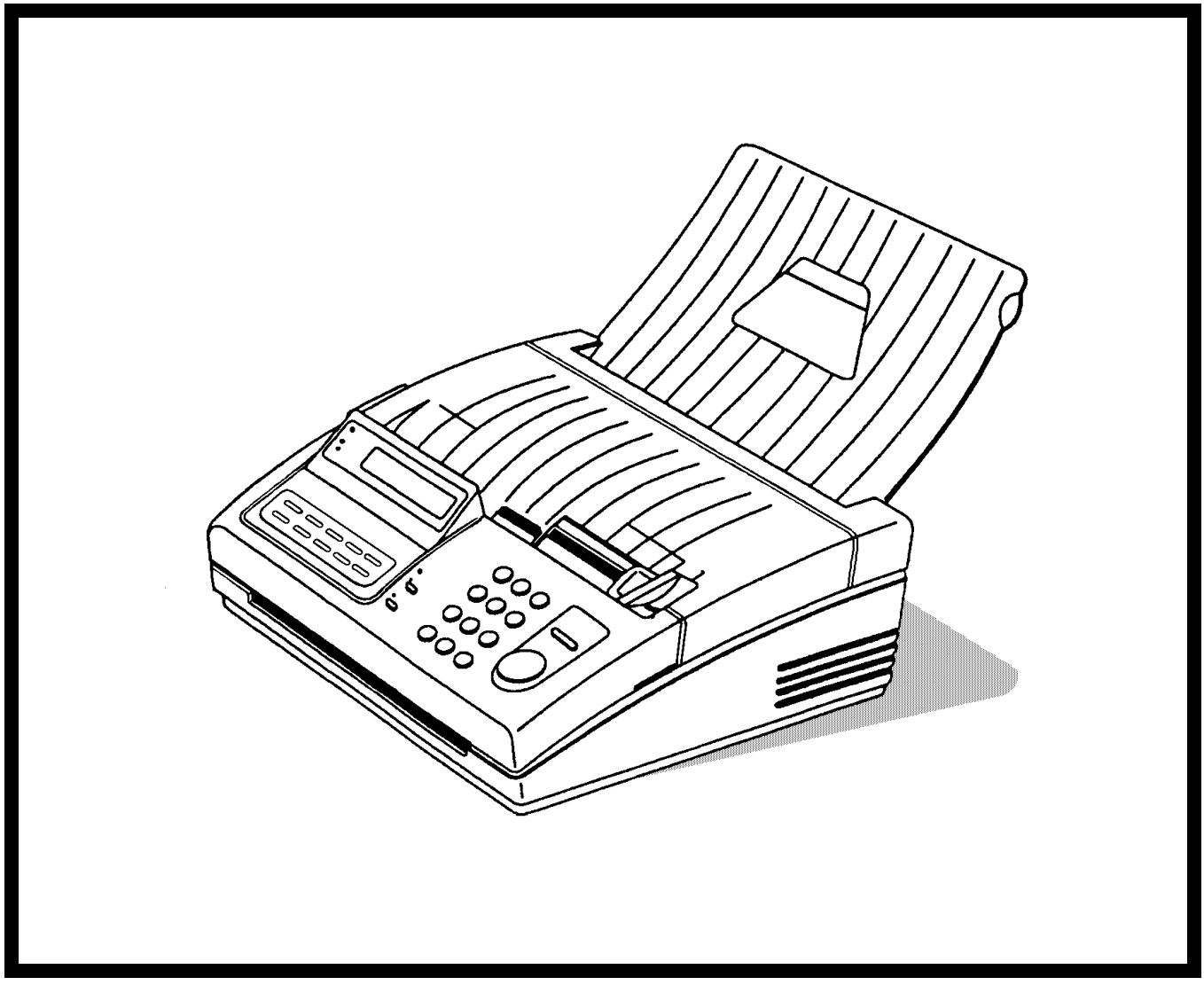
RICOH

α *Inn Fax*
(Alpha II)

SERVICE MANUAL



1. INTRODUCTION

1. 1. General Specifications

Item	Specification
Type	Desktop transceiver
Telephone Circuit	PSTN/PBX/α-LINK
Document Size	Width:148 - 218 mm Length: 105 - 600 mm Thickness: 0.05 - 0.15 mm
Scanning Method	Flat bed, CCD
Scanning Width	216 ± 1 mm
Effective Printing Width	210 mm (minimum)
Scan Resolution	Standard: 8 x 3.85 dots/mm Detail:8 x 7.7 dots/mm
Transmission Time	15s(Measured using a CCITT #1 test chart, Slerexe Letter, at 9,600 bps, MH coding with EFC, 10 ms/line I/O rate, standard resolution)
Data Compression Method	MH, EFC, SSC
SAF Memory Capacity	None
Modulation Method	V29, V27ter, V21
Transmission Data Rate	9600/7200/4800/2400 bps (Automatic fallback)
Protocol	ITUT T.30 standard (NET 30)
Printing Method	Thermal printing
Printer Paper Size	216 mm x 50 m roll
Dimensions	280 x 454 x 203 mm
Weight	4.3 kg
Input Voltage	North America: 120Vac, 50/60Hz Other Area: 220-240 Vac, 50 Hz
Recommended Operating Environment	Temperature: 17 - 28 °C Humidity: 30 - 85 %RH

1. 2. Features LIst

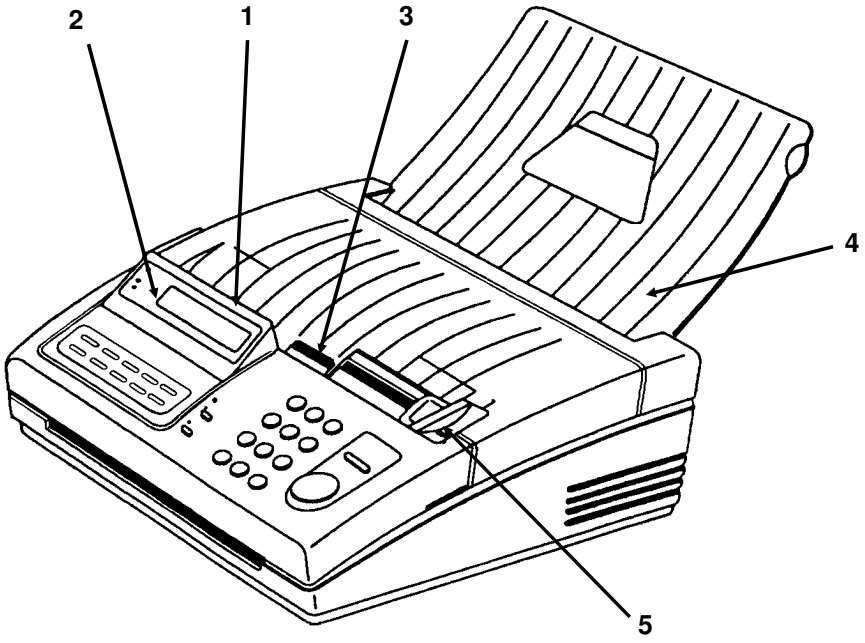
Features	α Inn Fax	
	Alpha	**Alpha II**
Transmission		
Automatic transmission	no	no
Manual transmission	yes	yes
ADF capacity	5	5
Automatic Contrast Control	yes	yes
Polling transmission	no	no
Send later	no	no
Dial via dialpad	yes	yes
Quick dial (one touch)	no	10
Speed dial (two touch)	no	no
Automatic redial	no	no
Manual redial	no	no
Label programming for Quick/Speed dials	no	yes
Page indicator CSI + P.1	yes	yes
Page indicator TTI + P.1 or P.1/10	yes	yes
Automatic page retransmission in normal tx mode	no	no
Reception		
Automatic reception	yes	yes
Manual reception	yes	yes
Polled reception	no	no
Automatic cutter	yes	yes
Manual cutter	no	no
Authorized reception (with TSI)	no	no
Decurler	yes	yes
Printing of the TSI on received copies (Germany)	no	no
Communication		
TTI (page header with name)	yes	yes
RTI (own phone number or text)	no	no
CSI (own phone number)	no	yes
Counters (user function)	no	no
Voice request	no	no
PD/DTMF change by switch	no	no
Modified read (MR)	no	no
ECM with MMR compression	no	no
Compatibility		
ITUT group 3	yes	yes
Copy quality		
Halftone (16 level) with image/text separation	yes	yes
Auto shading	yes	yes
MTF	yes	yes
8 x 7.7 lines/mm	yes	yes
Automatic contrast (threshold) control	yes	yes
Reports *Duration of - transmission not printed on the report for the alpha II.		
TCR	yes	yes
Transmission report (* See above)	yes	yes
Quick dial list	no	no
Speed dial list	no	no

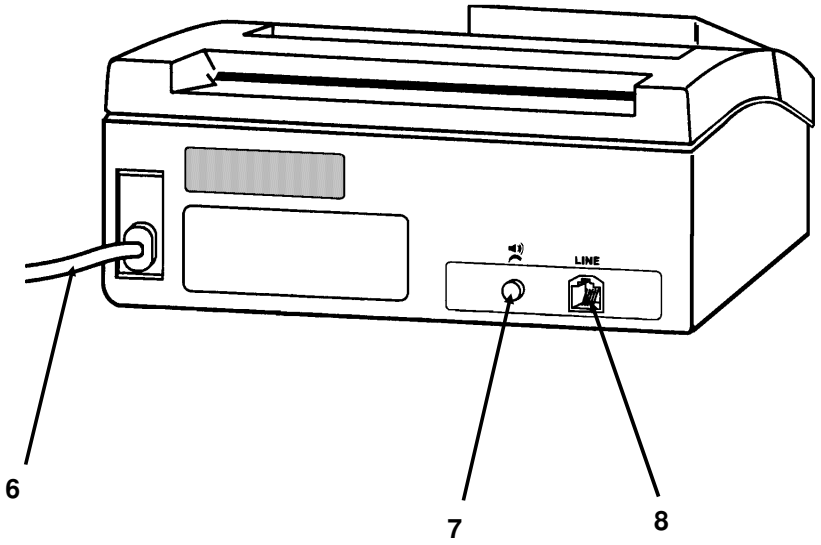
Features	α Inn Fax	
Group dial list	no	no
Error report	yes	yes
Rejected Call Report in Authorized Reception	no	no
Stored document list	no	no
Power failure report	no	no
SAF features (9 pages memory)		
SAF capacity in kbytes	no	no
Memory transmission	no	no
Serial broadcasting	no	no
Substitute reception	no	no
Forwarding (1 number)	no	no
File confirmation/clearance	no	no
Automatic page retransmission in memory tx	no	no
Remaining memory indication on LCD (during scanning)	no	no
Group dial	no	no
Telephone features ** No speaker sound generated at reception even though communication error occurs for the alpha II model.		
Built-in handset	no	no
On-hook dial	yes	yes
Monitor speaker	yes	yes
Music on hold	no	no
Speakerphone	no	no
AI Redial (last 5 numbers)	no	no
12 key dialpad	yes	yes
Volume control for speaker (** See above)	yes	yes
Volume control for ringer	no	no
Power down function (Ring, Dial, Speech)	no	no
FAX/PHONE switch		
Auto receive/manual receive switch	no	no
Auto answer delay time adjustment	no	no
Automatic fax/tel switch	no	no
Speech generation (AVM)	no	no
Interfaces		
Telephone answering machine (TAM) interface	no	no
PC interface	no	no
Others		
Copy mode (normal, detail, fine, halftone)	yes	yes(Exc Fine)
Time indicator	yes	no
Clock adjustment	yes	yes
LCD display prompt	yes	yes
LCD size (KB)	2 x 20	2 x 20
Battery backed-up RAM size in kbytes	8	32
Service features		
Remote diagnostics	yes	yes
Printer test pattern	yes	yes
Bit switch setting	yes	yes
ROM/RAM data display/list	yes	yes(List only)
NCU parameter setting	yes	yes
Pulse width setting	no	no
Service report (last 3 errors)	yes	yes
Service counters	yes	yes

1. 3. Exterior

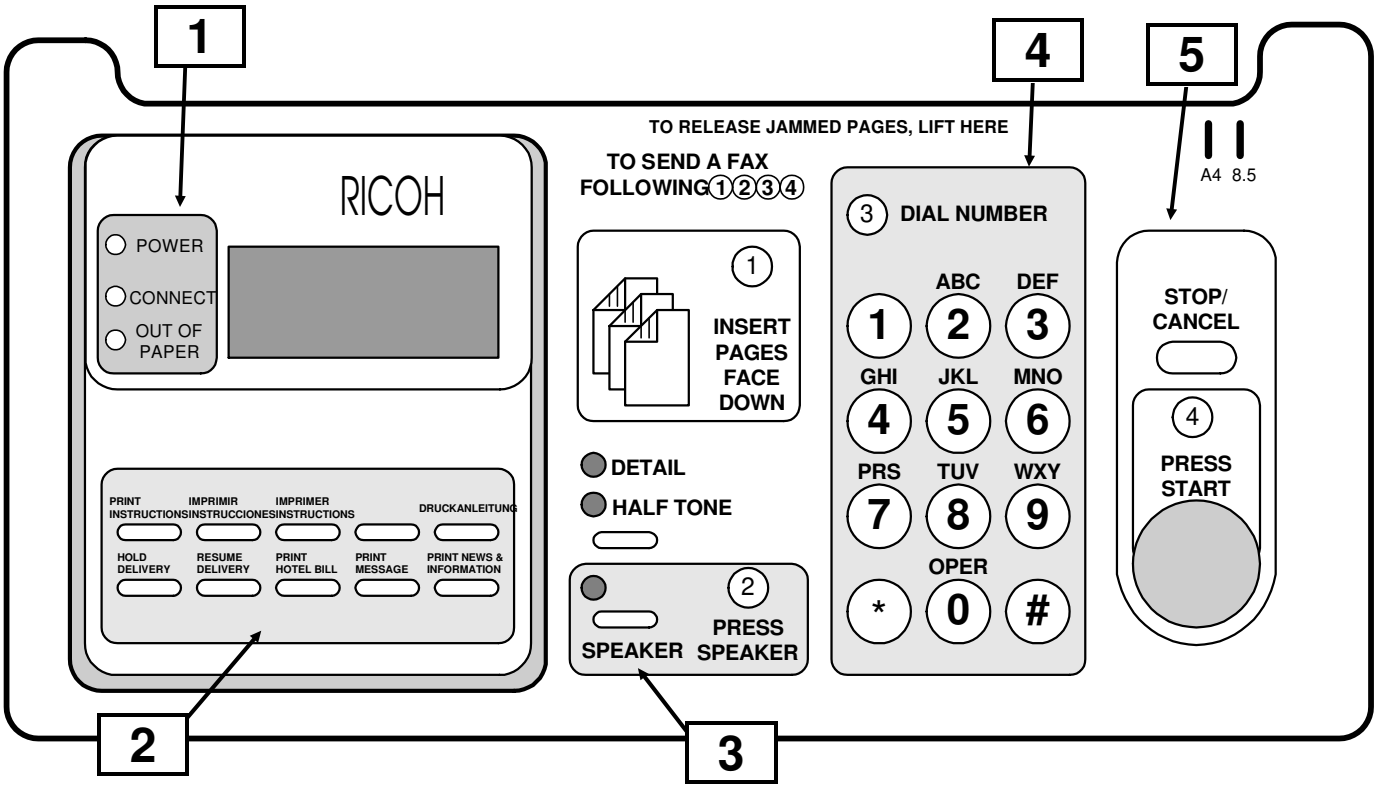
1. 3. 1. Component Layout

1. ADF
   Up to 5 pages can be fed automatically.
2. Operation Panel
   Refer to section 1-3-2.
3. Printer Cover/Cover Release Lever
   To open the cover, push the release lever forward and pull up the cover.
4. Copy Tray
5. Document Guide
6. Power Cord
7. Speaker Volume Control
8. Line Jack





1. 3. 2. Operation Panel



*** Note: Printed For North America only.**

No.	Name	Function
1	Power indicator	Lights when the machine is plugged in and the power is supplied.
	Connect indicator	Lights when a message is being transmitted or received.
	Out of Paper indicator	Lights when the paper has run out. Remember, the striped section of the paper cannot be used for printing.
2	Quick Dial Keys	Each of these keys can be programmed several services. (See Service mode in detail)
3	Detail/Halftone indicators and key	Press this key if you want to change the scanning resolution. Detail will increase the quality of diagrams, graphic work, or text with small print, or if you want to send printed pictures or photographs, select halftone.
	Speaker indicator and key	Press this key before dialing a telephone number.
4	Dialpad	Dial the telephone number with these keys.
5	Stop/Cancel key	Press to stop or cancel a fax communication.
	Start key	Press to start a fax transmission or manual reception.

2. PROGRAMMING, TESTING, AND PRINTING REPORTS

2. 1. SERVICE LEVEL OPERATION

2. 1. 1. Entering and Exiting Service Mode

ENTERING SERVICE MODE

Press # → Stop → # → Stop → # sequentially within 5 seconds.

The machine enters the service mode, then the main menu is printed.

```
SERVICE MODE:
TO SELECT AN ITEM PRESS "START" N-TIMES, THEN "#", EXIT WITH "STOP"
1:TEST HARDWARE 2:PRINT REPORTS 3:CHANGE SETTINGS
```

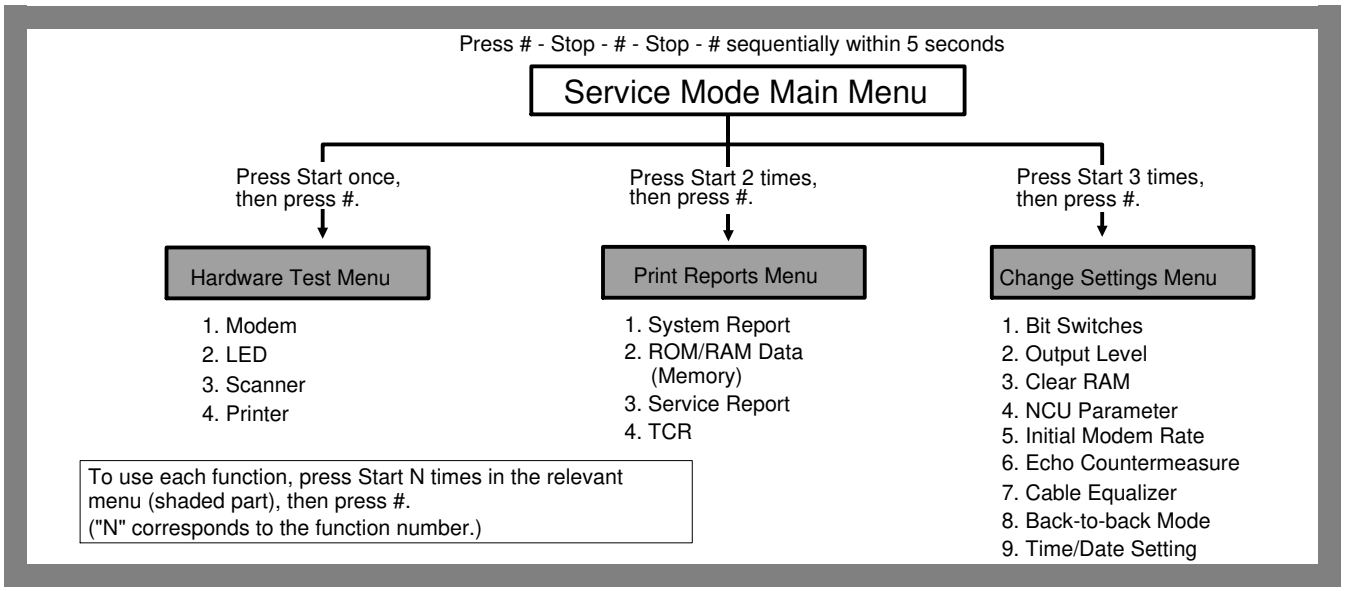
To enter "Check Hardware" mode, press Start once, then press #. The machine prints the "Hardware Test" menu.

```
HARDWARE TEST:
1:MODEM  2:LED  3:SCANNER  4:PRINTER
```

To enter "Print Reports" mode, press Start twice, then press #. The machine prints the "Print Reports" menu.

```
PRINT REPORTS:
1:SYS REPORT  2:MEMORY  3:SERVICE REPORT  4:TCR
```

To enter "Change Settings" mode, press Start three times, then press #. The machine prints the "Change Settings" menu.




```
CHANGE SETTINGS:
1:BITSWITCH  2:OUTPUT LEVEL  3:CLEAR RAM  4:NCU PAR
5:INIT RATE  6:ECHO  7:CABLE EQUALIZER 8:BACK-TO-BACK MODE 9:TIME/DATE
```

EXITING SERVICE MODE

Press Stop in the service mode main menu.

Note: The following service operations are explained in section 2-1-3.
CSI setting/Time/Date setting/Entry Quick Dial/OFF/Hook Monitor timesetting/country code setting.

2. 1. 2. Check Hardware

```
HARDWARE TEST:
1:MODEM  2:LED  3:SCANNER  4:PRINTER
```

1. Modem Test

To enter modem test mode, enter the "Hardware Test" mode, press Start once, then press #. The "Modem Test" menu will be printed.

```
MODEM FREQUENCY TEST:
1:NONE  2:9600  3:7200  4:4800  5:2400  6:300  7:1100  8:2100
```

To test a modem signal, press Start n times then press #, (e.g., press Start three times for a 7200 bps signal). The modem test continues until you press Stop.

2. LED Test

There are two ways to enter the LED test mode.

