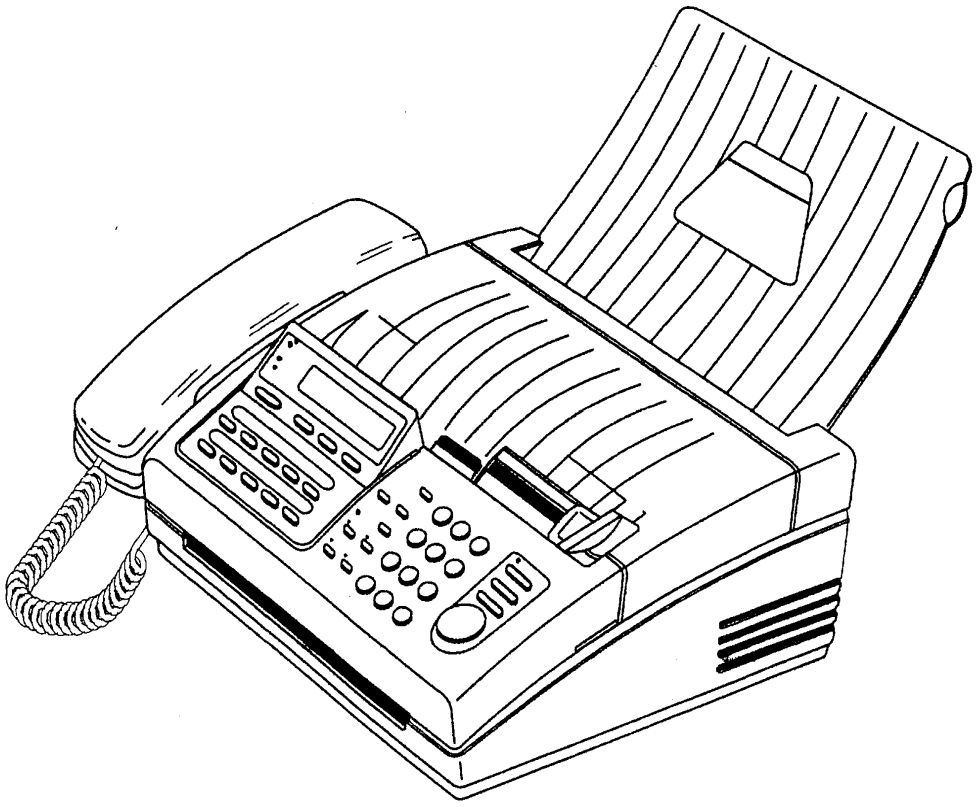
RICOH

RICOH FAX RF03
RICOH FAX250

SERVICE MANUAL



1. INTRODUCTION

1-1. GENERAL SPECIFICATIONS

Item	Specification
Type	Desktop transceiver
Telephone Circuit	PSTN/PABX
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
Scan Resolution	Standard: 8 x 3.85 dots/mm Detail: 8 x 7.7 dots/mm Fine: 8 x 15.4 dots/mm
Transmission Time	**RF03** - 15 s (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) **FAX250** - 11 s (Measured using a CCITT #1 test chart, Slerexe Letter, at 9,600 bps, MMR coding with ECM, 10 ms/line I/O rate, standard resolution)
Data Compression Method	MH, EFC, SSC, MR, MMR* (*: FAX250 only)
SAF Memory Capacity	**RF03** - None **FAX250** - 128 kbytes (9 CCITT #1 test charts can be stored.) -256 kbytes when ECM is switched off by user function (18 CCITT#1 test charts can be stored.)
Modulation Method	V29, V27ter, V21
Transmission Data Rate	9600/7200/4800/2400 bps (Automatic fallback)
Protocol	CCITT T.30 standard (NET 30)
Printing Method	Thermal printing
Printer Paper Size	216 mm x 50 m roll
Dimensions	353 x 302 x 108 mm excluding tray and handset
Weight	4.8 kg
Input Voltage	220 - 240 Vac, 50 Hz, single phase
Recommended Operating Environment	Temperature: 17 - 28 °C Humidity: 30 - 80 %RH

1-2. FEATURES LIST

Features	RF03	FAX250
Transmission		
Automatic transmission	yes	yes
Manual transmission	yes	yes
ADF capacity	10	10
Automatic Contrast Control	yes	yes
Polling transmission	yes	yes
Send later	yes	yes
Dial via dialpad	yes	yes
Quick dial (one touch)	10	10
Speed dial (two touch)	50	50
Automatic redial	yes	yes
Manual redial	yes	yes
Label programming for Quick/Speed dials	yes	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	yes	yes
Reception		
Automatic reception	yes	yes
Manual reception	yes	yes
Polled reception	yes	yes
Automatic cutter	yes	yes
Manual cutter	no	no
Authorized reception (with TSI)	yes	yes
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)	yes	yes
CSI (own phone number)	yes	yes
Counters (user function)	no	no
Voice request	no	no
PD/DTMF change by switch	yes	yes
Modified read (MR)	yes	yes
ECM with MMR compression	no	yes
Compatibility		
CCITT group 3	yes	yes
Copy quality		
Halftone (16 level) with image/text separation	yes	yes
Auto shading	yes	yes
MTF	yes	yes
8 x 15.4 lines/mm	yes	yes
Automatic contrast (threshold) control	yes	yes
Reports		
Activity Log (Journal)	yes	yes
Sent Fax Report (Transmission report)	yes	yes
Quick dial list	yes	yes
Speed dial list	yes	yes
Group dial list	no	yes
Error report	yes	yes

Features	RF03	FAX250
Rejected Call Report in Authorized Reception	yes	yes
Stored document list	no	yes
Power failure report	no	yes
SAF features (9 pages memory, or 18 pages when ECM is switched off by user function)		
SAF capacity in kbytes	no	128(or 256 when ECM is off)
Memory transmission	no	yes
Serial broadcasting	no	yes
Substitute reception	no	yes
Forwarding (1 number)	no	yes
File confirmation/clearance	no	yes
Automatic page retransmission in memory tx	no	yes
Remaining memory indication on LCD (during scanning)	no	yes
Group dial	no	yes
Telephone features		
Built-in handset	yes	yes
On-hook dial	yes	yes
Monitor speaker	yes	yes
Music on hold	no	no
Speakerphone	no	no
AI Redial (last 5 numbers)	yes	yes
12 key dialpad	yes	yes
Volume control for speaker	yes	yes
Volume control for ringer	yes	yes
Power down function (Ring, Dial, Speech)	yes	yes
FAX/PHONE switch		
Auto receive/Telephone answering machine receive switch	yes	yes
Auto answer delay time adjustment	no	no
Automatic fax/tel switch	yes	yes
Speech generation (AVM)	yes	yes
Interfaces		
Telephone answering machine (TAM) interface	yes	yes
PC interface	no	no
Others		
Copy mode (normal, detail, fine, halftone)	yes	yes
Time indicator	yes	yes
Clock adjustment	yes	yes
LCD display prompt	yes	yes
LCD size	2 x 20	2 x 20
Battery backed-up RAM size in kbytes	32	32
Service features		
Remote diagnostics	yes	yes
Printer test pattern	yes	yes
Bit switch setting	yes	yes
ROM/RAM data display/list	yes	yes
NCU parameter setting	yes	yes
Pulse width setting	no	no
Service report (last 10 errors)	yes	yes
Service counters	yes	yes

1-3. DETAILED FEATURES DESCRIPTION

1-3-1. Reception Modes

There are four reception modes, AUTO, TAM, FAX and TEL, one of which can be programmed in the Auto Select key on the operation panel, and by using function 04 "SET AUTO MODE" and function 05 "SET FAX SWITCH".
AUTO mode allows the machine to capture the line without any rings being heard by the users. Then, the machine starts to detect CNG for about 30 s while sending back ring-back tone or AVM (Artificial Voice Message) in one or two languages selected by the user. After that, it automatically receives the fax message or, if CNG is not detected, it calls the user by ringing from the speaker.
TAM mode allows connection to telephone answering machines (TAM) connected on the same line. There are two types of TAM interface software used depending on the connection between the machine and the telephone answering machine.
The first type of TAM interface is used in the countries where the TAM is connected to the machine as an external device. When the external device captures the line, the machine detects DC at the LIU. Then, the machine starts listening to the line for about 30 s. If the machine detects one or two CNG signals or a period of silence, the machine will capture the line and send CED/NSF/DIS to receive a fax message.
The second type of TAM interface is prepared for the countries (e.g., Germany) where the machine is connected to the TAM as an external device. In this case, the machine cannot detect DC when the TAM goes off-hook. So, it monitors the ringing signal. After the programmed number of rings, the machine starts listening to the line. If the machine detects one or two CNG signals, the machine will capture the line and send CED/NSF/DIS to receive a fax message. With the second type of TAM interface, the machine cannot receive fax messages from machines which do not send a CNG.
FAX mode allows the machine to receive all incoming fax messages.
TEL mode allows user to answer all incoming calls.

1-3-2. Authorized Reception

The machine automatically stores in the RAM the TSI (or RTI) from the terminals programmed in the Quick Dials and Speed Dials, once the user sends a document to these terminals. Then, if Authorized Reception is switched on, the machine compares the TSI from the remote terminal with these TSIs memorized in the RAM, when the machine receives a fax call from any terminal. So, Authorized Reception prevents reception from terminals which are not programmed in the Quick/Speed Dials.
If an unauthorized sender sends a fax message while this feature is switched on, the machine rejects the call and notifies the users by printing a rejection report with the unauthorized sender's TSI or RTI.

1-3-3. Automatic Tx Speed Updating (AI Dial)

The machine memorizes last five modem speeds that were used during transmission to each destination programmed in the Quick/Speed dials and the Forwarding terminal. Then, the machine chooses the most appropriate modem speed from the record for the next transmission, in order to reduce the time for modem shift-down (approx. 5 s). This feature works only when the machine has more than two modem speed records. The modem speed is recorded in the memory if there are no error pages during transmission.
This feature can work with other manufacturers' terminals.

1-3-4. Page Retransmission in Normal Tx Mode

In the normal transmission mode, the machine can retransmit failed pages as if in memory tx mode.
While sending the document, the machine backs up the document in the ECM memory in case page retransmission is needed. If the machine receives a negative code (RTN or PIN) after a page, the machine retransmits the whole page from the ECM memory.

1-3-5. Forwarding

The machine can forward all received messages to the programmed Forwarding terminal. You can program the month, date and time for Forwarding to be switched on and for it to be switched off. Also, local printing of forwarded messages can be switched on and off.

1-3-6. Reception Mode Switchover

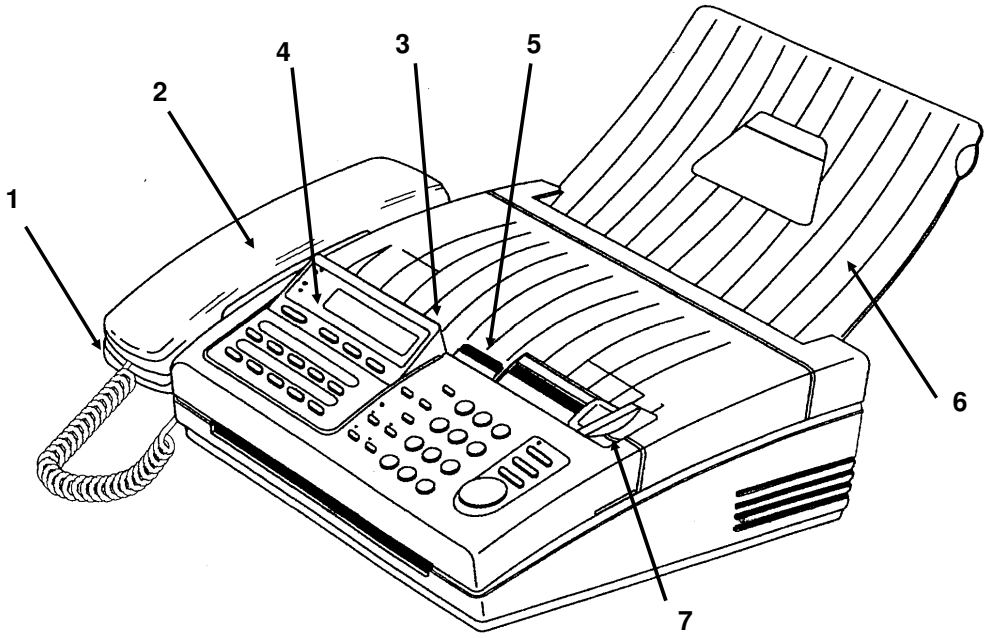
The machine allows user to receive incoming fax messages from a telephone answering machine (TAM) by pressing "2" twice on the TAM. The DTMF receiver on the FDU detects the signal and enables the machine to receive the message.
This function may be disabled by changing the RAM data. The number to press on the TAM and the number of times to press that number can also be changed by changing the RAM data. (Please see section 3-2, Useful RAM Addresses.)

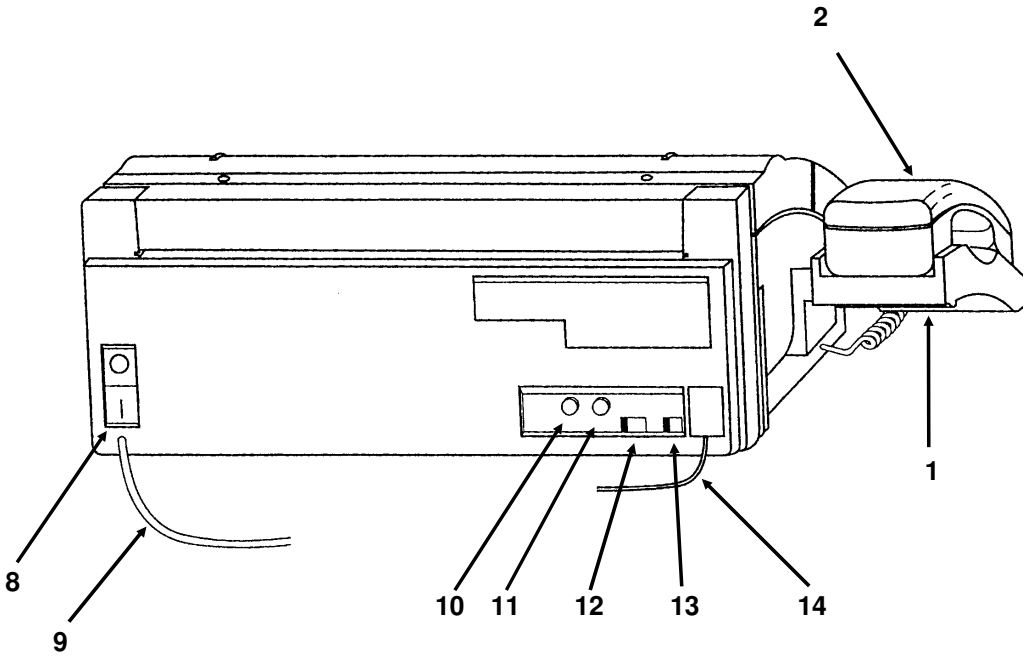
NOTES:
- Reception mode switchover can be done only when a call is answerd by the TAM. However, if the other party presses "2" twice, reception mode switchover may take place.
- Reception mode switchover does not work with dial pulses.

1-4. EXTERIOR

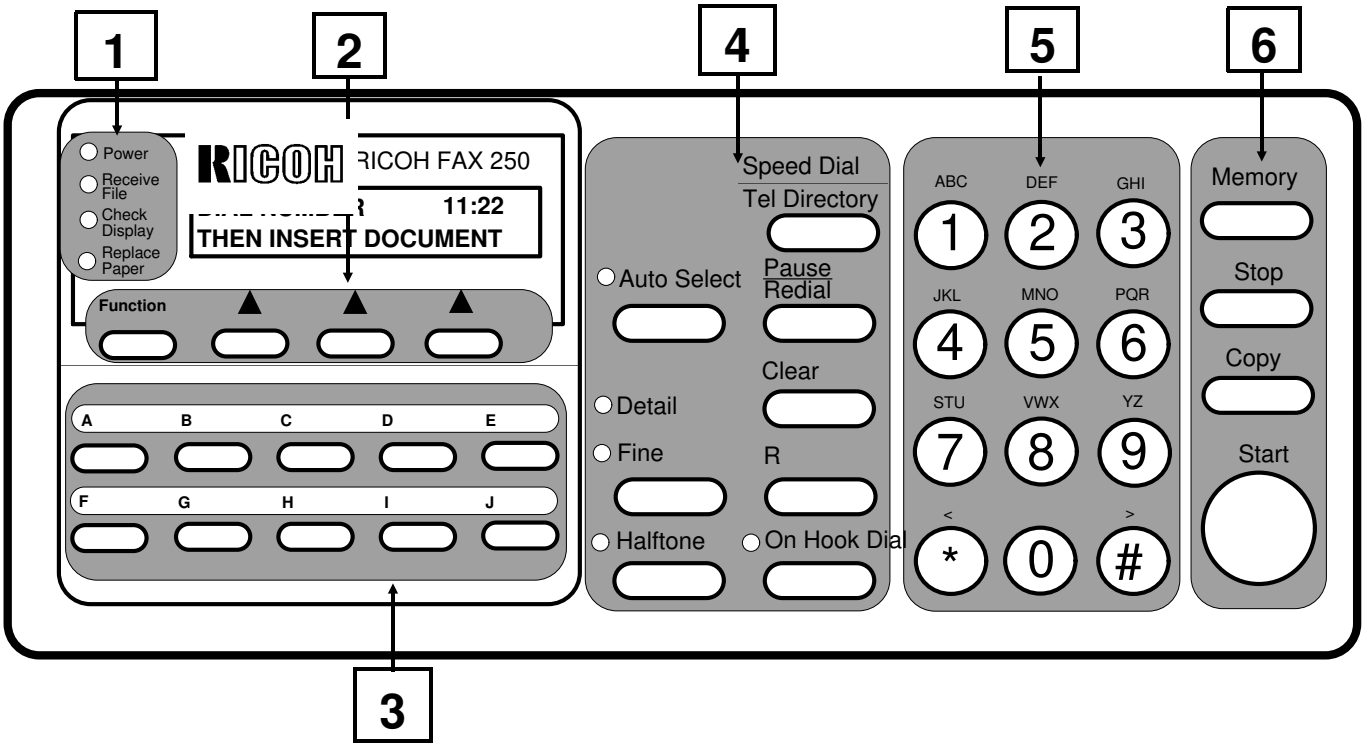
1-4-1. Component Layout

1. Handset Cradle
   This contains a hook switch and a ringer.
2. Telephone Handset
   This contains a microphone and an earphone.
3. ADF
   Up to 10 pages can be fed automatically.
4. Operation Panel
   Refer to section 2-1-2.
5. Printer Cover/Cover Release Lever
   To open the cover, push the release lever forward and pull up the cover.
6. Copy Tray
7. Document Guide
8. Power Switch
9. Power Cord
10. Speaker Volume Control
11. Ringer Volume Control
12. Pulse/Tone Switch
13. GS/FS Switch
14. Telephone Cable





1-4-2. Operation Panel



No.	Name	Function
1	Power indicator	Lights when the power is switched on.
	Receive File indicator (Only FAX250)	Lights when received messages are stored into memory.
	Check Display indicator	Lights when the machine has a problem.
	Replace Paper indicator	Lights when the paper has been used up.
2	Function key and three softkeys	Press to access a function in the function list, and choose one of the soft keys below the required instruction indicated on the LCD.
3	Quick Dial keys	Each of these keys can be programmed with a telephone number and a label.
4	Auto Select key and indicator	If it is lit, AUTO (automatic Tel/Fax switch) mode is selected. If it is not lit, either TAM (Telephone Answering Machine) mode, FAX(automatic receive) mode, or Tel(manual receive) mode is selected, depending on the mode selected with function 04 and 05.
	Resolution key and indicators	Press this key to change the resolution. If neither of the Detail or Fine indicators are lit, Standard resolution is selected.
	Halftone key and indicator	Press this key when you wish to send a photograph.
	Speed Dial key	Press this key to use a Speed Dial code.
	Pause/Redial key	Press this key when you want to enter a pause in a telephone number, or press this key when you want to redial one of the last five numbers dialled.
	Clear key	Press this during programming to erase the last character.
	“R”(Recall) key*	Press this key when you want to access the PSTN from behind a PABX which requires the Ground or Flash Start method. The GS/FS setting can be changed by a slide switch on the back of the machine.
	On Hook Dial key and indicator*	Press this key to dial without picking up the handset.
5	Dialpad*	Dial using these keys and use to input characters during programming.

No.	Name	Function
6	Memory key (Only FAX250)	Press to use memory transmission.
	Stop key	Press to stop the machine and return it to standby mode.
	Copy key	Press to copy the document now in the feeder.
	Start key	Press to start sending or receiving a fax message.

The keys with an asterisk * can be used for making a telephone call if the main power is switched off.

2. PROGRAMMING, TESTING, AND PRINTING REPORTS - RF03/FAX250

2-1. USER LEVEL PROGRAMMING

Function List

No.	Function	Brief Explanation
01	Quick Dial Programming	Use to program a telephone number and a label in each Quick Dial key.
02	Speed Dial Programming	Use to program a telephone number and a label in each Speed Dial code.
03	Telephone List Printing	Use to print the telephone list, which contains Quick Dials, Speed Dials, and Groups.
04	Set AUTO Mode	Use to program settings for AUTO mode (Auto Tel/Fax switch).
05	Set Fax Switch	Use to select the function mode from among TAM mode, FAX mode (Automatic Receive), and TEL mode (Manual Receive).
06	Send Later	Use to program the machine to send a document at a later time.
07	Polling Transmission	Use to set up a document to be polled from a remote terminal.
08	Polling Reception	Use to program the machine to poll documents from remote terminals.
09	Activity Log Printing and On/Off	Use to print an Activity Log (Journal) and switch on/off storage of communication records in the report's memory area.
10	Sent Fax Report (transmission report) On/Off	Use to switch automatic Sent Fax Report output on or off.
11	Page Header (TTI) On/Off	Use to switch the TTI printout on each transmitted page on or off.
12	Enter Page Header (TTI)	Use to program the TTI.
13	Enter Your Name (RTI)	Use to program the RTI.
14	Enter Your Fax Number (CSI)	Use to program the CSI. This function cannot be accessed by the users in Austria.
15	Clock Adjustment	Use to adjust the date and time.
16	Set PABX	Use to program the machine for actual PABX type.
17	Polling ID Programming	Use to program the ID code, which is used for secured polling and the closed network feature (closed network can only be switched on in service mode).
18	Key Touch Tone On/Off	Use to switch the key touch tone off or on.
19	RDS On/Off	Use to switch RDS on or off. This function cannot be accessed by the users, unless bit 6 of bit switch 1 is set to 1 by RDS installation operation or by service later.
20	Set Language	Use to change the LCD and report language.
21	Authorized Reception On/Off	Use to prevent reception from terminals other than those programmed in the Quick/Speed Dials.
22	Reviewing Stored Documents*	Use to review the documents stored in the memory.
23	Forwarding*	Use to program the machine to forward received messages to a programmed terminal.
24	Group Dial Programming*	Use to make dialling groups (up to 5 groups can be made).
25	ECM On/Off*	Use this to switch ECM on or off.

* Only for FAX250

2-2. SERVICE LEVEL OPERATION

2-2-1. Entering and Exiting Service Mode

ENTERING SERVICE MODE

Press Start → Stop → Start → Stop → Start sequentially within 3 seconds.

After entering service mode, the following service functions are available.

