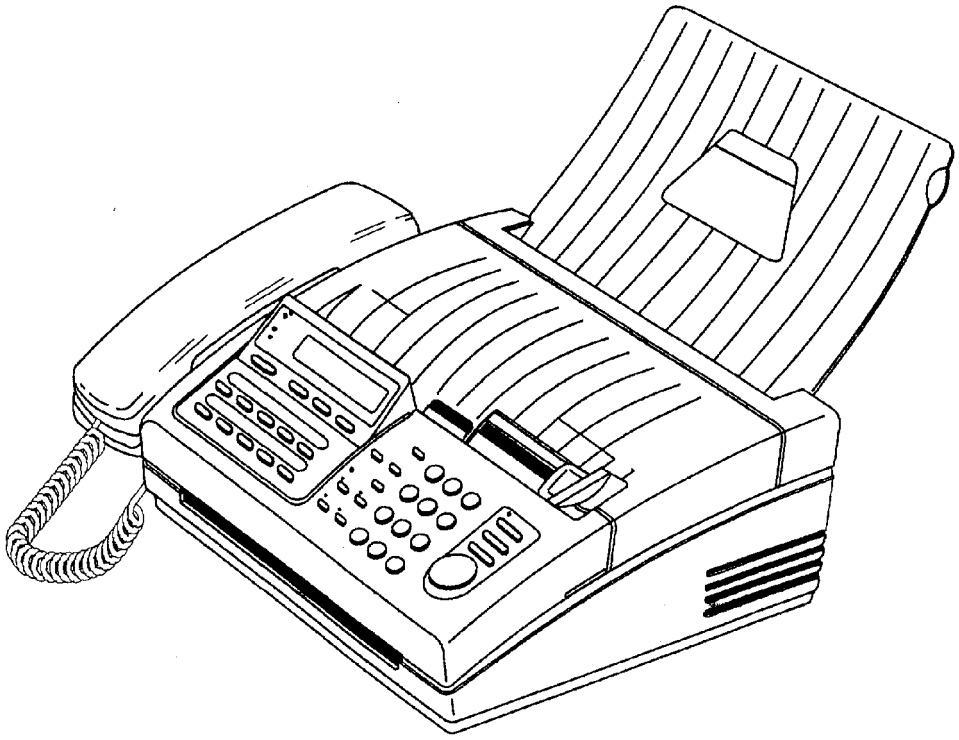
RICOH

RICOH FAX240

SERVICE MANUAL



1. OVERALL MACHINE INFORMATION

1-1. General Specifications

Item	Specification
Type	Desktop transceiver
Telephone Circuit	PSTN/PBX
Document Size	Width: 5.8"-8.58" (148 - 218 mm) Length:4.1"-23.6" (105 - 600 mm) Thickness: 0.05 - 0.15 mm
Scanning Method	Flat bed, CCD
Scanning Width	8.5" (216 ± 1 mm)
Effective Printing Width	8.26" (210 mm) (minimum)
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	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
SAF Memory Capacity	128 kbytes (9 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	8.5"x164'(216 mm x 50 m) roll
Dimensions	13.9"x11.9"x4.25"(355 x 454 x 203 mm)
Weight	10.1 lbs. (4.6 kg)
Input Voltage	120 Vac, 50/60 Hz, single phase
Recommended Operating Environment	Temperature: 63°–82°F(17 - 28 °C) Humidity: 30 - 85 %RH

1-2. Features

Features	FAX240
Transmission	
Automatic transmission	yes
Manual transmission	yes
ADF capacity	5
Automatic Contrast Control	yes
Polling transmission	yes
Send later	yes
Dial via keypad	yes
Quick dial (one touch)	10
Speed dial (two touch)	40
Automatic redial	yes
Manual redial	yes
Label programming for Quick/Speed dials	yes
Page indicator CSI + P.1	yes
Page indicator TTI + P.1 or P.1/10	yes
Automatic page retransmission in normal tx mode	yes
Reception	
Automatic reception	yes
Manual reception	yes
Polled reception	yes
Automatic cutter	yes
Manual cutter	no
Authorized reception (with TSI)	yes
Decurler	yes
Printing of the TSI on received copies	yes
Communication	
TTI (page header with name)	yes
RTI (own phone number or text)	yes
CSI (own phone number)	yes
Counters (user function)	no
Voice request	no
PD/DTMF change by switch	yes
Modified read (MR)	yes
ECM with MMR compression	yes
Compatibility	
CCITT group 3	yes
Copy quality	
Halftone (16 level) with image/text separation	yes
Auto shading	yes
MTF	yes
8 x 15.4 lines/mm	yes
Automatic contrast (threshold) control	yes
Reports	
TCR	yes
Transmission Report	yes
Quick dial list	yes
Speed dial list	yes
Group dial list	yes
Error report	yes

Features	FAX240
Rejected Call Report in Authorized Reception	yes
Stored document list	yes
Power failure report	yes
SAF features (9 pages memory)	
SAF capacity in kbytes	128 (256 if ECM off)
Memory transmission	yes
Serial broadcasting	yes
Substitute reception	yes
Forwarding (1 number)	yes
File confirmation/clearance	yes
Automatic page retransmission in memory tx	yes (if ECM on)
Remaining memory indication on LCD (during scanning)	yes
Group dial	yes
Telephone features	
Built-in handset	yes
On-hook dial	yes
Monitor speaker	yes
Music on hold	yes
Speakerphone	no
AI Redial (last 5 numbers)	yes
12 key dialpad	yes
Volume control for speaker	yes
Volume control for ringer	yes
Power down function (Ring, Dial, Speech)	yes
FAX/PHONE switch	
Auto receive/manual receive switch	yes
Auto answer delay time adjustment	no
Automatic fax/tel switch	yes
Speech generation (AVM)	yes
Interfaces	
Telephone answering machine (TAM) interface	yes
PC interface	no
Others	
Copy mode (normal, detail, fine, halftone)	yes
Time indicator	yes
Clock adjustment	yes
LCD display prompt	yes
LCD size	2 x 20
Battery backed-up RAM size in kbytes	32
Service features	
Remote diagnostics	yes
Printer test pattern	yes
Bit switch setting	yes
ROM/RAM data display/list	yes
NCU parameter setting	yes
Pulse width setting	no
Service report (last 10 errors)	yes
Service counters	yes

1-3. Detailed Features Description

1-3-1. Auto Select Mode

There are three reception modes, AUTO, TAM and FAX, one of which can be programmed in the Auto Select key on the operation panel using function 04 “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. When the external device captures the line, the machine detects DC at the NCU. Then, the machine starts listening to the line. 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.
FAX mode allows the machine to receive all incoming fax messages.

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, if ECM is on. 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.

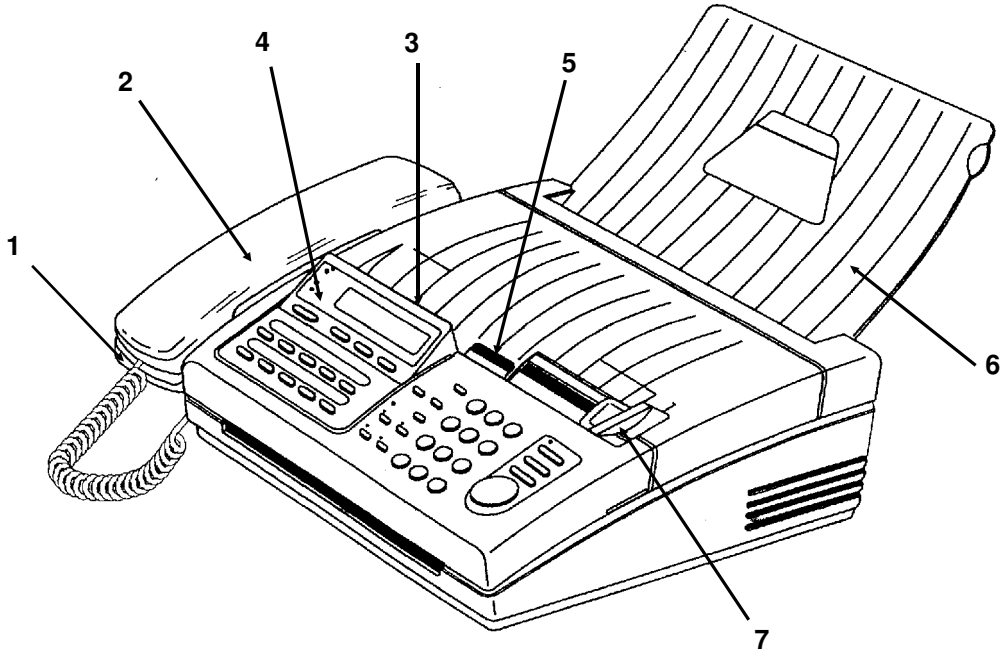
1-3-5. Forwarding

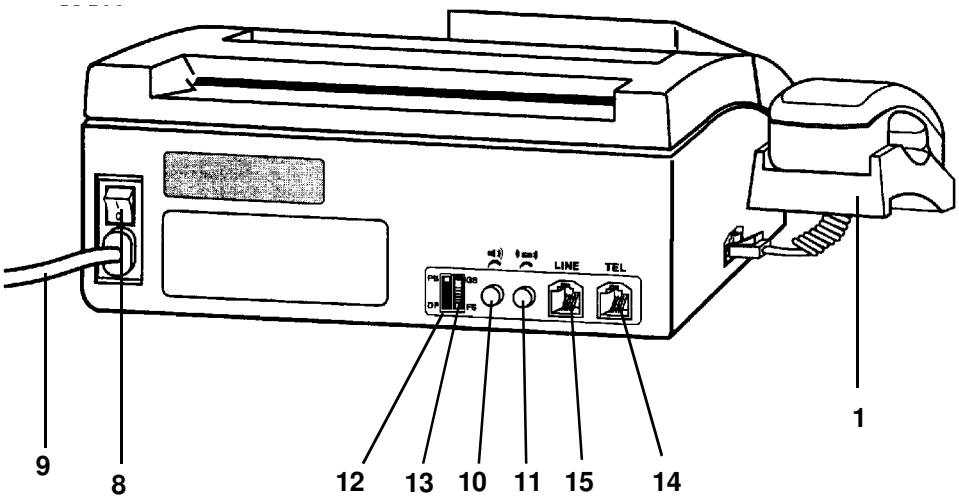
The machine can forward all received messages to the programmed Forwarding terminal. You can program the month, date and time for Forwarding to be switched on and for it to be switched off. Also, local printing of forwarded messages can be switched on and off.

1-4. Exterior

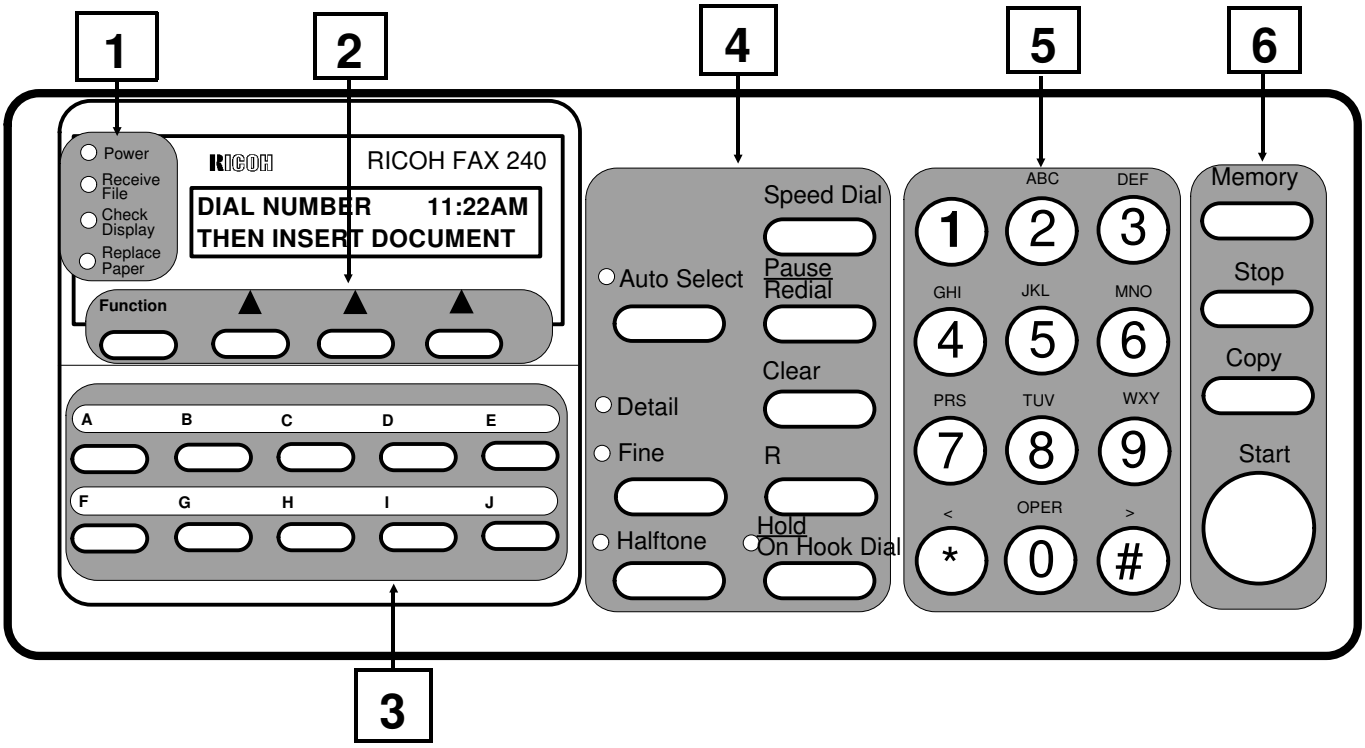
1-4-1. Component Layout

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 5 pages can be fed automatically.
4. Operation Panel
   Refer to section 1-4-2.
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
    … Not used
14. Telephone Jack
15. Line Jack





1-4-2. Operation Panel



No.	Name	Function
1	Power indicator	Lights when the power is switched on.
	Receive File indicator	Lights when received messages are stored into memory because of a printer problem. Up to 10 messages can be stored.
	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, then choose one of the soft keys as indicated below the function,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 not lit, Tel (manual receive) mode is selected. If it is lit, either FAX (automatic receive) mode, AUTO (automatic Tel/Fax switch) mode, or TAM (Telephone Answering Machine) mode is selected, depending on the mode selected with function 04.
	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 dialed.
	Clear key	Press this during programming to erase the last character.
	“R”(Recall) key* **Note:** This key is not used in the USA	Press this key when you want to access the PSTN from behind a PBX which requires the Flash Start method.
	Hold/On Hook Dial key and indicator*	Press this key to dial without picking up the handset. Also, press this key to place the other party on hold during a telephone conversation.
5	keypad*	Dial using these keys and use to input characters during programming.

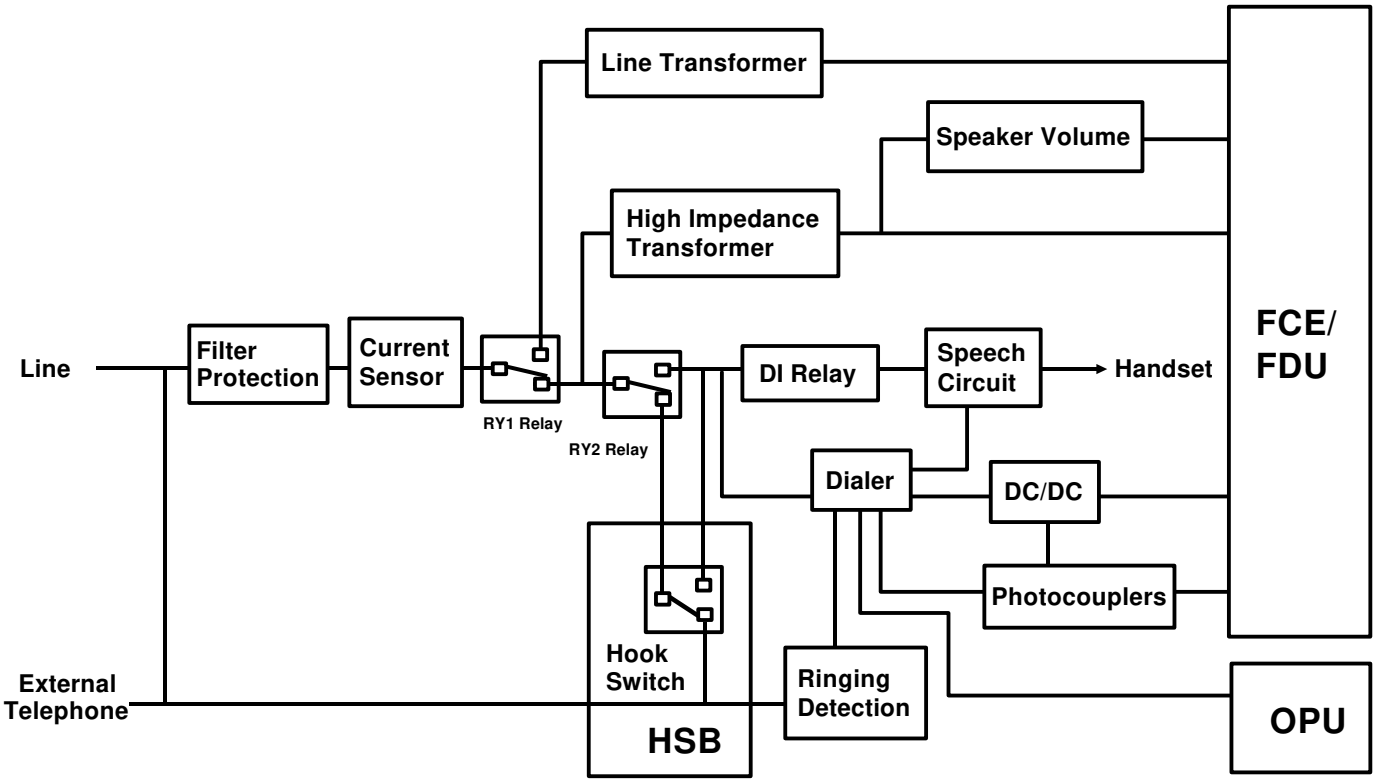
No.	Name	Function
6	Memory key	Press to use memory transmission.
	Stop key	Press to stop the current operation and return to standby mode.
	Copy key	Press to copy the document now in the feeder.
	Start key	Press to start sending or receiving a fax message.

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

2. DETAILED SECTION DESCRIPTIONS

2-1. NCU

NCU Block Diagram



The NCU (Network Control Unit) has all the telephone line interface functions and contains an internal 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, RY1 relay, RY2 relay, and ring detection circuit. The RY1 relay switches the line connection either to the internal telephone unit or to the modem. The RY2 relay switches the line either to the external telephone and the ring detection circuit or to the internal dialing 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 dialer and speech circuit for dialing and voice communication. The RY2 relay is only switched up when the “On Hook Dial” key is pressed for On-hook dialing.
The internal telephone unit contains the handset interface, speech circuit, and a dialer (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.

NOTE: In some documentation the NCU may also be referred to as the line interface unit (LIU).