(1) Enter the "Hardware Test" menu, press Start twice, then press #.

(2) Turn on the power while holding down Start, Stop and 8. When you hear the buzzer, release the Stop key first, then release Start and 8.

All LEDs on the operation panel will blink sequentially until you press Stop.

3. Scanner Test

To enter the Scanner test mode, enter the "Hardware Test" menu, press Start three times, then press #. The LED array is switched on until you press Stop.

4. Printer Test

To enter the printer test mode, enter the "Hardware Test" mode, press Start four times, then press #. The machine prints the test pattern.

2. 1. 3. Print Reports

```
PRINT REPORTS:
1:SYS REPORT  2:MEMORY  3:SERVICE REPORT  4:TCR
```

1. System Report

To print the system report, enter the "Print Reports" mode, press Start once, then press #. The system report contains the ROM version and date, country code, CCITT/Maker codes, Tx/Rx counters, print/scan counter, output level, bit switch settings, and NCU parameters.

2. ROM/RAM (Memory) Data Printout

To print ROM/RAM data, enter the "Print Reports" mode, press Start twice, then press #. The following message will be printed.

```
ENTER FIRST 8 ADDRESS BITS: START=0 #=1
```

Then enter the first 8 bits of the address (the upper byte of the address in binary code) using the Start (0) and #

(1) keys (e.g., if the address is 2EF6(H), enter 00101110 = 2E(H) = S-S-#-S-#-#-#-S: S=Start).
The machine prints 100(H) bytes of data from the entered address (in the example, data will be printed from 2E00(H) to 2EFF(H)).
After printing the data, the following message will be printed:

```
START:PREVIOUS  #:NEXT
```

If you press Start, the data in the preceding 100(H) range will be printed.
If you press #, the data in the next 100(H) range will be printed.

3. Service Report

To print the service report, enter the "Print Reports" mode, press Start three times, then press #.
The service report contains the last 3 error communication records and the last 10 error codes.

4. TCR

To print the TCR, enter the "Print Reports" mode, press Start four times, then press #. The TCR contains the last 5 communication records.

2. 1. 4. Change Settings

```
CHANGE SETTINGS:
1:BITSWITCH  2:OUTPUT LEVEL  3:CLEAR RAM 4:NCU PAR
5:INIT RATE  6:ECHO  7:CABLE EQUALIZER  8:BACK-TO-BACK MODE  9:TIME/DATE
```

1. Bit Switch Programming

To enter this mode, enter the "Change Settings" mode then press Start once. The entry menu will be printed.

```
BITSWITCH 0:00000000/00 1:00000100/04 2:00000001/01
SET BITSWITCH : ENTER 2 ADDRESS BITS: START=0 #=1
```

The upper line of the menu shows the current settings of the bit switches.
If you want to change the setting of a bit switch, enter the bit switch number in two-bit binary code (e.g., press Start (0) then # (1) for bit switch (1). The selected bit switch setting will be printed.

```
BITSWITCH-1:00000100 ENTER 8 DATA BITS: START=0 #=1
```

Then enter new settings using the Start and # keys (e.g., 11110000 = #-#-#-#-S-S-S-S).
Refer to section 4-1 for the bit switch definitions.

```
BITSWITCH-1 SET: 11110000 DEFAULT: 00000100
```

After printing the new settings, the machine returns to the bit switch entry menu.

2. Tx Level Adjustment

To enter this mode, enter the "Change Settings" menu, press Start twice, then press #. The entry menu will be printed.

```
OUTPUTLEVEL: -9
SET THE OUTPUT LEVEL IN -N DBM: ENTER 4 DATA BITS: START=0 #=1
```

Enter the new tx level (e.g., for -6 dBm, enter 0110 = S-#-#-S)

```
OUTPUT LEVEL SET -6 DBM  DEFAULT: -10 DBM
```

After printing the new setting, the machine returns to the "Change Settings" entry menu.

3. RAM Clear

There are two way to enter this mode.

(1) Enter the "Change Settings" menu, press Start three times, then press #. The following instruction will be printed.

```
TO CLEAR RAM PRESS #
```

Press # to erase the RAM data. After the RAM has been all reset to the factory settings or if you pressed any other key than # in this step, the machine will return to the "Change Settings" entry menu.

(2) Turn on the power while holding down Start, Stop and 7.
To erase the RAM data, release the keys after you have heard more than two beeps the buzzer.
After all the RAM has been reset, the machine will return to standby.

4. NCU Parameter Programming

To enter this mode, enter the "Change Settings" menu, press Start four times, then press #. The entry menu will be printed.

```
NCU 0:00001111/0F 1:00110001/31 2:00000001/01 ------------------ 5:00001111/0F
SET NCU PARAMETER : ENTER 3 ADDRESS BITS: START=0  #=1
```

The upper line of the menu shows the current parameter settings.
If you want to change the setting of a parameter, enter the parameter number in three-bit binary code (e.g., press Start (0), Start (0), then # (1) for NCU parameter 1), then press Start. The selected parameter setting will be printed.

```
FOR NCU-1:00110001 ENTER 8 DATA BITS: START=0 #=1
```

Then enter new settings using the Start and # keys. (e.g., 01000000 = S-#-S-S-S-S-S-S for 40(H)).
Refer to section 3-2-1 (Address 037D - 0381 (H)) for the NCU parameter definitions.

```
NCU-1 SET: 01000000 DEFAULT: 00110001
```

After printing the new settings, the machine returns to the NCU parameter entry menu.

5. Initial Rx Modem Rate Programming

To enter this mode, enter the "Change Settings" menu, press Start 4 times, then press #. The following instruction will be printed.

```
SET INIT. MODEM RATE - 1:9600 2:4800
```

Select the required Rx modem rate by pressing Start one or two times, then press #.

```
INIT. MODEM RATE: 9600
```

Then the machine will return to the "Change Settings" menu.

6. Echo Countermeasure (DIS Detection Times) Programming

To enter this mode, enter the "Change Settings" menu, press Start five times, then press #. The following instruction will be printed.

```
SET ECHO COUNTERMEASURE - 1:1X 2:2X
```

This Select the required setting by pressing Start once (1x) or twice (2x), then press #.

```
ECHO COUNTERMEASURE IS 2X
```

Then the machine will return to the "Change Settings" menu.

7. Rx Cable Equalizer

To enter this mode, enter the "Change Settings" menu, press Start six times, then press #. The following instruction will be printed.

```
SET CABLE EQUALIZER - 1: ON 2:OFF
```

Select the required setting by pressing Start once, or twice, then press #.

```
CABLE EQUALIZER IS ON
```

Then the machine will return to the "Change Settings" menu.

8. Back-to-back Mode

To enter this mode, enter the "Change Settings" menu, press Start seven times, then press #. The following instruction will be printed.

```
SET BACK-TO-BACK MODE - 1:ON 2:OFF
```

Select the required setting by pressing Start one or two times, then press #.

```
BACK-TO-BACK MODE IS ON
```

Then the machine will return to the "Change Settings" menu.

Exit service mode, then do the back-to-back mode operation.

Important Notice for Back-to-Back Mode
When in back-to-back mode, you cannot enter service mode unless you exit back-to-back mode first. This is because the machine starts communication if you press Start - Stop - and so on, in back-to back mode.
To exit back-to-back mode, do the following;

1. Make sure that the machine is not communicating.
2. While pressing Halftone to light the Halftone LED, press Stop.
3. Enter the service mode.
4. After finishing with service mode, re-enter back-to-back mode if required.

Note: This function is kept disable for Australia and New Zealand

9. Time/Date

There are two way to enter this mode.

Enter the "Change Settings" menu, press Start eight times, then press #.

The following LCD will be displayed.

SET YEAR: 1992
DOWN:1 UP:2 OK:3

Select the required setting by pressing 1 or 2, then press 3. Then set the date and time in accordance with the message on the LCD. After setting, the machine will returen to the "Change Settings" menu.

2. 1. 5. Other Service Operation

1. CSI setting

Press 1, 2, and 3 simultaneously, the following LCD will be displayed.

```
ENTER YOUR FAX No?
YES: START NO:STOP
```

Enter your telephone number using the dialing pad. Use the "#" key to put "+" and the "*" key to add a empty space. Up to 20 characters can be entered including empty space.

2. Time/Date setting

Press 4.5, and 6 simultaneously, the following LCD will be displayed.

```
SET TIME/DATE?
YES: START NO: STOP
```

select the required setting by pressing start, then set the year, month, day, hours, and minutes in accortance with the message on the LCD.

3. Quick Dial registration

Press 7, 8 amd 9 simultaneously, the following LCD will be displayed.

```
SET QUICK DIAL KEY?
SET: A-J NO: STOP
```

select the required setting by pressing Quick Dial key,
Then enter the service function number which is provided from INN FAX.

Default setting is as follows

Quick Dial	North America	Asia/Oceania	Japan	Function
A	*0	*0	*0	Instruction (English)
B	*1	*1	*3	Instruction (Spanish)
C	*2	*2	--	Instruction (French)
D	*3	*3	--	Instruction (Japanise)
E	*4	*4	--	Instruction (German)
F	*91	*91	*91	Hold Delivery
G	*92	*92	*92	Resume Delivery
H	*98	*98	--	Hotel Bill
I	*97	*97	--	Hotel Message
J	*9333	*9333	--	News & Information

4. OFF Hook monitor time setting

Press *, O, and # simultaneously, the following LCD will be displayed.

SET OFF HOOK TIMER?
YES: START NO: STOP

Set the OFF Hook Timer by pressing "#" key to increase or "*" key to decrease. This timer can be adjusted from 20 sec to 90 sec at intervals of 5 sec. Default is set at 40 sec.

5. Country Code Setting

Press 1, 4 and 7 simultaneously, the following LCD will be displayed.

SET COUNTRY CODE?
YES: START NO: STOP

Enter the country code using dialing pab according to the following country code list.

Country	Code	Country	Code
France	00000	Netherland	01101
Germany	00001	Spain	01110
England	00010	Israel	01111
Italy	00011	Brank	10000
Austria	00100	America	*10001
Belgium	00101	Brank	10010
Denmark	00110	Japan	*10011
Finland	00111	Hongkong	*10100
Ireland	01000	South Africa	10101
Norway	01001	Australia	*10110
Sweden	01010	New Zealand	*10111
Switzerland	01011	Singapore	*11000
Portugal	01100	Malaysia	11001

If enter other than above code which are marked "*", the country code will be set at the American code. (10001)

3. SERVICE TABLES

3. 1. BIT SWITCHES

WARNING
Do not adjust a bit switch that is described as "Not used", as this may cause the machine to malfunction or to operate in a manner that is not accepted by local regulations.

Bit Switch 0			
	FUNCTION	**SETTINGS**	**COMMENTS**
0	Not used		
1	Rx cable equalizer	0: Disabled 1: Enabled	Set this bit to 1, when there is a serious signal loss during reception at the higher frequency range. The cable equalizer will amplify the signal in this range by +3 dBm.
2	DIS detections	0: Once 1: Twice	The machine will send DCS (G3 set-up signal) if it receives DIS. If echoes are frequent, setting this bit to 1 will allow the machine to wait for the second DIS before sending DCS.
3	TSI (RTI) printout on received copies	0: Disabled 1: Enabled	If this bit is 1, the TSI or RTI received from the sender will be printed on the top of each page.
4	Burst error threshold/ error line ratio	0: 6 (12) [24] lines/10% 1: 3 (6) [12] lines/5%	If there are more consecutive error lines in the received page than the threshold specified by this bit, the page is rejected. Values in parenthesis ( ) are for Detail resolution, and those in square brackets [ ] are for Fine resolution. Also, if the number of error lines divided by the total number of lines reaches the ratio determined by this bit, the machine will send RTN to the other end. If you want to receive messages with fewer error lines, set this bit to 1.
5	Training error threshold	0: 4 bits 1: 1 bit	If the machine detects more errors during training than the number set by this bit, training fails and the machine will send FTT to ask the other terminal for modem rate shift-down. Set this bit to 1 if you want to receive messagesat a more reliable modem speed.
6	Initial Rx modem rate	0: 9,600 bps 1: 4,800 bps	The setting of this bit is used to inform the sending machine of the initial starting modem rate for the machine in receive mode. If 9,600 bps presents a problem during reception, use 4,800 bps.
7	Back to back test	0: Disabled 1: Enabled	Set this bit to 1, when you want to test a back-to-back communication. **Note:** This function is kept disable for Australia and New Zealand.

Important Notice for Back-to-Back Mode
When in back-to-back mode, you cannot enter service mode unless you exit back-to-back mode first. This is because the machine starts communication if you press # - Stop - and so on to enter service mode, in back-to-back mode.
Refer to the notice in section 2-1-4 for how to exit back-to-back mode.

Bit Switch 1			
	FUNCTION	**SETTINGS**	**COMMENTS**
0	Reconstruction time for the first line	0: 6 sec. 1: 10 sec.	When the sending terminal is controlled by a computer, there may be a delay in receiving page data after the local machine accepts set-up data and sends CFR. If this occurs, set this bit to 1 to give the sending machine more time to send data.
1	Tx level for DTMF tome	0: Default value 1: Fix at - 8 dbm	Default value: North America - 7 dB, Japan - 9dB, Hongkong - 7dB, Singapore - 7dB, New Zealand - 9dB, Australia - 6dB
2	Not used		
3	PSTN/PBX dial tone and busy tone detection	0: Enabled 1: Disabled	Set this bit to 1 when you wish to disable tone detection.
4	DTMF Tone before Manual reception	0: Disabled 1: Enabled	
5	Not used		
6	Not used		
7	Communication parameter display and line monitoring after handshaking	0: Disabled 1: Enabled	This is a fault-finding aid. If this bit is set to 1, the LCD shows the key parameters (see below) and the speaker is enabled during message transmission and reception. This should be normally disabled because it cancels the CSI/TSI (RTI) display for the user.

Bit Switch 2			
	FUNCTION	**SETTINGS**	**COMMENTS**
0	Not used		
1	($) Display on LCD	0: Disabled 1: Enabled	
2	OFF Hook Monitor Timer	0: Enabled 1: Disabled	
3 **4**	TTI Selection	0: P1, 1: P2, 0: P3, 1: P4 0 0 1 1	P1: INN FAX, P2: INN FAX HOTEL SERVICE P3: HOTEL FAX, P4: Blank
5	DTMF Tone before document Transmission	0: Enabled 1: Disabled	
6 **7**	DTMF Tone Selection (at Document Transmission)	0: D 1: A 0: B 1: C 0 0 1 1	

Default Settings

Bit Sw.	Default
0	0000 0000
1	0000 0100
2	0000 0000

3. 2. USEFUL RAM ADDRESSES

In the equations that occur in the following tables, N represents the decimal value stored in the RAM address.

WARNING
Changing any RAM data that are not listed in this table may cause the machine to malfunction.

3. 2. 1. Address Table

Use the "PRINT MEMORY" function to check the data in the RAM, or use RDS to check and change the RAM data listed below.

Address (Hex)	Function		
0000 - 0002	Bit switches 00 to 02 (0000 = Bit switch 00, 0001 = Bit switch 01, and so on); refer to section 3-1 for details.		
0009	User function parameters Bit 7: Sent Fax Report (1: On) Bits 6 through 0: Not used		
02E5	Received page counter (BCD)	High: Tens digit	Low: Units digit
02E6		High: Thousands digit	Low: Hundreds digit
02E7		High: Hundred thousands digit	Low: Ten thousands digit
02E8 - 02EA	Transmitted page counter	(Refer to the recieved page counter)	
02EB	Printed page counter (BCD)	High: Tens digit	Low: Units digit
02EC		High: Thousands digit	Low: Hundreds digit
02ED		High: Hundred thousands digit	Low: Ten thousands digit
02EE - 02F0	Scanned page counter	(Refer to the printed page counter)	
00D0	Country code Caution: Do not change		
00D3 - 00D5: Line current detection parameters			
00D3	Line current detection time [Time = N x 10 (ms), detection disabled if N = FF]		
00D4	Line current reset time [Time = N x 20 (ms)]		
00D5	Line current dropout detection time [Time = N x 20 (ms)]		
00D6 - 00DA: Ringing signal detection parameters			
00D6	**NCU Parameter 00:** Acceptable ringing signal frequency, upper limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]		
00D7	**NCU parameter 01:** Acceptable ringing signal frequency, lower limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]		
00D8	**NCU parameter 02:** Number of rings until a call is detected [Number = N x 1]		
00D9	**NCU parameter 03:** Minimum required length of a ring [Length = N x 20 (ms)]		
00DA	**NCU parameter 04:** Minimum required length of an interval between rings [Length = 40 x N (ms)]		
00DB	**NCU parameter 05:** Modem transmission level [Level = - N (dBm)]		
00EC	Time between dialed digits (DTMF dial mode) [Time = N x 20 (ms)]		
00ED	DTMF tone length [Time = N x 20 (ms)]		
00EA	Ringing signal counting time for α-Link [Time = N x 20 (ms)]		
035B - 03F0	TCR generation area (30 byte x 5 communications)		
0703 - 0789	Service report and error report generation area (45 bytes x 3 communications)		
0F81 - 0F94	Error code memory (up to 10 codes x 2 bytes)		
0F95	Number of characters in the CSI - 14 (H)		
0F96 - 0FA9	CSI (ASCII)		
1730	Check RAM		
1782	Paper end sensor threshold value		

Address (Hex)	Function
1783	Jam sensor threshold value
2039	DTMF transmission level [Level = -N(dBm)]
2044 - 204E	11 byte data for one touch dial A
204F - 2059	11 byte data for one touch dial B
205A - 2064	11 byte data for one touch dial C
2065 - 206F	11 byte data for one touch dial D
2070 - 207A	11 byte data for one touch dial E
207B - 2085	11 byte data for one touch dial F
2086 - 2090	11 byte data for one touch dial G
2091 - 209B	11 byte data for one touch dial H
209C - 20A6	11 byte data for one touch dial I
20A7 - 20B1	11 byte data for one touch dial J

Format of one touch dial
Input number by using ASCII code (Max 10 digits)
Input stop code (FFH) at the end of ASCII code

ex) In case, Input "*933" into the one touch dial A,

Address	Number
2044H: 2AH	← "*"
2045H: 39H	← "9"
2046H: 33H	← "3"
2047H: 33H	← "3"
2048H: FFH	← Stop Code

3. 2. 2. Format of the Generation Area

The Activity Log is generated in addresses 035B - 03F0 (H). The record of each communication is stored in blocks of 30 bytes as explained in the following table.

Byte No.	Functions
0	Header Bit 7: Not used Bit 6: TCR (1: Enabled) Bits 5 through 0: Not used
1	Communication start time Month (BCD)
2	Communication start time Day (BCD)
3	Communication start time Hour (BCD)
4	Communication start time Minute (BCD)
5 - 24	Remote terminal's RTI, TSI or CSI (ASCII)
25	Communication mode Bit 7: Resolution step down (1: Yes) Bit 6: Reduction (1: Yes) Bit 5: 0: Standard 0: Fine 1: Detail 1: Not used 4 0 1 0 1 Bit 3: Forwarding (1: On) Bit 2: Memory tx/rx (1: Yes) Bit 1: ECM (0: Non-ECM, 1: ECM) Bit 0: Tx or Rx (0: Rx, 1: Tx)
26	Communication time Minutes (BCD)
27	Communication time Seconds (BCD)
28	Communication result and causes of error Bit 7: Result (0: OK, 1: Error) Bit 6: Document jam (1: Yes) Bit 5: Authorized reception (0: Not rejected, 1: Rejected) Bit 4: Not used Bit 3 - 0: Cause of error (BCD) 7 (BCD): Not used 6 (BCD): 5 (BCD): 8 minutes close 4 (BCD): Busy 3 (BCD): T1 time over in telephone call 2 (BCD): T1 time over in fax call 1 (BCD): Errors during fax communication 0 (BCD): No error
29	Total page(s) (BCD)

3. 2. 3. Format of the Service Report and Error Report Generation Area

The Service Report and the Error Report are generated in addresses 0703 - 0789 (H). The record of each error communication is stored in blocks of 45 bytes as explained in the following table. This machine can store up to 3 error communication records.

Byte No.	Functions
0	Header Bit: 7 Service Report or Error Report (1: Enabled) Bit 6 through 0: Not used
1 - 29	Same as the Activity Log memory
30	Error page #1 (BCD)
31	Error page #2 (BCD)
32	Error page #3 (BCD)
33	Error page #4 (BCD)
34	Error page #5 (BCD)
35	Error code #1 (High) (BCD)
36	Error code #1 (Low) (BCD)
37	Error code #2 (High) (BCD)
38	Error code #2 (Low) (BCD)
39	Error code #3 (High) (BCD)
40	Error code #3 (Low) (BCD)
41	Error code #4 High) (BCD)
42	Error code #4 (Low) (BCD)
43	Error code #5 (High) (BCD)
44	Error code #5 (Low) (BCD)

3. 2. 4. Format of the Error Code Memory

The error codes are stored in 0F81 - 0F94 (H). Each error code is stored in blocks of 2 bytes as explained in the following table. This machine can store up to 10 error codes.

Byte No.	Functions
0	Error code (High) (BCD)
1	Error code (Low) (BCD)

3. 3. VARIABLE RESISTORS AND SWITCHES

PCB	Address	Function
LIU	VR1	Ringer volume adjustment (user adjustable)
PSU	S001	A thermostat; this switches the power off automatically when the temperature goes higher than 95 ± 5 °C, and recovers after switching the power switch off and on.