No.	Function	Brief Explanation
Functions 30 to 38 are mainly prepared for factory use.		
30	RAM Test	Use to test the SRAM and DRAMs on the FCE.
31	Key Test	Use to test all keys on the operation panel.
32	LED Test	Use to test all LEDs on the operation panel.
33	LCD Test	Use to test the LCD on the operation panel.
34	Speaker Test	Use to test the monitor speaker.
35	Printer Test	Use to print a test pattern.
36	PTT Test	Use to test the modem signals, DTMF tones, and transmission level.
37	Frequency Test	Use to generate signals of the desired frequency and level.
38	Burn-in Test	Do not use this function. If this function is used, the RAM will be all cleared.
The following functions are prepared for service use.		
40	Factory Adjustment	Use to check the ROM version, to adjust the tx level with the resistor R374 on the FDU, and to clear the RAM.
41	Not used	
42	Not used	
43	Bit Switch Programming	Use to change the bit switch settings.
44	Scanner Adjustment Mode	Use to switch on the LED array for scanner adjustment.
91	Display ROM/RAM Data	Use to display and change the ROM/RAM data.
92	Print System Report	Use to print the system report.
93	Print ROM/RAM Data	Use to print ROM/RAM data.
94	Not used	
95	Print Service Report	Use to print the service report.
96	Not used	
97	Not used	
98	NCU Parameter Programming	Use to adjust the NCU parameters.

EXITING SERVICE LEVEL

Press Stop, Function, or EXIT at any time.

The machine will exit service mode automatically 40s after you enter it.

Note: In the functions, the new settings will not be saved by pressing the Function key. To save the new settings, you have to press “SET” or “OK”, then exit the service mode.

WARNING

Functions 30 to 38 are for factory use. If you wish to do these tests, do all the tests from 30 to 35 continuously before exiting the service mode. Otherwise, the machine stops to function.
(You will have to reset all the RAM data to restore the machine. Please see note 3 in section 3-2-1.)

2-2-2. RAM Test (Function 30)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 30, then press SET.
3. The machine starts to check the SRAM and the two DRAMs without clearing any RAM data stored.
   If the RAM test succeeded, the machine prints “RAM TEST OK”, and goes to the Key Test.
   If the RAM test failed, the machine displays “RAM ERROR AT ##AAAA” (## = type of RAM; AAAA = address) for 3 s, then “RAM TEST FAILED” is printed
   (Type of RAM: 09 = SRAM, 00 - DRAM0, 10 - DRAM1)

   After this test, the machine automatically goes into function 31.

2-2-3. Key Test (Function 31)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 31, then press SET.
3. The display shows the name of a key. If the key is pressed the display shows the next one until the last key “J” is pressed.
   If the key test was successful, the machine prints “KEY TEST OK”.
   If the key test was failed or aborted, the machine prints “KEY TEST FAILED.
   After this test, the machine automatically goes to the LED test.

Display	Key	Display	Key	Display	Key
1 through #	Keys in the dialpad	ONL	On Hook Dial	CLR	Clear
SHO	Speed Dial	FUN	Function	FIN	Detail/Fine
MLT	Memory	LEF	Softkey (Left)	STO	Stop
AUT	Auto Select	MID	Softkey (Middle)	CPY	Copy
RED	Redial	RIG	Softkey (Right)	STA	Start
HOL	R	PHO	Halftone	A through J	Quick Dial keys

2-2-4. LED Test (Function 32)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 32, then press SET.
3. All the LEDs on the operation panel blink sequentially until OK or ERROR is pressed.
   If OK is pressed, the machine prints “LED TEST OK” and goes to the LCD test.
   If ERROR is pressed, the machine prints “LED TEST FAILED”, and goes to the LCD test.

2-2-5. LCD Test (Function 33)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 33, then press SET.
3. The two lines on the LCD alternately show a line of solid black characters until OK or ERROR is pressed.
   If OK is pressed, the machine prints “LCD TEST OK” and goes to the Speaker Test.
   If ERROR is pressed, the machine prints “LCD TEST FAILED”, and goes to the Speaker Test.

2-2-6. Speaker Test (Function 34)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 34, then press SET.
3. The machine emits a tone from the speaker until OK or ERROR is pressed. Press the “>” key to switch between the two different volume levels.
   If OK is pressed, the machine prints “VOL TEST OK” and goes to the Printer Test.
   If ERROR is pressed, the machine prints “VOL TEST FAILED” and goes to the Printer Test.

2-2-7. Printer Test (Function 35)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 35, then press PRINT.
3. A test pattern with diagonal lines is printed. After printing, the machine goes to standby mode.

2-2-8. PTT Test (Function 36)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 36, then press SET.
3. Press “MDM” for modem test, “DTMF” for DTMF test, or “LEV.” for tx level adjustment.

4.1 Modem Test
The test starts from silence (the machine only goes off-hook), then by pressing the # key the signal changes to 9,600bps - 7,200bps - 4,800bps - 2,400bps - 300bps - 600Hz - 1100Hz - 2100Hz. (Press the * key to go backwards through the sequence.)
After you have finished the test, press EXIT to go back to step 3.

4.2 DTMF Test
Press a key on the dialpad (0 - 9, * and #) to test the DTMF signal.
After you have finished the test, press EXIT to go back to step 3.
Note that the machine will emit a DTMF signal with the country specific length, even if the slide switch on the rear of the machine is not set at “Tone”.
If you wish to get a continuous DTMF tone, set the slide switch at “Tone”, switch off the power, then press the required key on the dialpad.

4.3 Tx Level Adjustment
The current tx level setting is displayed in the upper right corner of the LCD. To change the setting, press # to increment or press * to decrement. After adjustment, press EXIT to save the setting.

2-2-9. Frequency Test (Function 37)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 37, then press SET.
3. The machine emits a sine wave of the displayed frequency. The frequency can be changed in units of 100Hz by pressing # (increment) or * (decrement). Also, the output level can be changed by pressing LEV.

2-2-10. Burn-in Test (Function 38)

Do not use this function.

2-2-11. Factory Adjustment (Function 40)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 40, then press SET.
   The upper line on the LCD shows the ROM version “VER x.xx dd.mm.yy c” (x.xx = version, dd.mm.yy = date, c = country setting). The lower line on the LCD shows “CLK 0.LEV RAMC”.
3. Press CLK for clock oscillator adjustment, 0.LEV for fine tx level adjustment, and RAMC for RAM clear.

4.1 Clock Oscillator Adjustment
This function is not for service. The oscillator has been adjusted in the factory. However, if the clock does not work correctly, please check the frequency of the oscillator with this function. The frequency of the output from TP401 has to be at 16,384 (± 0.04) Hz. Adjust the frequency by means of C403 on the FCE.
Press Stop and reassemble the machine after you have completed the adjustment.

4.2 Tx Level Fine Adjustment
This function lets the machine output a 2,100Hz signal with a -9 dBm output level.
Connect a millivoltmeter (the accuracy should be better than 1%) and a 600 ohm resistor between Line-a and Line-b on the LINE jack while the machine is swicthed off. Then enter this mode and adjust the level at -9.5 (± 0.1) dBm (259.5 ± 3 mV) by means of the variable resistor R374.
Press Stop and reassemble the machine after you have completed the adjustment.

4.3 RAM Clear
RAM is all reset to the initial settings and the CPU is restarted.
WARNING: With this function, all the previous settings will be reset to the initial settings.

2-2-12. Bit Switch Programming (Function 43)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 43, then press SET.
3. The setting of bit switch 0 is displayed.
   To change the setting of a bit, press the bit number on the dialpad (0 - 7). Press < or > to select other switches.
4. To store the new setting, press OK.

Important Notice for Back-to-Back Mode (Bit Switch 0, Bit 7)
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. Press Halftone to light the Halftone LED, then press Stop.
3. Enter the service mode.
4. After finishing with service mode, re-enter back-to-back mode if required.

2-2-13. Scanner Adjustment (Function 44)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 44, then press SET.
3. The LED array is switched on until “OK” is pressed. Refer to section 5-5 for more details on scanner adjustment.

2-2-14. Display and Rewrite ROM/RAM Data (Function 91)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 91, then press SET.
3. The upper line on the LCD shows “ADD: aaaa VAL: ddd/hh” (aaaa = address, ddd = decimal value of the data, and hh = hexadecimal value of the data).
4. Select the address where the data you want to display or change is stored, using keys 0 through 9 and Quick Dial keys A through F, or using the * key to decrement the address and the # key to increment the address.
5. Press EDIT, if you want to rewrite the data.
6. Rewrite the data in the hexadecimal data field. (The “<” and “>” keys are used to move the cursor in the data field.)
7. Press OK to save the new data at the selected address.
8. Press Stop to exit this function or go back to step 3 to change another address.

2-2-15. System Report (Function 92)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 92, then press PRINT. The system report will be printed.

2-2-16. Print ROM/RAM Data (Function 93)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 93, then press SET.
3. Enter the start address then press OK.
   The address field has 5 digits, as the first digit is used for bank identification and the following 4 digits are for the actual address. Use the bank identification number “0” for addresses 0000 - 3FFF(H) and C000 - FFFF(H), and “9” for addresses 4000 - 7FFF(H).
4. Enter the end address then press OK. The machine prints a list of ROM/RAM data in the selected address range.

2-2-17. Service Report (Function 95)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 95, then press PRINT. The service report will be printed.

2-2-18. NCU Parameter Programming (Function 98)

1. Enter the service mode (see section 2-2-1).
2. Press Function, enter 98, then press SET.
3. The upper line on the LCD shows “ADD: aa VAL: ddd/hh” (aa = parameter number, ddd = decimal value of the data, and hh = hexadecimal value of the data).
4. Select the required parameter number with keys 0 through 9, or press # or * to scroll through the parameters.
5. Press EDIT if you want to change the data.
6. Rewrite the data in the decimal data field. (The “<” and “>” keys are used to switch the cursor between the address and data fields, and the * and # keys are used to decrement/increment the data value.)
   Refer to section 3-2-2 (Address 0376 - 0380 (H)) for the definition of NCU parameters.

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: 8 (16) [32] lines/10% 1: 5 (10) [20] 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.

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 to enter service mode, in back-to-back mode.
Refer to the notice in section 2-2-12 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	Substitute reception file forwarding **(FAX250 only)**	0: Normal operation 1: Forward all files	Set this bit to 1 if the printer is out of order. The machine will forward all files to the Forwarding terminal.(Do not change this setting for RF03.)
2	Not used		
3	PSTN/PABX dial tone and busy tone detection	0: Enabled 1: Disabled	Set this bit to 1 when you wish to disable tone detection.
4	Closed network in reception	0: Disabled 1: Enabled	Set these bits to 1 to switch on Closed Network. With Closed Network, communication will not go ahead if the ID code of the other terminal does not match the ID code of this terminal. The ID code has to be programmed with function 16 before switching on these bits. This feature may not be reliable when communicating with another maker's machine.
5	Closed network in transmission	0: Disabled 1: Enabled	
6	Remote read/write request	0: Always enabled 1: User selectable	0: RDS is always enabled. The user cannot switch it off. 1: If a technician or RDS operator sets this to 1 after installation, the user can select either "ON for 24 hours" or "OFF".
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.

Modem rate (bps)	**Sub-scan resolution (lines/mm)**	**Coding**	**Width and reduction**	**Mode**	**I/O rate (ms/line)**
96: 9,600 72: 7,200 48: 4,800 24: 2,400	S: 3.85 D: 7.7 F: 15.4	1D: MH 2D: MR 1E: MH + EFC 2E: MR + EFC 1S: MH + SSC 2S: MR + SSC 1C: MH + ECM 2C: MR + ECM MC: MMR + ECM	A: A4 N: No reduction	DCS: CCITT G3 NSS: Non-standard G3	0M: 0 5M: 5 10M: 10 20M: 20 40M: 40

Bit Switch 2			
	FUNCTION	**SETTINGS**	**COMMENTS**
0	Not used		
1	Not used		
2	Not used		
3	Not used		
4	CSI programming **(Austria only)**	0: User level 1: Service level	1: Function 13 “Enter Your Fax Nr.” only appears in service mode.
5	TAM interface type **(Germany only)**	0: Normal 1: German type	0: The normal type of TAM interface monitors the line current on the LIU, to detect whether the external TAM goes off-hook or on-hook. 1: The German type of TAM interface does not monitor the line current on the LIU, because the TAM and the fax are connected in parallel to the line. Refer to section 1-3-1 for more details.
6	TAM (Telephone Answering Machine) interface	0: Enabled 1: Disabled	If this bit is 1, TAM mode cannot be selected with function 05 by the user. NOTE: If no language is selected for the voice prompt in the TAM mode and if this bit is set to 1, no message is emitted in the Auto Mode even if a voice prompt has been selected for Auto Mode.
7	“CCT-FAX” insertion on transmitting pages **(Germany only)**	0: Disabled 1: Enabled	In Germany, “CCT-FAX” has to be printed on the top of all transmitted pages, while the machine is approved with “CCT-FAX” category.

Default Settings

In Germany, the default setting will be changed after the machine is approved with fax category B.

Bit Sw.	Normal	Austria	Germany (CCT-FAX)
0	0000 0000	0000 0000	0000 1000
1	0000 0000	0000 0000	0000 0000
2	0000 0000	0001 0000	1010 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. Ram addresses

Use service function 91 to view or adjust the contents of a RAM address. See section 2-2-14 for details.

Address (Hex)	Function
0000 - 0002	Bit switches 00 to 02 (0000 = Bit switch 00, 0001 = Bit switch 01, and so on); refer to section 4-1 for details.
0009	User function parameters Bit 7: Sent Fax Report On/Off [Function 09] (1: On) Bit 6: TTI (Page Header) On/Off [Function 10] (1: On) Bit 5: Key Touch Tone On/Off [Function 17] (1: On) Bit 4: RDS On/Off [Function 18] (1: On for 24 hours) Bit 3: Not used Bit 2: Forwarding On/Off [Function 22] **Note 1,2** (1: On) Bit 1: Forwarding Mode [Function 22] **Note 1,2** (0: Now or Later mode, 1: Daily mode) Bit 0: Forwarding File Local Printing On/Off [Function 22] (1: On)
000A	User function parameters Bit 7: Communication record listing on Journal [Function 08] (1: On) Bit 6: Authorized Reception On/Off [Function 20] (1: On) Bit 5: ECM On/Off [Function 25] **Note 2** (1: On) Bits 4 through 0: Not used
000C	Check RAM **Note 3**
0039	Exchanger type connected to the machine Bit 2 = 0: PSTN Bit 2 = 1: PABX
00CA	Reception mode switchover Bit 0 = 1: On
0200	Check RAM **Note 3**
028D	Paper end sensor threshold value
028E	Paper jam sensor threshold value
0300 - 0302: Line current detection parameters	
0300	Line current detection time [Time = N x 10 (ms), detection disabled if N = FF]
0301	Line current reset time [Time = N x 20 (ms)]
0302	Line current dropout detection time [Time = N x 20 (ms)]
0303 - 0320: PSTN tone detection parameters	
0303 - 030E	Modem data for PSTN dial tone frequency range **Caution:** Do not adjust.
030F	PSTN dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0310	PSTN dial tone reset time [Time = N x 0.16 (s)]
0311	PSTN dial tone continuous tone time [Time = N x 20 (ms)]
0312	PSTN dial tone permissible dropout time [Time = N x 20 (ms)]
0313	PSTN pause time [Time = N x 0.16 (s)]
0314	PSTN ringback tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0315 - 0320	Modem data for PSTN busy tone frequency range **Caution:** Do not adjust.

Address (Hex)	Function
0321 - 033E: PABX tone detection parameters	
0321 - 032C	Modem data for PABX dial tone frequency range **Caution:** Do not adjust.
032D	PABX dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
032E	PABX dial tone reset time [Time = N x 0.16 (s)]
032F	PABX dial tone continuous tone time [Time = N x 20 (ms)]
0330	PABX dial tone permissible dropout time [Time = N x 20 (ms)]
0331	PABX pause time [Time = N x 0.16 (s)]
0332	PABX ringback tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0333 - 033E	Modem data for PABX busy tone frequency range **Caution:** Do not adjust.
033F - 0348: Busy tone detection parameters	
033F	Busy tone ON time (range 1) [Time = N x 10 (ms)]
0340	Busy tone OFF time (range 1) [Time = N x 10 (ms)]
0341	Busy tone ON time (range 2) [Time = N x 10 (ms)]
0342	Busy tone OFF time (range 2) [Time = N x 10 (ms)]
0343	Busy tone ON time (range 3) [Time = N x 10 (ms)]
0344	Busy tone OFF time (range 3) [Time = N x 10 (ms)]
0345	Busy tone ON time (range 4) [Time = N x 10 (ms)]
0346	Busy tone OFF time (range 4) [Time = N x 10 (ms)]
0347	Continuous busy tone detection time [Time = N x 10 (ms)]
0348	Bits 0 to 3: Busy tone signal state time tolerance (for all ranges) Bit 3 2 1 0 Tolerance 0 0 0 1 ± 50% 0 0 1 0 ± 25% 0 0 1 1 ± 12.5% Bits 4 to 7: Number of cycles required for detection
0349 - 0359: International dial tone detection parameters	
0349 - 0354	Modem data for international dial tone frequency range **Caution:** Do not adjust.
0355	International dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0356	International dial tone reset time [Time = N x 0.16 (s)]
0357	International dial tone continuous tone time [Time = N x 20 (ms)]
0358	International dial tone permissible dropout time [Time = N x 20 (ms)]
0359	International dial pause time [Time = N x 0.16 (s)]
035A - 036A: National dial tone detection parameters	
035A - 0365	Modem data for domestic dial tone frequency range **Caution:** Do not adjust.
0366	National dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0367	National dial tone reset time [Time = N x 0.16 (s)]
0368	National dial tone continuous tone time [Time = N x 20 (ms)]
0369	National dial tone permissible dropout time [Time = N x 20 (ms)]
036A	National dial pause time [Time = N x 0.16 (s)]
036B - 036C	International dial access number Example: If the number is 100, store F1 in address 036B, and 00 in address 036C.
036D	PABX operator pause [Time = N x 20 (ms)]
036F	CCITT T1 time [Time = N x 2.56 (s)]
0370	Maximum number of dialling attempts to the same station in normal tx mode
0371	Redial interval in normal tx [Time = N (minutes)]

Address (Hex)	Function
0372	Interval between dialing to different stations [Time = N x 2.56 (s)]
0373	Dial tone detection level [Level = 0 - N x 0.375 (dBm)]
0374	Busy tone detection level [Level = 0 - N x 0.375 (dBm)]
0375	Minimum signal detection level [Level = 0 - N x 0.375 (dBm)]
0376 - 037A: Ringing signal detection parameters **(Use function 98 to change)**	
0376	**NCU Parameter 00:** Acceptable ringing signal frequency, upper limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]
0377	**NCU parameter 01:** Acceptable ringing signal frequency, lower limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]
0378	**NCU parameter 02:** Number of rings until a call is detected [Number = N x 1]
0379	**NCU parameter 03:** Minimum required length of a ring [Length = 20 x N (ms)]
037A	**NCU parameter 04:** Minimum required length of an interval between rings [Length = 40 x N (ms)]
037B - 037C: Pulse dial parameters **(Use function 98 to change)**	
037B	Do not change this setting.
037C	**NCU parameter 06:** Pause between dialled digits after Grand Start / Flash start (pulse dial mode) [Time = N x 20 (ms)]
037D	**NCU parameter 07:** Time waited when a pause is entered at the operation panel [Time = N x 20 (ms)]
037E - 037F: Tone dial parameters **(Use function 98 to change)**	
037E	**NCU parameter 08:** DTMF tone length [Time = N x 5 + 60 (ms)]
037F	**NCU parameter 09:** Time between dialled digits (DTMF dial mode) [Time = N x 5 + 60 (ms)]
0380	**NCU parameter 10:** Modem transmission level [Level = - N (dBm)]
0381	Language selected for LCDs and reports 0(D): English 1(D): German 2(D): Dutch 3(D): Italian 4(D): Spanish 5(D): Swedish 6(D): Portuguese 7(D): French 8(D): Norwegian
0384	Redial interval for memory transmission [N x 1 (min.)] (Default: 5 minutes)
0385	Maximum number of dialling attempts for memory transmission [N (times)] (Default: 5 times)
0386 - 0387	Intercity access code for France: 16(D) [0386 = FF(H), 0387 = 16(BCD)]
0399	Ringing time in Auto mode [Time = N (s)] The value N should be a multiple of 5 between 5 and 25. This can also be programmed with the programming sheet.
039D - 03A0: CNG detection parameters	
039D	Maximum acceptable CNG OFF-time [Time = N x 20 (ms)]
039E	Minimum acceptable CNG OFF-time [Time = N x 20 (ms)]
039F	Maximum acceptable CNG ON-time [Time = N x 20 (ms)]
03A0	Minimum acceptable CNG ON-time [Time = N x 20 (ms)]
03A1	Country code transferred from the LIU (Hex) 00: France 01: Germany 02: UK 03: Italy 04: Austria 05: Belgium 06: Denmark 07: Finland 08: Ireland 09: Norway 0A: Sweden 0B: Switzerland 0C: Portugal 0D: Netherlands 0E: Spain 0F: Israel 10: Not used 11: Not used 12: Asia
03C3	Mode selection in Auto Select mode Bit 3 2 1 0 Mode 0 0 0 1 Auto Tel/Fax switch with AVM 0 0 1 0 Auto Tel/Fax switch with ringback tone 0 0 1 1 Semi-Auto (TAM) mode 0 1 0 0 FAX mode
03C7	Continuous silent period detection time in TAM mode [Time = N x 65 (ms)]
03C8	PSTN access code from behind Loop Start PABX (BCD)
03CD	Number of rings until a call is detected in TAM mode [N (times)]
0F30	Check RAM **Note 3**

Address (Hex)	Function
20A1	Forwarding end date and time **Note 2** Minute (BCD)
20A2	Forwarding end date and time **Note 2** Hour (BCD)
20A3	Not used
20A4	Forwarding end date and time **Note 2** Day (BCD)
20A5	Forwarding end date and time **Note 2** Month (BCD)
20A6	Forwarding end date and time **Note 2** Year (BCD)
20A7	Forwarding start date and time **Note 2** Minute (BCD)
20A8	Forwarding start date and time **Note 2** Hour (BCD)
20A9	Not used
20AA	Forwarding start date and time **Note 2** Day (BCD)
20AB	Forwarding start date and time **Note 2** Month (BCD)
20AC	Forwarding start date and time **Note 2** Year (BCD)
20AD - 226E	Activity Log generation area [30 bytes x 15 communications] (Refer to section 3-2-2)
2272 - 2433	Service report and error report generation area [45 bytes x 10 communications] (Refer to section 3-2-3)
2438 - 24F7	Error code memory [up to 32 codes x 6 bytes] (Refer to section 3-2-4)
2736 - 2737	Polling ID code Example: ABCD 2736 (High) = A, (Low) = B 2737 (High) = C, (Low) = D
2A7D	Received page counter (BCD) High: Tens digit Low: Units digit
2A7E	High: Thousands digit Low: Hundreds digit
2A7F	High: Hundred thousands digit Low: Ten thousands digit
2A80 - 2A82	Transmitted page counter (Same as above)
2A83 - 2A85	Printed page counter (Same as above)
2A86 - 2A88	Scanned page counter (Same as above)
35D5	Check RAM **Note 3**
4000 - 468F	TSI for Authorized Reception [21 bytes (digits(ASCII) + TSI) X 60 stations]
525A - 538A	Modem rates used in the last five communications to the terminals programmed in the Quick/Speed dials and to the forwarding terminal. (5 bytes x 61 destinations) [0: No history, 1: 2400 bps, 2: 4800 bps, 3: 7200 bps, 4: 9600 bps]
538B	Number of characters in the RTI - 14 (H)
538C - 539F	RTI (ASCII)
53A0	Number of characters in the CSI - 14 (H)
53A1 - 53B4	CSI (ASCII)
53B5	Number of characters in the TTI - 20(H)
53B6 - 53D5	TTI (ASCII)
53D6	Number of digits in the forwarding terminal's telephone number
53D7 - 53F6	Forwarding terminal's telephone number (ASCII)
54D0	Check RAM **Note 3**
57CE	Check RAM **Note 3**
6408	AVM language in AUTO and TAM modes. **Note 4** AVM ROM 1 1(D): English 2(D): German 3(D): Dutch 4(D): French AVM ROM 2 1(D): English 2(D): Swedish 3(D): Danish 4(D): Norwegian 5(D): Finnish AVM ROM 3 1(D): English 2(D): Italian 3(D): Spanish 4(D): Portuguese
6409	Second AVM language in AUTO and TAM modes. (Same as above)
6412	Number of signal detection required for reception mode switchover [N times] (Default: 2 times)
6414	Reception mode switchover detection time (continuous tone) [Time = N X 20 msec] (Default: 800 msec)
6416	Reception mode switchover detection time (single tone) [Time = (N + 2) X 5 msec] (Default: 40 msec)

When you use addresses after 4000H, it is necessary to input "9" in front of the address. (eg: 4000H ⇒ 94000H)

Address (Hex)	Function		
6417	Reception mode switchover access number		(Default: 2)
ROM Version • The following addresses are ROM addresses. The data in these addresses cannot be changed.			
C00C	Version	(High)	(ASCII)
C00D	A period “ . ”		(ASCII)
C00E	Version	(Low)	(ASCII)
C00F	Version	(Low)	(ASCII)
C010	A blank space “ ”		(ASCII)
C011	Day	(Tens digit)	(ASCII)
C012	Day	(Units digit)	(ASCII)
C013	A period “ . ”		(ASCII)
C014	Month	(Tens digit)	(ASCII)
C015	Month	(Units digit)	(ASCII)
C016	A period “ . ”		(ASCII)
C017	Year	(Tens digit)	(ASCII)
C018	Year	(Units digit)	(ASCII)
C019	A blank space “ ”		(ASCII)
C01A	Hour	(Tens digit)	(ASCII)
C01B	Hour	(Units digit)	(ASCII)
C01C	A colon "."		(ASCII)
C01D	Minute	(Tens digit)	(ASCII)
C01E	Minute	(Units digit)	(ASCII)
C01F	A blank space ":"		(ASCII)
C020	Not used		(ASCII)
C021	Machine code	RF03 = 33(H)	FAX250 = 33(H)

When you use addresses after 4000H, it is necessary to input "9" in front of the address. (eg: 4000H ⇒ 94000H)

Notes:

1. Forwarding requires the following switches and data.

ON/OFF Bit 2 of 0009	Mode Bit 1 of 0009(H)	Start data and time 20A7 - 20AC(H)	End Data and time 20A1 - 20A6(H)
OFF (0)			
ON (1)	NOW (0)	Current date and time is stored.	End time and date is stored here (user programmable). If "UNDEFINED" is selected, the start date and time is copied here.
	LATER (0)	start date and time is stored here (user programmable).	
	DAILY (1)	The daily start time is stored here.	The daily end time is stored here.

