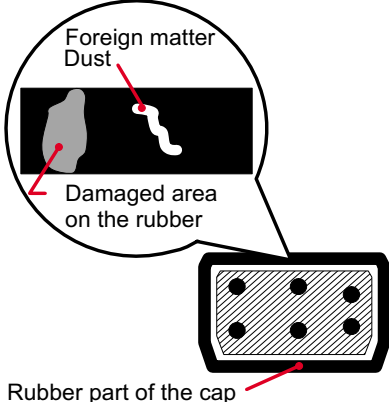
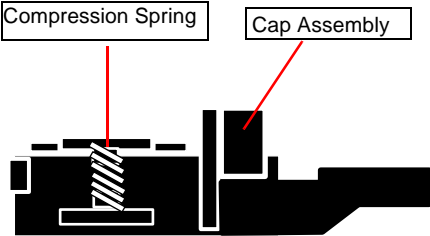
Step	Check Point	Action
4	Check the cap for any foreign matter, dirt, or damage.	Release the carriage lock to move the carriage unit away from the home position. Then, have a close look at the cap rubber and check for any problem below. 
5	Has the Tension Spring assembled in the Cap Unit come off?	If the Tension Spring assembled in the Cap Unit, comes off, the sealing ability lowers and the cap rubber portion dose not fit to the surface of the printhead. And the ink is not absorbed from the head. Therefore, check that the Compression Spring is securely assembled in the following figured portion. 

Table 3-15. Cleaning does not Solve the Print Problem (continued)

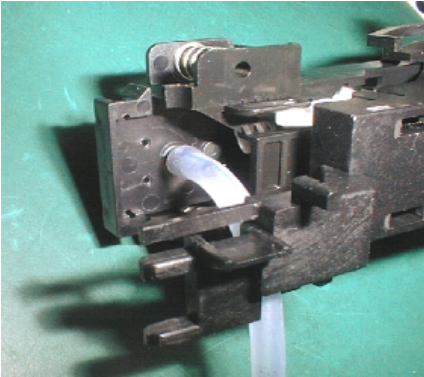
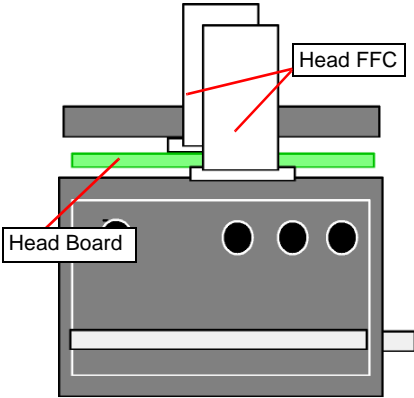
Step	Check Point	Action
6	Is any ink tube disconnected from the cap unit?	<p>Referring to the figure below, check the following points:</p> <ul style="list-style-type: none"> The ink tube is inserted to the Cap assembly securely as following figure. There is no damage on the ink tube. 
7	Is the FFC disconnected from the printhead board?	<p>Remove the Head FFC holder from the CR unit, and check that two FFC are properly connected. Even though no slant connection or disconnection is found, disconnect the FFC once and install them again.</p> 

Table 3-15. Cleaning does not Solve the Print Problem (continued)

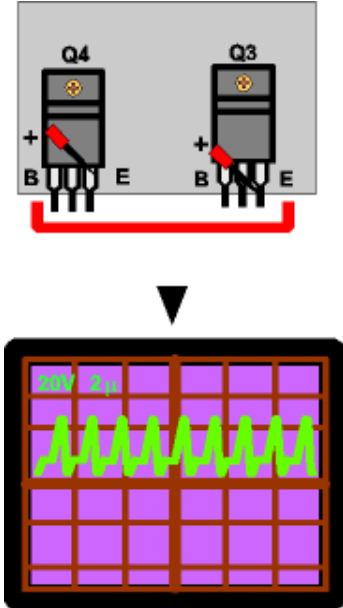
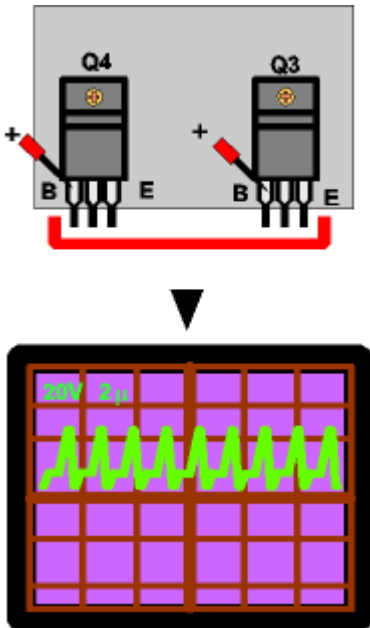
Step	Check Point	Action
8	Is the head driver transistor defective?	<p>If you see the C298 Main from the heat sink side, the following two power transistors can be found:</p> <ul style="list-style-type: none"> Q3 and Q4: Outputs the common voltage <p>To check if each pair transistor is working properly, check the trapezoid waveform at the emitter terminal of the charging side. Check the waveform while running a print.</p>  <ul style="list-style-type: none"> Check the continuity of each transistor by referring the Step 11 for the "Isolating the Faulty Part on the Power Supply Board" <p>NOTE: Frequency of waveform and voltage level (p-p) varies if printing is performed through the driver. Therefore, as long as the trapezoid waveform is output, the head driver IC is considered good, and the printhead must be replaced in that case.</p>

Table 3-15. Cleaning does not Solve the Print Problem (continued)

Step	Check Point	Action
9	Is the head driving pre-driver defective?	<p>If a trapezoid waveform is not output in the previous step, check all the power transistors (Q3 - Q4) for base waveforms. Like the head transistor in Step 8, the base terminal input the similar trapezoid waveforms from the pre driver IC, but any waveform is not input at Emita terminal. Replace the Power Transistor.</p>  <p>If the waveforms are not output correctly on Base terminal of each Power Transistor, replace the IC10 or 11 on C298 Main Board. Otherwise, replace the C298 Main Board.</p>

CHAPTER

4

DISASSEMBLY AND ASSEMBLY

4.1 Overview

This chapter describes procedures for disassembling the main components of EPSON Stylus COLOR 860/1160. Unless otherwise specified, disassembly units or components can be reassembled by reversing the disassembly procedure. Therefore, no assembly procedures are included in this chapter. Precautions for any disassembly or assembly procedure are described under the heading "CHECK POINT". Any adjustments required after disassembling the units are described under the heading "REQUIRED ADJUSTMENT".

4.1.1 Precautions for Disassembling the Printer

See the precautions given under the heading "WARNING" and "CAUTION" in the right column and the following page, respectively, when disassembling or assembling EPSON Stylus Color 440/640/740.



- **Disconnect the power cable before disassembling or assembling the printer.**
- **Wear protective goggles to protect your eyes from ink. If ink gets in your eye, flush the eye with fresh water and see a doctor immediately.**
- **If ink comes into contact with your skin, wash it off with soap and water. If irritation occurs, contact a physician.**
- **A lithium battery is installed on the main board of this printer. Be sure to observe the following instructions when serving the battery:**
 - Keep the battery away from any metal or other batteries so that electrodes of the opposite polarity do not come in contact with each other.
 - Do not heat the battery or put it near fire.
 - Do not solder on any part of the battery. (Doing so may result in leakage of electrolyte from the battery, burning or explosion. The leakage may affect other devices close to the battery.)
 - Do not charge the battery. (An explosion may be generated inside the battery, and cause burning or explosion.)
 - Do not dismantle the battery. (The gas inside the battery may hurt your throat. Leakage, burning or explosion may also be resulted.)
 - Do not install the battery in the wrong direction. (This may cause burning or explosion.)
- **Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacture. Dispose the used batteries according to government's law and regulations.**



Risque d'explosion si la pile est remplacée incorrectement. Ne remplacer que par une pile du même type ou d'un type équivalent recommandé par le fabricant. Eliminer les piles déchargées selon les lois et les règles de sécurité en vigueur.



- Never remove the ink cartridge from the carriage unless this manual specifies to do so.
- When transporting the printer after installing the ink cartridge, be sure to pack the printer for transportation without removing the ink cartridge.
- Use only recommended tools for disassembling, assembling or adjusting the printer.
- Apply lubricants and adhesives as specified. (See Chapter 6 for details.)
- Make the specified adjustments when you disassemble the printer. (See Chapter 4 for details.)
- When assembling, if an ink cartridge is removed and needs to be installed again, be sure to install a new ink cartridge because of the following reasons;
 - Once the ink cartridge mounted on the printer is removed, air comes into and creates bubbles in the cartridge. These bubbles clog ink path and cause printing malfunction.
 - If an ink cartridge in use is removed and is reinstalled, ink quantity will not be detected correctly since the counter to check ink consumption is cleared.
- Because of the reasons above, make sure to return the printer to the user with a new ink cartridge installed.

4.1.2 Tools

Table 4-1 lists the tools recommended for disassembling, assembling, or adjusting the printer. Use only tools that meet these specifications.

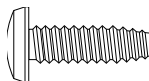
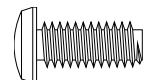
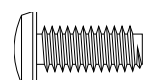
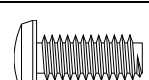
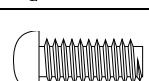
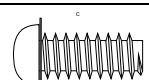
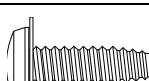
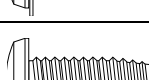
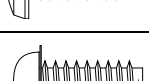
Table 4-1. Tool List

Tools	Commercially Available	Code
(+) Driver No.2	O.K.	B743800200
(+) Driver No.1	O.K.	B743800100
Tweezers	O.K.	B741000100
Hexagon Box Driver (Opposite side:5.5mm)	O.K.	B741700100

4.1.3 Specification for Screws

Table 4-2 shows screw specifications. During assembly and disassembly, make sure that the specified types of screws are used at proper locations, referring to the table below. Note that the screw numbers described in the manual correspond to the numbers in the table.

Table 4-2. Screw Characteristic

No.	Body	Name	Size
1		+Bind, S-tite	M3X6
2		+Bind, P-tite (CBP tight)	M3X6
3		+Bind, P-tite (CBP tight)	M3X8
4		+Bind, P-tite (CBP tight)	M2.5X5
5		+Pan head (C.P.)	M3X6
6		+Pan head, B-tite Sems W1	M3X8
7		+Bind, S-tight, Sems R2(CBS Sems)	M3X6
8		+Bind, S-tight,	M3X10
9		+Pan head, B-tite Sems W1	1.7 X 5

4.1.4 Service Checks After Repair

Before returning the printer after servicing, use the check list below, which enables you to keep record of servicing and shipping more efficiently.

Table 4-3. Inspection Checklist for the Repaired Printer

Category	Component	Item to check	Is Check Required?	
Printer units	Self-test	Is the operation normal?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
	On-line test	Was the on-line test successful?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
	Printhead	Is ink ejected normally from all nozzles?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
	Carriage mechanism		Does the carriage move smoothly?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Any abnormal noise during movement?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Any dirt or obstacles around the shaft of carriage guide?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Is the CR motor at the correct temperature (not over heating)?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
	Paper feeding mechanism		Is paper fed smoothly?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Does paper get jammed?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Does paper get skew during paper feeding?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Are papers multi fed?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Does the PF motor get overheated?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
			Abnormal noise during paper feeding?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary
		Is the paper path clear of all obstructions?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
Adjustment	Specified adjustment items	Are adjusted conditions all right?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
Lubricant	Specified lubricated item	Is lubrication applied to the specified locations?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
		Is the quantity of lubrication adequate?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
Function	ROM version	Newest version:	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
Shipment package	Ink cartridges	are the ink cartridges installed correctly?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
	Protection conditions during transport	Is all the pointed parts firmly fixed?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	
Others	Attached items	Are all attached items from users included?	<input type="checkbox"/> Checked / <input type="checkbox"/> Not necessary	

4.2 Disassembly Procedures

The flowchart below shows procedures for disassembly.

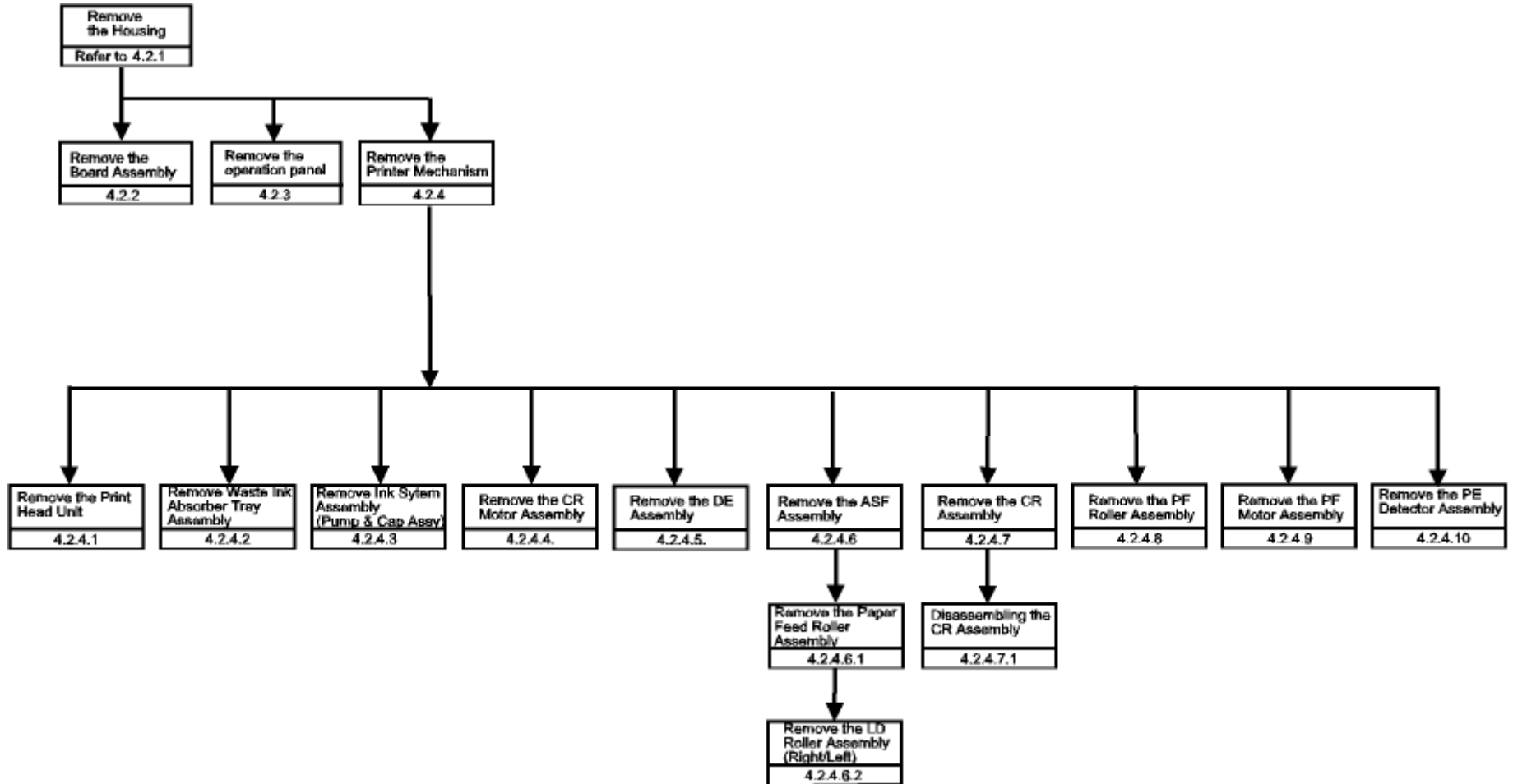


Figure 4-1. Flowchart of Disassembly

4.2.1 Removing the Upper Housing

Since the printer mechanism itself structures the bottom part, the printer mechanism appears just by removing the Upper Housing.

1. Open the printer cover and turn the PG adjustment lever towards (+) side.
2. Remove 4 screws (No.8) securing the Upper Housing, and remove it upward. Refer to Figure 4-2. The left column's photos show you the Stylus Color 860 and right column's photos show you the Stylus Color 1160.



Lift up and remove the Upper Housing, pulling it forward.
(Since it collides with the carriage)



After assembling the Upper Housing, confirm the Head FFC is placed in the gutter which is located at the back side of the of the Upper Housing.

In case the Head FFC is not placed in the gutter, it may damage the head FFC.

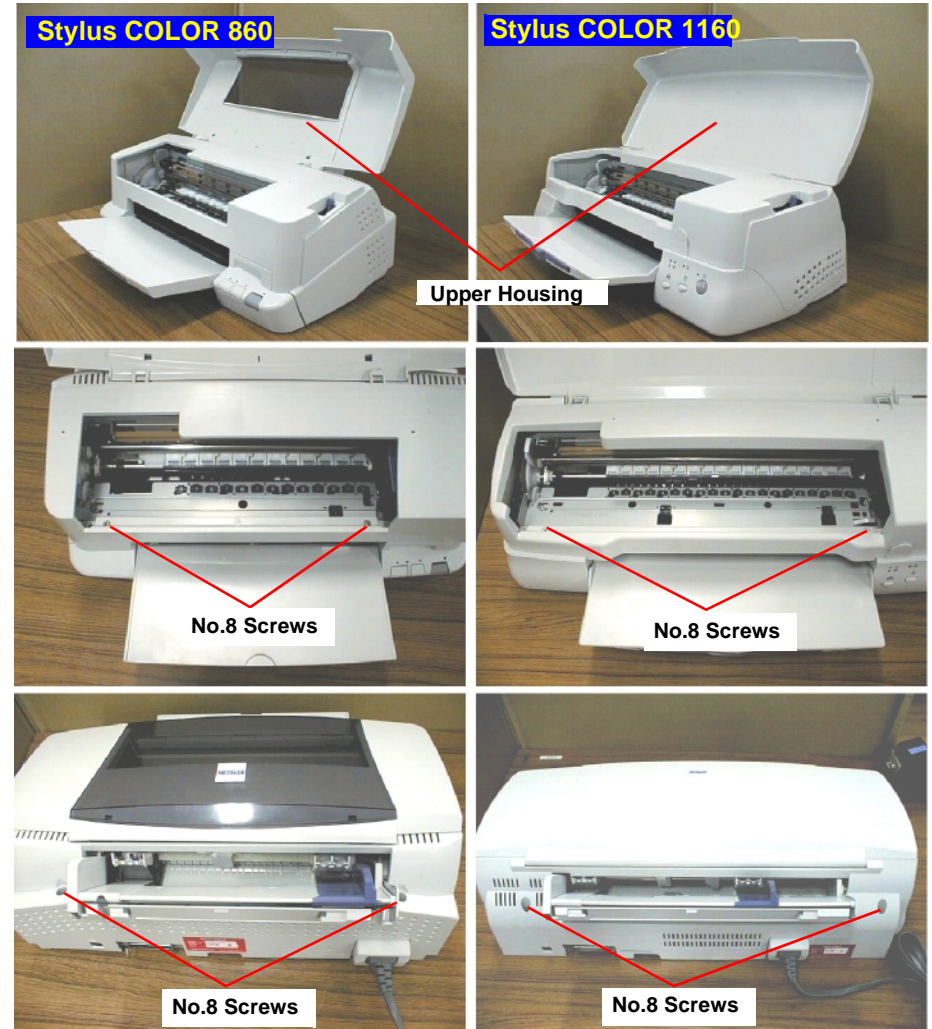


Figure 4-2. Removing the Upper Housing

4.2.2 Removing the Circuit Board Assembly

Since the Main Board and Power Supply Circuit Board are built in a separate bracket from the Printer Mechanism, remove the whole bracket from the printer mechanism.

NOTE: The Main board and the Power Supply Board equipped with the Stylus COLOR 860/1160 are the same, as listed below:

- Stylus COLOR 860: C298MAIN, C298PSB/PSE
- Stylus COLOR 1160: C298MAIN, C298PSB/PSE

1. Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Remove the 7 screws (No.1) securing the M/B Shield Plate on the printer mechanism. Refer to Figure 4-3.

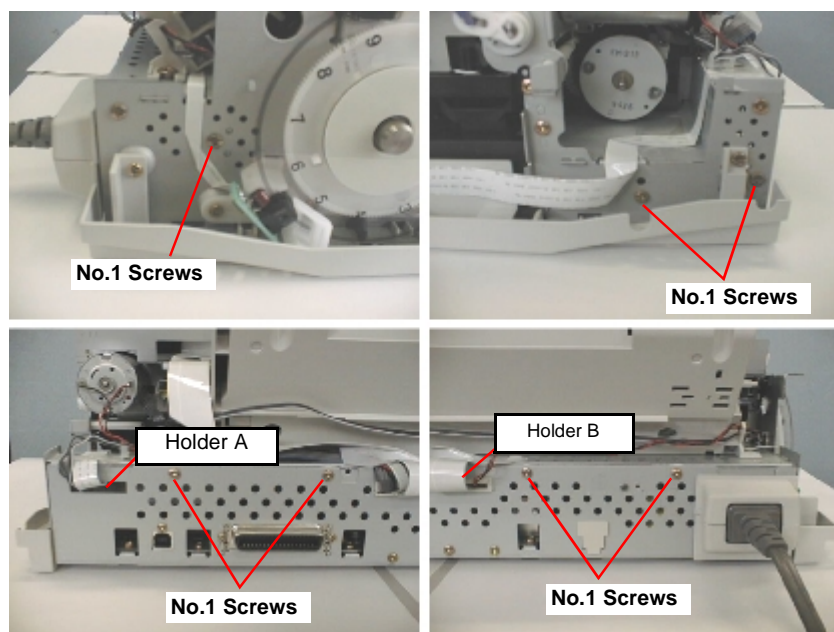


Figure 4-3. Removing the M/B Shield Plate

- 3) Pull out the "M/B Shield Plate Assembly" a little bit and remove cables which are hung on the holders A and B as you can see in Figure 4-3. Then take all cables below out of the connectors on the main board.

- CN1 (AC Source on PS board)
- CN5 (PE sensor)
- CN6 (ASF HP sensor)
- CN7 (ASF/Pump motor)
- CN8 (Head FFC1)
- CN9 (Head FFC2)
- CN10 (PS Cable)
- CN11 (Control Panel)
- CN12 (PF Encoder Sensor)

After removing all the cables from the Main Board, detach the Shield Plate M/B Assembly completely from the printer mechanism.

- 4) When removing each Circuit Board unit from the "M/B Shield plate", remove the screws securing each unit and shield plate.
 - C298MAIN: Total 12 screws
(No.1 screw: 9 screws)
(No.5 screw: 3 screws)
 - C298PSB/PSE: Total 4 screws (No.1 screw: 4 screws)

Refer to the next page for Figure 4-4. Also, when removing the Power Supply Board, remove the cable connecting to the CN10 (locking type) on the Main Board.

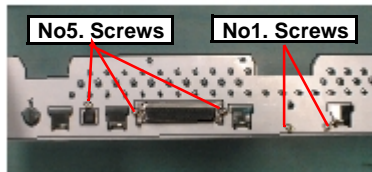
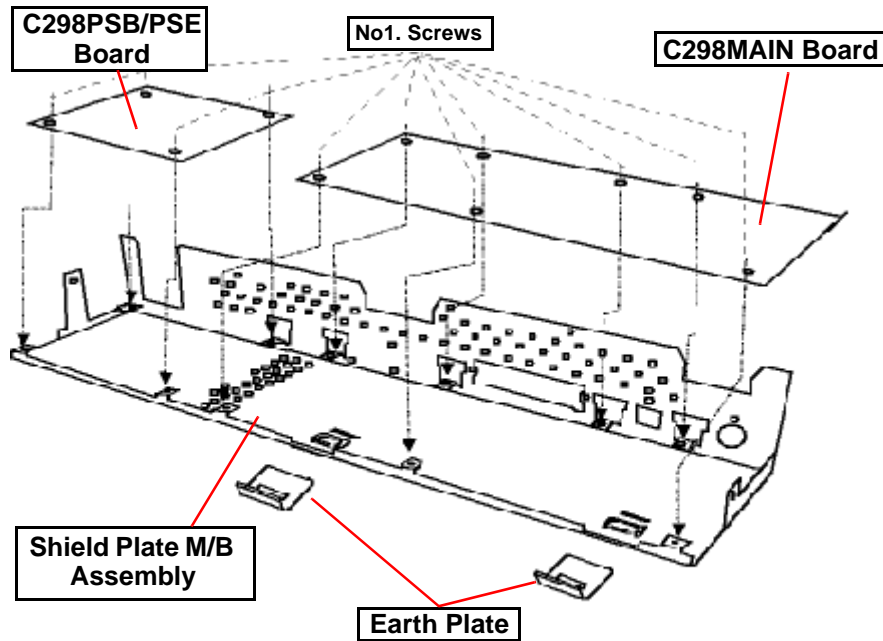


Figure 4-4. Removing Each Circuit Board



- Since the CN10 is a locking connector, be sure to release the locks before removing the cables. Also, make sure to lock them when connecting the cable.



Be sure to perform the following adjustments after replacing the Main Board;

1. Head voltage ID Input (Refer to Chapter 5.)
2. Bi-D adjustment, including Head Gap Adjustment (Refer to Chapter 5.)
3. USB ID data input (Refer to Chapter 5.)

Be sure to exchange the following parts also when replacing the Main Board;

1. Waste Ink Absorption Pad
2. Ink Cartridge (BK & Color)

This parts exchange is required since the several ink counters stored in the EEPROM are lost when the Main Board is replaced.



Make sure each cable is set in the correct cable holder (A or B) on the M/B Shield Plate. Refer to Figure 4-5.

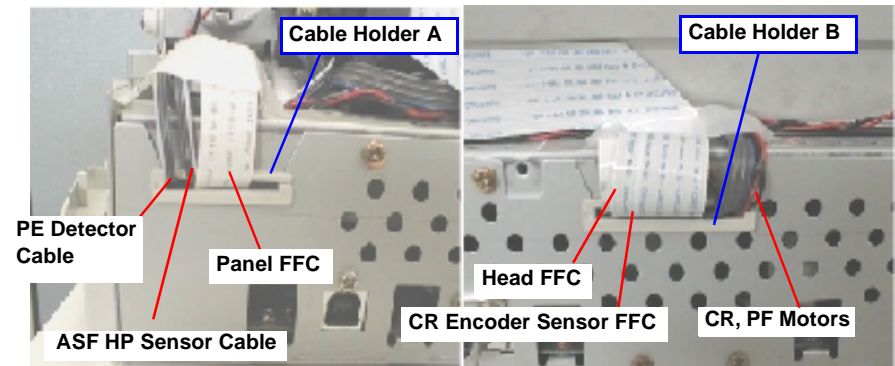


Figure 4-5. Setting the Cables to Holders A and B

4.2.3 Removing the Operation Panel

The panel board equipped with each printer is as follows:

- Stylus COLOR 860: C298PNL
- Stylus COLOR 1160: C304PNL

1. Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Remove two screws (No.1) securing the Operation Panel Assembly.
Then:
Stylus COLOR 860: Disconnect the Operation Panel Assembly from the Printer Mechanism.
Stylus COLOR 1160: Release the joint for the protrusion on the Operation Panel and the gutter of the Right Sub Frame, and remove the Operation Panel Assembly from the Printer Mechanism
Refer to Figure 4-6. The left column's figures show the Stylus COLOR 1160 and the ones in the right column show the Stylus COLOR 860.
- 3) **Stylus COLOR 860:** Remove two screws (No.3) and detach the Sub Right Panel Housing from the Operation Panel Assembly.
Stylus COLOR 1160: Remove four screws (No.3) securing the C304PNL board. Note the Stylus COLOR 1160 does not have a Sub Right Panel Housing.
- 4) Remove the Panel Shield Plate and the C298PNL/C304PNL board from the Operation Panel Assembly.
- 5) Disconnect the Panel FFC from the connector on the C298PNL/C304PNL board.



Removing the Operation Panel Assembly also separates the stacker assembly from the Printer Mechanism, since the Stacker Assembly is held with Operation Panel.

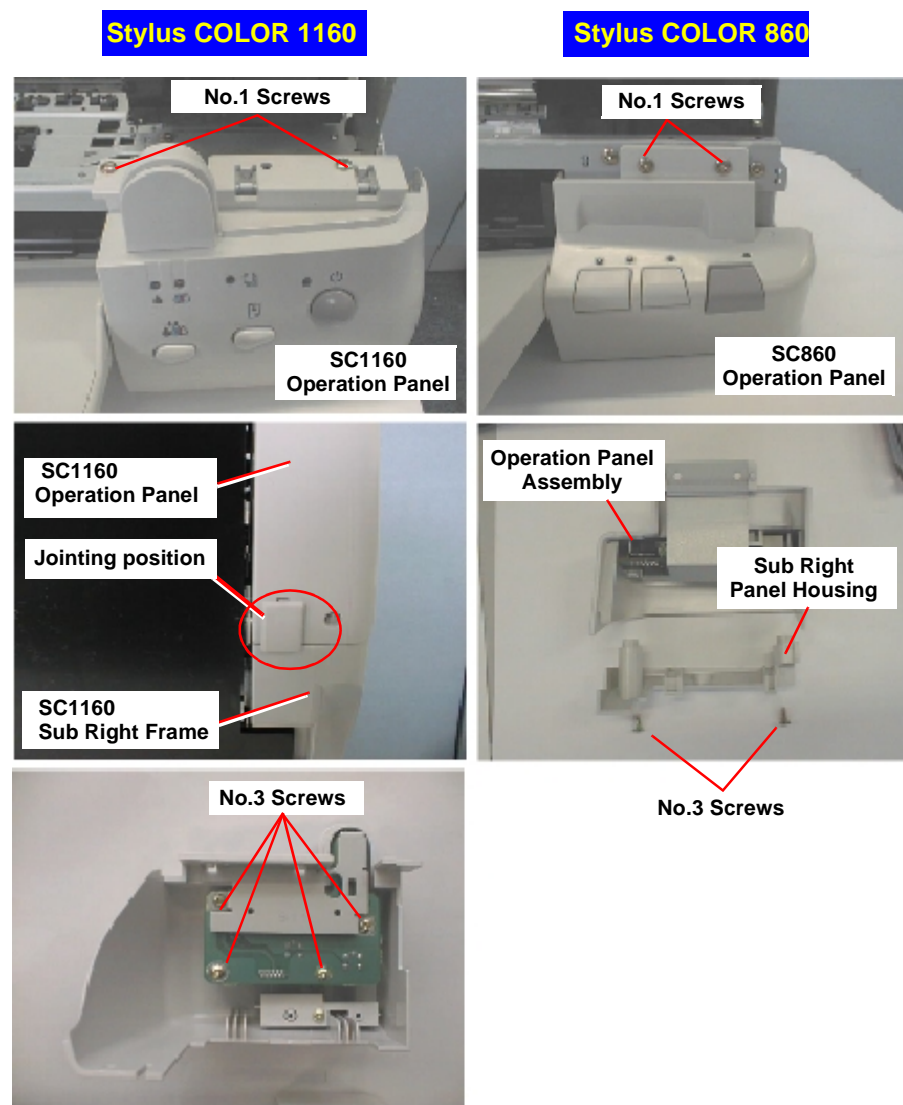


Figure 4-6. Removing the Operation Panel

4.2.4 Disassembling the Printer Mechanism

Since Stylus Color 860/1160 do not have the Lower Housing, the printer mechanism part should already appear by now. Therefore, this section explains procedures for disassembling the major parts or units of the printer mechanism.

4.2.4.1 Removing the Printhead Unit

1. Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Slide the CR Lock Lever to the front side with tweezers or small driver and release the CR Lock Lever from the CR unit. Then move the CR Assembly to the left.
- 3) Take both black and color ink cartridges out of the CR Assembly.
- 4) Remove the blue covers for black and color ink cartridges from the CR Assembly.
- 5) Remove the Torsion Spring 49 from the left side of the CR Assembly and one screw (No.2) securing the Fastener Head Plate. Then take out the Fastener Head Plate. Refer to Figure 4-7.
- 6) Remove the Head FFC Holder from the CR Assembly by releasing four hooks. (Two hooks; Left/Right sides of CR unit, Two hooks; Back side of the CR unit) Refer to Figure 4-7.

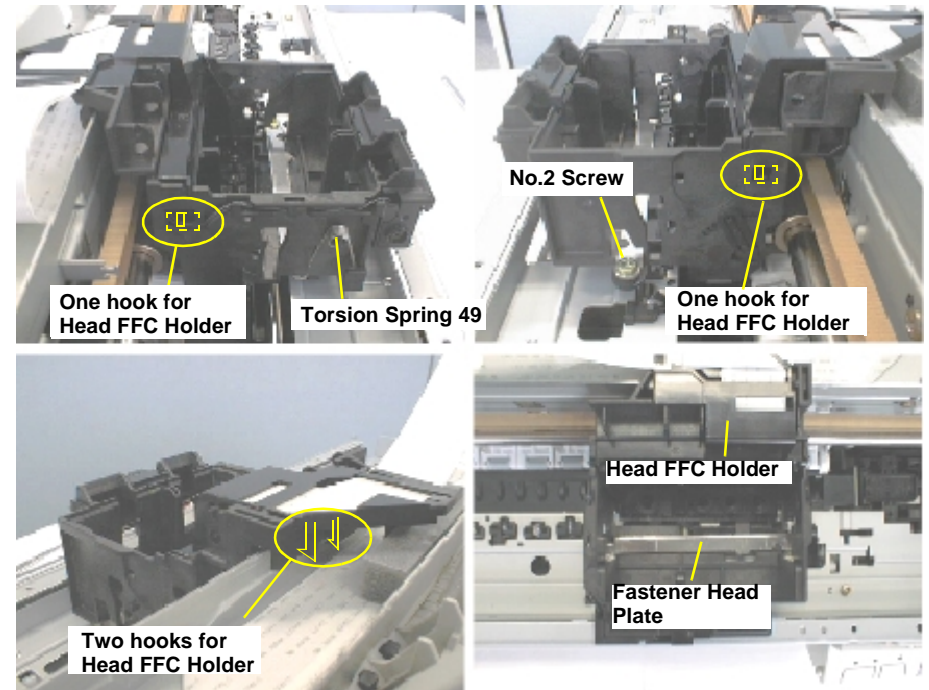


Figure 4-7. Removing the Printhead

- 7) Remove the two Head FFCs that connect to the Printhead Drive Circuit Board built in the CR Assembly and remove the narrow FFC from the CR Encoder Sensor Board on the CR Assembly.



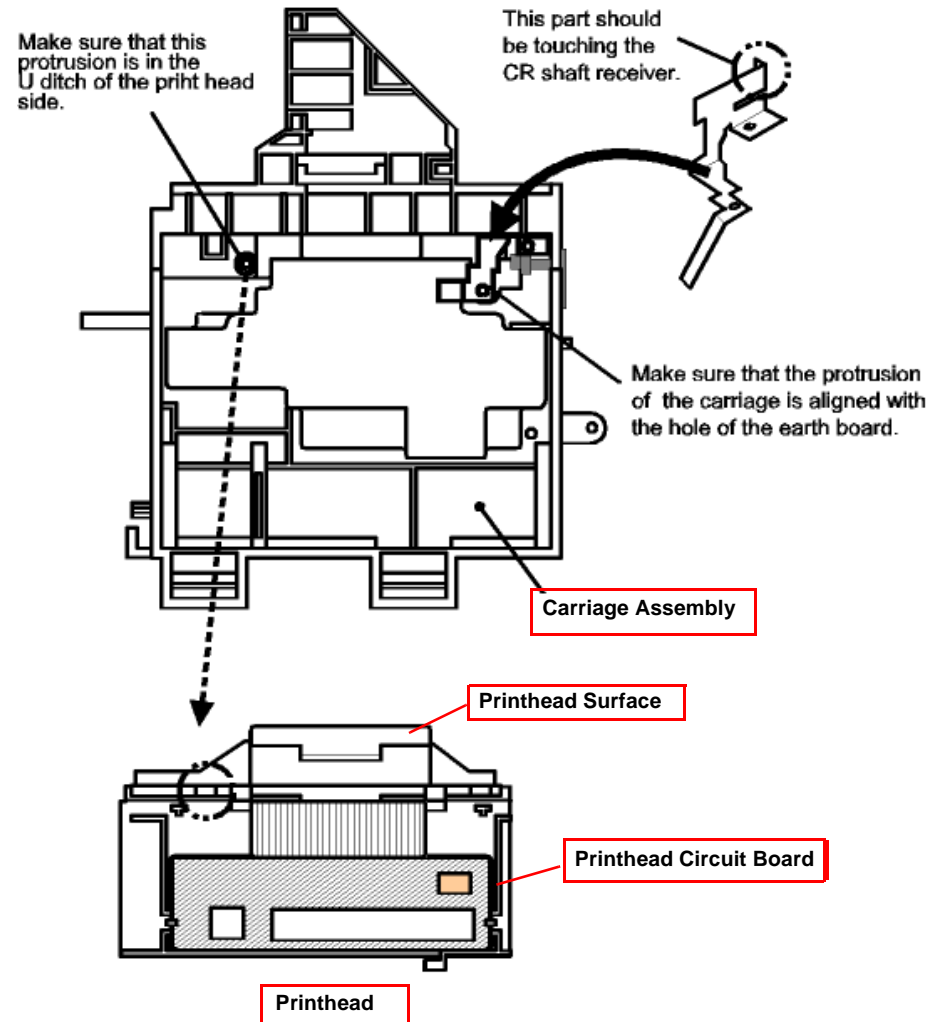
- Make sure that the earth board is installed at the right corner of the CR unit correctly. There are 2 pins used to determine the location. Refer to Figure 4-8.
- When you install the printhead to the carriage, make sure that the protrusion on the carriage side is placed in the U-ditch of the printhead. Refer to Figure 4-8.



- Since the ink cartridge once taken out can not be used again, be sure to install a new ink cartridge when you return the printer to the user.
- Before packing the printer for transportation, make sure new ink cartridges are installed and the carriage is locked with the CR lock lever securely.



- When you replace the printhead unit, perform the following adjustments. (Refer to Chapter 5 for more details.):
1. Initial ink charge (Refer to Chapter 5/Section 5.2.3.9.)
 2. Head Voltage ID Input (Refer to Chapter 5/Section 5.2.3.5.)
 3. Head Angular Adjustment (Refer to Chapter 5/Section 5.2.3.6.)
 4. Bi-D Adjustment (Chapter 5 /Section 5.2.3.7.)



Nozzle Selector is included in the printhead.

Figure 4-8. Installing the Printhead

4.2.4.2 Removing the Waste Ink Absorber Tray Assembly

1. Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Remove one screw (No.1) securing the Left Housing Panel to the Printer Mechanism. Refer to Figure 4-9.
- 3) Remove two screws (No.1) securing Left Sub Frame and remove Left Sub Frame. Refer to Figure 4-9.

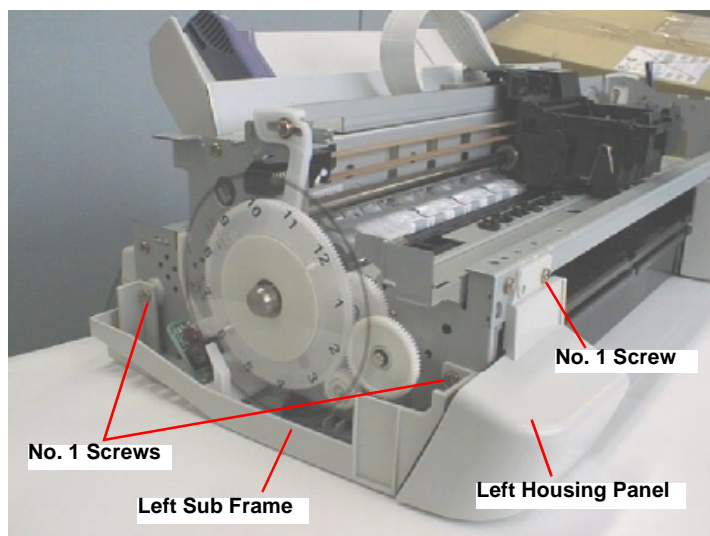


Figure 4-9. Removing the Left Housing Panel & Left Sub Frame

- 4) Insert a screw driver through the center hole in the Paper Eject Assembly and remove one screw (No.3) securing the Lower Paper Support Front to the Waste Ink Absorber Tray Assembly. Refer to Figure 4-10.
- 5) Inserting a screw driver through the cutout, remove No. 3 screw* securing Waste Ink Absorber Tray Assembly to the right bottom part of the mechanism. Refer to Figure 4-10.
* One screw for SC860 and two screws for SC1160
- 6) On the Left side of the printer mechanism, using tweezers or a small screw driver, carefully shift the Tray Spacer securing the Waste Ink Absorber Tray Assembly to left horizontally. Refer to Figure 4-10.
- 7) Remove the Waste Ink Absorber Tray Assembly pulling it downward.