3. 4. SENSORS

No.	Name	Function
SB-1	Document Sensor	Detects whether a document is placed in the feeder or not. The 58th bit on the SBU is used as this sensor.
SB-2	Scan Line Sensor	Detects when the top of a page is at the scan line position. The 4th bit on the SBU is used as this sensor.
SB-4	Paper End Sensor	Detects whether paper is in the paper holder or not.
SB-5	Paper Jam Sensor	Detects whether paper is jammed in the printer or not.
SB-7	Cutter Start Sensor	Detects whether the cutter blade is at the home (start) position or not.
SB-8	Cutter End Sensor	Detects whether the cutter blade is at the end position or not. If the cutter blade is detected at the cutter end position, the cutter motor reverses to move the blade to the cutter start position.
SB-10	Cover Sensor	Detects whether the printer cover is closed or not.

4. REMOVAL AND ADJUSTMENT

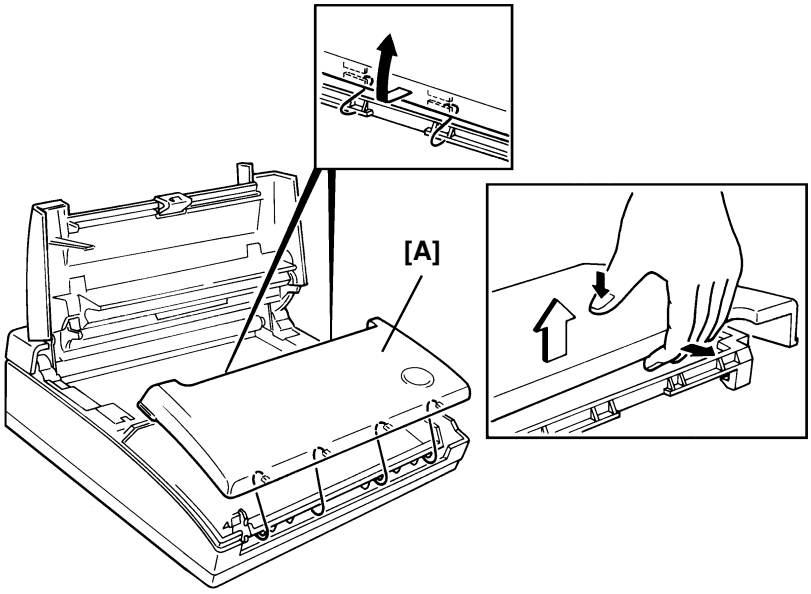
CAUTION

1.Unplug the machine from the power outlet before removing any of the covers.
2. The danger of explosion exists if the lithium battery on the FDU is incorrectly replaced. Replace only with the same or an equivalent type recommended by the manufacturer. Discard used batteries in accordance with the manufacturer's instructions.

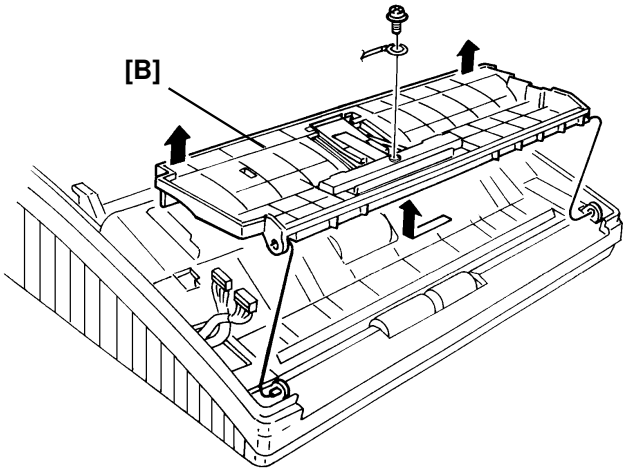
4. 1. COVERS

4. 1. 1. Operation Panel Assembly

1. Open the ADF.
2. Remove the operation panel cover [A] as shown below.

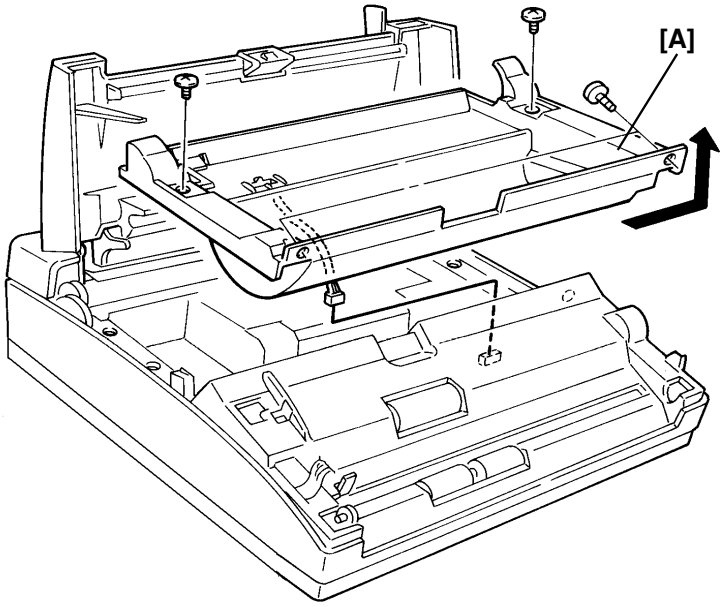


3. Disconnect three connectors.
4. Remove the lower cover [B] (1 ground wire).

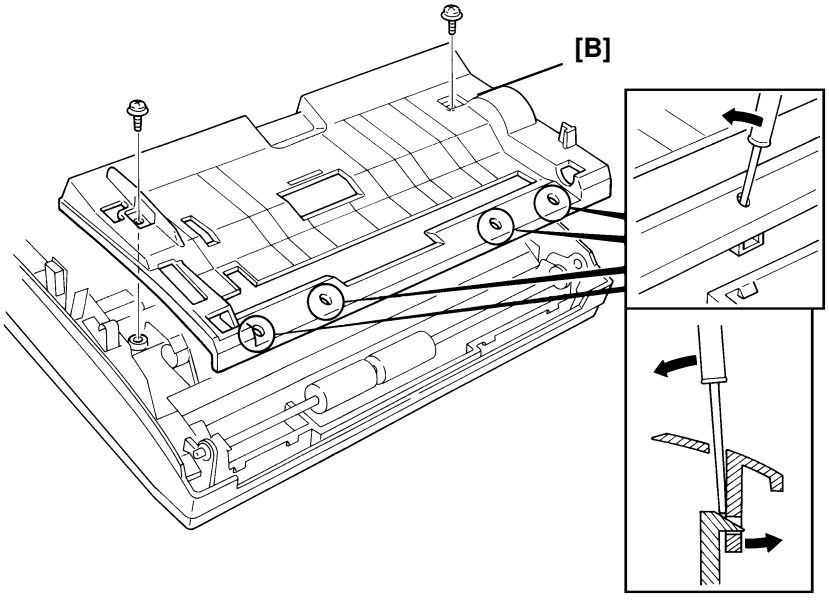


4. 1. 2. Paper Holder and Scanner Cover

1. Open the printer cover.
2. Remove the paper holder [A] (4 screws, 1 connector).



3. Remove the operation panel assembly (see section 4-1-1).
4. Remove the scanner cover [B] with a screwdriver as shown below (2 screws).

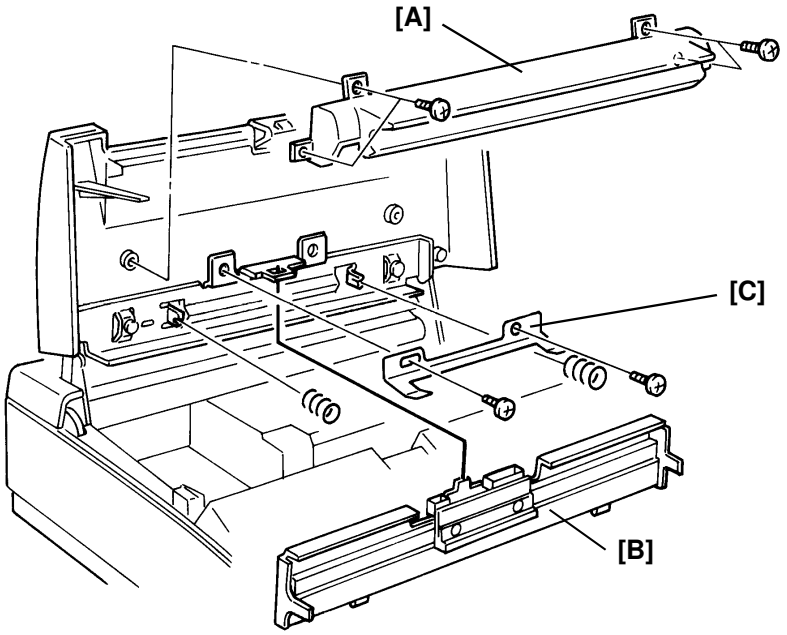


4. 1. 3. Thermal Head and Printer Cover

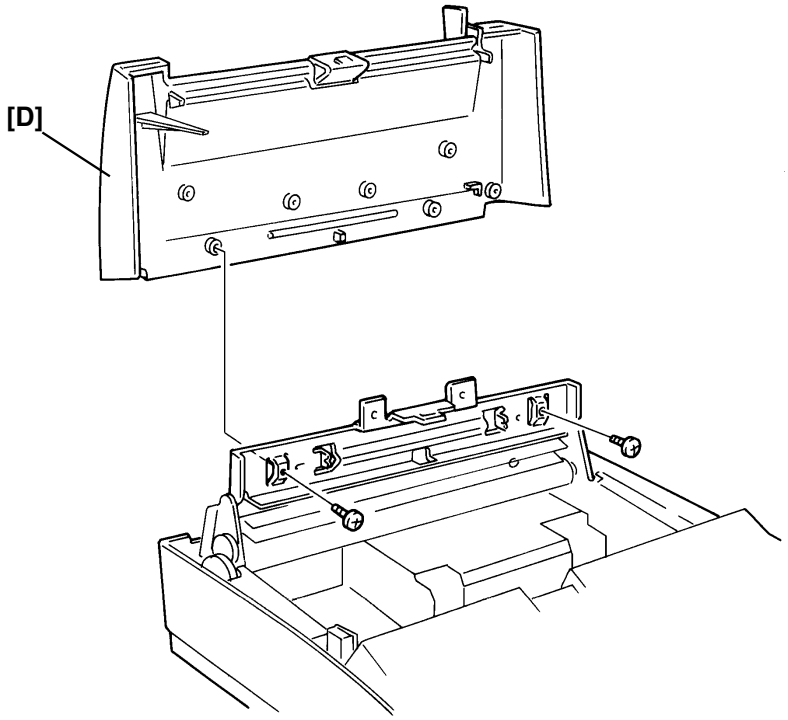
1. Open the printer cover.
2. Remove the thermal head cover [A] (4 screws).
3. Remove the thermal head [B] and the spring plate [C] (2 connectors, 2 springs, 2 screws).

Reassembly Note

- The dents on the thermal head bracket must fit into the slots on the thermal head.



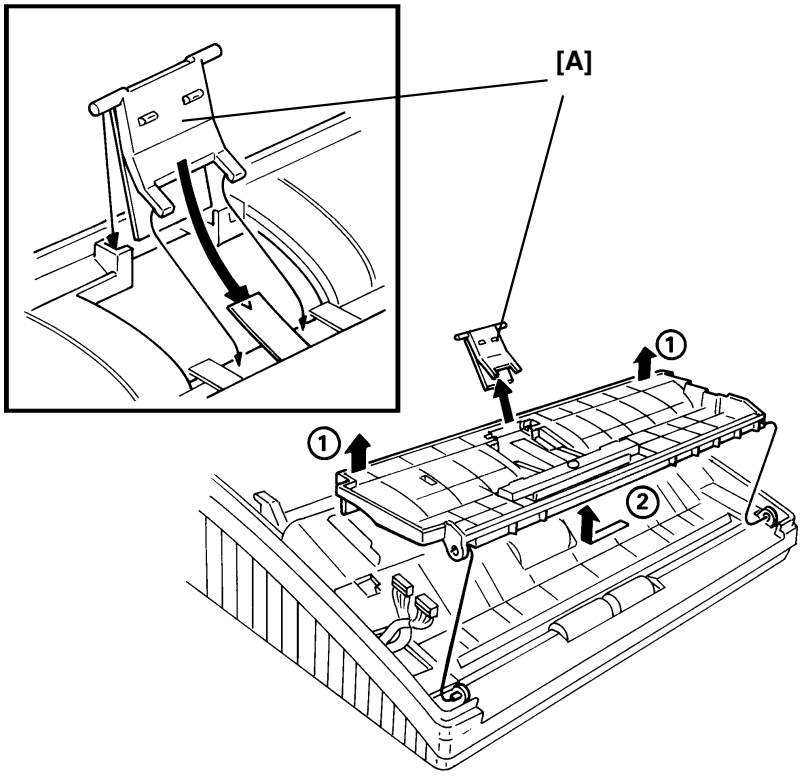
4. Remove the printer cover [D] (2 screws).



4. 2. SCANNER

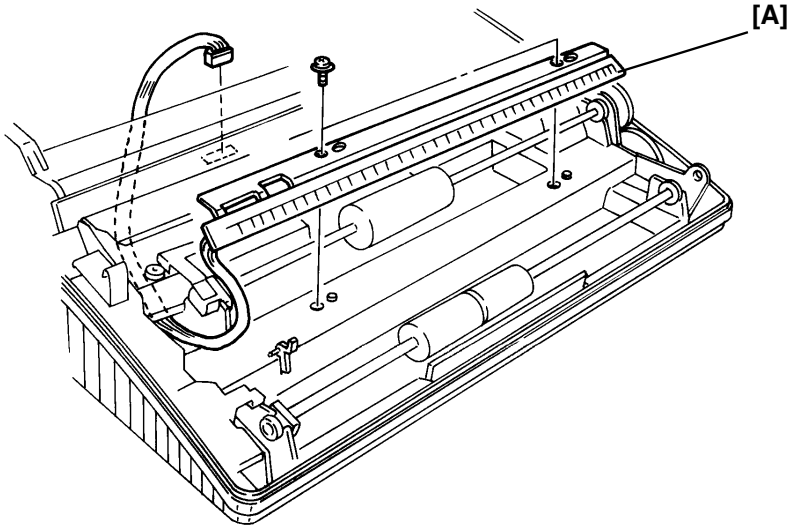
4. 2. 1. Separation Rubber Plate

1. Remove the operation panel assembly (see section 4-1-1).
2. Remove the rubber plate [A].



4. 2. 2. LED Array

1. Remove the operation panel assembly, the paper holder and the scanner cover (see section 4-1).
2. Remove the LED array [A] (2 screws, 1 connector).

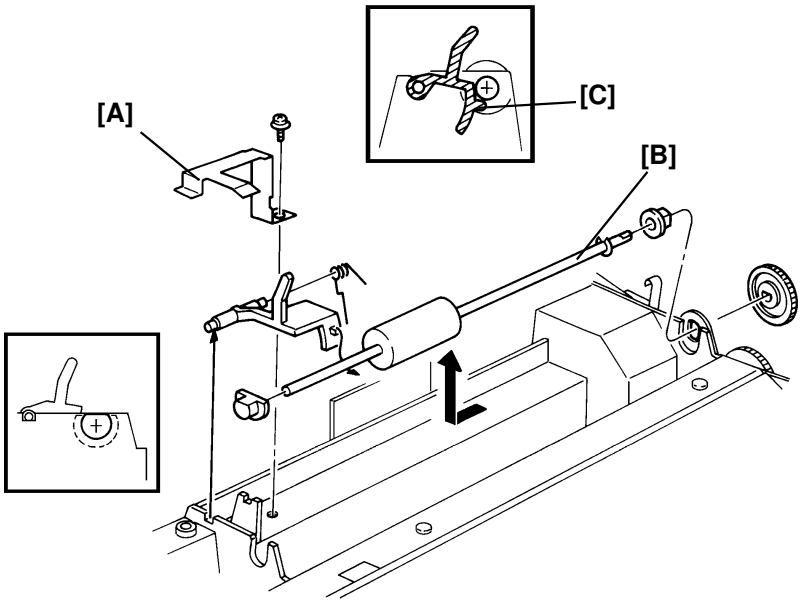


4. 2. 3. Feed Roller

1. Remove the operation panel assembly, the paper holder and the scanner cover (see section 4-1).
2. Remove the metal bracket [A] (1 screw).
3. Remove the feed roller [B].

Note for Reassembly

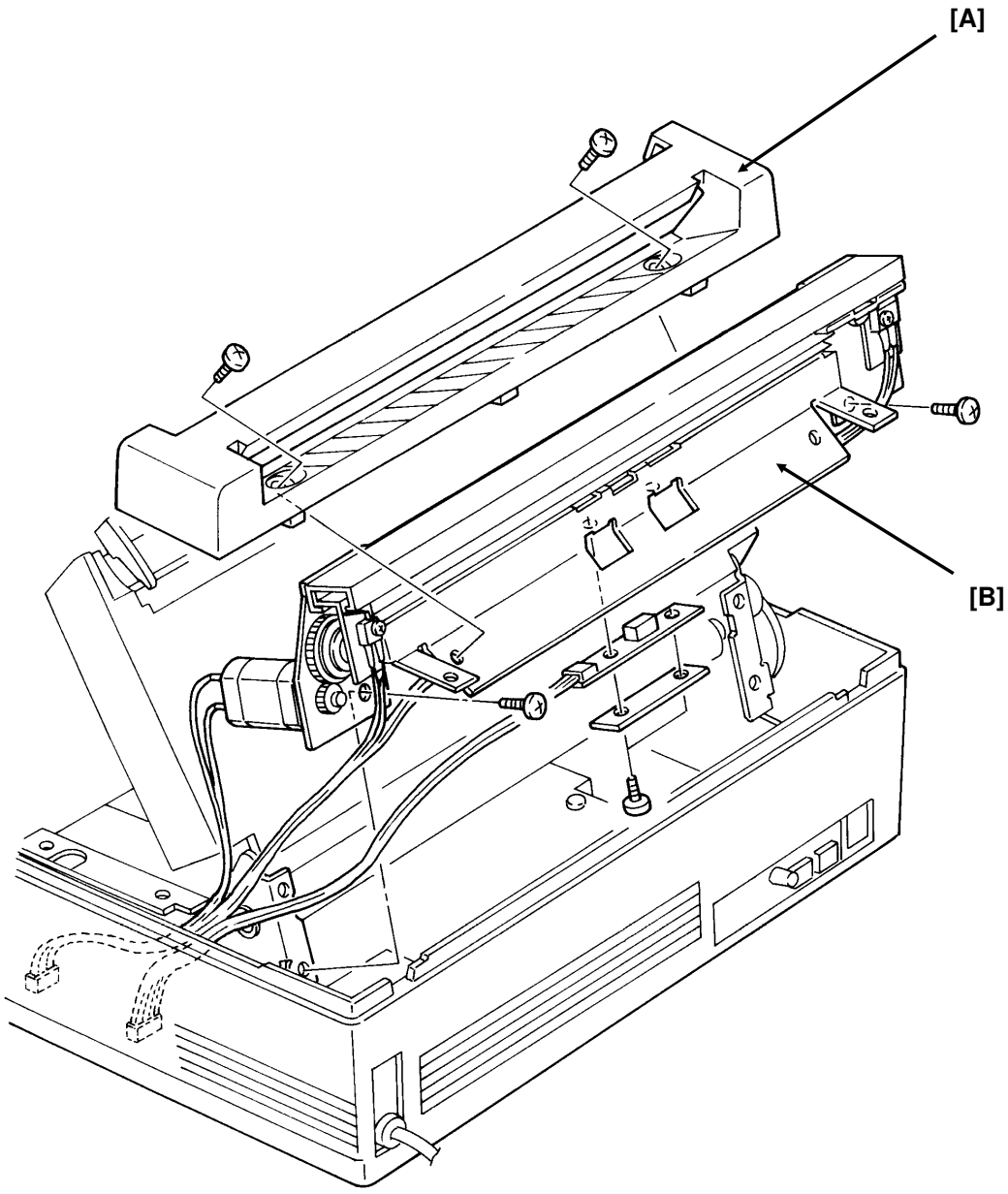
- Pin [C] on the document sensor actuator must be under the feed roller shaft.