2. FAX250 only

3. If the data is changed and the power is switched off and on, all items stored in the RAM are reset except the clock.

4. The language sets for AVM is determined by the type of AVM ROM on the FDU. The following table shows which type of AVM ROM is used for each country model.

Country	AVM ROM Type	FDU Part Number RF03/ FAX250
United Kingdom	1	H0968521
Germany	1	H0968521
Italy	3	H0968523
Spain	3	H0968523
Netherlands	1	H0968521
Sweden	2	H0968522
Austria	1	H0968521
Switzerland	1	H0968521
Belgium	1	H0968521
Denmark	2	H0968522
Norway	2	H0968522
Portugal	3	H0968523
Finland	2	H0968522

3-2-2. Format of the Activity Log (Sent Fax Report) Generation Area

The Activity Log and the Sent Fax Report are generated in addresses 20AD - 226E (H). The record of each communication is stored in blocks of 29 bytes as explained in the following table.

Byte No.	Functions
0	Header Bit 7: Sent Fax Report (1: Enabled) Bits 6 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): Page separation 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 2272 - 2433(H). The record of each error communication is stored in blocks of and 45 bytes as explained in the following table. The RF03/FAX250 can store up to 10 error communication records.

Byte No.	Functions	
0 - 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 2438 - 24F7 (H). Each error code is stored in blocks of 6 bytes as explained in the following table. The RF03/FAX250 can store up to 32 error codes.

Byte No.	Functions	
0	Error code (High)	(BCD)
1	Error code (Low)	(BCD)
2	Month	(BCD)
3	Day	(BCD)
4	Hour	(BCD)
5	Minute	(BCD)

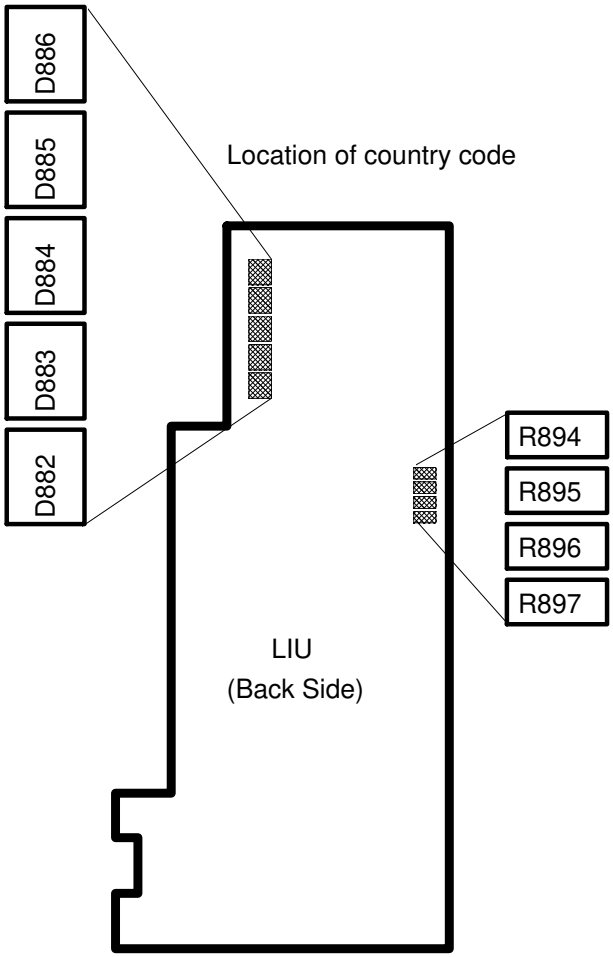
3-3. COUNTRY CODES

A four-bit country code is programmed with a combination of diodes on the LIU, and it is transferred to the FCE through serial port.

3-3-1. Country code/Address table

This table shows the address of each country code bit on the LIU.

Bit	Code
C0	D882
C1	D883
C2	D884
C3	D885



Country Code setting

Country	C3	C2	C1	C0
Austria	1	1	1	1
Belgium	1	1	1	0
Denmark	1	1	0	1
Finland	1	1	0	0
France	1	0	1	1
Germany	1	0	1	0
Greece	1	0	0	1
Ireland	1	0	0	0
Italy	0	1	1	1
Netherlands	0	1	1	0
Norway	0	1	0	1
Portugal	0	1	0	0
Spain	0	0	1	1
Sweden	0	0	1	0
Switzerland	0	0	0	1
United Kingdom	0	0	0	0

A setting of 0 means that a diode installed at the corresponding address on the LIU. A setting of 1 means that a diode is not installed at the corresponding address on the LIU. The country code setting is printed on the system report.

3-4. VARIABLE RESISTORS AND SWITCHES

PCB	Address	Function
FDU	R374	Tx signal output level fine adjustment
FCE	C403	Real time clock frequency adjustment. Do not adjust. (RF02F/FAX240F only)
LIU	R808	Speaker volume adjustment(user adjustable)
	R867	Ringer volume adjustment (user adjustable)
	SW880	PD/DTMF select switch (user selectable except in Austria)
	SW881	GS/FS select switch (user selectable except in Austria)
PSU	SW102	A thermostat; this switches the power off automatically when the temperature goes higher than 85 ± 5°C, and recovers after switching the power switch off and on or after cooling down by about 5°C

3-5. 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 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 postition 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.

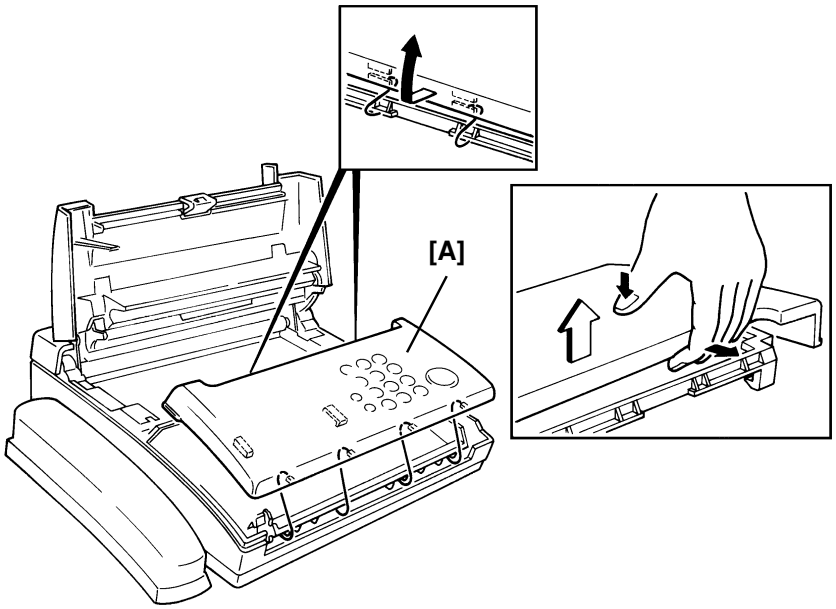
4. REMOVAL AND ADJUSTMENT

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.

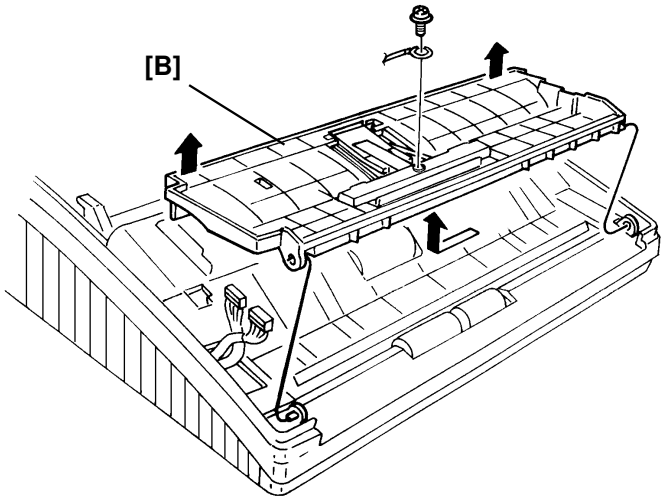
4-1. COVERS

4-1-1. Operation Panel Assembly

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

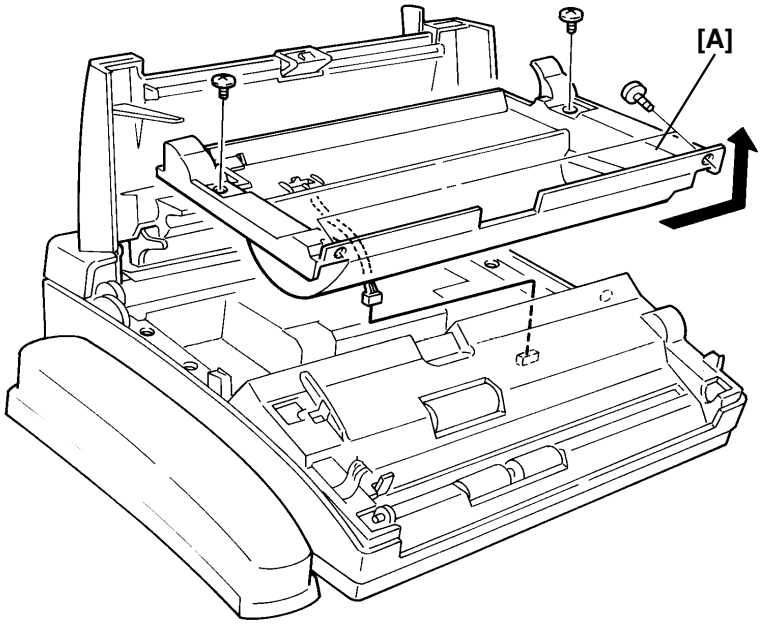


3. Disconnect both connectors.
4. Remove the lower cover [B] (1 ground wire).



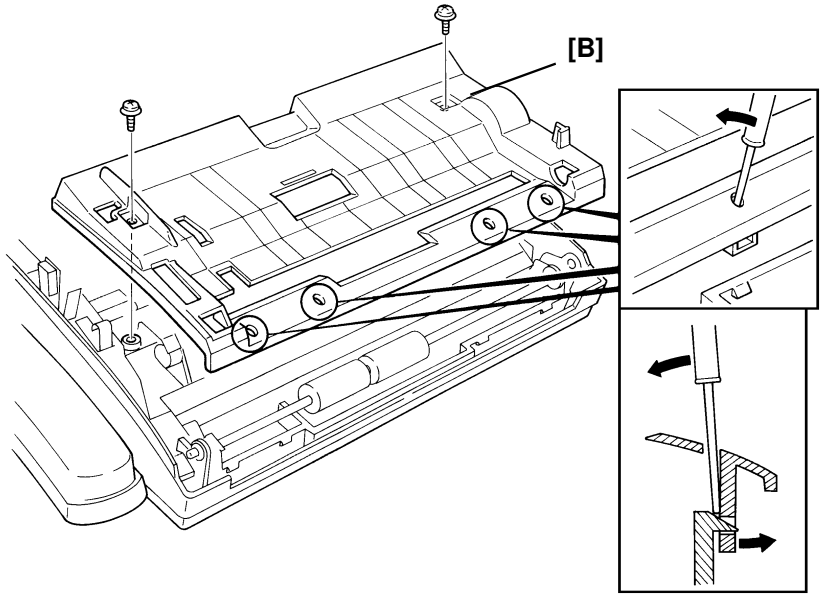
4-1-2. Paper Holder and Scanner Cover

1. Remove the operation panel assembly (see section 4-1-1).
2. Open the printer cover.
3. Remove the paper holder [A] (4 screws, 1 connector).



4. Remove the scanner cover [B] with a small watchmaker's screwdriver as shown below.

   Note: Use a screwdriver which is less than 2 mm thick, otherwise the scanner cover will warp and cause a document jam later.

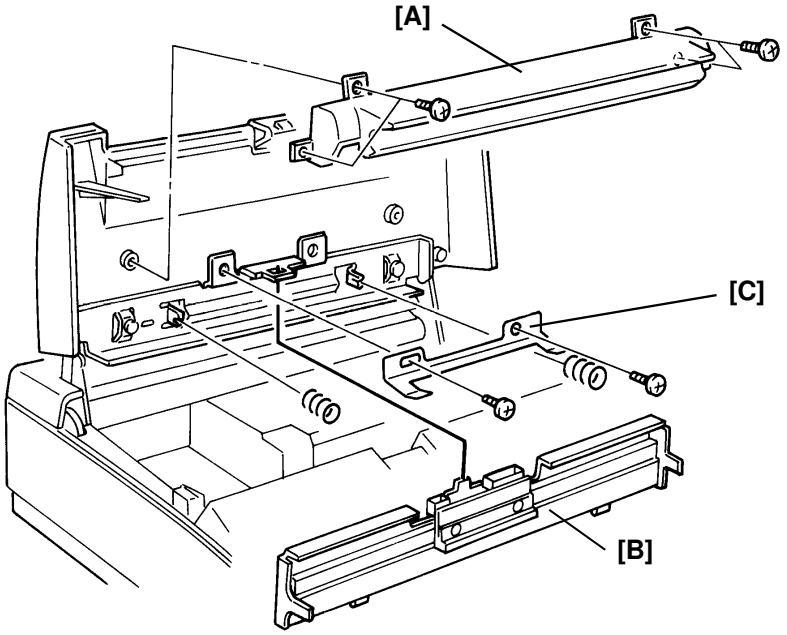


4-1-3. Thermal Head and Printer Cover

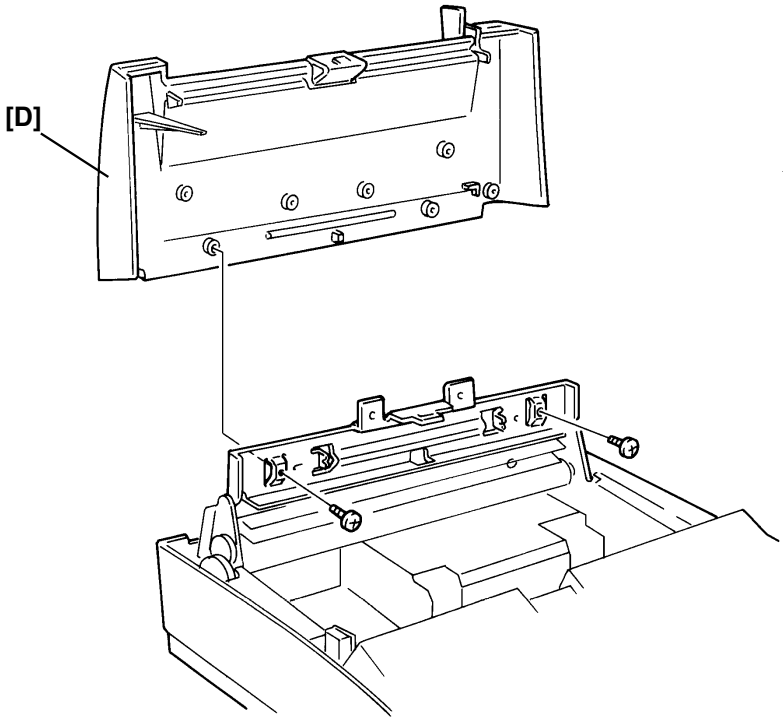
1. Open the printer cover.
2. Remove the thermal head cover [A] (4 screws).
3. Remove the thermal head [B] and the spring plate [C] (2 connectors, 2 springs, 2 screws).

Reassembly Note

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



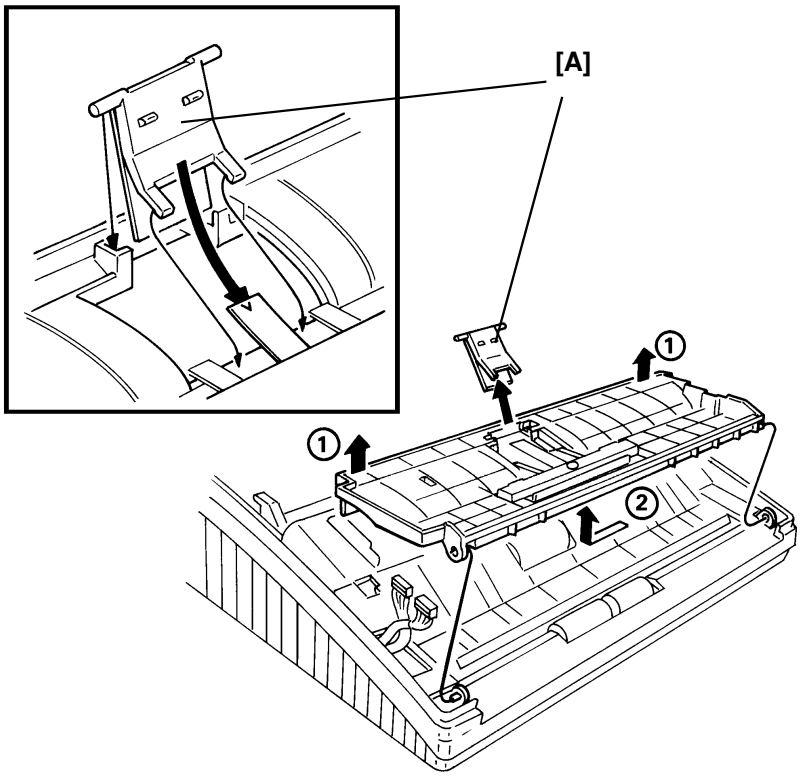
4. Remove the printer cover [D] (2 screws).



4-2. SCANNER

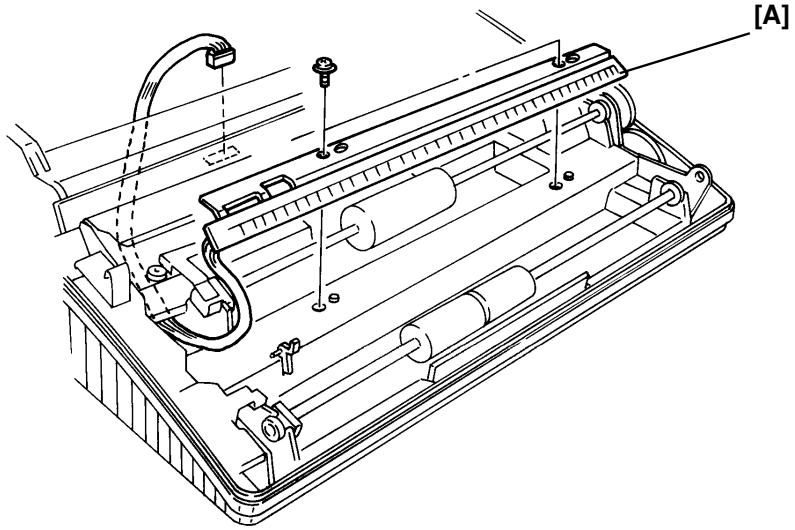
4-2-1. Separation Rubber Plate

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).

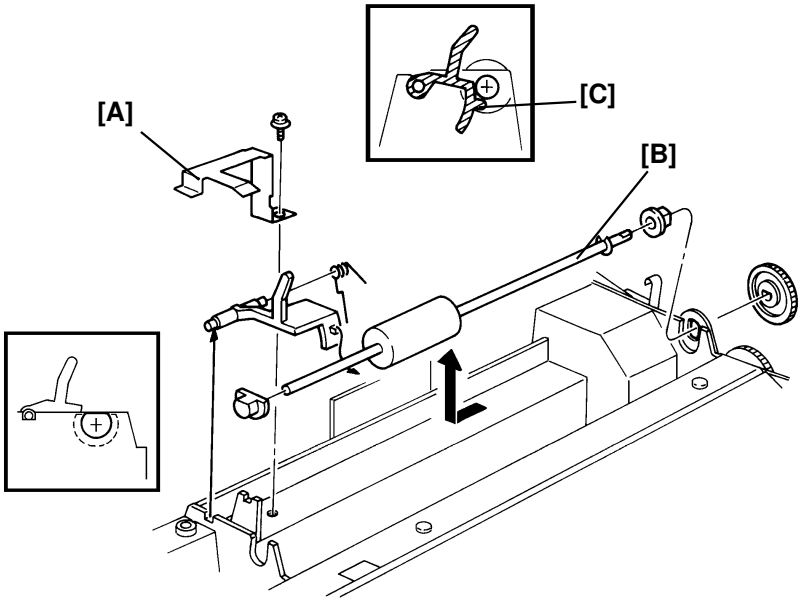


4-2-3. Feed Roller

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

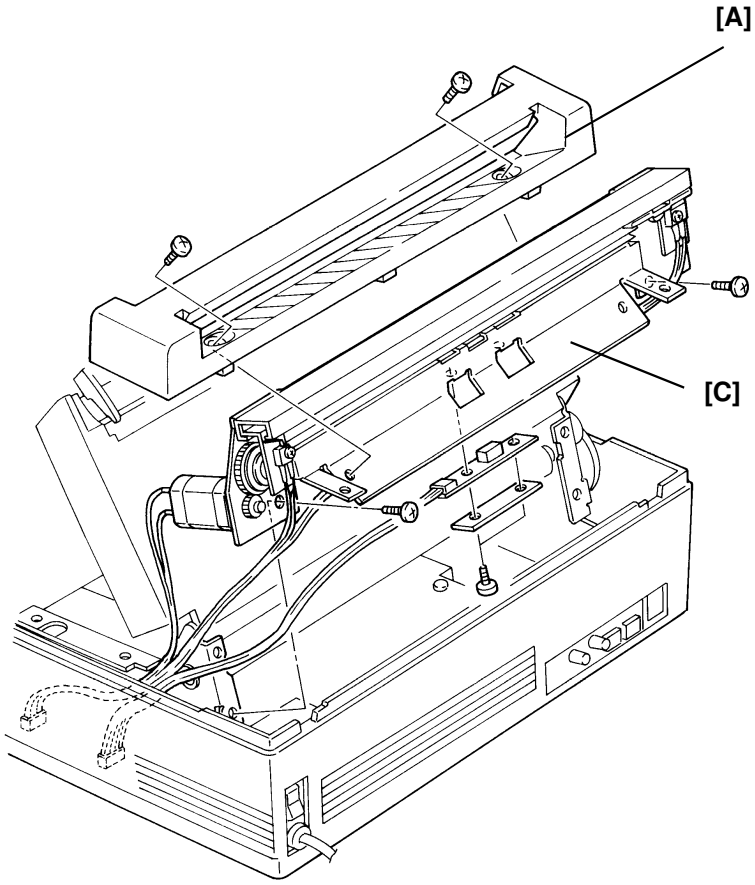
- Pin [C] on the document sensor actuator must be under the feed roller shaft.