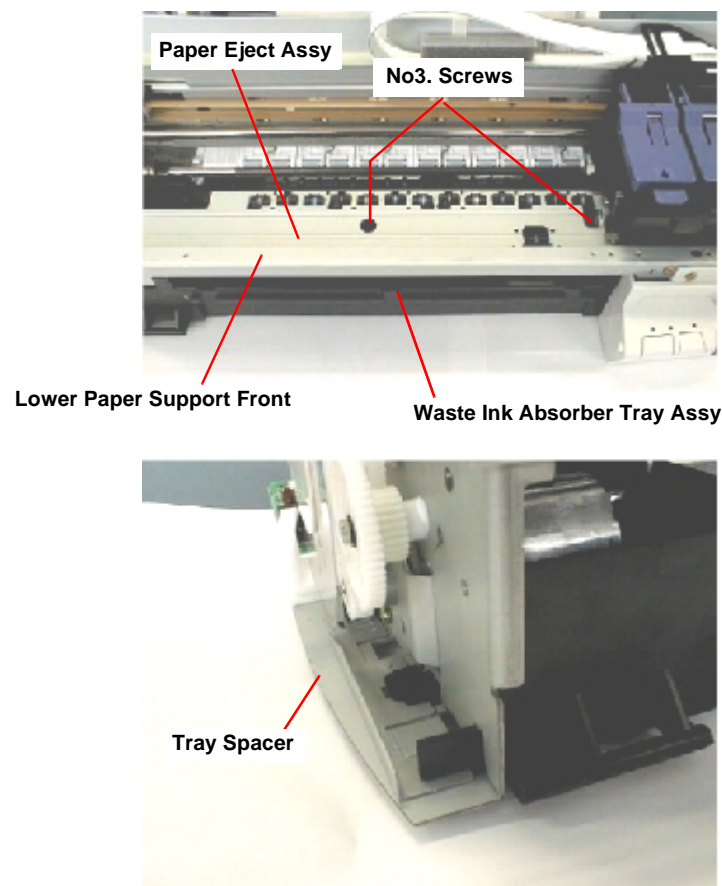


Figure 4-10. Removing two No.3 screws and Tray Spacer



1. When installing the Waste Ink Absorber Tray Assembly, make sure to fix it with the Spacer Tray in the left side of the printer mechanism. Refer to Figure 4-11.
2. Be careful not to damage Loop Scale when removing the Tray Spacer.



1. After the replacing the Waste Ink Absorber, perform the following Panel Reset Function for ink overflow counter. Turn on the Printer while holding the “Load/Eject SW”+”Cleaning SW”, then hold “Cleaning SW” for 10 seconds.
Otherwise, perform the counter reset operation by using the adjustment program. For details, Refer to Chapter 5 Section 5.2.3.11.

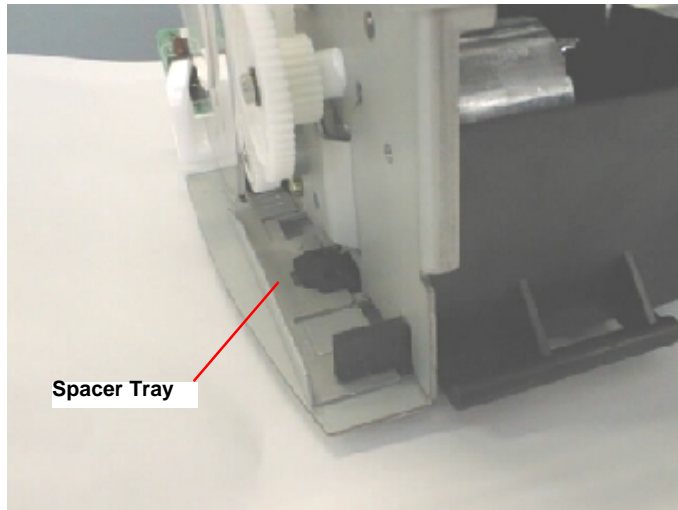


Figure 4-11. Installing the Spacer Tray

4.2.4.3 Removing the Ink System Assembly

NOTE: The Pump Assembly and Cap Assembly are included in the Ink System Assembly

1. Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Remove the Operation Panel. (Refer to Section 4.2.3.)
- 3) Remove two screws (No.1) securing the Right Sub Frame. Refer to Figure 4-12.

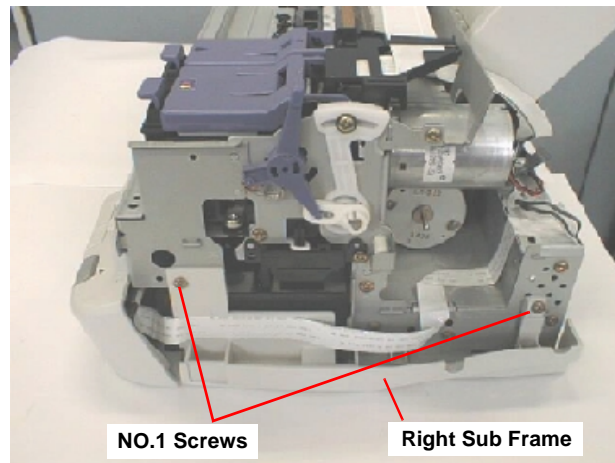


Figure 4-12. Removing the Right Sub Frame

- 4) Remove the Waste Ink Absorber Tray Assembly (Refer to Section 4.2.4.2.)
- 5) Raise the Printer Mechanism toward ASF side so that you can see the bottom of the Printer Mechanism. Refer to Figure 4-13.

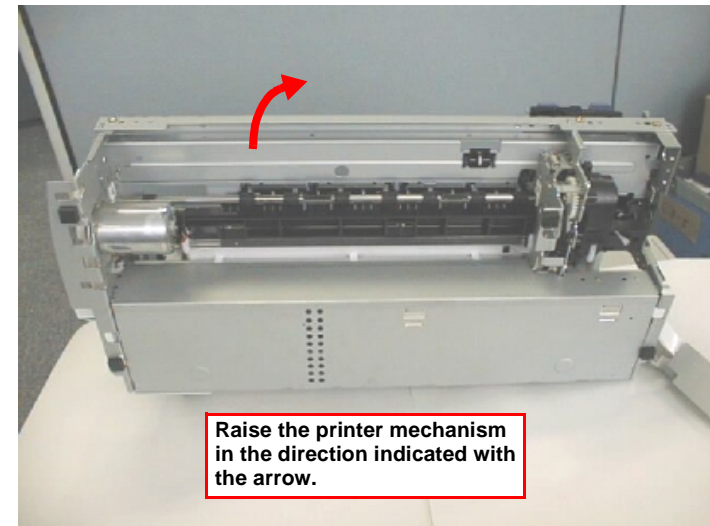


Figure 4-13. Raising the Printer Mechanism

- 6) From the Middle Frame, remove three screws (No.1) securing the Pump Assembly in the Ink System Assembly.
Then, from the Right Frame, remove one screw (No.1) securing the Cap Assembly in the Ink System Assembly. Refer to Figure 4-14.
- 7) Release three hooks fixing the Cap Assembly to the Metal plate for Ink System Assembly and remove the Cap Assembly. Refer to Figure 4-14.
- 8) Remove the ink tube carefully from the Cap Assembly.

CAUTION

1. **When replacing the cleaner head built in the Pump assembly, be careful of the following points.**
 - Do not touch the cleaner head with your bare hands. Use gloves or tweezers.
 - Do not smear the head cleaner with oil or grease.
 - When installing the cleaner head, set the rubber side (black side) toward the right side of the frame.
2. **When replacing the Cap Assembly, do not touch the sealing rubber portion of the Cap Assembly.**
3. **The components parts of the Pump Assembly are no individually supplied as ASP. So please replace the whole Pump Assembly when the Pump Assembly needs replacing.**

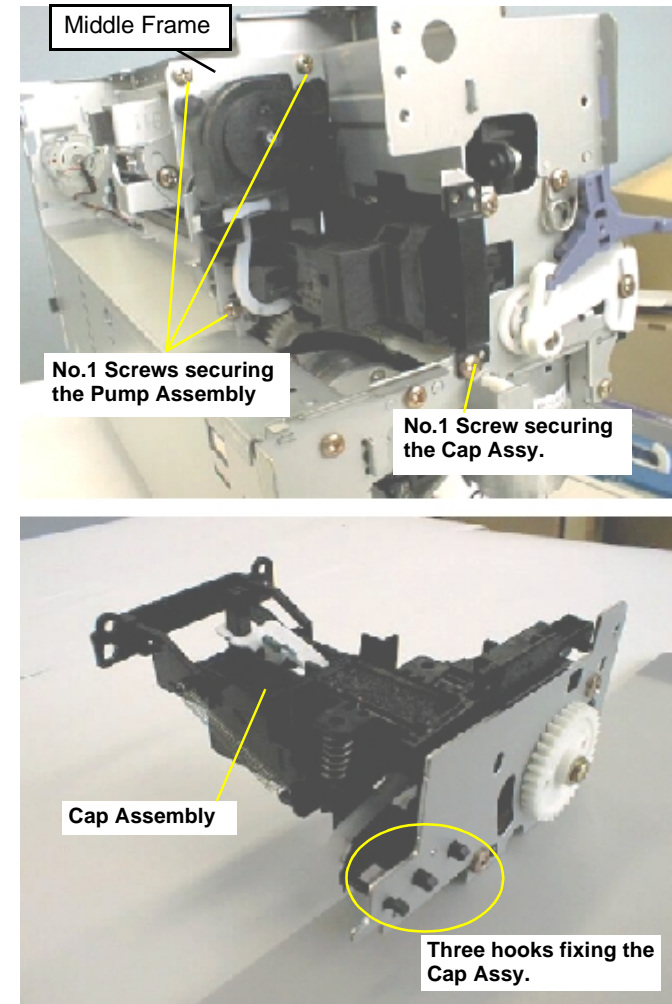


Figure 4-14. Removing the Pump Assembly & Cap Assembly



- Since the spring is included among the gears in the pump assembly, make sure that the parts do not pop out during disassembly and assembly.
- When assembling the Cap Assembly to the Ink System Assembly, make sure that the Ink absorption Pad has been set in the Cap Assembly. Refer to Figure 4-15.
- When assembling the printer, be careful not to crush or leave any stress on the ink tube connecting the pump assembly and the cap assembly.
- Check that the ink tube is connected securely to the connect portion of the Cap Assembly. Refer to the Figure 4-16.
- Check that the ink tube is placed correctly in the Ink System Assembly. Refer to Figure 4-16.
- After installing the Pump Assembly, ensure that the cleaner parts move back and forth by rotating the Gear.
- After setting the three protrusions of Cap Assembly to the suitable fixing holes of the metal plate, secure the Ink System Assembly to the Middle Frame with the screws. See Figure 4-14.

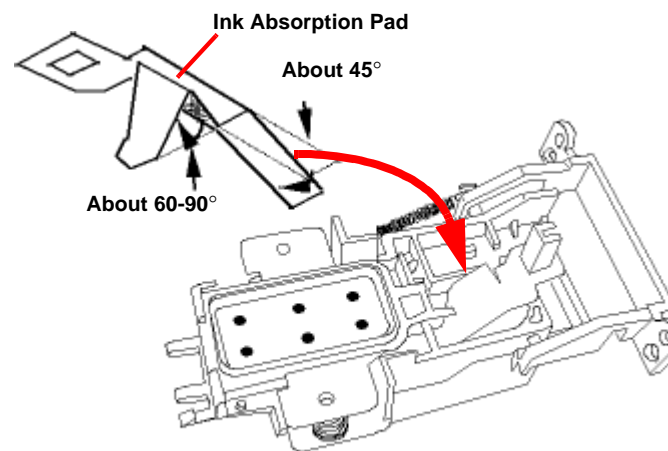


Figure 4-15. Setting the Ink Absorption Pad

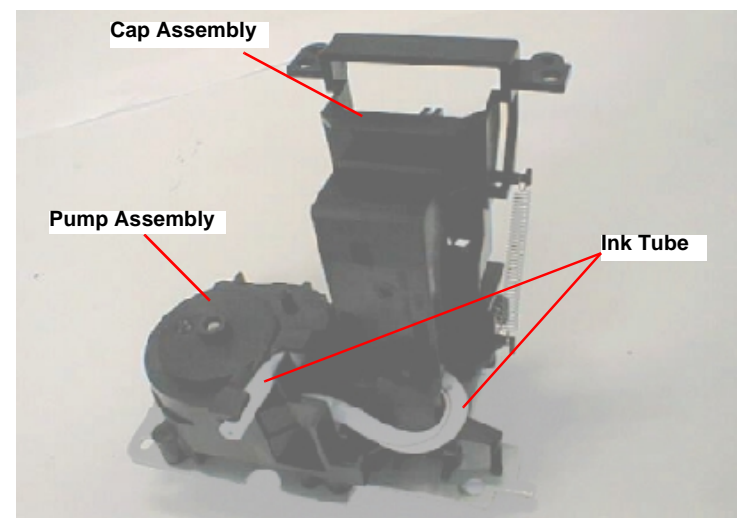


Figure 4-16. Placing the Ink Tube in the Ink System

4.2.4.4 Removing the CR Motor Assembly

1. Remove the Upper Housing. (Refer to Section 4.2.1)
- 2) Using tweezers or a small screw driver, slide the CR Lock Lever to front and release the CR Lock Lever from the CR unit. Then move the CR unit to the center area of the CR shaft.
- 3) Loosen the CR Timing Belt by pushing the Driven Pulley Holder to right using a screw driver, and remove the Timing Belt carefully from the pinion gear on the CR motor. Refer to Figure 4-17.

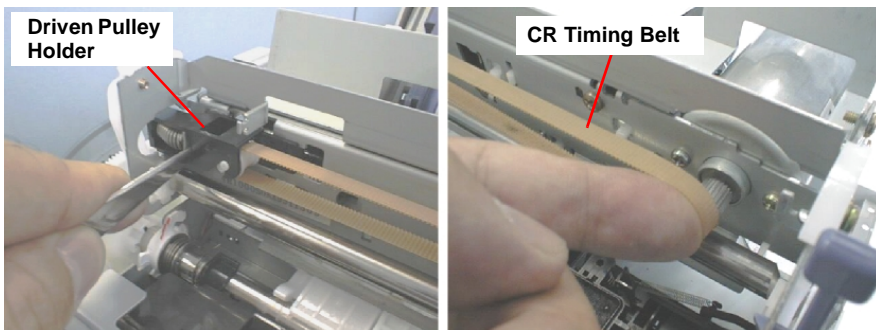


Figure 4-17. Removing the Timing Belt

- 4) Remove two screws (No.1) while holding the CR motor and remove the CR motor assembly. Refer to Figure 4-18.

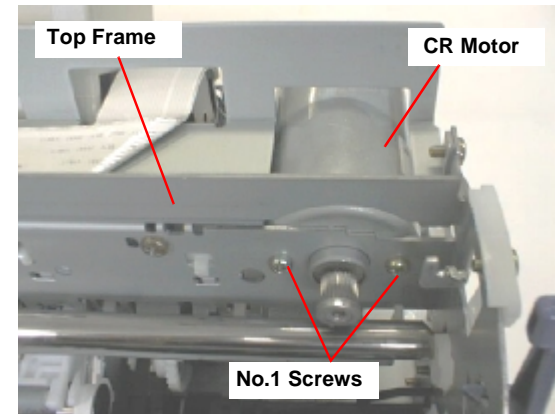


Figure 4-18. Removing the CR Motor Assembly



- When you remove the Timing Belt from the pinion gear on CR motor, be careful not to damage the CR Encoder Slit Plate.
- When you remove the CR motor through the hole in the Top Frame, make sure the pinion gear does not hit the edge of the hole.

4.2.4.5 Removing the DE Assembly (include the ASF/Pump motor)

1. Remove the Upper Housing (Refer to Section 4.2.1)
- 2) Remove the Ink System Assembly (Pump Assembly & Cap Assembly) (Refer to Section 4.2.4.3)
- 3) Remove the CR Motor Assembly. (Refer to Section 4.2.4.4.)
- 4) Raise the Printer mechanism toward ASF side so that you can see the bottom of the Printer Mechanism. Refer to Figure 4-19.

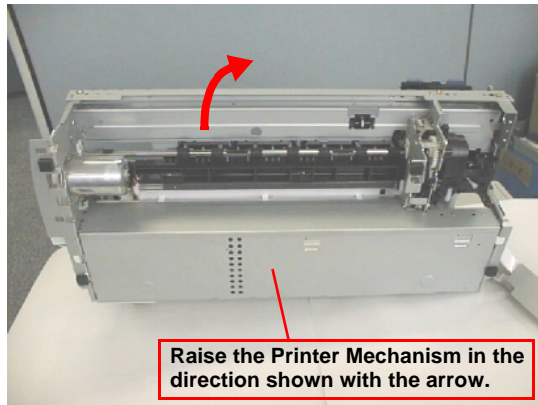


Figure 4-19. Raising the Printer Mechanism

- 5) Using tweezers, remove the Tension Spring 7.37 on the Middle Frame and loosen the No. 1 screw securing the Metal Plate for Combination gear 12,22.92. Refer to Figure 4-20.

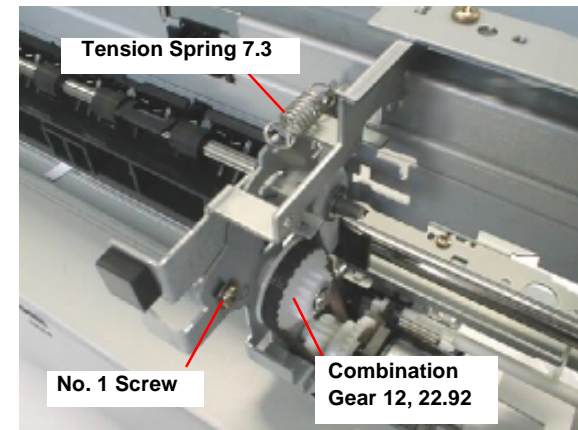


Figure 4-20. Removing the Tension Spring

- 6) Loosen the Tension Belt by pushing down the Metal Plate for Combination Gear 12,22.92 and remove the Tension Belt from the Combination gear 12, 22.92. Refer to Figure 4-21.

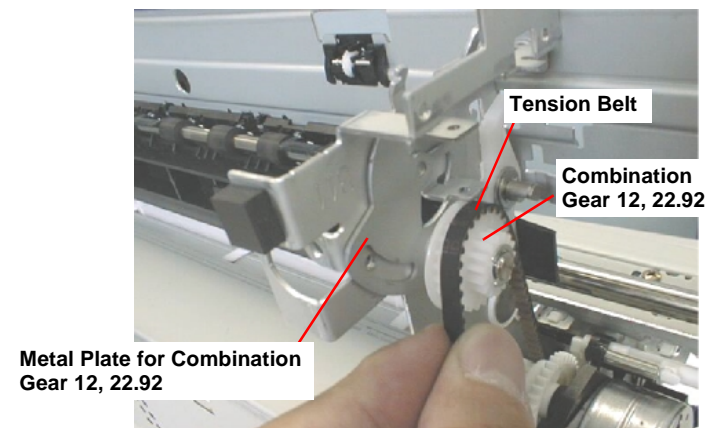


Figure 4-21. Removing the Tension Belt

- 7) Remove the Torsion Spring 0.618 between DE Lock Lever and the hook on the DE unit. Refer to Figure 4-22.

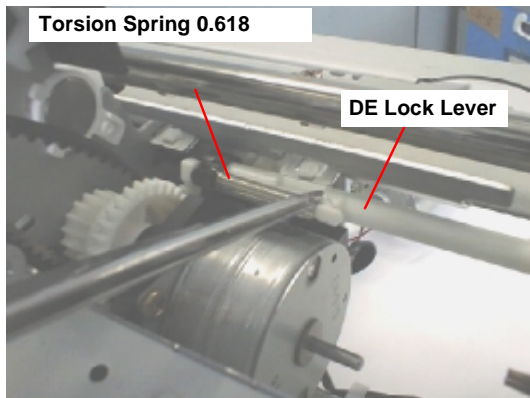


Figure 4-22. Removing the Tension Spring 0.618

- 8) Push down the hook on the DE unit carefully and slide the DE Lock Lever until it touches the right frame. The left end of the DE Lock lever comes off the hole (for DE Lock Lever) in the DE unit. Refer to Figure 4-23.
- 9) Pull the left edge of the DE Lock Lever to your side slightly and slide it to the left carefully to remove the DE Lock Lever from the hole in the Top Frame. Refer to Figure 4-23.
- 10) Remove two screws (No.1 & No. 3) securing the DE unit. Refer to Figure 4-24.
- No.1 Screw: Securing the DE Unit to the Middle Frame.
 - No. 2 Screw: Securing the DE unit to the Top Frame.

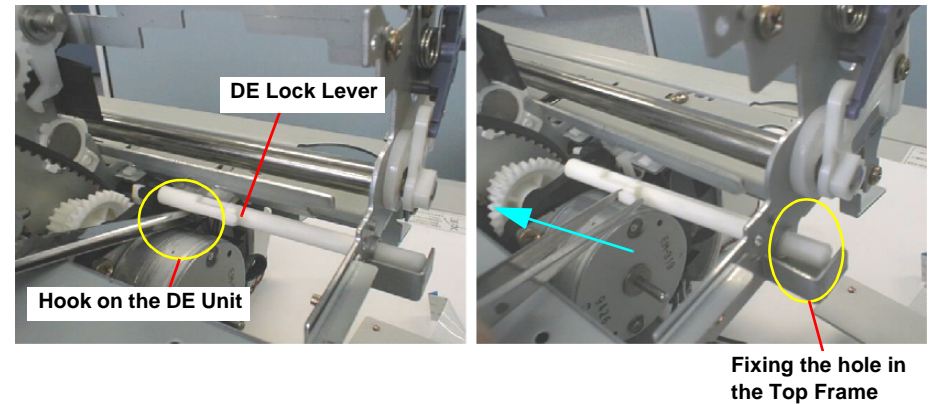


Figure 4-23. Removing the DE Lock Lever

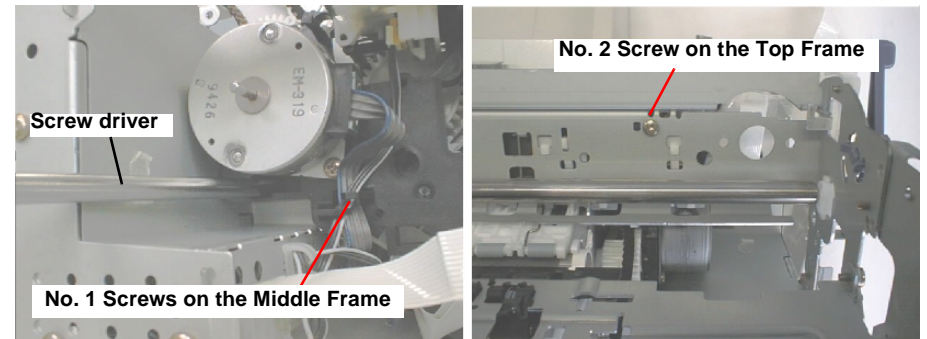


Figure 4-24. Removing the DE Assembly

- 11) Remove the several cables from the hook on the DE Assembly and disconnect the connector from the PE sensor.
- 12) Slide the DE Assembly to the right.
- 13) Remove two screws (No.3) securing the ASF/Pump Motor to the DE unit. Refer to Figure 4-25.
- 14) Push down Planetary Gear 15.2 unit to the Pump drive engagement side to release the pinion gear of ASF/Pump motor in the DE Assembly. (See Figure 4-26.)

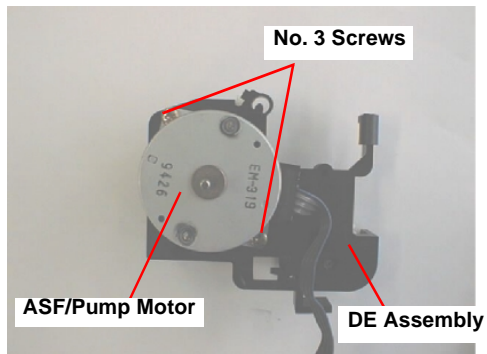


Figure 4-25. Removing the ASF/Pump Motor from DE Unit

- 15) Remove the ASF/Pump Motor from the DE Assembly.



- When you push down the hook in Step 8 to remove the DE Lock Lever, be careful not to break the hook.
- Do not damage the CR Encoder Slit plate when removing the No.2 screw from the Top Frame in Step10.



- Check that all gears are assembled in the DE unit. Refer to Figure 4-26.
- Before you assemble the ASF/Pump motor to the DE unit, set the Planetary gear 15.2 unit to the Pump drive side.
- Make sure that the Panel FFC is placed on the bottom frame before you assemble the DE unit to the Middle Frame.
- Set the Tension Belt to the 17.19 gear of the Combination Gear 17.19, 25.6 before securing the DE unit to the Middle Frame. Refer to Figure 4-27.
- Make sure that the three protrusions on the DE unit fit in the corresponding holes in the Middle Frame.
- After setting the Tension Belt to the Gear 22.92 of the Combination Gear 12, 22.92, hang the Tension Spring 7.3 in the following order. Refer to Figure 4-28.
 1. To the hook on the Middle Frame.
 2. To the hook on the Metal plate for the Combination Gear 12,22.92
- Make sure that the following cables are set in the hook on the DE unit when assembling the unit.
 - PE Sensor cable
 - ASF/Pump motor cable
 - CR motor cable.

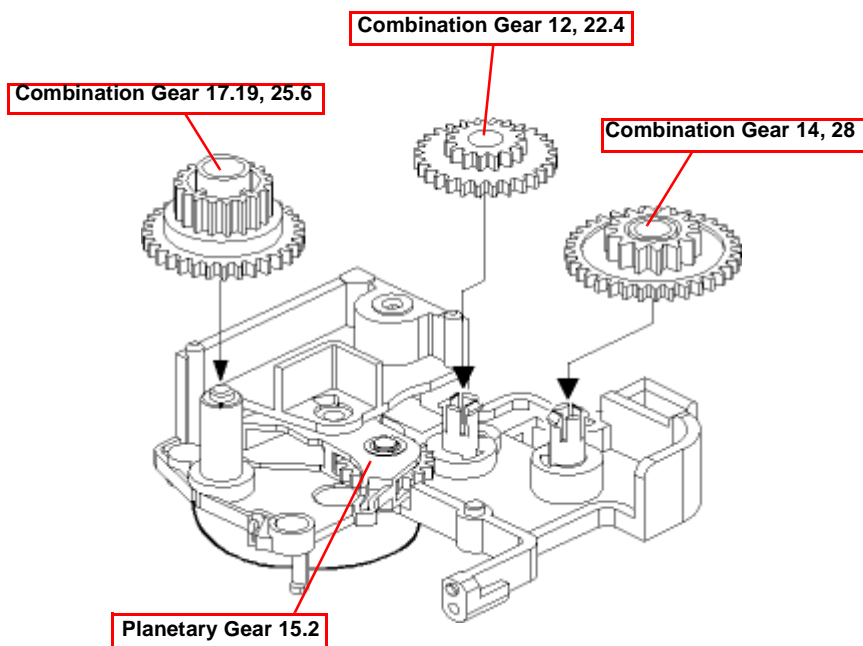


Figure 4-26. Gear Engagement in DE Assembly

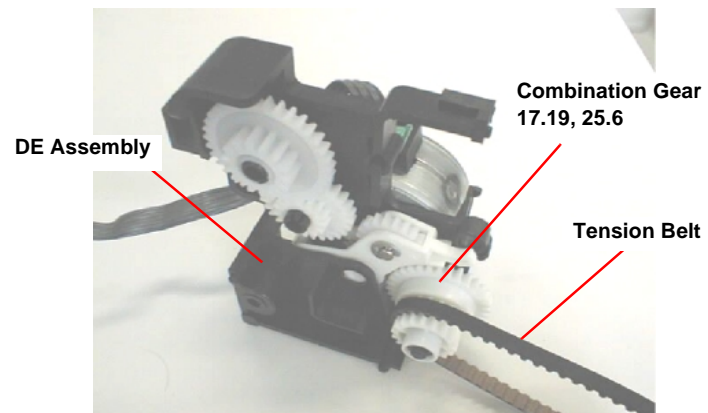


Figure 4-27. Setting the Tension Belt to 17.19 Gear

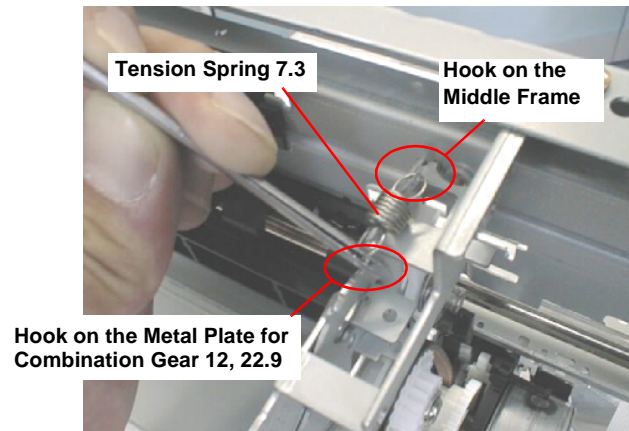


Figure 4-28. Setting the Tension Spring 7.37

4.2.4.6 Removing the ASF Assembly

1. Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Remove the following Cables from the cable hook in right side (viewed from back) of the ASF Assembly.
 - ASF HP Sensor Cable
 - PF Motor Cable
- 3) Remove two screws (No.7 and ASF fixing screw) securing the ASF unit to the Bottom Frame. Refer to Figure 4-29.

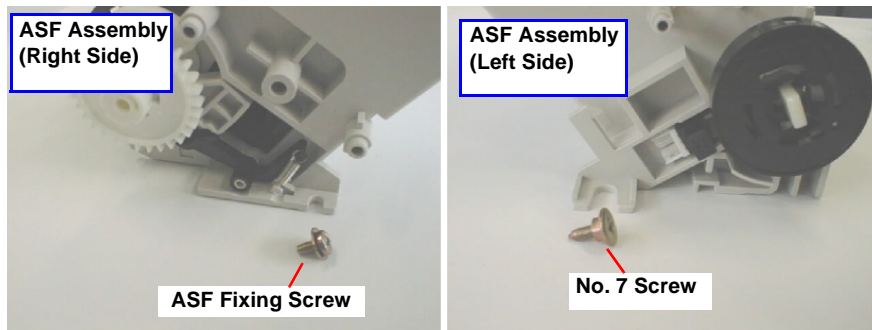


Figure 4-29. Removing the ASF Assembly (1)

- 4) Slide the ASF unit to the right (viewed from back) and pull it backward carefully while holding up the Sub Paper Support Upper. Refer to Figure 4-30.

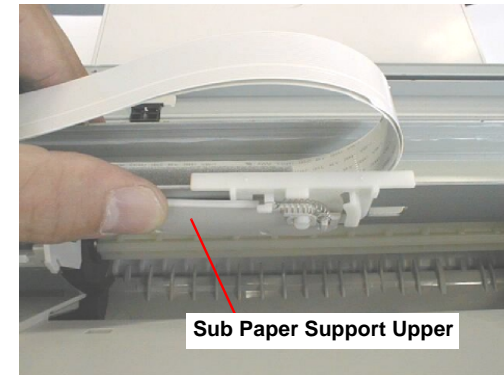


Figure 4-30. Removing the ASF Assembly (2)

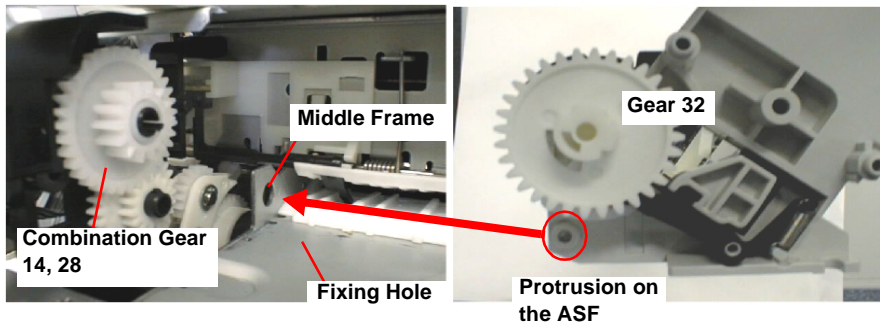


- When installing the ASF assembly, make sure that the protrusion on the ASF is assembled into the fixing hole in the Middle Frame.
- Engage the Gear 32 (ASF Unit) and Combination Gear 14,28 (DE unit) carefully when installing the ASF unit is to the Bottom Frame. Otherwise, gears may be damaged. Refer to Figure 4-31.



- Screws for ASF Assembly should be used at the following positions. (Looking from the back of printer). Refer to Figure 4-29.
 - Right Side (viewed from the back): ASF Fixing Screw
 - Left side (viewed from the back): Screw No.7
- Make sure the ASF HP sensor cable and the PF Motor Cable are set in the hook on the right side (viewed from the back) of ASF unit. Refer to Figure 4-32.

Stylus COLOR 860



Stylus COLOR 1160

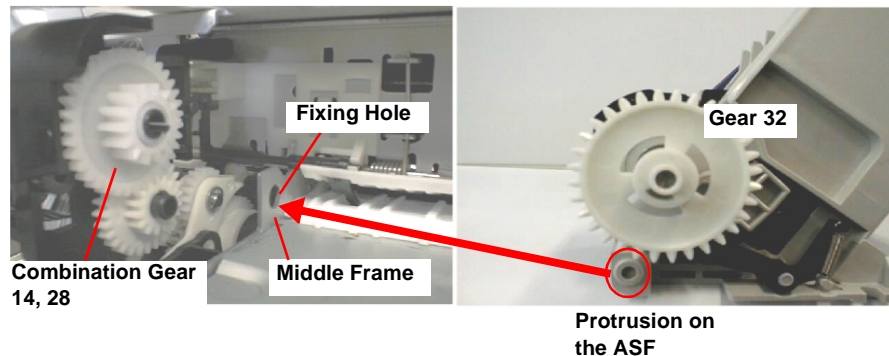


Figure 4-31. Assembling notice for ASF Assembly.

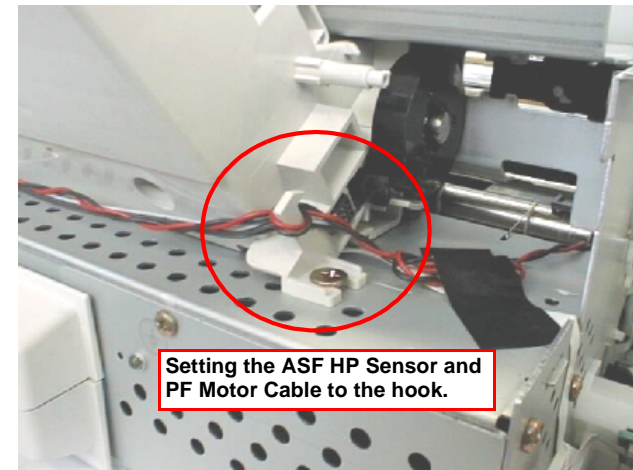


Figure 4-32. Setting the ASF HP Sensor & PF Motor cable

4.2.4.6.1 Removing the Paper Feed Roller Assembly

1. Remove the ASF assembly. (Refer to Section 4.2.4.6.)
- 2) Remove the Gear 32 from the right edge of the LD Shaft by releasing the hook in the Gear 32. Refer to Figure 4-33.
- 3) Remove the Right Hopper Release Lever from the right edge of the LD Roller Shaft. Refer to Figure 4-33.

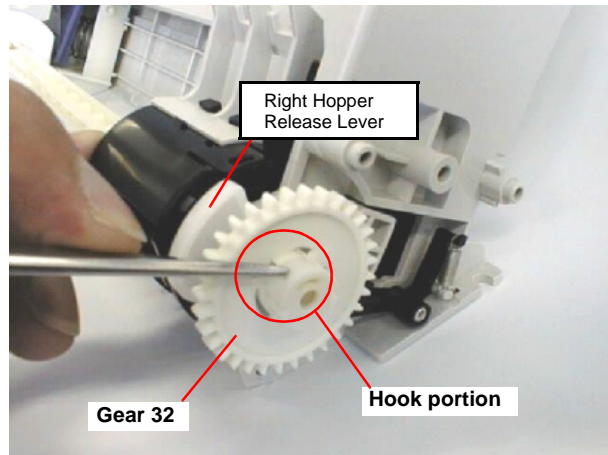


Figure 4-33. Removing the Gear 32 & LD Roller

- 4) Move the left Paper Feed Roller Assembly to the center. Then:
 - Stylus COLOR 860:** Remove the Left LD Roller Fixing Bushing (white plastic) attached to the left end of the LD Roller Shaft. Refer to Figure 4-34.
 - Stylus COLOR 1160:** Remove the E-Ring attached to the left end of the LD Roller Shaft. Refer to Figure 4-34.
- 5) Slide the LD roller shaft to the left side and remove the ASF HP Detection Wheel after releasing its hook. Refer to Figure 4-34.

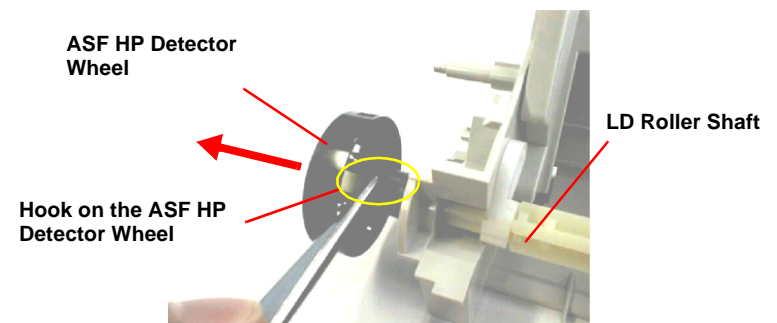
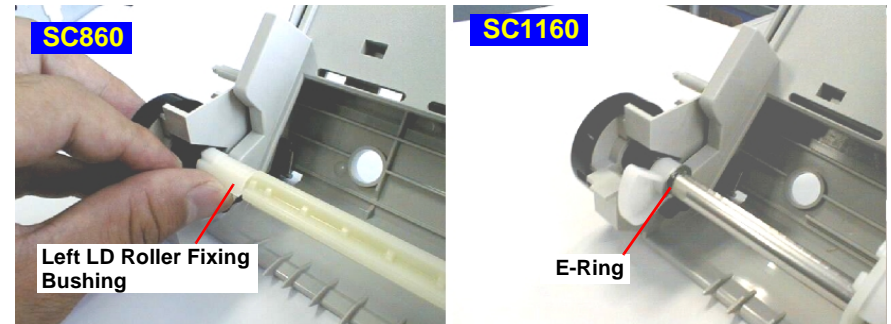


Figure 4-34.
Removing the LD Roller Fixing Bushing & ASF HP Detector Wheel

- 6) Release the Hopper Assembly fixing hooks from the protrusion at the top left corner of the ASF Frame by following the step in Figure 4-35.

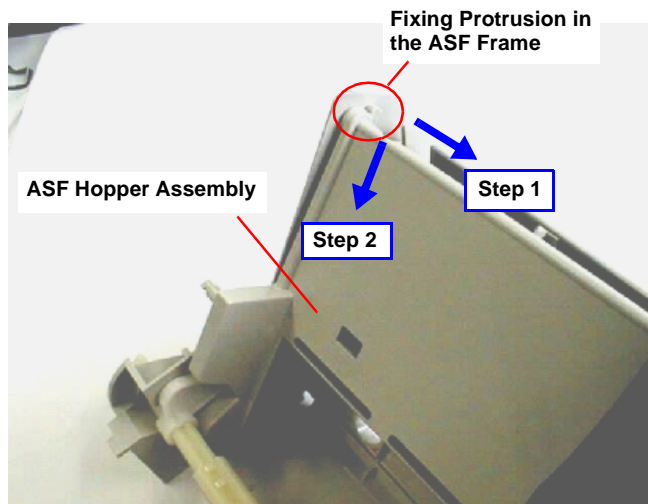


Figure 4-35. Releasing the Hopper Assembly

- 7) Set the right arm portion of the Hopper Assembly to the square hole in the right side of the ASF Frame and remove the Hopper Assembly carefully. Refer to Figure 4-36.