4. 3. PRINTER

4. 3. 1. Rear Cover, Cutter Unit, and Platen Roller

1. Remove the rear cover [A] (2 screws).
2. Remove the paper holder and the cutter unit [B] (4 screws, 2 connectors).



3. Remove the FCE, FDU, PSU and LIU (see section 4-4).

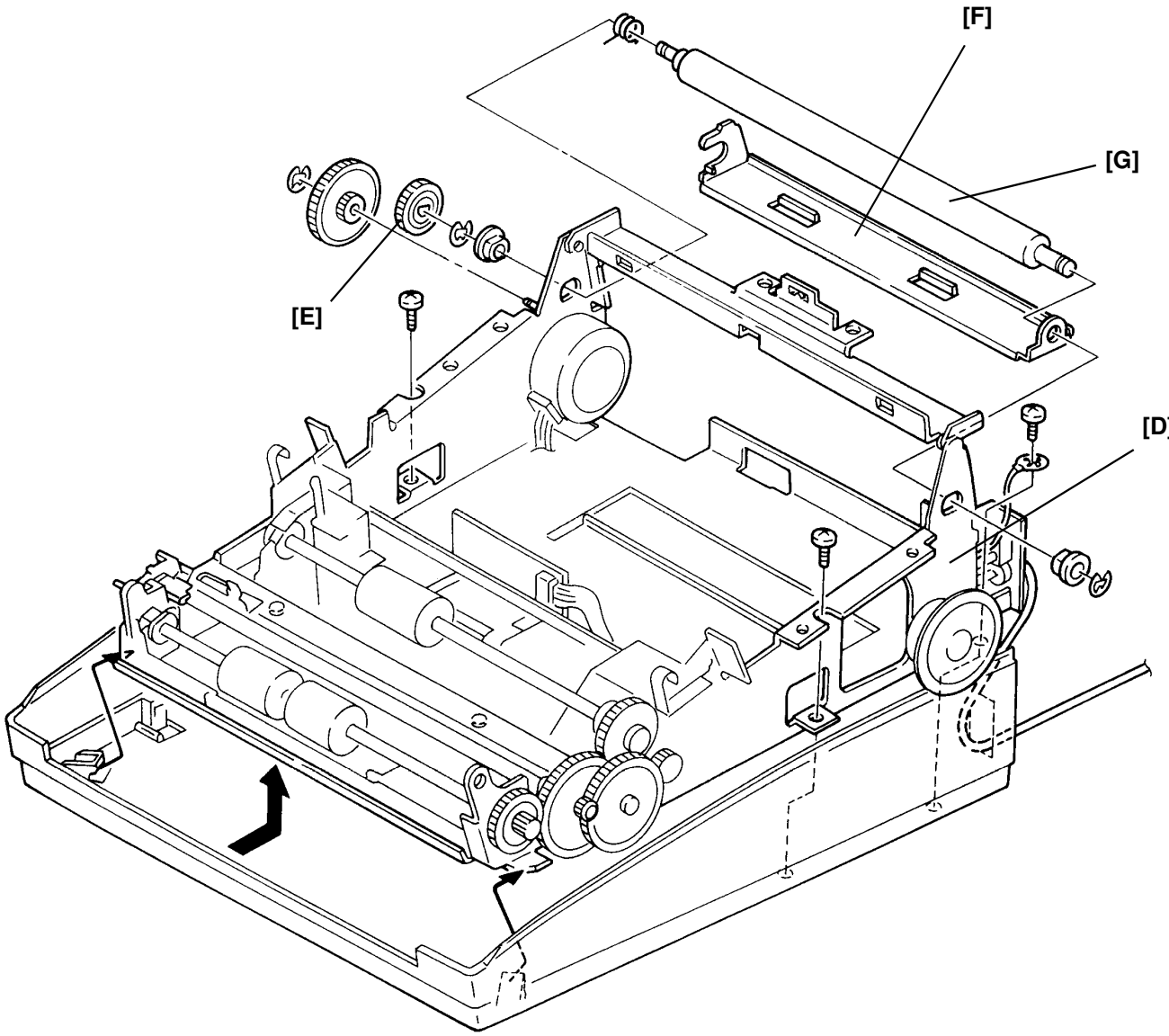
4. Remove the mono-chassis [D] (2 screws, 1 ground wire).

5. Remove two gears [E] (1 E-ring).

6. Remove the decurler bracket [F] and platen roller [G] (2 E-rings, 2 bushings, 1 spring).

Reassembly Note

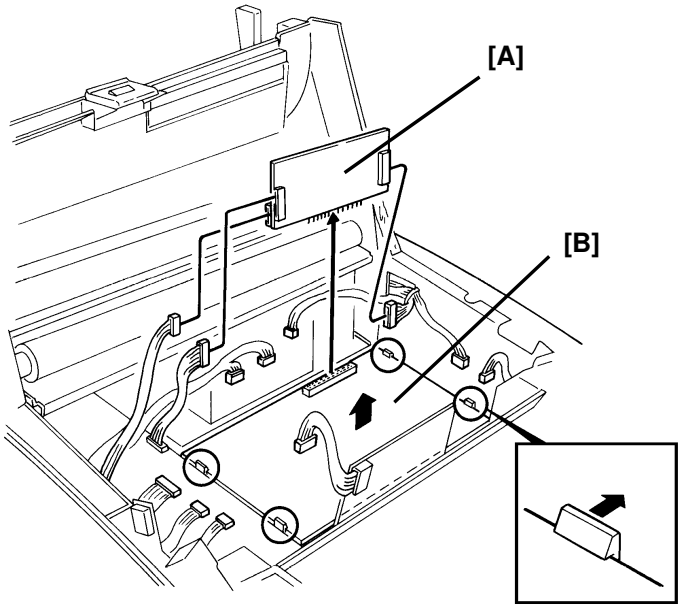
- Be careful not to assemble the gears the wrong way round.
- The left bushing - platen roller is smaller than right bushing.
- Lubricate the left shaft of the platen roller all the way round after changing the platen roller or the spring clutch for the decurler (Use Mobil Temp 78, part no. 54479078).



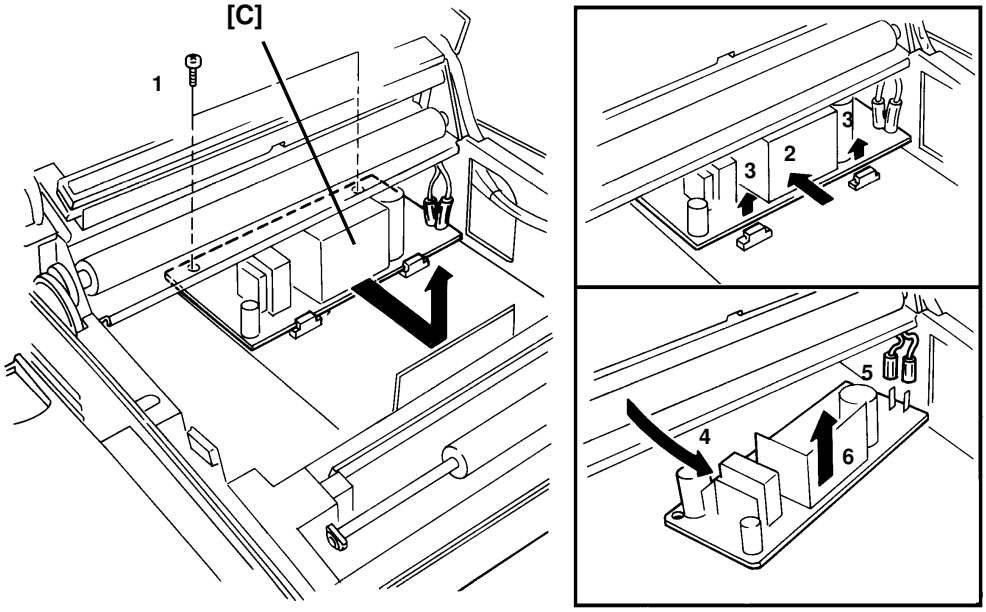
4. 4. PCBs

4. 4. 1. FCE, FDU, and PSU

1. Remove the paper holder (see section 4-1-2).
2. Remove the FCE [A] (3 connectors).
3. Remove the FDU [B] (9 connectors).

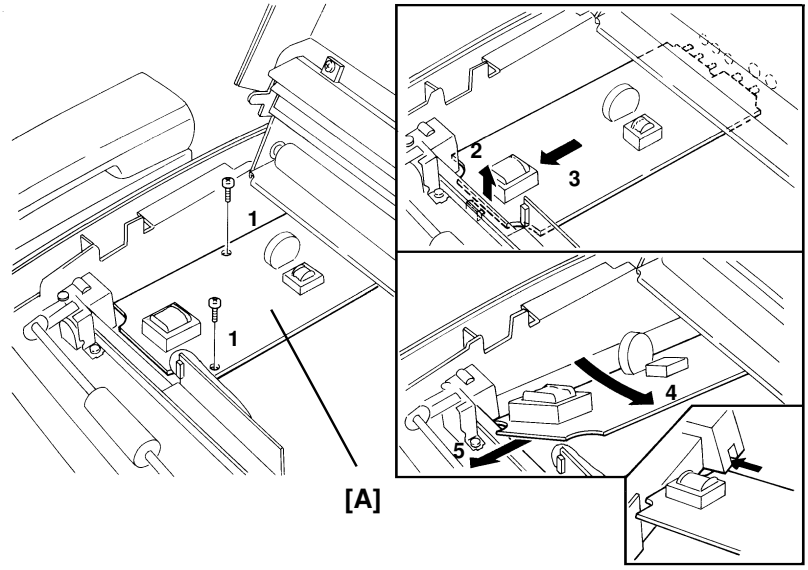


4. Remove the rear cover (2 screws).
5. Remove the PSU [C] (2 connectors).



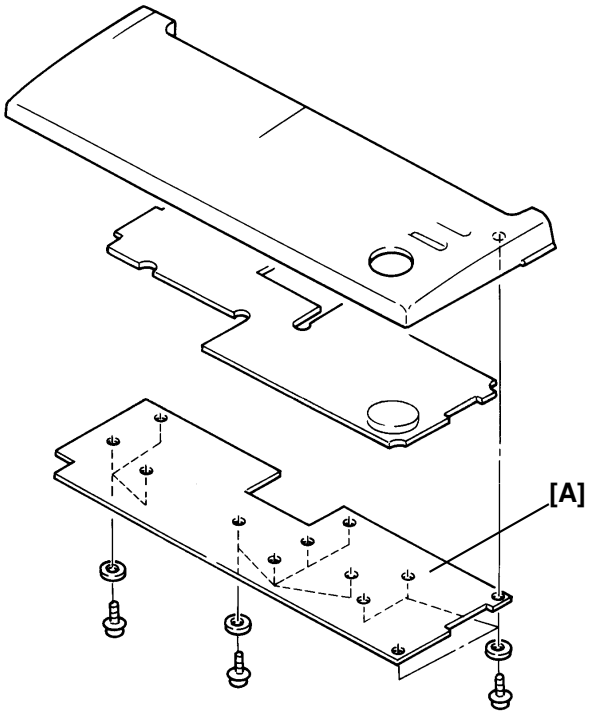
4. 4. 2. LIU

1. Remove the paper holder and the scanner cover.(see section 4-1-2).
2. Remove the LIU [A] (2 screws, 6 connectors).



4. 4. 3. OPU

1. Remove the operation panel cover (see section 4-1-1).
2. Remove the OPU [A].



4. 5. SBU REPLACEMENT AND SCANNER/SENSOR ADJUSTMENT

4. 5. 1. SBU Adjustment Tools

1. Adjustment Kit (P/No. H0809600)
2. Test PCB (P/No. H0939650)

Additionally, the test chart which is included in the adjustment kit is available as part number H0809602.

4. 5. 2. SBU Replacement

1. Unplug the machine from the wall outlet.
2. Remove the printer cover, operation panel assembly, and scanner cover (see sections 2-1 and 2-3).
3. Remove the SBU (2 screws, 1 connector at CN7 on the FDU)

4. 5. 3. Scanner/Sensor Adjustment

Every time you replace the SBU or when the machine has a document non-feed or jam problem because of incorrect scanner/sensor adjustment, adjust the scanner/sensor mechanism as shown below.

As the scanner has 2 features, scanning document and detecting sensor actuator movement, the scanner needs exact adjustment. Refer to Appendix D for more details on the scanner/sensor mechanism.

This section is divided into 4 parts:

1. Preparation
2. Horizontal Scan Line Adjustment
3. Vertical Scan Line Adjustment
4. Focusing

"Preparation" explains how to set up the SBU adjustment tools in the machine.

"Horizontal Scan Line Adjustment" explains how to adjust the horizontal position of the SBU with the tools. This section is quite important because the machine cannot detect sensor movement unless the SBU is well adjusted properly.

"Vertical Scan Line Adjustment" explains how to adjust the vertical position of the SBU with the tools. The new test chart is designed so that the SBU can be adjusted vertically.

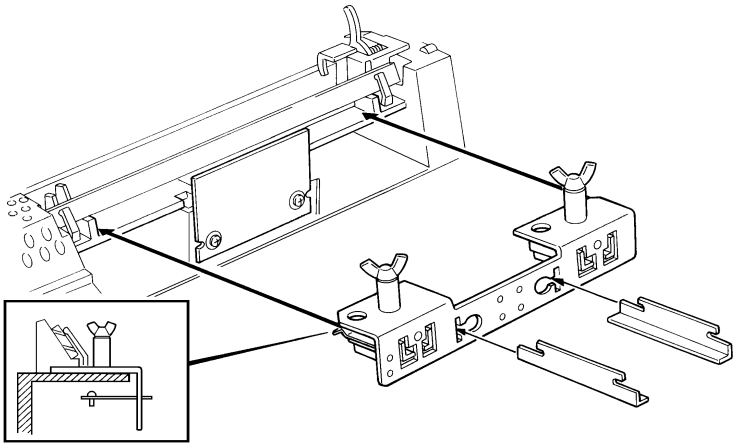
"Focusing" explains how to adjust focusing on the CCD. Adjusting the lens position is a bit more difficult than for other current models.

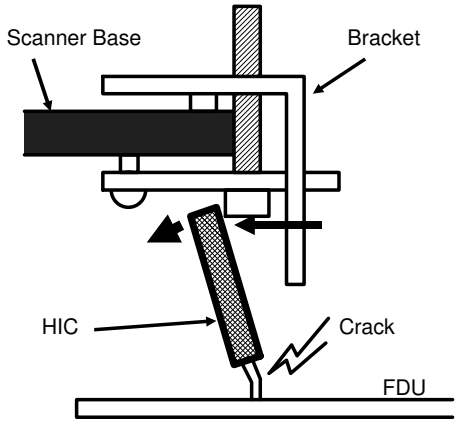
1. Preparation

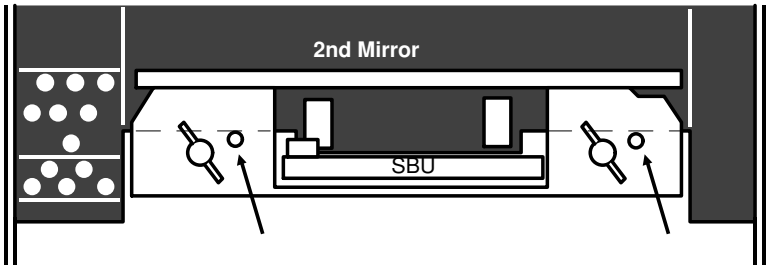
1. Install a new SBU in the machine. (Do not connect the harness to the FCE.)
2. Clamp the bracket to the scanner base. Set the left side of the bracket first as shown below.

   Notes:

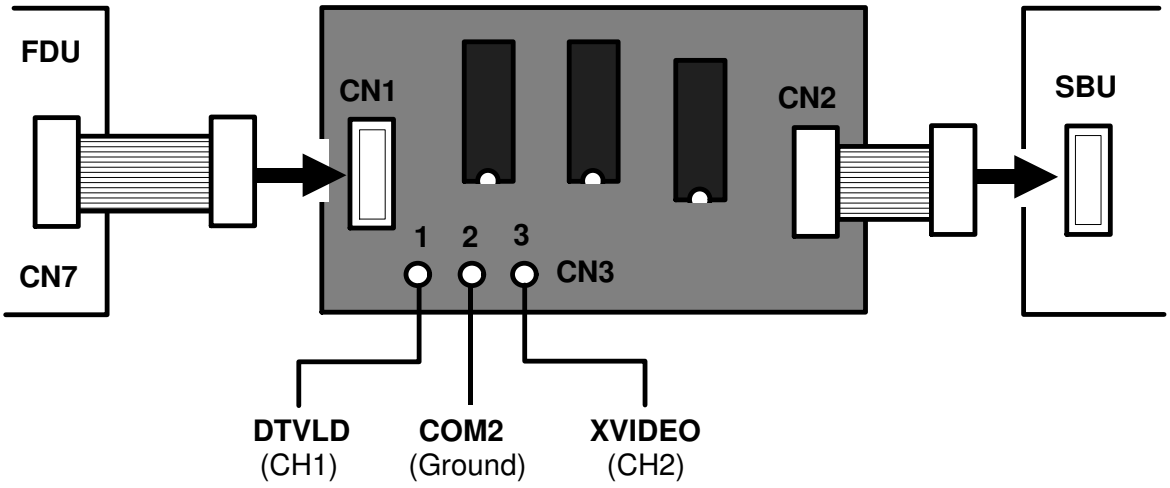
   1. The dents on the bracket must fit to the edge of scanner base. Otherwise, the pins from the HIC might crack as shown in the diagram.
   2. The shape of the bracket might be different from the drawing.







3. Connect the harness from the FDU (CN7) to CN2 on the test PCB, then connect the harness from the test PCB to the SBU.



1. Preparation

4. Connect the test pins to the oscilloscope as follows:
   Pin 1 (DTVLD) - Channel 1 (CH1) on the oscilloscope
   Pin 2 (COM2) - Ground
   Pin 3 (XVIDEO) - Channel 2 (CH2) on the oscilloscope

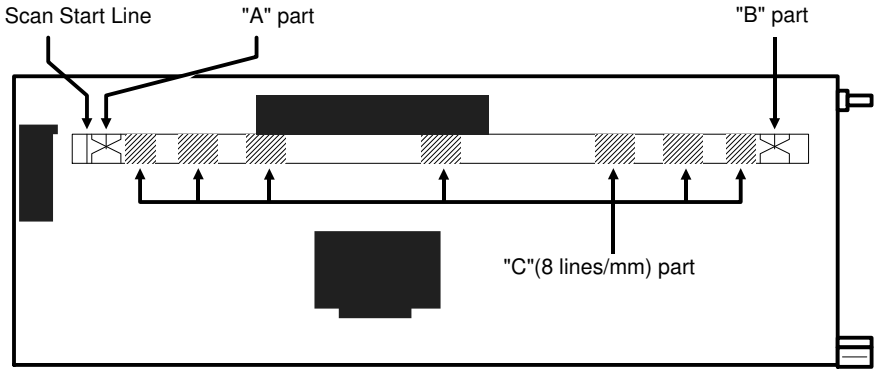
5. Attach the test chart to the machine.

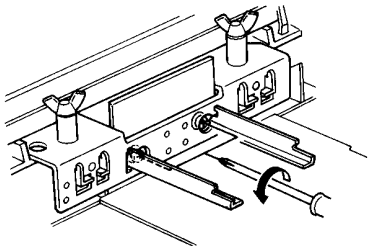
6. Connect the operation panel to the machine.

7. Enter the service mode and switch the LED array on (see section 2-1-2).

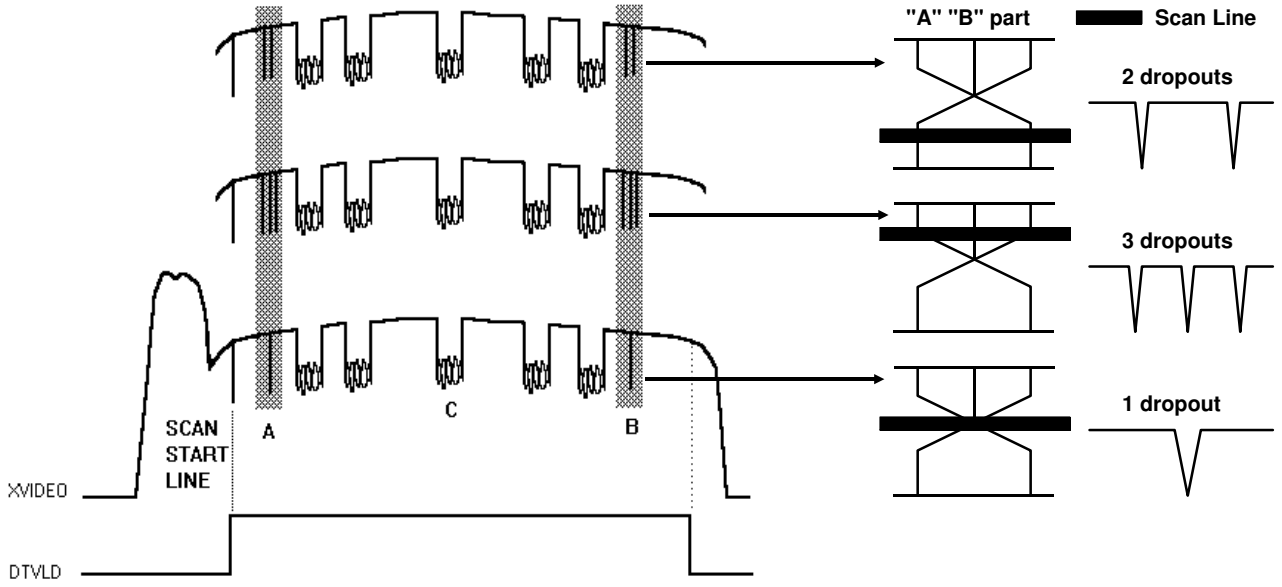
8. Set up the oscilloscope as follows:
   CH2 (XVIDEO) - 0.2 V/div.
   TIME - 1 ms/div.
   Then, select CH2 (XVIDEO) on the oscilloscope.

9. The XVIDEO signal shows one of the waveforms shown below. One, two or three dropouts should appear at "A" and "B" depending on the vertical scan line position, and moire should appear at "C".
   If this waveform cannot be seen on the oscilloscope screen, loosen the SBU securing screws and adjust the SBU position until this waveform appears on the screen.
   The moire sometimes does not appear on the screen unless the lens is well focused. So, if the moire does not appear on the screen, go to the **"Focusing"** procedure first, then go to the **"Horizontal/Vertical Scan Line Adjustment"** procedures.
   If this waveform appears on the screen, go to the **"Horizontal/Vertical Scan Line Adjustment"** procedures, then check that the moire at "C" satisfies the criterion in the **"Focusing"** section.