2-2. Making a Telephone Call

2-2-1. Manual Dialing from the External Telephone

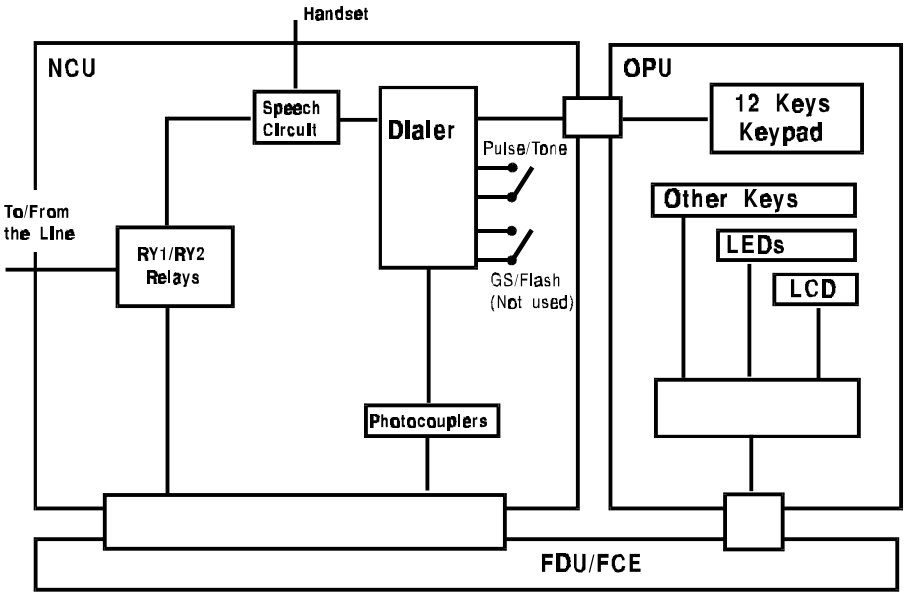
In standby mode, the line is connected to the external telephone. Then the user can dial from the external handset. If the user presses Start to send or receive a fax message, the RY1 relay switches up to connect the line to the modem.

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

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

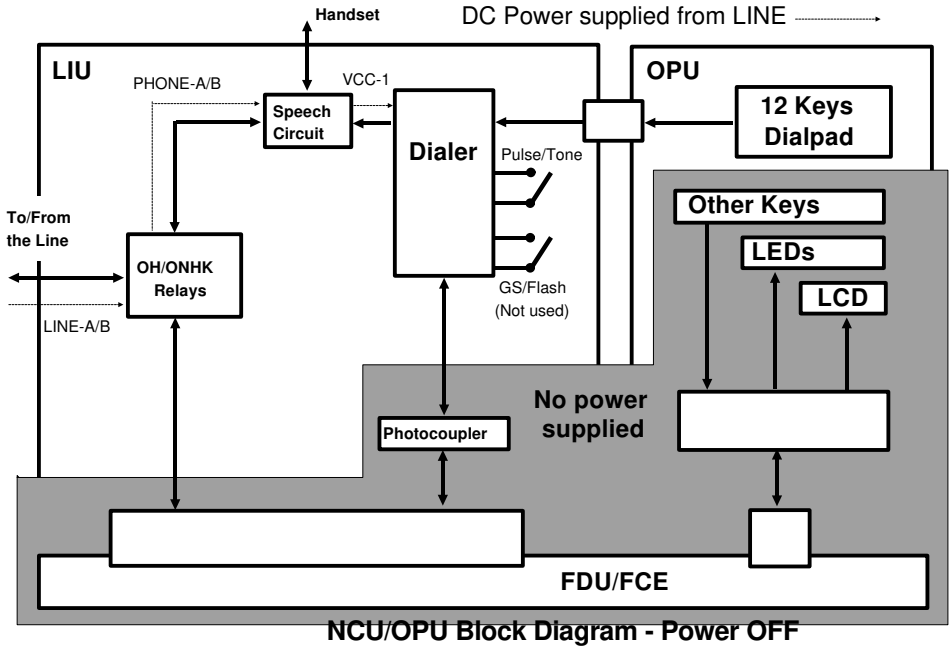
Handset mode: When the user picks up the handset, the Hook Switch goes up to connect the line to the dialer and speech circuit. The digits dialed at the keypad are deleted by the dialer, and the dialer dials the number and passes them to the FCE to indicate the dialed number on the LCD. If the user presses Start to send or receive a fax message, the RY1 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 RY2 relay switches up to connect the dialer to the line. Then the dialer acts in the same way as explained for handset mode.



NCU/OPU Block Diagram

The telephone features (dialing, 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 dialer is powered by the DC voltage from the line. Then the dialed digits are directly informed to the dialer.



NCU/OPU Block Diagram - Power OFF

2-2-3. Automatic Dialing

When the machine starts to dial, the RY2 relay switches up to close the DC loop. After line current is detected, (see the diagram on page A-1), the dialer starts dialing. 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.

2-2-4. Dialing Method (Pulse/Tone)

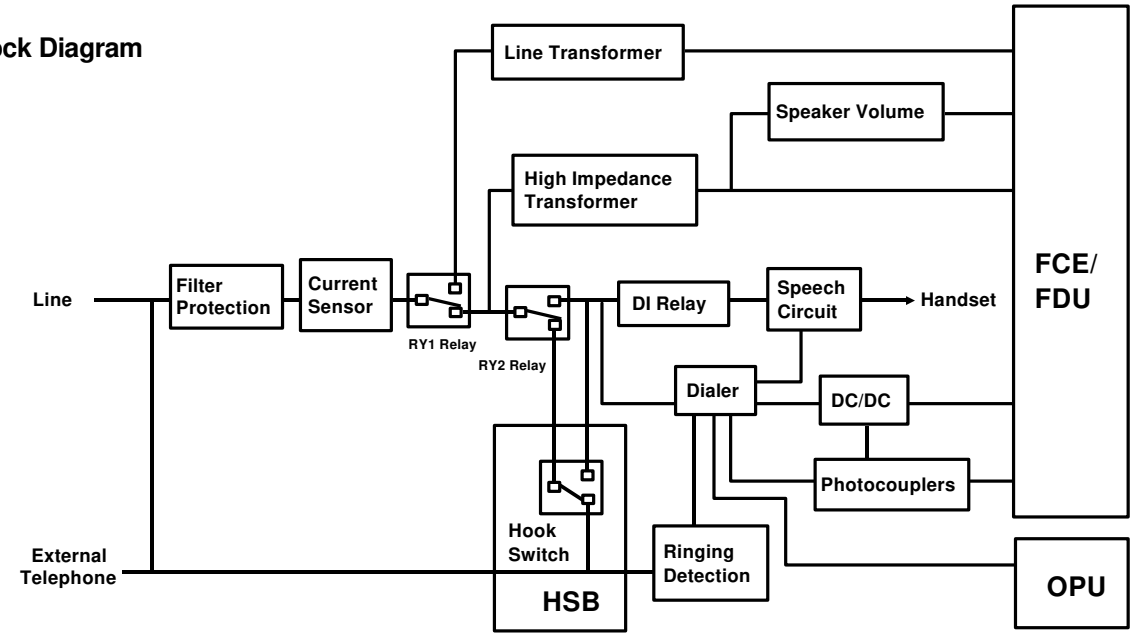
The NCU has a mechanical switch beside the modular jack to select either pulse dial or DTMF dial. This switch can be accessed by the user. The dialer checks the setting of this switch every time the FCE detects off-hook, then dials the number using the indicated method.

2-2-5. PSTN Access from behind the PBX

When the machine is behind a PBX, 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: Not used
After the DC loop is closed, the machine detects the line current, detects PBX dial tone, accesses the PSTN using the correct method, detects PSTN dial tone, then dials the number.

2-3. Receiving a Telephone Call

NCU Block Diagram



2-3-1. 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 RY1 relay switches up to connect the line to the modem, which is on the FCE.

2-3-2. FAX (Automatic Receive) Mode

When the machine detects a ringing signal, the machine switches up the RY1 relay and starts to send CED/DIS/NSF for fax reception.

2-3-3. 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 RY1 relay (the ringer is disabled by the dialer 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 RY1 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.

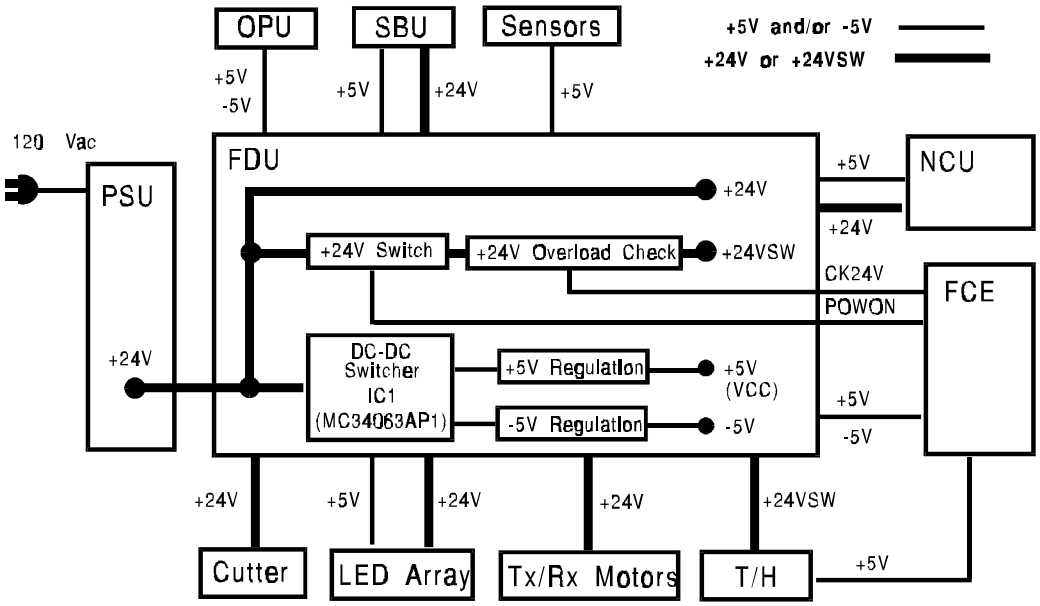
2-3-4. TAM (Telephone Answering Machine) Mode

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.

2-4. Power Distribution

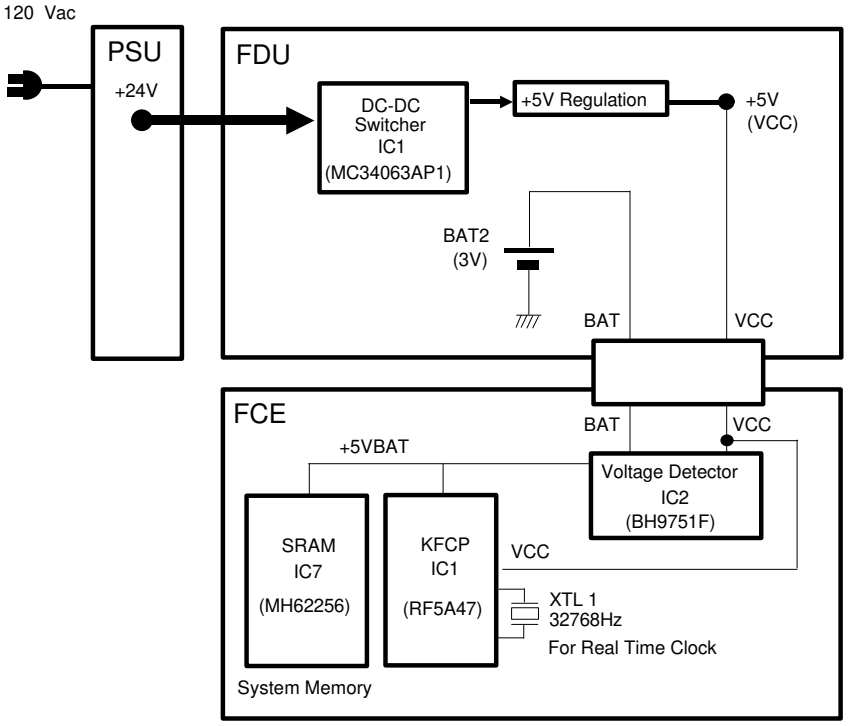
2-4-1. PSU/FDU

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



2-4-2. 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.



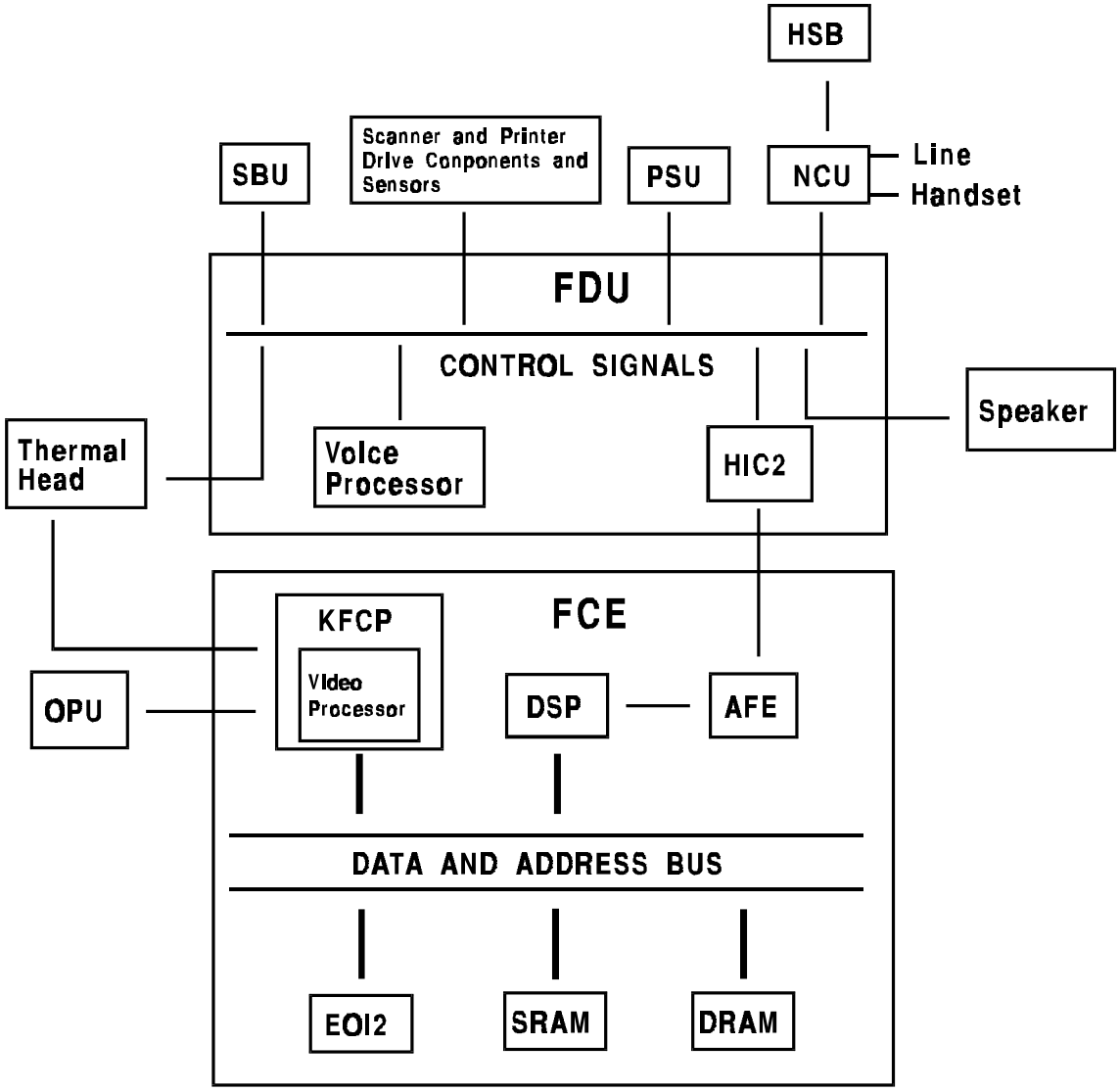
2-4-3. NCU Back-up

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 NCU circuit is closed. Then the speech and ring detection circuit regulates the line voltage to wake up the microcontroller on the NCU. For more details, see previous section.

2-5. Electrical Component Description/Data Flow

2-5-1. PCBs

This section explains the functions of the PCBs and their components.
NOTE: The FCE and FDU together, perform the fuctions handed by the FCU in other Ricoh facsimile machines.



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 (one for SAF, and the other for ECM). There is an OTP (One Time Programmable) ROM in a SOP type package. See the preceding page for information about battery back-up of the system memory on the FCE.

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.

3. NCU (Network Control Unit)

This unit performs all interface functions to the telephone line and contains an internal telephone unit. See section 2-1 for details.

4. PSU (Power Supply Unit)

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

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.

6. OPU (Operation Panel Unit)

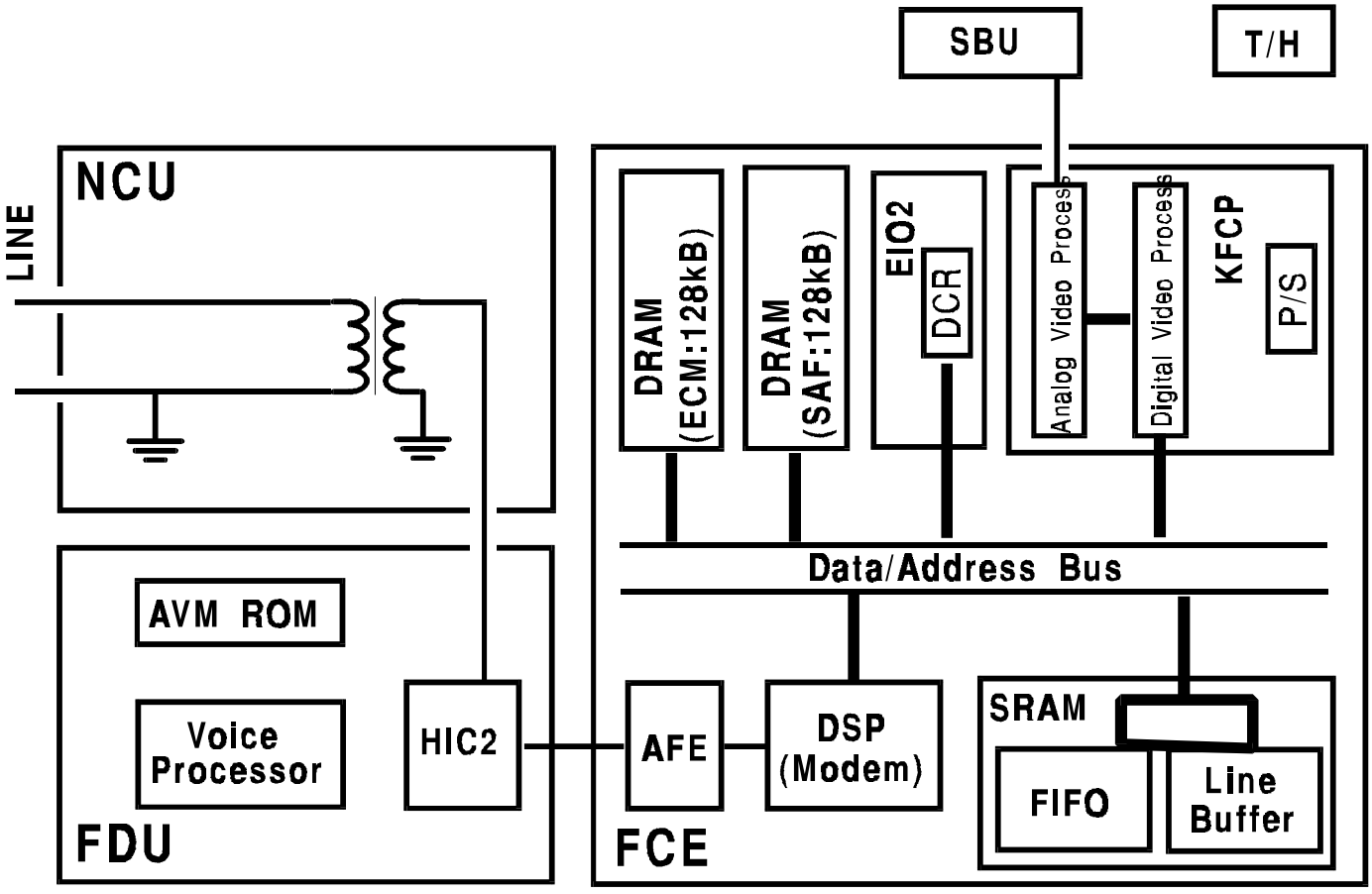
This unit receives all keypad input information and indicates instructions for users using LEDs and an LCD. The ten key pad is still available for dialing even if the main power is switched off.