4-3. PRINTER

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

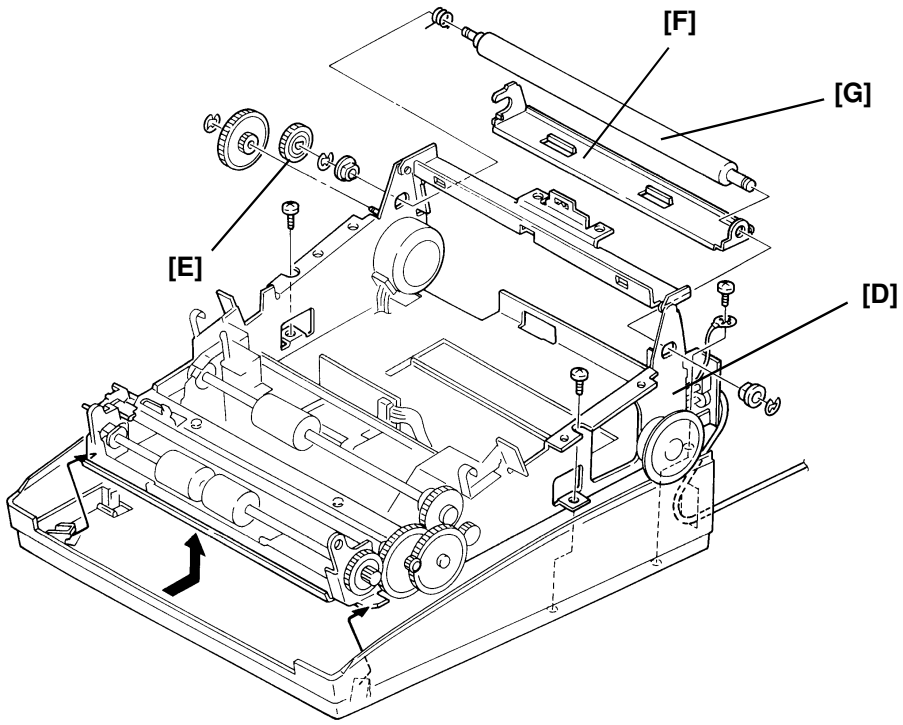
1. Remove the rear cover [A] and the cutter unit [C] (4 screws).
2. Remove the operation panel assembly, the paper holder, the scanner cover and the printer cover (see section 4-1).



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

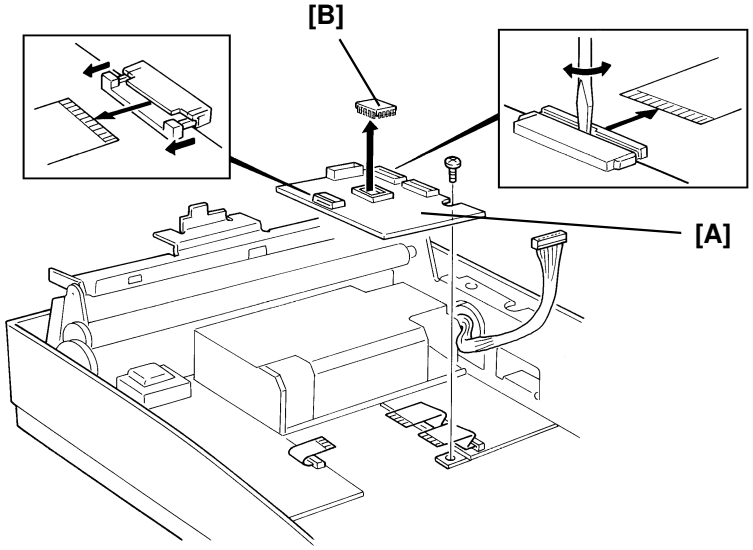
- Be careful not to assemble the gears the wrong way round.
- The left bushing - platen roller is smaller than right bushing.
- Lubricate the left shaft of the platen roller all the way round after changing the platen roller or the spring clutch for the decurler (Use Mobil Temp 78, part no. 54479078).



4-4. PCBs

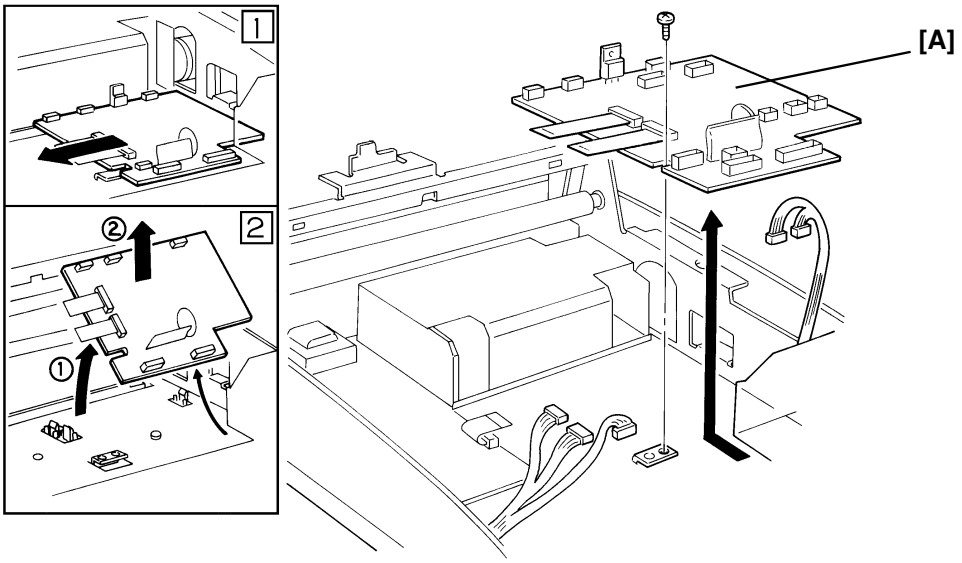
4-4-1. FCE and ROM

1. Remove the paper holder (see section 4-1-2).
2. Remove the FCE [A] (1 screw, 2 connectors, 3 flat cables).
3. Remove the ROM [B].

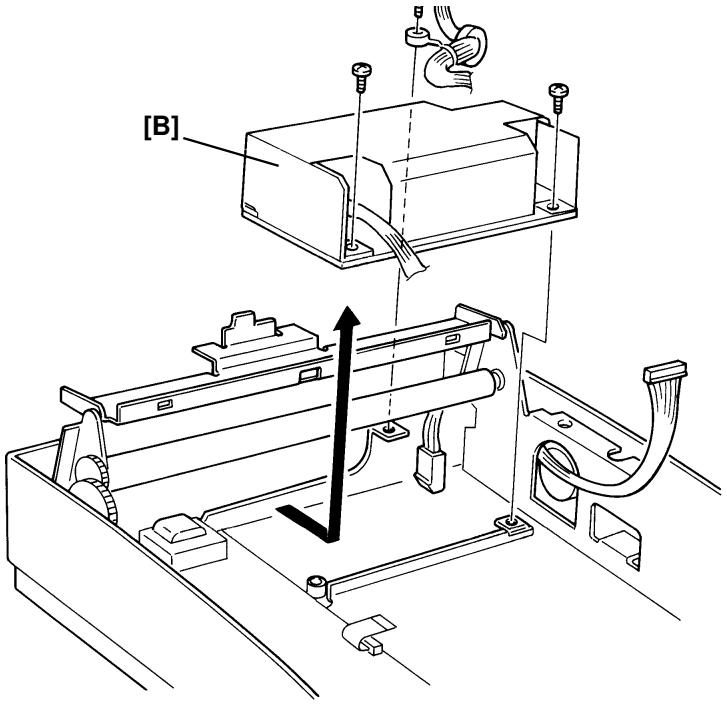


4-4-2. FDU, PSU and LIU

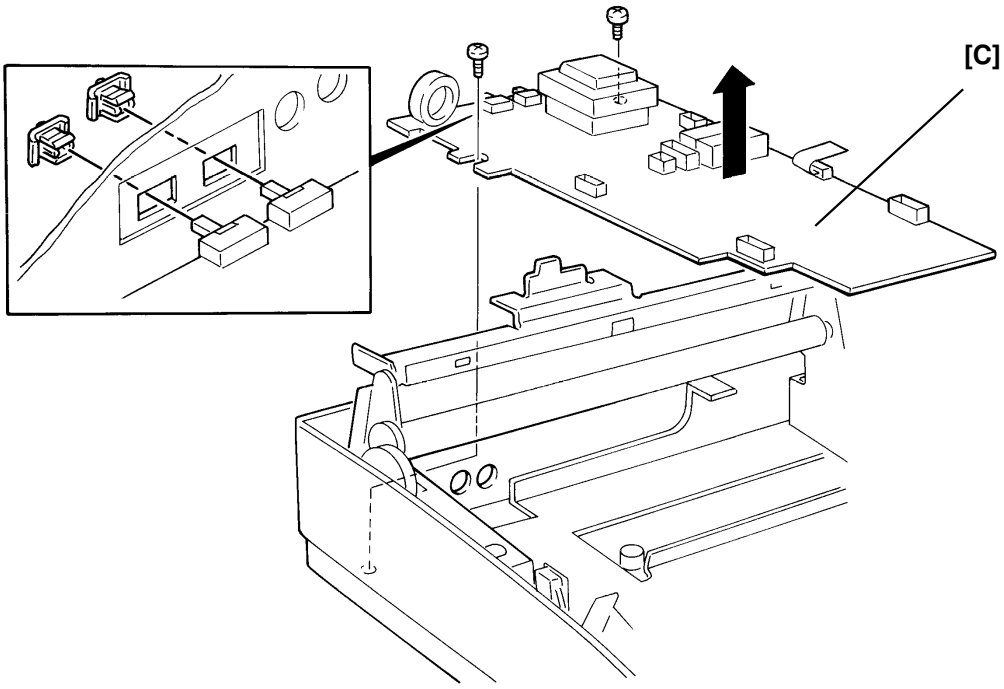
1. Remove the paper holder, the rear cover and the paper guide bracket or cutter unit (see sections 4-1-2 and 4-3-1).
2. Remove the FCE (see section 4-4-1).
3. Remove the FDU [A] (1 screw, 10 connectors, 2 flat cables).

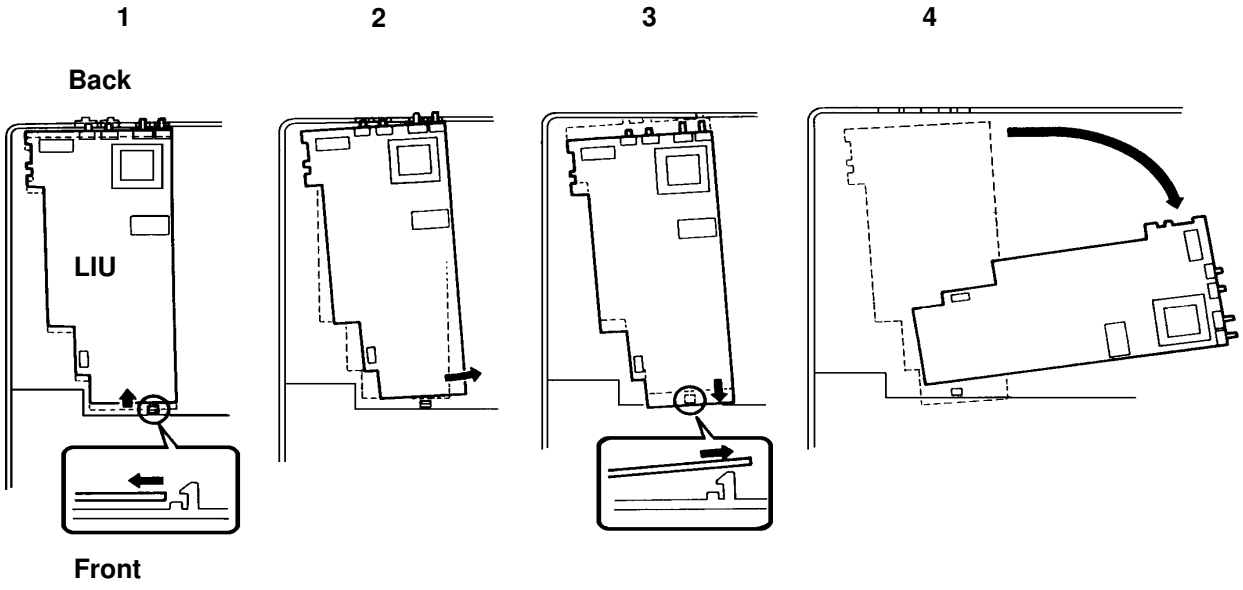


4. Remove the PSU [B] (2 screws, 2 connectors).



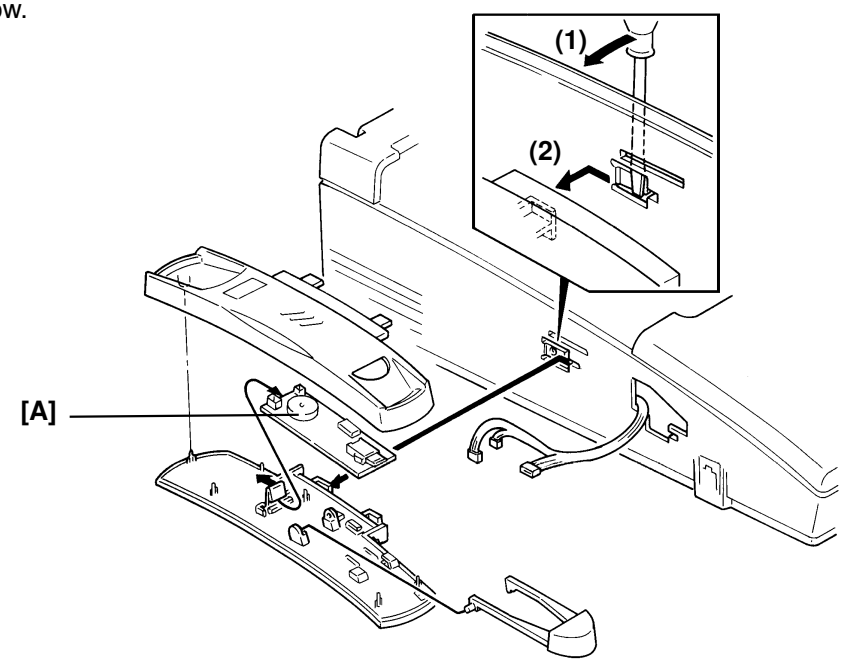
5. Remove the LIU [C] (2 screws, 7 connectors).





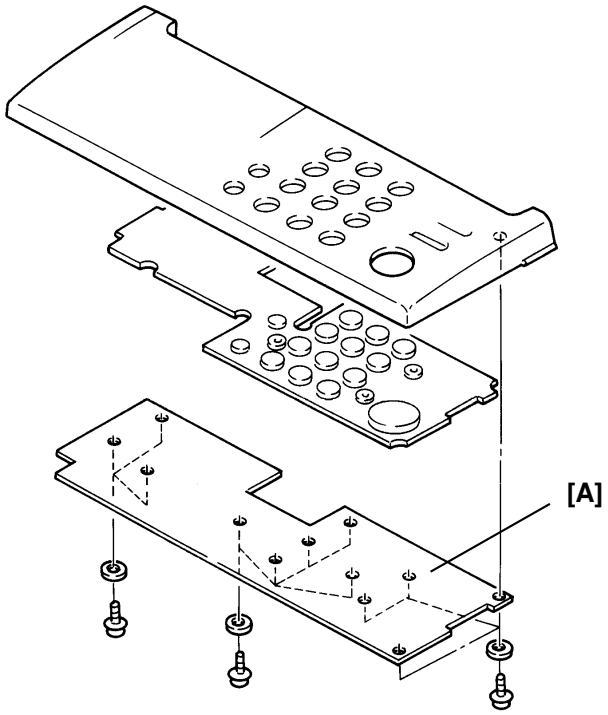
4-4-3. HSB

1. Remove the paper holder (see section 4-1).
2. Remove the cradle unit as shown below.
3. Remove the HSB [A] (3 connectors).



4-4-4. OPU

1. Remove the operation panel cover (see section 4-1-1).
2. Remove the OPU [A], (21 screws, 2 connectors).



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. H0939600)
3. 7 pin connector (P/No. 11024206)
4. Harness - SBU - FDU (P/No. H0938309)

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 3-1 and 3-3).
3. Remove the SBU (2 screws, 1 connector at P302 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.

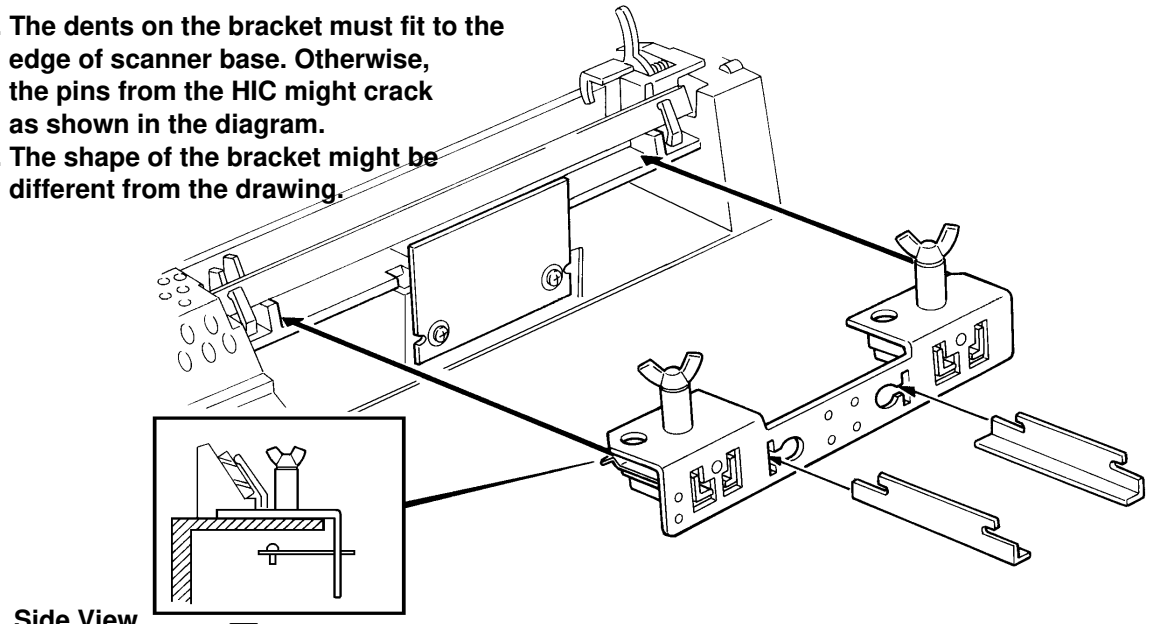
"Focusing" explains how to adjust focusing on the CCD. Adjusting the lens position is a bit more difficult than for other current models.

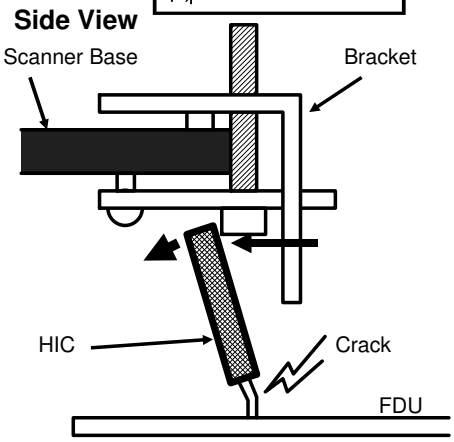
1. Preparation

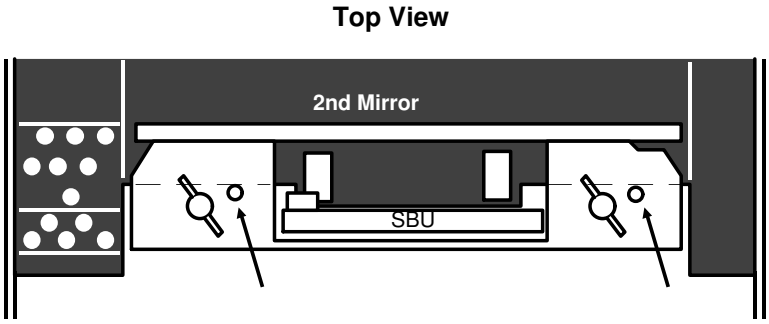
1. Install a new SBU in the machine. (Do not connect the harness to the FCU.)
2. Clamp the bracket to the scanner base. Set the left side of the bracket first as shown below.

Notes:

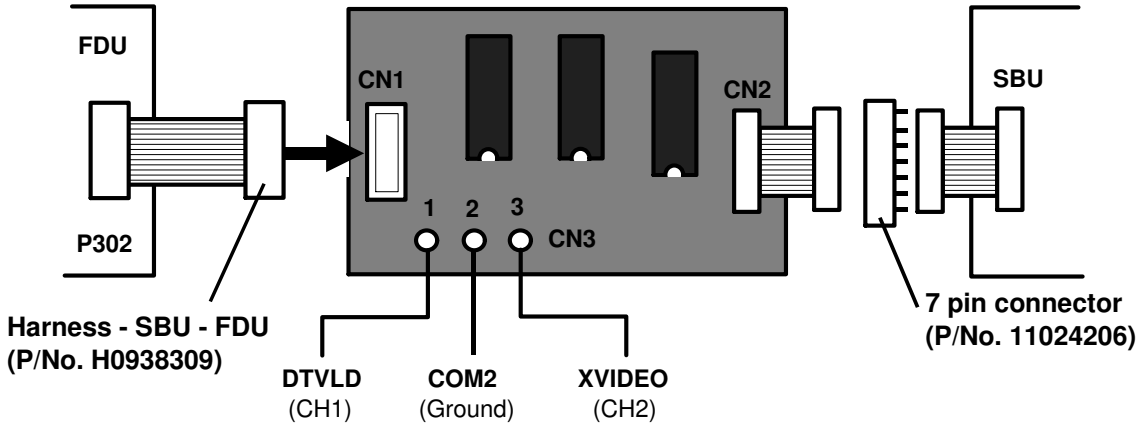
1. **The dents on the bracket must fit to the edge of scanner base. Otherwise, the pins from the HIC might crack as shown in the diagram.**
2. **The shape of the bracket might be different from the drawing.**





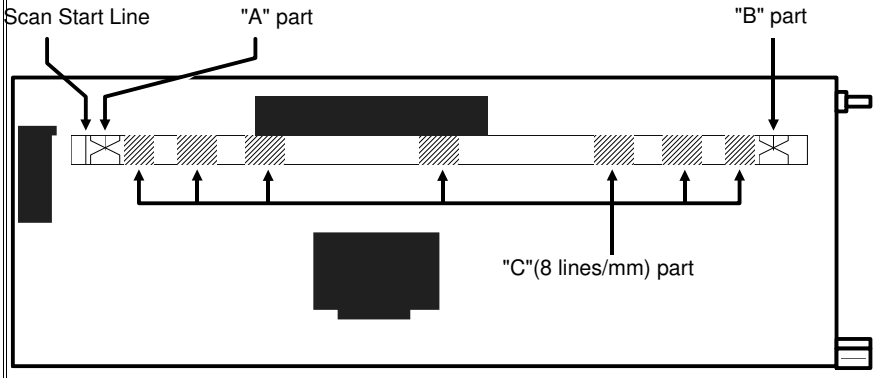


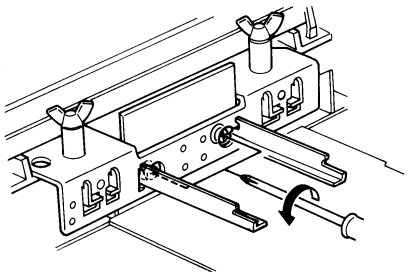
3. Connect the harness from the FDU (P302) to CN1 on the test PCB, then connect the harness from the test PCB(CN2) to the harness from the SBU through 7 pin connector (P/N: 1102 4206).
   Important: Make sure that the test PCB is connected as shown in the diagram below. The SBU may be damaged if the test PCB is connected the other way around.