Test Chart attached on the Pressure Plate

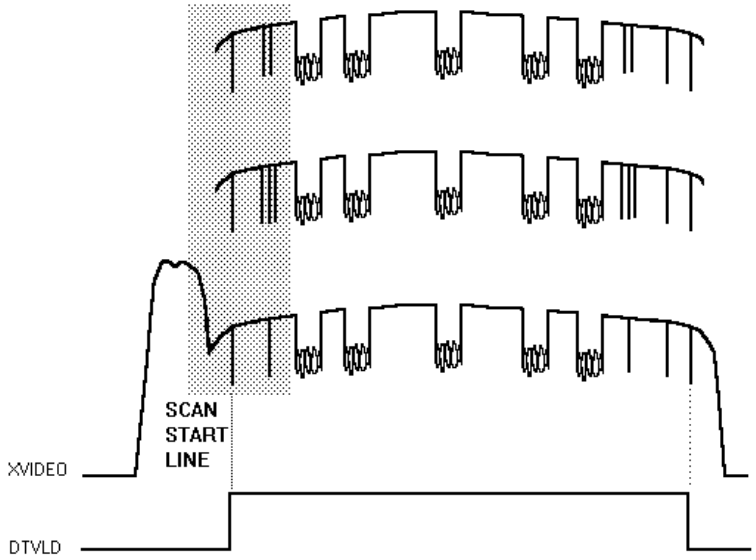


2. Horizontal Scan Line Adjustment

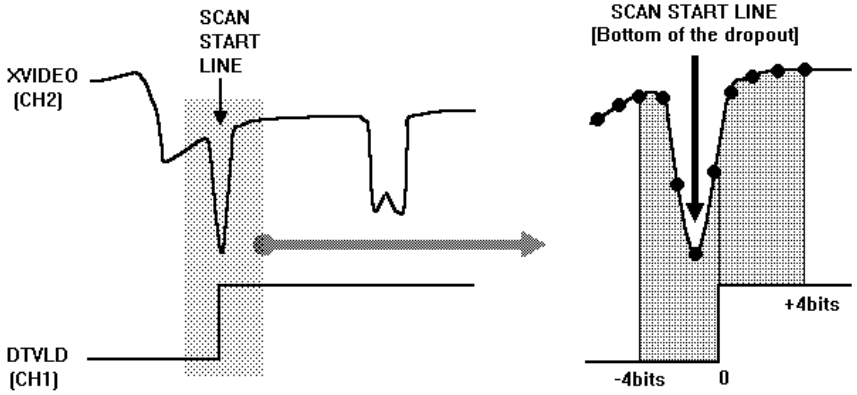
1. Set up the oscilloscope as follows:
   CH1 (DTVLD) - 5 V/div.
   CH2 (XVIDEO) - 0.2 V/div.
   TIME - 1 ms/div.
   Use ALT mode to display CH1 and CH2 at the same time.

2. Loosen the SBU securing screws.

3. The XVIDEO signal shows one of the waveforms shown below.



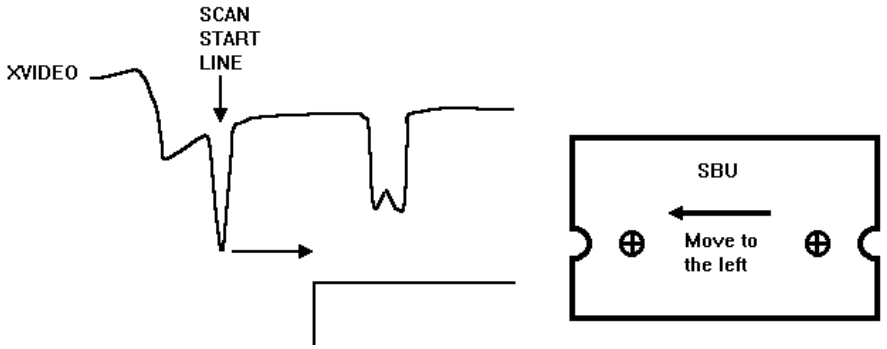
4. Enlarge the shaded part of the waveform above by changing the TIME scale to 50 μs/div or 20 μs/div. The scan start line appears as the first sharp dropout from the left of the XVIDEO signal on the oscilloscope. The dropout of the waveform has to be within ±4 bits from the rising edge of the DTVLD signal as shown below.



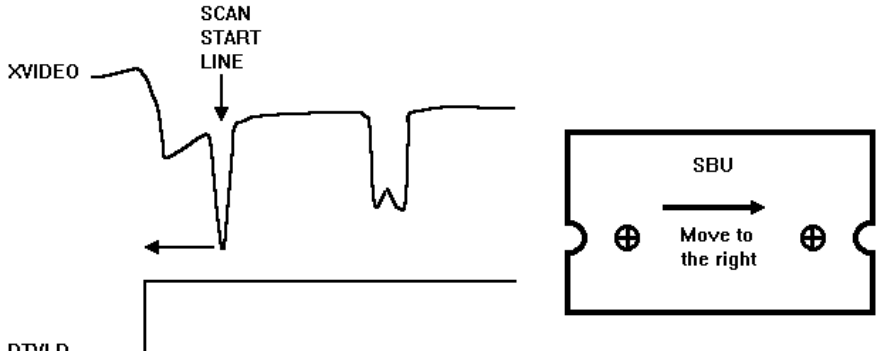
If the scan start line is not at the correct position, go to step 5 to adjust the horizontal scan line position.

2. Horizontal Scan Line Adjustment

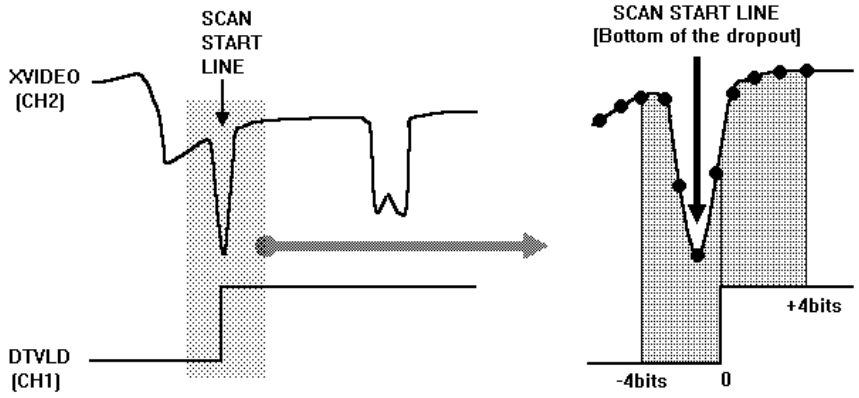
5. Adjust the horizontal scan line position as shown below.
   If the scan start line is to the left of the rising edge of the DTVLD signal, move the SBU to the left.



If the scan start line is to the right of the rising edge of the DTVLD signal, move the SBU to the right.



6. After adjustment, be sure that the scan start line is within ± 4 bits from the rising edge of the DTVLD signal, then go to the **"Vertical Scan Line Adjustment"** procedure.

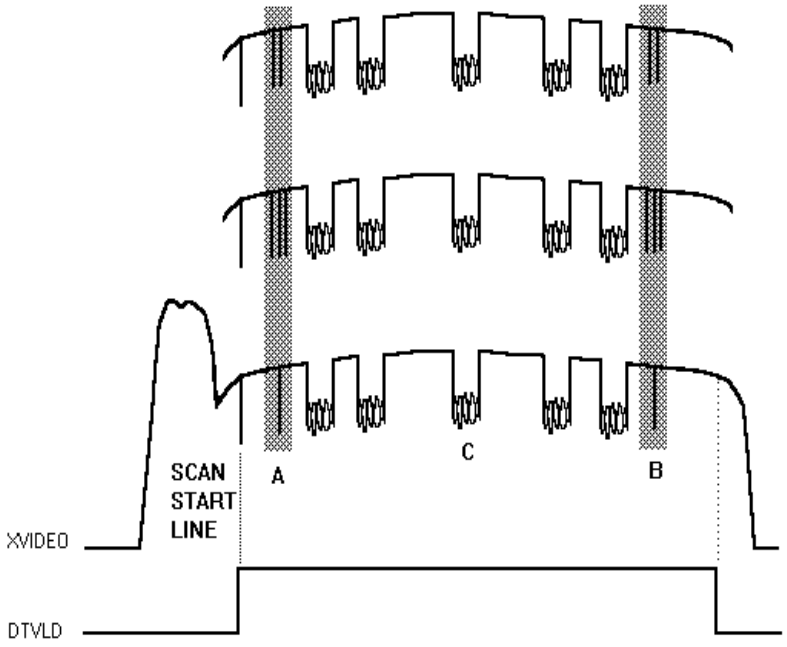


Note: Scan end line adjustment is not necessary.

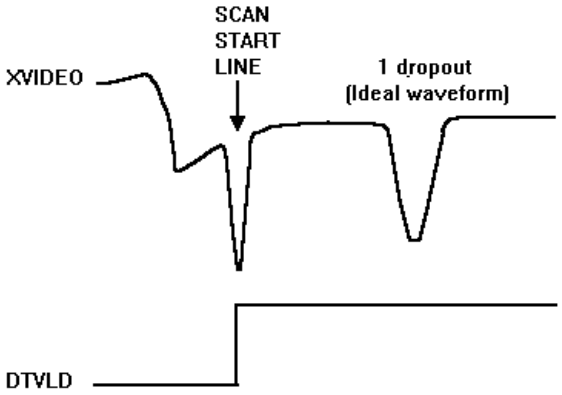
3. Vertical Scan Line Adjustment

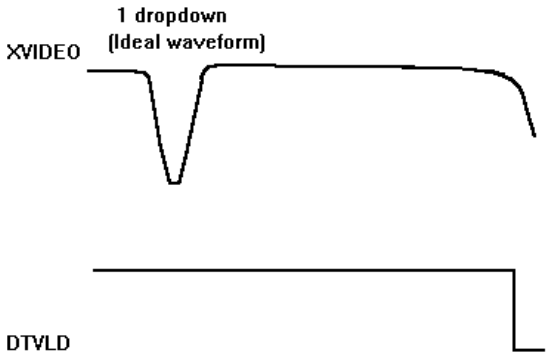
1. Set up the oscilloscope as follows:
   CH1 (DTVLD) - 5 V/div.
   CH2 (XVIDEO) - 0.2 V/div., not inverted
   TIME - 1 ms/div.
   Use ALT mode to display CH1 and CH2 at the same time.

2. The XVIDEO signal shows one of the waveforms shown below.
   At “A” and “B” on the XVIDEO waveform, one, two or three dropouts are seen now.



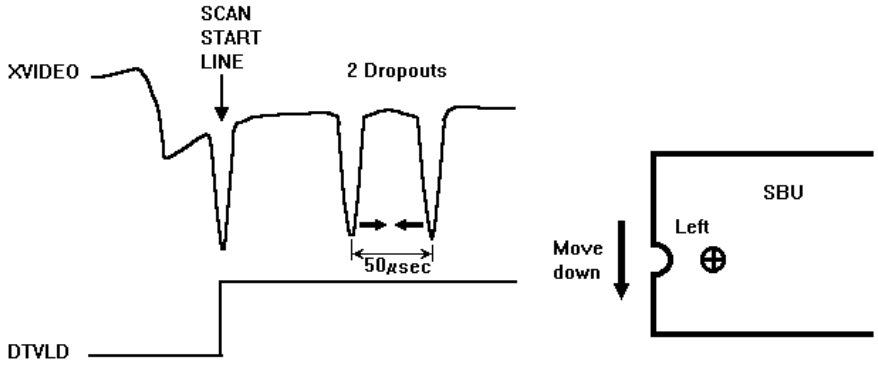
Enlarge areas “A” and “B” by changing the time scale to 50 μs/div or 20 μs/div.
The ideal waveform should have only one dropout at each of “A” and “B”. If the waveform has two or three dropouts there, go to step 3 to adjust the “A” part (scan start side) and/or step 4 to adjust the “B” part (scan end side).



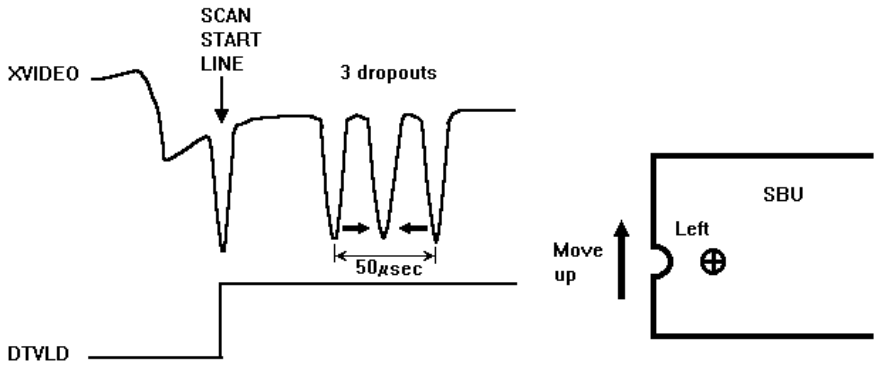


3. Vertical Scan Line Adjustment

3. Adjustment at the scan start side.
   If the waveform has two dropouts at the scan start side, move down the left side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



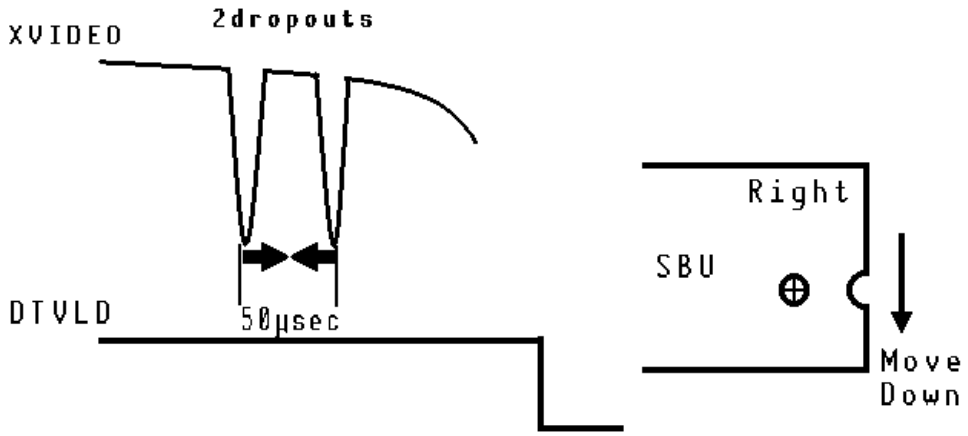
   If the waveform has three dropouts at the scan start side, move up the left side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



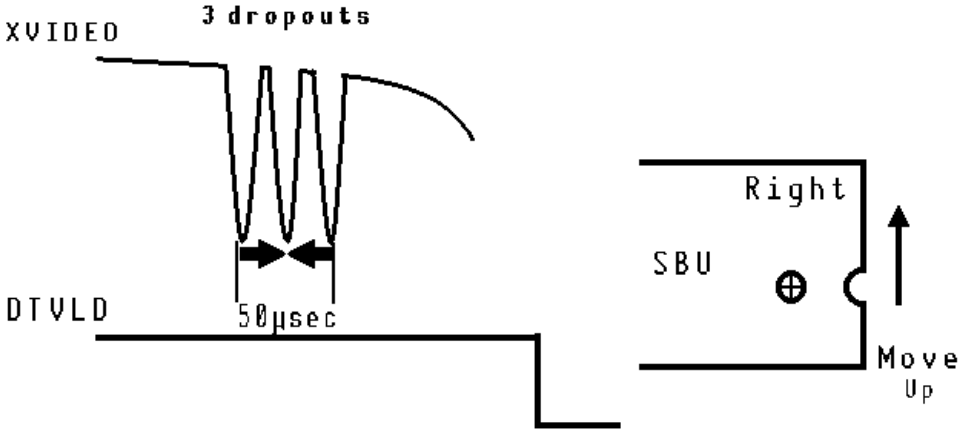
3. Vertical Scan Line Adjustment

4.

Adjustment at the scan end side.
If the waveform has two dropouts at the scan end side, move down the right side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



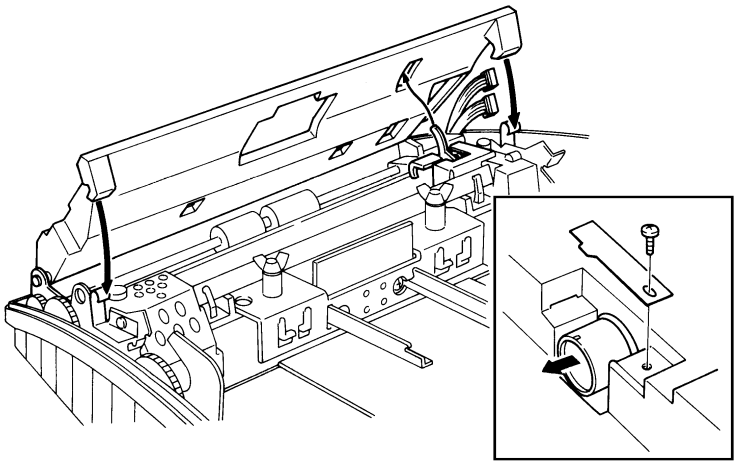
If the waveform has three dropouts at the scan end side, move up the right side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



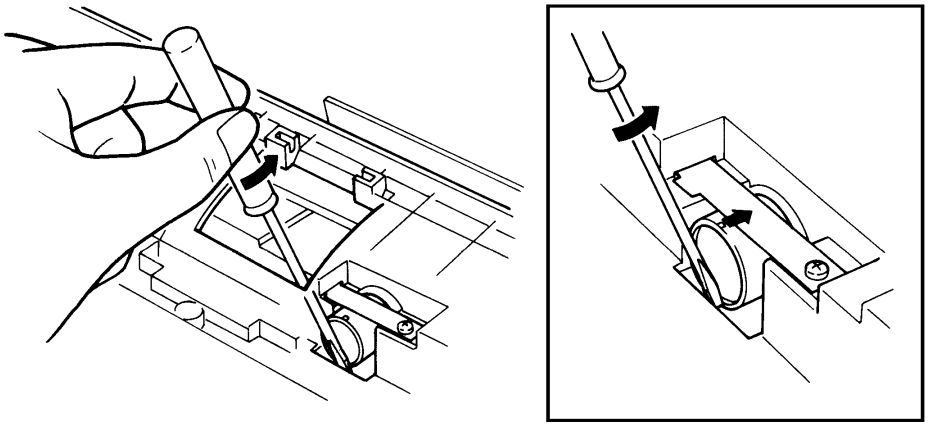
5. After adjusting the scan end side, confirm that the scan start side is still well adjusted, as the adjustment at one side often changes the waveform at the other side.

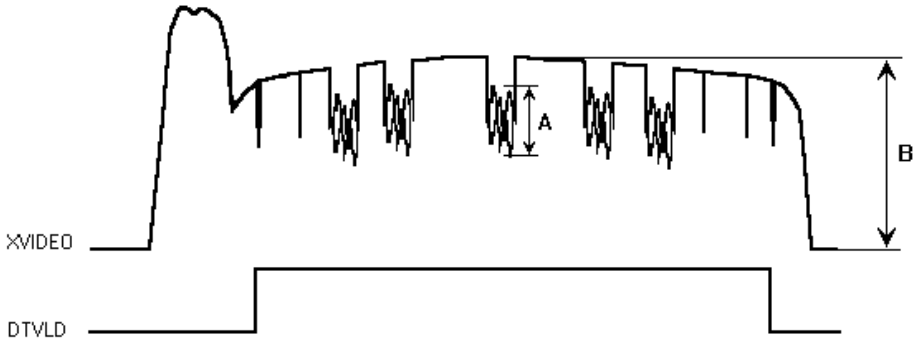
4. Focusing

1. Loosen the lens securing screw [A] and pull out the lens 1 or 2 mm from the scanner base surface as shown on the right.



2. Move back the lens using a small (-) screwdriver so that the amplitude of each moire [A] becomes more than 20% of the white level output [B].





3. Tighten the lens securing screw.

After finishing the adjustments, switch off the power, take out the adjustment tools, bracket, test lead and the white pressure plate from the machine. Then reassemble the machine.

5. TROUBLESHOOTING

5. 1. COPY QUALITY PROBLEMS

5. 1. 1. Received Copies

If there is no fault in the receiving terminal or on the line, but the copy quality is bad, do the following:

- Check that the thermal head, platen roller and spring plate assembly are assembled completely.
- Clean the thermal head (soft cloth and alcohol).
- Replace the thermal head or FDU.

5. 1. 2. Printouts Made in Copy Mode

If printouts of received fax messages are OK but printouts made using copy mode are not, the following faults must be considered in addition to the printer faults mentioned above.

Symptom	Remedies
Blank or black copies	• Check the scanner/sensor mechanism and adjust or replace any defective parts. • Replace the SBU or FDU.
Vertical black lines on the copy	• Clean the scanner optics and LED array (soft cloth). • Replace the SBU if there are any sharp peaks or dropouts in the CCD waveform.
Uneven density	• Adjust the scan line position (see section 4-5-3). • Clean the scanner optics and LED array (soft cloth). • Replace the LED array if it is defective.
Magnification	• Check that the mirrors are assembled correctly on the scanner base.
Blurred characters	• Adjust the focusing (see section 4-5-3).
Filled-in characters	• Adjust the focusing (see section 4-5-3).
Side-to-side registration error	• Adjust the scan start position (see section 4-5-3).
One side darker than the other	• Adjust the CCD waveform flatness (see section 4-5-3). • Check the LED array; replace it if it is defective.
Image only partially scanned	• Adjust the scan line position and/or scan start position (see section 4-5-3).