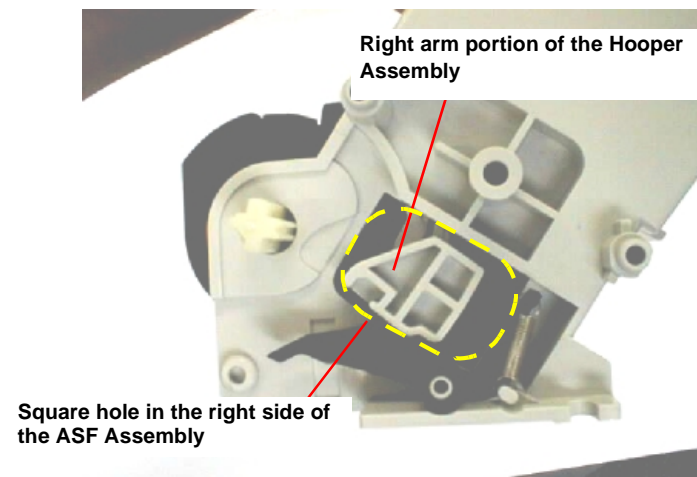


Figure 4-36. Setting the Right Arm of Hopper Assembly

- 8) Using tweezers, carefully take out the right and left compression springs 1.961 that are fixed between the Paper Feed Roller Assembly and the Hopper Assembly. Refer to Figure 4-41.
- 9) Lift up the right Paper Feed Roller Assembly a little to release the right end of the LD Roller Shaft, and move the LD Roller Shaft to the right. Then remove it from the hole in the left side of the ASF Frame.
- 10) Remove the Left Hopper Release Lever from the left end of the LD Roller Shaft.
- 11) Remove the Paper Feed Roller Assembly from the LD Roller Shaft.

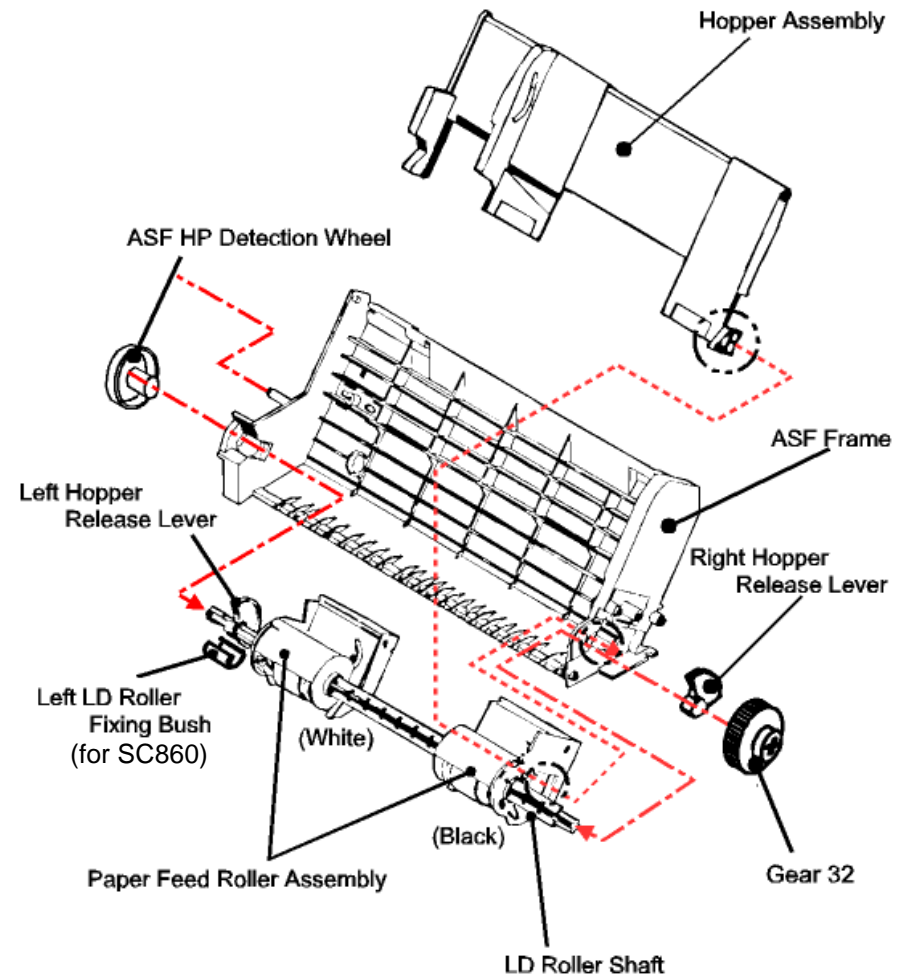


Figure 4-37. Disassembling the ASF Assembly



- During disassembly and assembly of the hopper assembly, do not let the grease on the cam parts touch other parts. Wipe off any grease smeared on other parts.
- Be careful of the direction of the Hopper Release Lever when installing it. Refer to Figure 4-38.
- Make sure that the following parts are installed steadily on the left edge of the LD Roller Shaft.
 - Left LD Roller Fixing Bushing (white plastic for SC860)
 - Left LD Roller Fixing E-ring (for SC1180)
 - ASF HP Detector Wheel (black plastic)
 Refer to Figure 4-34, Figure 4-37.
- When installing the right and left Paper Feed Roller Assemblies to the LD Roller Shaft, make sure that the black one goes to the right.
- Make sure that gutters in the back of both Paper Feed Roller Assemblies are set on the rail in the ASF Frame. Refer to Figure 4-39.
- After installing the Paper Feed Roller Assembly, be sure to fit the groove in the Edge guide to the top left edge of the right Paper Feed Roller Assembly. Refer to Figure 4-39-1.
- Ensure that the right Paper Feed Roller Assembly is fixed with the hook on the ASF unit. Check it from the back of the ASF Frame. Refer Figure 4-40.
- During assembly, when setting the compression spring 1.961 to the spring installation position in the Paper Feed Assembly, hang the spring on the hook temporarily. Then, do not forget to release these springs from the hooks through the holes in the back of paper feed assembly by rotating the springs. (Refer to theFigure 4-41.)

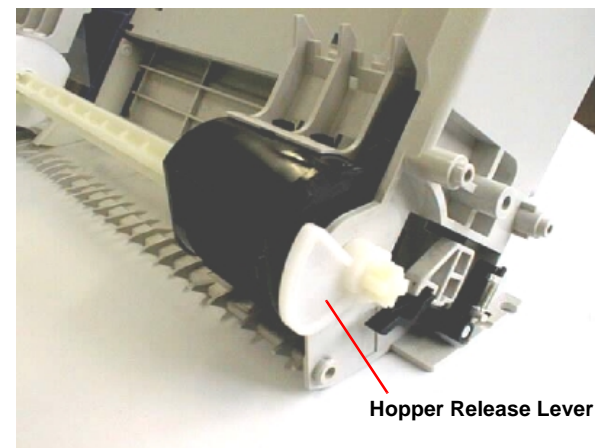


Figure 4-38. Assembling the LD Hopper Release Lever

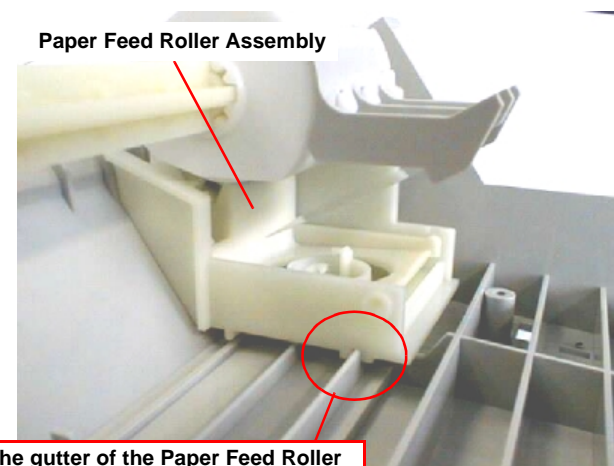


Figure 4-39. Fitting the Paper Feed Roller Assy. to the Rail

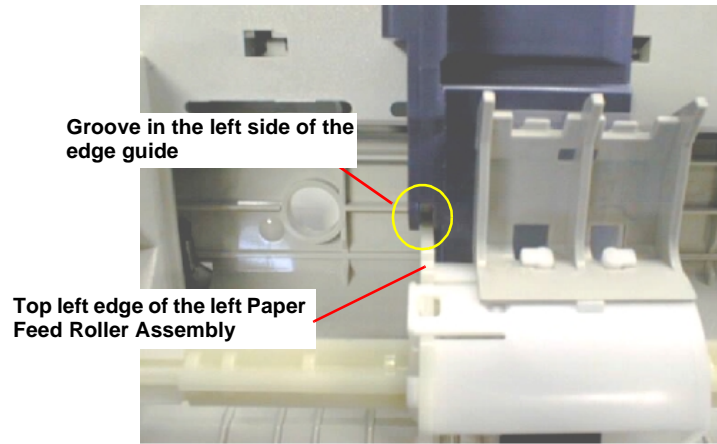


Figure 1-39-1. Engaging the Paper Guide

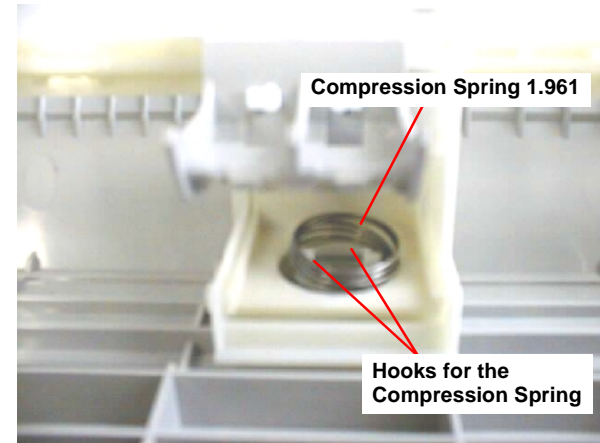


Figure 4-41. Setting the Compression Spring 1.961

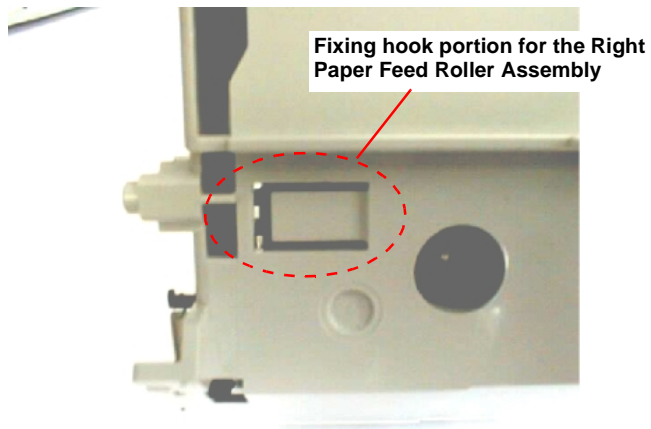


Figure 4-40. Fixing the Right Paper Feed Roller Assembly

4.2.4.6.2 Removing the Right and Left LD Roller Assembly

1. Disassemble the ASF assembly and remove the Paper Feed Roller Assembly and Hopper Assembly from the ASF Assembly. (Refer to Section 4.2.4.6.)
- 2) Release the two hooks fixing the LD Roller Cover to the Paper Feed Roller Assembly. Refer to Figure 4-42.
- 3) Release the two hooks fixing the LD Roller Assembly around the shaft hole of the Paper Feed Roller Assembly. Refer to Figure 4-42.

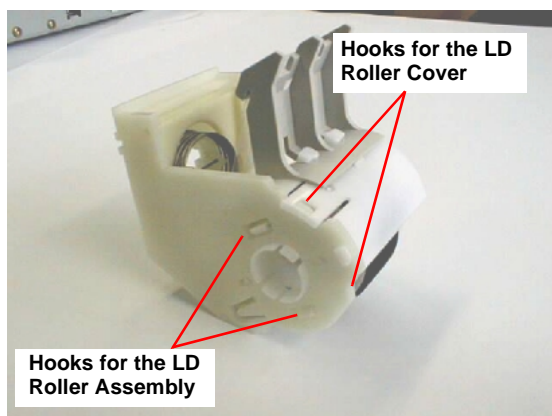


Figure 4-42. Releasing hooks for LD Roller



- When installing the LD roller assembly, make sure that the hooks are hung on the Paper Feed Roller Assembly.
- Do not touch the surface of the LD Roller with hand.

4.2.4.7 Removing the CR Assembly

1. Remove the Upper Housing. (Refer to Section 4.2.1)
- 2) Remove the Tension Spring 1.494 fixing the CR Encoder Slit Plate to the protrusion in the left side of the Top Frame and remove the CR Encoder Slit Plate carefully from the CR unit.

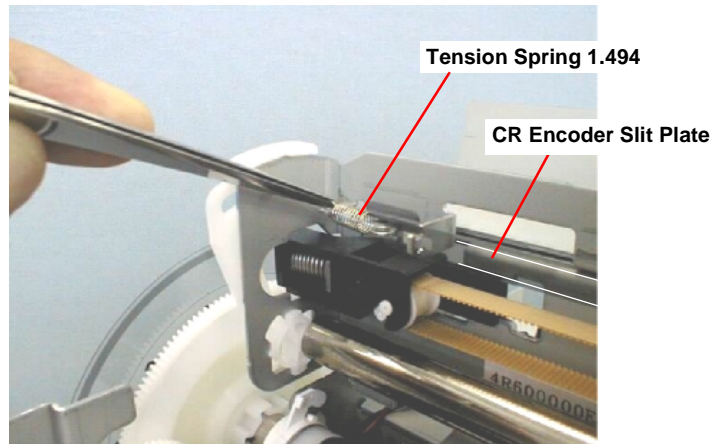


Figure 4-43. Remove the Tension Spring 1.491& CR Encoder Slit

- 3) Loosen the Timing Belt by pushing the Driven Pulley Holder and remove the Timing Belt from the pinion gear of the CR motor. Refer to Figure 4-44.
- 4) Using tweezers, take the Compression Spring 23.52 out of the Driven Pulley Holder. Refer to Figure 4-44.

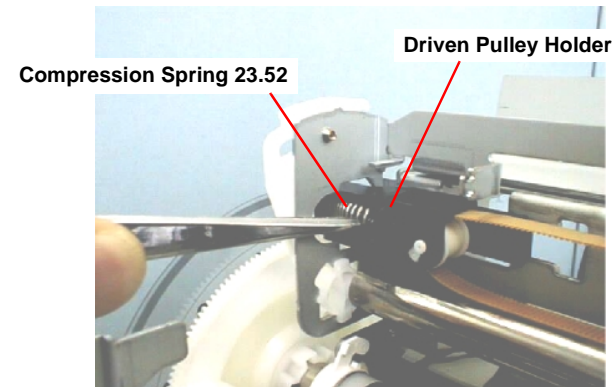


Figure 4-44. Taking Out the Compression Spring 23.52

- 5) Slide the Driven Pulley Holder to the right and remove it to the front.
- 6) Remove the Driven Pulley from the Driven Pulley Holder together with the timing belt. Refer to Figure 4-45.

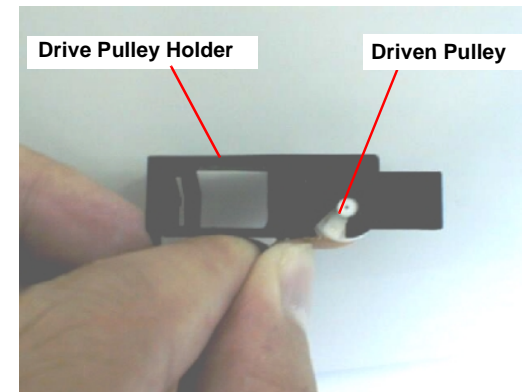


Figure 4-45. Removing the Driven Pulley

- 7) Move the PG Lever to bring its hooks to the wider areas of the cutouts in the right side of the Top Frame. Then remove the PG Lever by releasing the hooks.

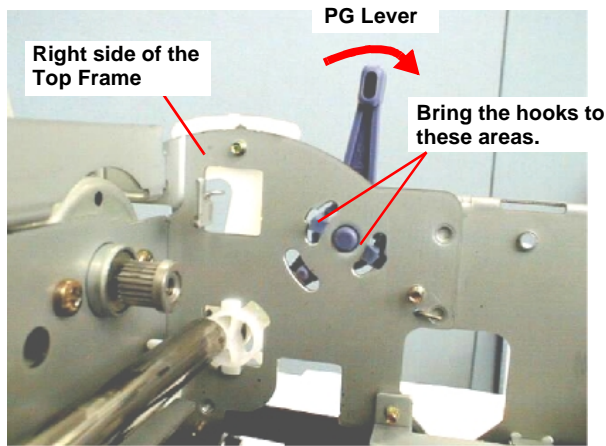


Figure 4-46. Setting the Two Hooks

- 8) Using tweezers, remove the Torsion Spring 63.7 hung onto the right side of the Top Frame and PG lever. Refer to Figure 4-47.
- 9) Release the fixed hook of the PG Lever Support, then remove the PG Lever Support and Disk Spring (6.2x0.15x1, S/NA) from the right end of the CR Guide Shaft. Refer to Figure 4-47.

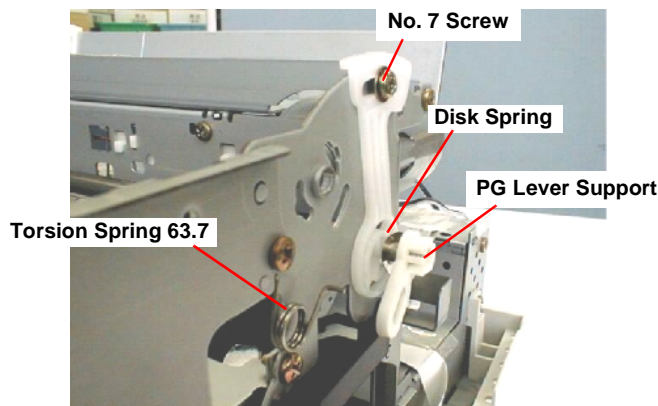


Figure 4-47. Removing the Torsion Spring 63.7 & PG Lever

- 10) Remove one screw (No.7) and rotate the Right Parallelism Adjustment Bushing and move it forward to align the locking protrusion of the Right Parallelism Adjustment Bushing with the notches in the right side of the Top Frame.

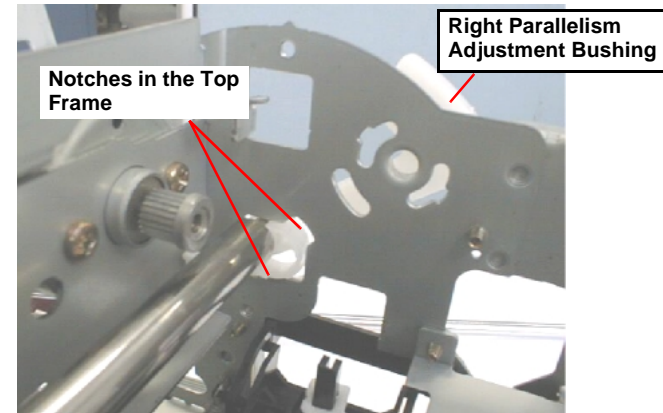


Figure 4-48. Removing the Right Parallelism AD Bushing



Be careful when removing the Right Parallelism Adjustment Bushing. If you remove it with the printhead installed, the CR Unit will fall to the platen.

11) Holding the carriage, remove the Right Parallelism Adjustment Bushing carefully by pushing it to the right slightly.

12) Remove the CR Assembly together with the CR Guide Shaft.



- Do not touch the surface of the CR Liner scale by hand. Dirt or stain causes the CR Unit to move incorrectly.
- Do not damage the CR Liner scale. Handle it carefully. Damage causes the CR Unit to move incorrectly.



- In case you forget to mark the present location where the Bushing is fixed on the TOP Frame, perform the PG Adjustment. Refer to the Chapter 5.



- When disassembling the Right Parallelism Adjustment Bushing, mark present location where the Bushing is fixed on the TOP Frame so that you can omit PG adjustment after assembly.
- When installing the Disk Spring (6.2x 0.15x1,S/NA), pay attention to its direction. Set the convex side facing to the right. Refer to Figure 4-47.
- When installing the PG Lever, refer to the Figure 4-47.
- After setting the CR Liner scale into the slot, ensure that the CR Liner scale is not in contact with either side of the slot in the CR unit. Refer to Figure 4-49.
- Make sure that the Oil Pad is set in the correct position in the CR unit when reassembling the CR unit to the CR Guide Shaft.

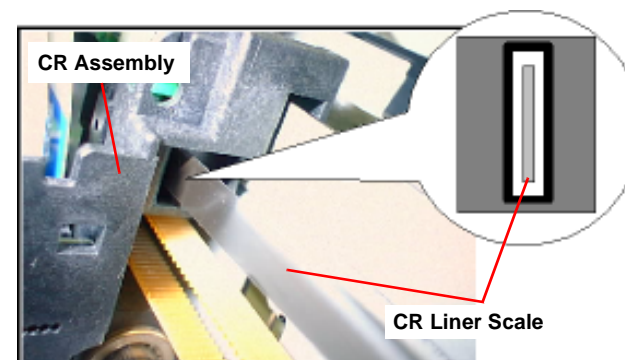


Figure 4-49. Checking the CR Encoder Slit Plate condition

4.2.4.7.1 Disassembling the CR Assembly

1. Remove the Printhead Unit. (Refer to Section 4.2.4.1)
- 2) Remove the No. 9 screw securing the I/C Detector Holder Bushing. Then remove the I/C Detector Cables placed along the gutter in the left side of the CR Assembly. Refer to Figure 4-50.

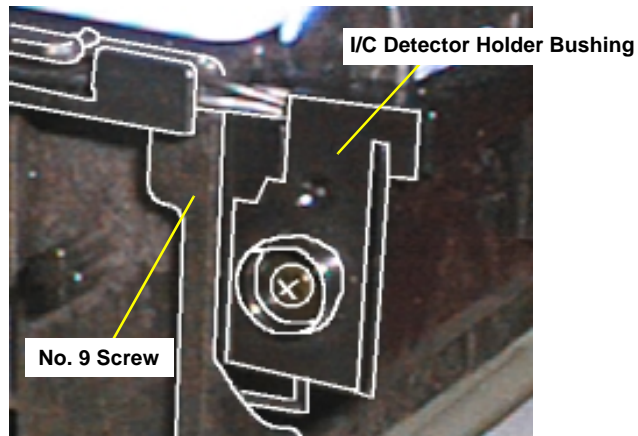


Figure 4-50. Removing the I/C Detector Holder Bushing

- 3) Remove the I/C Detector Holder by releasing the four hooks. Refer to Figure 4-51.

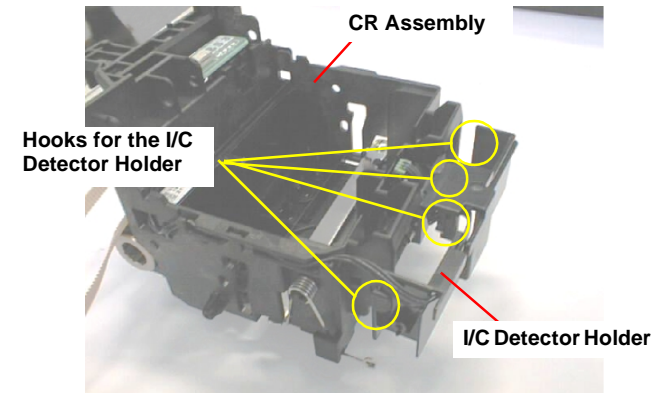


Figure 4-51. Removing the I/C Detector Holder

- 4) Remove the I/C Detector from the CR assembly.

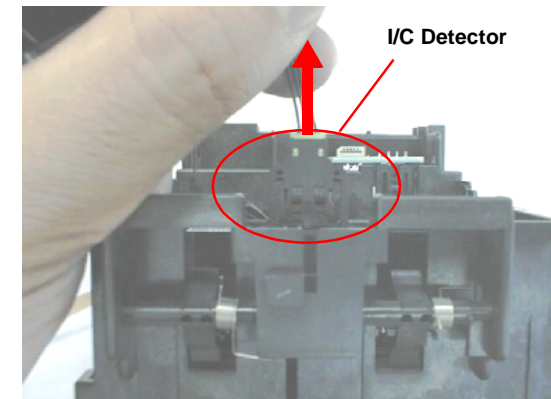


Figure 4-52. Removing the I/C Detector

- 5) Remove the CR Encoder Board Assembly from the CR Frame as shown in Figure 4-53.

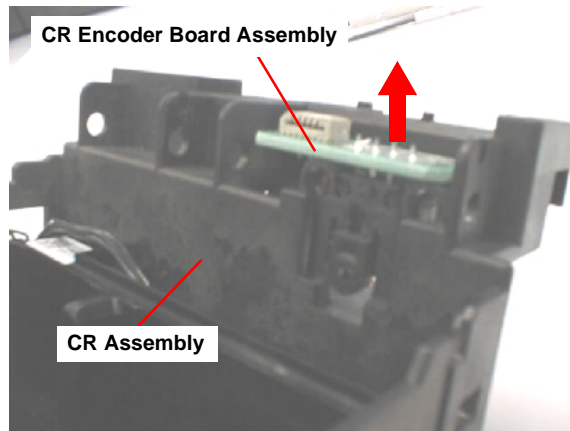


Figure 4-53. Removing the CR Encoder Board Assy.

- 6) Remove the CR Timing Belt from the gutter in the CR Frame.



- Make sure that the Torsion Spring 1.08 is hung onto the protrusion of the I/C Detector Lever and the hook on the CR frame correctly. Refer to Figure 4-54.
- Ensure that the I/C Detector Cables are placed along the gutters as Figure 4-55.
- Make sure that the I/C Detector Lever acts correctly.

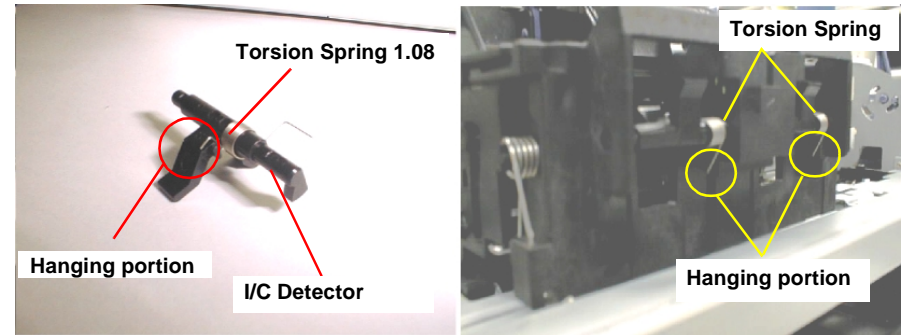


Figure 4-54. Assembling the I/C Detector Lever

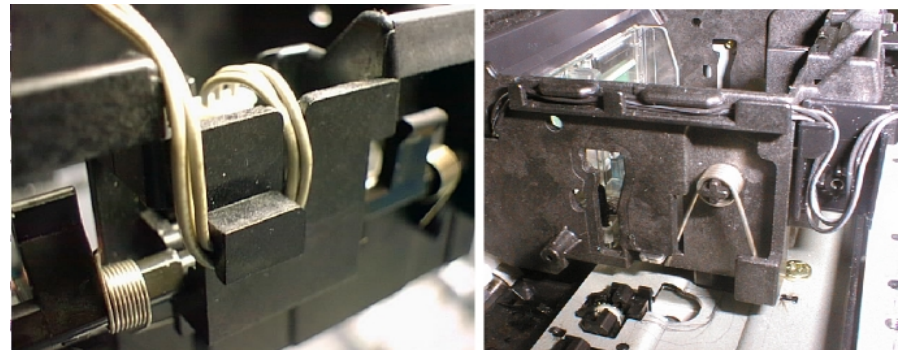


Figure 4-55. Placing the I/C Detector Cables

4.2.4.8 Removing the PF Roller Assembly and Paper Eject Roller Assembly

- 1) Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Remove the Control Panel and Left Housing Panel.
- 3) Remove the Left Sub Frame.
- 4) Remove the ASF Assembly from the Printer Mechanism. (Refer to Section 4.2.4.6.)
- 5) Remove the CR Assembly. (Refer to Section 4.2.4.7.)
- 6) Remove three screws (No.1) securing the CR Unit Guide Plate to the Top Frame.

NOTE: The number of Upper Paper Guide Assemblies attached to each model varies as shown below:

- Stylus COLOR 860: 5 pieces
- Stylus COLOR 1160: 8 pieces

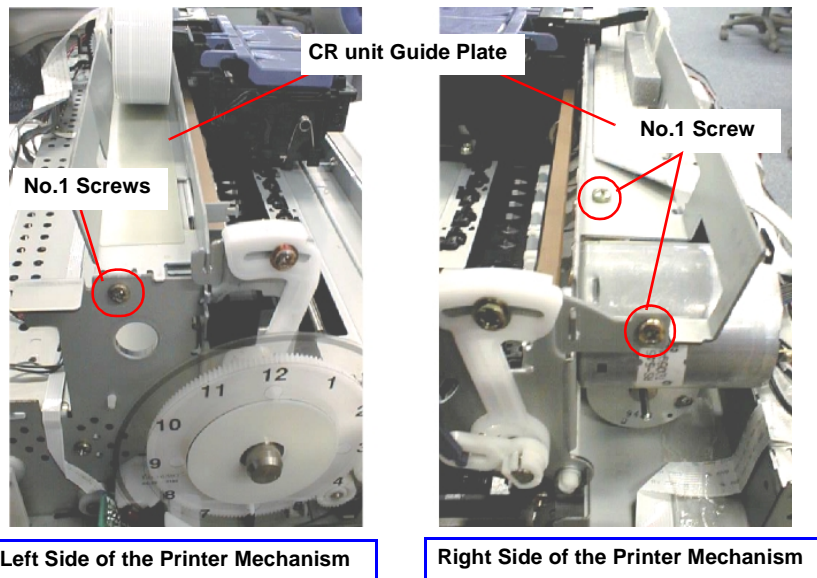


Figure 4-56. Screws Securing the CR Unit Guide Plate

- 7) Remove the Upper Paper Guide Assemblies (Refer to “Note”) and one Right Paper Guide Assembly, in the following direction, releasing their Torsion Springs 117.6 from the hooks on the Top Frame. Refer to Figure 4-57
 - Upper Paper Guide Assemblies: Remove them backward.
 - Right Upper Paper Guide Assembly: Remove it forward.

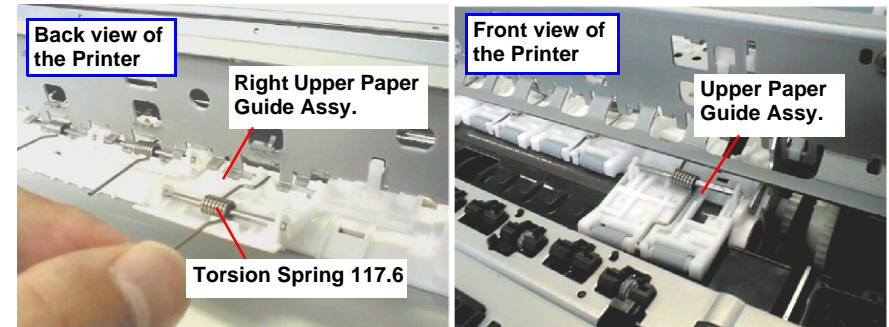


Figure 4-57. Removing the Upper Paper Guide Assembly

- 8) Stylus COLOR 860: Slide the Left Paper Guide to the left and remove it, releasing one hook from the Top Frame. Refer to Figure 4-58.
 Stylus COLOR 1160: The Left Upper Paper Guide Assy is not assembled.

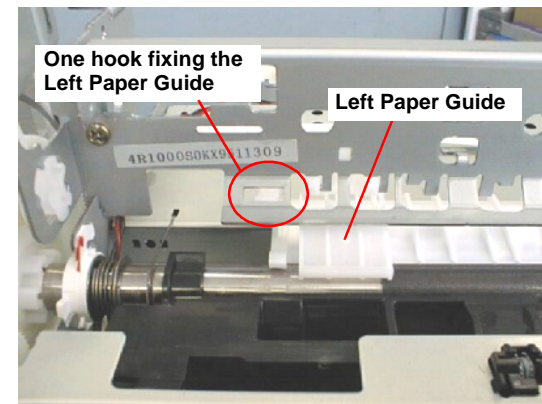


Figure 4-58. Removing the Left Paper Guide

- 9) Remove three screws (No.1) securing the Front Frame to the Printer Mechanism and remove it. Refer to Figure 4-59.
- 10) Remove three screws (No.1) securing the Paper Eject Frame Assembly and remove it. Refer to Figure 4-59.

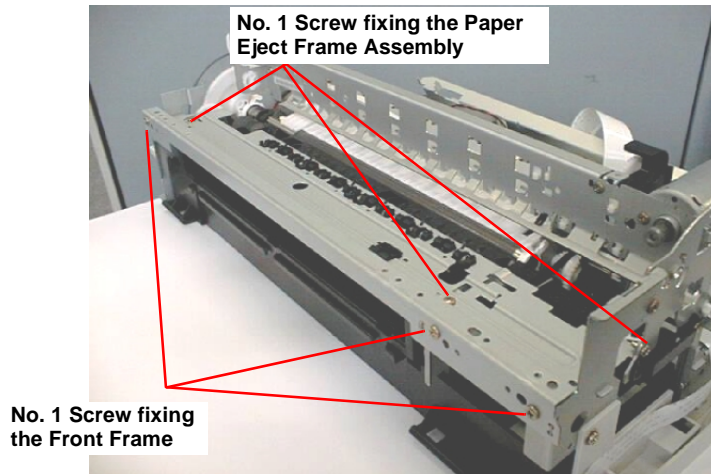


Figure 4-59. Removing the Front Frame & Paper Eject Frame

- 11) Remove the PF Earth Spring between the left edge of the PF Roller and the Bottom Frame.
- 12) Remove the Paper Guide Front by releasing the hooks (SC860: two hooks, SC1160: four hooks) from the Paper Eject Roller Shaft. Refer to Figure 4-60.
- 13) Remove the Earth Spring from the left edge of the Paper Eject Roller Assembly.
- 14) Remove the Paper Eject Roller Assembly, releasing the fixing locks located on the right and Left edges of the Paper Eject Roller Shaft. Refer to Figure 4-61.

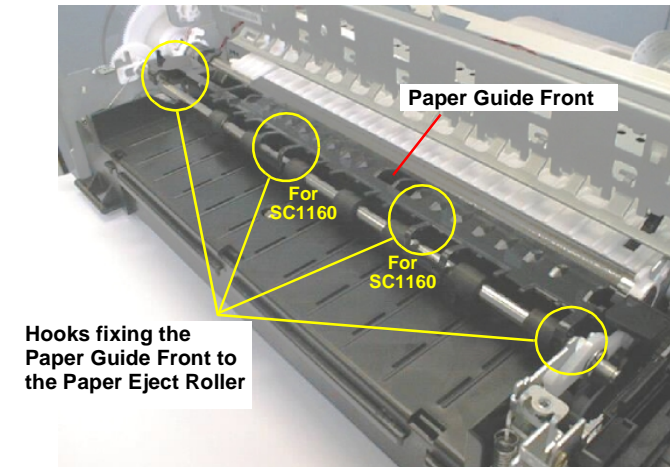


Figure 4-60. Removing the Paper Guide Front

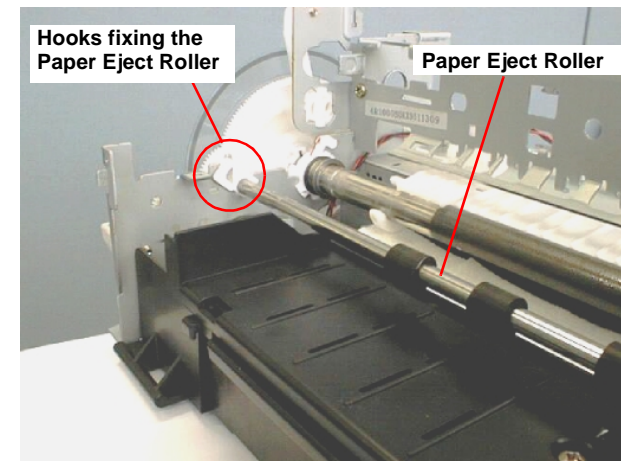
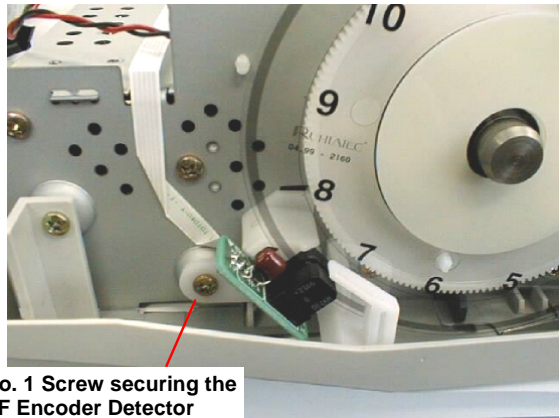


Figure 4-61. Removing the Paper Eject Roller Assembly

- 15) Remove one screw (No.1) securing the PF Encoder Detector Assembly and remove it from the Printer Mechanism. Refer to Figure 4-62.



No. 1 Screw securing the PF Encoder Detector

Figure 4-62. Removing the PF Encoder Sensor

- 16) Release the fixed hook of the Left Bushing 12 holding the PF Roller Assembly and turn the bushing forward to align it with the cut in the Left Frame. Refer to Figure 4-63
- 17) Release the three hooks fixing the Paper Guide Rear and slide it to the left. Refer to Figure 4-64.

- 18) Slide the PF Roller Assembly to the left side carefully and pull it out from the Printer Mechanism. Refer to Figure 4-64.

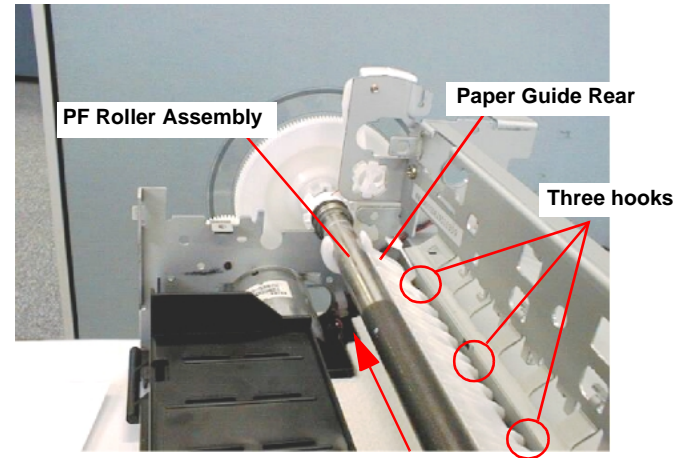


Figure 4-64. Removing the PF Roller Assembly

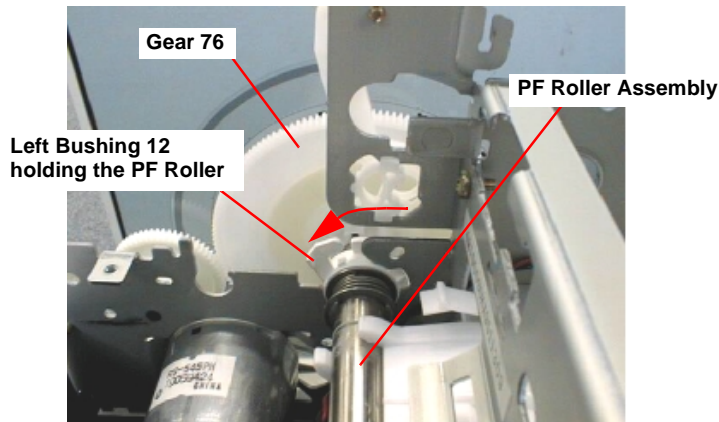


Figure 4-63. Setting the protrusion on Bushing 12



- Do not bend or damage the PF Loop scale Plate during disassembly and assembly.
- Do not touch the surface of the PF roller by hand.
- Be careful not to scratch the PF roller assembly during disassembly and assembly, since its surface is specially coated to improve paper feeding.
- Be careful not to damage the hook of the Paper Guide Front during disassembly and assembly.
- Be careful not damage the fixing hook portion on the Bushing 12. It is a very fragile part.