7. HSB (Hook Switch Board)

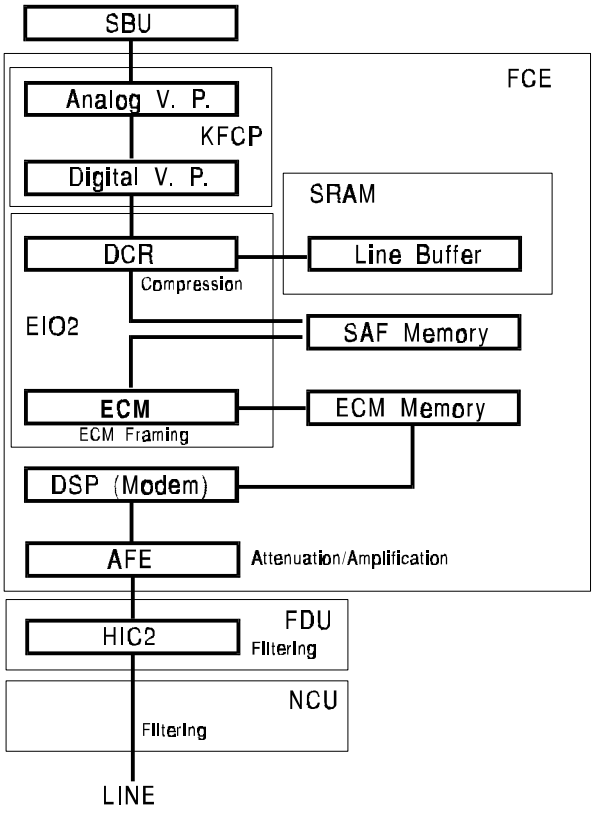
This board has a hook switch and a ringer.

2-5-2. Data Flow

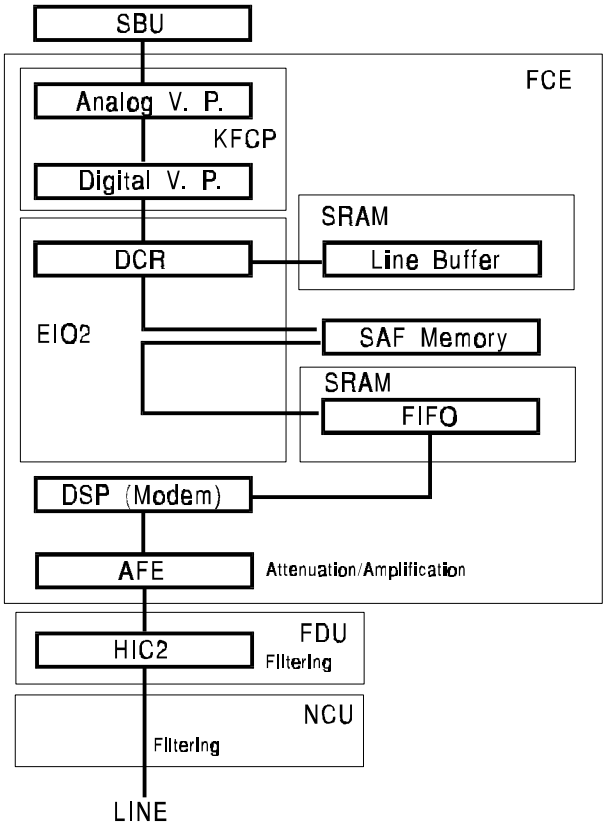
1. Transmission



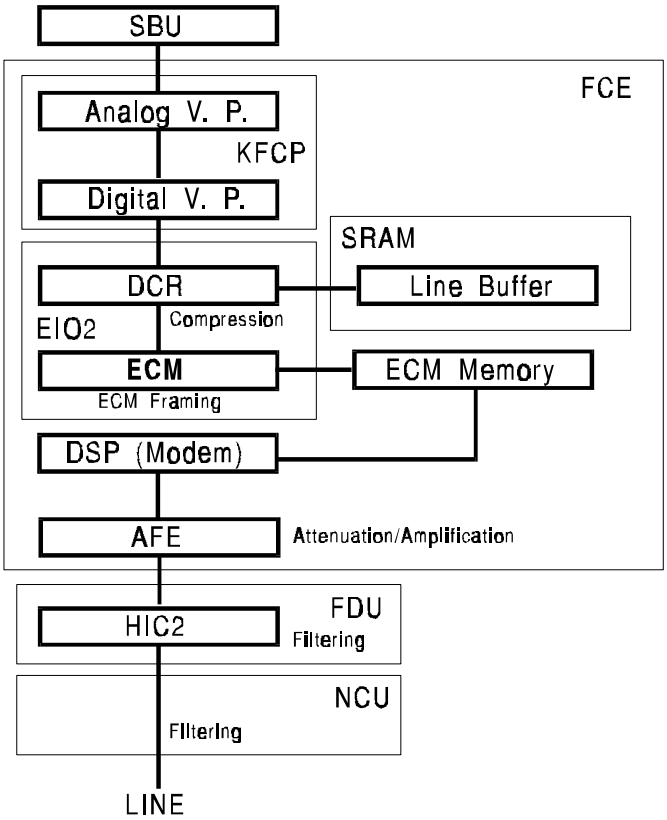
2. Direct Transmission (non ECM)



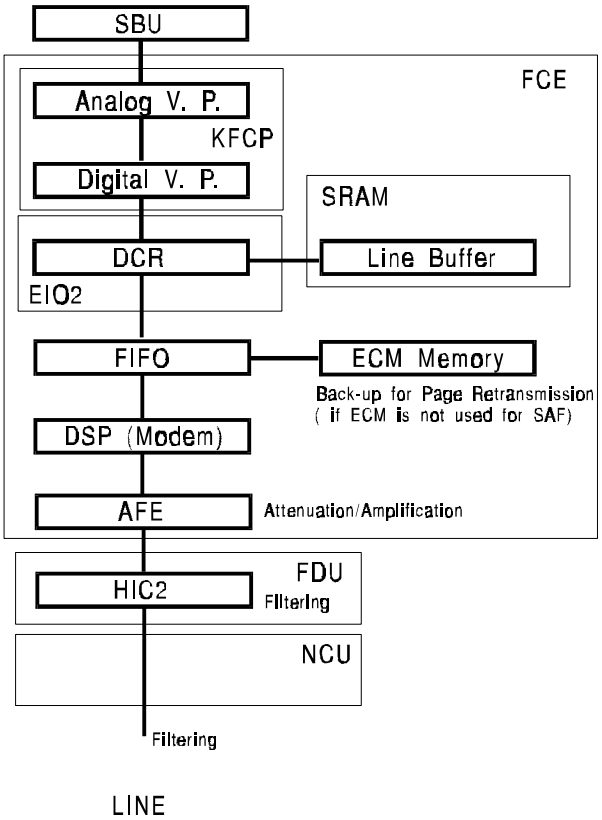
3. Direct Transmission (ECM)



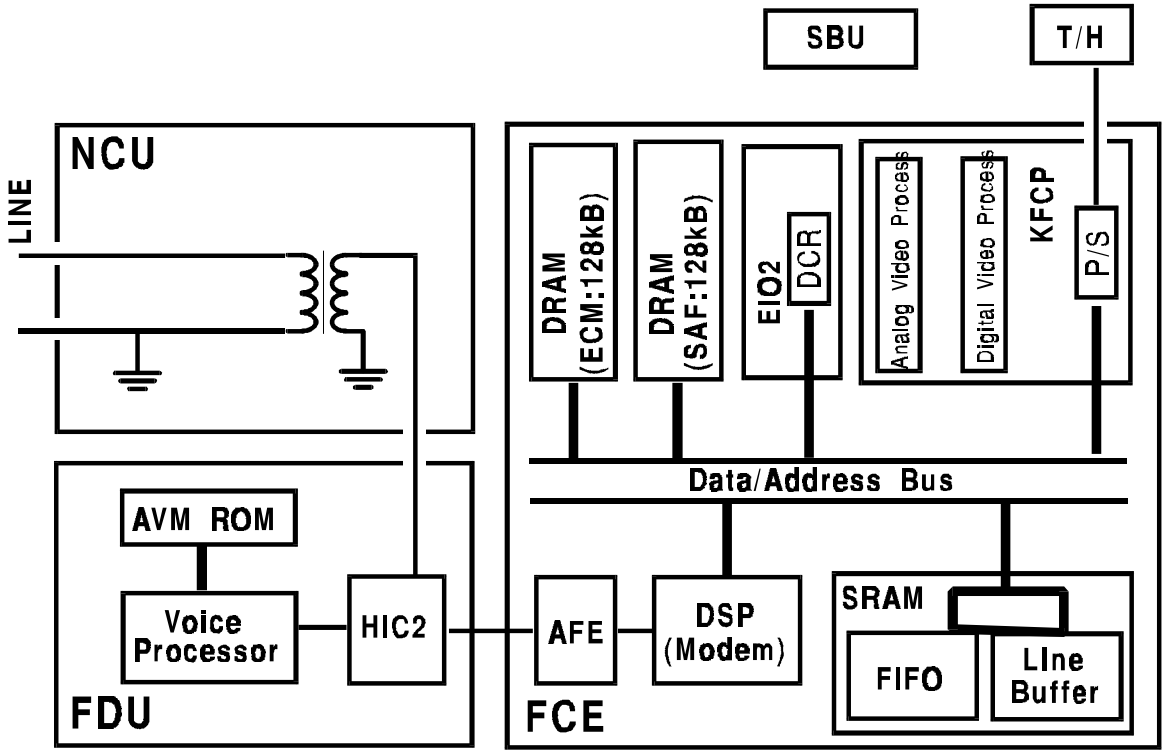
4. Memory Transmission (non ECM)



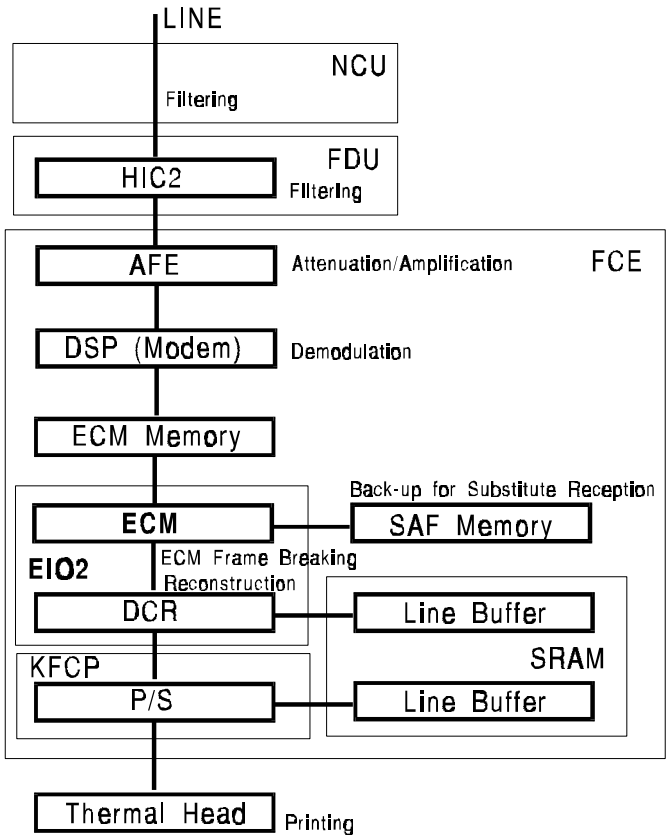
5. Memory Transmission (ECM)



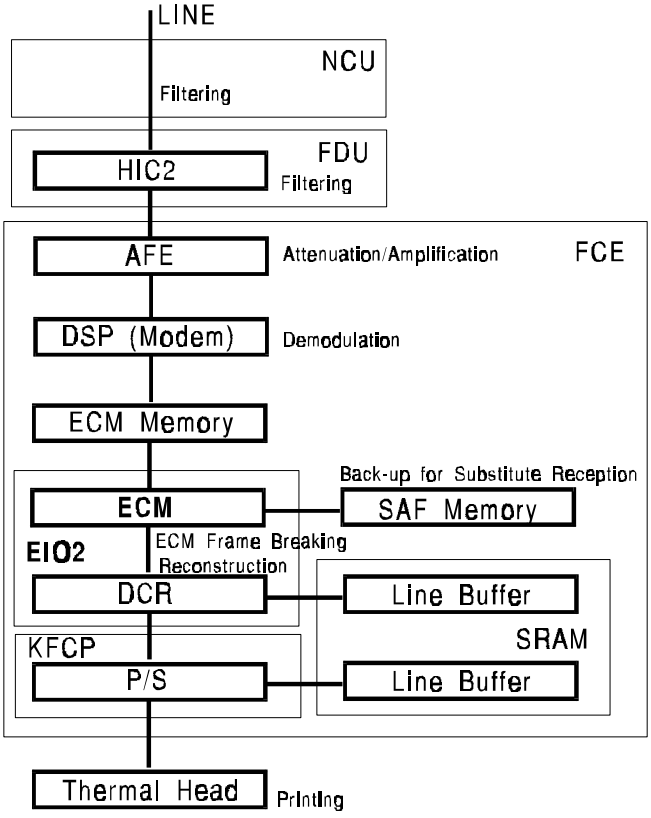
2-5-3. Reception



1. Non ECM Reception



2. ECM Reception



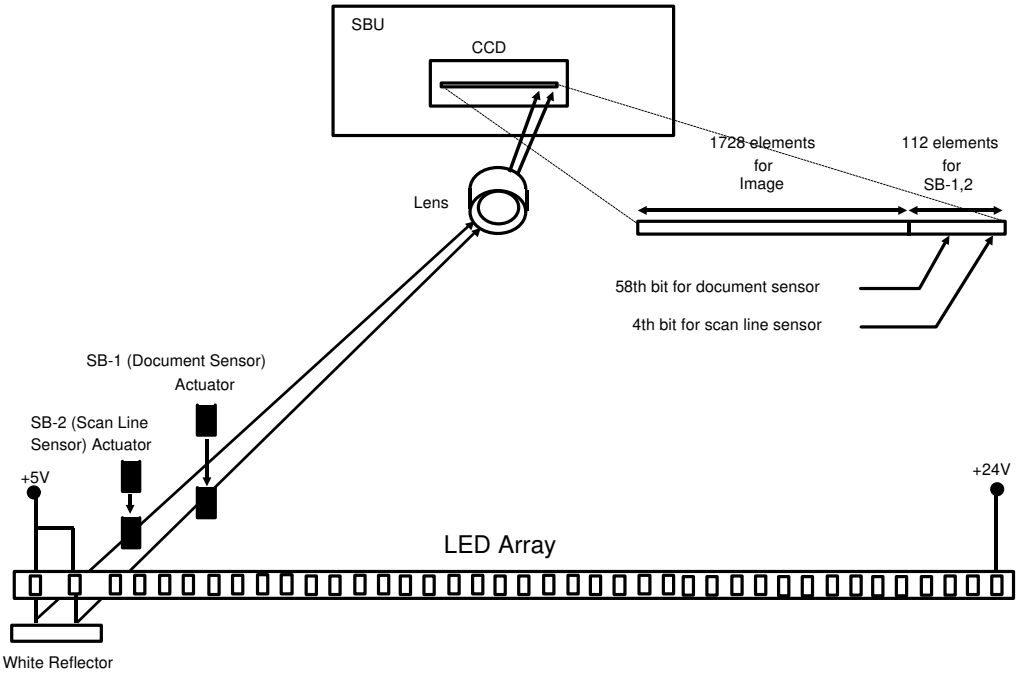
2-6. Mechanical Description

2-6-1. ADF/Scanner

The machine has two significant differences, in the ADF/scanner mechanism from previous models. The first, is the integrated scanner and sensor mechanism, and the second, is the simplified ADF mechanism.

1. Integrated Scanner/Sen - sor Mechanism

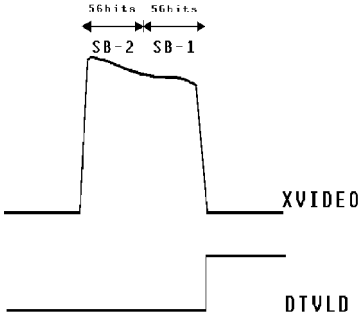
The document sensor (SB-1) and scan line sensor (SB-2) are integrated into the scanner mechanism. The basic composition of these sensors is similar to photointerrupters. However, instead of using discrete photodiode/phototransistor assemblies for each sensor, elements of the LED array and CCD are used.



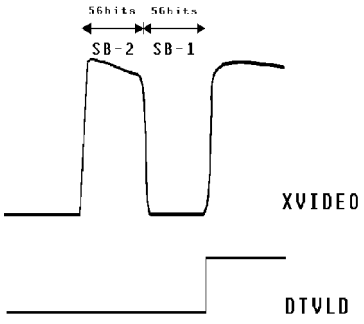
On the left hand side of the LED array, there are red LEDs dedicated for the two scanner sensors. These LEDs are always on. Light from these LEDs passes through the lens to the right hand side of the CCD, where there are 112 elements specially provided to detect this light (the 4th bit is allocated to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

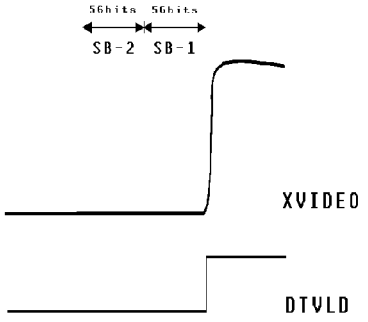
In standby mode, the CCD output is as shown on the right. The peak on the left side of the waveform indicates that the light path in both of the sensors is unblocked.



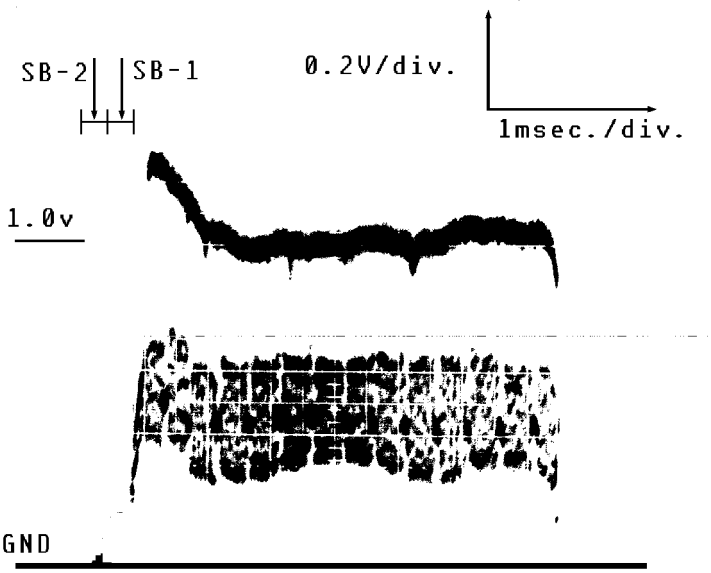
When a document is placed in the feeder, the document sensor actuator blocks the light path to the CCD. When the CPU detects this, it starts prefeeding the document and switches on the rest of the LED array.



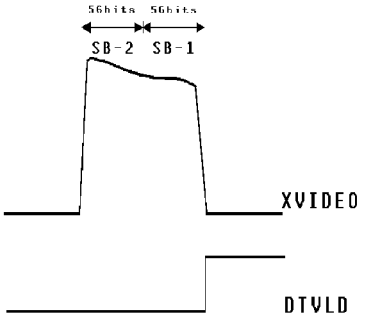
When the document reaches the scan line sensor, the actuator blocks the light path through that sensor. Then prefeed stops to prepare for scanning.



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.