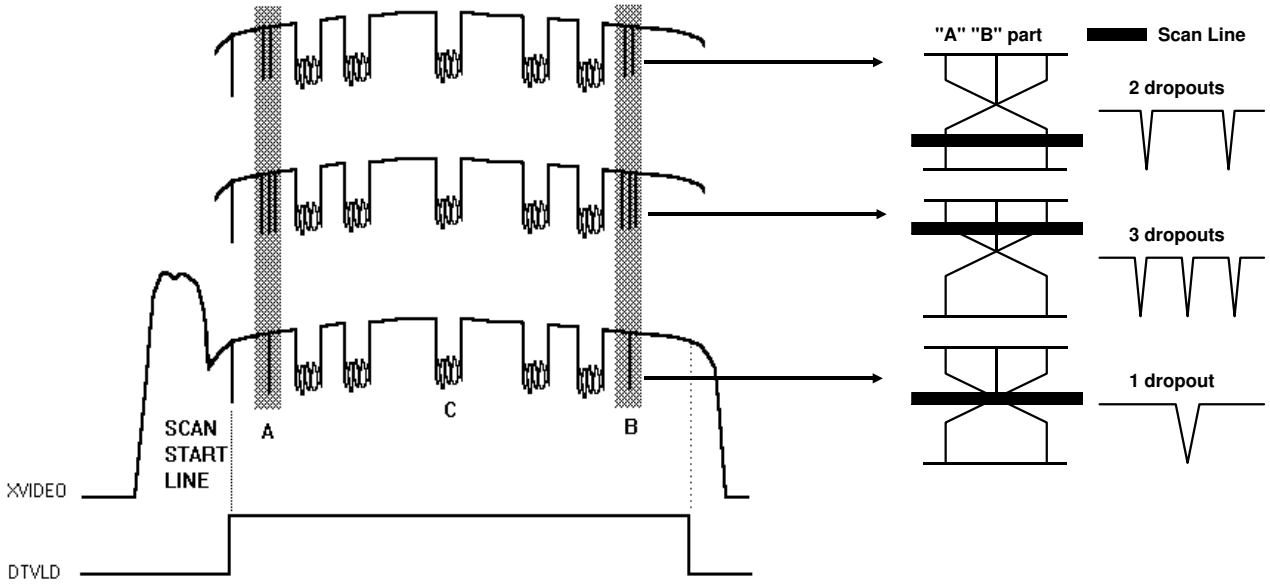


1. Preparation

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 3-4-13).
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.





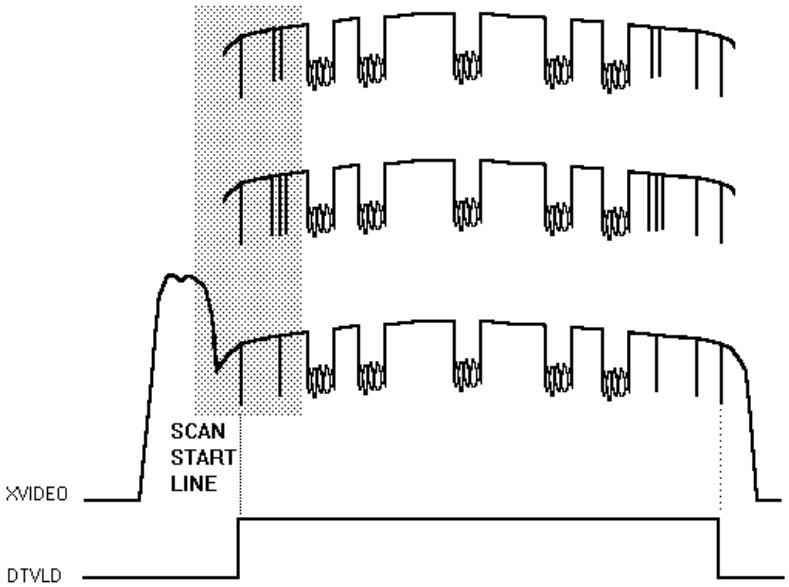


2. Horizontal Scan Line Adjustment

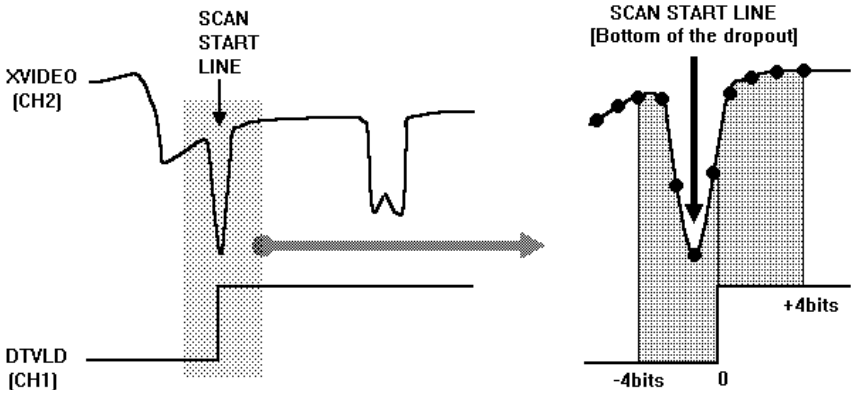
1. Set up the oscilloscope as follows:
   CH1 (DTVLD) - 5 V/div.
   CH2 (XVIDEO) - 0.2 V/div.
   TIME - 1 ms/div.
   Use ALT mode to display CH1 and CH2 at the same time.

2. Loosen the SBU securing screws.

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



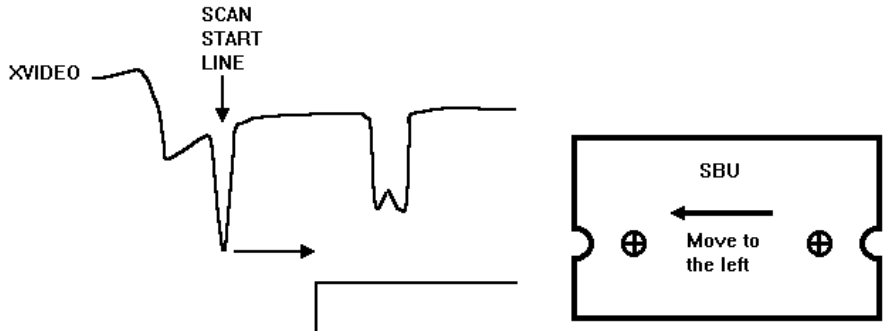
4. Enlarge the shaded part of the waveform above by changing the TIME scale to 50 μs/div or 20 μs/div.
   The scan start line appears as the first sharp dropout from the left of the XVIDEO signal on the oscilloscope.
   The dropout of the waveform has to be within ±4 bits from the rising edge of the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



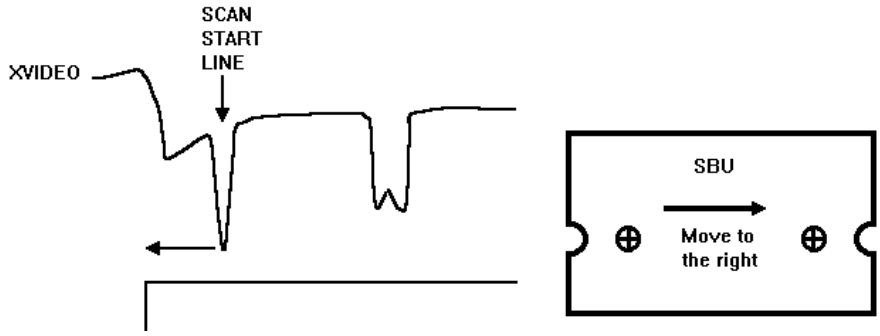
If the scan start line is not at the correct position, go to step 5 to adjust the horizontal scan line position.

2. Horizontal Scan Line Adjustment

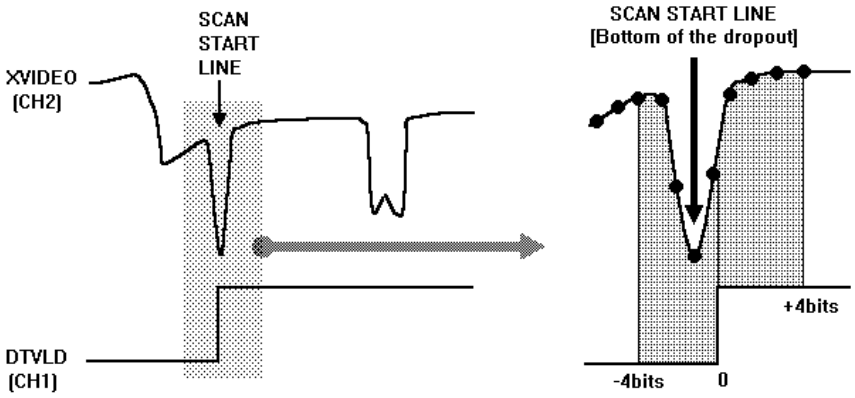
5. Adjust the horizontal scan line position as shown below.
   If the scan start line is to the left of the rising edge of the DTVLD signal, move the SBU to the left.



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.

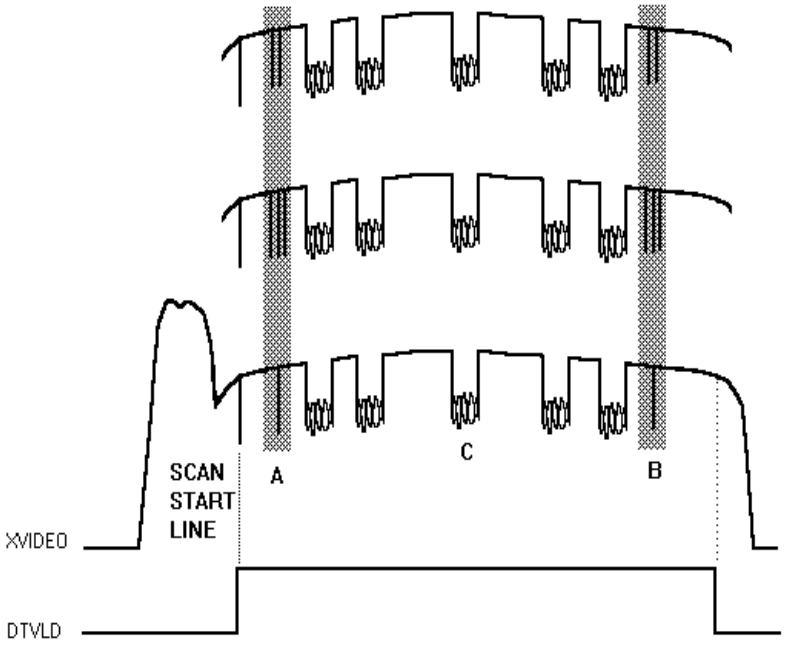


Note: Scan end line adjustment is not necessary.

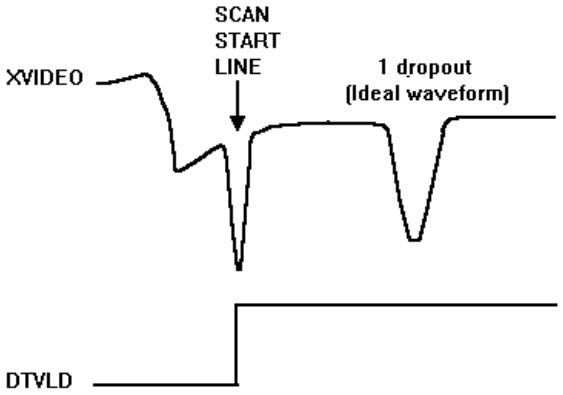
3. Vertical Scan Line Adjustment

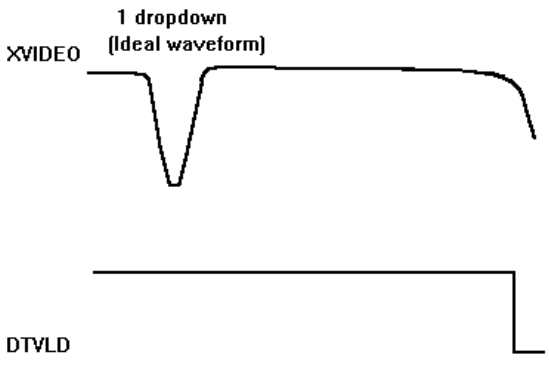
1. Set up the oscilloscope as follows:
   CH1 (DTVLD) - 5 V/div.
   CH2 (XVIDEO) - 0.2 V/div., not inverted
   TIME - 1 ms/div.
   Use ALT mode to display CH1 and CH2 at the same time.

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.



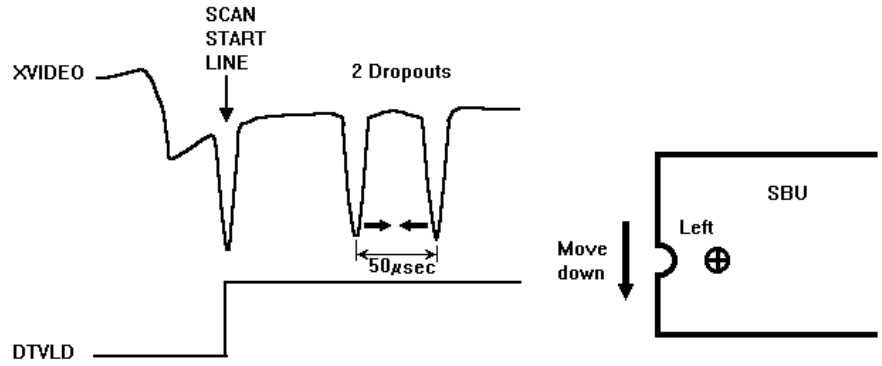
Enlarge areas “A” and “B” by changing the time scale to 50 μs/div or 20 μs/div.
The ideal waveform should have only one dropout at each of “A” and “B”. If the waveform has two or three dropouts there, go to step 3 to adjust the “A” part (scan start side) and/or step 4 to adjust the “B” part (scan end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



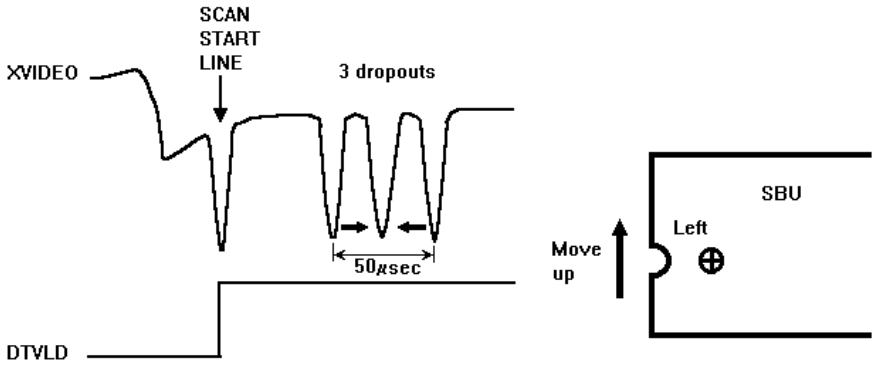


3. Vertical Scan Line Adjustment

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.

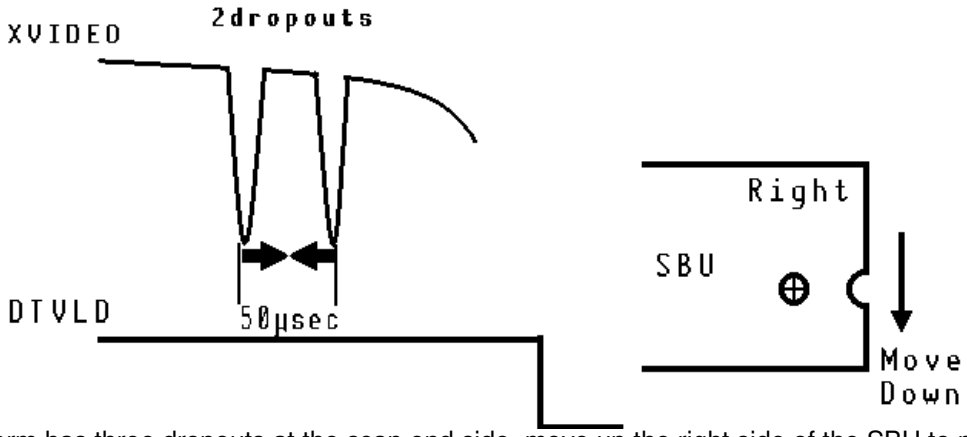


   If the waveform has three dropouts at the scan start side, move up the left side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 μs.

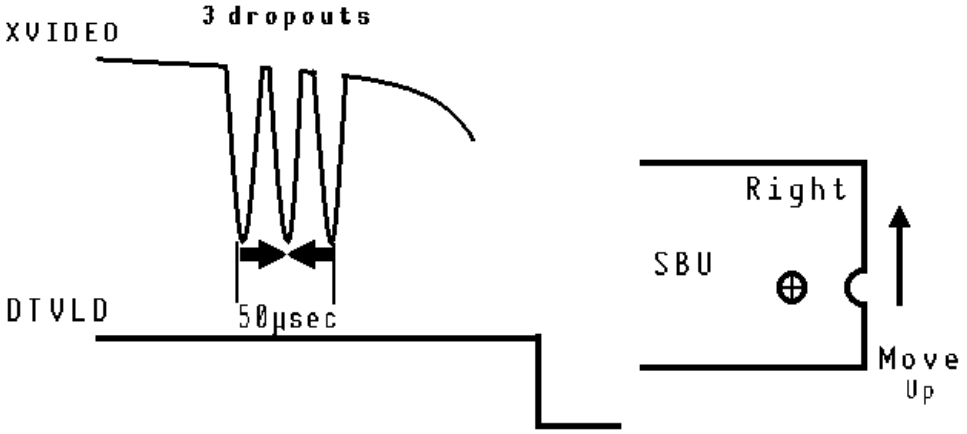


3. Vertical Scan Line Adjustment

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.



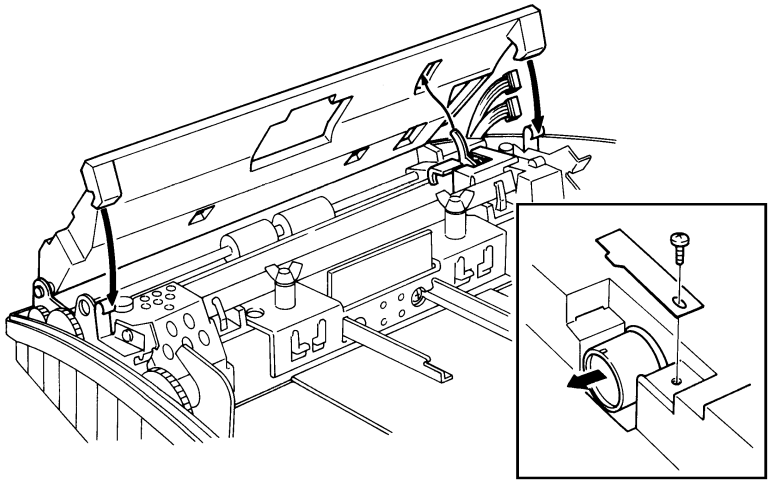
   If the waveform has three dropouts at the scan end side, move up the right side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



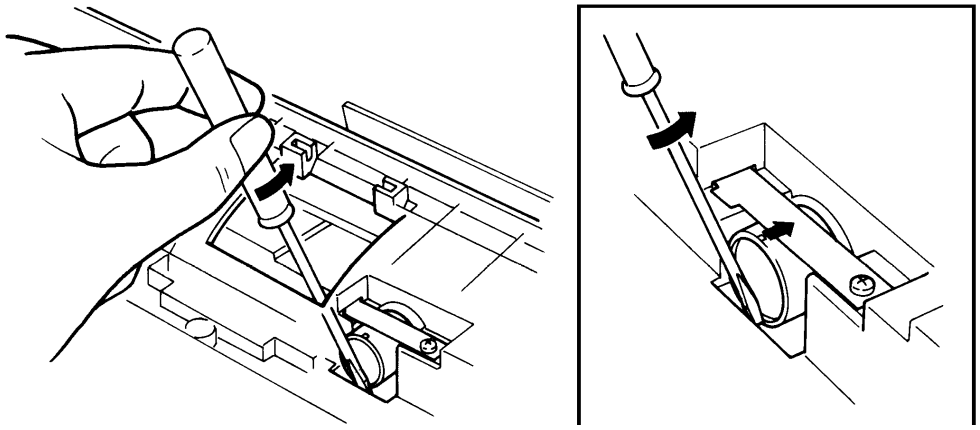
5. After adjusting the scan end side, confirm that the scan start side is still well adjusted, as the adjustment at one side often changes the waveform at the other side.

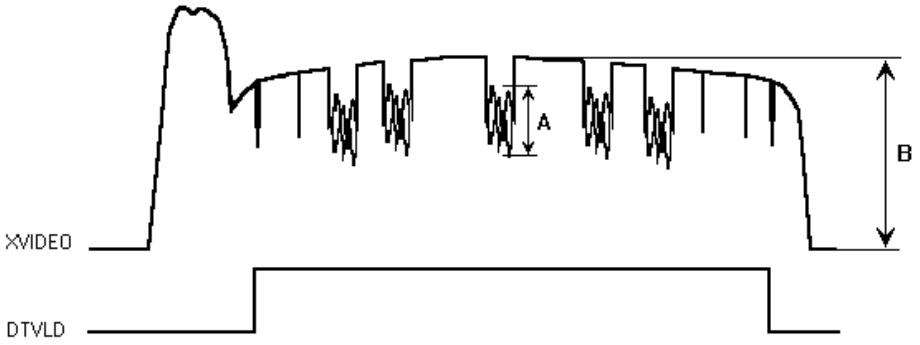
4. Focusing

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 ressemble 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 • 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
Filled-in characters	• Adjust the focusing
Side-to-side registration error	• Adjust the scan start position
One side darker than the other	• Adjust the CCD waveform flatness • Check the LED array; replace it if it is defective.
Image only partially scanned	• Adjust the scan line position and/or scan start position

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

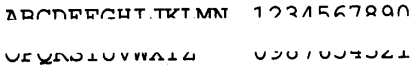
Missing lines; shrinkage in the sub scan direction

- 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.

Test	Action if Yes	Action if No
8. Is the scan start line of the SBU well adjusted ?	Go to step 9.	Adjust the scan start position.
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.