- When the Right Upper Paper Guide Assembly is installed on the Top Frame with a Torsion Spring 117.6, ensure that the PE Detector Lever is set in the square cut off area in the Right Upper Paper Guide. Insert the Right Upper Paper Guide Assembly from the front so you can set the PE Detector Lever in the square cut area in the Right Upper Paper Guide. Refer to Figure 4-65.
- Make sure that the Torsion Spring 117.6 is set in the gutter in the Upper Paper Guide Assembly.
- Make sure the PF Earth Spring is set in the gutter in the left edge of the PF Roller.
- When replacing the PF Loop scale and Gear 76 with a new one, you need to use the special tool to assemble them. Refer to the Chapter 5 Section 5.3

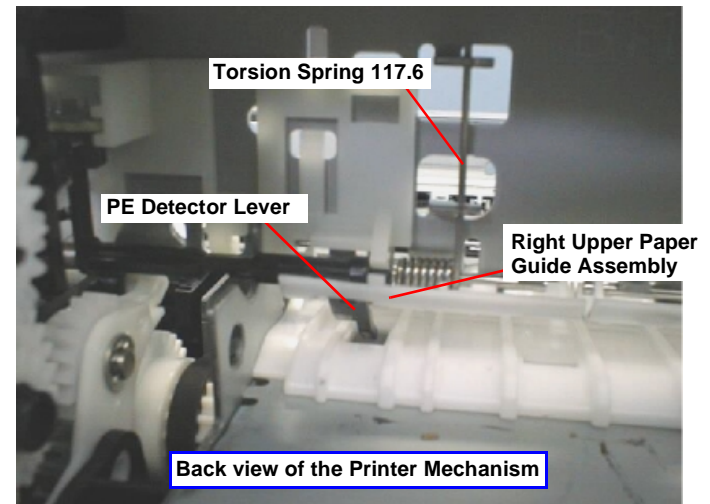


Figure 4-65. Installing the Right Upper Paper Guide Assy.



- When the Gear 76 is removed or replaced with new one, PF motor backlash adjustment is required. Refer to the Chapter 5 (Section 5.2.2)

4.2.4.9 Remove the PF Motor Assembly

- 1) Remove the Upper Housing (Refer to Section 4.2.1.)
- 2) Remove the ASF Assembly from the Printer Mechanism. (Refer to Section 4.2.4.6.)
- 3) Remove the Carriage Assembly. (Refer to Section 4.2.4.7.)
- 4) Remove the PF Roller Assembly. (Refer to Section 4.2.4.8.)
- 5) Remove the Plain Washer (4.1x0.5x4.5) from the Combination Gear 13.5,30 and then remove the Combination Gear 13.5,30 carefully. Refer to Figure 4-66.

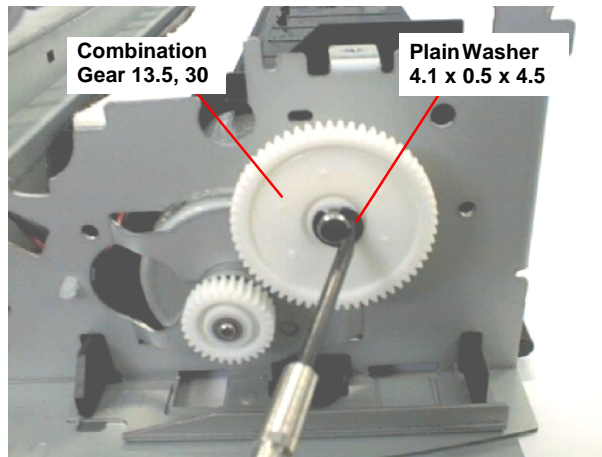


Figure 4-66. Removing the Flat Washer & Gear 13.5,30

- 6) Holding the PF Motor, remove one No.5 screw and PF Motor fixing screw securing the PF Motor, and remove the motor from the Left Side Frame. Refer to Figure 4-67.

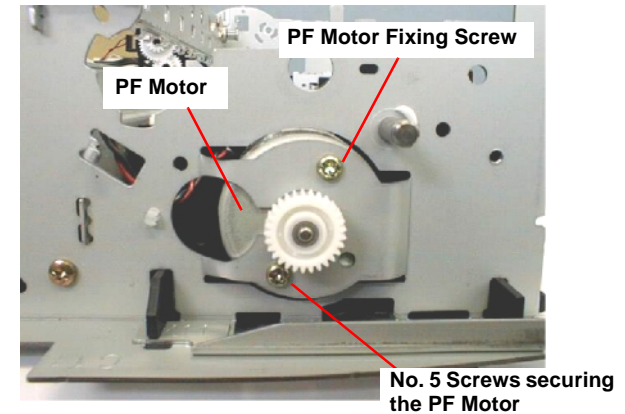


Figure 4-67. Removing the PF Motor



Do not damage the teeth of the Combination Gear 13.5,30.



In case the PF motor is removed or replaced, the backlash between the PF pinion gear and the Gear 76 has to be set with a suitable value. Refer to the Chapter 5 (Section 5.2.2).

4.2.4.10 Removing the PE Detector Assembly

1. Remove the Upper Housing. (Refer to Section 4.2.1.)
- 2) Remove the ASF Assembly. (Refer to Section 4.2.4.6.)
- 3) Remove the Right Upper Paper Guide to forward releasing the Torsion Spring 117.6. Refer to Figure 4-57.
- 4) Remove the CR Timing Belt and CR Liner Scale (Refer to Section 4.2.4.7.)
- 5) Disconnect the PE Detector connector from the PE Detector Circuit Board. Refer to Figure 4-68.

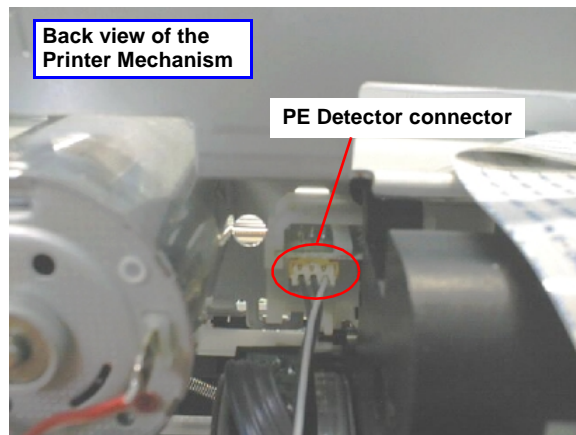


Figure 4-68. Removing the PE Detector connector

- 6) Using tweezers or a screw driver, release the CR lock lever, and move the CR unit to the center area of the CR Shaft.
- 7) Release four fixed hooks securing the PE Detector Assembly from the front side, and slide the PE Detector Assembly upward to remove.

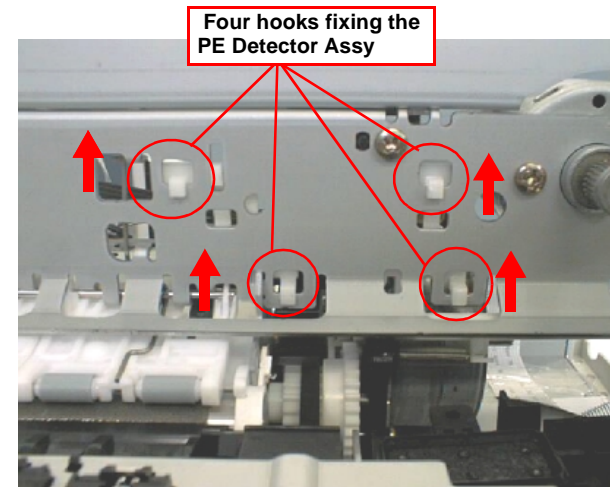


Figure 4-69. Removing the PE Detector Assembly



During assembly, make sure that the tip (sensor part) of the detector lever is in the hole in the Right Paper Guide Assembly. Refer to Figure 4-65.

CHAPTER

5

ADJUSTMENT

5.1 Overview

This chapter describes adjustments required when the printer is disassembled and assembled after repair.

Additionally, this section describes the PF motor Loop scale unit assembling procedure required when the PF Loop scale or Gear 76 is replaced to new one.

5.1.1 Required Adjustments

Stylus COLOR 860/1160 require the following adjustments. (Refer to Table 5-1) Perform any necessary adjustment referring to the figures and procedures described throughout this chapter.

Table 5-1 Adjustment Required

No.	Adjustment Item	Conditions
1	Parallelism Adjustment	<ul style="list-style-type: none"> When you replace or remove the Carriage guide shaft. When you move the parallelism adjustment bushing.
2	Backlash value Adjustment	<ul style="list-style-type: none"> When you replace the PF motor or Gear 76.
4	Initial Ink Charge	<ul style="list-style-type: none"> When you replace or remove the printhead.
5	Head Voltage ID Input	<ul style="list-style-type: none"> When you replace the printhead. When you replace the main board. <p>Note) The head ID values stored in the EEPROM are not erased by EEPROM reset operation.</p>
6	Printing Head Angle Adjustment	<ul style="list-style-type: none"> When you replace or remove the printhead. When you move the printhead angle adjusting lever.
7	Bi-D Adjustment	<ul style="list-style-type: none"> When you replace or remove the printhead. When you replace the main board. When you replace the CR Motor.
8	USB ID data Input	<ul style="list-style-type: none"> When you replace the main board.
9	Protection counter reset	<ul style="list-style-type: none"> When you replace the waste ink pad.

Table below shows the actions taken and required adjustments in the order to be performed.

Table 5-2 Actions Taken and Adjustment Required

No.	Content of Operation	Adjustment Procedure
1	Removal of the printhead	<ol style="list-style-type: none"> Perform initial ink charge. Perform printhead angle adjustment. Perform Bi-d Adjustment.
2	Replacement of the printhead	<ol style="list-style-type: none"> Perform initial ink charge. Perform Head voltage ID writing operation Perform printhead angle adjustment. Perform Bi-d Adjustment.
		1.
3	Replacement of the main board	<ol style="list-style-type: none"> Perform Head voltage ID writing operation. Perform Bi-d adjustment. USB ID input After perform the above adjustments, replace the following parts. 1) Ink Cartridge. 2) Waste Ink Pad. Above two kinds of the counter are erased by replacing the Main board.
4	Replacement or Removal of the Carriage Unit	<ol style="list-style-type: none"> Perform parallel adjustment. Perform printhead angle adjustment. Perform Bi-d adjustment.
5	Replace of the CR Motor	<ol style="list-style-type: none"> Perform Bi-d adjustment.
6	Replacement of the Printer Mechanism	<ol style="list-style-type: none"> Perform Head Voltage ID Input. Perform initial ink charge. Perform Bi-d adjustment.
7	Replacement or removal of the following parts. 1) PF motor 2) Gear 76 3) PF roller assembly (Gear 76 & Loop scale is assembled with PF roller)	<ol style="list-style-type: none"> Perform the Backlash Adjustment.

5.1.2 Adjustment Tools Required

Table 5-3 below shows adjustment tools for Stylus COLOR 860/1160.

Table 5-3 Adjustment Tools Required

No.	Name	Adjustment Item	Contents/Spec.
1	Thickness Gauge	Parallelism Adjustment	thickness:1.14 mm
2	Micro scoop	Backlash Adjustment	Magnified ratio: x 15 Scale:0.1mm
3	Adjustment Program	Each Mechanism Settings	Stylus COLOR 760 860 1160 Program Disk; 3.5inch 2 FDD



- Never use the bent (curved or tilted) or rusty thickness gauge.
- Erase any dirt, grease or obstacles on the thickness gauge before you use it.

5.2 Adjustment

This section explains specific procedures for each adjustment required for Stylus COLOR 860/1160.

5.2.1 Parallelism Adjustment

When replacing the carriage assembly or removing it during printer mechanism disassembly, perform the parallelism adjustment during assembling and set the standard distance from the surface of the printhead to the paper surface.

CAUTION



- Do not scratch the special coated surface of the PF roller assembly and rib surface of the front paper guide;B.
- Before performing this Adjustment, clean the thickness gauge with the clean cloth moistened the alcohol.
- Be careful not to leave any mar or dirt on the surface of the printhead. (Never use a rusty or dirty thickness gauge. Also, do not push the thickness gauge hard against the head.)

[Right Parallelism Adjustment]

1. Install the "Parallelism adjustment bushing" for right and left frame and set them on the peaking of the upper frame side so that they match with "the standard mark of parallelism adjustment bushing".

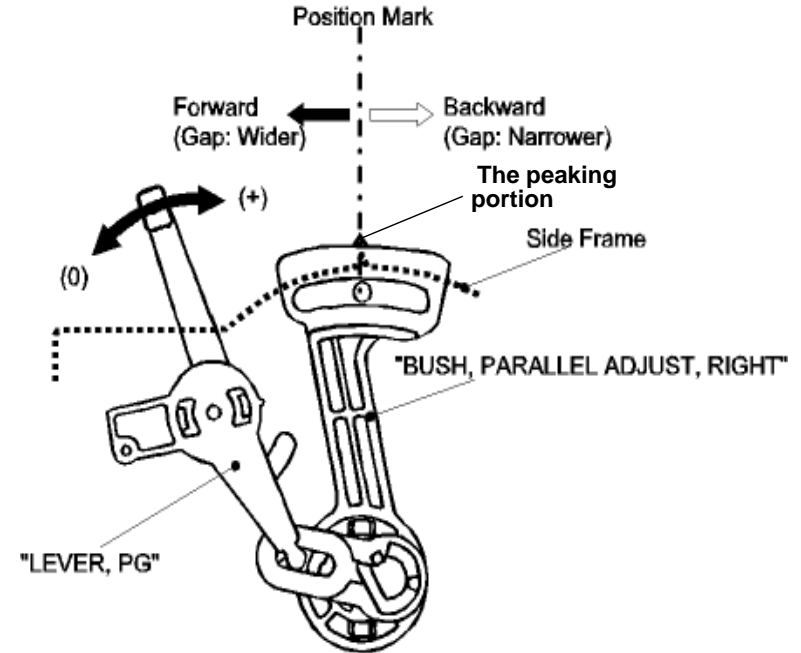


Figure 5-1. Parallelism Adjustment Bushing

2. Set the PG lever front. (Gap is small.)

3. Move the carriage to the center and set the thickness gauge (t=1.14mm) on the fixed position of Front Paper Guide as you can see in the following figure 5-2.

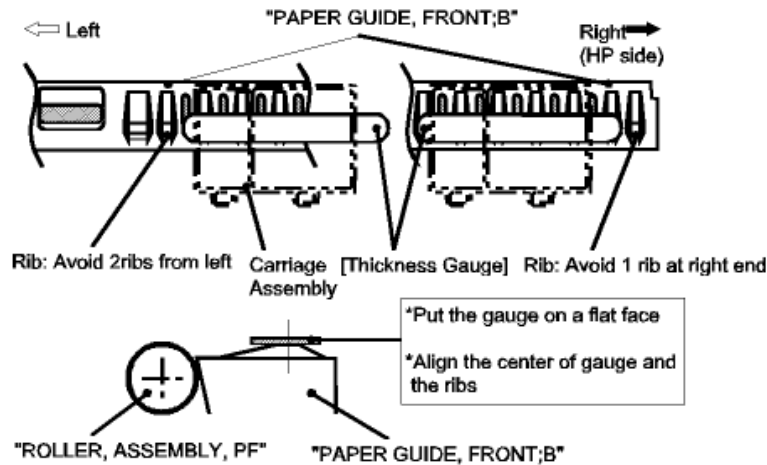


Figure 5-2. Setting the Thickness Gauge



- Put the thickness gauge on the flat side of the rib of the Front Paper Guide.
- When you move the Carriage, move it, pulling the timing belt with your hand. In this case, be careful not damage the Linear Scale for CR encoder sensor.

4. Move the carriage to the position that the printhead overlaps the thickness gauge.
5. Move the right Parallelism adjustment bushing to the rear until the thickness gauge moves with the carriage when you move the carriage about 20 mm right and left. (Gap will be narrowed.)
6. From this thickness with which the thickness gauge starts moving with the carriage, move the gear of the right Parallelism adjustment bushing one notch toward front side. (Gap will be widen.)
7. With the PG lever set front (gap is small) and then rear, move the carriage right and left and make sure that the thickness gauge does not move for the both settings.

[Left Parallelism Adjustment]

8. Perform Steps 2 to 7 for the left Parallelism adjustment bushing.

[Checking parallelism]

9. Perform steps 1 to 4 again.
10. Make sure that the thickness gauge does not move right and left along with the carriage when the carriage is moved about 20 mm.
11. Move the right Parallelism adjustment bushing one notch to the rear (Gap will be narrowed). Then check that the thickness gauge moves along with the carriage. If the thickness gauge does not move, go back to Step 1 and repeat the adjustment.
12. If the gap is adjusted correctly, move the right parallelism adjustment bushing one notch toward front side (Gap will be widen).

[Fixing Parallelism Adjustment Bushing]

13. Fix the right and left Parallelism adjustment bushings with screws.
(No.7 screw for each.)

When completing this adjustment, check the overlap amount of the printhead and head cleaner.

1. Move the carriage next to the head cleaner and make sure that overlap between the tip of the printhead and cleaner head is more than 0.5 mm.

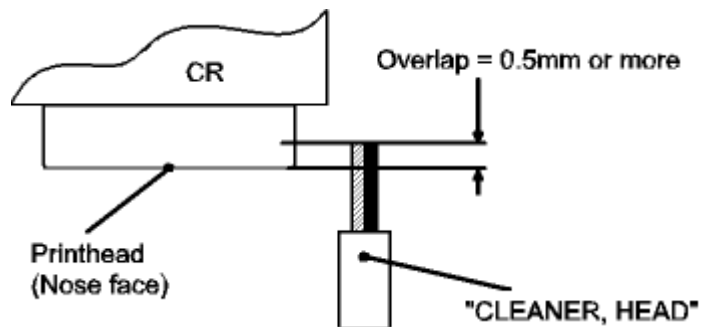


Figure 5-3. Overlap of Head Surface and the Cleaner Blade

2. Then, rotate the Combination Gear 13.5, 30 and return the head cleaner under the Paper Eject Frame while releasing the Pump Planetary Lever Fixing Guide.

5.2.2 Backlash value Adjustment for PF motor

When you remove or replace the following part, perform this adjustment.

- PF motor
- Gear 76
- PF Roller Assembly
(When the Gear 76 (& loop scale) is removed with the PF Roller assembly, this adjustment is required)

This adjustment sets the suitable backlash value between the Gear 76 and the pinion Gear of the PF motor.

The required backlash value is **0.1mm**. (over 0mm to less than 0.1mm)

CAUTION



In case this adjustment is not performed correctly, following phenomenon will occur.

<<The backlash value is too narrow>>

- The PF motor dose not rotate correctly based on the defined current value in the firmware. As the result, paper feed accuracy is lowered.
- It sounds that the Gear 76 and the PF pinion gear is jarred during the printing.

<<The backlash value is too wide>>

- The PF motor dose not rotate correctly based on the defined current value in the firmware. As the result, paper feed accuracy is lowered. Especially, the printed image will lowered around the bottom of the paper.

Before you start this adjustment, make sure that the following parts are removed on the printer mechanism.

- Combination Gear 13.5,30
- Waste Ink pad assembly (As for the removing, refer to the Section 4.2.4.2)
- Left Housing Panel.
- Left Sub Frame

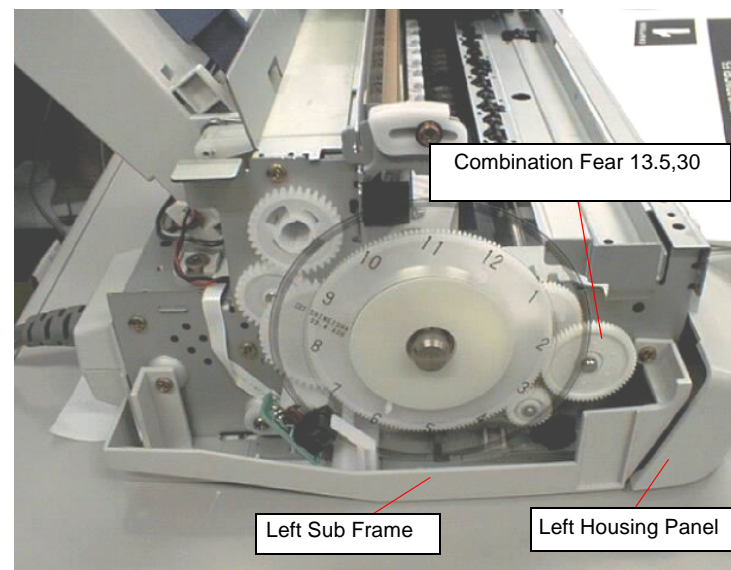


Figure 5-4. Combination Gear 13.5, 30 & PF Encoder Sensor

CAUTION



Be careful not damage the Loop scale when the Combination Gear 13.5, 30 and the PF Encoder Sensor.

1. Fasten the PF motor fixing screw and the No.5 screw securing the PF motor with 6kg-cm torque once again.

CAUTION

Do not secure the PF fixing screw and the No.5 screw with over securing torque. In case the securing torque is over 6kg-cm, the PF motor may be broken or paper feed accuracy is lowered.

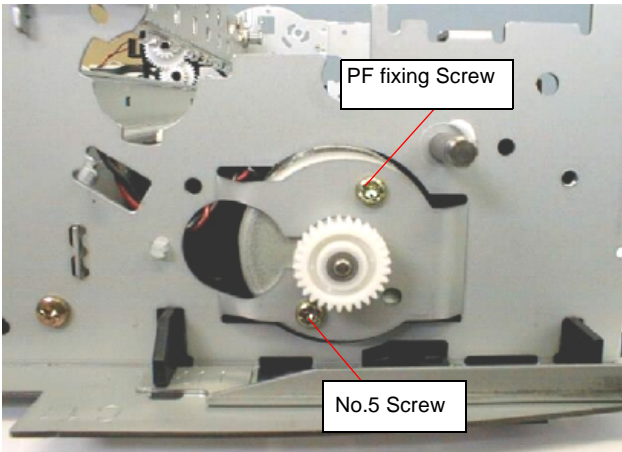


Figure 5-5. PF motor fixing screw & No.1 Screw

2. Loosen the No.5 screw securing the PF motor a little and engaged the teethes of the PF motor pinion gear carefully to the teethes of the Gear 76.

3. Push the following figured “A” point on the Gear 76 to the Left frame side. The Gear 76 should be pushed to the Left frame side about 3mm. In case the “A” portion returns to the normal position with the jarring sounds, the backlash value will be around the Standard (0.1mm)

But, the following condition is confirmed, the backlash value will not be suitable.

- The “A” portion of the Gear 76 dose not return to the normal position. The backlash value is too narrow.
- The “A” portion of the Gear 76 returns to the normal position without any jarring sounds. The backlash value is too wide.

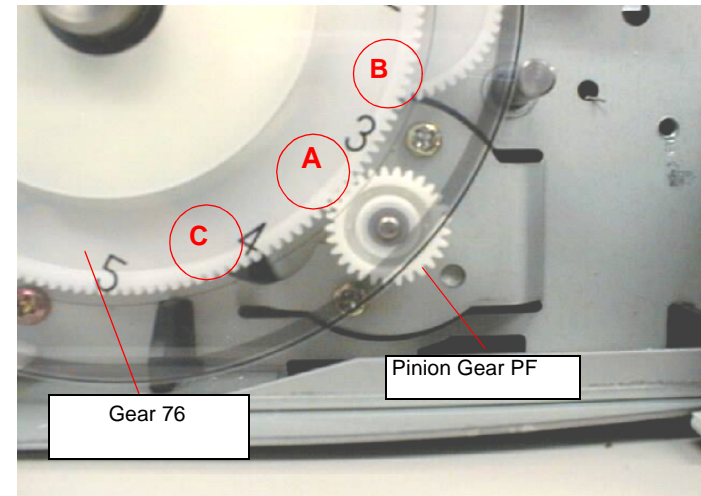


Figure 5-6. Pushing the Gear 76 to the Left side frame side

CAUTION

When you push the above red circled point by hand, push the Gear 76 on the Loop scale carefully. For the another method, turn over the loop scale carefully around the red circled point and push the Gear 76 directly.

4. For the reconfirmation, push the "B" and "C" position of the Gear 76 to the Left Frame side. The Gear 76 should be pushed to the Left frame side about 3mm. And make sure that Gear 76 returns to the normal position smoothly with the jarring sounds. But, the following condition is confirmed, the backlash value will not be suitable.
 - The "B" or "C" portion of the Gear 76 dose not return to the normal position. The backlash value is too narrow.
 - The "B" or "C" portion of the Gear 76 returns to the normal position without any tarrying sounds. The backlash value is too wide.
5. If the backlash value is too narrow, move the PF motor to front side of the printer a little by pulling the PF motor. If the backlash value is too wide, move the PF motor to the rear side of the printer a little by pushing the PF motor.
6. Repeat the above step 3 to 5 until the backlash value is adjusted around the suitable value.
7. In case the above adjustment procedural is completed, check the backlash value between the Gear 76 and the pinion gear of the PF motor by using Micro scoop. Refer to the Figure 5-7.
8. If the backlash value is over 0.1mm or 0 mm, perform the step 5 and Step 7.



- After complete this adjustment, make sure the loop scale dose not have any damage.
- The suitable backlash value is as follows.
Over 0mm to less than 0.1mm

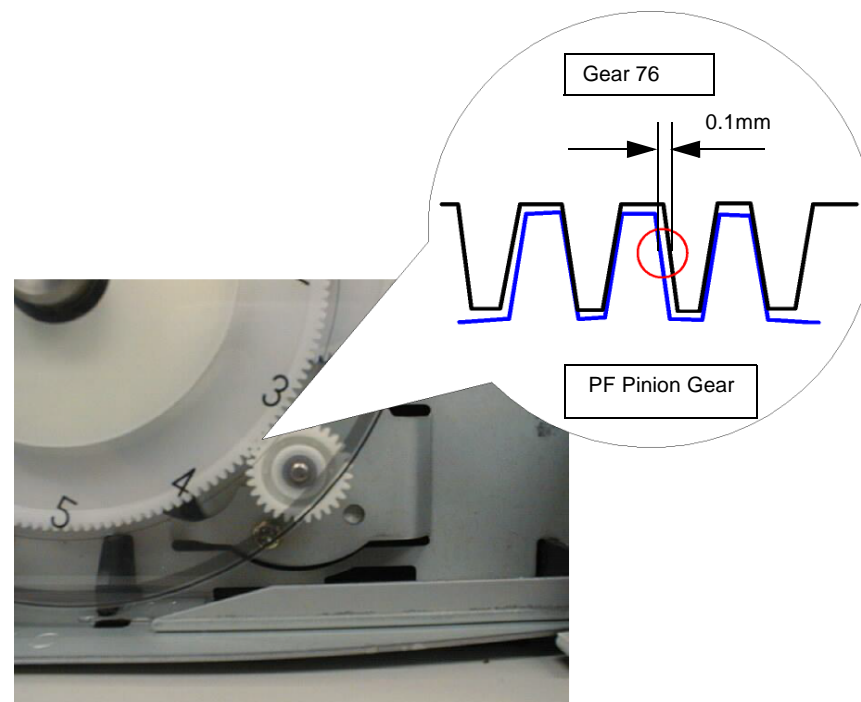


Figure 5-7. Check the backlash value

5.2.3 Adjustment by Adjustment Program

In this printer, it is necessary to set the correct information for each printer mechanism in order to maintain consistent printing function and quality, eliminating difference of each printer mechanism's characteristics.

Therefore, in case that the combination of the printer mechanism and main board changes or the printhead is replaced during repair, you must set and save the correct information to the main board, using the exclusive adjustment program.

5.2.3.1 About Adjustment Program

The adjustment program (Program name: Stylus COLOR 760 860 1160) enables you to set various values correctly to prevent malfunction and fluctuation of printing quality and printing function caused by difference in components and assembly when the printer components are replaced during repair. Basic adjustment items by using this program are shown as follows.

Table 5-1 Basic adjustment items

No.	Main Items	Adjustment items
1	Adjustment	Head Voltage ID input
		Head Angular adjustment
		Bi-Directional adjustment
		USB ID input
2	Maintenance	Head Cleaning
		Initial Ink charge
		Protection counter check
		Reset the protection counter value
3	Recovery for clogged nozzle	Recovery routine
4	Print A4 pattern	A4 check pattern printing

5.2.3.2 How to set up the program

In order to set up the program, insert 1st FDD 3.5 inch disk (Installer Disk) to the 3.5 inch FDD disk drive and start the install the program file in the Windows environment. After complete the set up, the SC760 860, 1160 Adjustment Program icon is added to the Program menu in the Start menu.

NOTE: Correct program is automatically installed according to your OS; Windows95 or Windows 98.

The following figure shows you the U/I of the Adjustment main menu.

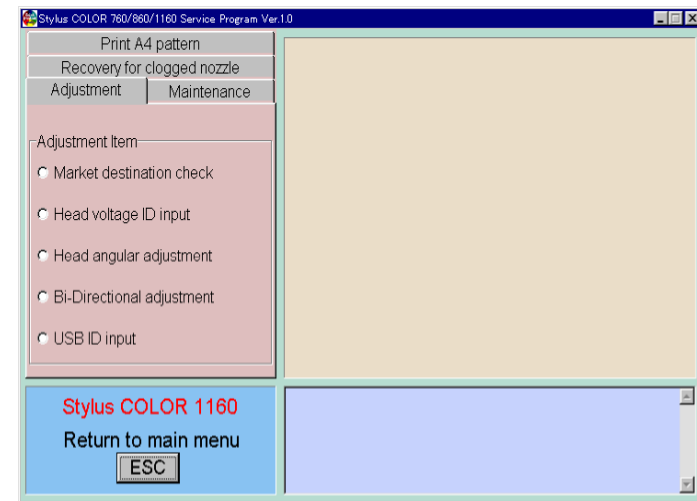


Figure 5-8. U/I of the Adjustment Main menu



This adjustment program can not be used in the Windows 3.1/NT and DOS environment.

5.2.3.3 Choose the Model

1. Before performing any adjustment, you need to choose the Model Name. When you click the OK button after choosing the model name, the adjustment program sends the factory command to the printer in order to set the IEEE1284-4 mode to OFF status. This is because this program dose not run in the IEEE1284-4 mode.



Figure 5-9. Main menu of the Program

NOTE: When the OK button is pressed in the above menu, this adjustment program dose not verify the model name stored in the PROM.

NOTE: IEEE-1284-4 mode is reset to ON status by performing the Hardware reset.

NOTE: When you choose the “About” and click it, the program version is shown.

5.2.3.4 Market Destination Check

This function is just to check the market destination setting stored in the EEPROM. Any CG chip is not mounted on the Main board and only 2 character tables (PC437, PC850) is stored in the PROM.

And the default setting is always set as PC437 in the EEPROM in our manufactory. So, in case you perform this function, the following figure is displayed.



Figure 5-10. Checking the present market destination

NOTE: In order to cancel the above menu, choose another menu or adjustment items.

5.2.3.5 Head Voltage ID Input

This adjustment function is required when any of the following parts is replaced.

- Printhead
- Main board
- Printer mechanism

This adjustment function enables you to write printhead Voltage ID into the specific address of the EEPROM. This operation is considered the most important to maintain proper ink discharging system. If any ID is not written correctly, it results in white or color lines and also gives bad influence on dot weight.

CAUTION


Before or after performing this operation, refer to the table 5-2 and perform any appropriate adjustments or operations.

1. When replacing any of the parts above, make a note of VH voltage ID in advance. You can find the VH voltage ID on the following position:
 - Printhead: On the top right face of the printhead. A 12-digit ID code is printed with the QR code on the label.
 - Printer mechanism: On the label of the packing box of the printer mechanism.
2. Run the Adjustment program and enter the Adjustment Main menu.

3. choose the “Head voltage ID input” and click it.
The menu shown in the next page appears. This function is useful only when the Main board is replaced with new one. When the print head is replaced with new one, go to step 6.

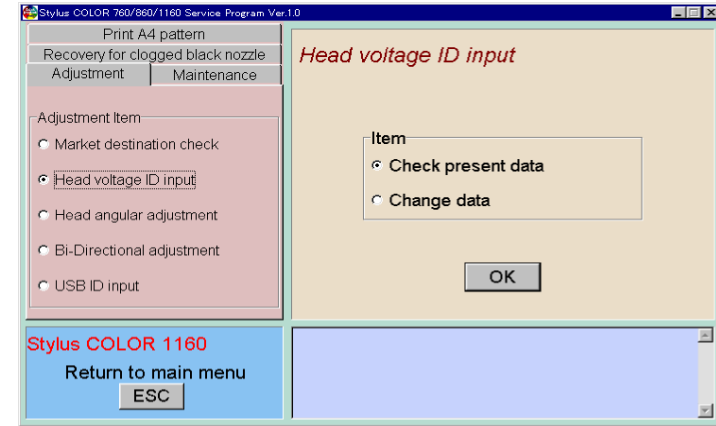


Figure 5-11. 1st Head Voltage ID input menu

- If you replace the failure Main board with a new one, try to perform the "Check present data". In case the logic circuit does not have any damage, you can read out the Head Voltage data of the present Head ID voltage data. If this function is available, you can check the present Head ID without removing the Head FFC holder.

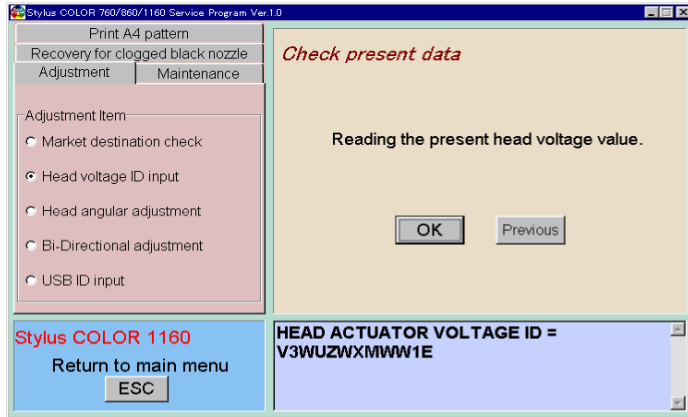


Figure 5-12. Read out the Head ID voltage from the EEPROM

- If you can read out the present Head voltage ID, take memo the read out Head ID voltage.

NOTE: In this Adjustment program, you can not write the read out Head ID to the new Main board in the read out Head ID menu. In case you write the read out Head ID to the new main board, you have to take memo the read out Head ID and input it again in the "Change data menu."

- Choose the "Change data" item in the Head ID input menu and click the OK button. Following Head ID input menu is displayed.

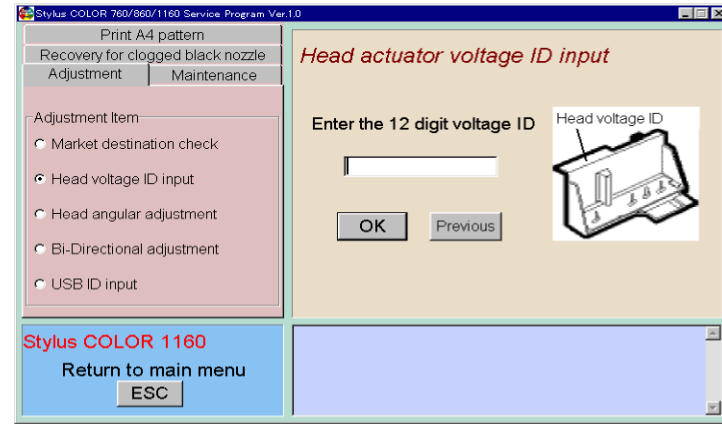


Figure 5-13. Entering the 12 digits Head ID

- Input a 12-digit code of the Head Voltage ID in the above menu. In case you input the incorrect character or symbol in this menu, this program detects it automatically and displays error message in the bottom column. Figure 5-17 shows you the one of the error message.

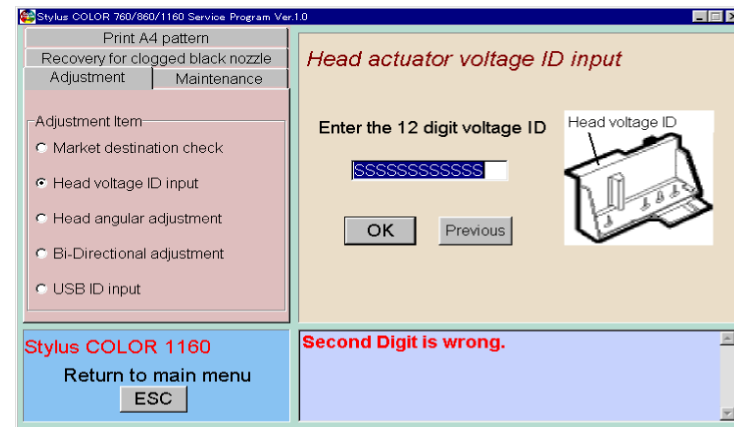


Figure 5-14. Error message in the Head ID entering menu

8. When the Head ID is input and write to the EEPROM, the following message is displayed on the bottom column in the menu.

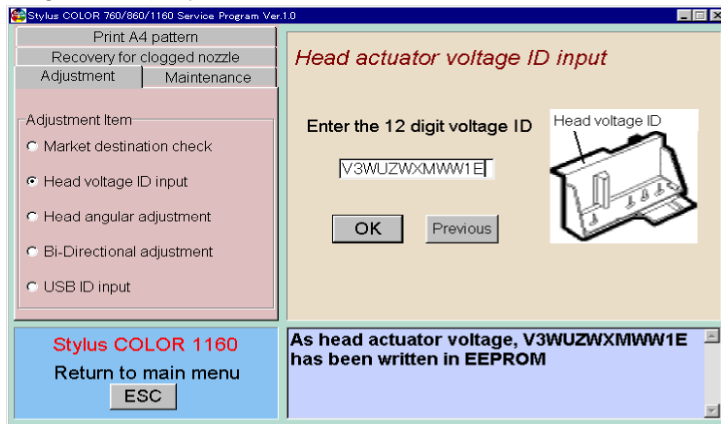


Figure 5-15. Completing the Head ID input

5.2.3.6 Head Angular Adjustment

During production, slight variations are created in printheads and carriage (which are used as a printhead base.) If these differences are not adjusted, they can adversely influence the printhead angle, and color overlapping is not performed correctly and color/white line problem occurs as a result. Therefore, in order to adjust the printhead angle correctly, the exclusive lever for adjusting the printhead angle is installed on the side of the carriage unit. By moving this lever, you are able to adjust the printhead angle without removing the ink cartridge. This adjustment is required in the following cases.

- When the printhead is replaced
- When the carriage unit is replaced.
- When the angle adjustment lever is moved.

Print the check pattern in the adjustment program to determine the angle degree needed for the printhead. Then move the adjustment lever in the carriage unit to set the printhead angle referring to the printed check pattern.

CAUTION Before or after performing this operation, refer to Table 5-2 and perform appropriate adjustments or operations.

1. Choose the “Head angular adjustment” in the Adjustment Main menu as following figure.

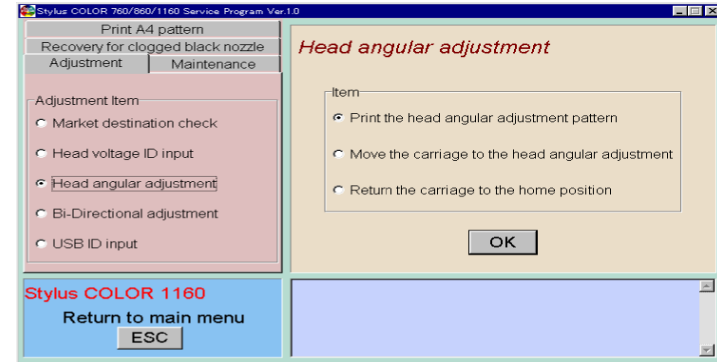


Figure 5-16. Choose the Head angular adjustment

2. Choose the “Print head angular adjustment pattern” in the “Head angular adjustment” menu and click the “OK” button to print the check pattern.

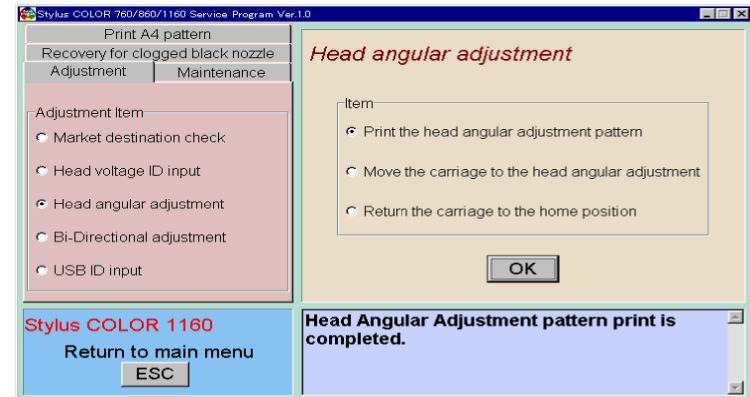


Figure 5-17. Choose the Print head angular adjustment pattern

- The following check pattern is printed.



Figure 5-18. Head Angular adjustment pattern.

- Choose the “Move the carriage to the head angular adjustment” in the “Head angular adjustment “menu and click the “OK” button as following figure. The printer moves to the I/C replacement position and stops at the position.