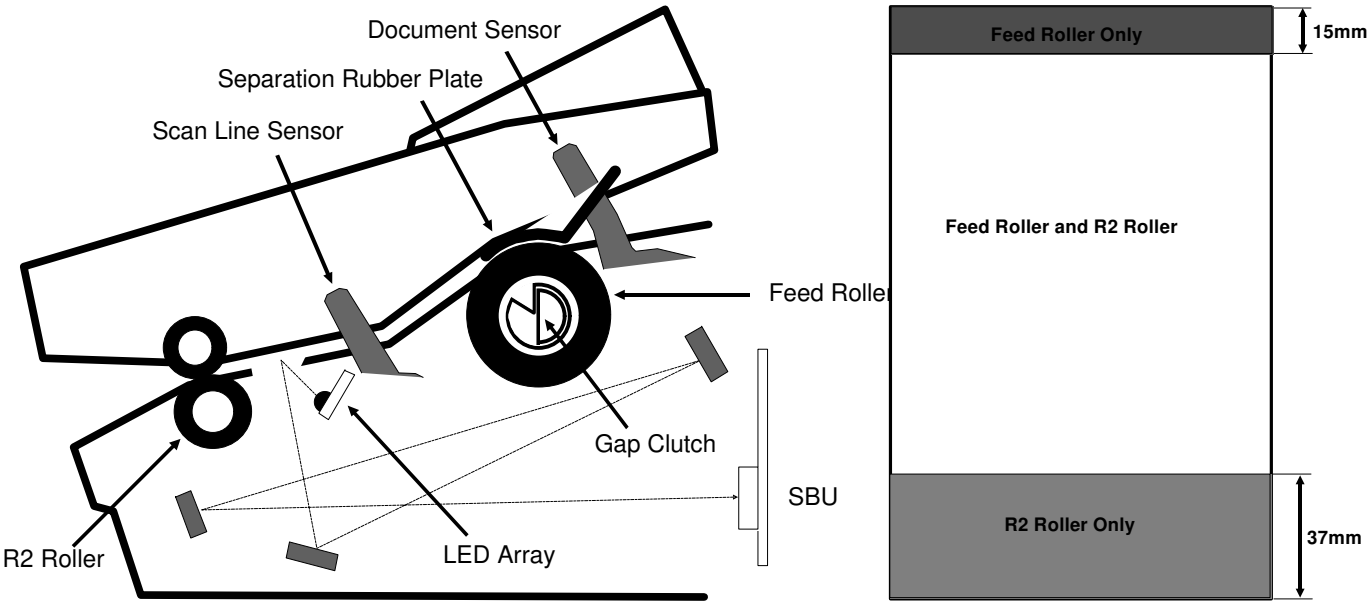


As the trailing edge of the page passes the scan line sensor, the light path through that sensor becomes unblocked again. However, if there are some pages remaining in the feeder, the light path through the document sensor remains blocked.



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.

2. ADF Mechanism

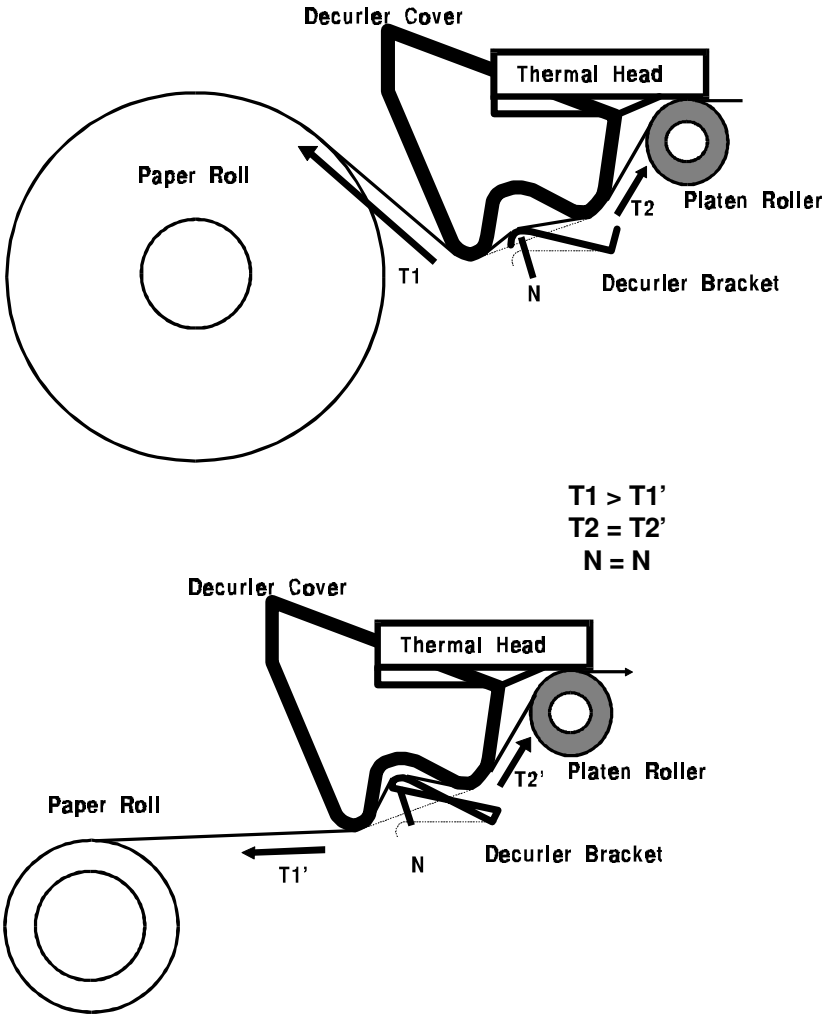


The ADF consists of the feed roller, R2 roller, document/scan line sensors and separation rubber plate.
When a document is placed in the feeder, the document sensor detects it as explained in the previous section. Then, the CPU switches the LED array on and turns the feed roller until the document reaches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

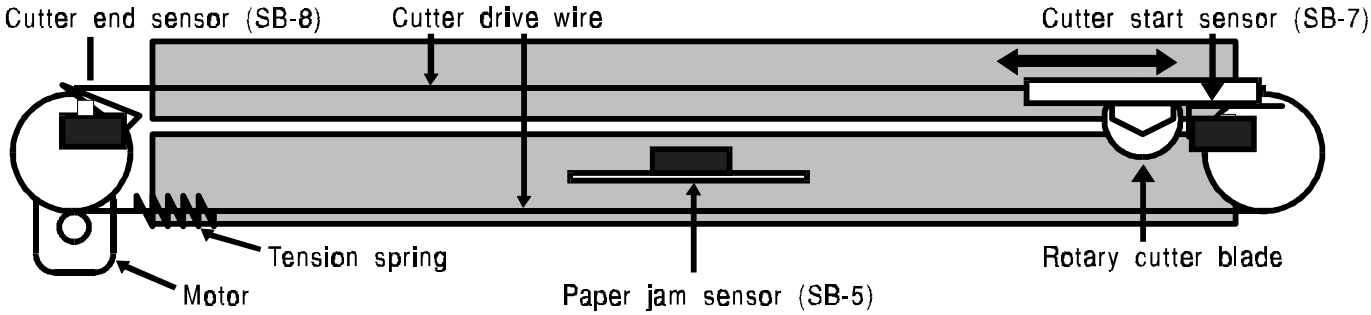
2-6-2. Printer

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. 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.

3. PROGRAMMING, TESTING, AND PRINTING REPORTS

3-1. 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 Fax Switch	Use to select the function of Auto Select mode from among AUTO mode (Auto Tel/Fax switch), TAM mode, and FAX mode (Automatic Receive).
05	Send Later	Use to program the machine to send a document at a later time.
06	Polling Transmission	Use to set up a document to be polled from a remote terminal.
07	Polling Reception	Use to program the machine to poll documents from remote terminals.
08	TCR Printing and On/Off	Use to print a TCR or to set the machine up to print reception only on the TCR
09	Transmission Report On/Off	Use to switch automatic Transmission Report output on or off.
10	Page Header (TTI) On/Off	Use to switch the TTI printout on each transmitted page on or off.
11	Enter Page Header (TTI)	Use to program the TTI.
12	Enter Your Name (RTI)	Use to program the RTI.
13	Enter Your Fax Number (CSI)	Use to program the CSI.
14	Clock Adjustment	Use to adjust the date and time.
15	Set PBX	Use to program the machine for the actual PBX type.
16	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).
17	Key Pad Tone On/Off	Use to switch on or off the acknowledgement beep, when keys are pressed.
18	RDS On/Off	Use to switch RDS on (for 24 hours) or off. This function cannot be accessed by the users, unless bit 6 of bit switch 1 is set to 1.
19	Set Language	Use to change the LCD and report language.
20	Authorized Reception On/Off	Use to prevent reception from terminals other than those programmed in the Quick/Speed Dials.
21	Reviewing Stored Documents	Use to review the documents stored in the memory.
22	Forwarding	Use to program the machine to forward received messages to a programmed terminal.
23	Group Dial Programming	Use to set up dialing groups (up to 5 groups can be programed).
24	ECM On/Off	Use this to switch ECM on or off.

3-2. SERVICE LEVEL OPERATION

3-2-1. Entering and Exiting Service Mode

ENTERING SERVICE MODE

Press Start → Stop → Start → Stop → Start sequentially within 5 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.
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 if no entries are made.

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.

3-2-2. RAM Test (Function 30)

1. Enter the service mode (see section 3-2-1).
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.

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

1. Enter the service mode (see section 3-2-1).
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 failed or was 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
SPE	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

3-2-4. LED Test (Function 32)

1. Enter the service mode (see section 3-2-1).
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 when stop is pressed.
   If ERROR is pressed, the machine prints “LED TEST FAILED”, and goes to the LCD test when stop is pressed..

3-2-5. LCD Test (Function 33)

1. Enter the service mode (see section 3-2-1).
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.

3-2-6. Speaker Test (Function 34)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 34, then press SET.
3. The machine emits a tone from the speaker until OK or ERROR is pressed.
   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.

3-2-7. Printer Test (Function 35)

1. Enter the service mode (see section 3-2-1).
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.

3-2-8. PTT Test (Function 36)

1. Enter the service mode (see section 3-2-1).
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 Stop to go back to step 3.

4.2 DTMF Test
Press a key on the dialpad (0 - 9, * and #) to test the DTMF signals.
After you have finished the test, press Stop 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 keypad. After you have finished the test, press stop to go back to step 3.

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 Stop to save the setting.

3-2-9. Frequency Test (Function 37)

1. Enter the service mode (see section 3-2-1).
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 Freq, then # (increment) or * (decrement). Also, the output level can be changed by pressing LEV then # or *.

3-2-10. Burn-in Test (Function 38)

Do not use this function.

⟹ 3-2-11. 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 RAMC.
3. Press RAMC or 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 for Hong Kong. The correct country code must be reset after a RAM reset (refer to Bit Switch 2).

NOTE: Use this function to check ROM version and RAM clear only! Do not change any of the Factory Settings using this function. Changing these settings will cause malfunction.

3-2-12. 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 keypad (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, in back-to-back mode the machine starts communication if you press Start - Stop - and so on, (the normal procedure to enter service mode.) 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, by pressing Function and the number of the desired Service Function.
4. After finishing with service mode, press Function to re-enter back-to-back mode.
5. To exit back-to-back mode, enter Service mode (steps 1-3) then reset Bit Switch 0,bit 7, to 0.

3-2-13. Scanner Adjustment (Function 44)

1. Enter the service mode (see section 3-2-1).
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.

3-2-14. Display and Rewrite ROM/RAM Data (Function 91)

1. Enter the service mode (see section 3-2-1).
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.

3-2-15. System Report (Function 92)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 92, then press PRINT. The system report will be printed.

3-2-16. Print ROM/RAM Data (Function 93)

1. Enter the service mode (see section 3-2-1).
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.

3-2-17. Service Report (Function 95)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 95, then press PRINT. The service report will be printed.

3-2-18. NCU Parameter Programming (Function 98)

1. Enter the service mode (see section 3-2-1).
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 4-2-1 (Address 0377 - 0381 (H)) for the definition of NCU parameters.

4. SERVICE TABLES

4-1. 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	RTI/TSI reception check in memory reception.	0: Enabled **1:** Disabled	**NOTE: This bit is ony affective on machine manufactured after serial number K2463860000 or machines with the FCE ROM Rev. "F" or later installed.** **0:** Message can be received into memory only when an RTI or TSI is received from the other terminal. **1:** Message can be recieved into memory even if an RTI or TSI is not received.
1	Rx cable equalizer	0: Disabled 1: Enabled	DO NOT CHANGE FACTORY SETTING.
2	DIS detections	0: Once 1: Twice	The machine will send DCS (G3 set-up signal) if it receives DIS. If echoes are frequent, setting this bit to 1 will allow the machine to wait for the second DIS before sending DCS.
3	TSI (RTI) printout on received copies	0: Disabled 1: Enabled	If this bit is 1, the TSI or RTI received from the sender will be printed on the top of each page.
4	Burst error threshold/ error line ratio	0: 6 (12) [24] lines/10% 1: 3 (6) [12] lines/5%	If there are more consecutive error lines in the received page than the threshold specified by this bit, the page is rejected. Values in parenthesis ( ) are for Detail resolution, and those in square brackets [ ] are for Fine resolution. Also, if the number of error lines divided by the total number of lines reaches the ratio determined by this bit, the machine will send RTN to the other end. If you want to receive messages with fewer error lines, set this bit to 1.
5	Training error threshold	0: 4 bits 1: 1 bit	If the machine detects more errors during training than the number set by this bit, training fails and the machine will send FTT to ask the other terminal for modem rate shift-down. Set this bit to 1 if you want to receive messages at 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 in back-to-back mode the machine starts communication if you press Start - Stop - and so on, the normal procedure to enter service mode.
Refer to the notice in section 3-2-12 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	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.
2	ECM transmission/reception	0: Enabled 1: Disabled	Set this bit to 1 when you want to switch off ECM.
3	PSTN/PBX dial tone and busy tone detection	0: Enabled 1: Disabled	Set this bit to 1 when you wish to disable tone detection.
4	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 (see below)	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.

COMMUNICATION PARAMETERS:

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	Country code		This must be kept at 10001 for the USA. Do not change the factory settings. Be sure the country code is set correcty any time the RAM has been cleared. * (See below)
1			
2			
3			
4			
5	TAM interface type	0: Normal 1: German type	0: The normal type of TAM interface monitors the line current on the NCU, 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 NCU, 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 04 by the user.
7	Not used		

Default Settings

Bit Sw.	Default
0	0000 0000
1	0000 0000
2	0001 0001

⇒ * The following setting will automatically be set (Default) when the country code 10001 (USA) is set.

Function	Default Setting	Function	Default Setting
Number of DIS detection	1	Bit Switch 1	00
Tx level (dbm)	-10	Bit Switch 2	11
Cable equalizer	OFF	NCU Parameter 0	011
Number of memory redials	4	NCU Parameter 1	090
DTMF "ON" time (msec.)	100	NCU Parameter 2	001
DTMF "OFF" time (msec.)	100	NCU Parameter 3	010
DP interval digit time (msec.)	800	NCU Parameter 4	003
Line current detction	OFF	NCU Parameter 5	007
PSTN dial tone detection	OFF	NCU Parameter 6	006
PTSN busy tone detection	OFF	NCU Parameter 7	101
PBX dial tone detection	OFF	NCU Parameter 8	008
PBX busy tone dectetion	OFF	NCU Parameter 9	008
Bit Switch 0	OFF	NCU Parameter 10	010

4-2. 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.

4-2-1. Address Table

Use service function 91 to view or adjust the contents of a RAM address. See section 3-2-14 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 3-1 for details.
0009	User function parameters Bit 7: Transmission 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: AM/PM Indication on LCD clock **Note 1** (1: On) Bit 2: Forwarding On/Off [Function 22] **Note 2** (1: On) Bit 1: Forwarding Mode [Function 22] **Note 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 TCR [Function 08] (1: On) Bit 6: Authorized Reception On/Off [Function 20] (1: On) Bits 5 through 0: Not used
0039	Exchanger type connected to the machine Bit 2 = 0: PSTN Bit 2 = 1: PBX
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 10 (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.
0321 - 033E: PBX tone detection parameters	
0321 - 032C	Modem data for PBX dial tone frequency range **Caution:** Do not adjust.
032D	PBX dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
032E	PBX dial tone reset time [Time = N x 0.16 (s)]
032F	PBX dial tone continuous tone time [Time = N x 20 (ms)]

Address (Hex)	Function
0330	PBX dial tone permissible dropout time [Time = N x 20 (ms)]
0331	PBX pause time [Time = N x 0.16 (s)]
0332	PBX ringback tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0333 - 033E	Modem data for PBX 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	PBX operator pause [Time = N x 20 (ms)]
036F	CCITT T1 time [Time = N x 2.56 (s)]
0370	Maximum number of dialing attempts to the same station in normal tx mode
0371	Redial interval in normal tx [Time = N (minutes)]
0372	Maximum number of dialing attempts to the same station in memory tx mode
0373	Interval between dialing to different stations [Time = N x 2.56 (s)]
0374	Dial tone detection level [Level = 0 - N x 0.375 (dBm)]
0375	Busy tone detection level [Level = 0 - N x 0.375 (dBm)]
0376	Minimum signal detection level [Level = 0 - N x 0.375 (dBm)]
0377 - 037B: Ringing signal detection parameters **(Use function 98 to change)**	

Address (Hex)	Function
0377	**NCU Parameter 00:** Acceptable ringing signal frequency, upper limit [Frequency = 1/(N x 10^{-3}) (Hz)]
0378	**NCU parameter 01:** Acceptable ringing signal frequency, lower limit [Frequency = 1/(N x 10^{-3}) (Hz)]
0379	**NCU parameter 02:** Number of rings until a call is detected [Number = N x 1]
037A	**NCU parameter 03:** Minimum required length of a ring [Length = 20 x N - 120 (ms)]
037B	**NCU parameter 04:** Minimum required length of an interval between rings [Length = 40 x N (ms)]
037C - 037D: Pulse dial parameters **(Use function 98 to change)**	
037C	**NCU parameter 05:** Dial pulse on/off ratio [on / (on+off) = 33 + N (%) Note: 0 ≤ N ≤ 7]
037D	**NCU parameter 06:** Pause between dialed digits (pulse dial mode) [Time = 50 x N + 500 (ms)]
037E	**NCU parameter 07:** Time waited when a pause is entered at the operation panel [Time = N x 20 (ms)]
037F - 0380: Tone dial parameters **(Use function 98 to change)**	
037F	**NCU parameter 08:** DTMF tone length [Time = N x 5 + 60 (ms)]
0380	**NCU parameter 09:** Time between dialed digits (DTMF dial mode) [Time = N x 5 + 60 (ms)]
0381	**NCU parameter 10:** Modem transmission level [Level = - N (dBm)]
0382	Language selected for LCDs and reports 0(D): English 1(D): Spanish 3(D): French
0386	Redial interval for memory transmission [N x 1 (min.)] (Default: 5 minutes)
0387 - 0388	Intercity access code for France: 16(D) [0386 = FF(H), 0387 = 16(BCD)]
039A	Ringing time in Auto mode [Time = N (s)] The value N should be a multiple of 5 between 5 and 25.
039E - 03A1: CNG detection parameters	
039E	Maximum acceptable CNG OFF-time [Time = N x 20 (ms)] **Note 3**
039F	Minimum acceptable CNG OFF-time [Time = N x 20 (ms)] **Note 3**
03A0	Maximum acceptable CNG ON-time [Time = N x 20 (ms)] **Note 3**
03A1	Minimum acceptable CNG ON-time [Time = N x 20 (ms)] **Note 3**
03A2	Country code 11: USA 14: Hong Kong 15: Australia 16: New Zealand 17: Israel 18: Thailand 19: Singapore 1A: Indonesia
03C5	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
03C9	Continuous silent period detection time in TAM mode [Time = N x 65 (ms)]
03CA	PSTN access code from behind Loop Start PBX (BCD)
03CF	Number of rings until a call is detected in TAM mode [N (times)]
20A1	Forwarding start date and time Minute (BCD)
20A2	Forwarding start date and time Hour (BCD)
20A3	Not used
20A4	Forwarding start date and time Day (BCD)
20A5	Forwarding start date and time Month (BCD)
20A6	Forwarding start date and time Year (BCD)
20A7	Forwarding end date and time Minute (BCD)
20A8	Forwarding end date and time Hour (BCD)
20A9	Not used
20AA	Forwarding end date and time Day (BCD)

Address (Hex)	Function		
20AB	Forwarding end date and time	Month (BCD)	
20AC	Forwarding end date and time	Year (BCD)	
20AD - 226E	TCR generation area (30 bytes x 15 communications)		
2272 - 2433	Service report and error report generation area (45 bytes x 10 communications)		
2438 - 24F7	Error code memory (up to 32 codes x 6 bytes)		
2736 - 2737	Polling ID code	Example: ABCD	2736 (High) = A, (Low) = B 2737 (High) = C, (Low) = D
2A7B	Received page counter (BCD)	High: Tens digit	Low: Units digit
2A7C		High: Thousands digit	Low: Hundreds digit
2A7D		High: Hundred thousands digit	Low: Ten thousands digit
2A7E - 2A80	Transmitted page counter	(Refer to the received page counter)	
2A81	Printed page counter (BCD)	High: Tens digit	Low: Units digit
2A82		High: Thousands digit	Low: Hundreds digit
2A83		High: Hundred thousands digit	Low: Ten thousands digit
2A84 - 2A86	Scanned page counter	(Refer to the printed page counter)	
5002 - 5100	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 51 destinations) [0: No history, 1: 2400 bps, 2: 4800 bps, 3: 7200 bps, 4: 9600 bps]		
5101	Number of characters in the RTI - 14 (H)		
5102 - 5115	RTI (ASCII)		
5116	Number of characters in the CSI - 14 (H)		
5117 - 512A	CSI (ASCII)		
512B	Number of characters in the TTI - 20(H)		
512C - 514B	TTI (ASCII)		
514C	Number of digits in the forwarding terminal's telephone number		
514D - 516C	Forwarding terminal's telephone number (ASCII)		
6408	AVM language in AUTO and TAM modes. 1(D): English 2(D): German 3(D): Dutch 4(D): French		
6409	Second AVM language in AUTO and TAM modes. (Same as above)		
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)	

Address (Hex)	Function
C01D	Minute (Tens digit) (ASCII)
C01E	Minute (Units digit) (ASCII)
C01F	A blank space " " (ASCII)
C020	Suffix (ASCII)
C021	Machine code 13 (H) - FAX240

Notes:

1. This bit only changes the language displayed on the LCD. The report language cannot be changed.
2. Forwarding requires the following switches and data.