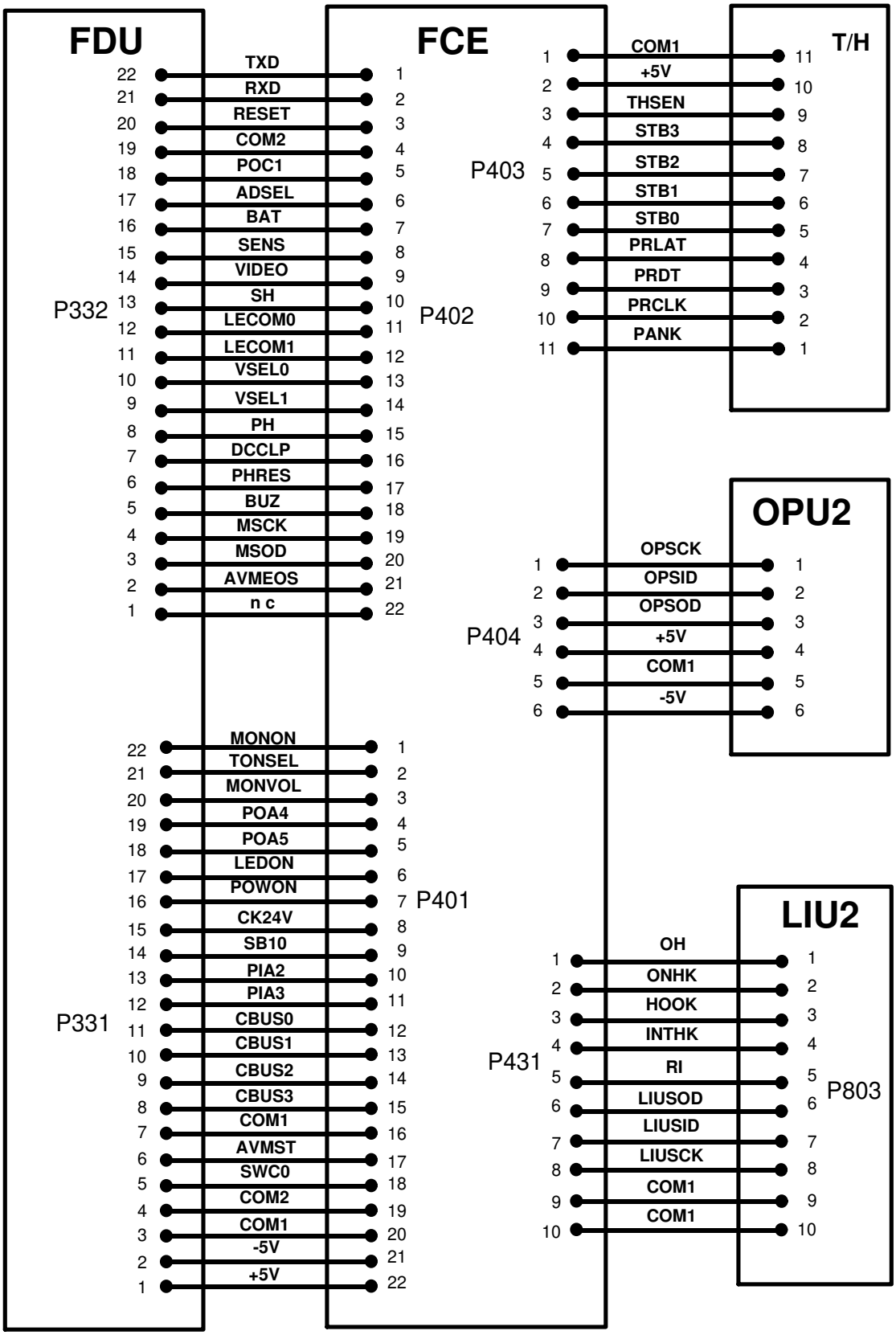
Code	Meaning	Suggested Cause/Action
0-10	The other end did not send a reply to EOP, EOM or MPS	Check the line connection. Check the FCE - FDU - LIU connection. Replace the FCE, LIU or FDU. Try adjusting the tx level (use NCU parameter 10). The other end may have a defective modem/NCU/FCU; try sending 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

FCE: P402			
No	**Name**	**Function**	**V**
1	TXD	Transmit data	0
2	RXD	Receive data	0
3	RESET	Reset out	5
4	COM2	Ground	0
5	SWC1	Switch column 1	0
6	ADSEL	SENS select signal	0
7	BAT	Battery power	5
8	SENS	SB-4 or SB-5	X
9	XVIDEO	Analog video signal	X
10	SH	Shift clock to CCD	C
11	LECOM0	Serial data of LED status from the OPU	5
12	LECOM1		5
13	VSEL0	Video gain control 0	5
14	VSEL1	Video gain control 1	5
15	PH	First phase transfer clock	C
16	DCCLP	DC restore request	C
17	PHRES	Reset clock (CCD output buffer)	C
18	BUZ	Buzzer drive signal	0
19	MSCK	Serial clock	5
20	MSOD	Serial output data	5
21	AVMEOS	AVM end of speech	5
22	PI05	KFCP I/O port	0

FCE: P401			
No	**Name**	**Function**	**V**
1	MONON	Monitor speaker on	0
2	TONSEL	Tone signal select	0
3	MONVOL	Speaker volume control	0
4	CUT0	Cutter drive 0	0
5	CUT1	Cutter drive 1	0
6	LEDON	LED array drive	0
7	POWON	24V power on signal	0
8	CK24V	24V detection	5
9	SB10	Cover open	0
10	SB7	Cutter start position	5
11	SB8	Cutter end position	0
12	CBUS0	System command data bus	0
13	CBUS1		0
14	CBUS2		0
15	CBUS3		0
16	PO1	EI02 output port P01	0
17	AVMST	AVM start	0
18	SWC0	Serial data of the key status from the OPU	0

FCE: P401			
No	**Name**	**Function**	**V**
19	COM2	Analog ground	0
20	COM1	Ground	0
21	-5V	DC power	-5
22	+5V	DC power	+5

6-1-2. FCE - Thermal Head

FCE: P403			
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	PANK	T/H type or R rank input	0

6-1-3. FCE - OPU

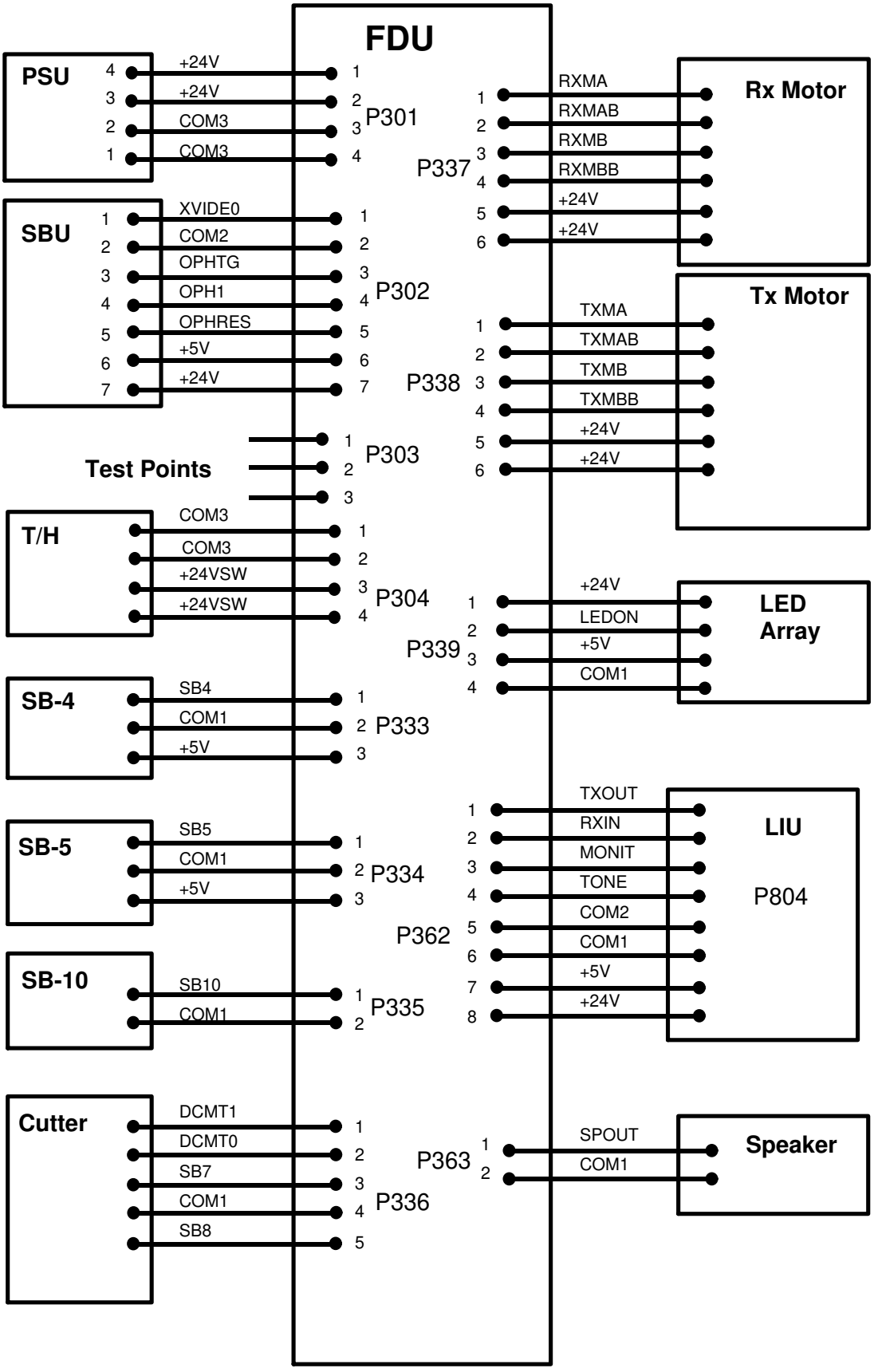
FCE: P404			
No	**Name**	**Function**	**V**
1	OPSCK	Serial shift clock	C
2	OPSID	Serial input data to FCE	C
3	OPSOD	Serial output data from FCE	C
4	+5V	+5V DC power	5
5	COM1	Ground	0
6	-5V	-5V DC power	-5

6-1-4 FCE - LIU

FCE: P431			
No	**Name**	**Function**	**V**
1	OH	OH relay control	0
2	ONHK	Internal tel on hook control	0
3	HOOK	Off hook detect	5
4	INTHK	Internal tel hook switch	0
5	RI	Ringing signal	5
6	LIUSOD	Serial output data from FCE	C
7	LIUSID	Serial input data to FCE	C
8	LIUSCK	Serial shift clock	C
9	COM1	Ground	0
10	COM1	Ground	0

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

6-2. CONNECTION FROM FDU



6-2-1. FDU - PSU

FDU: P301			
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

FDU: P302			
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

FDU: P303			
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

FDU: P304			
No	**Name**	**Function**	**V**
1	COM3	Ground for +24V	0
2	COM3	Ground for +24V	0
3	+24VSW	Switched 24V	0
4	+24VSW	Switched 24V	0

6-2-5. FDU - FCE

P332: See FCE P402 (section 6-1-1)

P331: See FCE P401 (section 6-1-1)

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

FDU: P333			
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)

FDU: P334			
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)

FDU: P335			
No	**Name**	**Function**	**V**
1	SB10	Signal from sensor	0
2	COM1	Ground	0

6-2-9. FDU - Cutter

FDU: P336			
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

FDU: P337			
No	**Name**	**Function**	**V**
1	RXMA	Rx motor phase 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

FDU: P338			
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

FDU: P339			
No	**Name**	**Function**	**V**
1	+24V	DC power	24
2	LEDON	LED array drive	15
3	+5V	DC power	5
4	COM1	Ground	0

6-2-13. FDU - LIU

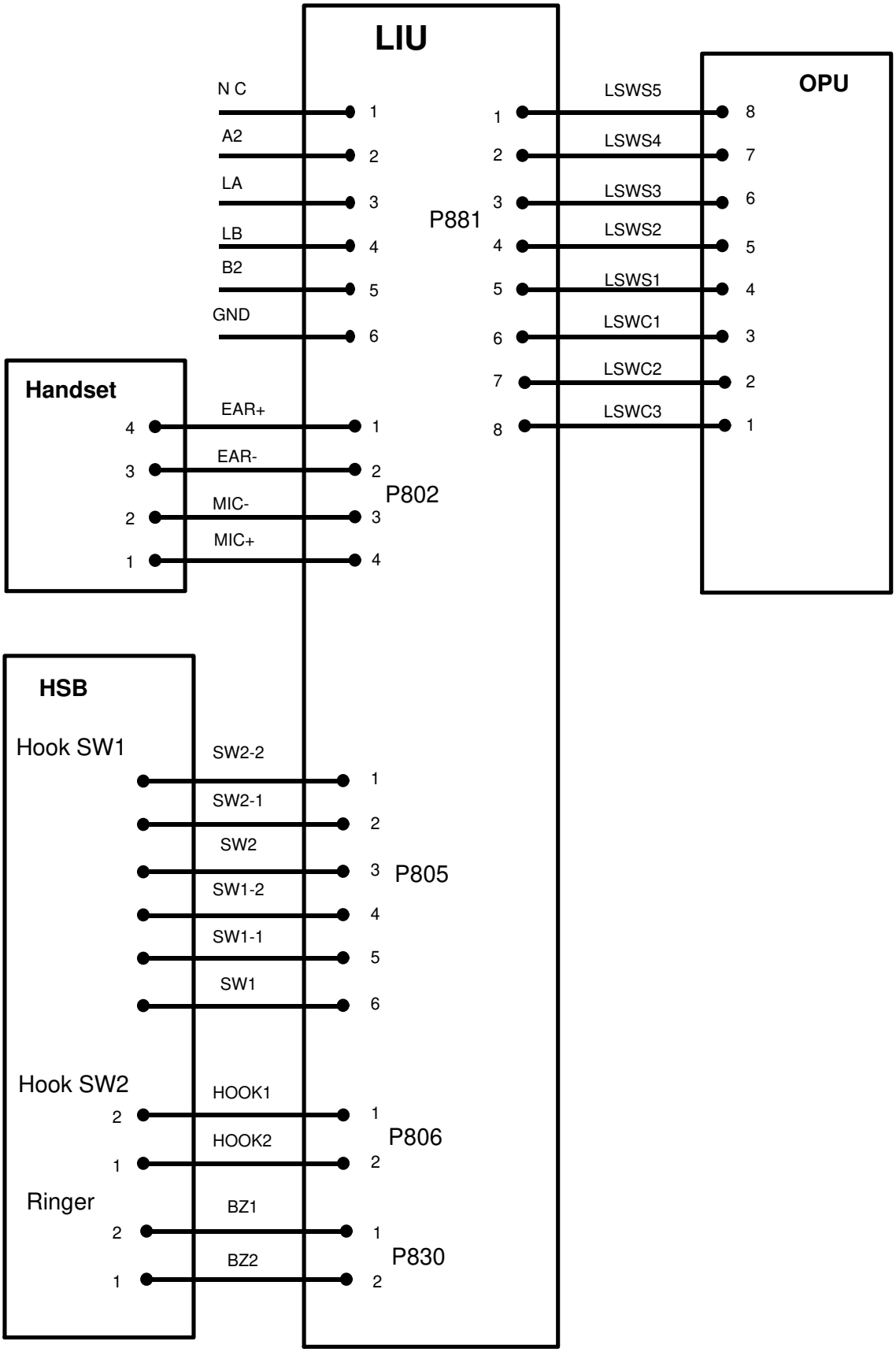
FDU: P362			
No	**Name**	**Function**	**V**
1	TXOUT	Transmit data	0
2	RXIN	Receive data	0
3	MONIT	Monitor input	0
4	TONE	Tone input	0
5	COM2	Analog ground	0
6	COM1	Ground	0
7	+5V	+5V DC power	5
8	+24V	DC power	24

6-2-14. FDU - Speaker

FDU: P363			
No	**Name**	**Function**	**V**
1	SPOUT	Speaker out	0
2	COM1	Ground	0

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

6-3. CONNECTION FROM LIU



6-3-1. LIU - Line

LIU: P801			
No	**Name**	**Function**	**V**
1	no, connection	No connection	0
2	A2	External phone tip	L
3	LA	Phone line tip	L
4	LB	Phone line ring	L
5	B2	External phone ring	L
6	GND	Tel Ground	0

6-3-2. LIU - Handset

LIU: P802			
No	**Name**	**Function**	**V**
1	EAR+	Speaker +	0
2	EAR-	Speaker -	0
3	MIC-	Microphone -	0
4	MIC+	Microphone +	0

6-3-3. LIU - FCE

P803: See FCE P431 (section 7-1-4).

6-3-4. LIU - FDU

P804: See FDU P362 (section 7-2-15).

6-3-5. LIU - HSB (Hook Switch 1)

LIU: P805			
No	**Name**	**Function**	**V**
1	SW2-2	Connection to the handset	0
2	SW2-1	Connection to the ring detection circuit	L
3	SW2	Connection from the line	L
4	SW1-2	Connection to the handset	0
5	SW1-1	Connection to the ring detection circuit	L
6	SW1	Connection from the line	L

6-3-6. LIU - HSB (Hook Switch 2)

LIU: P806			
No	**Name**	**Function**	**V**
1	HOOK1	Handset off-hook	0
2	HOOK2	Ground	0

6-3-7. LIU - HSB (Ringer)

LIU: P830			
No	**Name**	**Function**	**V**
1	BZ1	Ringer drive	0
2	BZ2	Ground	0

6-3-8. LIU - OPU Dialpad

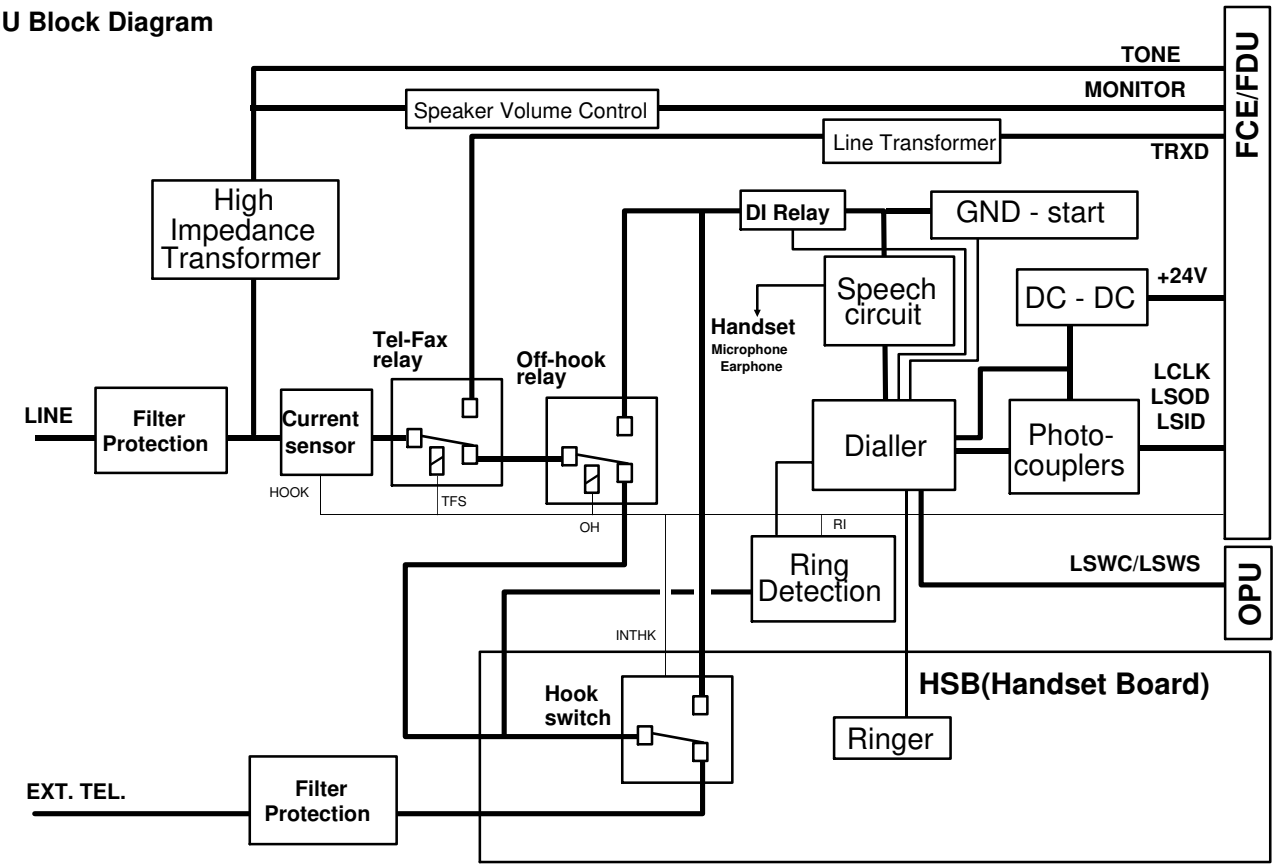
LIU: P881			
No	**Name**	**Function**	**V**
1	LSWS5	Key input	5
2	LSWS4	Key input	5
3	LSWS3	Key input	5
4	LSWS2	Key input	5
5	LSWS1	Key input	5
6	LSWC1	Common signal to the dialpad	C
7	LSWC2		C
8	LSWC3		C

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

APPENDIX A. LINE INTERFACE

1. OVERALL LIU DESCRIPTION

LIU Block Diagram



The LIU (Line Interface Unit) has all the telephone line interface functions and contains a telephone unit which is powered by the machine when the machine is switched on, and is alternatively powered from the telephone line when the machine is switched off.

The line interface contains filters, a current sensor, TEL/FAX (TF) relay, Off-Hook (OH) relay and ring detection circuit. The TF relay switches the line connection either to the internal telephone unit or to the modem. The OH (Off-hook) relay switches the line either to the external telephone and the ring detection circuit or to the internal dialling circuit.
In standby mode, both relays are switched down to connect the line to the external telephone and the ring detection circuit. When the internal handset is picked up, the hook switch goes up to connect the line to the dialler and speech circuit for dialling and voice communication. The OH relay is only switched up when the “On Hook Dial” key is pressed for On-hook dialling.
The internal telephone unit contains the handset interface, speech circuit, and a dialler (a single chip PCD3344 microcontroller with built-in CPU, ROM, RAM and DTMF tone generator).

The single tone signals, CNG, CED, dial tone, and busy tone are detected by the modem on the FCE through a high impedance transformer.

2. MAKING A TELEPHONE CALL

2-1. Manual Dialling from the External Telephone

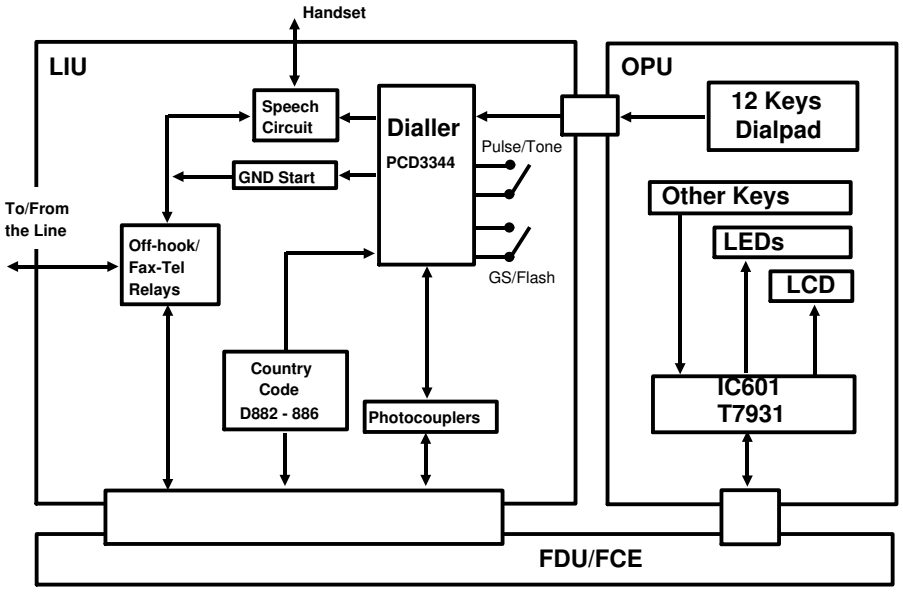
In standby mode, the line is connected to the external telephone. Then the user can dial from the external handset. If the user presses Start to send or receive a fax message, the TF relay switches up to connect the line to the modem.