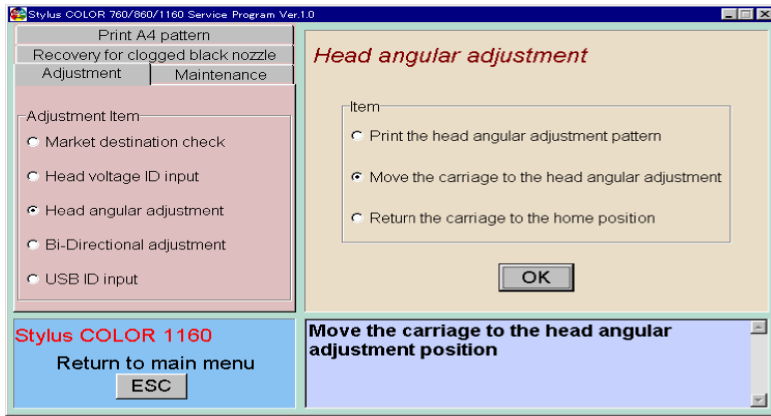


Figure 5-19.

Choose the Move the carriage to the head angular adjustment

- Loosen the printhead securing screw securing the printhead on the carriage. (You don't need to remove it completely.)

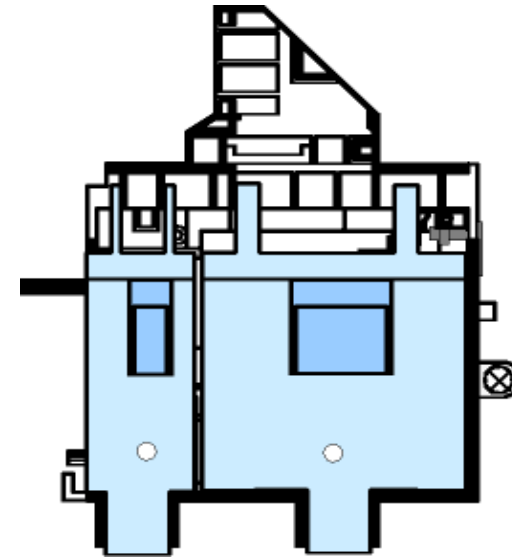


Figure 5-20. Head fixing screw position

NOTE: Loosen the printhead securing screw securing the printhead on the carriage. (You don't need to remove it completely.)

6. Look at the black/magenta combination in the pattern and move the adjusting lever to make the magenta lines stay between the black lines with even space. The figure below shows how the pattern changes as the adjusting lever moves right (rear) or left (front).

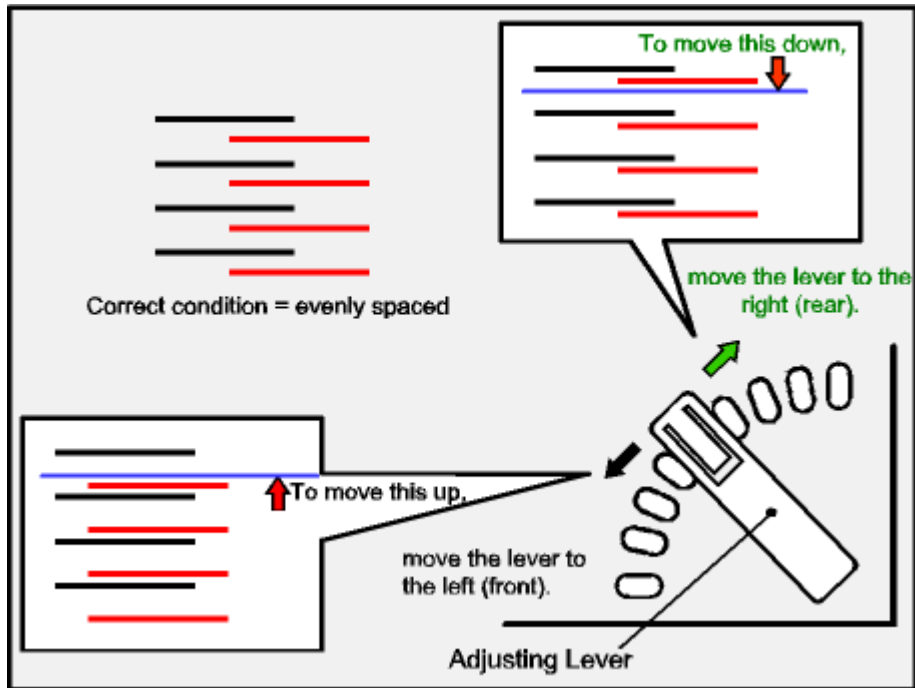


Figure 5-21.

Lever Operation and Corresponding Change in Pattern

7. After changing the position of the adjust lever, choose “Head angular adjustment pattern” again and click the “OK” button. The printer prints out a head angular adjustment pattern again.
8. Verify the pattern on the printout again.
9. Repeat the procedures from Step 2 to Step8 until the combination pattern of black/magenta is correct.
10. After completing the adjustment, choose the “Move the carriage to the head angular adjustment” in the “Head angular adjustment” menu. Refer to the step4).
11. Tighten the loosened screw (head fixing screw) and choose the “Return the carriage to the home position “in the Head angular adjustment menu. The carriage turns back to the home position.

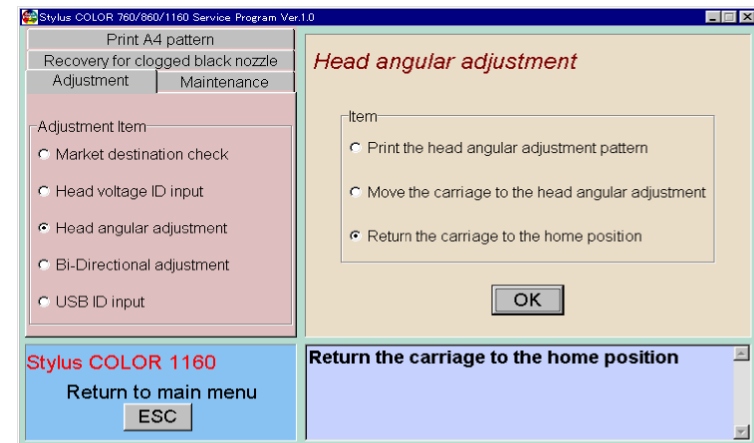


Figure 5-22. Return the carriage to the home position

5.2.3.7 Bi-D Adjustment

You perform this adjustment to correct differences in printing positions, which is caused by incorrect of printing timing in right and left directions during the Bi-directional printing. Therefore, you are required to perform this adjustment after performing the following operations.

- Replacing the Print mechanism
- Replacing the main board
- Replacing the CR motor
- Replacing the Carriage Assembly
- Replacing the Printhead

1. Choose the “Bi-directional adjustment” in the “Adjustment main menu” as following figure.

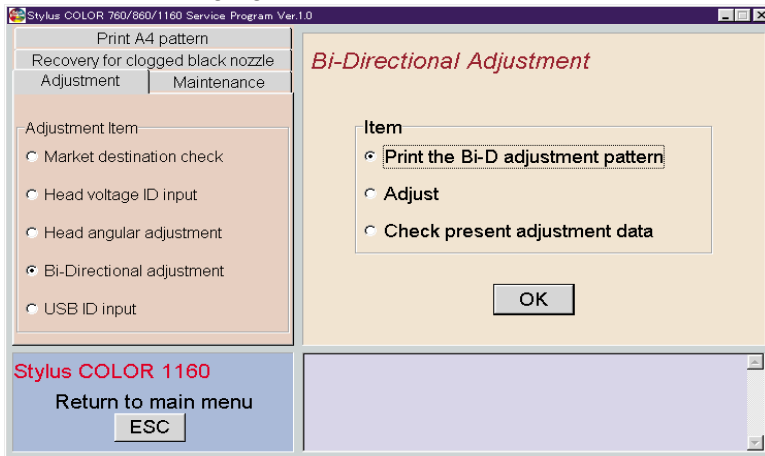


Figure 5-23. Choose the Bi-d adjustment

2. Choose the “Print the Bi-d adjustment pattern” in the “Bi-Directional Adjustment pattern” and click the “OK” button.

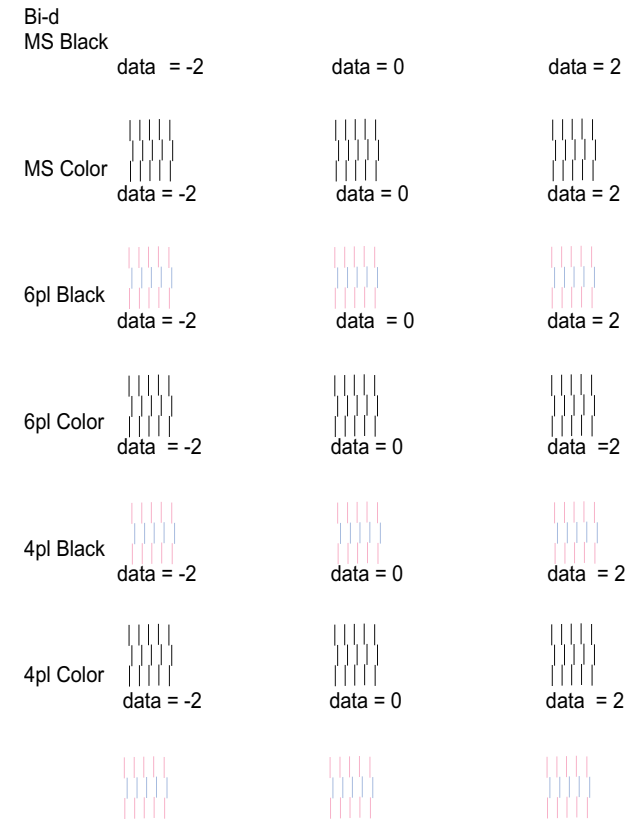


Figure 5-24. Bi-d adjustment pattern.

NOTE:

As shown in the sample, gaps between passes are sometimes created in different directions among patterns.

This unexpected change in direction is caused by an ink jet printer-specific reason, which is an ink jet printer inevitably performs a periodical cleaning specified by the flashing timer even during Bi-D pattern printing, so that the printing direction suddenly changes.

However, this directional difference among Bi-D patterns should not be considered, and you can always confirm and adjust the pattern correctly by referring to gap amount only.

3. Click the “Previous” and go back to the BI-Directional Adjustment” menu. And choose the “Adjust” menu and click the “OK” button.

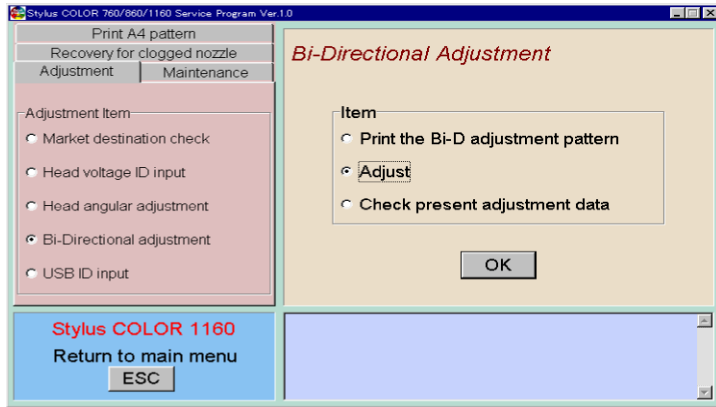


Figure 5-25. Choose the Adjust menu

4. Check the printed pattern and find the misaligned dot type.

5. Choose the misaligned dot size in the following menu and click the “OK” button.

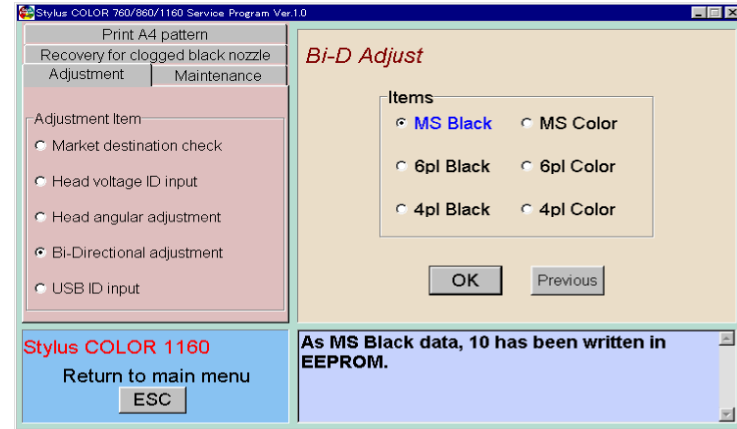


Figure 5-26. Choose the misaligned dot size

6. By choosing the misaligned dot size, following input menu for the adjustment value is displayed.

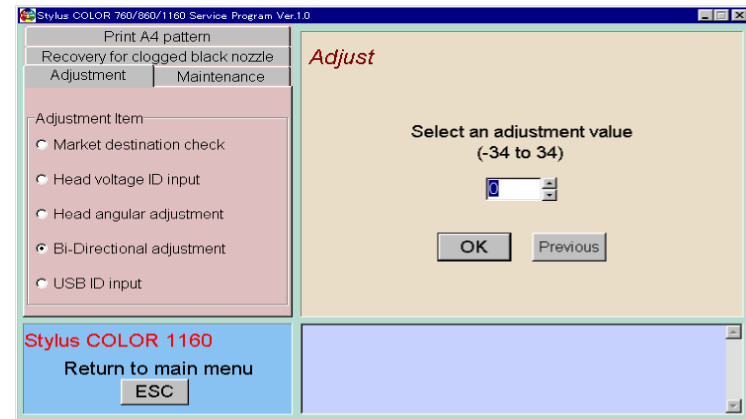


Figure 5-27. Bi-d adjustment input menu

7. Check the printed pattern again and Input the suitable value in the above menu and click the “OK” button. The input value is written in the specific address of the EEPROM. Refer to Figure 5-28.
The value **0** (blue) appears in the center of the screen and changes the value by clicking the up/down icon. Apply the value for the most properly aligned pattern in the Bi-D adjustment pattern print.
You can change the value by input the suitable value directly from the key board.
In case the + value is input, the 2nd vertical printed pattern is shift to the left side. And in case the - value is input, the 2nd vertical printed pattern is shift to the right side.

9. Choose the “Print the Bi-D adjustment patter” and click the “OK” button.
10. Check if the all 3 vertical line is alined correctly in the adjusted dot size pattern. If you can watch the misaligned pattern, repeat the step 3 to Step10 until the Bi-d adjustment pattern is alined.

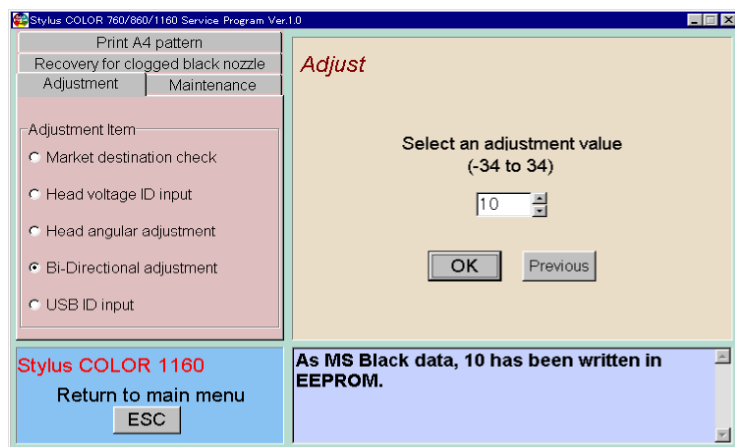


Figure 5-28. Input the suitable value

8. To confirm if the adjustment value is suitable, click the “Previous” button and go back to the “Bi-Directional Adjustment” menu.

5.2.3.8 USB ID input

When you replace the main board with a new one, you have to input the USB ID newly into the specific address of the EEPROM.

When the Printer and the PC are connected with a USB cable, the USB port driver loads the unique code from the specific address of the printer's EEPROM and provides the USB port number to the unique code. The USB port driver controls the several USB ports under the Windows 98 environment.

A unique code called USB ID is input to the specific address of the EEPROM in our manufactory and the following total 18-digit code is used as a USB ID for the EPSON ink jet printer.

- Factory line number (3-digit)
- PC number (2-digit)
- Input year/month/date/time (hour,minutes,second) (12-digit)
The timer data of the PC is used for this input data.
- Number 0
An "0" is automatically added for the last digit in the input program.

In repair activity, we use a 10-digit code of the Serial number for a USB ID. The remaining 8digits code is generated in the adjustment program and added to the serial number automatically.



In case the USB ID is not input in the adjustment program after the main board is replaced to new one, the USB ID may not possibly unique one. In this case, the USB ID conflicts the another peripheral USB ID in the USB port driver and the another USB peripheral may not possibly be used with the USB.

1. Choose the "USB ID input" in the Adjustment main menu.

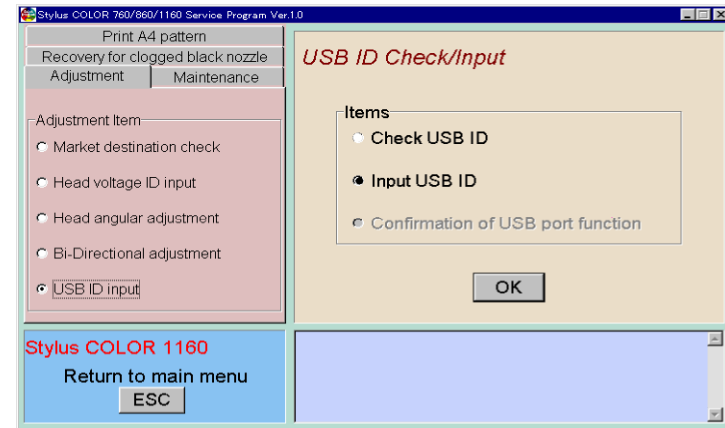


Figure 5-29. Choose the USB ID input menu

2. Choose the "Input USB ID" and click "OK" button in the "USB ID check/Input" menu. Following menu is displayed.

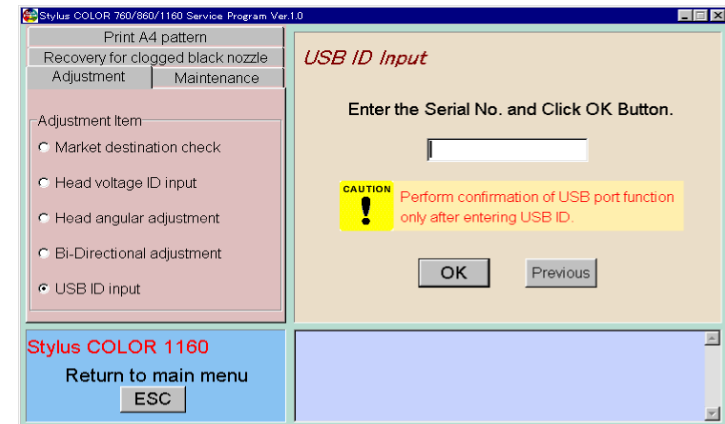


Figure 5-30. Choose the USB ID input menu

3. Check the 10digits code of the serial number on the serial number label stuck around the rear side of the Upper housing.

- Input the 10digits code of the serial number in the input menu and click "OK" button.

NOTE: Even though you input irresponsible another 10digits code and click the "OK" button, the program allow to input the code and write down it the specific address of the EEPROM. But, there is a possibility that the code is not unique and the code conflicts another USB ID in the USB port driver.

- After click the "OK" button, following message is shown in the bottom of the USB ID Check/Input menu In this message, you can check if the USB ID is written in the EEPROM correctly.

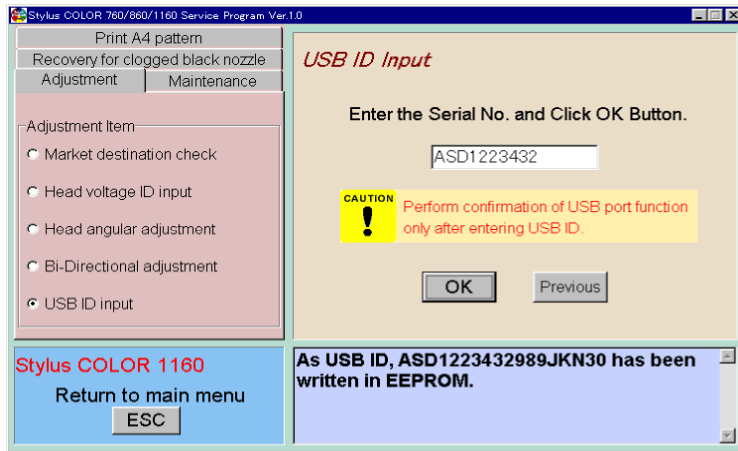


Figure 5-31. Write down the USB ID

- Click the "Previous" button and go back to the "USB ID Check/Input" menu.

- Select the "Confirmation of USB port function" and click the "OK" button in the "USB ID Check/Input" menu.

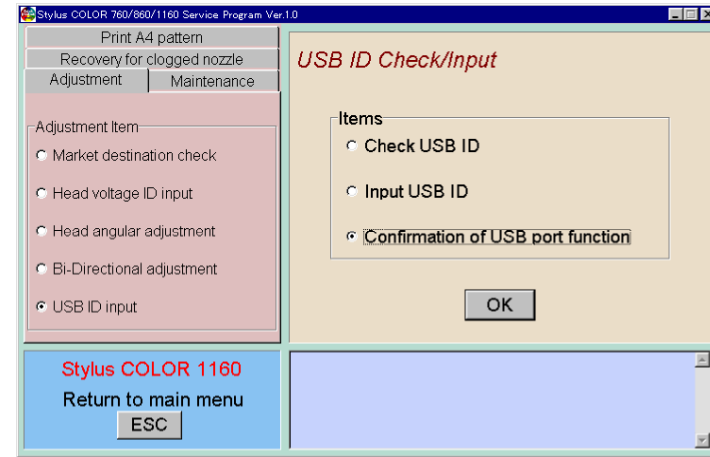


Figure 5-32. Choose the Confirmation of USB port function

NOTE: Above "Confirmation of USB port function" is available only the USB port and driver are installed in the Windows 98 environment.

- The following message appears.

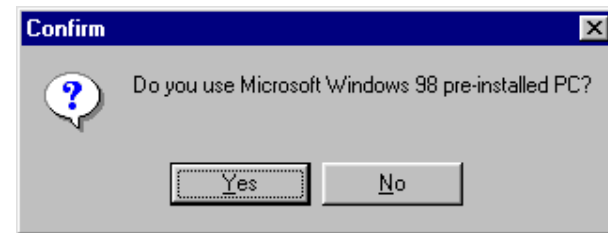


Figure 5-33. Message 1

The action to take hereafter varies depending on your PC's condition. If you select "Yes", go to **Flow Y**. If you select "No", go to **Flow N**.

Flow Y (Windows98 pre-installed)

A-1. The message below appears. Click OK.



Figure 5-34. Message 2

A-2. The following menu appears. Click OK.

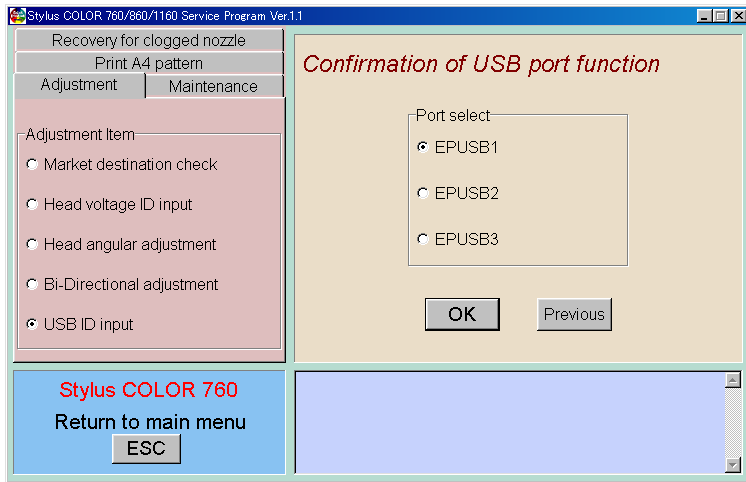


Figure 5-35. Port Confirmation Menu

A-3. The following menu appears.

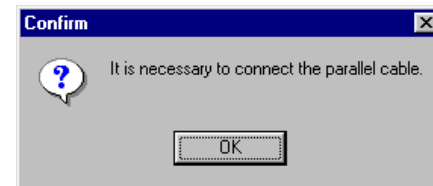
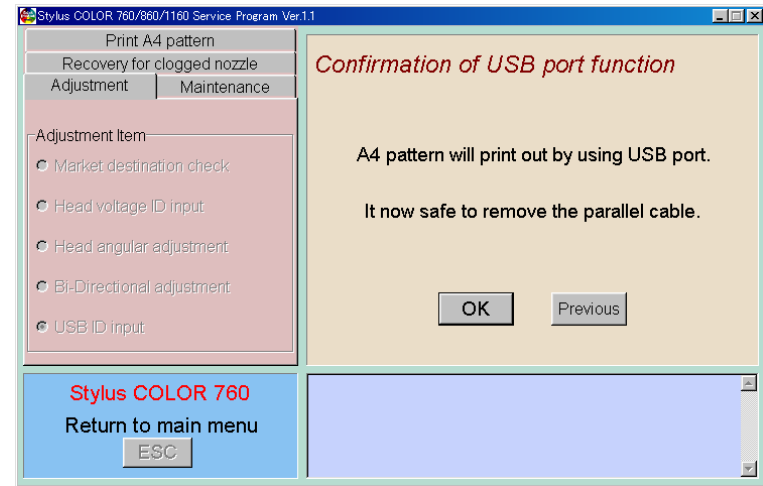


Figure 5-37. Message 3



* In this menu, only "OK" and "Previous" buttons are effective.

Figure 5-36. Confirmation Of USB Port Function Menu



In the following step, be sure to connect a parallel cable before clicking the OK button. Otherwise, the program will hang up.

If you select "OK", A4 check pattern will print and the message below follows. If you select "Previous", the message below appears.

A-4. Connect a parallel cable and then click “OK”. The “USB ID input” menu appears again (step 7).

NOTE: If the USB port operates correctly, 2 sheets of A4 Check pattern are printed.

Flow B (Windows98 not installed)

B-1. The message below appears.

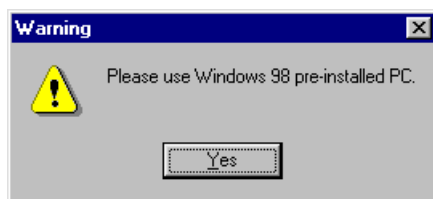



Figure 5-38. Message 4

B-2. Click “Yes”. The “USB ID input” menu appears again (step 7).

5.2.3.9 Initial Ink Charge Operation

After you replaced any of the following units, perform initial ink charge and return the printer after making sure that ink is ejected correctly from the printhead.

- After replacing the printer mechanism
- After replacing or removing the printhead

CAUTION  Before you perform the initial ink charge operation, replace the installed cartridges with new ones, because the ink amount used for the initial ink charge operation is so large.

1. Choose the “Maintenance menu”. The following menu is displayed.

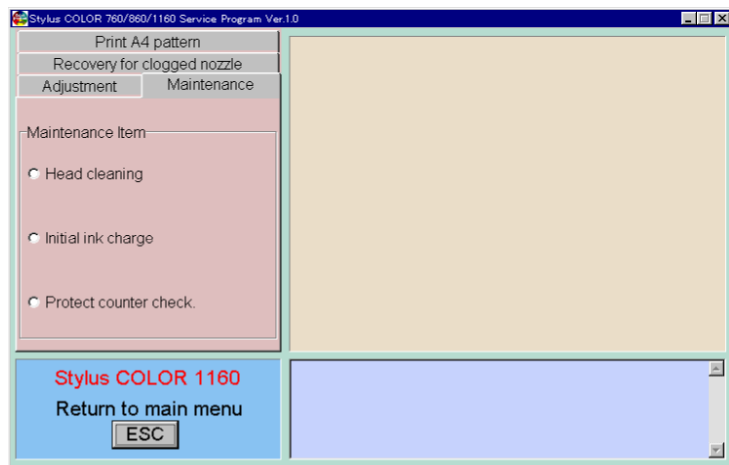


Figure 5-39. Choose the Maintenance menu

2. Choose the “Initial Ink charge” item in the “Maintenance Menu” and click the “OK” button.

NOTE: As described in the menu message, about 1/5 amount of the Black ink cartridge and 1/7 amount of the Color ink cartridge are consumed in the initial ink charge operation.

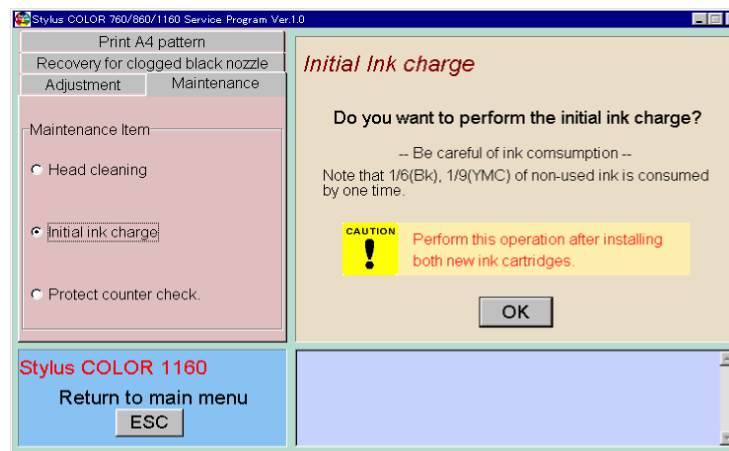



Figure 5-40. Choose the Initial Ink Charge

NOTE: The initial ink charge is carried out without turning off/on the printer. It takes about 1 minutes & 45seconds for this operation to complete the whole sequence.)

5.2.3.10 Head Cleaning Operation

With this sequence, you can forcibly solve the clogged nozzle problem caused by viscous ink. This program performs powerful cleaning (CL1' cleaning (ink consumption ;1.55ml + rubbing operation))forcibly.

CAUTION  If you can not recover the clogged nozzles despite you performed this cleaning operation, enter the Initial ink charge sequence by referring to Section 5.2.3.11.

1. Choose the “Head cleaning” in the “Maintenance menu” as following figure.

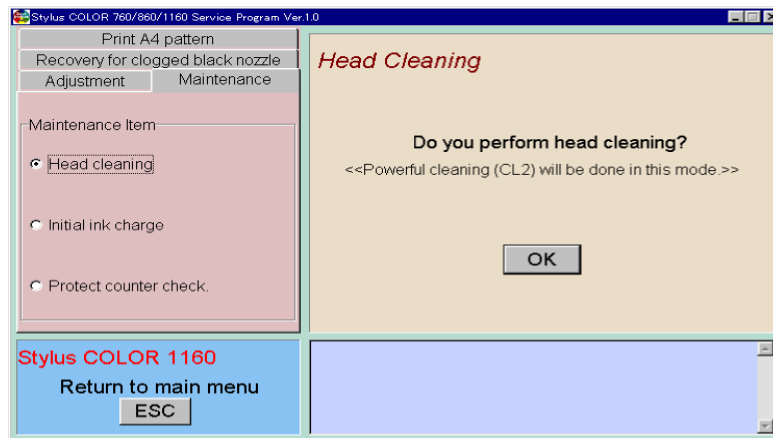


Figure 5-41. Choose the Maintenance

2. Click the “OK” button in the menu. The powerful cleaning is performed. (It takes 30 seconds for the process to complete.)

5.2.3.11 Protection Counter Check/Reset

The program allows you to check or clear the current protection counter value. (waste ink amount counter)

NOTE: You can confirm or clear the current protection value by main unit alone. Refer to Section 1.4.3.)

[Check the present counter value]

1. Choose the “Check the present counter value” in the “Maintenance” menu and click the “OK” button.

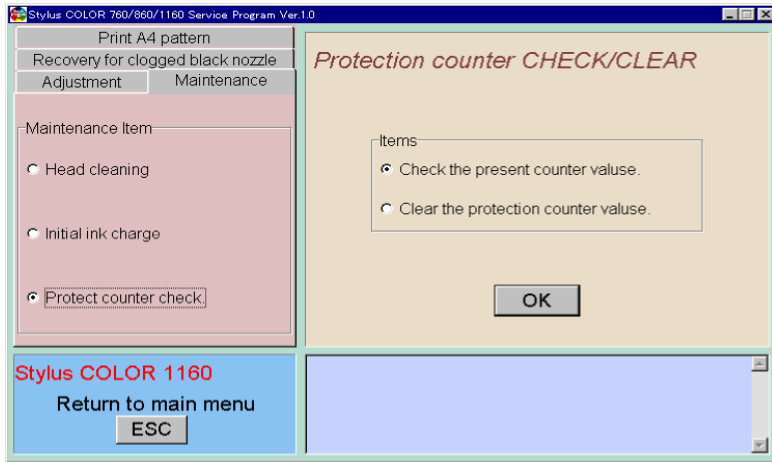


Figure 5-42. Choose the Check the present counter value

2. By clicking the “OK” button, following menu is displayed.

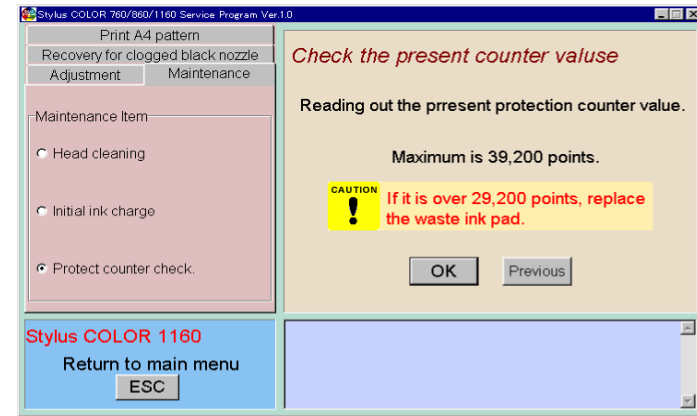


Figure 5-43. Check the present counter value

3. After read the Caution description on the above menu, click the “OK” button in the menu. The present counter value is displayed on the bottom column as following figure.

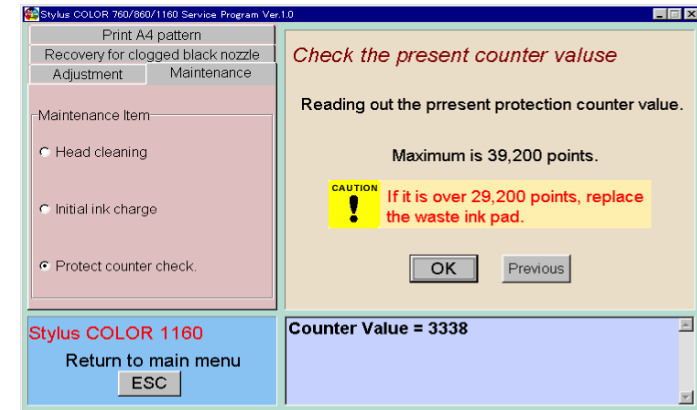


Figure 5-44. Present counter value

4. If the present counter value is over 29200 points, we recommend you to replace the Waste ink drain pad to new one.

[Clear the protection counter value]

1. Choose the “Clear the protection counter value” in the “Maintenance” menu and click the “OK” button.

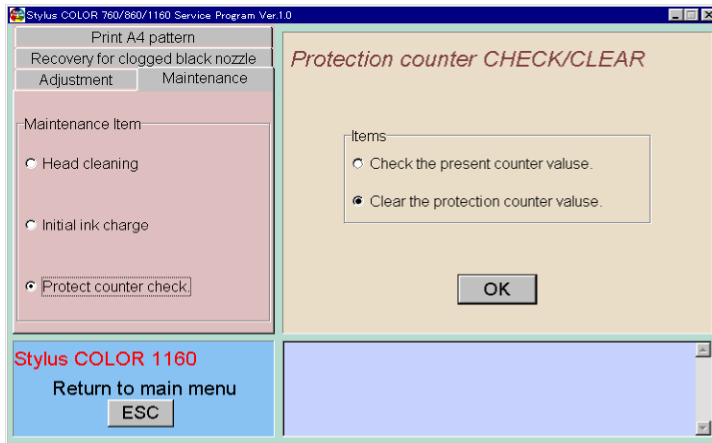


Figure 5-45. Choose the Clear the protection counter value

2. By clicking the “OK” button, the following menu is displayed.

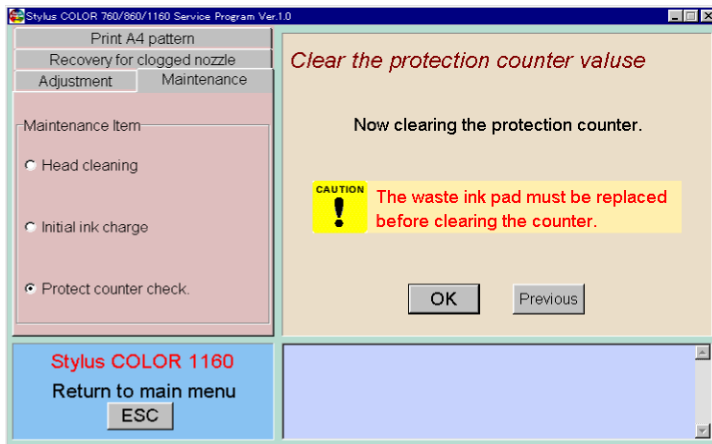


Figure 5-46. Clear the Protection counter value

3. After you read the description on the menu, click the “OK” button. When the “OK” button is clicked, the following message is displayed on the bottom column in the menu.



Figure 5-47. Clear the protection counter value 2



- Be sure to replace the installed waste ink pad with a new one after or before you clear the current protection counter value.

5.2.3.12 Recovery for the clogged nozzle

This function repeats to print the Nozzle check pattern and to perform the head cleaning. You can check the recovered nozzle condition after perform the head cleaning.

NOTE: In this sequence, CL1' mode (1.55ml) + rubbing operation is always performed.

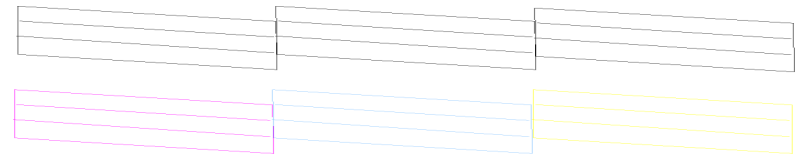


Figure 5-49. Nozzle Check pattern

1. Choose the “Recovery for clogged nozzle” menu. The following menu is displayed.

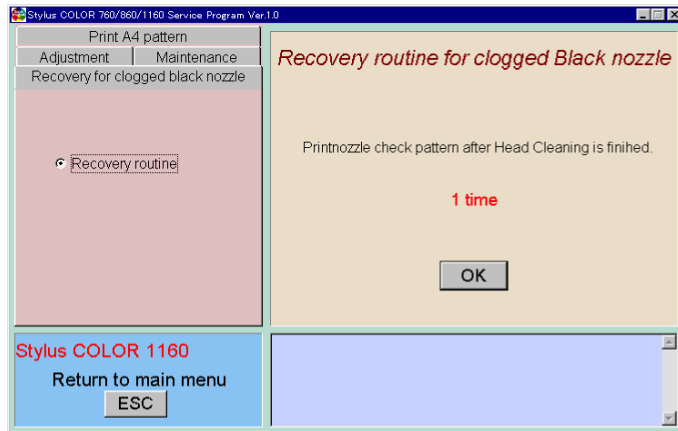


Figure 5-48. Choose the Recovery for clogged nozzle

2. After set the plain paper, click the “OK” button. The printer performs the head cleaning sequence and prints the nozzle check pattern as shown in the next page’s figure.

3. After complete one set of the sequence, the program display the counter that this program is performed as following figure.

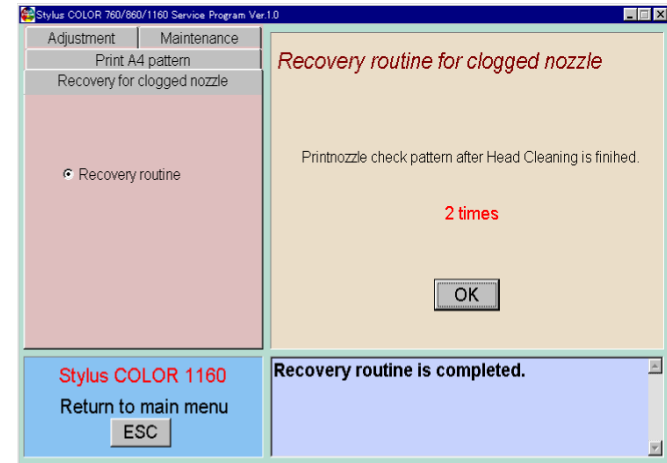


Figure 5-50. Display the counter for this program

4. Depends on the nozzle recovery condition, repeat this program.

5.2.3.13 Print A4 pattern

This function prints following several kinds of the check pattern on the A4 paper. By printing this A4 pattern, you can check the all adjustment result on the printed result. (except the USB ID input)

NOTE: 2 sheets of the A4 Plain paper is used for this printing. So, set 2 sheets in the ASF unit before starting the program.