ON/OFF Bit 2 of 0009 (H)	Mode Bit 1 of 0009 (H)	Start Date and Time 20A1 - 20A6 (H)	End Date and Time 20A7 - 20AC (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.

3. These RAM data is clear if the power is switched off.

4-2-2. Format of the TCR and Transmission Report Generation Areas

The TCR and the Transmission Report are generated in addresses 20AD - 226E (H). The record of each communication is stored in blocks of 30 bytes as explained in the following table.

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

4-2-3. 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 45 bytes as explained in the following table. There can be up to 10 records.

Byte No.	Functions
0	Header Bit 7: Service Report or Error Report (1: Enabled) Bit 6 through 0: Not used
1 - 29	Same as the TCR 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)

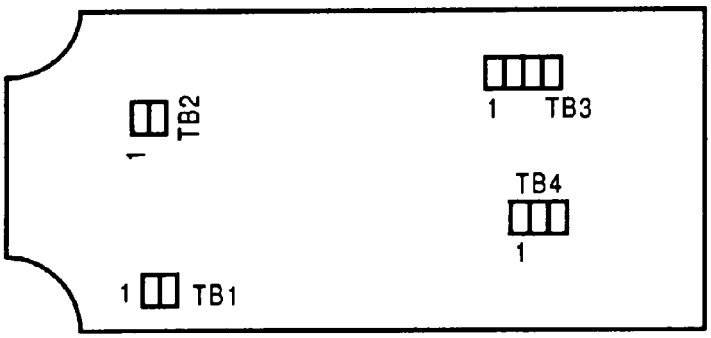
4-2-4. Format of the Error Code Memory

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 machine 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)

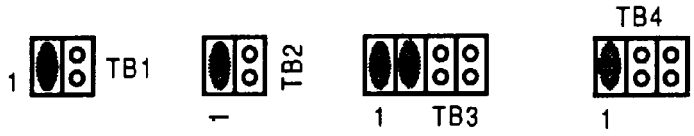
4-3. JUMPERS

NCU



The jumper wires are set as shown below on the factory.

WARNING: Do not change the factory setting.



4-3. VARIABLE RESISTORS AND SWITCHES

PCB	Address	Function
NCU	VR1	Ringer volume adjustment (user adjustable)
	VR2	Speaker volume adjustment (user adjustable)
	VR3	DTMF signal Tx level adjustment
	SW1	GS/FS select switch (not used)
PSU	S001	A thermostat; this switches the power off automatically when the temperature goes higher than 95 ± 5 °C, and recovers after switching the power switch off and on

4-4. SENSORS

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

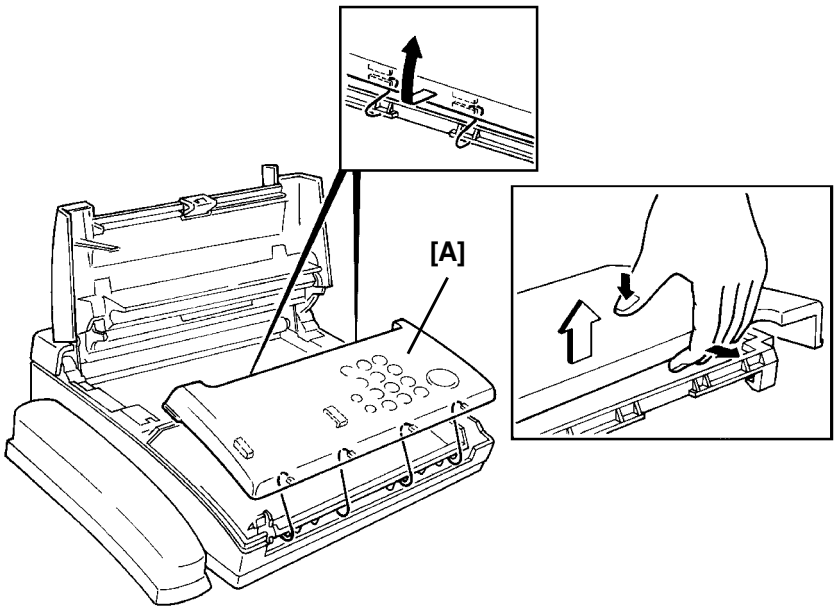
5. REMOVAL AND ADJUSTMENT

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.

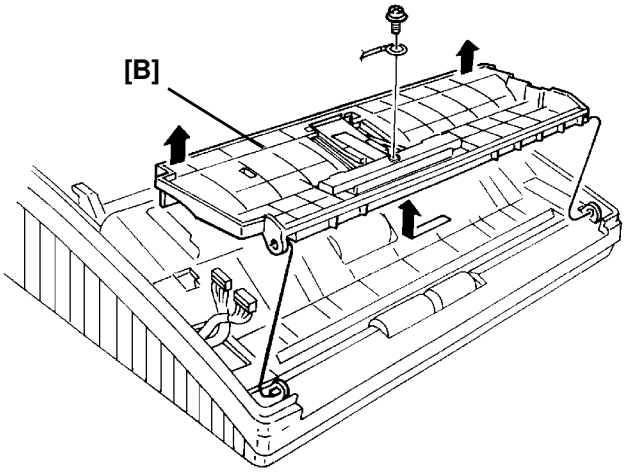
5-1. COVERS

5-1-1. Operation Panel Assembly

1. Open the ADF.
2. Remove the operation panel cover [A]. Pull up gently on the grey upper section, unclipping it from the lower, portion which holds the separation plate, as shown below.

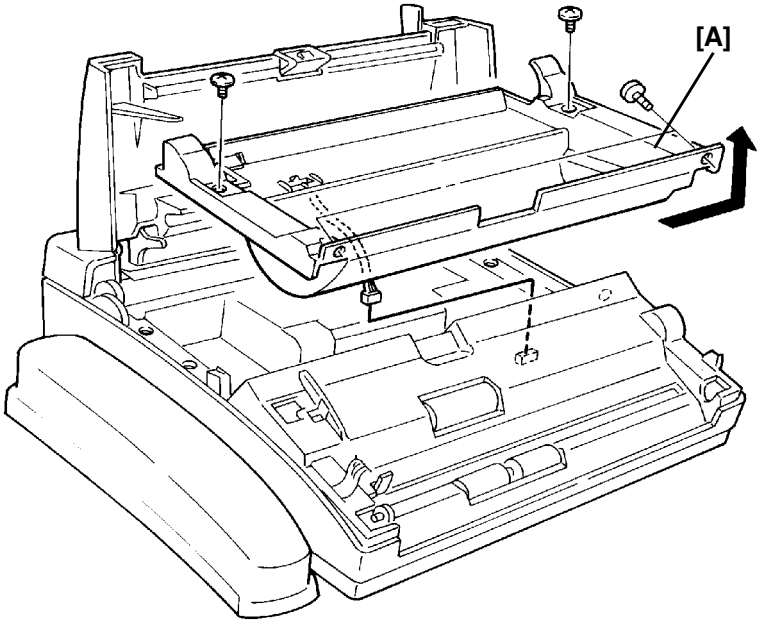


3. Disconnect three connectors.
4. Remove the lower cover [B] (1 ground wire). The screw holding the ground connector also holds the separation plate in place. When reassembling, be sure ground wire is secured.

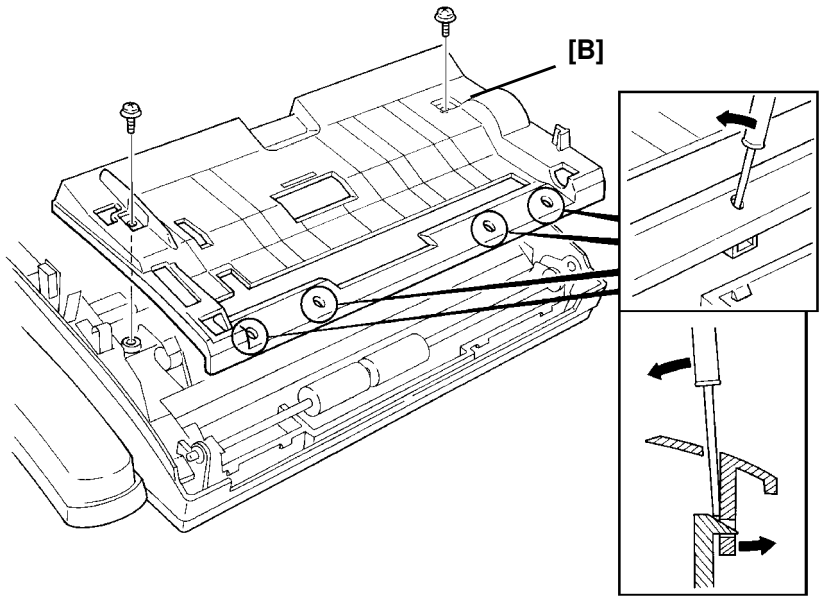


5-1-2. Paper Holder and Scanner Cover

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



3. Remove the operation panel assembly (see section 5-1-1).
4. Remove the scanner cover [B] with a screwdriver as shown below (2 screws). Place a small screwdriver into each of the rectangular holes toward the front of the machine. Pry the cover up by gently pushing the handle of the screwdriver toward the back of the machine, to unfasten the 4 plastic clips.

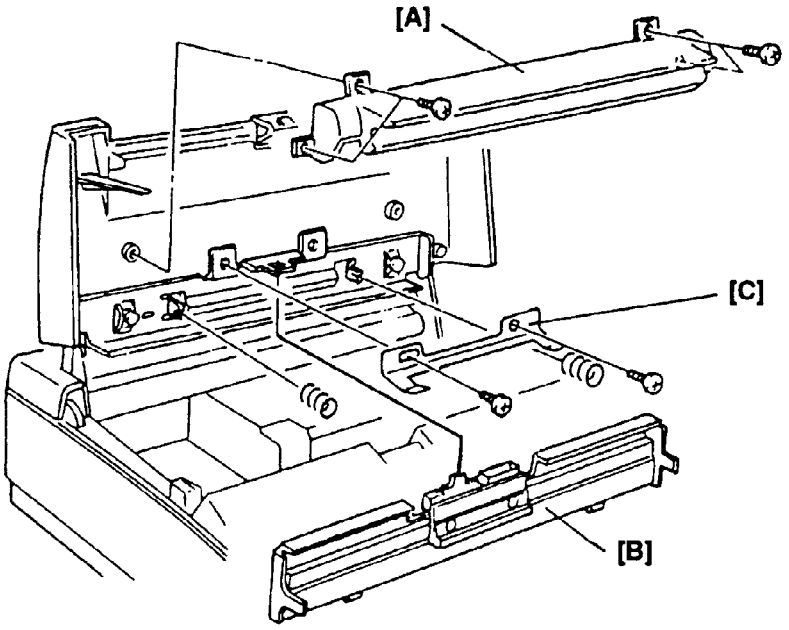


5-1-3. Thermal Head and Printer Cover

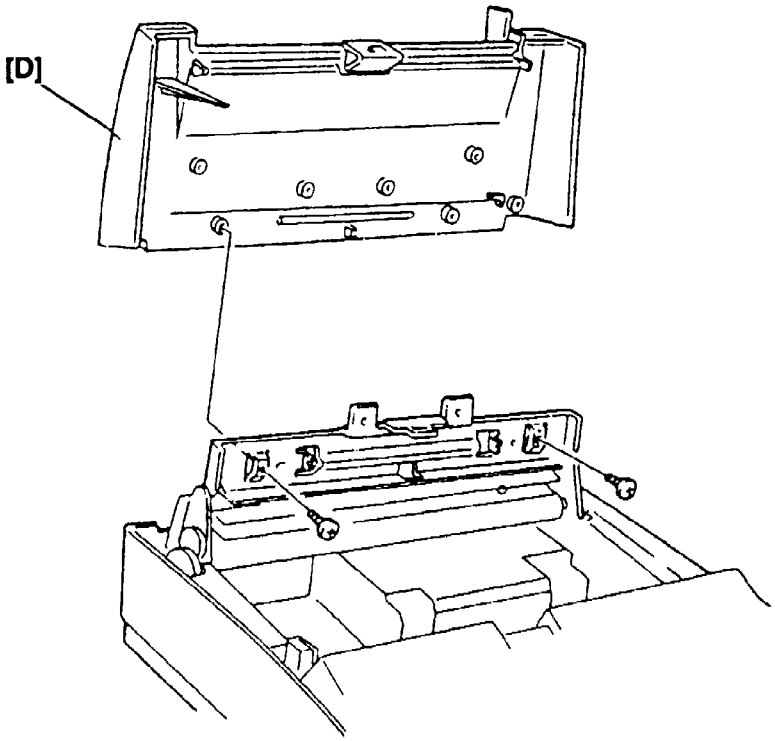
1. Open the printer cover.
2. Remove the thermal head cover [A] (4 screws). Note location of springs before removing screws.
3. Remove the thermal head [B] and the spring plate [C] (2 connectors, 2 springs, 2 screws with lock washers).

Reassembly Note

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



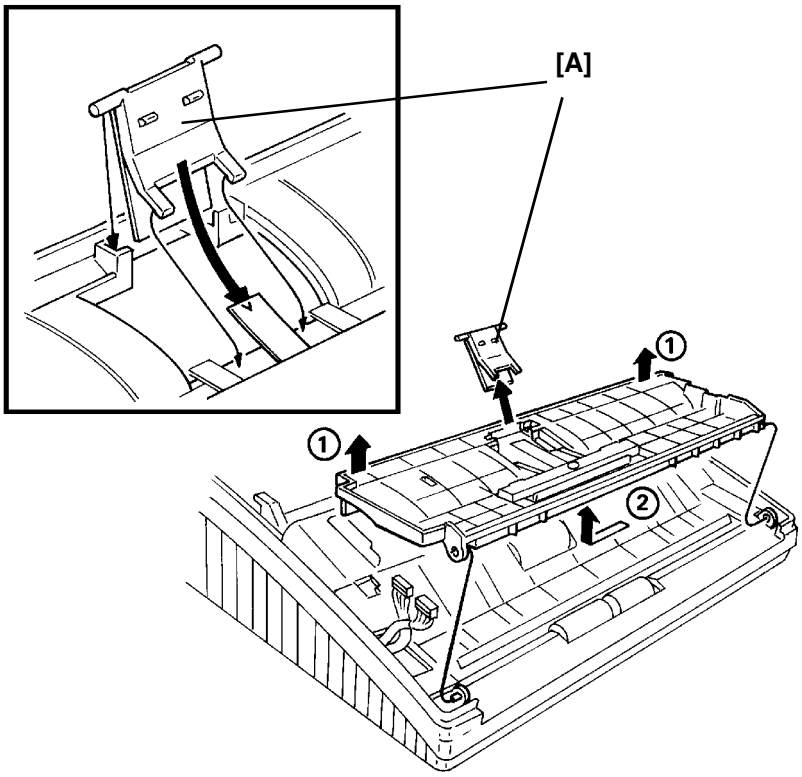
4. Remove the printer cover [D] (2 screws with lock washers).



5-2. SCANNER

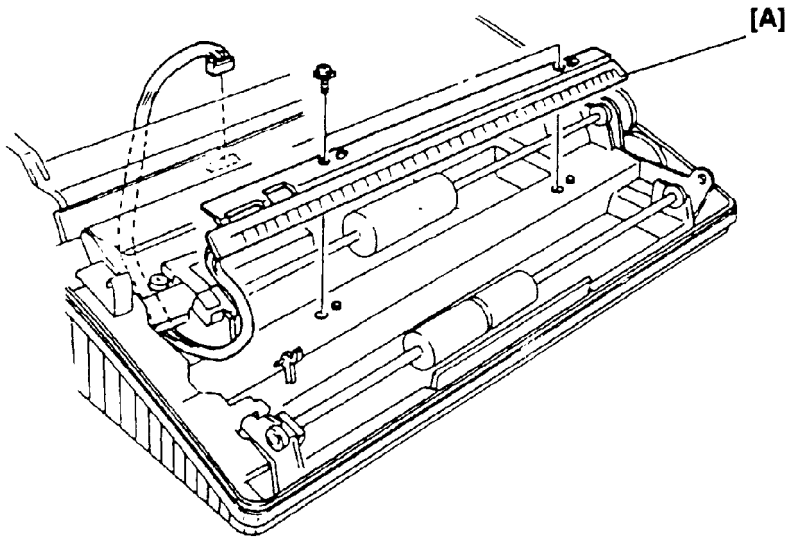
5-2-1. Separation Rubber Plate

1. Remove the operation panel assembly (see section 5-1-1).
2. Remove the rubber plate [A].



5-2-2. LED Array

1. Remove the operation panel assembly, the paper holder and the scanner cover (see section 5-1).
2. Remove the LED array [A] (2 screws, 1 connector unplug from FDU).