2-2. Manual Dialling from the Built-in Telephone

There are two ways to dial manually from the built-in telephone: handset mode and on-hook mode.

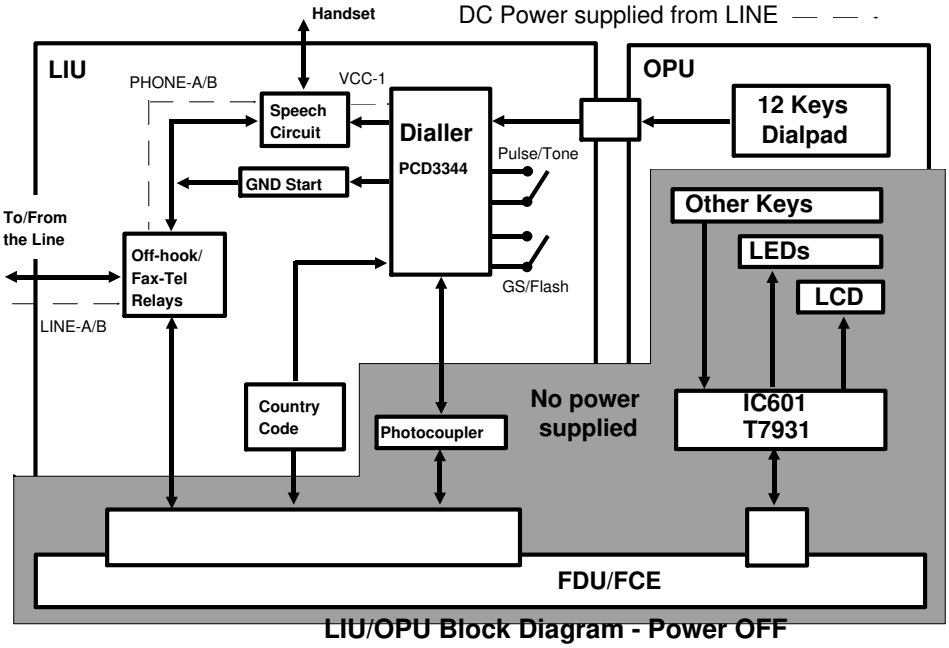
Handset mode: When the user picks up the handset, the Hook Switch goes up to connect the line to the dialler and speech circuit. The digits dialled at the dialpad are directly informed to the dialler, and the dialler dials the number and passes them to the FCE to indicate the dialled number on the LCD. If the user presses Start to send or receive a fax message, the TF relay switches up to connect the line to the modem on the FCE.

On-hook mode: When the user presses the On Hook Dial key, the OH relay switches up to connect the dialler to the line. Then the dialler acts in the same way as explained for handset mode.



LIU/OPU Block Diagram

The telephone features (dialling, voice communication) can also be used when the machine is switched off.
When the handset goes off-hook or the On Hook Dial key is pressed, the dialler is powered by the DC voltage from the line.
Then the dialled digits are directly informed to the dialler.



LIU/OPU Block Diagram - Power OFF

2-3. Automatic Dialling

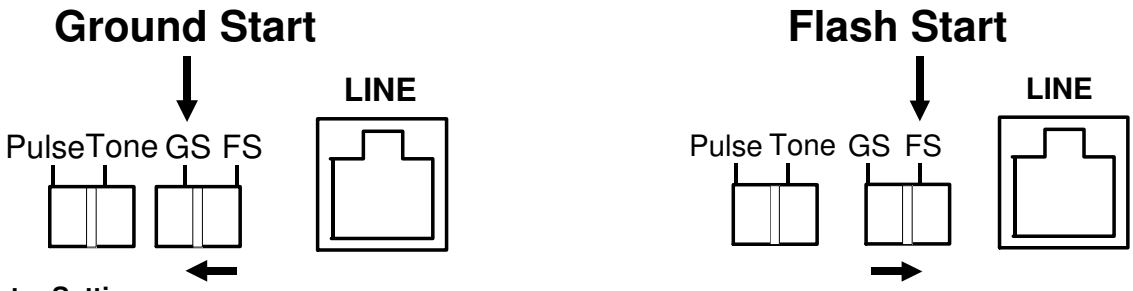
When the machine starts to dial, the TF relay switches up to close the DC loop. After the HOOK signal goes low to indicate that line current is detected, and the modem detects dial tone at TONE (see the diagram on page A-1), the dialler starts dialling. Then the machine waits for the line connection and CED before it starts sending the fax message. If busy tone is detected before line connection, the machine will disconnect the line.

2-4. Dialling Method (Pulse/Tone)

The LIU has a mechanical switch beside the modular jack to select either pulse dial or DTMF dial. This switch can be accessed by the user (in most countries). The dialler checks the setting of this switch every time the FCE detects off-hook, then dials the number using the indicated method.

2-5. PSTN Access from behind the PABX

When the machine is behind a PABX, the user can program which type of access method is required.
Loop Start: The user has to program an access code with Function 15.
Ground/Flash Start: The user has to select GS/Flash with Function 15, and select the function of the R (Recall) key either for Ground Start or Flash Start with the slide switch at the rear of the machine.
After the DC loop is closed, the machine detects the line current, detects PABX dial tone, accesses the PSTN using the correct method, detects PSTN dial tone, then dials the number.

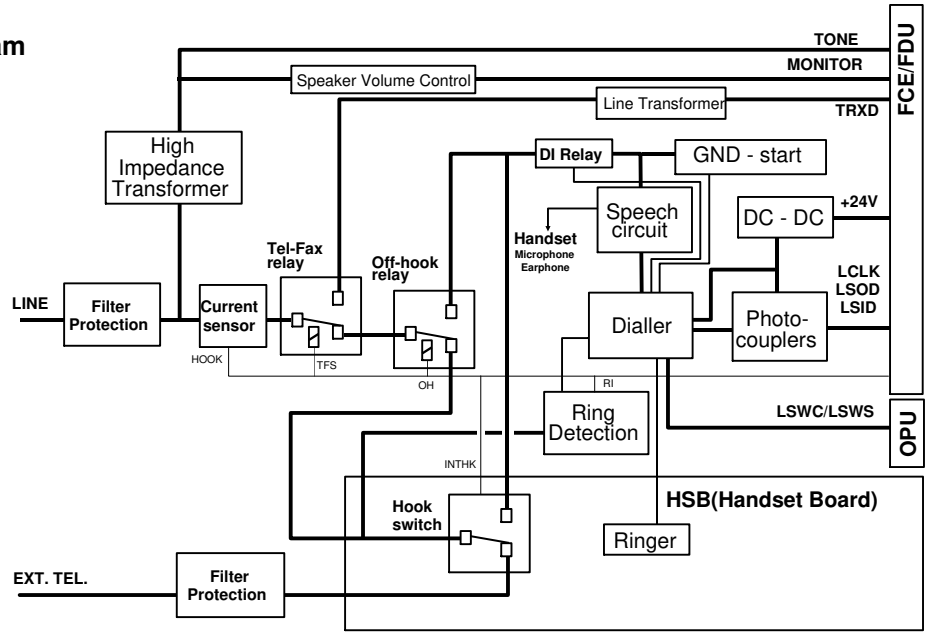


2-6. Country Settings

Each country setting is programmed in the ROM on the FCE. The FCE passes the dialling parameters to the dialler on the LIU through the photocouplers, depending on the country code setting on the LIU.

3. RECEIVING A TELEPHONE CALL

LIU Block Diagram



3-1. Manual Receive Mode

When the user picks up the handset, the Hook Switch goes up to connect the line to the speech circuit for voice conversation. If the user presses Start to send or receive a fax message, the TF relay switches up to connect the line to the modem, which is on the FCE.

3-2. FAX (Automatic Receive) Mode

When the machine detects a ringing signal, the machine switches up the TF relay and starts to send CED/DIS/NSF for fax reception.

3-3. AUTO (Auto Tel/Fax Switch) Mode

This mode switches the line automatically to the internal telephone unit or to the modem, depending on the type of remote terminal (phone or fax).
When the machine detects a ringing signal, the machine switches up the TF relay (the ringer is disabled by the dialler in this mode). Then the machine starts CNG detection, starts to send a voice message (3.5 s after ring detection), and starts to call the user to the machine (7 s after ring detection). If a CNG is detected during these periods, the machine starts to send CED/DIS/NSF for fax reception. If the user picks up the handset (the Hook Switch goes up), the machine switches down the TF relay to connect the line to the speech circuit. If CNG is not detected and the user does not respond to the call within 30 s, the machine sends CED/DIS/NSF before disconnecting the line.

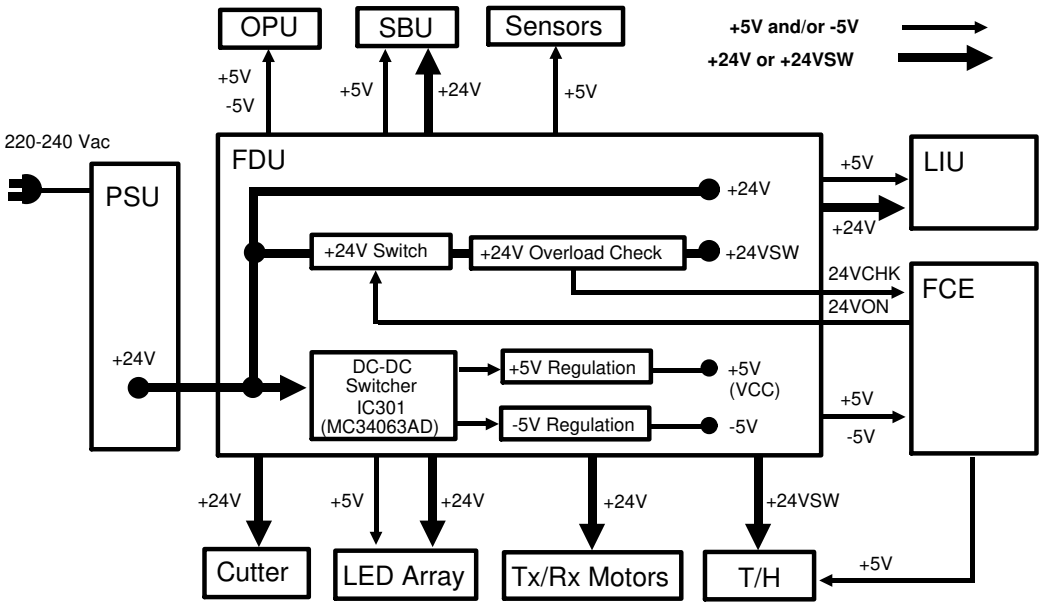
3-4. TAM (Telephone Answering Machine) Mode

This mode is only for use when a telephone answering machine (TAM) is connected to the same line.
When a call is coming in, the external TAM first catches the call; the machine can detect this by checking the HOOK signal. To let the TAM catch the line first, the number of rings (N) until TAM detects a call has to be programmed in the machine. The machine automatically waits N+1 rings before it catches the call, in order to let the external TAM catch the call first when the TAM is active.
After catching the call, the TAM sends the pre-recorded message to the other end, and the machine starts to detect a CNG and a 5s (variable) silent period. If the machine detects a CNG or a 5s silent period, the machine regards the other end as a fax terminal and sends CED/DIS/NSF to receive the fax message.
Refer to section 1-3-1 for more information.

APPENDIX B. POWER DISTRIBUTION

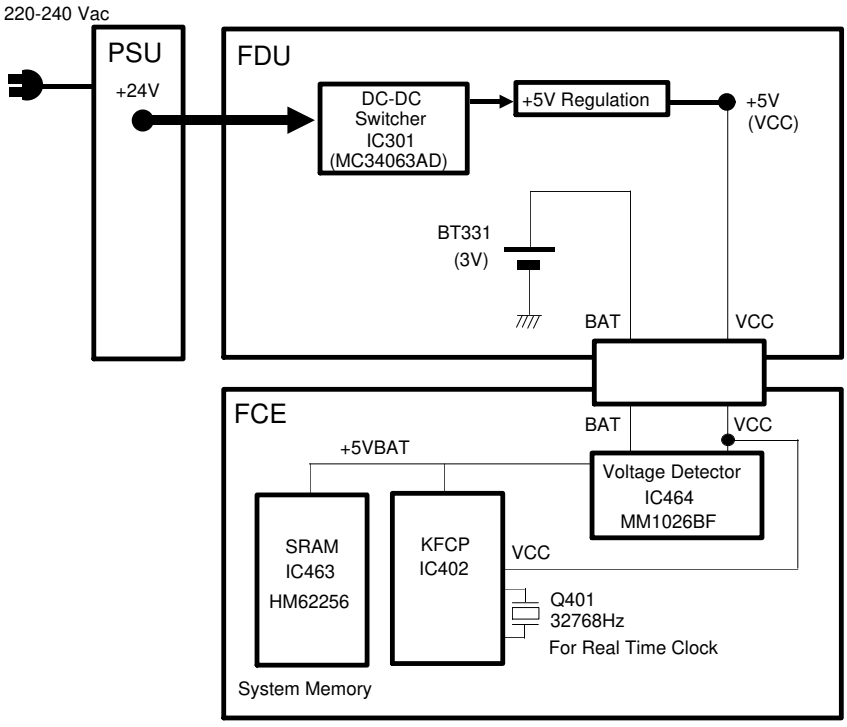
1. PSU/FDU

The PSU regulates the 220-240 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.



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.



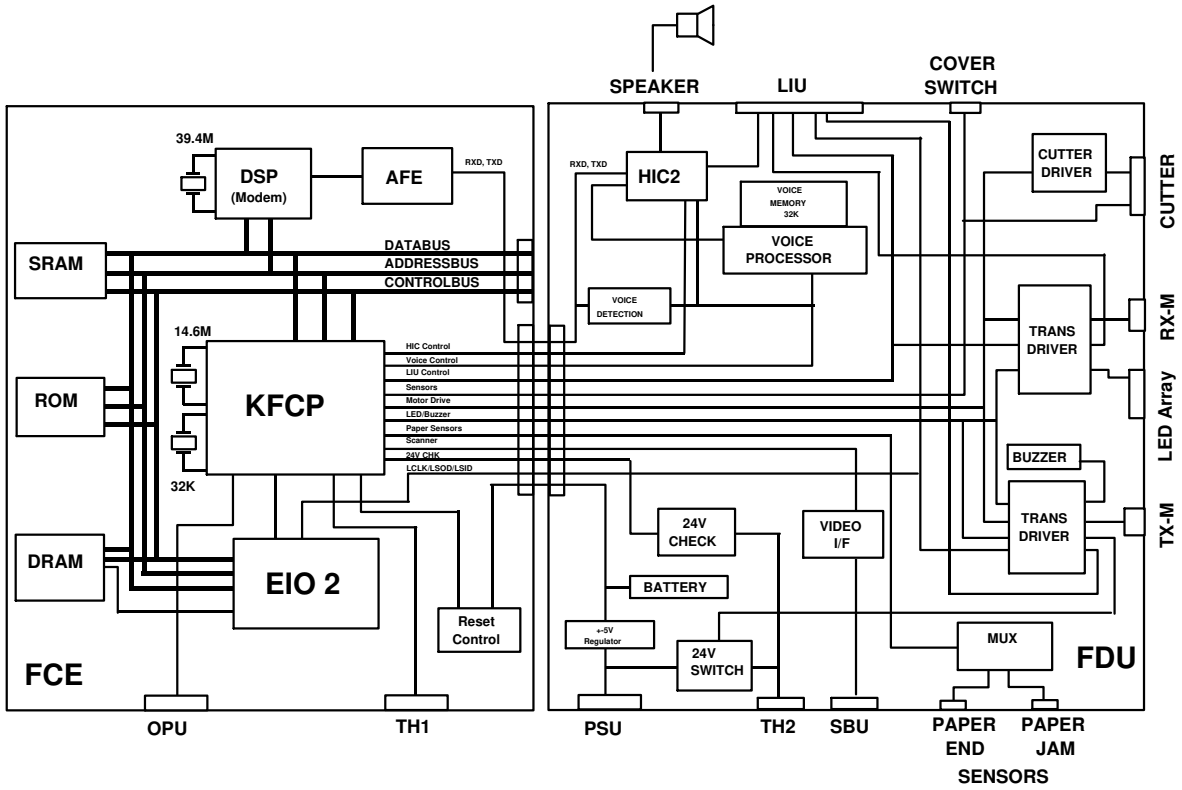
3. LIU BACK-UP

When the power is not supplied from the PSU, the internal telephone unit is still active. When the handset is picked up or the On Hook Dial key is pressed, the dc loop in the LIU circuit is closed. Then the speech and ring detection circuit regulates the line voltage to wake up the microcontroller on the LIU. For more details, see Appendix A "Line Interface".

APPENDIX C. ELECTRICAL COMPONENT DESCRIPTION/DATA FLOW

1. PCBs

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



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 (1 Mbits), an SRAM (32 kbytes), and two 128 kbyte DRAMs (only for FAX250: one for SAF, and the other for ECM). There is an OTP (One Time Programmable) ROM in a PLCC type package.

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.

1-3. LIU (Line Interface Unit)

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

1-4. PSU (Power Supply Unit)

This unit regulates the 220-240V 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.

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.

1-6. OPU (Operation Panel Unit)

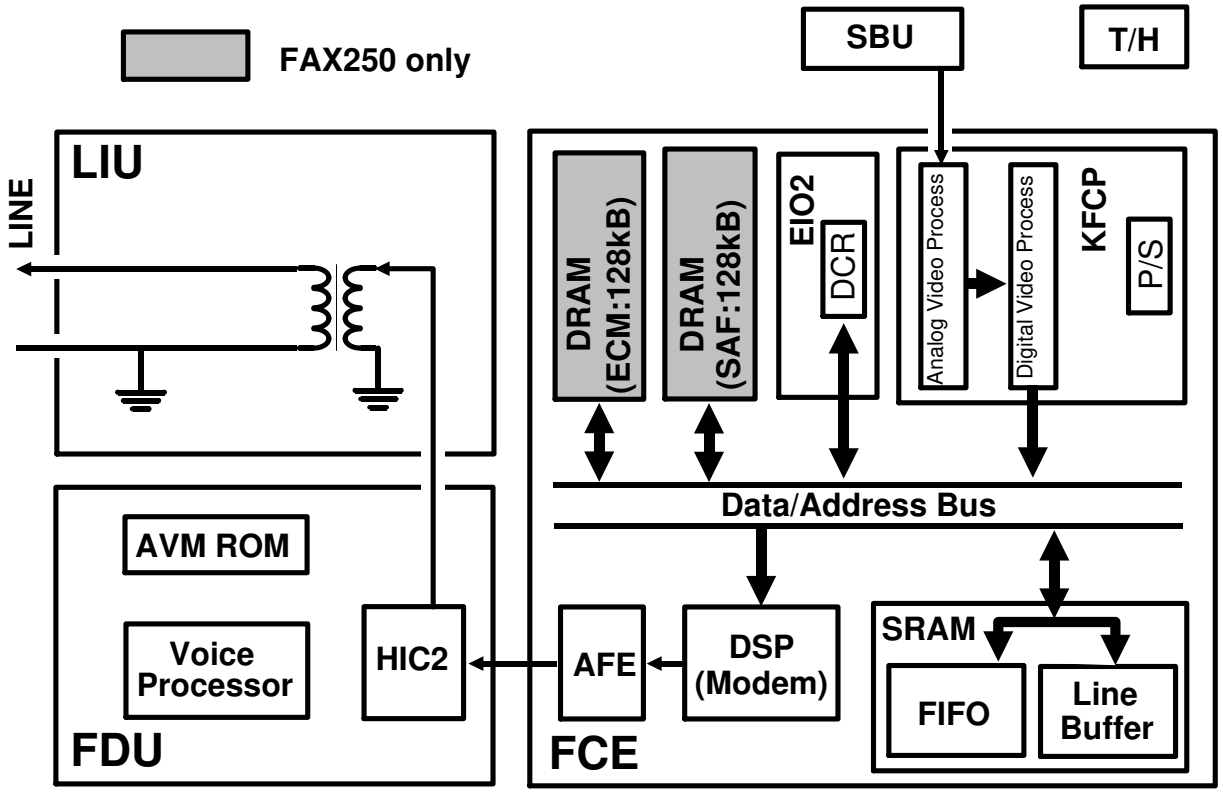
This unit receives all keypad input information and indicates instructions for users using LEDs and an LCD. The ten key pad is still available for dialling even if the main power is switched off.

1-7. HSB (Hook Switch Board)

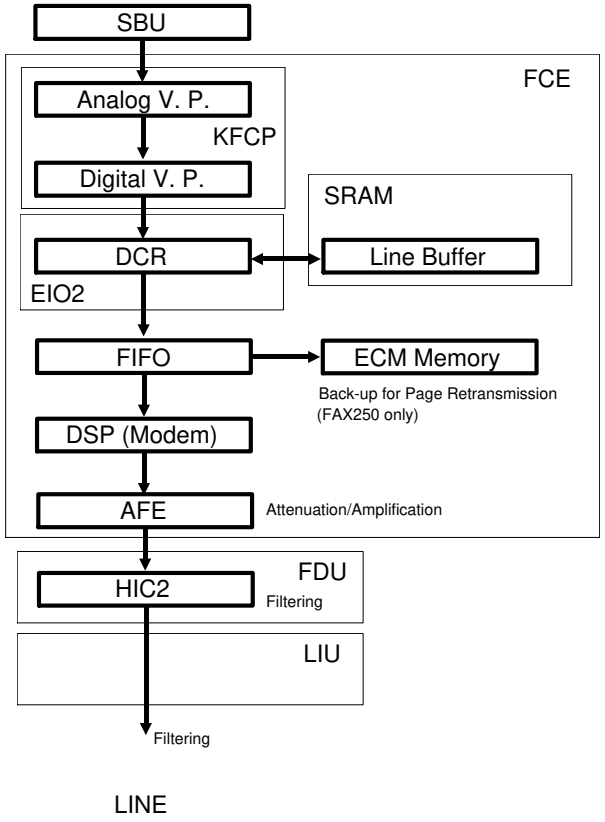
This board has a hook switch and a ringer.