1. Choose the “Print A4 pattern” and click the “OK” button to print the A4 check pattern in the following menu.

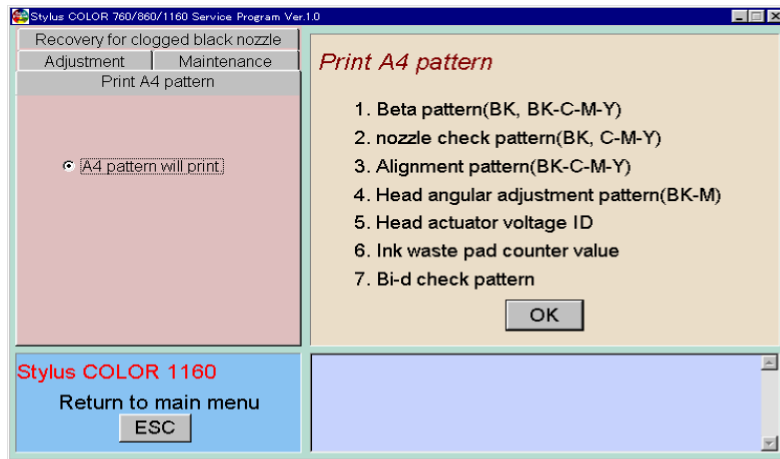


Figure 5-51. Choose the “Print A4 pattern

2. After complete the printing, following message is displayed on the bottom column in the menu.

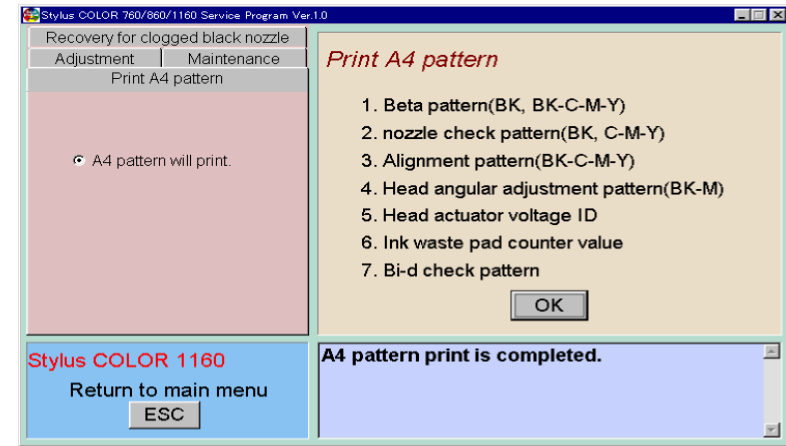


Figure 5-52. Complete the printing.

3. Check the all printed patterns on the 2 sheets of the printed paper. If you find out any incorrect portion, Choose the adjustment menu and try to adjust it.



- The check point for the first solid pattern (beta pattern 360 x 360dpi normal dot) in the A4 Check pattern is as follows.
 - Any white line is not observed
 - Uneven banding is not observed extremely.
- The check point for the second Nozzle check pattern (360dpi) is as follows.
 - Ink is fired from all nozzles.
 - Uneven banding is not observed extremely.

5.3 PF Loop scale unit assembling procedure

This section describes how to assemble the following parts

- PF Loop scale
- Base plate
- Double side adhesive tape
- Gear 76

This assembling procedure is required when the following parts is replaced.

- Gear 76
- Loop Scale

For this assembling, following tool is required.

Table 5-1 Required Assembling Tool

No.	Assembling Item	assembling parts	Required tool
1	Scale PF unit Assembling tool	Stick the Loop scale unit to the Gear 76	AS Tool code: 1051767
2	Mounting Plate scale Attachment tool	Stick the Loop scale to the base plat	AS Tool cod: 1051765

5.3.1 Assembling the PF Loop scale unit

This section describes how to assemble the following parts.

- PF Loop scale
- Base plate
- Adhesive Tape

1. Set the AS Tool # 1051765 as following figure
2. Peel off the protection tape from the Base plate and set it on the AS Tool # 1051765. The adhesive side should be faced to upward.

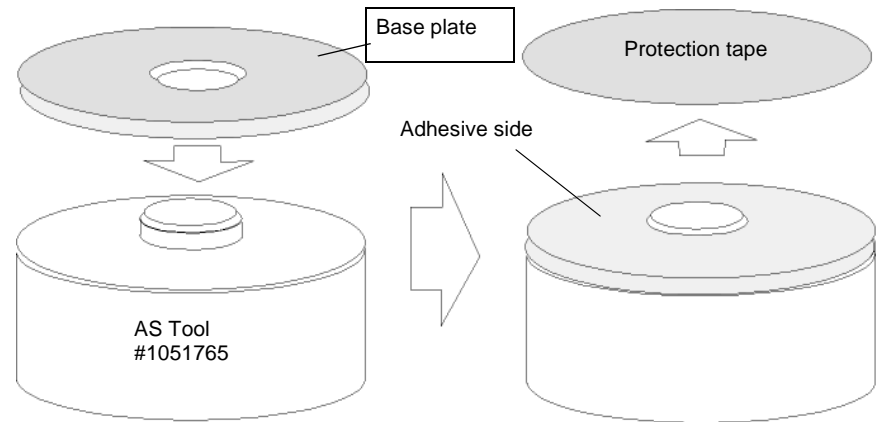


Figure 5-53. Setting the Base plate on the AS Tool # 1051765

- Set the small column to the shaft hole of the PF Loop scale and put the PF Loop scale on the Base plate. The printed character side of the PF Loop scale should be faced to the Base plate.

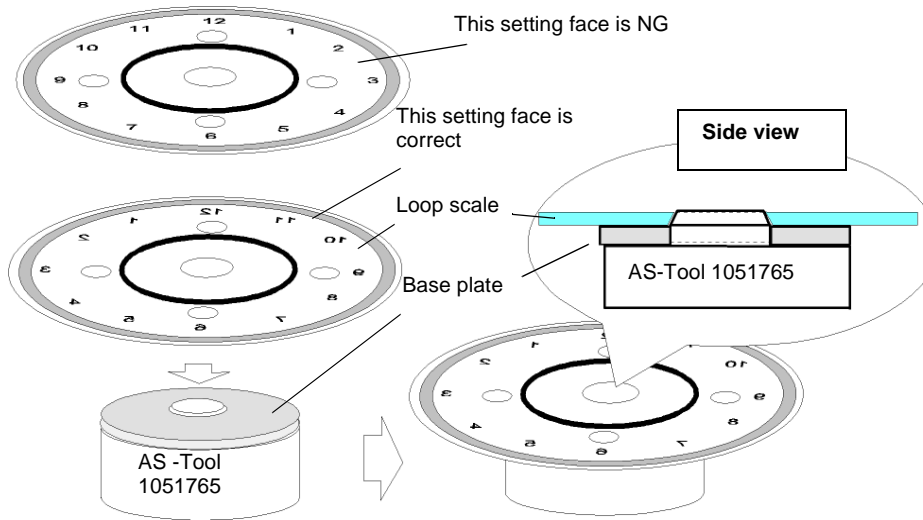


Figure 5-54. Put the PF Loop scale on the Base plate

- Press the PF Loop scale against the Base plate carefully and stick the PF Loop scale to the Base Plate.

CAUTION Do not touch the following portion.

- Inside of PF Loop scale shaft hole
- Character printed side of the Loop scale

CHECK POINT It is no problem if the outline of the Base plate dose not just fit to the printed circled line of the PF Loop scale. Refer to Figure 5-55

- Peel off the protection tape from the adhesive tape (double side) and stick it inside the printed circled line on the PF Loop scale.

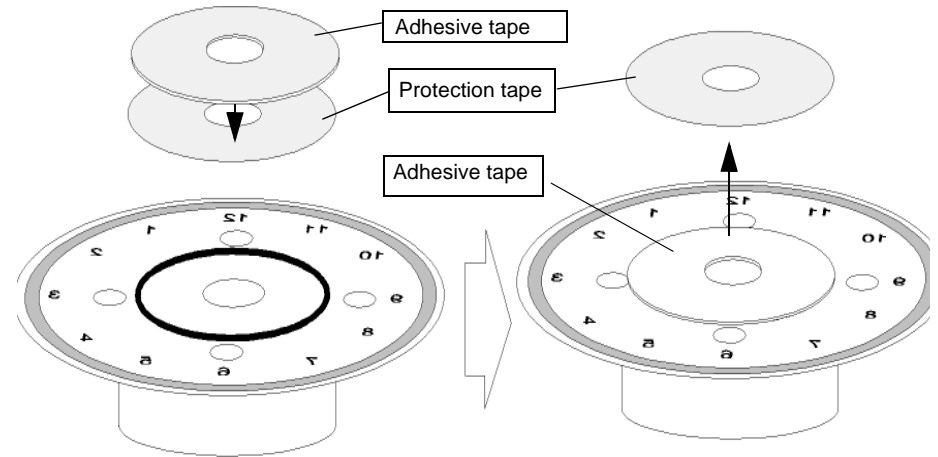


Figure 5-55. Sticking the Protection Tape to the PF Loop Scale

CHECK POINT It is not problem if the out line of the Adhesive tape dose not just fit to the printed circled line of the PF Loop scale.

5.3.2 Sticking the PF Loop scale unit to Gear 76

This section describes how to stick the PF Loop scale unit to the Gear 76.

1. Peel off the protection tape from the PF Loop scale unit and put the shaft hole of the PF Loop scale unit to the PF shaft.
The PF Loop Scale should be set a right angle against the PF roller.
2. Set two small circled cut off holes to the two protrusions on the Gear 76, and press the PF Loop scale units slowly & carefully to the Gear 76 side with the AS Tool # 1051767 as following figure.

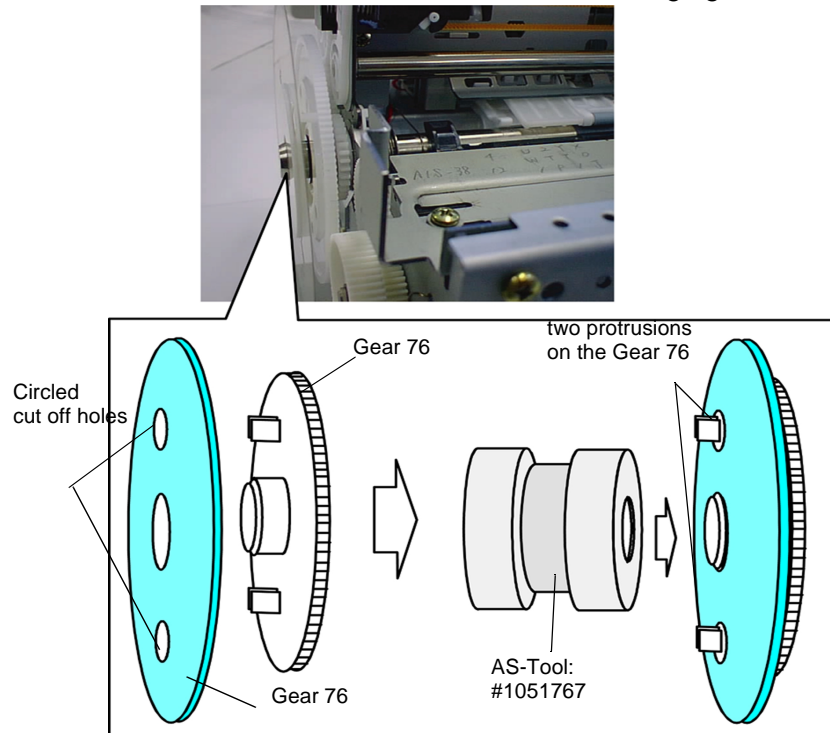


Figure 5-56. Stick the PF Loop scale unit on Gear 76



- Do not touch the following portion.
 - Inside of PF Loop scale shaft hole
 - Character printed side of the Loop scale
- Do not damage the inside of the PF shaft hole of the PF Loop scale unit.
- After assembled the PF roller Assembly (included Gear 76) to the printer mechanism, stick the PF Loop scale unit to the Gear 76.



- Check the two protrusions on the Gear 76 is sticking from the small circled cut off holes of the PF Loop scale. Refer to Figure 5-57.
- Make sure there is no dirt or scratch on PF Loop scale

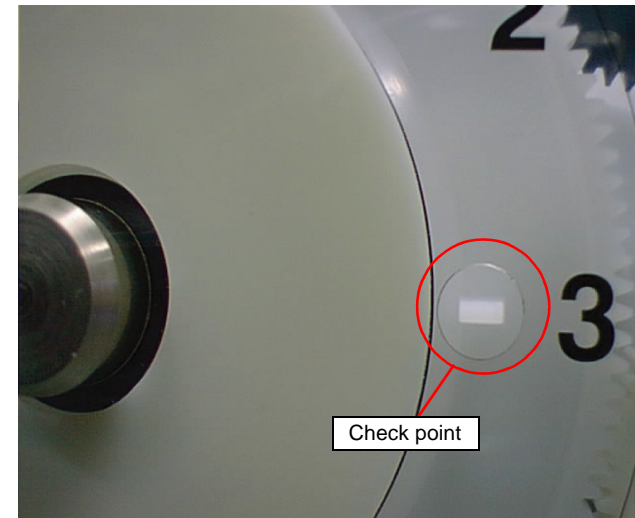


Figure 5-57. Checking the PF Loop scale sticking condition

CHAPTER

6

MAINTENANCE

6.1 Overview

This section describes points and procedures for maintaining the printer in its optimum condition.

6.1.1 Cleaning

The printer has no mechanical components which require regular cleaning. Therefore, note that the points suggested below are only to check for dirt, and cleaning should be performed upon necessity.



- **Never use chemical solvents, such as thinner, to clean the printer. These chemicals can damage the printer components.**
- **Be careful not to damage the components in attempt to clean inside the printer.**
- **Do not scratch the surface of “ROLLER, ASSEMBLY, PF”. (Use a soft brush to wipe off the dust, or use a soft cloth moistened with alcohol.)**

□ **Housing:**

Use a soft clean cloth moistened with water to wipe off any dirt. If the housing is stained with ink, use a cloth moistened with neutral detergent to wipe it off.

□ **Inside the Printer:**

Use a vacuum cleaner to remove any paper dust.

6.1.2 Service Maintenance

If print irregularity (missing dot, white line, etc.) has occurred or the printer indicates “Maintenance Error”, take the following actions to clear the error.

□ **Head Cleaning:**

The printer has a built-in head cleaning function, which is activated by operating the control panel.

Confirm that the printer is in stand-by state (the POWER indicator is not blinking), and hold down the cleaning button on the control panel for more than 3 seconds.

The printer starts the cleaning sequence. (The POWER indicator blinks during the cleaning sequence.)

□ **Maintenance Error Clear:**

Ink is used for the operations such as cleaning as well as printing. Therefore, the printer wastes certain amount of ink and drains it into waste ink pad, while counting the amount of the waste ink. Once the amount of the waste ink reaches the predetermined limit, the printer indicates “Maintenance Error” and the waste ink pad should be replaced.

■ **Overflow Counter Limit:**

Overflow Counter (Protection Counter A) ≥ 39200

■ **Timing for Replacing the Waste Ink Pad:**

When the total amount of the waste ink reaches the predetermined limit, the LED indicates “Maintenance Error”. (Refer to Section 1.4.4 “Printer Conditions and Panel Status”)

Also, during repair servicing, check the ink counter along with the firmware version, ink counter, select code page, nozzle check pattern on the status printing sheet. If the ink counter value is close to its limit, notify your customer and recommend that the waste ink pad be replaced (If the waste ink pad is not replaced at that time, there is a possibility that “Maintenance Error” will occur soon after the printer is returned to the customer). Once you have the confirmation of the customer, replace the waste ink pad.

■ **Replacement Procedure:** Refer to Section 4.2.4.2.


■ **After the Replacement:**

Reset the Overflow Counter (Protection Counter A) by pressing the Load/Eject SW + Cleaning SW with Power On function. Refer to 1.4.3 “Panel Functions” for details.

6.1.3 Lubrication

The type and amount of oil and grease used to lubricate the printer parts are determined based on the results of internal evaluations. Therefore, be sure to apply the specified type and amount of oil and grease to the specified part of the printer mechanism during servicing.

- CAUTION**



 - **Never use oil and grease other than those specified in this manual. Use of different types of lubricant can damage the printer and its components.**
 - **Never apply larger amount of lubricant than specified in this manual.**

Table 6-1. Specified Lubricants

Type	Name	EPSON Code	Supplier
Grease	G-26	B702600001	EPSON
Oil	O-12	1038991	EPSON

Table 6-2. Lubrication Point

No.	Standard	Remarks
1	<Lubrication Point> Inside of "BUSHING, 12, RIGHT"	See p. 151.
	<Lubricant Type> G-26	
	<Lubrication Amount> Take a 3mm-diameter ball and apply it evenly to the inside of the bushing.	
2	<Lubrication Point.> "HOLDER, PULLEY, DRIVEN"	See p. 151
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 3mm (4 places)	
3	<Lubrication Point> Inside of "BUSHING, 12, LEFT"	Use a brush to apply grease. See p. 151
	<Lubricant Type> G-26	
	<Lubrication Amount> Take a 3mm-diameter ball and apply it evenly to the inside of the bushing.	
4	<Lubrication Point> Inside of "BUSHING, 6" (2 bushings)	Use a brush to apply grease. See p. 151.
	<Lubricant Type> G-26	
	<Lubrication Amount> Take a 1mm-diameter ball and apply it evenly to the inside of the bushing.	
5	<Lubrication Point> Flat surface of "PULLEY, DRIVEN"	See p. 152.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 1mm (2 places)	

Table 6-2. Lubrication Point (continued)

No.	Standard	Remarks
6	<Lubrication Point> "SHAFT, PULLEY, DRIVEN"	See p. 152.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 1mm	
7	<Lubrication Point> Inside of "COMBINATION GEAR, 12, 22.4"	Use a dispenser to apply oil. See p. 152.
	<Lubricant Type> O-12	
	<Lubrication Amount> Apply oil evenly to the inside of the gear.	
8	<Lubrication Point> Inside of "COMBINATION GEAR, 14, 28"	Use a dispenser to apply oil. See p. 152.
	<Lubricant Type> O-12	
	<Lubrication Amount> Apply oil evenly to the inside of the gear.	
9	<Lubrication Point> Center of Pole C (2 places)	See p. 152.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 3mm	
10	<Lubrication Point> "FELT, D3.6"	Wipe off any oil leaking into the motor side. See p. 152.
	<Lubricant Type> O-12	
	<Lubrication Amount> Full (but not overfull)	

Table 6-2. Lubrication Point (continued)

No.	Standard	Remarks
11	<Lubrication Point> Groove of "ROLLER, PF"	See p. 152.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 5mm	
12	<Lubrication Point> Contact point between "ROLLER, EJECT" and "GROUND SPRING, EJECT"	See p. 152.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 2mm	
13	<Lubrication Point> Bearing of "PAPER GUIDE, REAR", and contact point between "ROLLER, PF" and the rotating gear of "Roller, PF Unit"	Apply grease while rotating the "Roller, PF Unit". See p. 153.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 1/2 turn	
14	<Lubrication Point> "PAPER GUIDE, FRONT" (3 places)	See p. 153.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 2mm (Roller Eject side) φ 1 x 2mm (Roller Eject side) φ 1 x 10mm (Roller PF side)	

Table 6-2. Lubrication Point (continued)

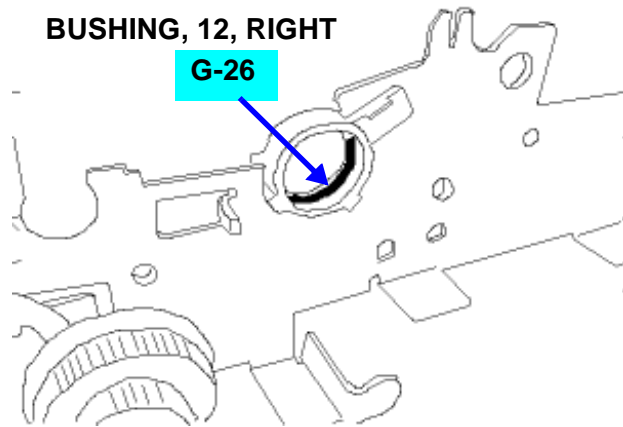
No.	Standard	Remarks
15	<Lubrication Point> Oil pad in the carriage assembly	Lubricate the oil pad only when: <ul style="list-style-type: none"> • Replacing the carriage assembly • Replacing the oil pad Use a precise syringe to apply oil. If you accidentally apply too much oil to the oil pad, throw the pad away and take a new one again. Leave the pad for a while to wait until oil is evenly infiltrated, then install it on the carriage assembly.
	<Lubricant Type> O-12	
	<Lubrication Amount> 0.72 ~ 0.77cc (0.65 ~ 0.69g) Note: This is the amount to be applied to a new oil pad.	
16	<Lubrication Point> Shaft for "FRAME, LEFT"	See p. 154.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 5mm	
17	<Lubrication Point> Inside of the right hole of "FRAME, ASF; B"	Use a brush to apply grease. See p. 154.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x 1mm Apply grease evenly to the inside of the hole.	
18	<Lubrication Point> Left and right edges of "HOPPER ASSEMBLY; C"	Use a brush to apply grease. See p. 154.
	<Lubricant Type> G-26	
	<Lubrication Amount> 2mm-diameter ball	

Table 6-2. Lubrication Point (continued)

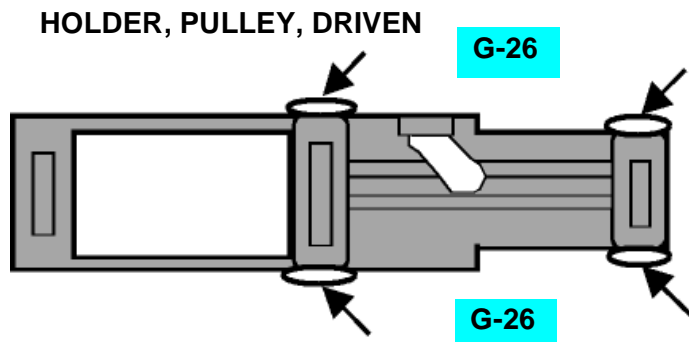
No.	Standard	Remarks
19	<Lubrication Point> "GUIDE PLATE, CR" (the part where the carriage slides on.)	See p.155.
	<Lubricant Type> G-26	
	<Lubrication Amount> φ 1 x approx. 270mm	



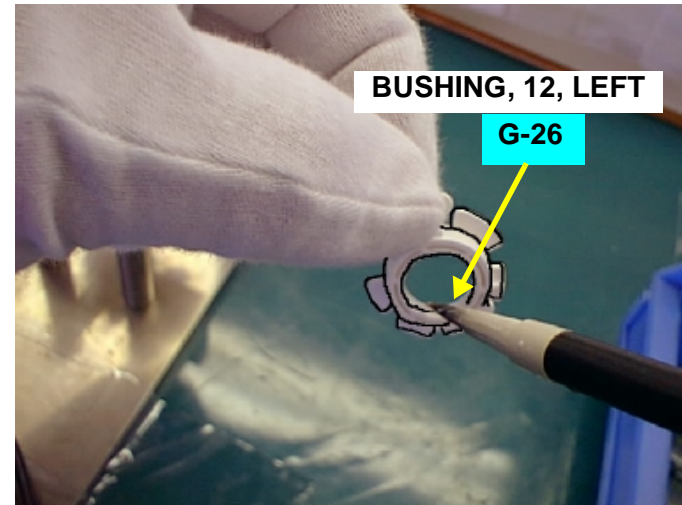
- Never apply oil to the CR guide shaft directly. This may cause fatal damage to the components of the printer.
- Avoid applying oil excessively to the oil pad. This may cause fatal damage to the components of the printer.



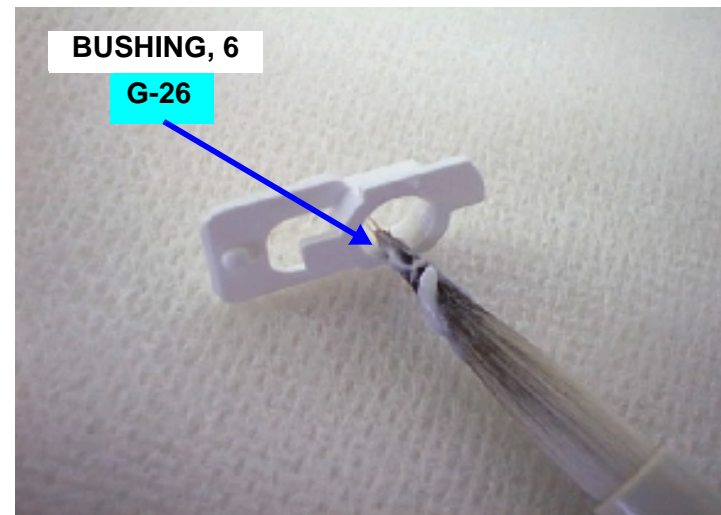
Lubrication Point No.1



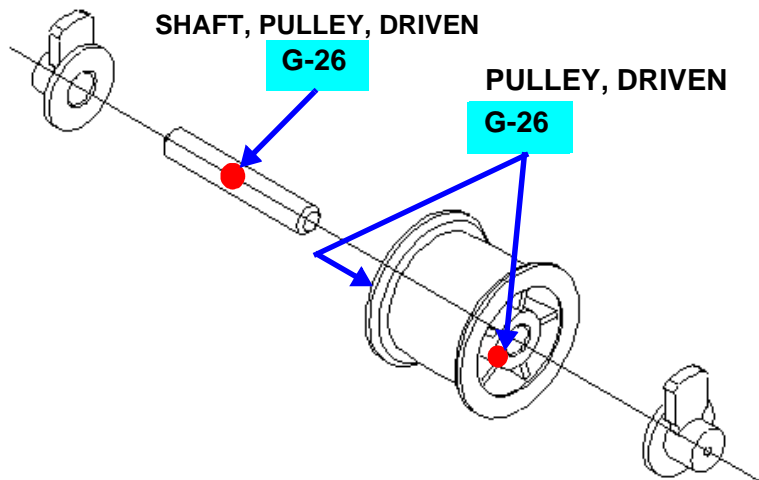
Lubrication Point No.2



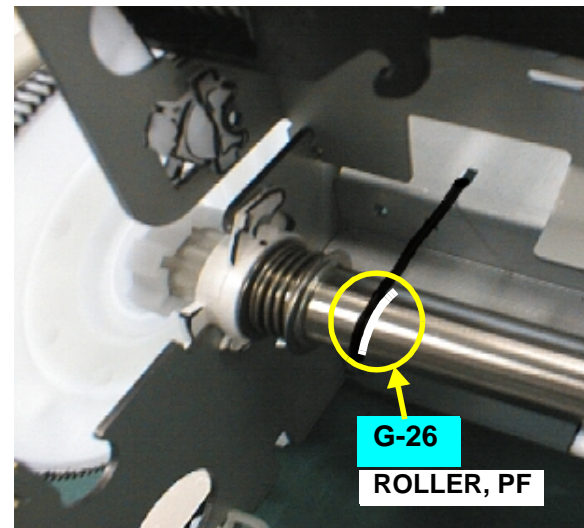
Lubrication Point No. 3



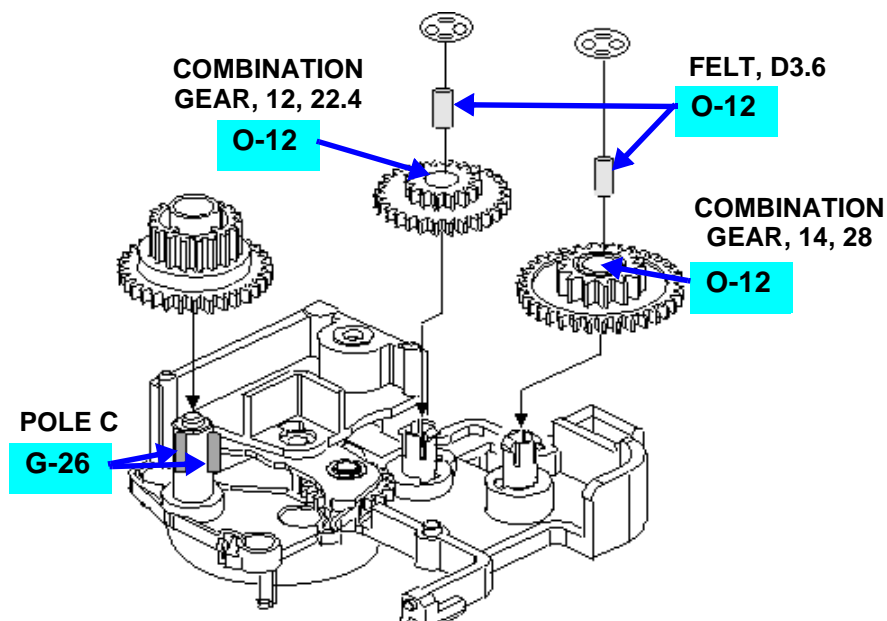
Lubrication Point No. 4



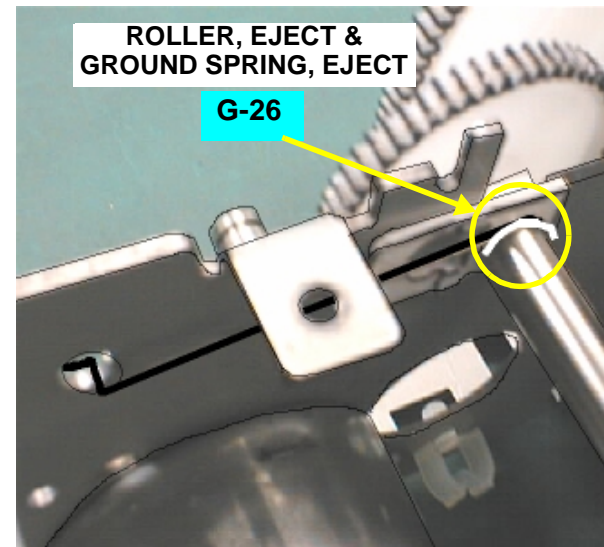
Lubrication Point No. 5, 6



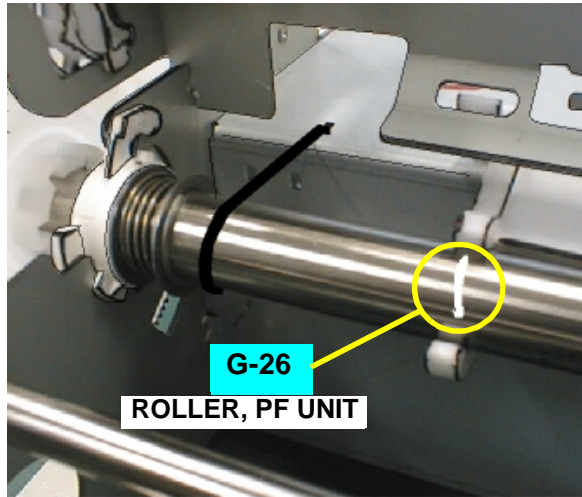
Lubrication Point No. 11



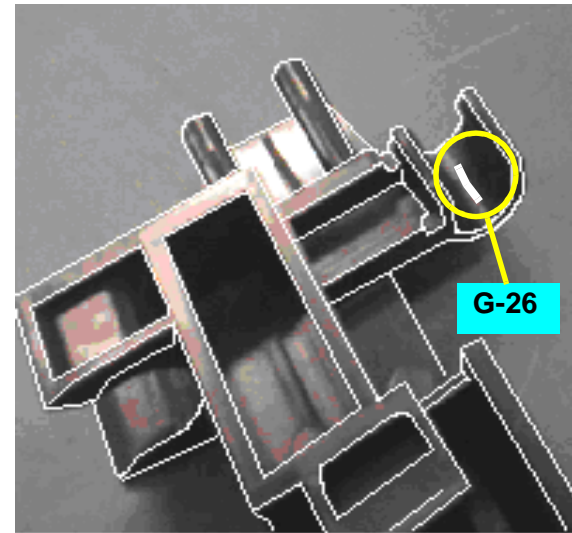
Lubrication Point No. 7, 8, 9, 10



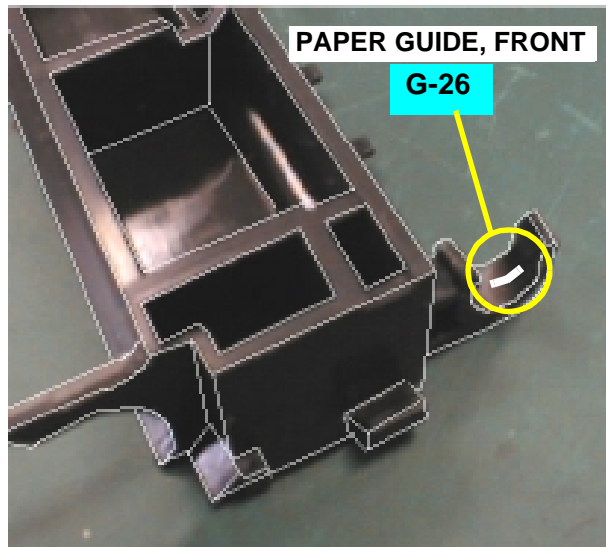
Lubrication Point No. 12



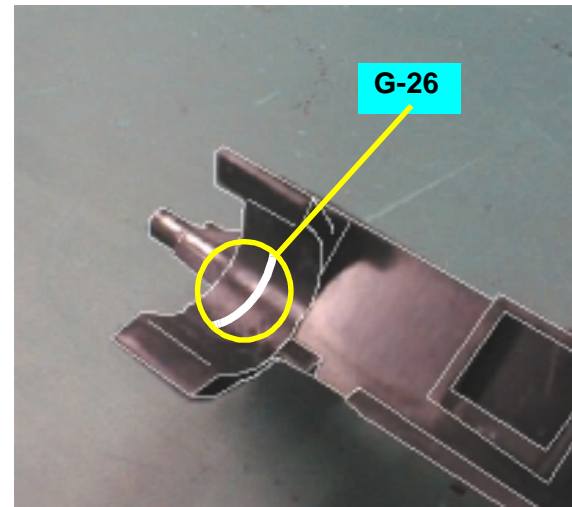
Lubrication Point No. 13



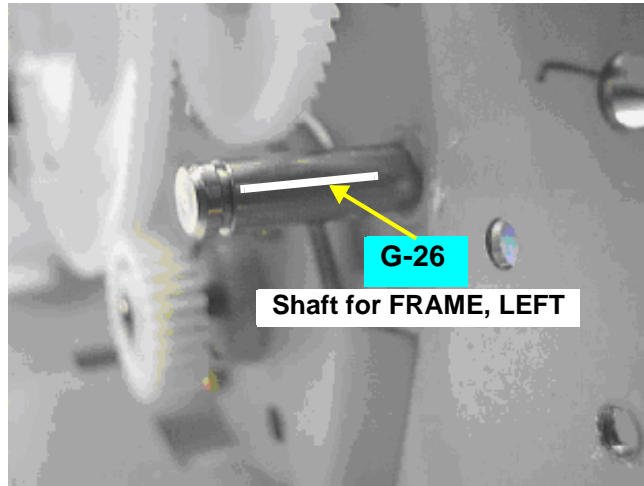
Lubrication Point No. 14-2



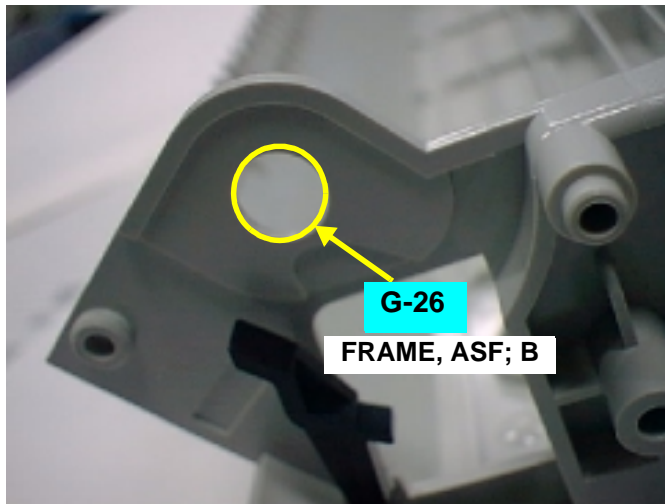
Lubrication Point No. 14-1



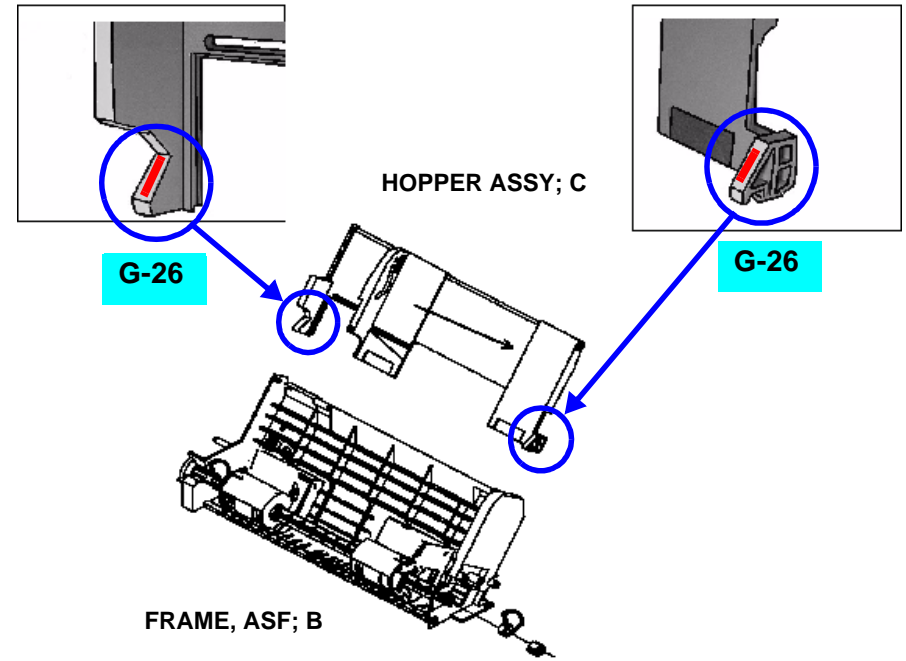
Lubrication Point No. 14-3



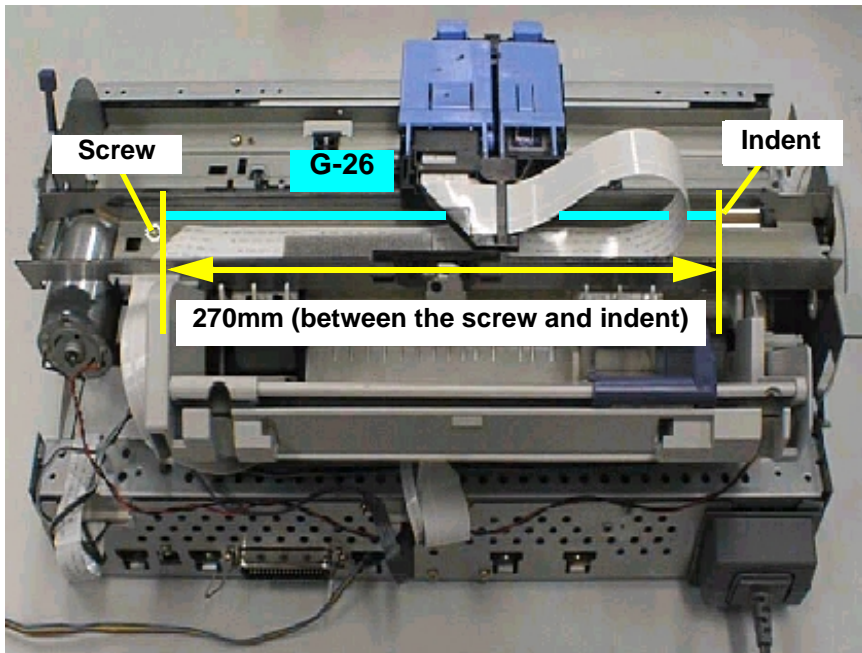
Lubrication Point No. 16



Lubrication Point No. 17



Lubrication Point No. 18



Lubrication Point No. 19

CHAPTER

7

APPENDIX

7.1 Connector Summary

This section gives information on connectors and their pin assignment.