5. 1. 3. Effects of Line Problems on Copy Quality

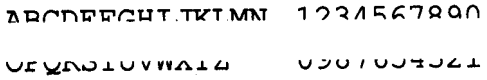
Missing lines; shrinkage in the sub scan direction

- Original -

ABCDEFGHIJKLMN 1234567890

OPQRSTUVWXYZ 0987654321

- Bad Copy Sample -



Cut off

- Bad Copy Sample -

ABCDEFGHIJKLMN 1234567890

Some lines may be missing
just before the cut off.

5. 2. MACHINE OPERATION

Use the following procedures while referring to the point-to-point diagram and signal tables. The procedures may not be exhaustive, but they may help you to solve the problem.

5. 2. 1. Scanner/Document Feeder

1. Non-feed

Test	Action if Yes	Action if No
1. Is the scanner cover closed properly?		
2. Was the document placed in the feeder correctly? Was the document of a recommended type?		
3. Is the document fed into scanner after you place it in the ADF ?	Finished.	Go to test 4.
4. Does the document sensor actuator move correctly.	Go to test 5.	Reassemble or replace the actuator. Go back to test 3.
5. Do the two red LEDs on the lefthand side of the LED array light correctly, without a document in the feeder ?	Go to step 8.	Go to step 6.
6. Check the +5V output from the FDU. Is the output correct ?	Replace the LED array, then go back to test 3	Go to step 7.
7. Does the PSU output +24V?	Check the PSU-FDU connection or replace the FDU.	If the wall socket is good, replace the PSU.
8. Is the scan start line of the SBU well adjusted ?	Go to step 9.	Adjust the scan start position.

Test	Action if Yes	Action if No
9. Check the connection to the tx motor. Does the FDU both: a) output +24V to the tx motor, b) output stepper motor drive phase signals to the motor?	Replace the FCE.	Replace the FDU.

2. Double Feed

Test	Action if Yes	Action if No
1. Was the document placed in the feeder carefully and in the correct manner?		
2. Clean or replace the separation rubber plate.		
3. Is the operation panel closed at each side ?		

3. Jam

Test	Action if Yes	Action if No
1. Check that the document is not curled seriously or not longer than 600 mm.		
2. Clean the rollers in the feeder/scanner with a soft cloth and water.		
3. Check for blockages in the document feed path. Check the scanner drive mechanism.		
4. Does the scan line sensor actuator move correctly ?	Go to test 5.	Reassemble or replace the actuator.
5. Do the two red LEDs on the lefthand side of the LED array light correctly, without a document in the feeder ?	Go to step 8.	Go to step 6.
6. Does the FDU output +5V output correctly ?	Replace the LED array.	Go to step 7.
7. Does the PSU output +24V?	Check the PSU-FDU connection or replace the FDU.	If the wall socket is good, replace the PSU.
8. Does the CCD on the SBU have defective elements in the scan line sensor detection part ?	Replace the SBU.	Replace the FCE.

4. Skew

Test	Action if Yes	Action if No
1. Clean the rollers in the feeder/scanner with a soft cloth and water.		
2. Clean or replace the separation rubber plate.		
3. Is the operation panel closed at each side ?		

5. Dirty Document

Test	Action if Yes	Action if No
1. Clean the rollers in the feeder/scanner with a soft cloth and water.		

5. 2. 2. Printer

1. Non Feed

Symptom: Non feed		
Check	**Action if Yes**	**Action if No**
1. Is the printer jammed with debris?	Clear the debris.	Go to step 2.
2. Is the printer cover closed properly?	Go to step 3.	Close the cover.
3. Are the connections between the FCE, FDU, and cover sensor loose?	Connect the cables properly.	Go to step 4.
4. Does the FDU switch on +24VSW when a ringing signal is detected or when Copy is pressed?	Go to step 8.	Go to step 5.
5. Does the signal from the cover switch change when the cover is opened and closed?	If CLOSE PAPER COVER is not displayed when the cover is open, change the FCE. Go to step 6.	Change the cover switch and/or the actuator mechanism.
6. Are the connections between the FDU, LIU, and telephone line loose?	Connect the cables properly.	Go to step 7.
7. Does the FCE send the POWON signal to the FDU when a ringing signal is detected or when Copy is pressed?	Replace the PSU.	Replace the FDU or LIU.
8. Are the connections between the FDU and the paper end sensor loose?	Connect the cables properly.	Go to step 9.
9. Does the Replace Paper indicator light when paper is present?	Go to step 11.	Go to step 10.
10. Does the signal from the paper end sensor change in the correct way?	Change the FCE.	Replace the paper end sensor.
11. Are the connections between the PSU, FDU, and the rx motor loose?	Connect the cables properly.	Go to step 12.
12. Does the FDU output power and phase drive signals to the rx motor?	Replace the rx motor.	Replace the FDU.

2. Jam

Symptom: Jam		
Check	**Action if Yes**	**Action if No**
1. Is the printer jammed with debris?	Clear the debris.	Go to step 2.
2. Is the printer jam sensor good?	Go to step 5.	Go to step 3.
3. Are the connections between the printer jam sensor and the FDU loose?	Connect the cables properly.	Go to step 4.
4. Does the signal from the printer jam sensor change correctly?	Change the FDU.	Replace the printer jam sensor.
5. Is the cutter blade at the home position after cutting (lefthand side of the machine) ?	Replace the FCE.	Open the printer cover, set the paper correctly, and close the printer cover. Go to step 6.
6. Does the cutter initialize itself ?	Go to step 7.	Replace the cutter unit.
7. Are the connections between the FDU and the paper end sensor loose?	Connect the cables properly.	Go to step 8.
8. Does the Replace Paper indicator light when paper is present?	Go to step 10.	Go to step 9.
9. Does the signal from the paper end sensor change in the correct way?	Change the FDU.	Replace the paper end sensor.
10. Are the connections between the PSU, FDU, and the rx motor loose?	Connect the cables properly.	Go to step 11.
11. Does the FDU output power and phase drive signals to the rx motor?	Replace the rx motor.	Replace the FDU.

Symptom: Abnormal noise		
Check	**Action if Yes**	**Action if No**
1. Is the cover closed?	Go to step 2.	Close the cover.
2. Are the printer mechanisms assembled correctly?	Replace the rx motor or the FDU.	Assemble the machine properly.

5. 3. ERROR CODES

If an error code occurs, retry the communication. If the same problem occurs, try to fix the problem as suggested below. Note that error codes 4-00, 01, 02, and 10 only appear in the error code display and on the service report.

Code	Meaning	Suggested Cause/Action
0-00	DIS/NSF not detected within 40 s of Start being pressed	Check the line connection. Check the LIU - FDU - FCE connectors. The machine at other end may be incompatible. Replace the FDU or LIU. Check for DIS/NSF with an oscilloscope. If the rx signal is weak, there may be a bad line.
0-01	DCN received unexpectedly	The other party is out of paper or has a jammed printer. The other party pressed Stop during communication.
0-03	Incompatible modem at other end	The other terminal is incompatible.
0-04	CFR or FTT not received after modem training	Check the line connection. Check the LIU - FDU -FCE connectors. Try changing the tx level (use NCU parameter 10). Replace the FCE, FDU or LIU. The other terminal may be faulty; try sending to another machine. If the rx signal is weak or defective, there may be a bad line.
0-05	Unsuccessful after modem training at 2400 bps	Check the line connection. Check the FCE - LIU - FDU connectors. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, FDU or LIU. Check for line problems.
0-06	The other terminal did not reply to DCS	Check the line connection. Check the FCE - FDU - LIU connectors. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, LIU or FDU. The other end may be defective or incompatible; try sending to another machine. Check for line problems.
0-07	No post-message response from the other end after a page was sent (3rd try failed)	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. The other end may have jammed or run out of paper. The other end user may have disconnected the call. Check for a bad line. The other end may be defective; try sending to another machine.
0-08	The other end sent RTN or PIN after receiving a page, because there were too many errors	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. The other end may have jammed, or run out of paper or memory space. Try adjusting the tx level (use NCU parameter 10). The other end may have a defective modem/NCU/FCU; try sending to another machine. Check for line problems and noise.

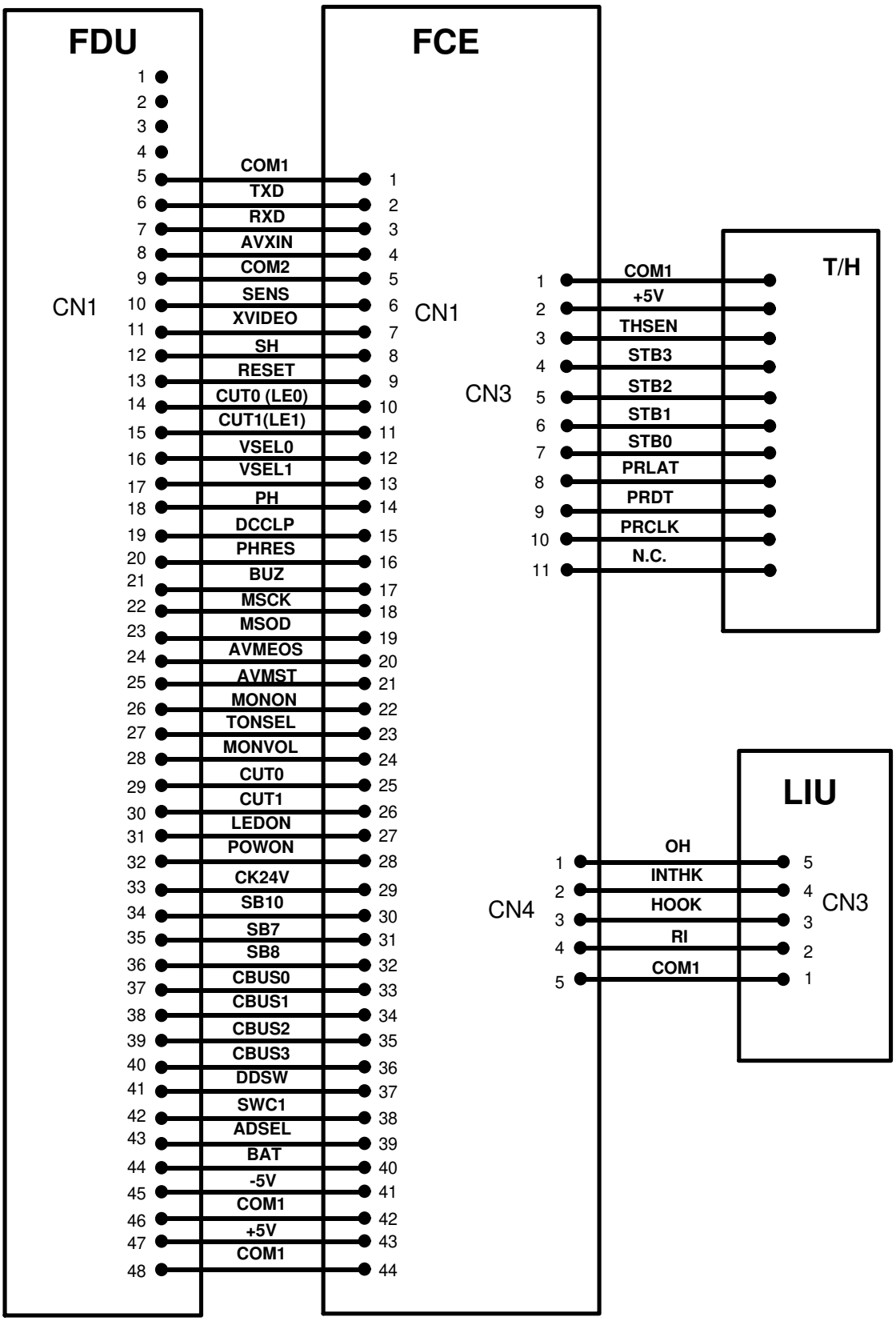
Code	Meaning	Suggested Cause/Action
0-10	The other end did not send a reply to EOP, EOM or MPS	Check the line connection. Check the FCE - FDU - LIU connection. Replace the FCE, LIU or FDU. Try adjusting the tx level (use NCU parameter 10). The other end may have a defective modem/NCU/FCU; try sending to another machine. Check for line problems and noise.
0-14	Non-standard post message response code received	Check the FCE - FDU - LIU connectors. Incompatible or defective remote terminal; try sending to another machine. Noisy line: resend. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, LIU or FDU.
0-20	Facsimile data not received within 6 s of retraining	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. Check for line problems. Try calling another fax machine. Change the reconstruction time from 6 s to 10 s (bit switch 01, bit 0). Switch the rx cable equalizer on (bit switch 00, bit 1).
0-21	EOL signal (end-of-line) from the other end not received within 5 s of the previous EOL signal	Check the connections between the FCE, FDU, LIU, & line. Check for line noise or other line problems. Replace the FCE, LIU or FDU. The remote machine may be defective or may have disconnected.
0-22	The signal from the other end was interrupted for more than 0.2 s	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. Defective remote terminal. Check for line noise or other line problems.
0-23	Too many errors during reception	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. Defective remote terminal. Check for line noise or other line problems. Switch the rx cable equalizer on (bit switch 00, bit 1). Ask the other end to adjust their tx level.
1-00	Document jam	Improperly inserted document or unsuitable document type. See "Mechanical Operation - Document Jam".
1-01	Document length exceeded the maximum	Divide the document into smaller pieces. See "Mechanical Operation - Document Jam".
1-10	Document in the scanning position at power-up	Clear debris from the sensor actuators. Check the SBU horizontal adjustment. Replace SBU, FCE or FDU.
1-17	Document jam in the feed-out area	
1-20	Printer jam - paper did not reach the exit	Clear any debris from the sensors and the paper path. Clean the sensors in the printer. Check that the copy tray is not overloaded. Check the paper feed mechanism and paper path for faults. Check the connections from the FDU to the rx motor and printer sensors. Replace the rx motor, printer jam sensor, or FDU.
1-21	Printer jam - paper stuck at the exit	

Code	Meaning	Suggested Cause/Action
1-23	Cutter jam	Clear any debris from the sensors and the paper path. Clean the cutter sensor. Check the cutter mechanism. Check the connections from the FDU to the cutter motor and cutter sensors. Replace the cutter motor, cutter sensor, or FDU.
1-24	Cutter failed to initialize	
1-30	Paper ran out during printing	Add paper. If paper is present, clean the paper end sensor and check the sensor circuit for defects. Replace the FCE, FDU or the paper end sensor.
1-33	Paper end was detected when the machine was switched on	
1-71	The printer cover was opened during printing	Check whether the user opened the cover during printing. Check the cover lock mechanism. Check the cover switch position and actuation mechanism. Check connections between the cover switch and the FDU. Replace the cover switch, FCE or FDU.
2-12	Modem clock irregularity	Replace the FCE.
2-20	Abnormal coding/decoding (cpu not ready)	Replace the FCE.
3-90		
4-00	One page took longer than 8 minutes to transmit	Check for a bad line. Try the communication at a lower resolution, or without halftone. Change the FCE.
4-01	Line current was cut	Check the line connector. Check the connection between the FDU and the LIU. Check for line problems. Replace the FDU, the FCE or the LIU.
4-02	The other end cut the received page as it was longer than the maximum limit.	Ask the other end to change their maximum receive length setting, then resend.
4-10	Communication failed because of ID Code mismatch (Closed Network) or TSI mismatch (Authorized Reception)	Get the ID Codes the same and/or the TSIs programmed correctly, then resend. The machine at the other end may be defective.
5-21	Memory overflow	Temporary memory shortage or the document takes up too much data. Use a lower resolution or do not use Halftone. Replace the FCE.
6-01	Post message could not be received after a page was sent (G3 ECM)	Check the line connection. Check the connections between LIU - FDU - FCE. Try adjusting rx cable equalizer. The other end may have a defective Modem/FCU/NCU; try sending to another machine. Check for line problems and noise.
6-02	EOR received (G3 ECM)	Check the line connection. Check the connections between LIU - FDU - FCE. Try adjusting rx cable equalizer. The other end may have a defective Modem/FCU/NCU; try sending to another machine. Check for line problems and noise.

Code	Meaning	Suggested Cause/Action
6-05	Facsimile data frame not received within 18 s of CFR, but there was no line fail (G3 ECM)	Check the line connection. Check the connections from the FCE, FDU to the LIU. Check for a bad line or defective remote terminal. Replace the FCE or LIU. Switch the rx cable equalizer on (bit switch 00, bit 1).
6-06	Coding/decoding error (G3 ECM)	Defective FCE. Defective remote terminal.
6-08	PIP/PIN was received in reply to PPS.NULL (G3 ECM)	The other end pressed Stop during communication. The other terminal may be defective.
6-09	ERR received (G3 ECM)	Check for a noisy line. Adjust the tx levels of the communicating machines. See code 6-05.
6-10	Error frames still received at the other end after all communication attempts at 2400 bps (G3 ECM)	Check for line noise. Adjust the tx level (use NCU parameter 01). Check the line connection. Defective remote terminal.

6. ELECTRICAL DATA

6. 1. CONNECTION FROM FCE



6. 1. 1. FCE - FDU

CN1			
No	**Name**	**Function**	**V**
1	N.C.	No connection	
2	N.C.	No connection	
3	N.C.	No connection	
4	N.C.	No connection	
5	COM1	Digital ground	0
6	TXD	Transmit data	X
7	RXD	Receive data	X
8	AVXIN	AVM send signal (COM2 N.C. in FDU)	0
9	COM2	Analog ground	0
10	SENS	SB4 or SB5	X
11	XVIDEO	Analog video signal	X
12	SH	Shift clock to CCD	C
13	RESET	Reset out	5
14	CUT0 (LE0)	LED control (N.C. in FDU)	0
15	CUT1 (LE1)	LED control (N.C. in FDU)	0
16	VSEL0	Gain control of video signal	0 - 5
17	VSEL1	Gain control of video signal	0 - 5
18	PH	1st phase transfer clock to CCD	C
19	DCCLP	DC restore request of video signal	C
20	PHRES	Reset clock to CCD	C
21	BUZ	Buzzer drive signal	0
22	MSCK	S/P clock of motor	C
23	MSOD	Data of motor	C
24	AVMEOS	from AVM IC (+5v in FDU)	C
25	AVMST	to AVM IC	C
26	MONON	Monitor speaker control	0
27	TONSEL	Tone/Rx control	0
28	MONVOL	to AVM IC	0
29	CUT0	Cutter control	0
30	CUT1	Cutter control	0
31	LEDON	LED-array control	0
32	POWON	+24VSW Control	0
33	CK24V	T/H check	5
34	SB10	SB10 (Cover open)	0
35	SB7	SB7 (Cutter position)	5
36	SB8	SB8 (Cutter position)	0
37	CBUS0	AVM IC data (N.C. in FDU)	0
38	CBUS1	AVM IC data (N.C. in FDU)	0

CN1			
No	**Name**	**Function**	**V**
39	CBUS2	AVM IC data (N.C. in FDU)	0
40	CBUS3	AVM IC data (N.C. in FDU)	0
41	PIO7	N.C. in FDU	0
42	SWC1	N.C. in FDU	0
43	ADSEL	SB4/SB5 exchange control	C
44	BAT	Battery power	3
45	-5V	Power	-5
46	SWC0	Digital ground (N.C. in FDU)	0
47	+5V	Power	+5
48	COM1	Digital ground	0