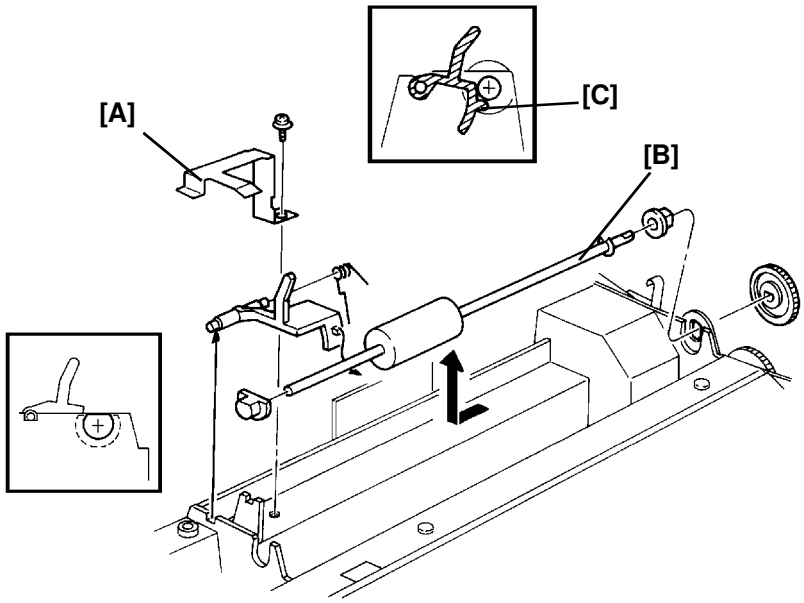


5-2-3. Feed Roller

1. Remove the operation panel assembly, the paper holder and the scanner cover (see section 5-1).
2. Remove the metal bracket [A] (1 screw).
3. Remove the feed roller [B].

Note for Reassembly

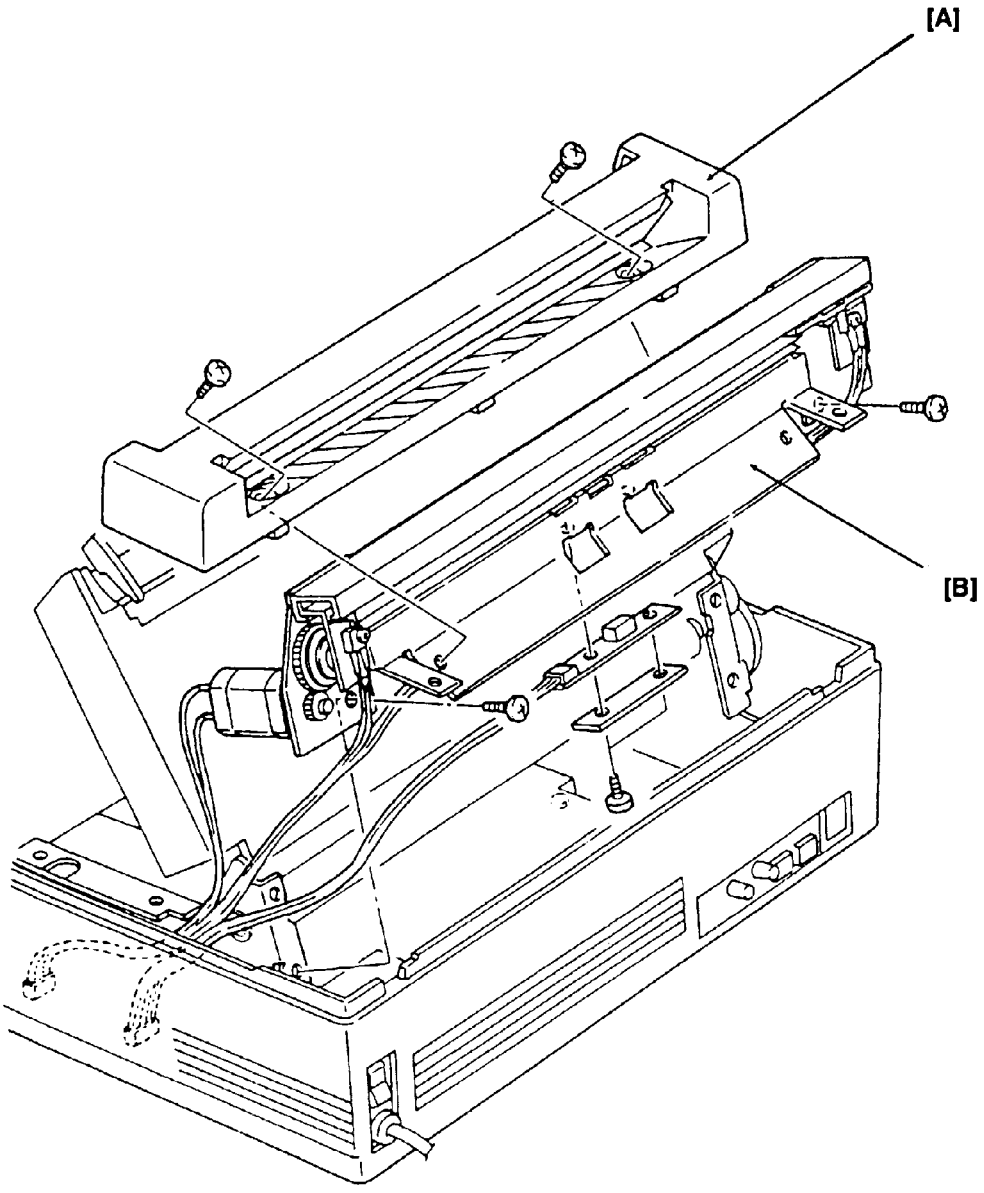
- Pin [C] on the document sensor actuator must be under the feed roller shaft.



5-3. PRINTER

5-3-1. Rear Cover, and Cutter Unit.

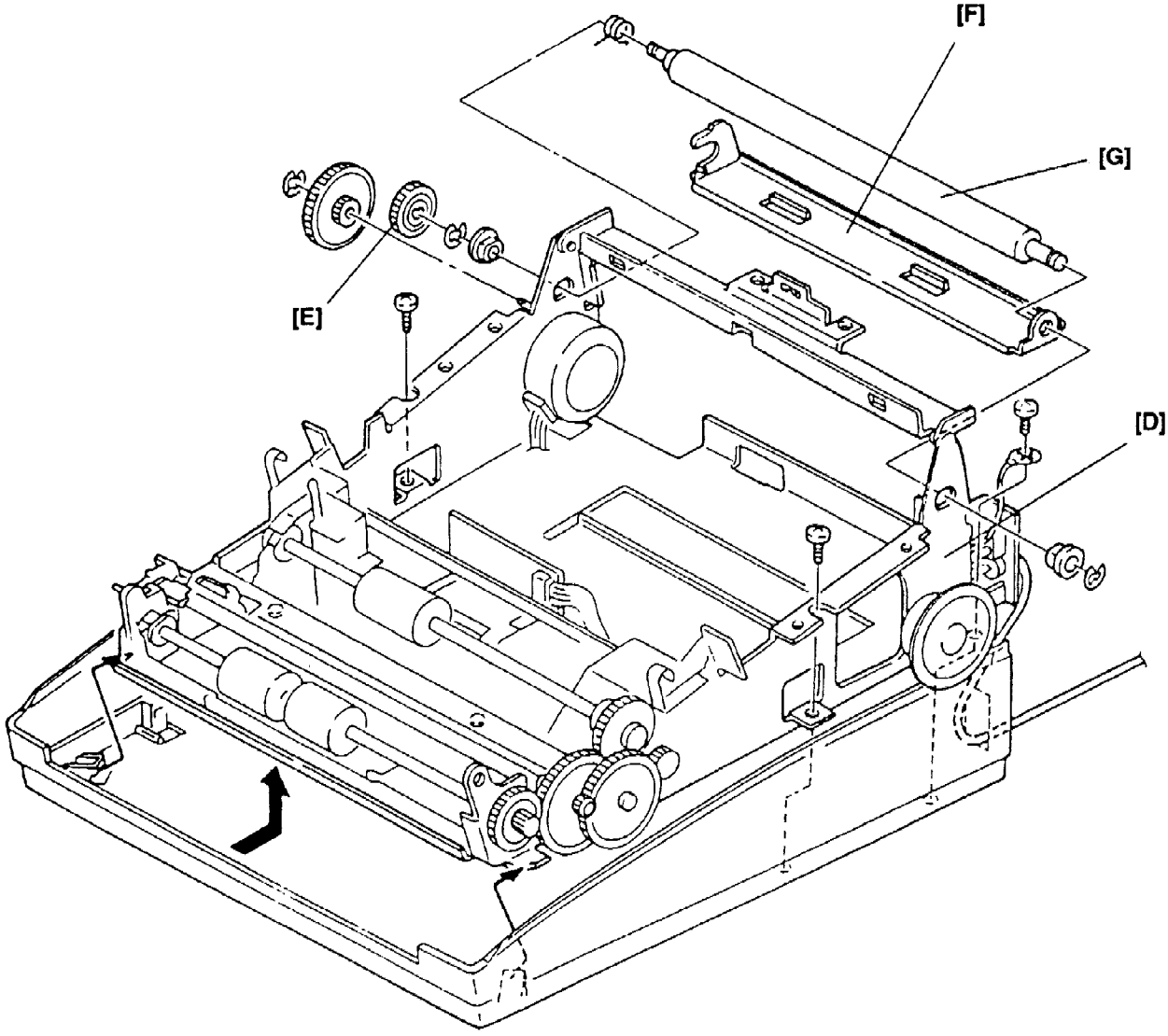
1. Remove the rear cover [A] (2 screws).
2. Remove the paper holder and the cutter unit [B] (2 screws, 2 connectors unplug at FDU).



3. Remove the FCE, FDU, PSU and NCU (see section 5-4).
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

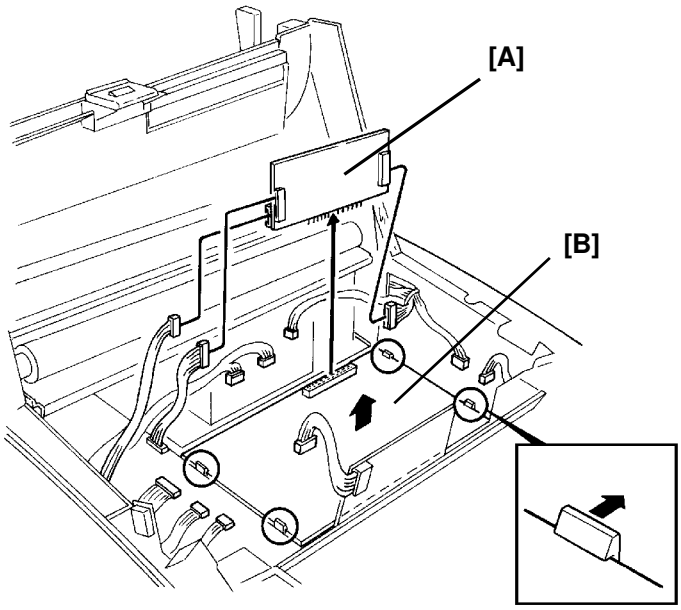
- Be careful not to assemble the gears the wrong way round.
- The left bushing - platen roller is smaller than right bushing.
- Lubricate the left shaft of the platen roller all the way round after changing the platen roller or the spring clutch for the decurler (Use Mobil Temp 78, part no. 54479078).



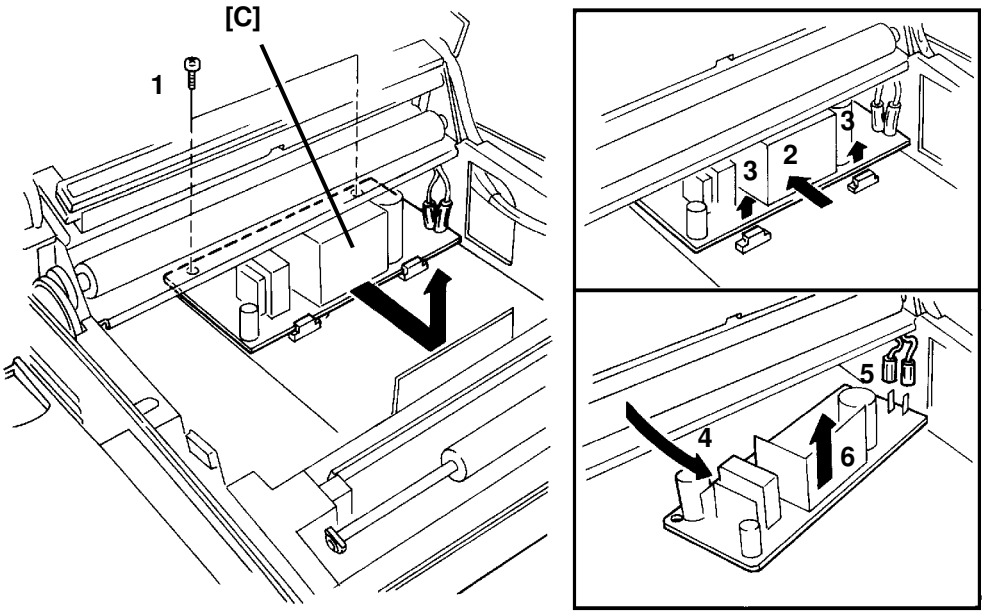
5-4. PCBs

5-4-1. FCE, FDU, and PSU

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

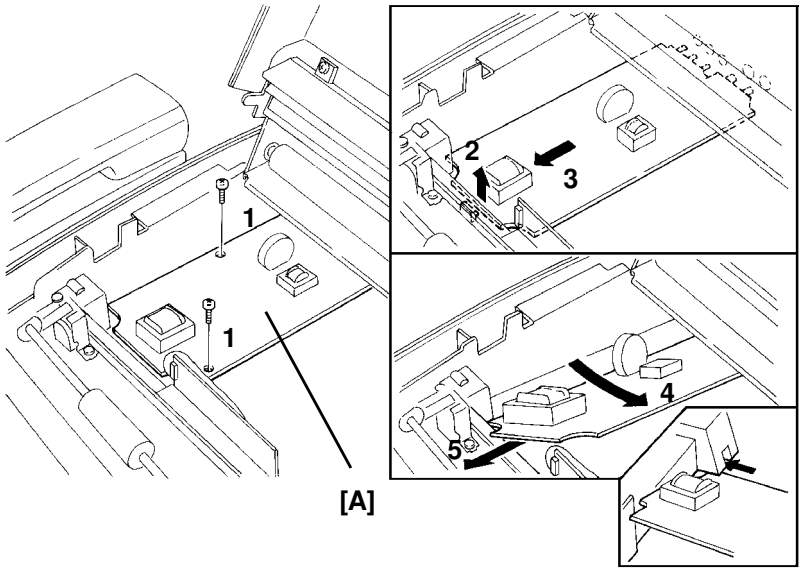


4. Remove the rear cover (2 screws).
5. Remove the PSU [C] (2 connectors).



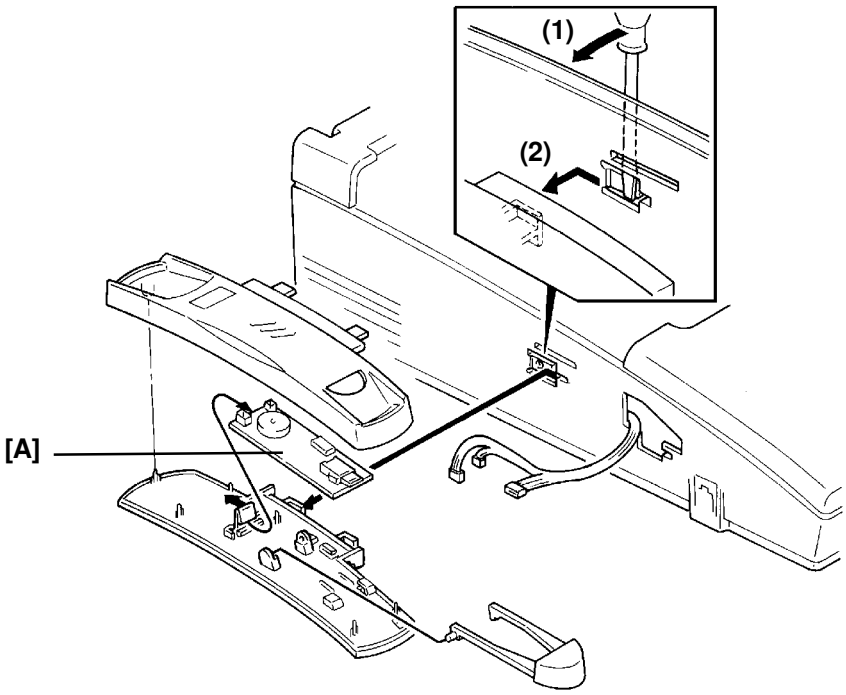
5-4-2. NCU

1. Remove the paper holder and the scanner cover.(see section 5-1-2).
2. Remove the NCU [A] (2 screws, 6 connectors).



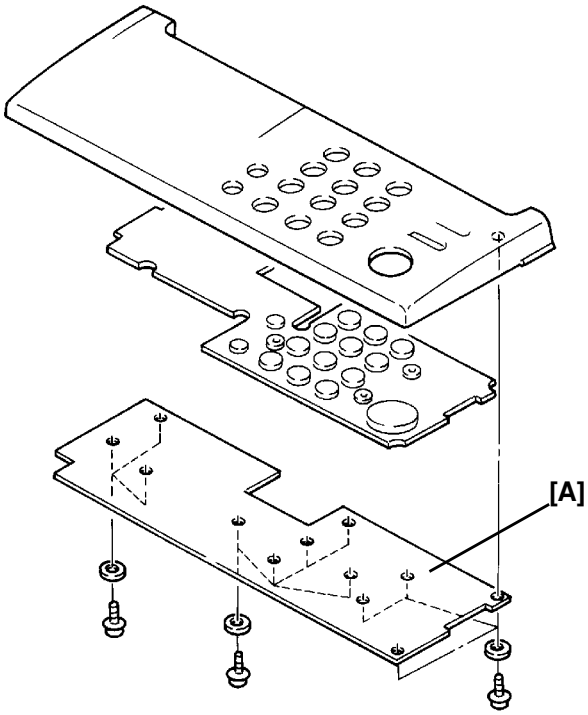
5-4-3. HSB

1. Remove the paper holder (see section 5-1).
2. Remove the cradle unit as shown below.
3. Remove the HSB [A] (3 connectors).



5-4-4. OPU

1. Remove the operation panel cover (see section 5-1-1).
2. Remove the OPU [A].



5-5. SBU REPLACEMENT AND SCANNER/SENSOR ADJUSTMENT

5-5-1. SBU Adjustment Tools

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

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

4-5-2. SBU Replacement

1. Unplug the machine from the wall outlet.
2. Remove the printer cover, operation panel assembly, and scanner cover (see section 4-1).
3. Remove the SBU (2 screws, 1 connector at CN7 on the FDU)

4-5-3. Scanner/Sensor Adjustment

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

As the scanner has 2 features, scanning document and detecting sensor actuator movement, the scanner needs exact adjustment. Refer to Section 2 of this manual 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 adjusted properly.