2. DATA FLOW

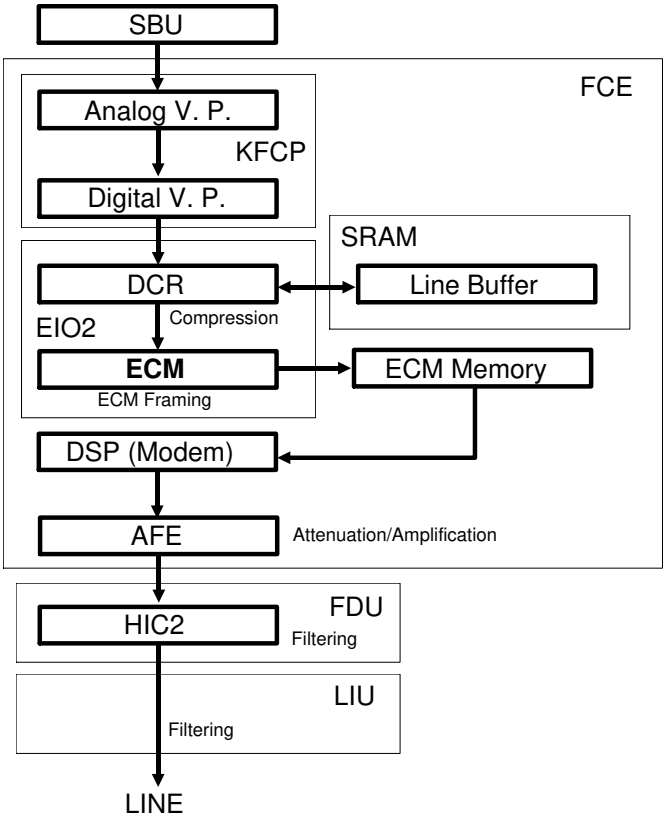
2-1. Transmission



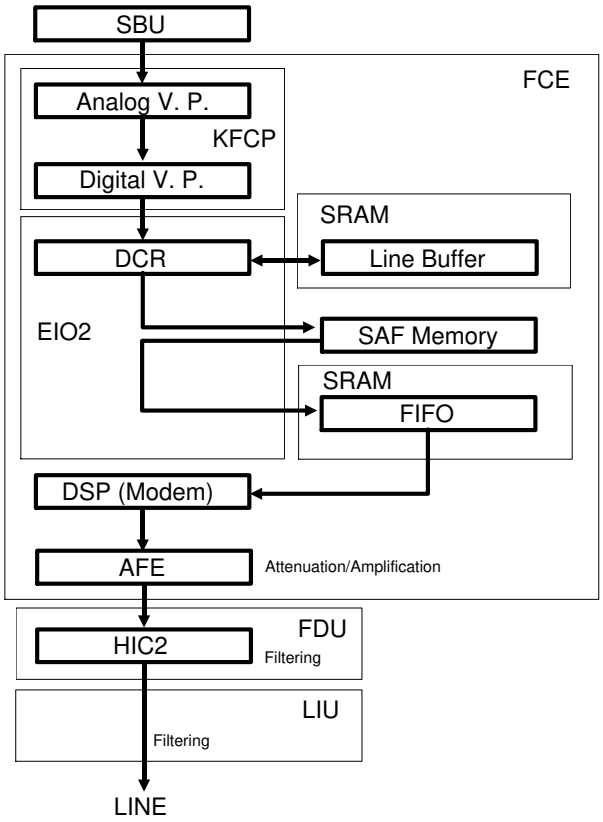
2-1-1. Direct Transmission (non ECM)



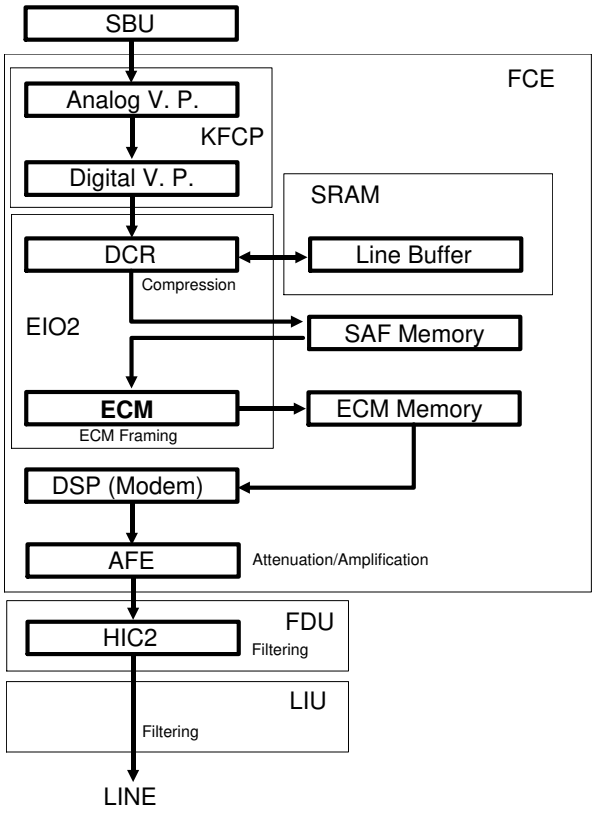
2-1-2. Direct Transmission (ECM)



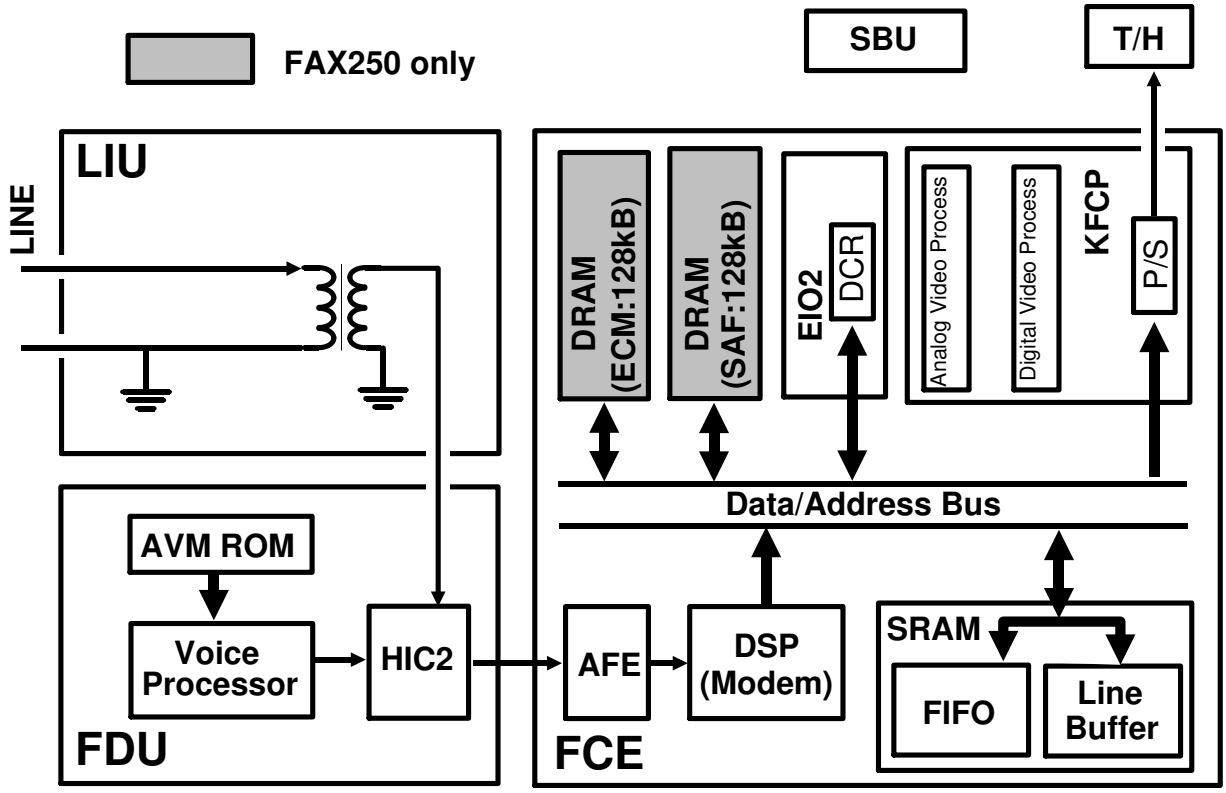
2-1-3. Memory Transmission (non ECM)



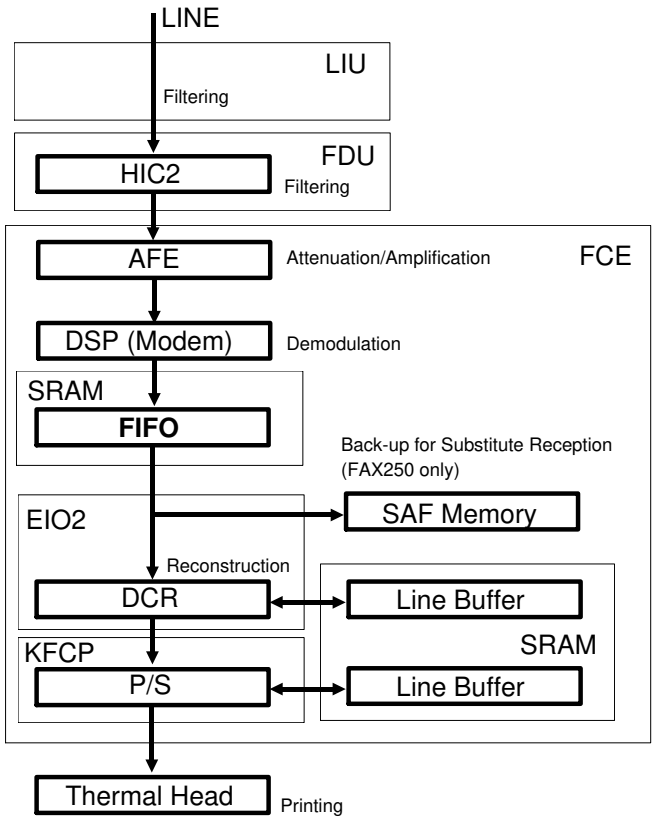
2-1-4. Memory Transmission (ECM)



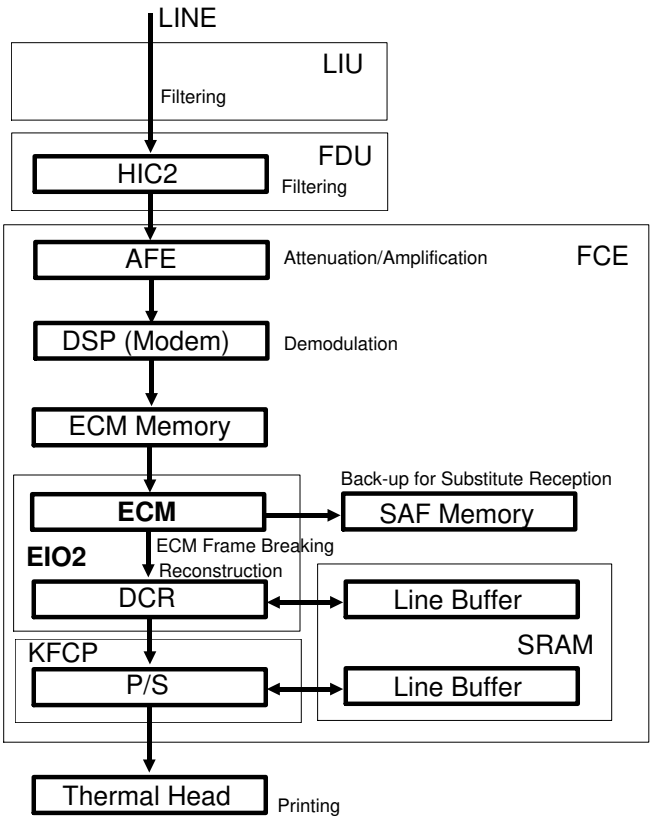
2-2. Reception



2-2-1. Non ECM Reception



2-2-2. ECM Reception



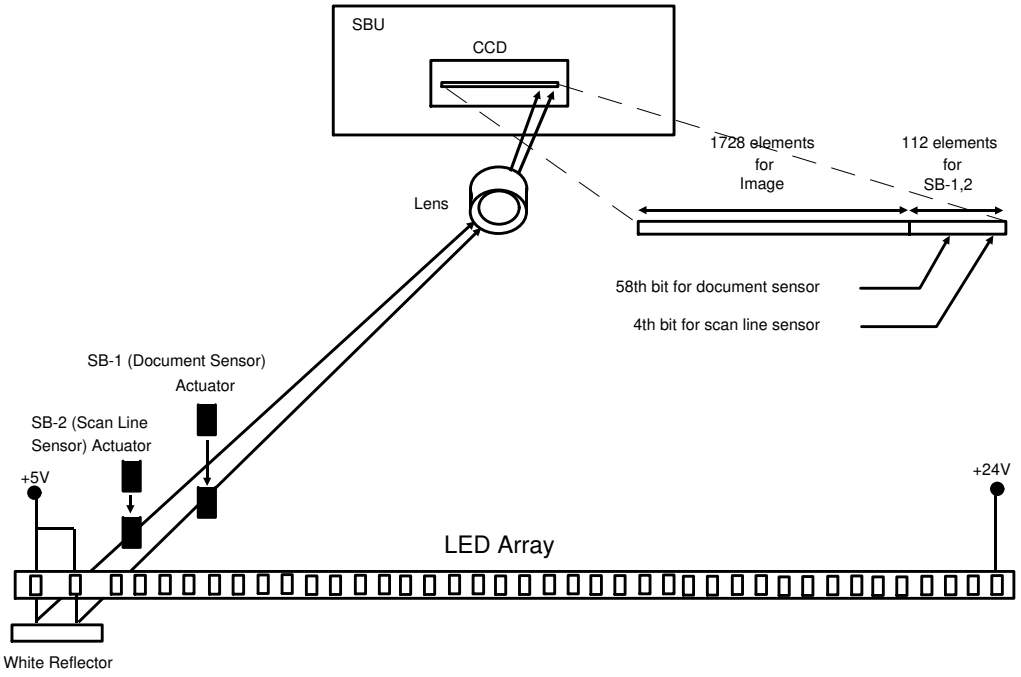
APPENDIX D. MECHANICAL DESCRIPTION

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.

1-1. Integrated Scanner/Sensor Mechanism

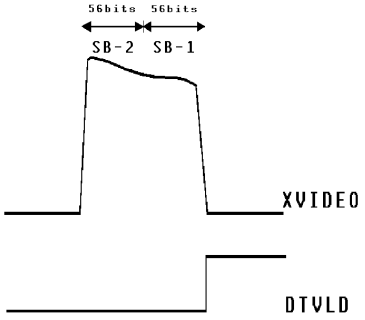
The document sensor (SB-1) and scan line sensor (SB-2) are integrated into the scanner mechanism. The basic composition of these sensors is similar to photointerrupters. However, instead of using discrete photodiode/phototransistor assemblies for each sensor, elements of the LED array and CCD are used.



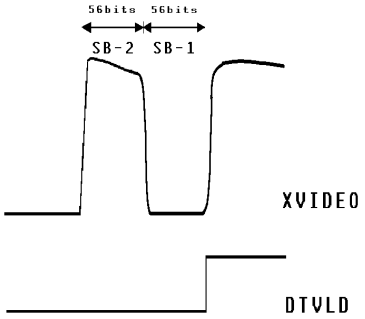
On the left hand side of the LED array, there are red LEDs dedicated for the two scanner sensors. These LEDs are always on. Light from these LEDs passes through the lens to the right hand side of the CCD, where there are 112 elements specially provided to detect this light (the 4th bit is allocated to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

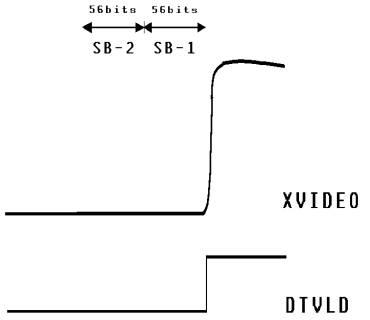
In standby mode, the CCD output is as shown on the right. The peak on the left side of the waveform indicates that the light path in both of the sensors is unblocked.



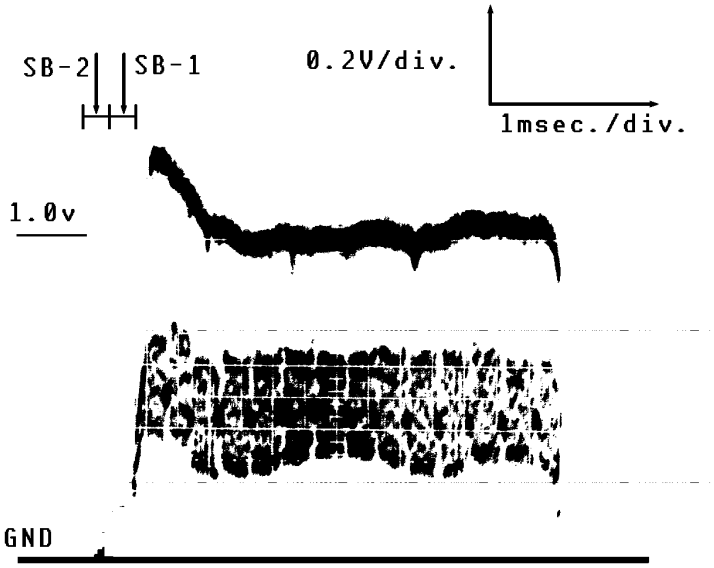
When a document is placed in the feeder, the document sensor actuator blocks the light path to the CCD. When the cpu detects this, it starts prefeeding the document and switches on the rest of the LED array.



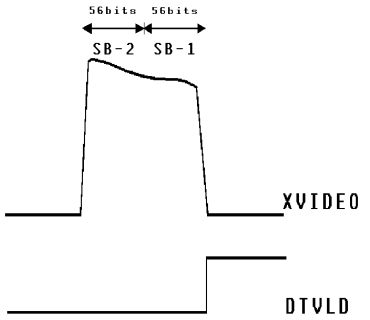
When the document reaches the scan line sensor, the actuator blocks the light path through that sensor. Then prefeed stops to prepare for scanning.



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.

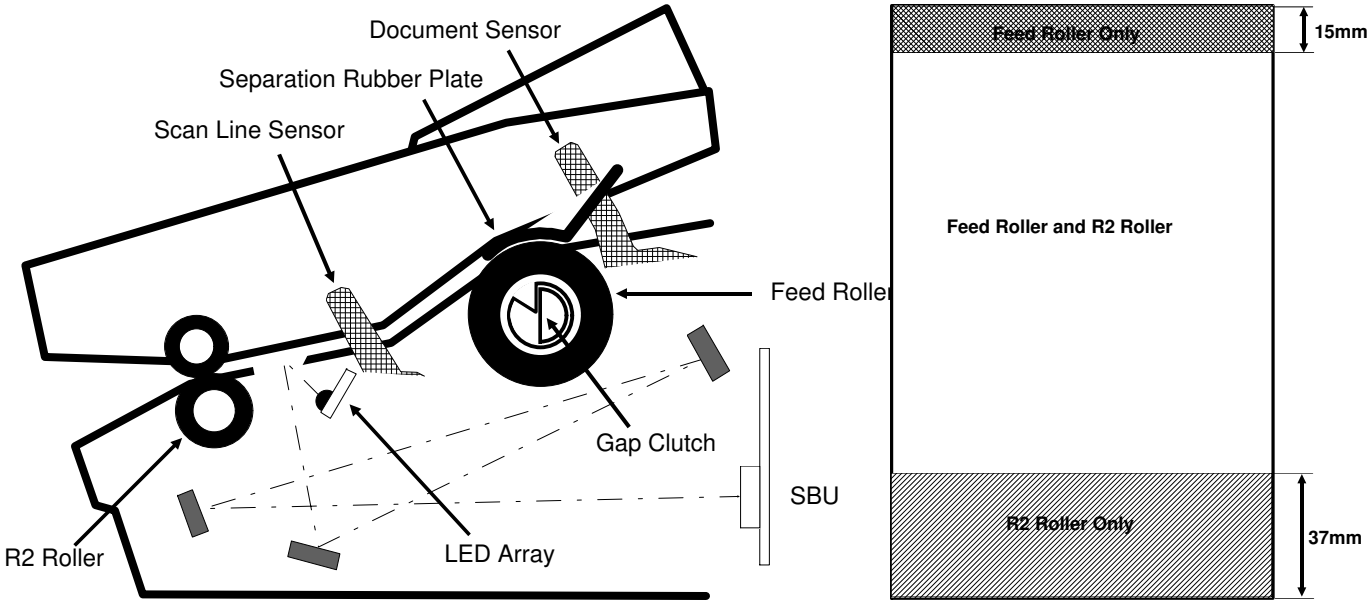


As the trailing edge of the page leaves the scan line sensor, the light path through that sensor becomes unblocked again. However, if there are some pages remaining in the feeder, the light path through the document sensor remains blocked.



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.

1-2. ADF Mechanism

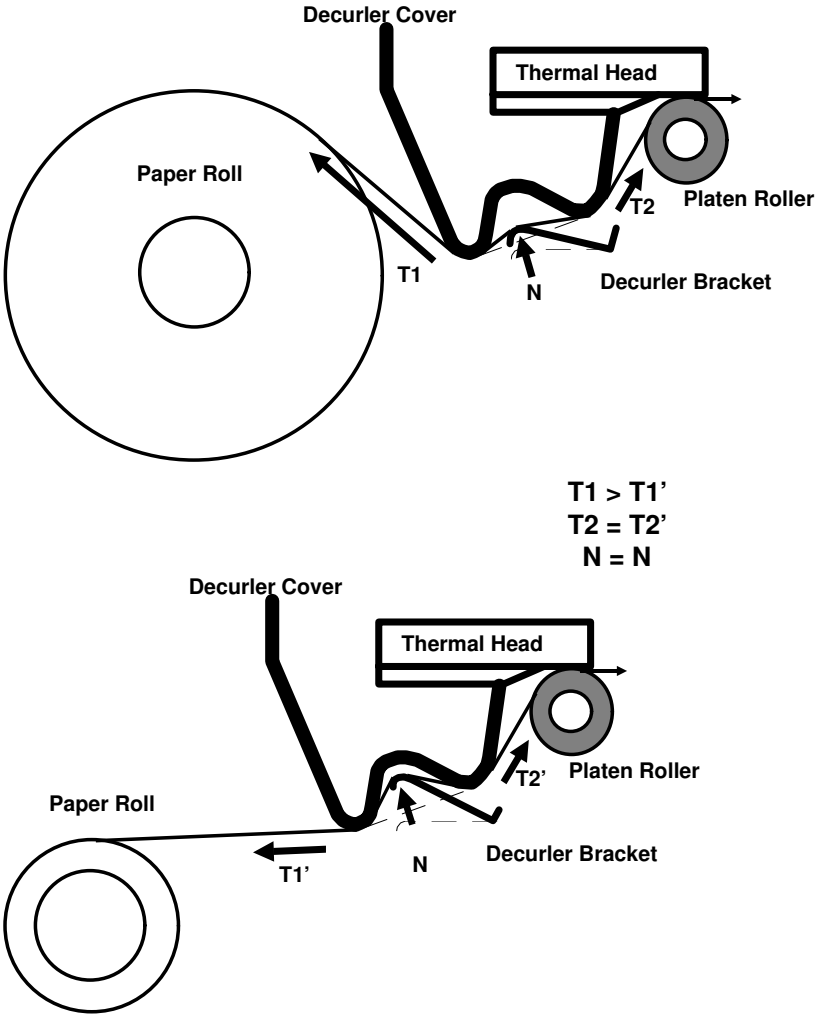


The ADF consists of the feed roller, R2 roller, document/scan line sensors and separation rubber plate.
When a document is placed in the feeder, the document sensor detects it as explained in the previous section. Then, the CPU switches the LED array on and turns the feed roller until the document reaches 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.

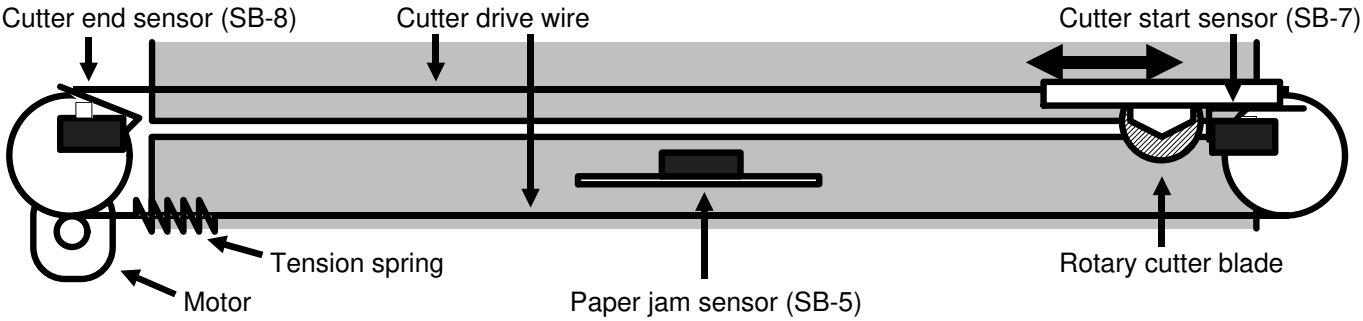
2. PRINTER

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. 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.