6. 1. 2. FCE - Thermal Head

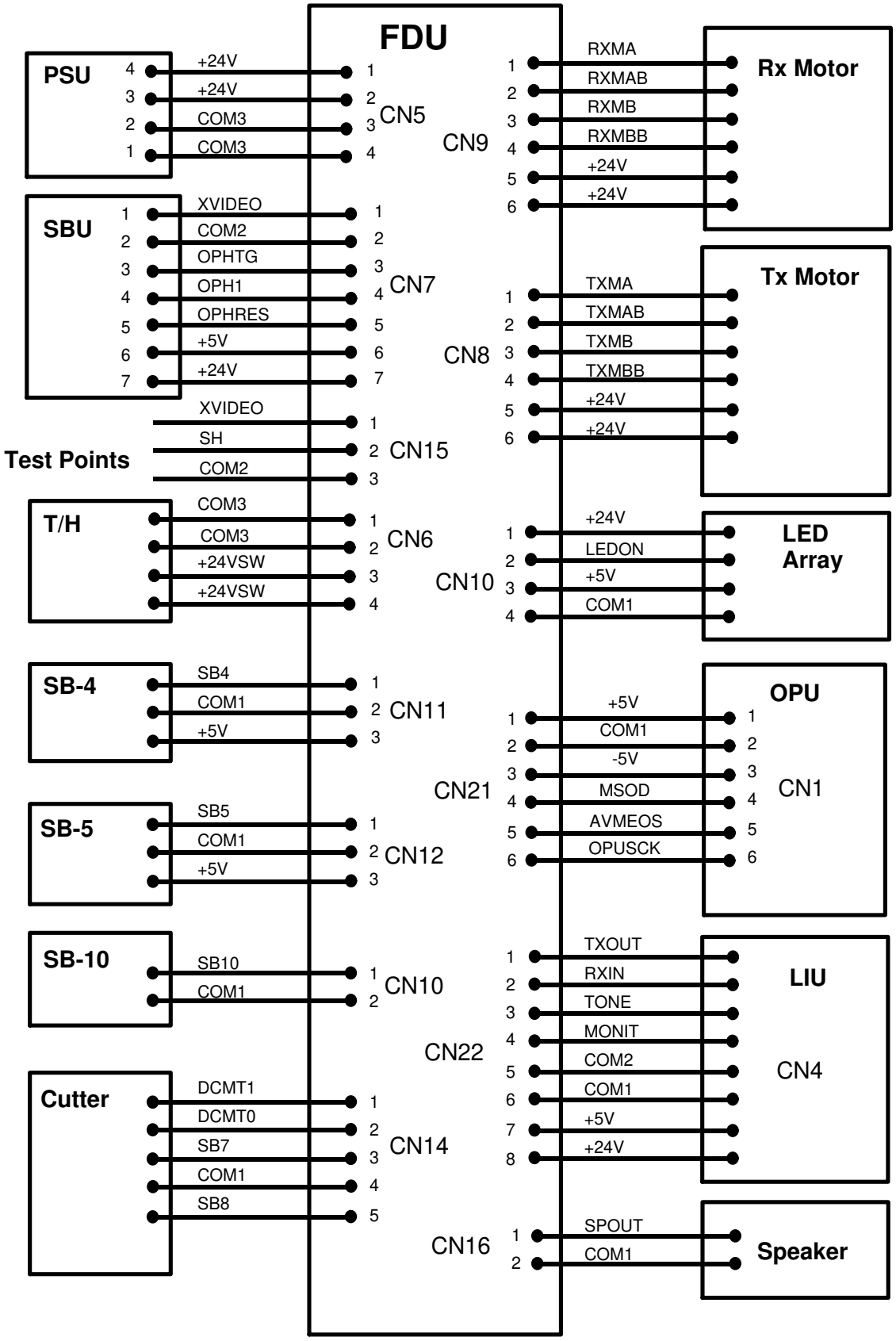
CN3			
No	**Name**	**Function**	**V**
1	COM1	Ground	0
2	+5V	Power	5
3	THSEN	Thermistor input	X
4	STB3	Fourth strobe	5
5	STB2	Third strobe	5
6	STB1	Second strobe	5
7	STB0	First strobe	5
8	PRLAT	Print data latch pulse	5
9	PRDT	Print data	5
10	PRCLK	Print data sampling clock	5
11	N.C.	No connection	0

6. 1. 3. FCE - LIU

CN4			
No	**Name**	**Function**	**V**
1	OH	OH relay control	0
2	INTHK (RIALP)	Internal hook SW detect (α-Link detect)	5
3	HOOK	Current detect	5
4	RI	Ringing detect	5
5	COM1	Ground	0

Note: "V" is the level of the signal after power on.
C: Clock (0 - 5V)
X: Analog (0 - 5V)
L: Telephone line

6. 2. CONNECTION FROM FDU



6. 2. 1. FDU - PSU

CN5			
No	**Name**	**Function**	**V**
1	+24V	DC power	24
2	+24V	DC power	24
3	COM3	Ground for +24V	0
4	COM3	Ground for +24V	0

6. 2. 2. FDU - SBU

CN7			
No	**Name**	**Function**	**V**
1	XVIDEO	Analog video signal	X
2	COM2	Analog ground	0
3	OPHTG	Shift clock to CCD	C
4	OPH1	First phase transfer clock	C
5	OPHRES	Reset clock (CCD output buff.)	C
6	+5V	+5V DC power	5
7	+24V	DC power	24

6. 2. 3. Scanner Test Points

CN15			
No	**Name**	**Function**	**V**
1	XVIDEO	Analog video	X
2	COM2	Ground	0
3	SHT	Shift clock to CCD	C

6. 2. 4. FDU - Thermal Head

CN6			
No	**Name**	**Function**	**V**
1	COM3	Ground for +24V	0
2	COM3	Ground for +24V	0
3	+24VSW	Switched 24V	5
4	+24VSW	Switched 24V	5

6. 2. 5. FDU - FCE

CN1: See FCE CN1 (section 6-1-1).

6. 2. 6. FDU - Paper End Sensor (SB-4)

CN11			
No	**Name**	**Function**	**V**
1	SB4	Signal from sensor	X
2	COM1	Ground	0
3	+5V	DC power	5

6. 2. 7. FDU - Paper Jam Sensor (SB-5)

CN12			
No	**Name**	**Function**	**V**
1	SB5	Signal from sensor	X
2	COM1	Ground	0
3	+5V	DC power	5

6. 2. 8. FDU - Cover Sensor (SB-10)

CN13			
No	**Name**	**Function**	**V**
1	SB10	Signal from sensor	0
2	COM1	Ground	0

6. 2. 9. FDU - Cutter

CN14			
No	**Name**	**Function**	**V**
1	DCMT1	Cutter drive 1	0
2	DCMT0	Cutter drive 0	0
3	SB7	Signal from cutter end position sensor	5
4	COM1	Ground	0
5	SB8	Signal from cutter home position sensor	0

6. 2. 10. FDU - Rx Motor

CN9			
No	**Name**	**Function**	**V**
1	RXMA	Rx motor phase $\overline{A}$ drive	24
2	RXMAB	Rx motor phase $\overline{A}$ drive	24
3	RXMB	Rx motor phase B drive	24
4	RXMBB	Rx motor phase $\overline{B}$ drive	24
5	+24V	+24V DC power	24
6	+24V	+24V DC power	24

6. 2. 11. FDU - Tx Motor

CN8			
No	**Name**	**Function**	**V**
1	TXMA	Tx motor phase A drive	24
2	TXMAB	Tx motor phase $\overline{A}$ drive	24
3	TXMB	Tx motor phase B drive	24
4	TXMBB	Tx motor phase $\overline{B}$ drive,	24
5	+24V	+24V DC power	24
6	+24V	+24V DC power	24

6. 2. 12. FDU - LED Array

CN10			
No	**Name**	**Function**	**V**
1	+24V	DC power	24
2	LEDON	LED array drive	14
3	+5V	DC power	5
4	COM1	Ground	0

6. 2. 13. FDU - LIU

CN22			
No	**Name**	**Function**	**V**
1	TXOUT	Transmit data	0
2	RXIN	Receive data	0
3	TONE (COM2)	Tone input	0
4	MONIT	Monitor input	0
5	COM2	Analog ground	0
6	COM1	Ground	0
7	+5V	+5V DC power	5
8	+24V	DC power	24

6. 2. 14. FDU - Speaker

CN16			
No	**Name**	**Function**	**V**
1	SPOUT	Speaker out	0
2	COM1	Ground	0

6. 2. 15. FDU - OPU

CN21			
No	**Name**	**Function**	**V**
1	+5V	Power	5
2	COM1	Ground	0
3	-5V	Power	-5
4	MSOD	Serial output data	C
5	AVMEOS	Serial input data	C
6	OPUSCK	Serial shift clock	C

Note: "V" is the level of the signal after power on.
C: Clock (0 - 5V)
X: Analog (0 - 5V)
L: Telephone line

6. 3. CONNECTION FROM LIU

6. 3. 1. LIU-Line

CN1			
No	**Name**	**Function**	**V**
1			
2	A1	Detection for α - Link	L
3	L1	Phone line tip	L
4	L2	Phone line ring	L
5	A2	Detection for α - Link	L
6			

6. 3. 2. LIU - FCE

CN3: See FCE CN4 (section 6-1-4).

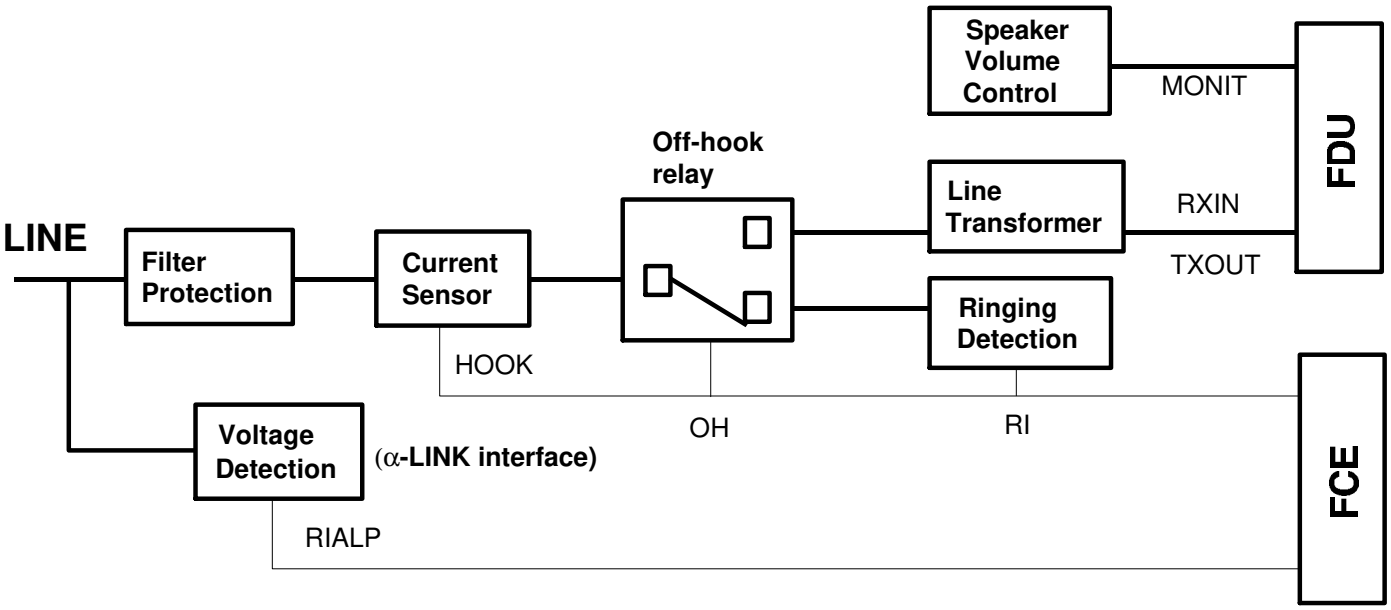
6. 3. 3. LIU - FDU

CN2: See FDU CN22 (section 6-2-13).

Note: "V" is the level of the signal after power on.
C: Clock (0 - 5V)
X: Analog (0 - 5V)
L: Telephone line

A. APPENDIX A. LINE INTERFACE

1. Overall LIU description



LIU Block Diagram

The LIU (Line Interface Unit) is the interface between the line or the α-LINK interface, and contains filters, a current sensor, Off-Hook(OH) relay, ring detection circuit and voltage detection for α-LINK interface. The OH relay switches the line either to the modem or to the ring detection circuit.

In standby mode, the relay is switched down to connect the line to the ring detection circuit. The OH relay is only switched up when the "SPEAKER" key is pressed for transmission.

2. Making a Telephone Call

When the user press the "SPEAKER" key, the OH relay switches up to connect the modem to the line. The digits dialled at the dialpad are informed to the modem through the FDU, and the modem dials the number.

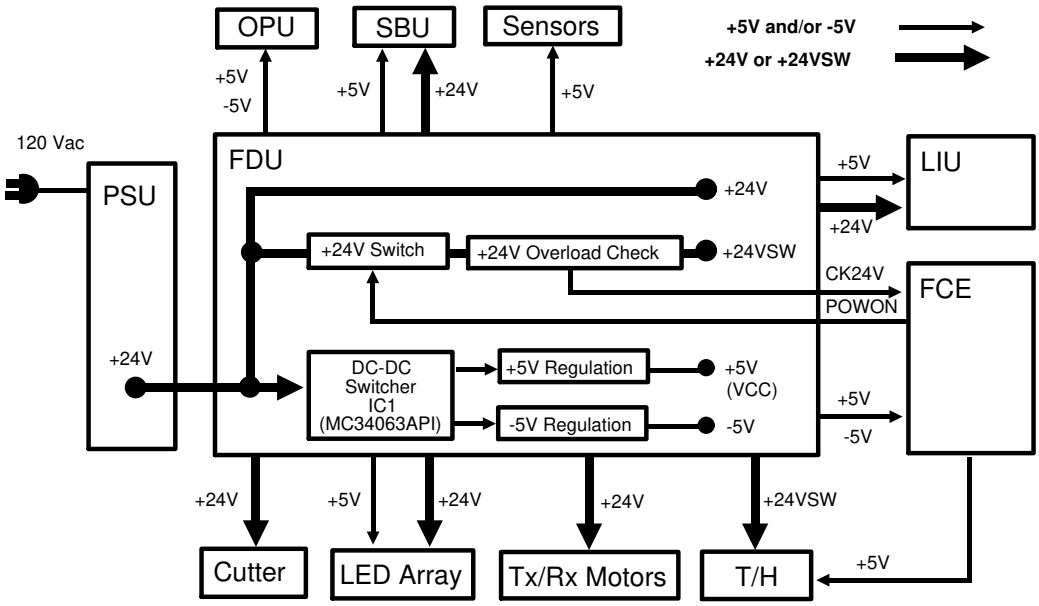
3. Receiving a Telephone Call

When the machine detects a ringing signal or a connection request signal for α-LINK interface, the machine switches up the OH relay and starts to send CED/DIS/NSF for fax reception.

B. APPENDIX B. POWER DISTRIBUTION

B. 1. 1. PSU/FDU

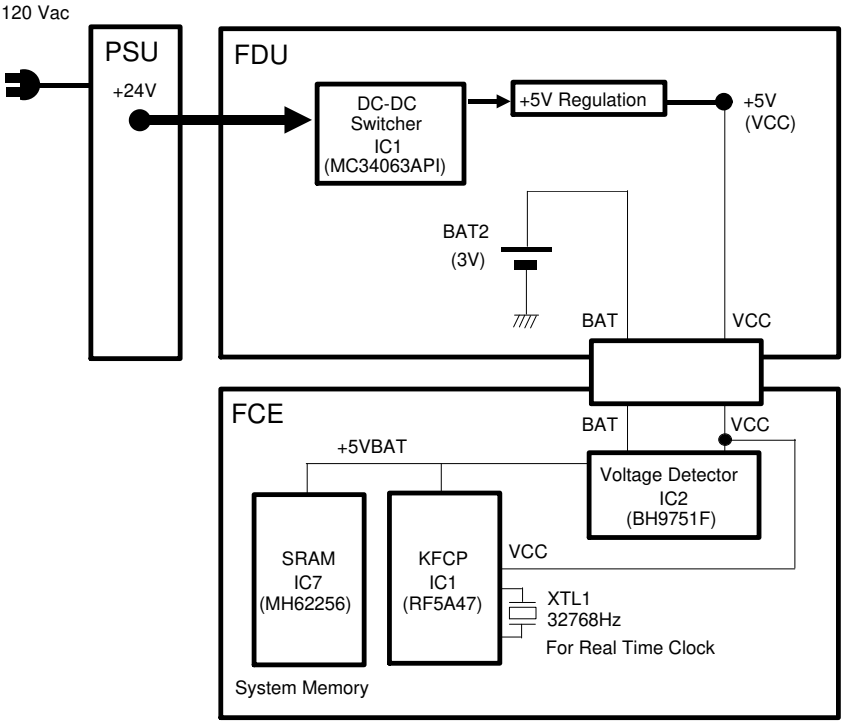
The PSU regulates the 120 Vac input to generate +24 Vdc. The +24Vdc is then supplied to the secondary power supply circuit on the FDU to generate ± 5 Vdc. The +24VSW for the thermal head is switched on by the FCE when a fax call is coming in; this voltage is watched by the FCE to check for overload.



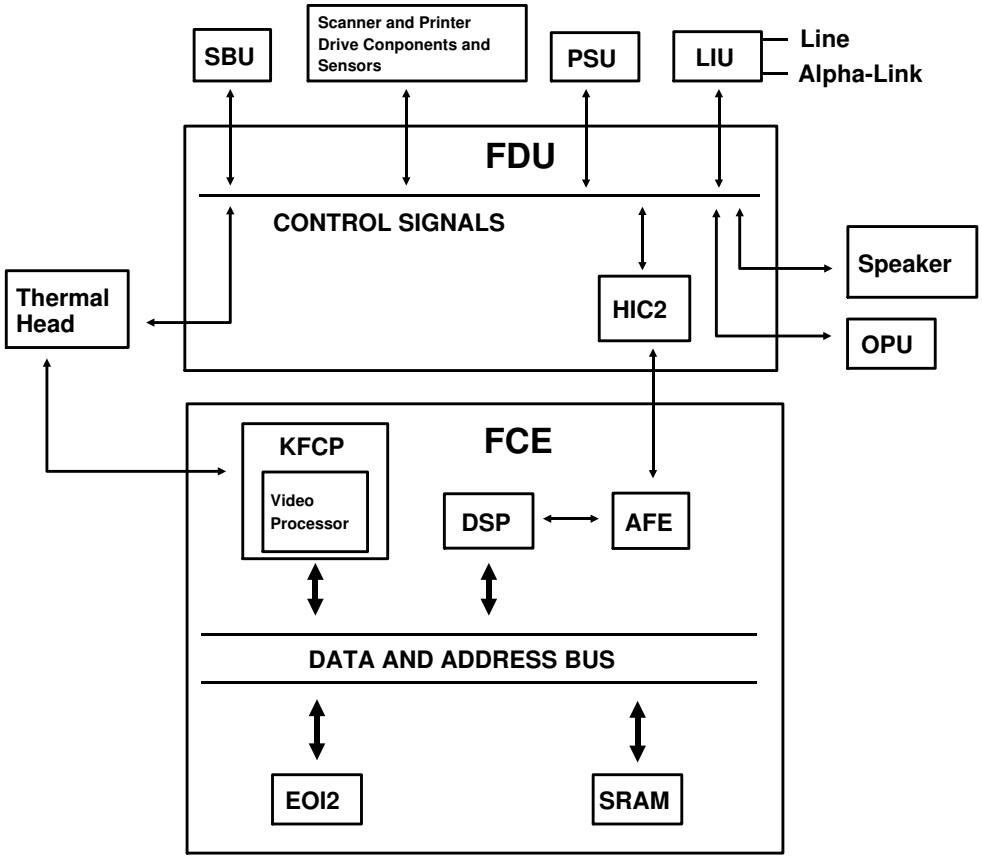
B. 2.

2. Battery Back-up

On the FCE board, the system memory SRAM and the KFCP, which controls the real time clock's oscillator, always have to be backed up by dc voltage. When the power is supplied from the PSU, VCC (+5V) and +5VBAT back up these ICs. When power is not supplied from the PSU, the voltage detector on the FCE connects the BAT signal, on which +3Vdc is supplied from the battery on the FDU, to +5VBAT, so that it can back-up these ICs.



C. APPENDIX C.
ELECTRICAL COMPONENT DESCRIPTION/DATA FLOW



C. 0. 1. 1. PCBs

This section explains the functions of the PCBs and their components.

C. 0. 2. 1-1. FCE (Facsimile Control Engine)

This engine board performs all control tasks, image processing, and Tx/Rx data processing. It contains the KFCP (which contains a CPU and a video processor), DSP (which contains the modem), a ROM (512 kbits) and an SRAM (8 kbytes). There is an OTP (One Time Programmable) ROM in a SOP type package.

C. 0. 3. 1-2. FDU (Facsimile Driver Unit)

This driver unit interfaces with the peripherals. It contains Tx, Rx and cutter motor drivers, the scanner interface, secondary power supply (which generates ±5V from the +24V output from the PSU), a battery for FCE back-up, a HIC for modem signal amplification and filtering, and an AVM generation circuit.

C. 0. 4. 1-3. LIU (Line Interface Unit)

This unit performs all interface functions to the telephone line. Refer to Appendix A “Line Interface” for details.

C. 0. 5. 1-4. PSU (Power Supply Unit)

This unit regulates the 120V ac input and generates +24V for the FDU and thermal head. The power cord and the main switch are separate from the PSU assembly and are fixed to the body frame.