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

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

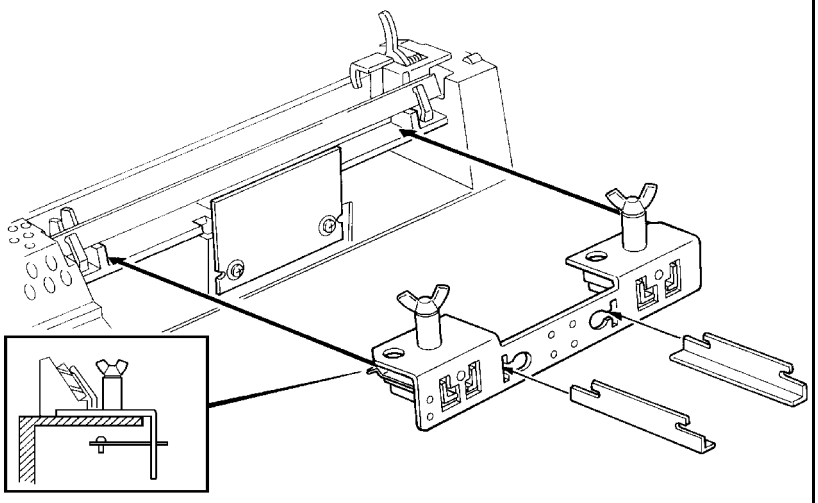
1. Preparation

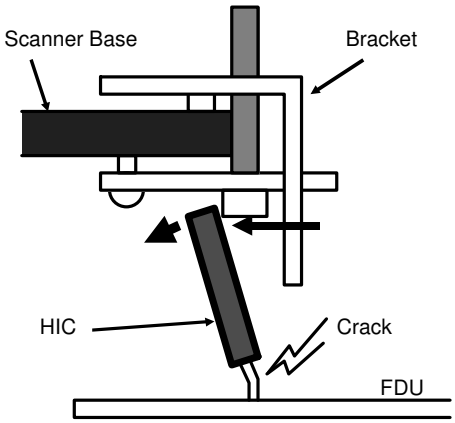
1. Install a new SBU in the machine. (Do not connect the harness to the FCE.)

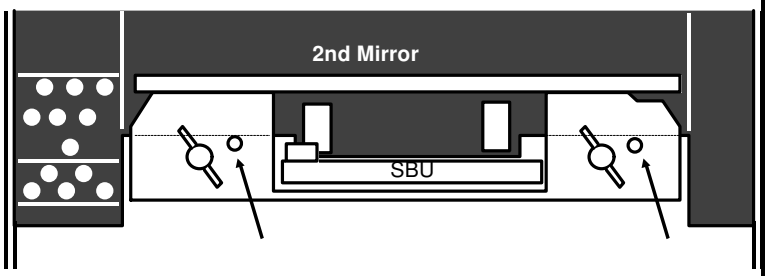
2. Clamp the bracket to the scanner base. Set the left side of the bracket first as shown below.

Notes:

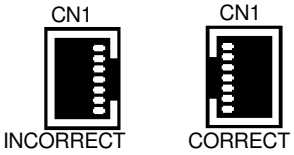
1. The dents on the bracket must fit to the edge of scanner base. Otherwise, the pins from the HIC might crack as shown in the diagram.
2. The shape of the bracket may vary slightly from the drawing.



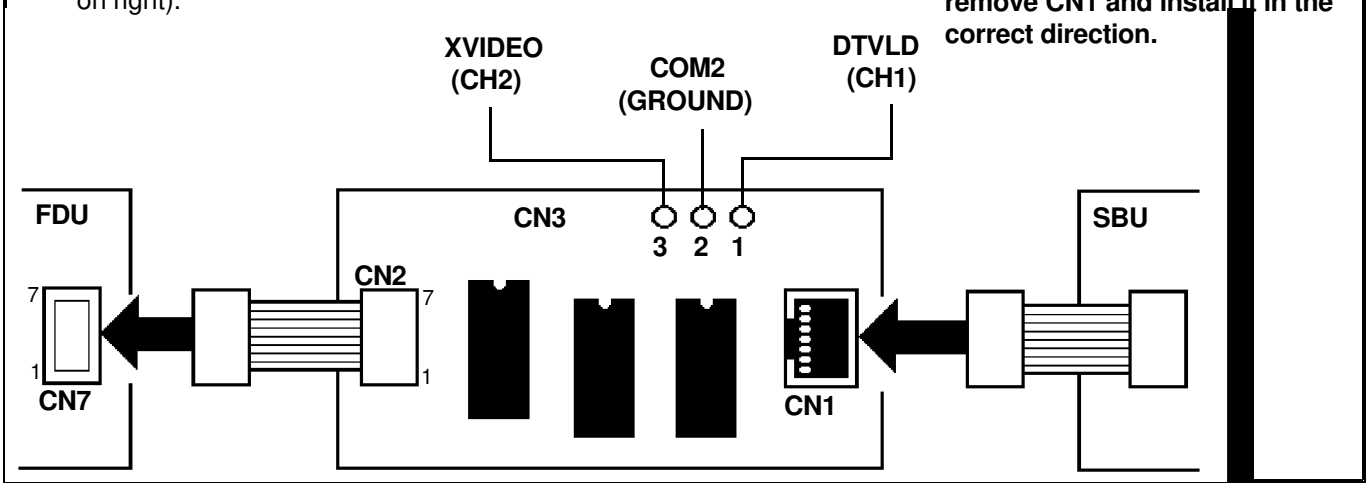




3. Connect the harness from CN2 on the test PCB to the FDU CN7. Then connect the harness from the SBU to the test PCB CN1 (refer to note on right).

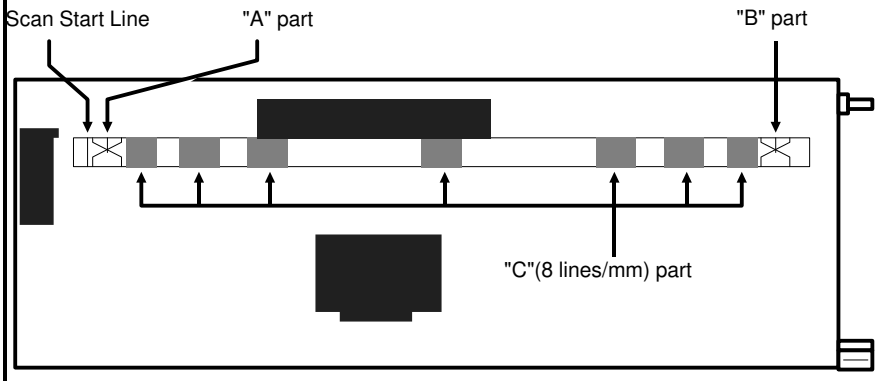


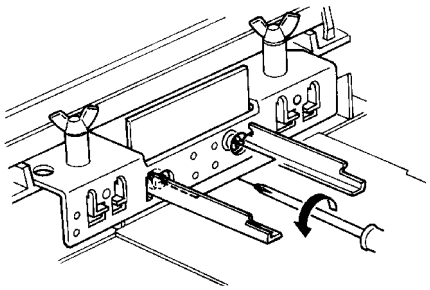
NOTE: If CN1 is white, check it for proper notch (key) allignment. CN1 must be installed with the key facing as illustrated (refer to illustration). If necessary, remove CN1 and install it in the correct direction.



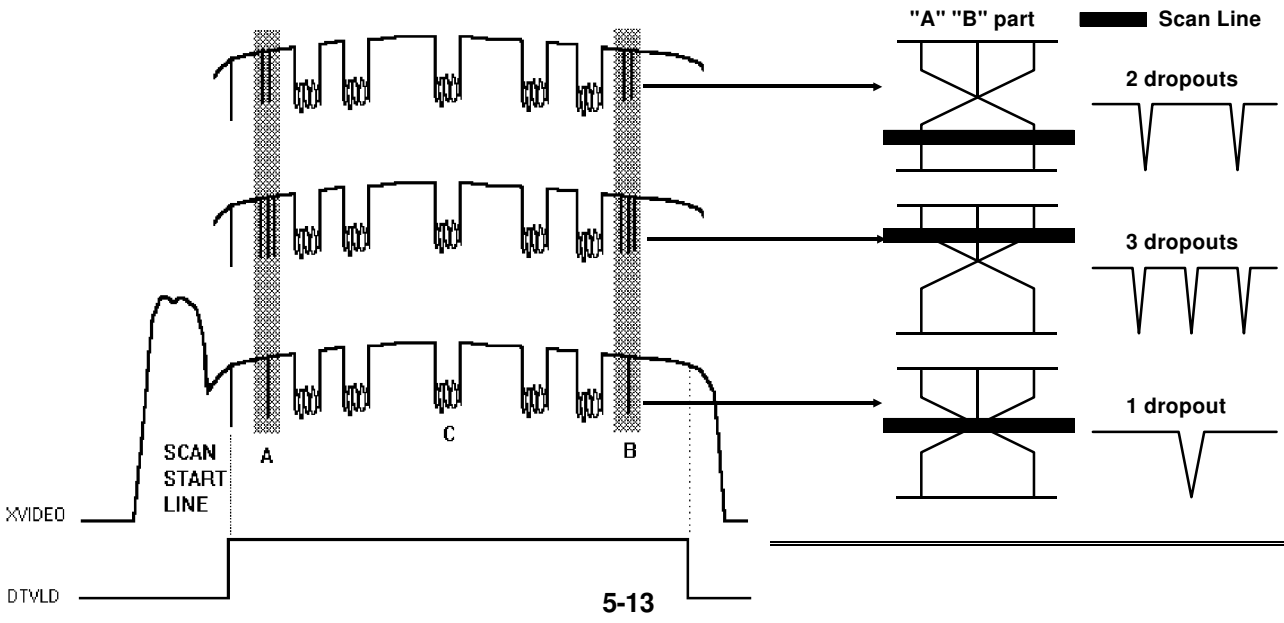
1. Preparation

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 3-2-13).
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 (The irregular line pattern, as shown below) 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 (the irregular lline pattern, as shown below) does not appear on the screen, go to the **"Focusing"** procedure first, then go to the **"Horizontal/Vertical Scan Line Adjustment "** procedures.
   If this waveform appears on the screen, go to the **"Horizontal/Vertical Scan Line Adjustment "** procedures, then check that the moire at "C" satisfies the criterion in the **"Focusing"** section.





Test Chart attached on the Pressure Plate

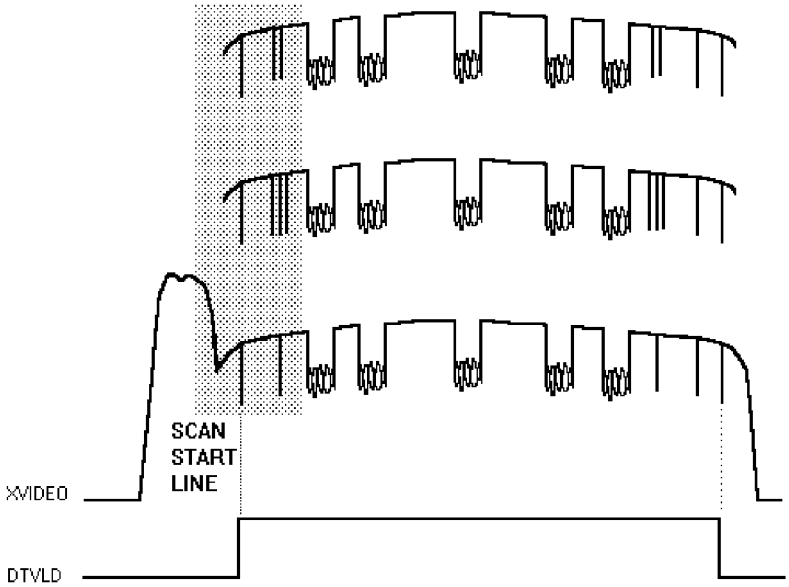


2. Horizontal Scan Line Adjustment

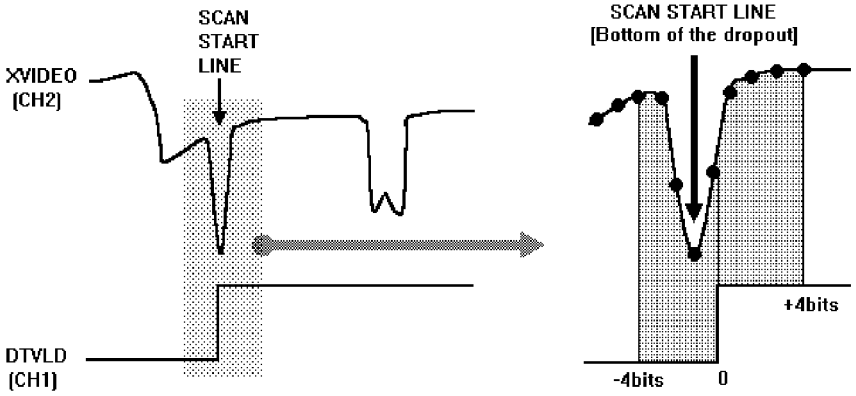
1. Set up the oscilloscope as follows:
   CH1 (DTVLD) - 5 V/div.
   CH2 (XVIDEO) - 0.2 V/div.
   TIME - 1 ms/div.
   Use ALT mode to display CH1 and CH2 at the same time.

2. Loosen the SBU securing screws.

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



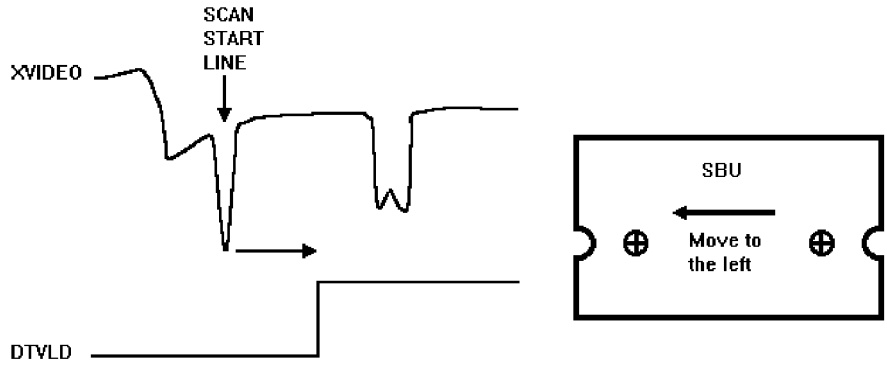
4. Enlarge the shaded part of the waveform above by changing the TIME scale to 50 µs/div or 20 µs/div. The scan start line appears as the first sharp dropout from the left of the XVIDEO signal on the oscilloscope. The dropout of the waveform has to be within ±4 bits from the rising edge of the DTVLD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



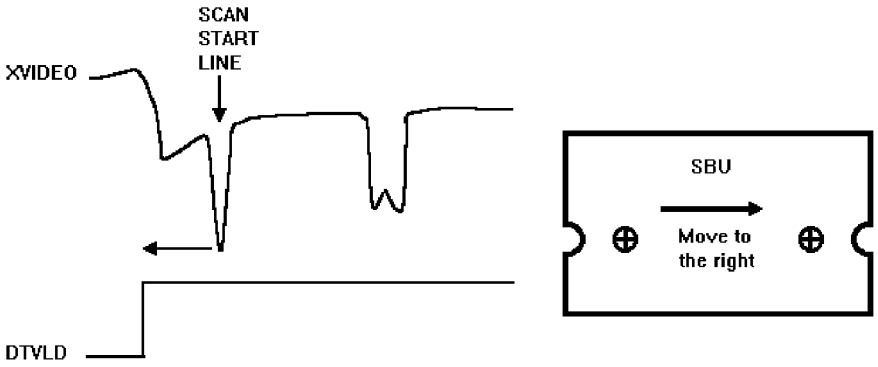
If the scan start line is not at the correct position, go to step 5 to adjust the horizontal scan line position.

2. Horizontal Scan Line Adjustment

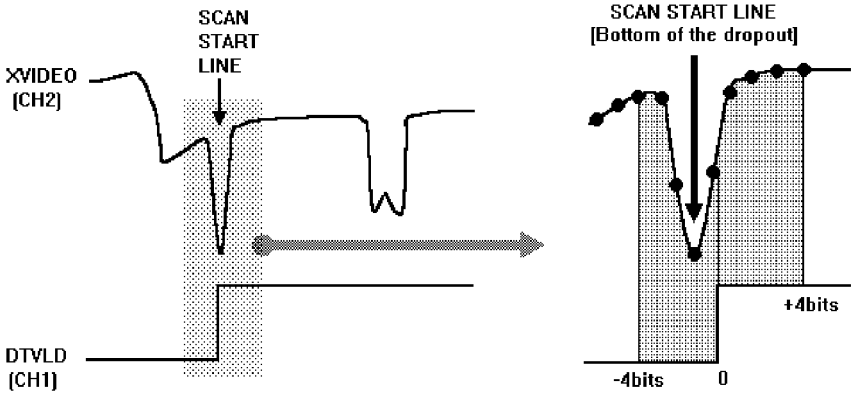
5. Adjust the horizontal scan line position as shown below.
   If the scan start line is to the left of the rising edge of the DTVLD signal, move the SBU to the left.



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



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

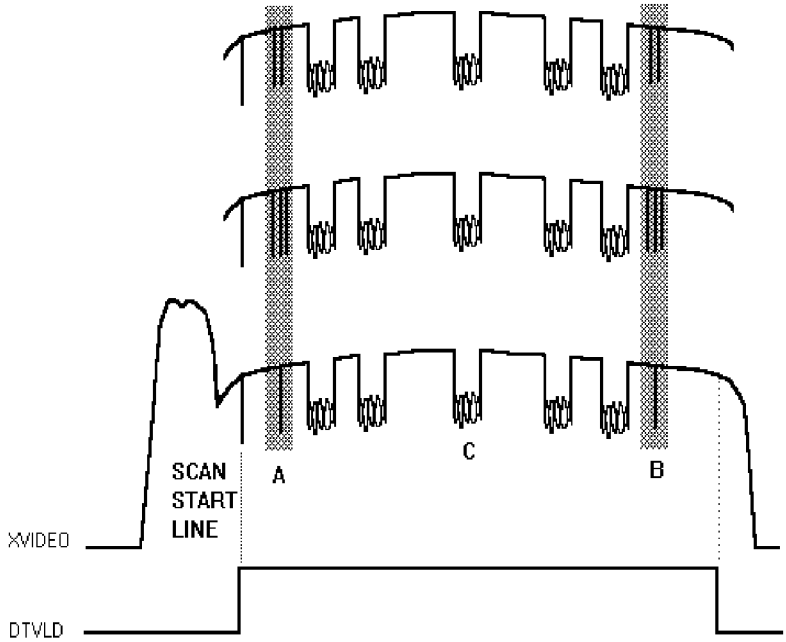


Note: Scan end line adjustment is not necessary.