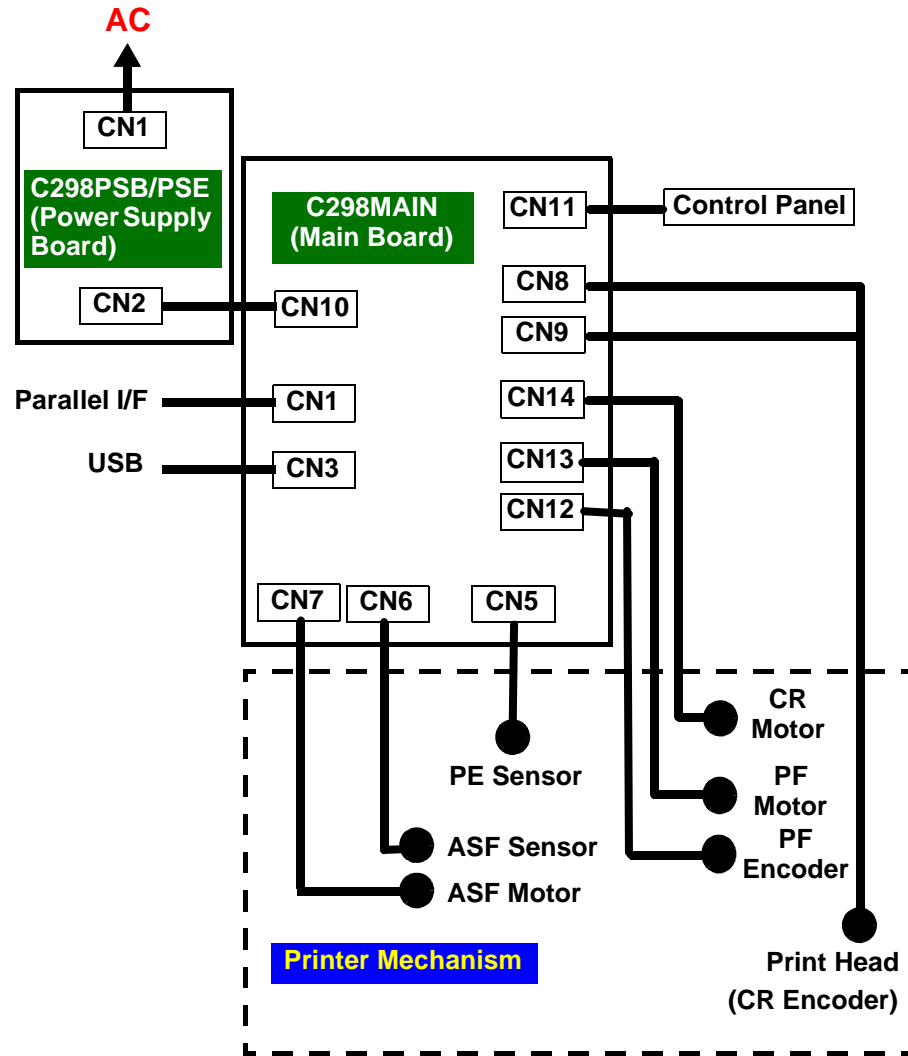


Figure 7-1. Cable Connection of Stylus Color 860/1160

7.1.1 Connector Pin Assignment

Tables below show connector pin assignments of the C298MAIN.

Table 7-1. Connector Summary of C298MAIN

Connector	Function	Reference
CN1	Parallel I/F Connector	
CN3	USB Connector	
CN5	To PE Sensor	Table 7-2
CN6	To ASF Sensor	Table 7-3
CN7	To ASF Pump Motor	Table 7-4
CN8	To Print Head (including CR Encoder)	Table 7-5
CN9	To Print Head	Table 7-6
CN10	To Power Supply Board	Table 7-7
CN11	To Control Panel	Table 7-8
CN12	To PF Encoder	Table 7-9
CN13	To PF Motor	Table 7-10
CN14	To CR Motor	Table 7-11

Table 7-2. Connector CN5

Pin	Signal Name	I/O	Function
1	PE	In	Sensor detect signal
2	GND	---	Ground
3	PEV	---	Sensor power supply (+5V)

Table 7-3. Connector CN6

Pin	Signal Name	I/O	Function
1	ASF	In	Sensor detect signal
2	GND	---	Ground
3	ASFV	---	Sensor power supply (+5V)

Table 7-4. Connector CN7

Pin	Signal Name	I/O	Function
1	ASFA	Out	Control signal for A phase
2	ASFB	Out	Control signal for B phase
3	ASF-A	Out	Control signal for -A phase
4	ASF-B	Out	Control signal for -B phase

Table 7-5. Connector CN8

Pin	Signal Name	I/O	Function
1	GND	---	Ground
2	ENB	In	CF Encoder B phase
3	VDD	---	Logic power supply (+5V)
4	ENA	In	CF Encoder A phase
5	GND	---	Ground
6	GND	---	Ground
7	LAT	Out	Head data latch pulse output
8	GND	---	Ground
9	CH	Out	Waveform selection signal for MS shot & Variable shot
10	GND	---	Ground
11	VDD	---	Logic power supply (+5V)
12	GND	---	Ground

Table 7-5. Connector CN8 (continued)

Pin	Signal Name	I/O	Function
13	VHV	---	+42V power supply for Nozzle Selector
14	GND2	---	Ground
15	GND2	---	Ground
16	GND2	---	Ground
17	GND2	---	Ground
18	COM	---	Head drive pulse (trapezoid waveform)
19	COM	---	Head drive pulse (trapezoid waveform)
20	COM	---	Head drive pulse (trapezoid waveform)
21	COM	---	Head drive pulse (trapezoid waveform)

Table 7-6. Connector CN9

Pin	Signal Name	I/O	Function
1	GND	---	Ground
2	GND	---	Ground
3	NCHC	Out	All nozzle fire selection signal
4	GND	---	Ground
5	GND	---	Ground
6	SCK	Out	Serial clock
7	SP	Out	Select signal for CH signal
8	SI6	Out	Print data output (6)
9	SI5	Out	Print data output (5)
10	SI4	Out	Print data output (4)
11	SI3	Out	Print data output (3)
12	SI2	Out	Print data output (2)
13	SI1	Out	Print data output (1)

Table 7-6. Connector CN9 (continued)

Pin	Signal Name	I/O	Function
14	NC	---	----
15	GND	---	Ground
16	THM	In	Thermistor detect signal
17	COC	In	Color I/C detection signal
18	COB	In	Black I/C detection signal

Table 7-7. Connector CN10

Pin	Signal Name	I/O	Function
1	+42V	---	Mechanism drive power supply
2	+42V	---	Mechanism drive power supply
3	GND	---	Ground
4	ESAVE		
5	PSC	Out	Power supply switch output signal
6	GND	---	Ground
7	GND	---	Ground
8	+5V	---	Logic power supply

Table 7-8. Connector CN11

Pin	Signal Name	I/O	Function
1	SW2	In	Panel switch on/off (2)
2	SW0	In	Panel switch on/off (0)
3	PSC	In	Power on/off switch
4	SW1	In	Panel switch input (1)
5	LED3	Out	LED drive signal (3)
6	+5V	----	Logic power supply

Table 7-8. Connector CN11 (continued)

Pin	Signal Name	I/O	Function
7	+5V	----	Logic power supply
8	LED2	Out	LED drive signal (2)
9	GND	---	Ground
10	LED1	Out	LED drive signal (1)
11	GND	----	Ground
12	LED0	Out	LED drive signal (0)

Table 7-9. Connector CN12

Pin	Signal Name	I/O	Function
1	GND	----	Ground
2	ENB	In	B phase signal
3	VCC	---	Logic power supply (+5V)
4	ENA	In	A phase signal
5	GND	----	Ground

Table 7-10. Connector CN13

Pin	Signal Name	I/O	Function
1	PFA	Out	Phase drive signal (A)
2	PFB	Out	Phase drive signal (B)

Table 7-11. Connector CN14

Pin	Signal Name	I/O	Function
1	CRA	Out	Phase drive signal (A)
2	CRB	Out	Phase drive signal (B)

7.1.2 EEPROM ADDRESS MAP

This section provides EEPROM address map for the Stylus Color 860/1100.

Table 7-12. EEPROM Address Map

Address	Explanation	Settings	QPIT Settings	Factory Settings
00H	Password		0FH	-
01H			5AH	-
02H	EEPROM mapping revision		42H	-
03H	Reserved		00H	-
04H	Interface selection	0: Auto 1: Parallel 3: USB	00H	00H*2
05H	Interface time-out	0 to 255 (by second, value of 0 means 10 seconds)	0AH	0AH
06H	Compatibility speed	0: Fast 1: Slow 2: Special-1 3: Special-2	00H	00H
07H	ECP speed *a	0: Fast 1: Slow	00H	00H
08H	IEEE1284.4 for Parallel	0: Auto 1: On 2: Off	00H	01H
09H	IEEE1284.4 for USB	0: Auto 1: On 2: Off	00H	01H
0AH	I/F Control flags	bit1: ECP mode (0=Off, 1=On) *b bit0: IEEE1284 mode (0=On, 1=Off) *c	00H	00H
0BH	Reserved		00H	-
0CH	Reserved		00H	-
0DH	Reserved		00H	-
0EH	Reserved		00H	-

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
0FH	Reserved		00H	-
10H	CPSI password		00H	00H
11H	CPSI password		00H	00H
12H	CPSI password		00H	00H
13H	CPSI password		00H	00H
14H	CPSI password		00H	00H
15H	CPSI password		00H	00H
16H	Print direction control	0: Bi-D 1: Uni-D 2: Auto	02H	02H
17H	CG table	0: PC 437 1: PC 850	00H	00H
18H	Font	0: Courier	00H	00H
19H	Pitch	0: 10cpi	00H	00H
1AH	Auto LF, Network I/F mode	bit1: Network I/F mode (0=Off, 1=On) bit0: Auto line feed (0=Off), 1=On)	00H	00H
1BH	Check mode control	bit7: Self test mode bit6: Hex dump mode	00H	00H
1CH	Reserved		00H	-
1DH	Reserved		00H	-
1EH	Reserved		00H	-
1FH	Reserved		00H	-
20H	Bi-D Adjustment for MultiShot (Bk)	-36<=n<=+36 (by 1/1440 inch)	00H	(*1)
21H	Bi-D Adjustment for 6pIVSD (Bk)	-36<=n<=+36 (by 1/1440 inch)	00H	(*1)

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
22H	Bi-D Adjustment for 4pIVSD (Bk)	-36<=n<=+36 (by 1/1440 inch)	00H	(*1)
23H	Bi-D Adjustment for MultiShot (Cl)	-36<=n<=+36 (by 1/1440 inch)	00H	(*1)
24H	Bi-D Adjustment for 6pIVSD (Cl)	-36<=n<=+36 (by 1/1440 inch)	00H	(*1)
25H	Bi-D Adjustment for 4pIVSD (Cl)	-36<=n<=+36 (by 1/1440 inch)	00H	(*1)
26H	1stDot Position Adjustment	-36<=n<=+36 (by 1/1440 inch)	00H	(*1)
27H	Reserved		00H	-
28H	Reserved		00H	-
29H	Reserved		00H	-
2AH	Roll paper flag	bit1: Panel Load Mode bit0: Rollpaper Mode	00H	00H
2BH	Error Code (SC 860) Reserved (SC 1160)		00H	00H -
2CH	PF Measurement Data (SC 860) PF Motor Parameter (SC 1160)		00H	00H
2DH	Reserved		00H	-
2EH	Reserved		00H	-
2FH	Reserved		00H	-
30H	Top margin	42 to 44 x 360 (by 1/360 inch)	00H	00H
31H			78H	78H
32H	Bottom margin	1244 to 44 x 360 (by 1/360 inch)	1EH	1EH
33H			F0H	F0H

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
34H	Page length	1244 to 44 x 360 (by 1/360 inch)	1EH	1EH
35H			F0H	F0H
36H	Reserved		00H	-
37H			00H	-
38H	Reserved		00H	00H
39H			00H	00H
3AH			00H	00H
3BH			00H	00H
3CH	Reserved		00H	-
3DH			00H	-
3EH	Reserved		00H	-
3FH			00H	-
40H			0FH	-
41H	Password		5AH	-
42H	Ink flag 1	bit7: Reserved bit6: Black one-time bit5: Color one-time bit4: Initial fill required bit3: Reserved bit2: Ink cleaning seq. bit1: Reserved bit0: Reserved	00H	10H
43H	Ink flag2	bit2: YMC cartridge changed and cleaned bit1: Black cartridge changed and cleaned bit0: Black cartridge changed and cleaned	00H	00H

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
44H	Ink counter Cb		00H	00H
45H			00H	00H
46H			00H	00H
47H			00H	00H
48H	Ink counter Cy		00H	00H
49H			00H	00H
4AH			00H	00H
4BH			00H	00H
4CH	Ink counter Cm		00H	00H
4DH			00H	00H
4EH			00H	00H
4FH			00H	00H
50H	Ink counter Cc		00H	00H
51H			00H	00H
52H			00H	00H
53H			00H	00H
54H	Reserved		00H	00H
55H			00H	00H
56H			00H	00H
57H			00H	00H
58H	Reserved		00H	00H
59H			00H	00H
5AH			00H	00H
5BH			00H	00H

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
5CH	Ink counter A0		00H	00H *3
5DH			00H	00H
5EH	Reserved		00H	00H
5FH			00H	00H
60H	Ink counter Rb0		00H	00H
61H			00H	00H
62H	Ink counter Rb80		00H	00H
63H			00H	00H
64H	Ink counter Ry0		00H	00H
65H			00H	00H
66H	Ink counter Ry80		00H	00H
67H			00H	00H
68H	CL time		00H	-
69H			00H	-
6AH	Reserved		00H	00H
6BH			00H	00H
6CH	Power off time		00H	00H*2
6DH			00H	00H*2
6EH	Reserved		00H	00H
6FH			00H	00H
70H	Accumulated printing time		00H	00H
71H			00H	00H

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
72H	Reserved		00H	00H
73H			00H	00H
74H			00H	00H
75H			00H	00H
76H			00H	00H
77H			00H	00H
78H			00H	00H
79H			00H	00H
7AH			00H	00H
7BH			00H	00H
7CH			00H	00H
7DH			00H	00H
7EH			00H	00H
7FH			00H	00H
80H			Password	
81H	5AH	-		
82H	Reserved		00H	-
9FH			00H	-
A0H	Head Actuator Rank ID for VhN	+1<=n<=+32	00H	(*1)
A1H	Head Actuator Rank ID for Vhu	+1<=n<=+40	00H	(*1)
A2H	Head Actuator Rank ID for VhL	+1<=n<=+37	00H	(*1)

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
A3H	Head Actuator Rank ID for VhU	+1<=n<=+43	00H	(*1)
4AH	Head Actuator Rank ID for VhM2	+1<=n<=+37	00H	(*1)
A5H	Head Actuator Rank ID for VhB	+1<=n<=+37	00H	(*1)
A6H	Head Actuator Rank ID for AR	0<=n<=+6	00H	(*1)
A7H	Microweave ID	+1<=n<=+9	00H	(*1)
A8H	Head Actuator Rank ID for lwB	+30<=n<=+70	00H	(*1)
A9H	Head Actuator Rank ID for lwC	+30<=n<=+70	00H	(*1)
AAH	Head Actuator Rank ID for lwM	+30<=n<=+70	00H	(*1)
ABH	Head Actuator Rank ID for lwY	+30<=n<=+70	00H	(*1)
ACH	Head Actuator Rank ID for lwLC	+30<=n<=+70	00H	(*1)
ADH	Head Actuator Rank ID for lwLM	+30<=n<=+70	00H	(*1)
AEH	Reserved		00H	-
BFH			00H	-
C0H	Password		0FH	-
C1H			5AH	-

Table 7-12. EEPROM Address Map (continued)

Address	Explanation	Settings	QPIT Settings	Factory Settings
C2H	USB ID		00H	(*1)
D3			00H	(*1)
D4	Reserved		00H	-
D7H			00H	-
D8H	Custom EEPROM sub number		00H	00H
D9H			00H	00H
DAH			00H	00H
DBH			00H	00H
DCH	Panel mask function	bit7: Entry Self-Test bit6: Entry Hex-Dump bit5: Extended settings bit4: Reserved bit3: Reserved bit2: Cleaning bit1: Replace I/C bit0: Load/Eject	00H	00H
DDH	Reserved		00H	-
DEH			00H	-
DFH			00H	-
E0H	Market ID	0:STD 2:Custom	00H	00H
E1H	Reserved		00H	-
E2H	Model Name		00H	-
FFH			00H	-

NOTE: *a: BUSY signal delay time from fall-edge of a -STB signal. (Fast:Max, 1MB/s, Slow:Max, 600KB/s)
 *b: Select IEEE1284 transfer mode. (ECP or Nibble)
 *c: Enable or disable reverse transfer (when disabled, ignore -SLIN signal).
 *1: Adjusted at factory.
 *2: Initialized after performed panel initialization of EEPROM.
 *3: Initialized after performed panel initialization of the ink overflow counter in EEPROM.

7.2 Circuit Board Component Layout

This section shows the circuit board component layout.

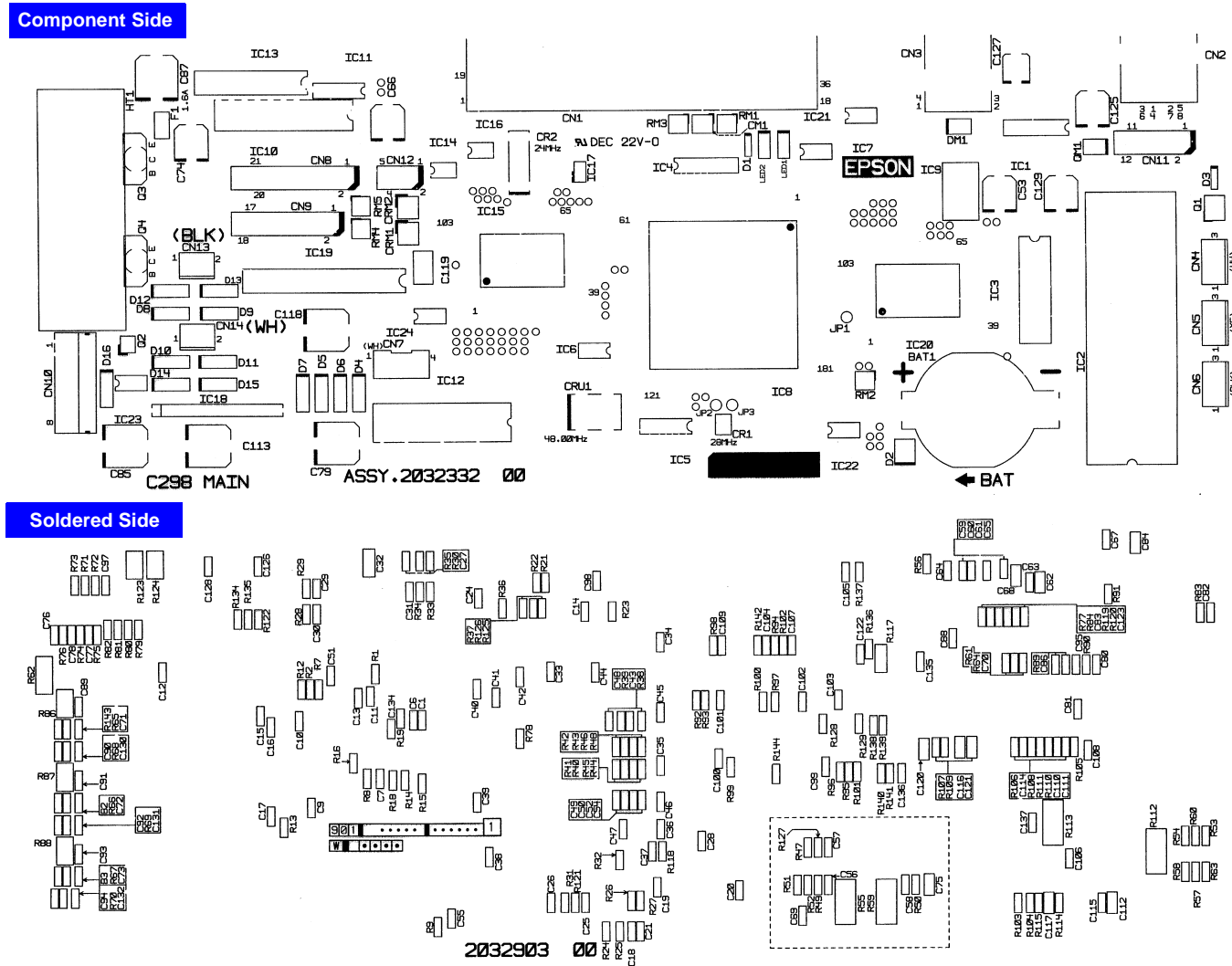


Figure 7-2. C298MAIN Component Layout

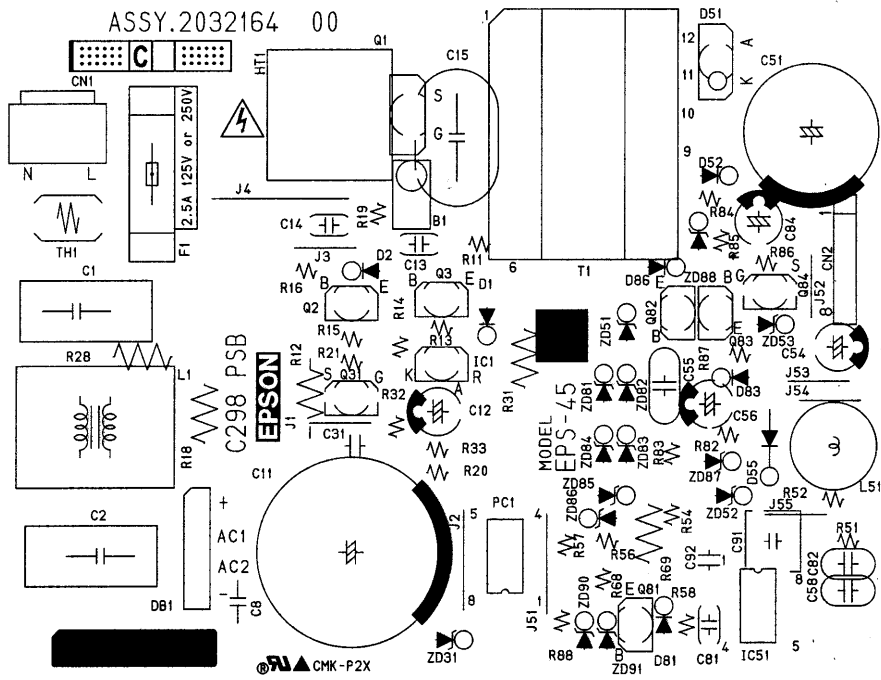


Figure 7-3. C298PSB Component Layout

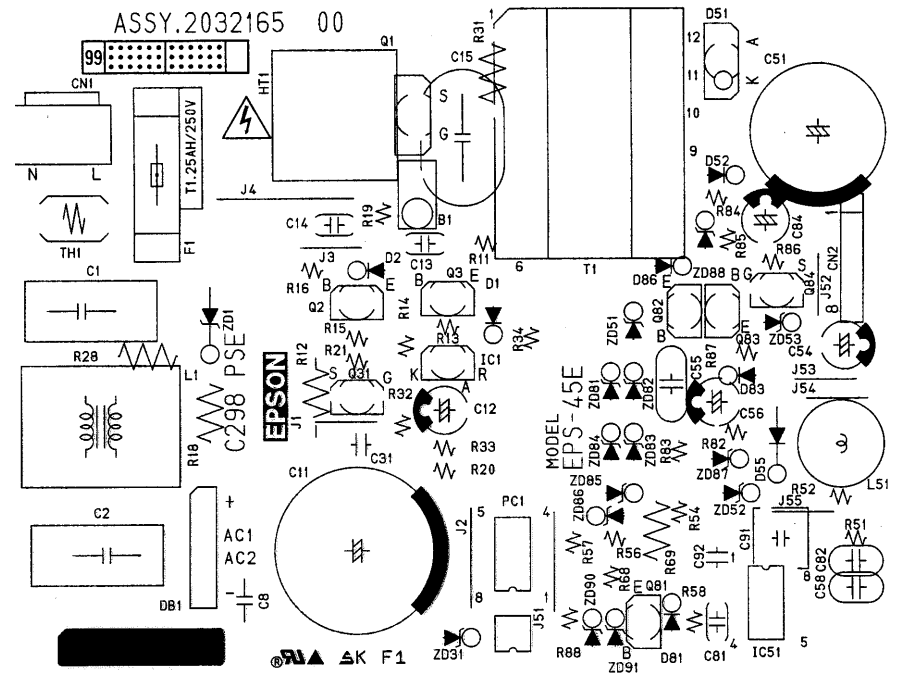


Figure 7-4. C298PSE Component Layout

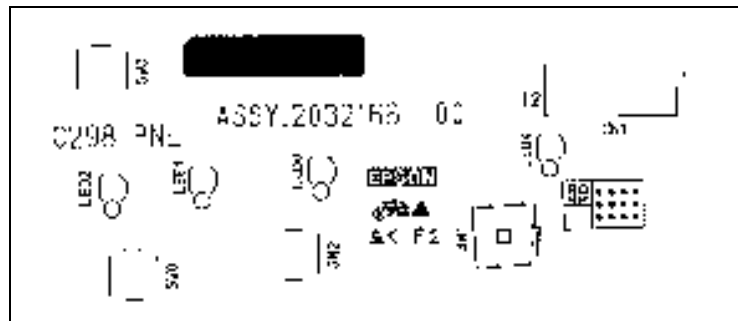
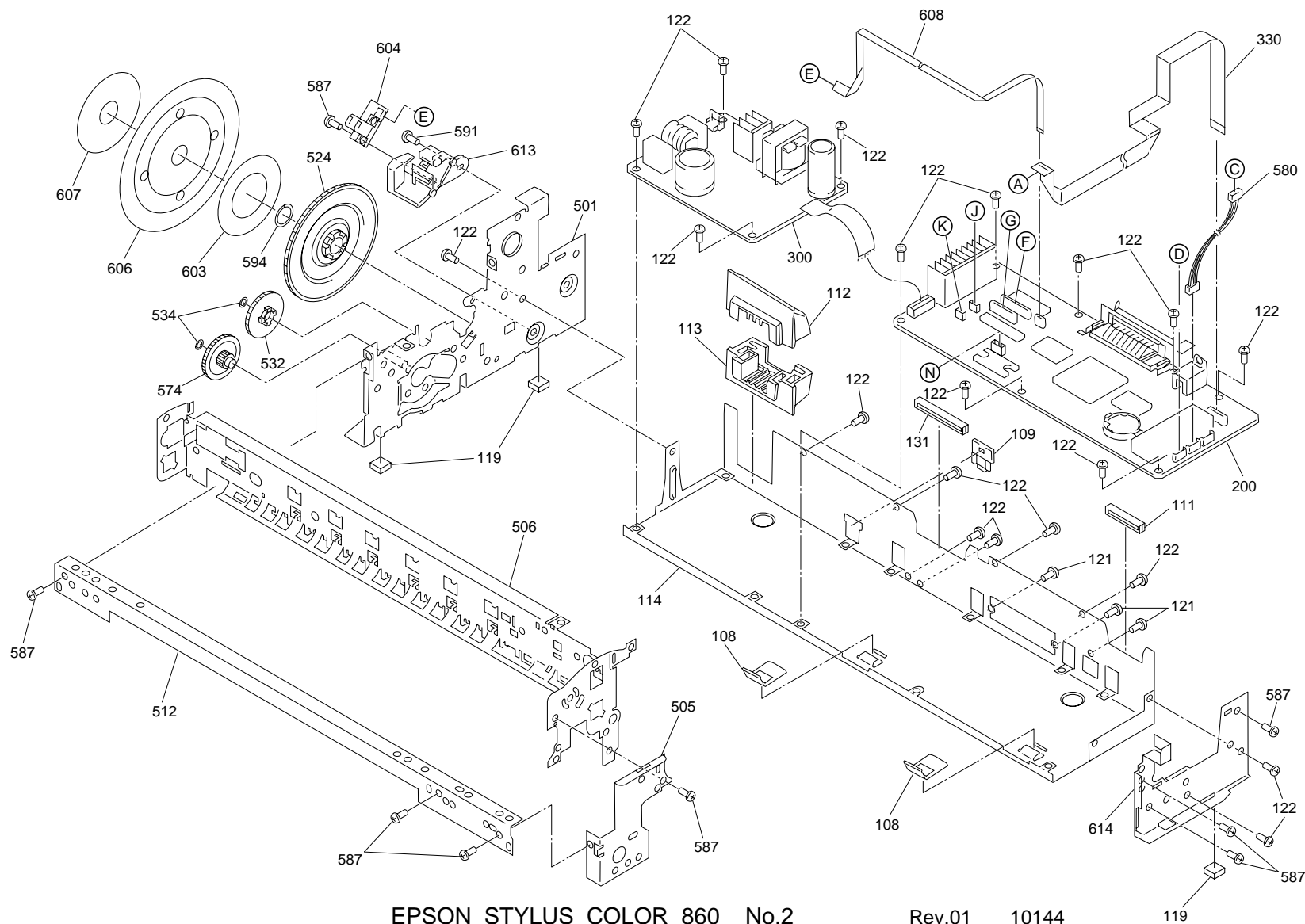
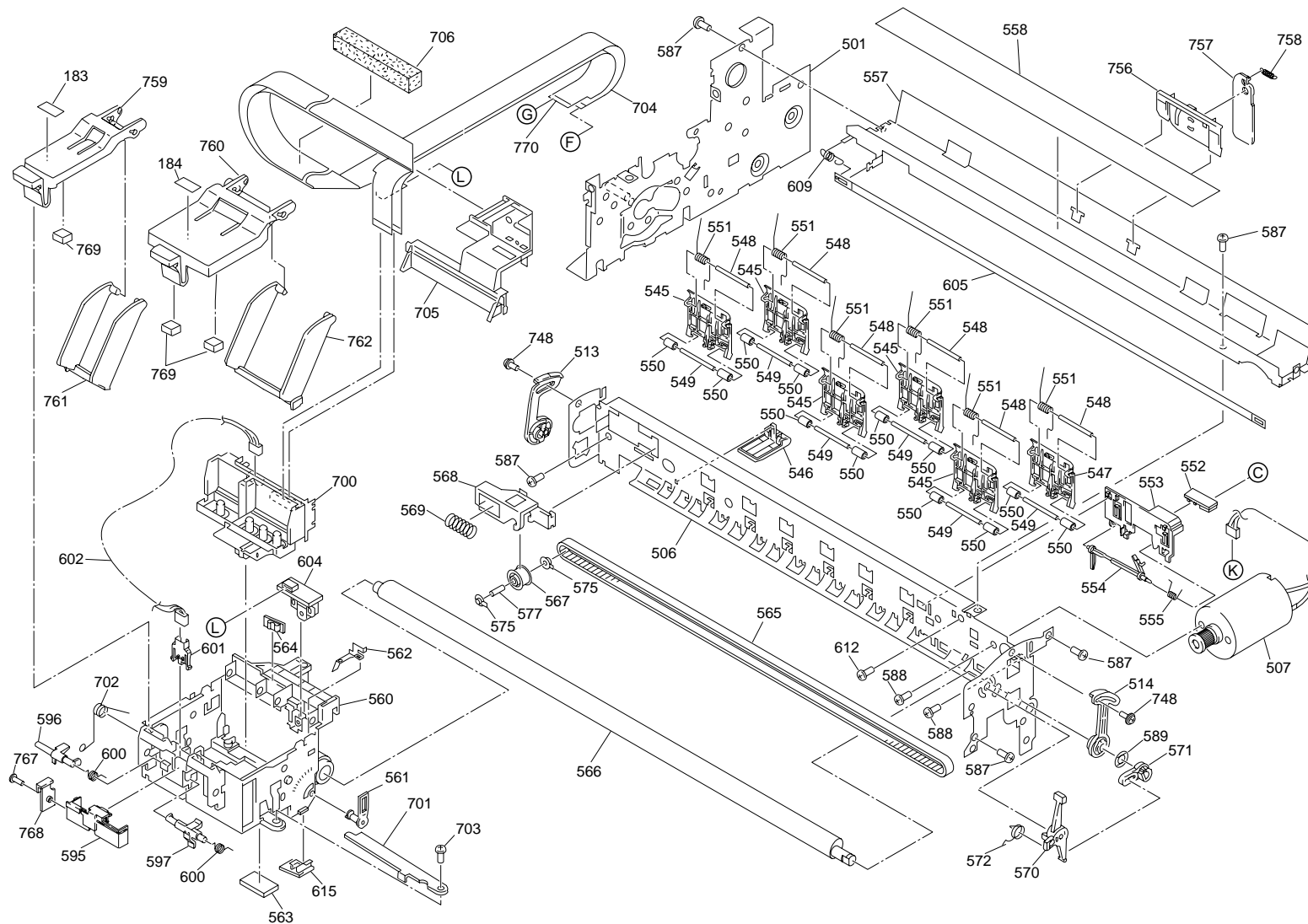
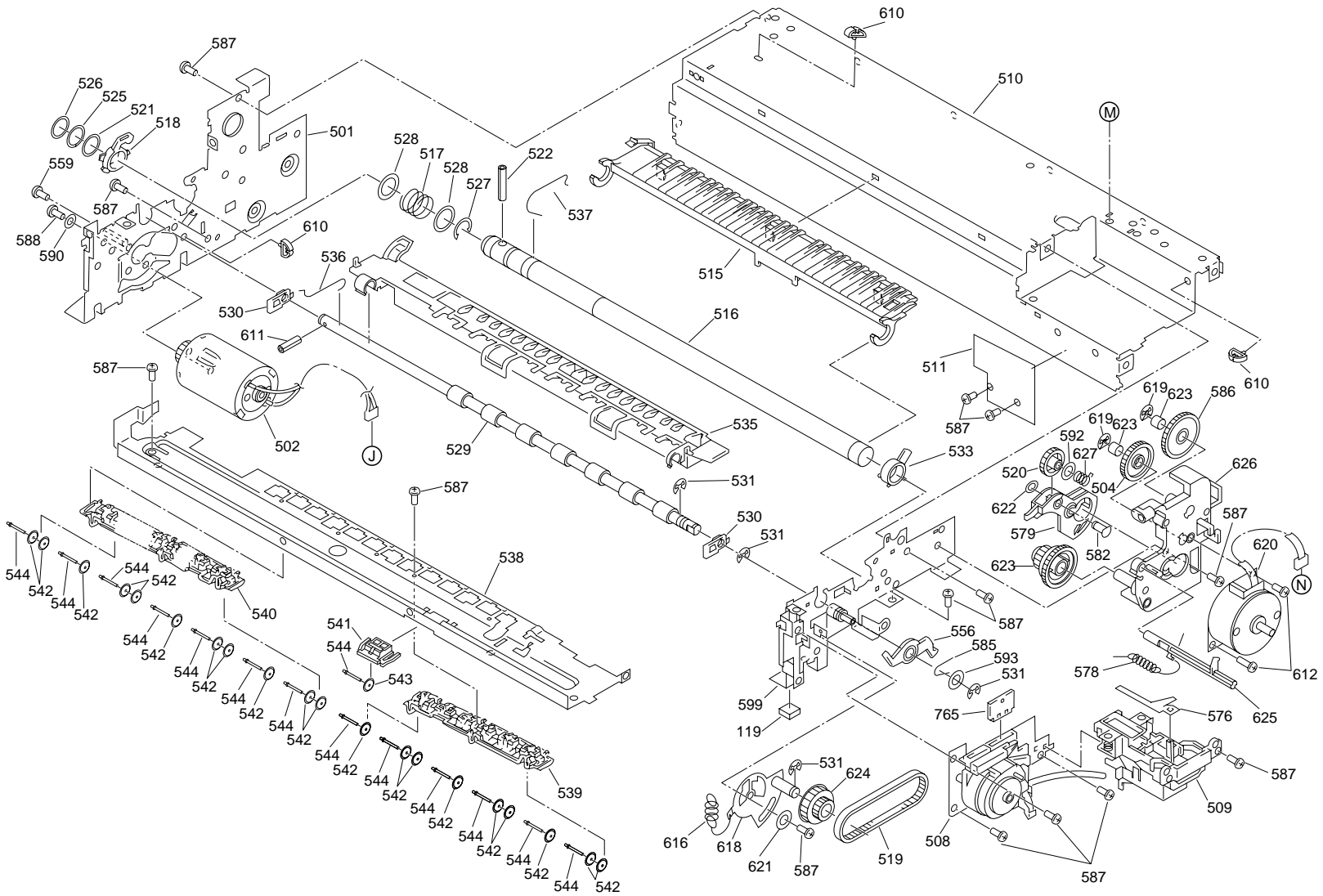


Figure 7-5. C298PNL Component Layout

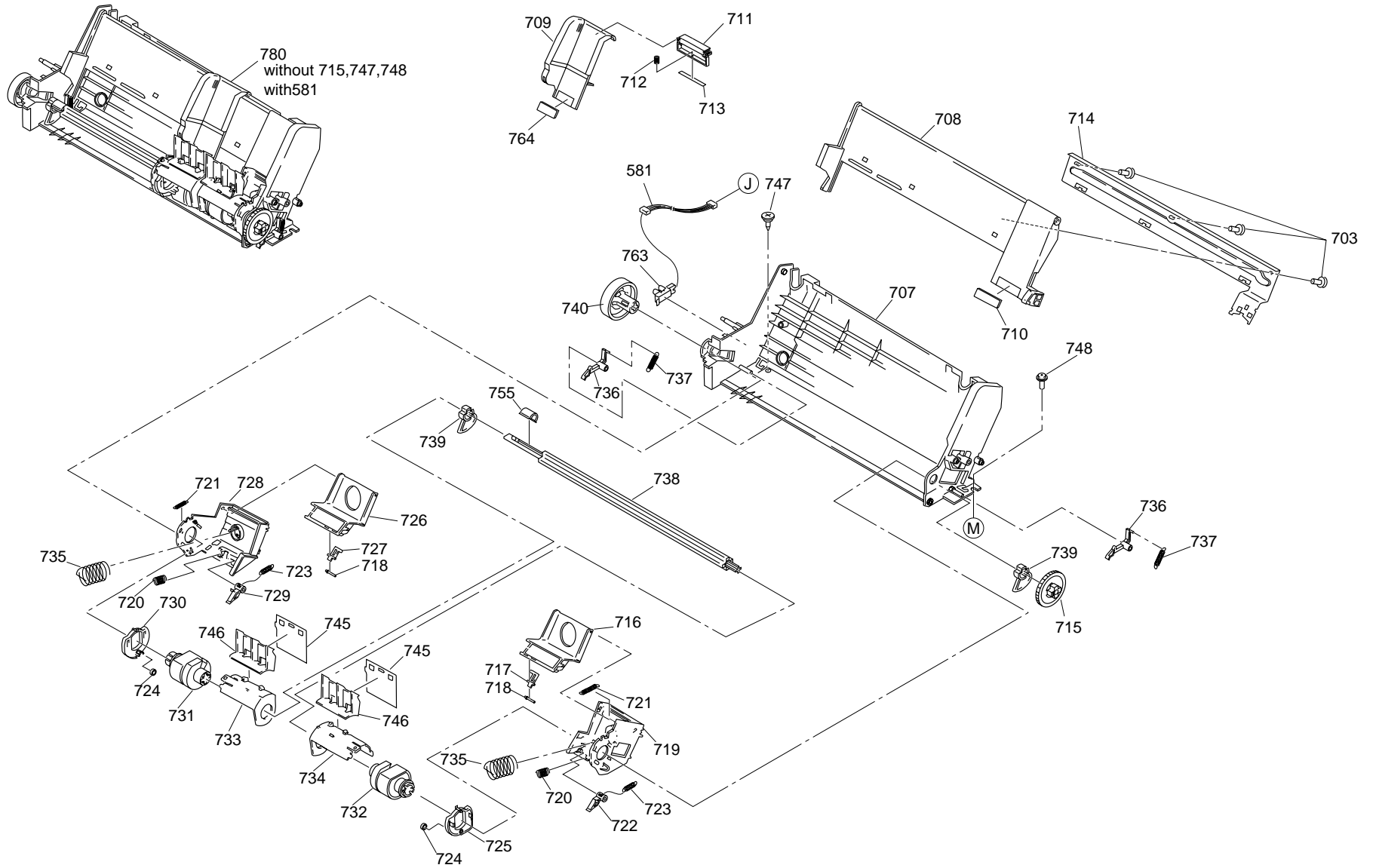




EPSON STYLUS COLOR 860 No.3 Rev.01 10144



EPSON STYLUS COLOR 860 No.4 Rev.01 10144



EPSON STYLUS COLOR 860 No.5

Rev. 01

10144

PARTS LIST

Table 7-13. Parts List - Stylus COLOR 860

Code	Parts Name	Code	Parts Name	Code	Parts Name
100	HOUSING	133	COMPRESSION SPRING, 2.94	517	COMPRESSION SPRING, 5.85
101	COVER ASSEMBLY	180	LABEL, CAUTION1	518	BUSHING, 12, LEFT
102	PAPER SUPPORT ASSEMBLY	181	LABEL, ACCESSORY	519	TENSION BELT, PUMP TRANSMISSION
103	STACKER ASSEMBLY	183	LABEL, LEVER CARTRIDGE, BLACK	520	SPUR GEAR, 15.2
104	PANEL ASSEMBLY	184	LABEL, LEVER CARTRIDGE, COLOR	521	SPACER, C-RING
105	SHIELD PLATE, PANEL	200	BOARD ASSEMBLY, MAIN	522	SCALLOP SP-AW, 2×16, F/B
106	HOUSING, PANEL, LEFT	300	BOARD ASSEMBLY, POWER SUPPLY	524	SPUR GEAR, 76
107	HOUSING, PANEL, RIGHT, SUB	330	HARNESS	525	SPACER, FIXING, ROLLER, PF
108	GROUNDING PLATE	400	POWER CABLE ASSY	526	SPACER, FIXING, ROLLER, PF;B
109	COVER, SHIELD PLATE, M/B, RIGHT	450	BOARD ASSEMBLY, PANEL	527	CRESCENT RING
111	COVER, CABLE	500	PRINTER MECHANISM (ASP)M4R10-100	528	PLAIN WASHER, 12.2×0.5×17, S/Na
112	COVER, INLET, TOP;B	501	FRAME ASSEMBLY, LEFT	529	ROLLER ASSEMBLY, PAPER EJECT
113	COVER, INLET, BOTTM;B	502	MOTOR ASSEMBLY, PF	530	BUSHING, 6
114	SHIELD PLATE, M/B	504	COMBINATION GEAR, 12, 22.4	531	E-RING, TYPE-E(4)
115	LOGO PLATE	505	RRAME, RIGHT, FRONT	532	SPUR GEAR, 28
116	HOUSING, SUB, RIGHT	506	FRAME, TOP	533	BUSHING, 12, RIGHT
117	HOUSING, SUB, LEFT	507	MOTOR ASSEMBLY, CR	534	PLAIN WASHER, 4.1×0.5×6.5
119	FOOT	508	PUMP ASSY	535	PAPER GUIDE, FRONT
121	CP SCREW, M3×6	509	CAP ASSY;B	536	GROUNDING SPRING, PAPER EJECT
122	CBS TITE SCREW, M3×6	510	FRAME, BOTTOM	537	GROUNDING SPRING, PF
123	CB(O) SCREW, 4×5, F/ZG	511	SHEET, PROTECTION, INK	538	FRAME, PAPER EJECT
124	CBS TITE SCREW, M3×10	512	FRAME, FRONT	539	HOLDER, STAR WHEEL, RIGHT
125	CBP TITE SCREW, M3×8, F/ZN	513	BUSHING, PARALLELISM, LEFT	540	HOLDER, STAR WHEEL, LEFT
126	CBP TITE SCREW, 3×10, F/Zn	514	BUSHING, PARALLELISM, RIGHT	541	HOLDER, STAR WHEEL, FRONT
131	COVER, CABLE;B	515	PAPER GUIDE, REAR	542	STAR WHEEL ASSEMBLY, 8;E
132	LOCK, STACKER	516	ROLLER, PF	543	STAR WHEEL, 8;B