C. 0. 6. 1-5. SBU (Sensor Board Unit)

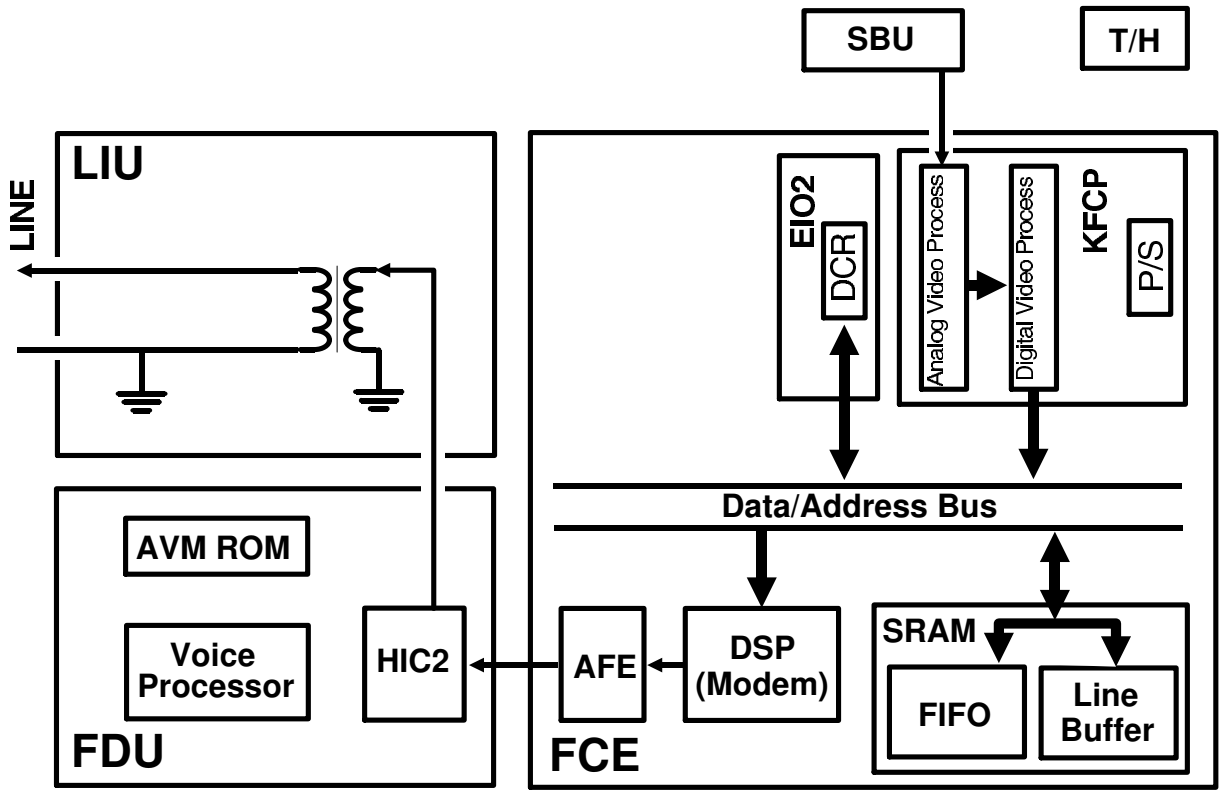
This unit has a CCD which scans the document and detects light path blockage by the document/scan line sensor actuators.

C. 0. 7. 1-6. OPU (Operation Panel Unit)

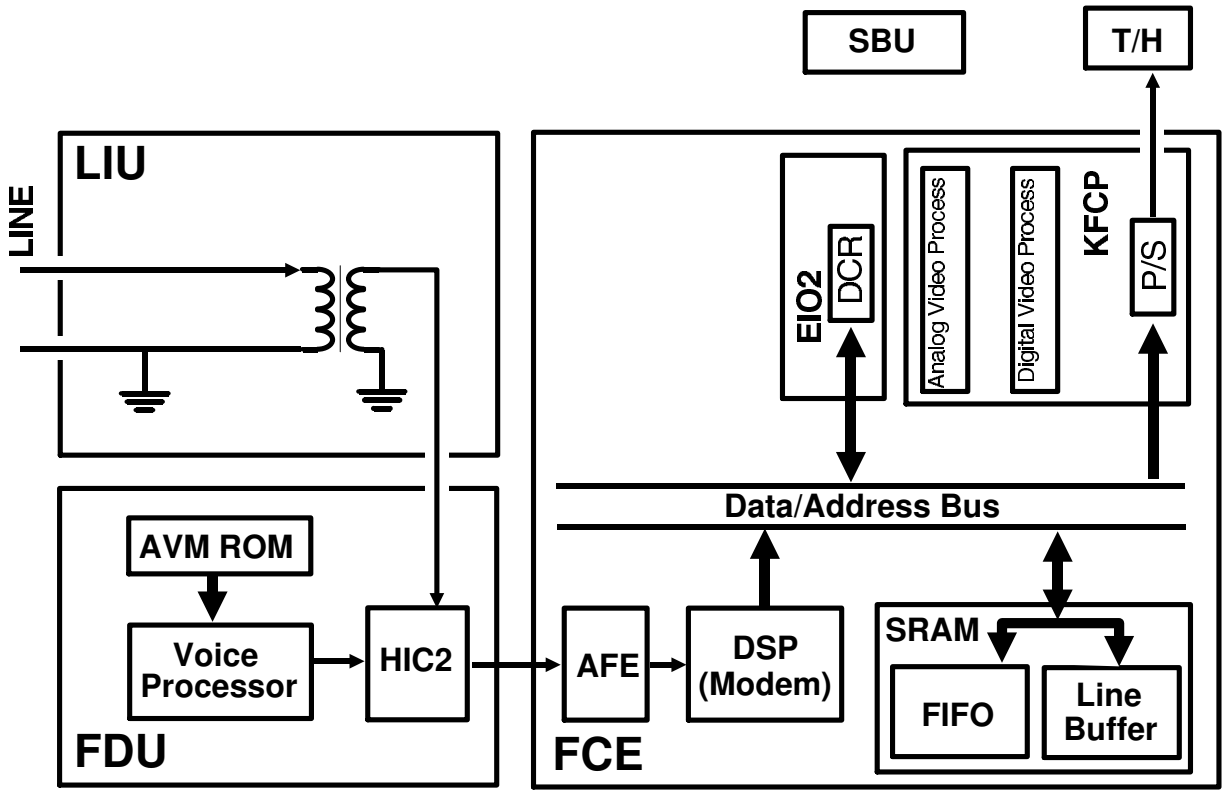
This unit receives all keypad input information and indicates instructions for users using LEDs and an LCD. The ten key pad is still available for dialling even if the main power is switched off.

C. 1. 2. Data Flow

C. 1. 1. 2-1. Transmission



C. 2. 2-2. Reception



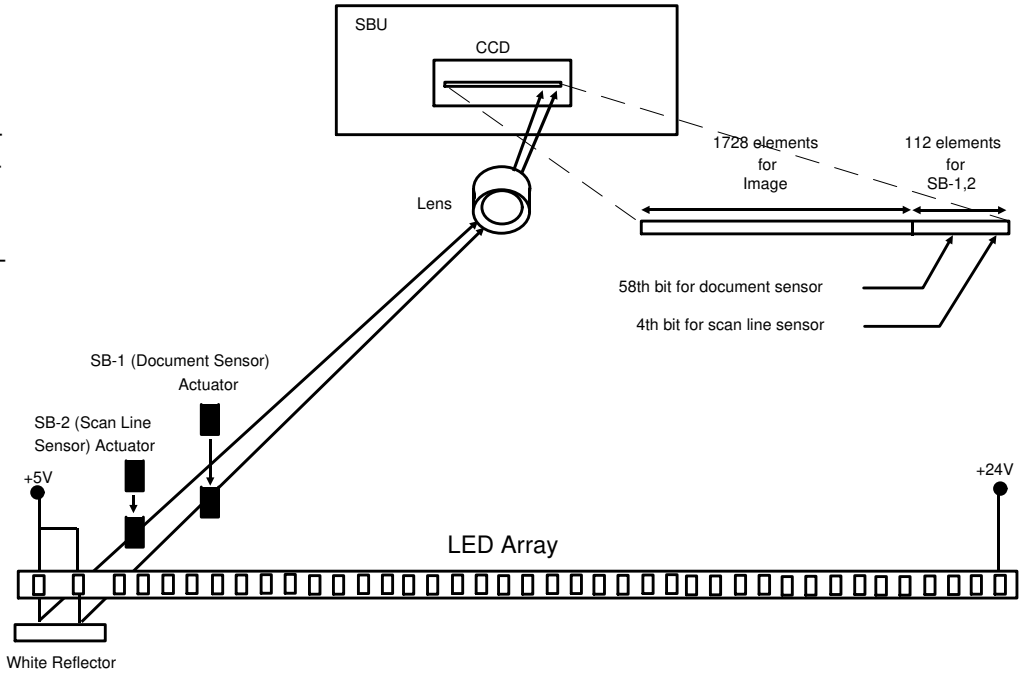
D. APPENDIX D. MECHANICAL DESCRIPTION

1. ADF/Scanner

The machine has two significantly different points in the ADF/scanner mechanism from the previous models. The first point is the integrated scanner and sensor mechanism, and the second point is the simplified ADF mechanism.

D. 0. 1. 1-1. Integrated Scanner/Sensor Mechanism

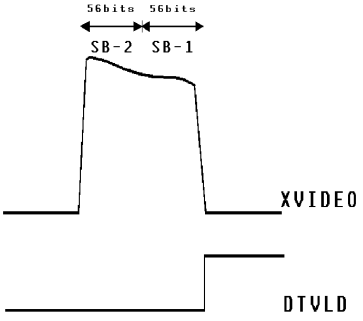
The document sensor (SB-1) and scan line sensor (SB-2) are integrated into the scanner mechanism. The basic composition of these sensors is similar to photointerrupters. However, instead of using discrete photodiode/phototransistor assemblies for each sensor, elements of the LED array and CCD are used.



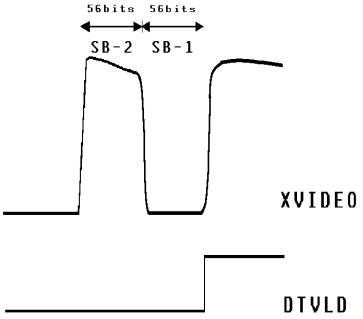
On the left hand side of the LED array, there are red LEDs dedicated for the two scanner sensors. These LEDs are always on. Light from these LEDs passes through the lens to the right hand side of the CCD, where there are 112 elements specially provided to detect this light (the 4th bit is allocated to the scan line sensor (SB-2) and the 58th bit is allocated to the document sensor (SB-1)).

If a sensor actuator blocks the light path, the CCD waveform shows a dropout, then the CPU will detect it.

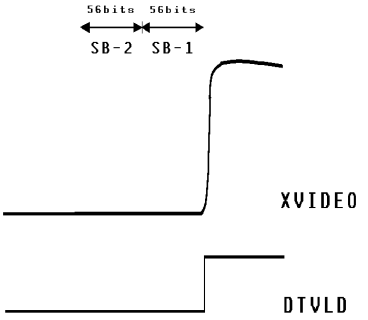
In standby mode, the CCD output is as shown on the right. The peak on the left side of the waveform indicates that the light path in both of the sensors is unblocked.



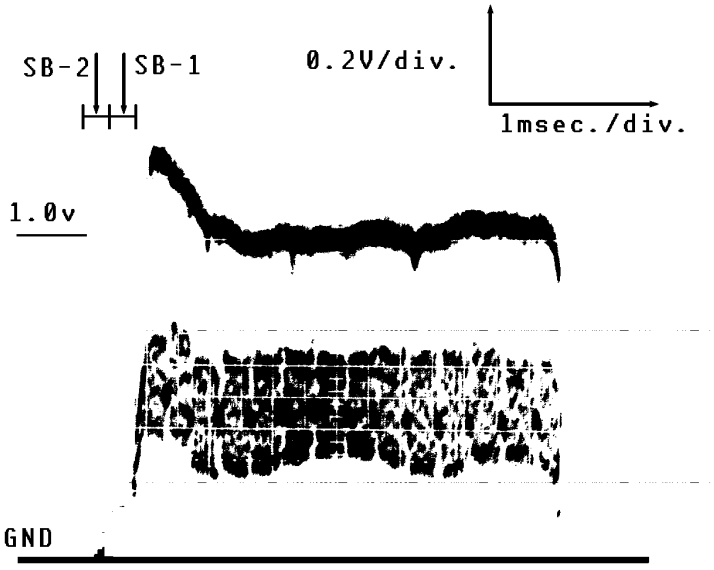
When a document is placed in the feeder, the document sensor actuator blocks the light path to the CCD. When the cpu detects this, it starts prefeeding the document and switches on the rest of the LED array.



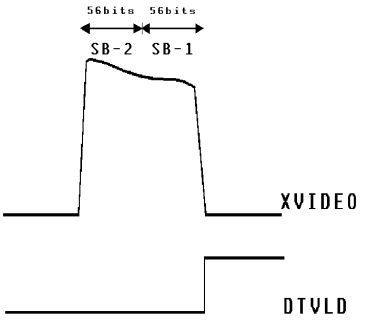
When the document reaches the scan line sensor, the actuator blocks the light path through that sensor. Then prefeed stops to prepare for scanning.



The XVIDEO output while the machine is scanning the document is shown on the right. While scanning the document, the LED array flashes every 10 ms.

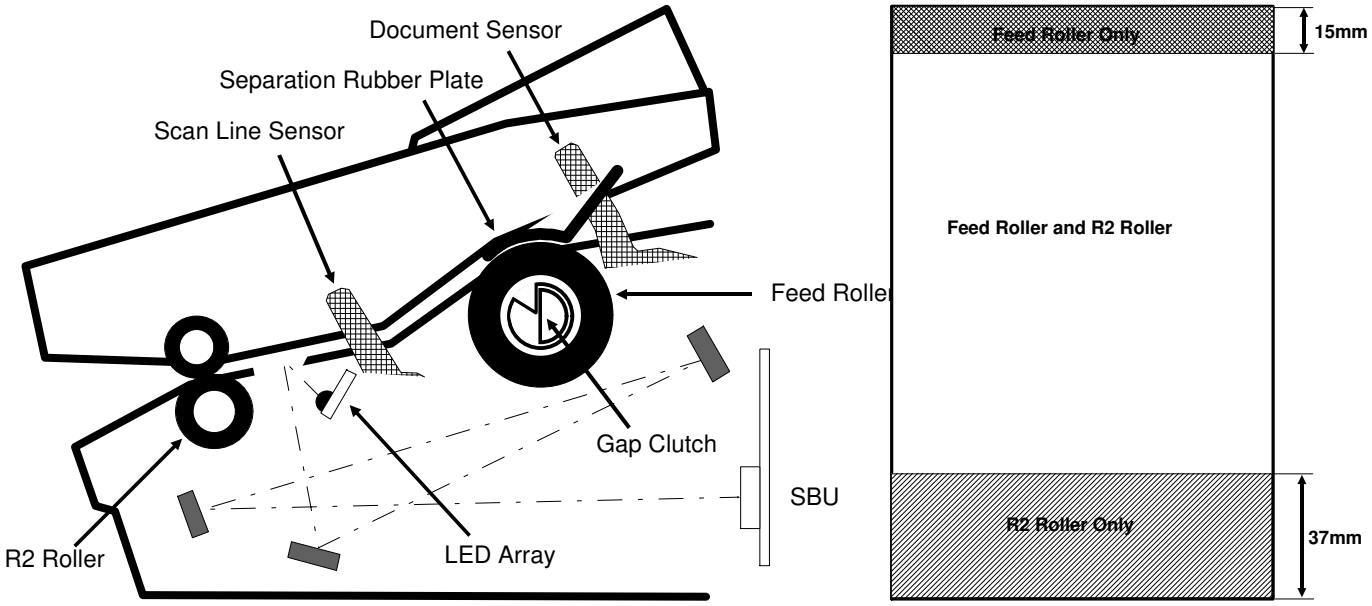


As the trailing edge of the page leaves the scan line sensor, the light path through that sensor becomes unblocked again. However, if there are some pages remaining in the feeder, the light path through the document sensor remains blocked.



After the transmission has ended, or after the copy has been printed, the LEDs for scanning the original switch off. The scanner is back in standby mode.

D. 0. 2. 1-2. ADF Mechanism

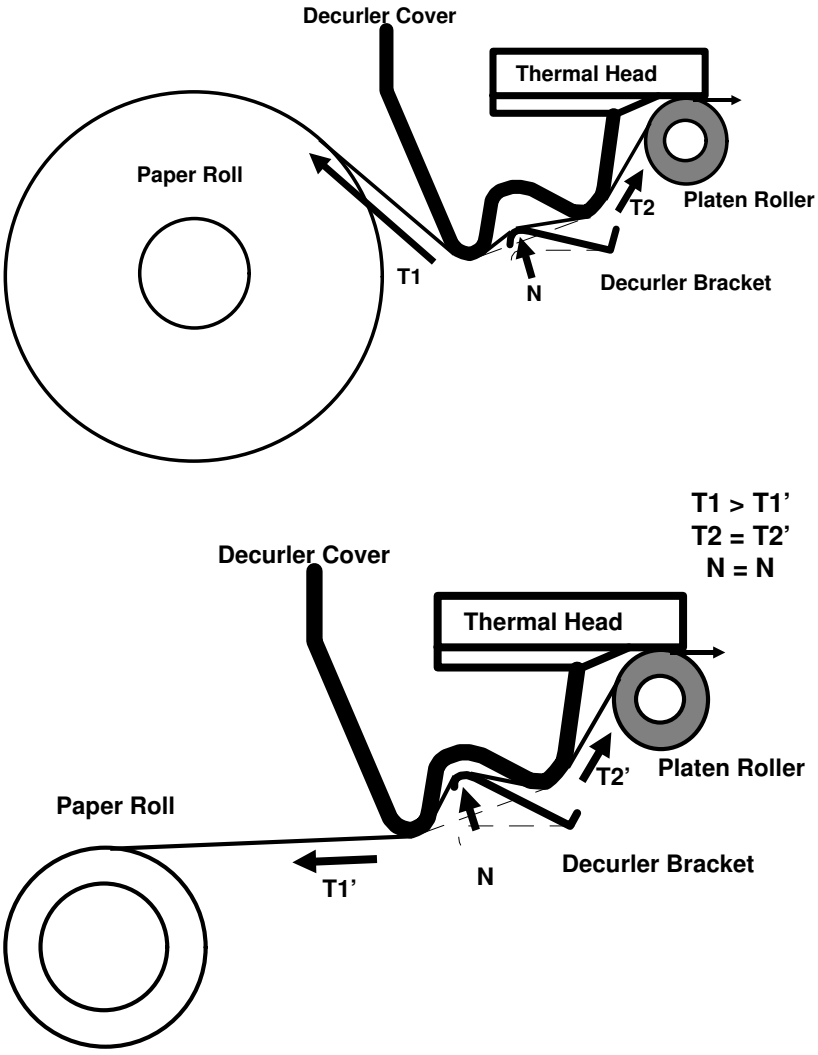


The ADF consists of the feed roller, R2 roller, document/scan line sensors and separation rubber plate.
When a document is placed in the feeder, the document sensor detects it as explained in the previous section. Then, the CPU switches the LED array on and turns the feed roller until the document reaches the scan line position. After the handshake is completed or the Copy key is pressed, the feed roller feeds the document until the leading edge reaches the R2 roller (the machine scans the first 15 mm of the document). From this point, the R2 roller feeds the document until the trailing edge of the document passes the feed roller. Both the R2 roller and the feed roller are in contact with the document. However, the R2 roller turns a bit faster than the feed roller. After the trailing edge passes the feed roller, only the R2 roller feeds the document.
So, the document is fed into scanner slowly during the first 15 mm, at the normal speed when the document is fed by both rollers, then at a faster speed when the document is free from the feed roller. The magnification rate of the scanned image varies in these three parts.

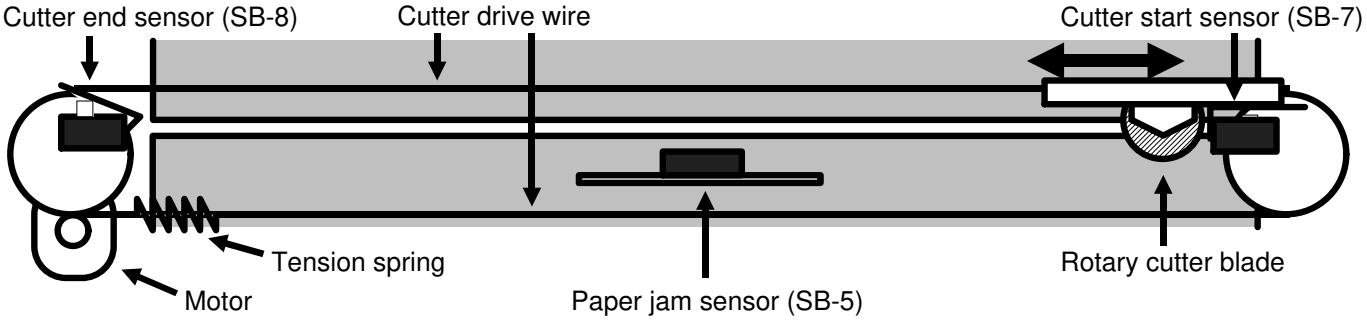
D. 1. 2. Printer

1. 2-1. Decurler

The decurler unit consists of the decurler cover, decurler bracket and the decurler spring on the platen roller shaft.
In standby mode, the decurler bracket is down at the standby position. When the machine starts printing, the decurler spring on the platen roller shaft lifts up the decurler towards the bend in the decurler cover. Then the paper path is curved as shown in the bottom diagram, so that the two bends on the decurler cover can apply negative stress to the curled paper to get rid of the curl from the paper.
The decurler bracket always applies the same negative force (N) to the paper, but the negative stress on the paper varies depending on the amount of paper remaining. The tension (T1) when the roll is almost full is stronger than the tension (T1') when the roll is almost empty, and the tension (T2) equals to (T2').
So, the paper path is curved more strongly as the paper roll gets lighter.
After printing has finished, the machine cuts the paper then reverses the Rx motor to feed back the paper to the printing position and to move the decurler bracket down to the standby position.



2. 2-2. Shuttle Cutter



The shuttle cutter consists of a paper guide frame, rotary cutter blade, motor, cutting start sensor (SB-7), cutting end sensor (SB-8), and jam sensor (SB-5).
In standby mode, the cutter blade is always at the cutting start position. When the machine has finished printing, the Rx motor stops then the cutter blade shuttles across the paper. The cutting end sensor detects that the cutter blade has finished cutting, then the CPU reverses the cutter motor to move the cutter blade to the cutting start position. After cutting, the Rx motor feeds out the copy, then it reverses to feed the paper back to the printing position and to move the decurler bracket down to the standby position.