Table 7-13. Parts List - Stylus COLOR 860 (continued)

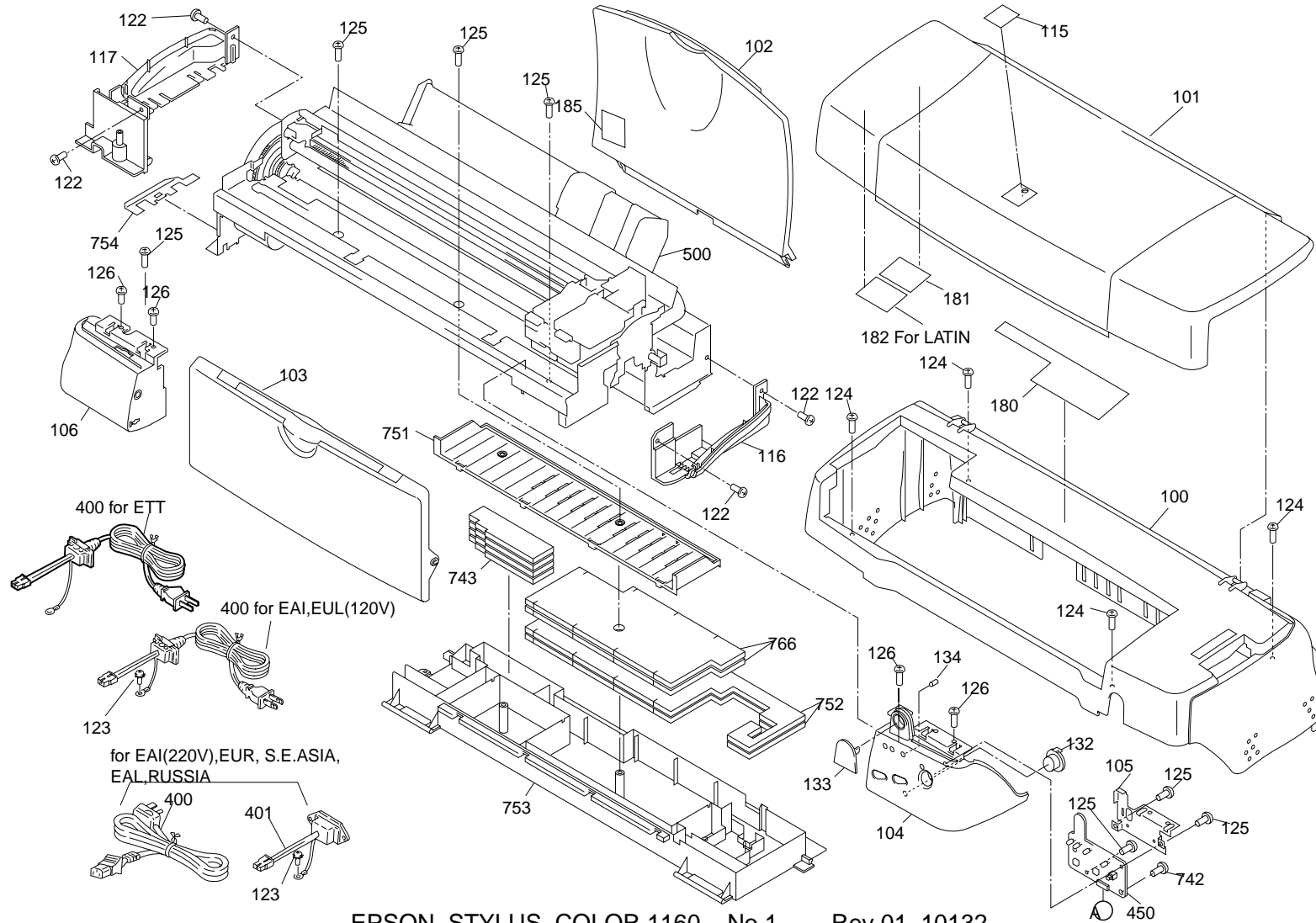
Code	Parts Name	Code	Parts Name	Code	Parts Name
544	BAR SPRING, STAR WHEEL	572	TORSION SPRING, 63.7	604	BOARD ASSEMBLY, ENCODER
545	PAPER GUIDE, UPPER;B	574	COMBINATION SPRING, 13.5, 30	605	SCALE, CR
546	PAPER GUIDE, LEFT	575	BUSHING, PULLEY, DRIVEN	606	SCALE, PF
547	PAPER GUIDE, RIGHT	576	ABSORBER, SLIDER, CAP	607	BRACKET, SCALE
548	SHAFT, PAPER GUIDE, UPPER	577	SHAFT, PULLEY, DRIVEN	608	FFC, ENCODER
549	SHAFT, ROLLER, DRIVEN	578	TENSION SPRING, 0.618	609	TENSION SPRING, 1.494
550	ROLLER, DRIVEN;D	579	LEVER, PLANETARY	610	MINI CLAMP
551	TORSION SPRING, 117.6	580	HARNESS, PE	611	SCALLOP SP-AW, 2×10, F/B
552	BOARD ASSEMBLY, PE	581	HARNESS, ASF	612	CBP TITE SCREW, M3×8, F/ZN
553	HOLDER, PE	582	SHAFT, SPUR GEAR, PLANETARY	613	BRACKET, BOARD ASSEMBLY
554	LEVER, PE	585	U-SHAPE SPRING, 5.2×0.13×10, S/NA	614	FRAME, RIGHT, REAR
555	TORSION SPRING, 0.22	586	COMBINATION SPRING, 14, 28	615	PLATE, SLIDE, CLEANER
556	LEVER, CR, LOCK	587	CBS TITE SCREW, M3×6	616	TENSION SPRING, 7.37
557	GUIDE PLATE, CR	588	CP SCREW, M3×6	618	LEVER ASSEMBLY, COMBINATION GEAR
558	SHEET, CABLE	589	LEAF SPRING, 6.2×0.15×11	619	RETAINING RING, D8.8
559	SCREW, MOUNTING, PF	590	PLAIN WASHER, 3.3×0.5×8, F/Uc	620	MOTOR ASSEMBLY, ASF
560	CARRIAGE ASSEMBLY;B	591	CBP TITE SCREW, 2.5×5, F/Zn	621	PLAIN WASHER, 3.1×0.5×12, F/ZN
561	LEVER, ADJUST	592	PLAIN WASHER, 6.2×0.2×9, L/NA	622	E-RING, TYPE-E(3)
562	EARTH PLATE, CR	593	PLAIN WASHER, 5.1×0.7×11, S/NA	623	COMBINATION GEAR, 17.19, 25.6
563	OIL PAD	594	PLAIN WASHER, 10.7×0.5×15.5, L/NA	623	FELT, D3.6
564	SLIDER, CR	595	HOLDER, DETECTOR, I/C	624	COMBINATION GEAR, 12, 22.92
565	TIMING BELT	596	LEVER, DETECTOR, I/C, BK	625	LEVER, DE, LOCK
566	SHAFT, CR, GUIDE	597	LEVER, DETECTOR, I/C, CL	626	BRACKET, MOTOR, ASF
567	PULLEY, DRIVEN	599	FRAME, MIDDLE	627	COMPRESSION SPRING, 3.944
568	HOLDER, PULLEY, DRIVEN	600	TORSION SPRING, 1.08	700	PRINTHEAD, IJ288-0C0
569	COMPRESSION SPRING, 23.52	601	DETECTOR, I/C	701	FASTENER, HEAD
570	LEVER, PG	602	HARNESS, I/C	702	TORSION SPRING, 49
571	LEVER, PG, SUPPORT	603	TAPE, D50	703	CBP TITE SCREW, 3×6, F/Zn

Table 7-13. Parts List - Stylus COLOR 860 (continued)

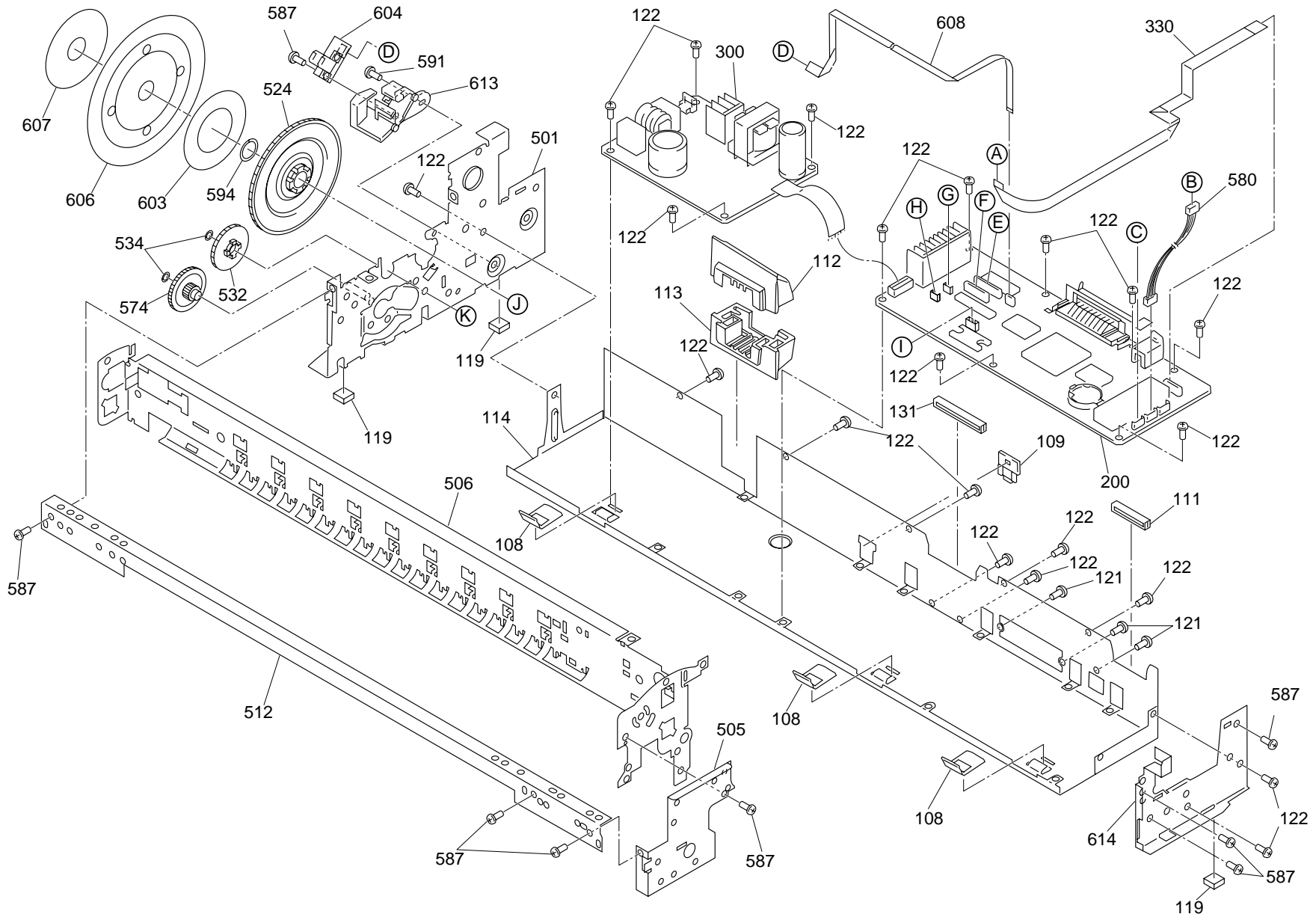
Code	Parts Name	Code	Parts Name	Code	Parts Name
704	CABLE, HEAD, A	732	ROLLER ASSEMBLY, LD, RIGHT	766	ABSORBER, WASTE INK, SMALL
705	HOLDER, CABLE	733	COVER, ROLLER, LD, LEFT	767	CPB TITE(O), 1.7×5, F/Zn
706	SPACER, CABALHEAD	734	COVER, ROLLER, LD, RIGHT	768	BUSHING, HOLDER, DETECTOR, I/C
707	FRAME, ASF;B	735	COMPRESSION SPRING, 1.961	769	SPACER, COVER CARTRIDGE
708	HOPPER	736	LEVER, FIXING, EDGE GUIDE;B	770	CABLE, HEAD, B
709	EDGE GUIDE	737	TENSION SPRING, 0.088	780	ASF UNIT;B
710	CORK	738	SHAFT, ROLLER, LD		
711	SLIDER, EDGE GUIDE	739	LEVER, HOPPER, RELEASE		
712	COMPRESSION SPRING, 3.23	740	WHEEL, DETECTOR		
713	PAD, BRAKE, EDGE GUIDE	745	SHEET, PAPER FEED		
714	REINFORCING PLATE, HOPPER	746	HOLDER, SHEET, PAPER FEED		
715	SPUR GEAR, 32	747	SHAFT, MOUNTING, CR		
716	PAD ASSEMBLY, RIGHT	748	CBS TITE (P4), 3×6, F/Zn		
717	LEVER, PAD, RELEASE, RIGHT	751	PAPER GUIDE, LOWER		
718	BAR SPRING, HOLDER, PAD	752	ABSORBER, WASTE INK, LARGE		
719	HOLDER, EDGE GUIDE, RIGHT	753	TRAY, ABSORBER		
720	COMPRESSION SPRING, 1.17	754	SPACER, TRAY		
721	TENSION SPRING, 0.62	755	BUSHING, FIXING, SHAFT, LEFT		
722	LEVER, PAPER RETURN, RIGHT	756	PAPER SUPPORT, SUB, UPPER		
723	TENSION SPRING, 0.294	757	HOLDER, PAPER SUPPORT, SUB, UPPER		
724	ROLLER, LD, SUB	758	TENSION SPRING, 0.29		
725	HOLDER, ROLLER, LD, SUB, RIGHT	759	COVER, CARTRIDGE, BK		
726	PAD ASSEMBLY, LEFT	760	COVER, CARTRIDGE, C		
727	LEVER, PAD, RELEASE, LEFT	761	SEPARATOR, CARTRIDGE, BK		
728	HOLDER, EDGE GUIDE, LEFT	762	SEPARATOR, CARTRIDGE, C		
729	LEVER, PAPER RETURN, LEFT	763	DETECTOR, HP;E		
730	HOLDER, ROLLER, LD, SUB, LEFT	764	CORK;B		
731	ROLLER ASSEMBLY, LD, LEFT	765	CLEANER HEAD, ASP		

7.4 Exploded Diagrams and Parts List for Stylus COLOR 1160

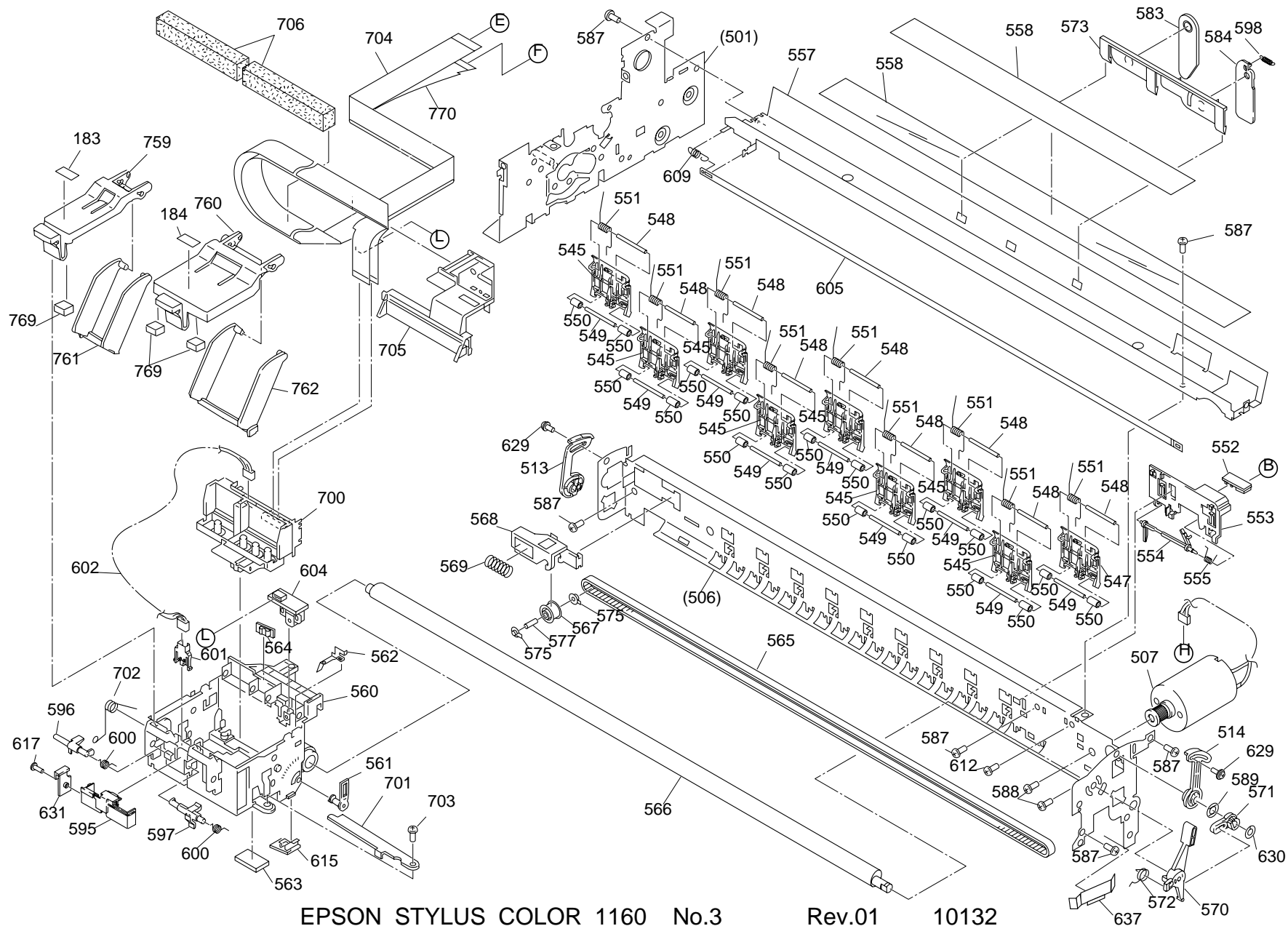
EXPLODED DIAGRAMS

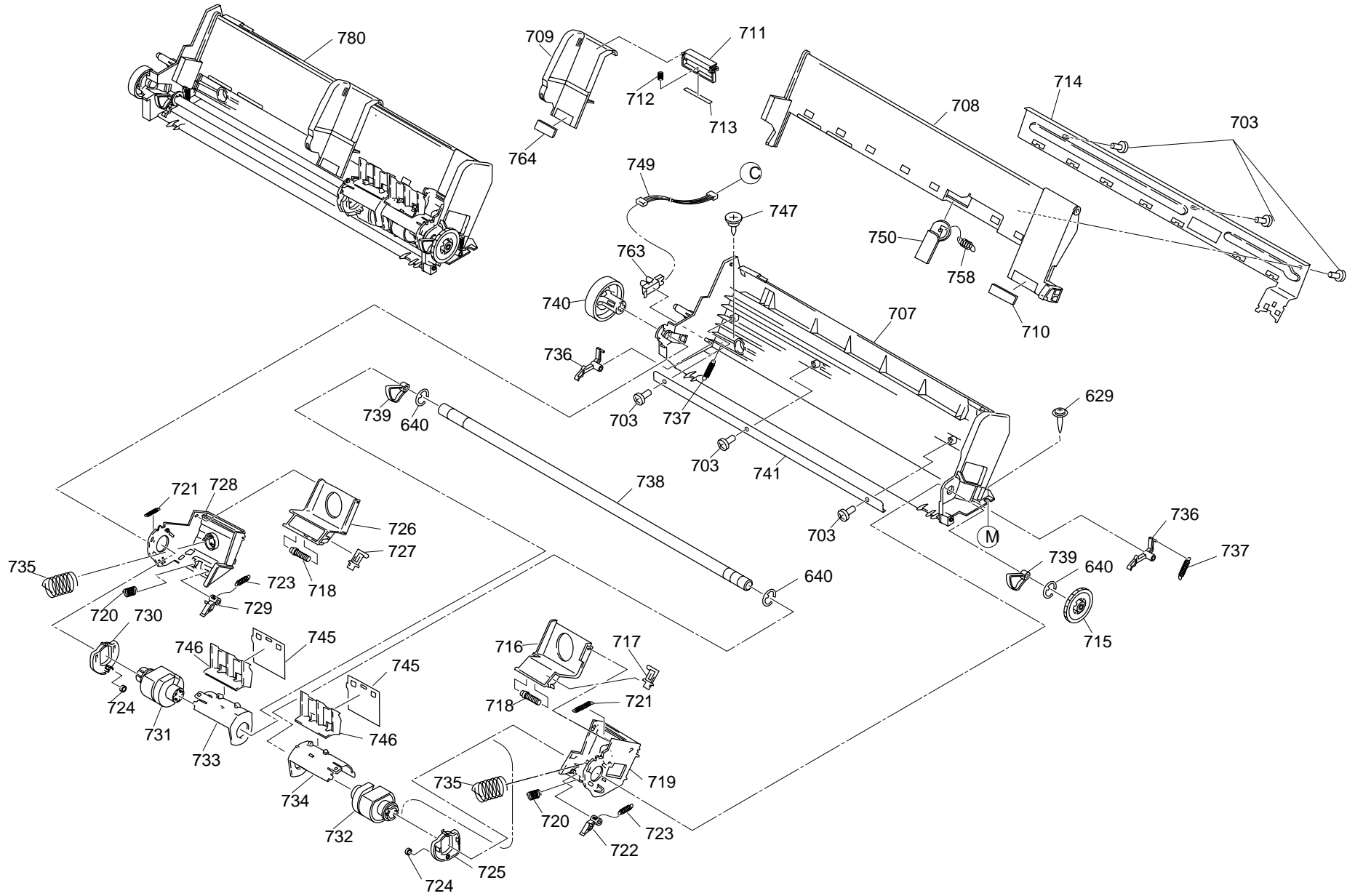


EPSON STYLUS COLOR 1160 No.1 Rev.01 10132

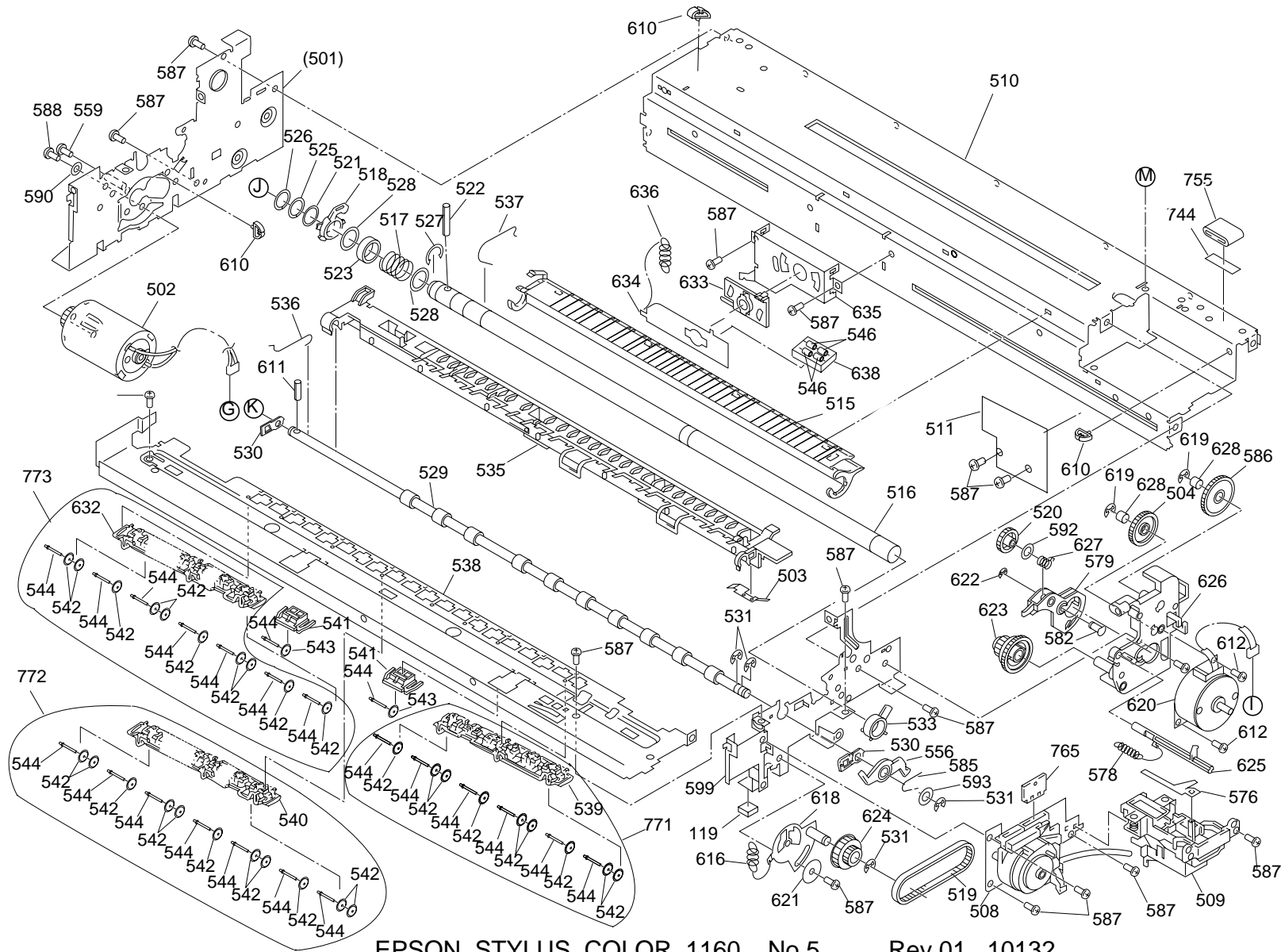


EPSON STYLUS COLOR 1160 No.2 Rev.01 10132





EPSON STYLUS COLOR 1160 No.4 Rev.01 10132



EPSON STYLUS COLOR 1160 No.5 Rev.01 10132

PARTS LIST

Table 7-14. Parts List for Stylus COLOR 1160

Code	Parts Name	Code	Parts Name	Code	Parts Name
100	HOUSING	131	COVER,CABLE;B	509	CAP ASSY.;B
101	COVER,PRINTER	132	BUTTON,PS	510	FRAME,LOWER
102	PAPER SUPPOT,ASSY	133	CAP,BUTTON,CSIC	511	SHEET,PROTECTION,INK
103	STACKER,ASSY.	134	TUBE,LENS	512	FRAME,FRONT
104	PANEL,ASSY.	180	LABEL,CAUTION 1	513	BUSHING,PARALLELISM ADJUST,LEFT
105	SHIELD PLATE,PANEL	181	LABEL,ACCESSORY	514	BUSHING,PARALLELISM ADJUST,RIGHT
106	PANEL ASSY.,LEFT	183	LABEL,LEVER CARTRIDGE,BLACK	515	PAPER GUIDE,REAR
108	GROUNDING PLATE	184	LABEL,LEVER CARTRIDGE,COLOR	516	ROLLER,PF
109	COVER,SHIELD PLATE,M/B,RIGHT	185	LABEL,PAPER SET;B	517	COMPRESSION SPRING,5.86
111	COVER,CABLE	200	BOARD ASSY.,MAIN	518	BUSHING,12,LEFT
112	COVER,INLET,UPPER;B	300	BOARD ASSY.,POWER SUPPLY	519	TENSION BELT,PUMP TRANSMISSION
113	COVER,INLET,LOWER;B	330	WIRE HARNESS	520	SPUR GEAR,15.2
114	SHIELD PLATE,M/B	400	POWER CABLE ASSY.	521	SPACER,C-RING
115	LOGO PLATE	450	BOARD ASSY.,PANEL	522	SCALLOP SPRING PIN-AW,2X16,F/B
116	HOUSING,SUPPORT,RIGHT	500	PRINTER MECHANISM(ASP),M4R60-100	523	SLEEVE,ROLOR,PF
117	HOUSING,SUPPORT,LEFT	501	FRAME ASSY.,LEFT	524	SPUR GEAR,76
119	FOOT	502	MOTOR ASSY.,PF	525	SPACER,FASTEN,ROLLER,PF
121	C.P.SCREW	503	GROUNDING PLATE,PAPER GUIDE,FRONT	526	SPACER,FASTEN,ROLLER,PF;B
122	C.B.S. SCREW	504	COMBINATION GEAR,12,22.4	527	C-RING
123	C.B.(O) SCREW,4X5,F/ZG	505	FRAME,RIGHT,FRONT	528	PLANE WASHER,12.2X0.5X17
124	C.B.S. SCREW	506	FRAME,UPPER	529	ROLLER ASSY.,EJECT OUT
125	C.B.P-TITE SCREW,3X8,F/ZN	507	MOTOR ASSY.,CR	530	BUSHING,6
126	C.B.S. SCREW	508	PUMP ASSY.	531	RETAINING RING

Table 7-14. Parts List for Stylus COLOR 1160 (continued)

Code	Parts Name	Code	Parts Name	Code	Parts Name
532	SPUR GEAR,28	557	GUIDE PLATE,CR	583	PAPER SUPPORT,SUPPORT,UPPER,LEFT
533	BUSHING,12,RIGHT	558	SHEET,CABLE	584	PAPER SUPPORT,SUPPORT,UPPER
534	PLANE WASHER,4.1X0.5X6.5	559	SCREW,MOUNT,PF	585	U-TYPE SPRING,5.2X0.13X10,S/NA
535	PAPER GUIDE ASSY.,FRONT	560	CARRIAGE ASSY.	586	COMBINATION GEAR,14,28
536	GROUNDING WIRE,EJ	561	LEVER,ADJUST	587	C.B.S. SCREW
537	GROUNDING SPRING,PF	562	GROUDING PLATE,HEAD	588	C.P.SCREW
538	FRAME,PAPER EJECT	563	OIL PAD	589	LEAF SPRING
539	HOLDER,STAR WHEEL,RIGHT	564	SLIDER,CR	590	PLAIN WASHER,3.3X0.5X8,F/UC
540	HOLDER,STAR WHEEL,LEFT	565	TIMING BELT	591	C.B.P-TITE,2.5X5,F/ZN
541	HOLDER,STARWHEEL,FRONT	566	SHAFT,CR,GUIDE	592	PLAIN WASHER,6.2*0.2*9,L/NA
542	STARWHEEL ASSY.,8;E	567	PULLEY,DRIVEN	593	PLAIN WASHER,5.1X0.7X11,S/NA
543	STARHWEEL,8;B	568	HOLDER,PULLEY,DRIVEN	594	PLAIN WASHER,10.7X0.5X15.5,L/NA
544	ROD SPRING,STAR WHEEL	569	COMPRESSION SPRING,23.52	595	HOLDER, DETECTOR,I/C
545	PAPER GUIDE,UPPER	570	LEVER,PG	596	LEVER,DETECTOR,I/C,BK
546	ROLLER,DRIVEN	571	LEVER,PG,SUPPORT	597	LEVER,DETECTOR,I/C,CL
547	PAPER GUIDE,RIGHT	572	TORSION SPRING,63.7	598	EXTENSION SPRING,0.29
548	SHAFT,PAPER GUIDE,UPPER	573	HOLDER,PAPER SUPPORT,SUPPORT,UPPER	599	FRAME,MIDDLE
549	SHAFT,ROLLER,DRIVEN	574	COMBINATION GEAR,13.5,30	600	TORSION SPRING,1.08
550	ROLLER,DRIVEN;D	575	BUSHING,PULLEY,DRIVEN	601	DETECTOR,I/C
551	TORSION SPRING,117.6	576	POROUS PAD,SLIDER,CAP	602	HARNESS,I/C
552	CIRCUIT ASSY,PE	577	SHAFT,PULLEY,DRIVEN	603	TAPE,D50
553	HOLDER,PE	578	EXTENSION SPRING,0.618	604	BOARD ASSY.,ENCODER
554	LEVER,PE	579	LEVER,PLANET	605	SCALE,CR
555	TORSION SPRING,0.22	580	HARNESS,PE	606	SCALE,PF
556	LEVER,CR,LOCK	582	SHAFT,SPUR GEAR,PLANET	607	MOUNTING PLATE,SCALE

Table 7-14. Parts List for Stylus COLOR 1160 (continued)

Code	Parts Name	Code	Parts Name	Code	Parts Name
608	FFC,ENCODER	632	HOLDER,STAR WHEEL,SUPPORT	716	PAD ASSY.,RIGHT
609	EXTENSION SPRING,1.494	633	BUSHU,ROLLER PF,SUPPORT	717	LEVER,PAD,RELEASE,RIGHT
610	MINI CRAMP,UAMS-05SN	634	LEVER,ROLLER PF,SUPPORT	718	ROD SPRING,HOLDER,PAD
611	SCALLOP SPRING PIN-AW,2X10,F/B	635	MOUNTIN PLATE,LEVER,ROLLER PF,SUPPORT	719	HOLDER,EDGEGUIDE,RIGHT
612	C.B.P-TITE SCREW,3X8,F/ZN	636	EXTENSION SPRING,10.1	720	COMPRESSION SPRING,1.17
613	MOUNTING PLATE,BOARD ASSY.	637	SHEET,INK STOPPER	721	EXTENSION SPRING,0.62
614	FRAME,RIGHT,REAR	638	HOLDER,ROLLER PF,SUPPORT	722	LEVER,PAPERRETURN,RIGHT
615	PLATE,SLIDE,CLEANER	639	SPACER MOTOR PF	723	EXTENSION SPRING,0.294
616	EXTENSION SPRING,7.37	640	RETAINING RING	724	ROLLER,LD,SUPPORT
617	C.P.B.(O) SCREW,1.7X5,F/ZN	700	PRINT HEAD,IJ288-0C0	725	HOLDER,ROLLER,LD,SUPPORT,RIGHT
618	LEVER ASSEMBLY,COMBINATION GEAR	701	FASTENER,HEAD	726	PAD ASSY.,LEFT
619	SET RING,D8.8	702	TORSION SPRING,49	727	LEVER,PAD,RELEASE,LEFT
620	MOTOR ASSY,ASF	703	C.B.P-TITE SCREW,3X6,F/ZN	728	HOLDER,EDGEGUIDE,LEFT
621	P.W.,3.1X0.5X12,F/ZN	704	CABLE,HEAD,A	729	LEVER,PAPERRETURN,LEFT
622	RETAINING RING	705	HOLDER,CABLE	730	HOLDER,ROLLER,LD,SUPPORT,LEFT
623	COMBINATION GEAR,17.19,25.6	706	SPACER,CABLE HEAD	731	ROLLER ASSY,LD,LEFT
624	COMBINATION GEAR,12,22.92	707	FRAME,ASF	732	ROLLER ASSY,LD,RIGHT
625	LEVER,DE,LOCK	708	HOPPER;B	733	COVER,ROLLER,LD,LEFT
626	MOUNTING PLATE,MOTOR,ASF	709	EDGEGUIDE	734	COVER,ROLLER,LD,RIGHT
627	COMPRESSION SPRIN,3.944	710	CORK	735	COMPRESSION SPRING,1.961
628	FERUTO,D3.6	711	SLIDER,EDGEGUIDE	736	LEVER,FASTEN,EDGEGUIDE;B
629	C.P.S-TITE(P4),3X6,F/ZN	712	COMPRESSION SPRING,3.23	737	EXTENSION SPRING,0.088
630	PLANE WASHER,4.5X0.5X8,L/NA	713	PAD,BREAK,EDGE GUIDE	738	SHAFT,ROLLER,LD
631	BUSHING,HOLDER,DETECTOR,I/C	714	SUPPORT PLATE,HOPPER	739	LEVER,HOPPER,RELEASE

Table 7-14. Parts List for Stylus COLOR 1160 (continued)

Code	Parts Name	Code	Parts Name	Code	Parts Name
741	STRENGTHEN PLATE,FRAME,ASF	770	CABLE,HEAD,B		
742	C.C.P-TITE SCREW,3X8,F/ZN	771	HOLDER ASSY.,STAR WHEEL,RIGHT,ASP		
743	POLUS PAD,FL	772	HOLDER ASSY.,STAR WHEEL,LEFT,ASP		
744	TAPE,14X17	773	HOLDER ASSY,STAR WHEEL,SUPPORT(ASP)		
745	SHEET,PAPERFEED				
746	HOLDER,SHEET,PAPERFEED				
747	SHAFT,MOUNT,CR				
748	C.P.S-TITE(P4),3X6,F/ZN				
749	HARNESS,ASF				
750	PAPER SUPPORT,HOPPER				
751	PAPER GUIDE,LOWER				
752	POLUS PAD,LARGE				
753	TRAY,POROUS PAD				
754	SPACER,TRAY				
755	FERRITE CORE,FSOC240RX01				
758	EXTENSION SPRING,0.29				
759	COVER,CARTRIDGE,BK				
760	COVER,CARTRIDGE,C				
761	SEPARATOR,CARTRIDGE,BK				
762	SEPARATOR,CARTRIDGE,C				
763	DETECTOR,HP				
764	CORK;B				
765	CLEANER HEAD,ASP				
766	POLUS PAD,SMALL				
769	SPACER,COVERCATRIDGE				

7.5 Circuit Diagram

This section contains the following circuit diagrams:

- C298PNL Board
- C304PNL Board
- C298PSB Board
- C298PSE Board
- C298MAIN Board