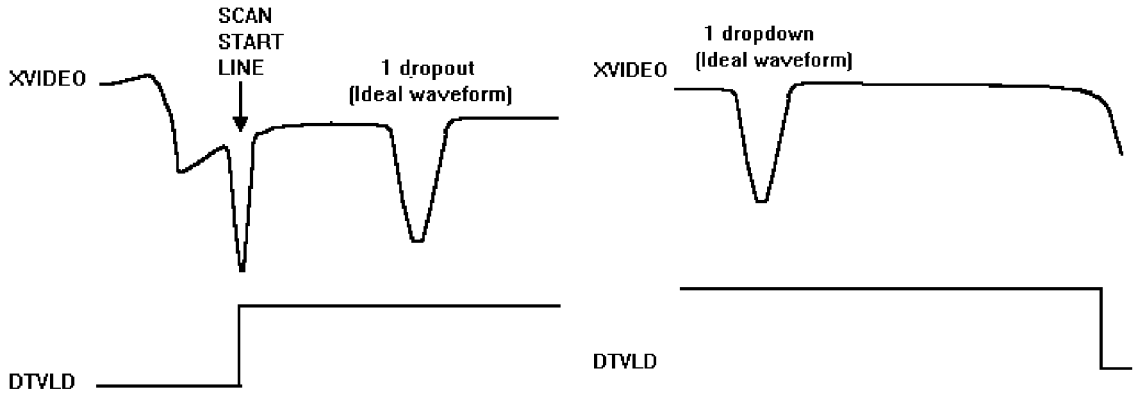
3. Vertical Scan Line Adjustment

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

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

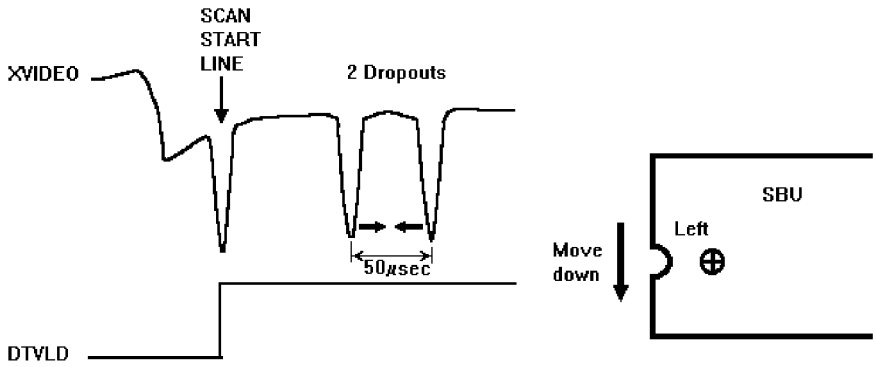


Enlarge areas “A” and “B” by changing the time scale to 50 μs/div or 20 μs/div.
The ideal waveform should have only one dropout at each of “A” and “B”. If the waveform has two or three dropouts there, go to step 3 to adjust the “A” part (scan start side) and/or step 4 to adjust the “B” part (scan end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

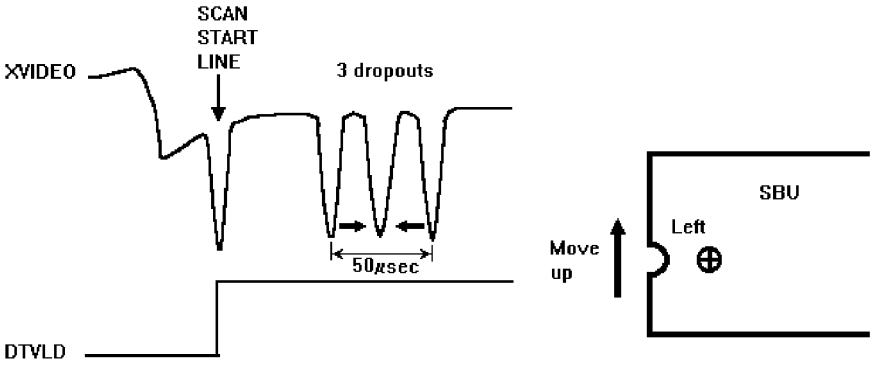


3. Vertical Scan Line Adjustment

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

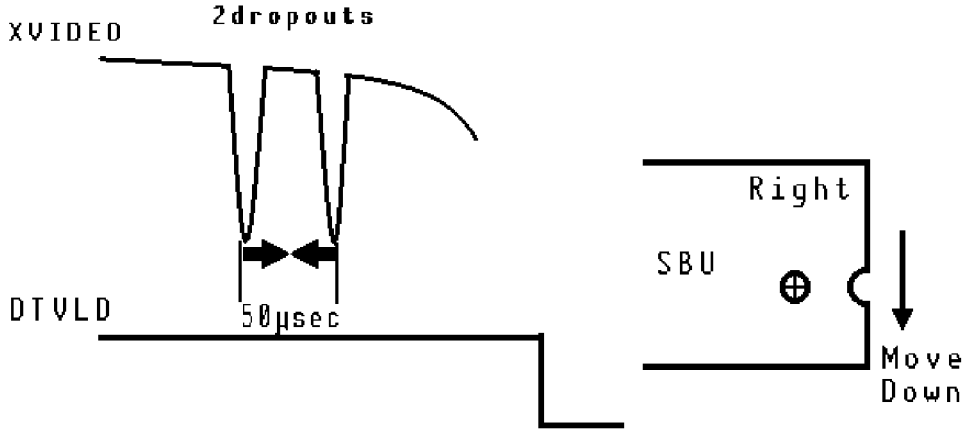


   If the waveform has three dropouts at the scan start side, move up the left side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 μs.

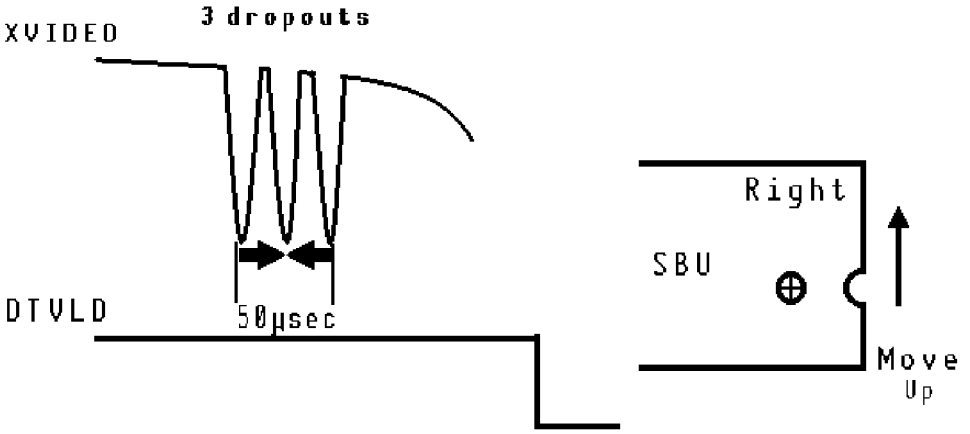


3. Vertical Scan Line Adjustment

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



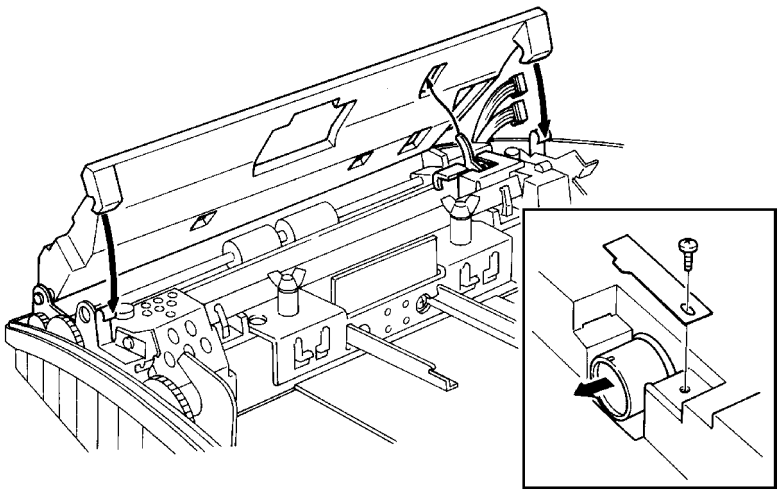
   If the waveform has three dropouts at the scan end side, move up the right side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



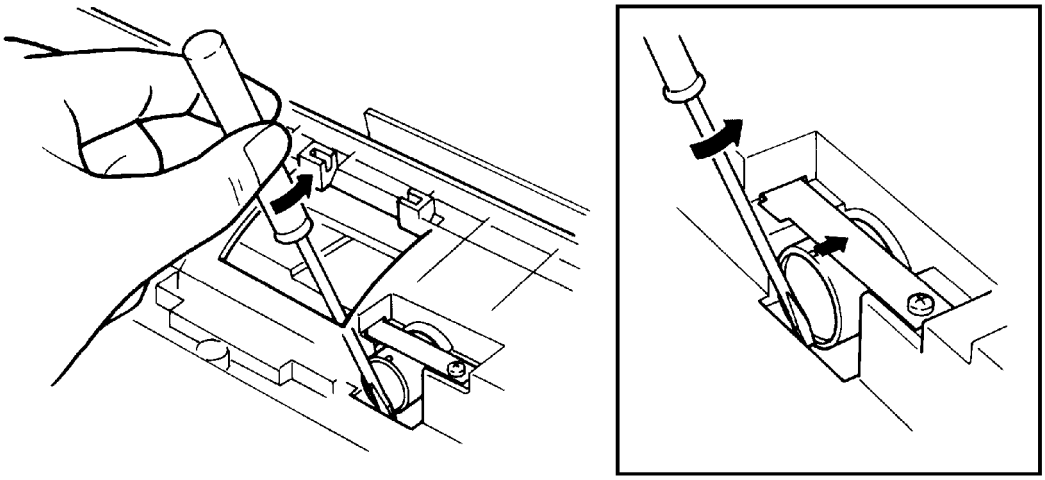
5. After adjusting the scan end side, confirm that the scan start side is still well adjusted, as the adjustment at one side often changes the waveform at the other side.

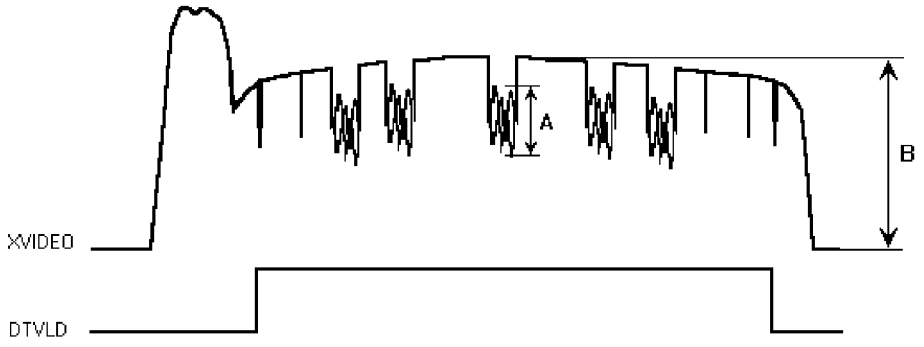
4. Focusing

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



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





3. Tighten the lens securing screw.

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

6. ELECTRICAL DATA

This section contains two types of documentation.

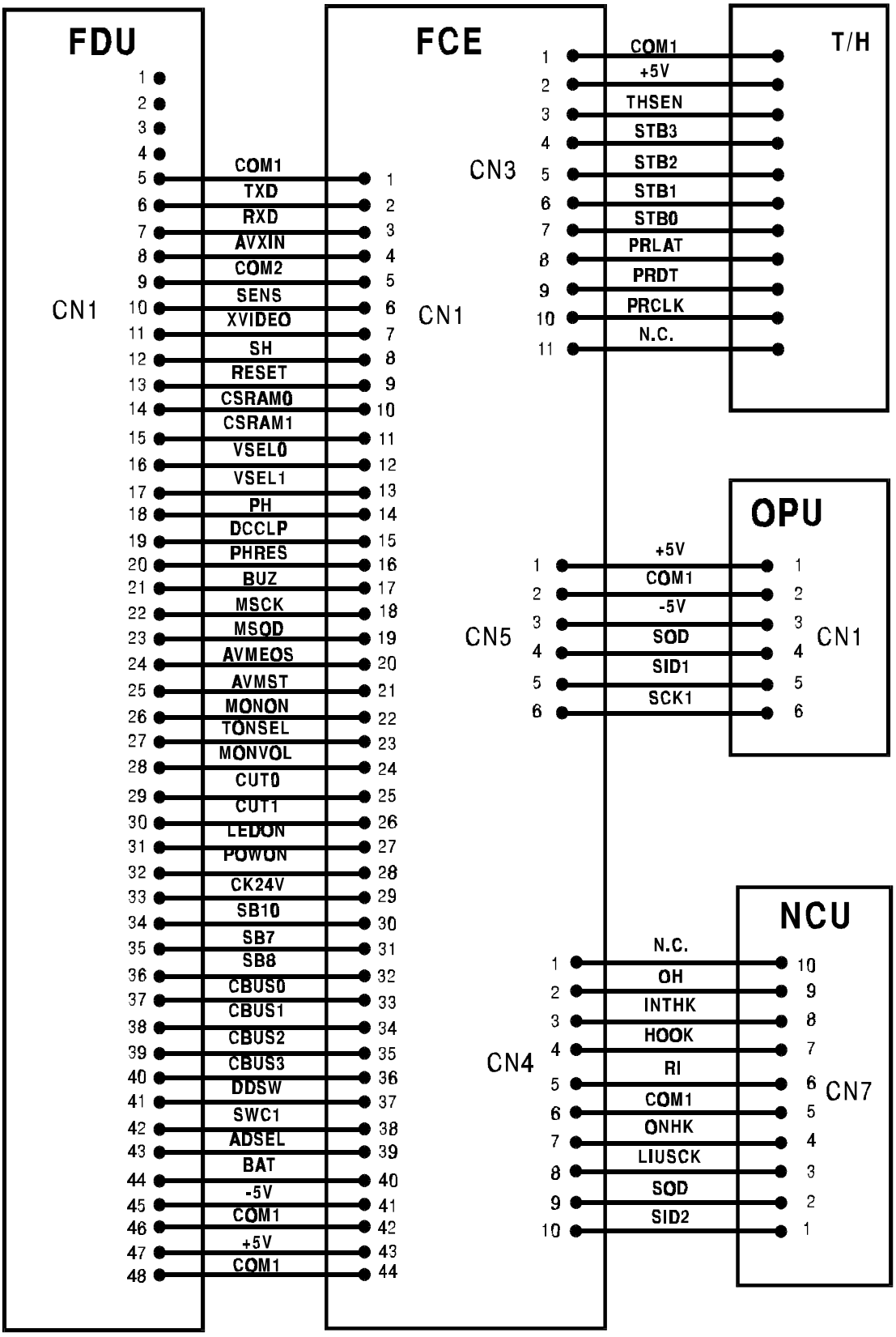
The point-to-point diagram show:

- Connections between boards
- Connections numbers and pin assignments
- Abbreviations for signals
- Voltage levels for power lines

On the pages facing each point-to-point is a Signal Table for each of the connections between boards. The Signal Tables show:

- A connector number, and the board on which that connector is located
- The pin numbers assigned to that connector
- The abbreviation for the signal on each pin
- An explanation of each signal (function)
- The voltage level on that pin, where it applies

6-1. CONNECTION FROM FCE



6-1-1. FCE - FDU

CN1			
No	**Name**	**Function**	**V**
1	N.C.	No connection	
2	N.C.	No connection	
3	N.C.	No connection	
4	N.C.	No connection	
5	COM1	Digital ground	0
6	TXD	Transmit data	X
7	RXD	Receive data	X
8	AVXIN	AVM send signal	X
9	COM2	Analog ground	0
10	SENS	SB4 or SB5	X
11	XVIDEO	Analog video signal	X
12	SH	Shift clock to CCD	C
13	RESET	Reset out	5
14	CSRAM0	N.C. in FDU (EIO2 control in FCE)	5
15	CSRAM1	N.C. in FDU (EIO2 control in FCE)	5
16	VSEL0	Gain control of video signal	0 - 5
17	VSEL1	Gain control of video signal	0 - 5
18	PH	1st phase transfer clock to CCD	C
19	DCCLP	DC restore request of video signal	C
20	PHRES	Reset clock to CCD	C
21	BUZ	Buzzer drive signal	0
22	MSCK	S/P clock of motor	C
23	MSOD	Data of motor	C
24	AVMEOS	from AVM IC	5
25	AVMST	to AVM IC	0
26	MONON	Monitor speaker control	0
27	TONSEL	Tone/Rx control	0
28	MONVOL	to AVM IC	0
29	CUT0	Cutter control	0
30	CUT1	Cutter control	0
31	LEDON	LED-array control	0
32	POWON	+24VSW control	0
33	CK24V	T/H check	5
34	SB10	SB10 (Cover open)	0
35	SB7	SB7 (Cutter position)	5
36	SB8	SB8 (Cutter position)	0
37	CBUS0	AVM IC data	0
38	CBUS1	AVM IC data	0
39	CBUS2	AVM IC data	0
40	CBUS3	AVM IC data	0

CN1			
No	**Name**	**Function**	**V**
41	DDSW	N.C. in FDU	0
42	SWC1	N.C. in FDU	0
43	ADSEL	SB4/SB5 exchange control	C
44	BAT	Battery Power	3
45	-5V	Power	-5
46	COM1	Digital ground (N.C. in FDU)	0
47	+5V	Power	5
48	COM1	Digital ground	0

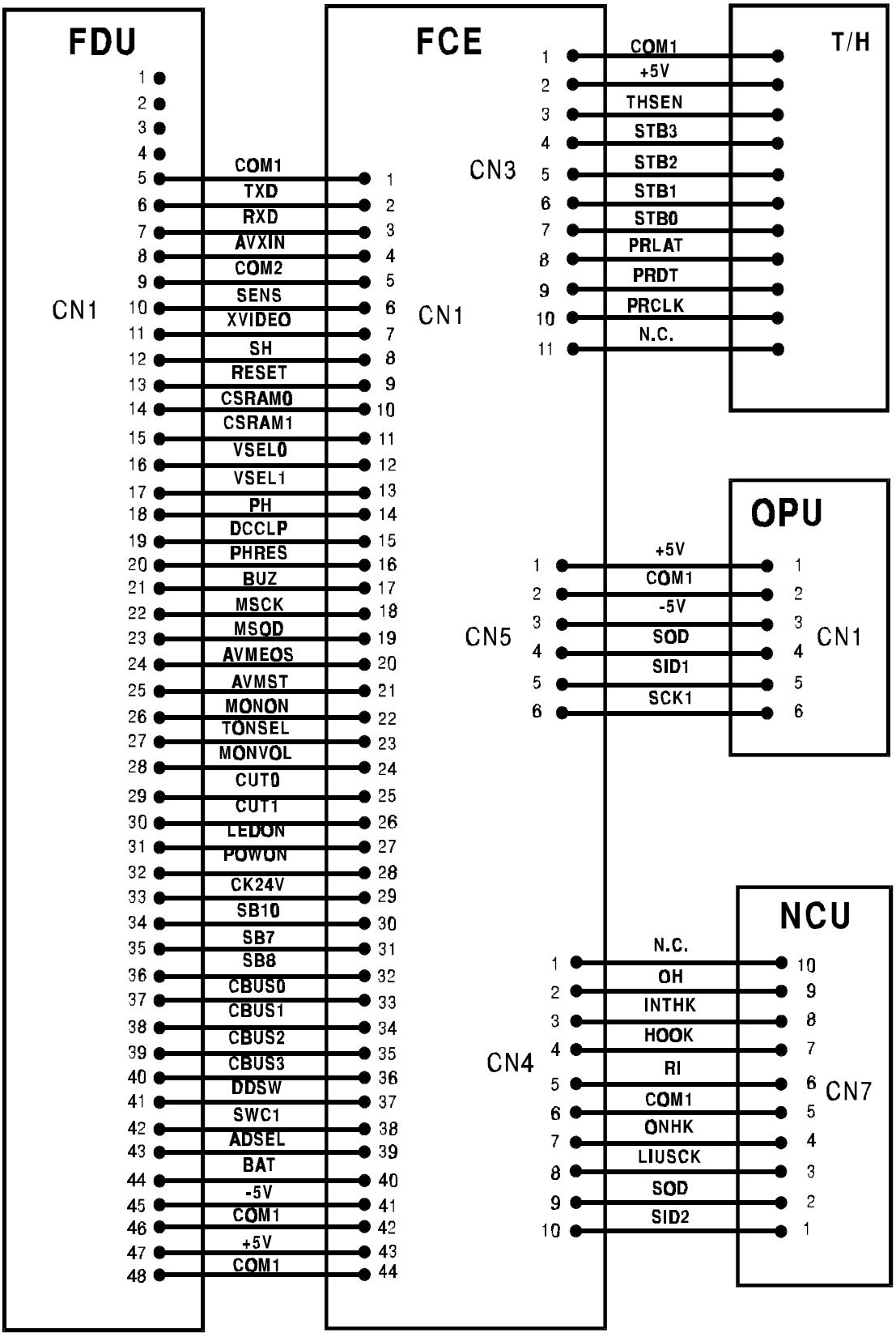
6-1-2. FCE - Thermal Head

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

6-1-3. FCE-OPU

CN5			
No	**Name**	**Function**	**V**
1	+5V	Power	5
2	COM1	Ground	0
3	-5V	Power	-5
4	SOD	Serial output data	C
5	SID1	Serial input data	C
6	SCK1	Serial shift clock	C

CONNECTION FROM FCE

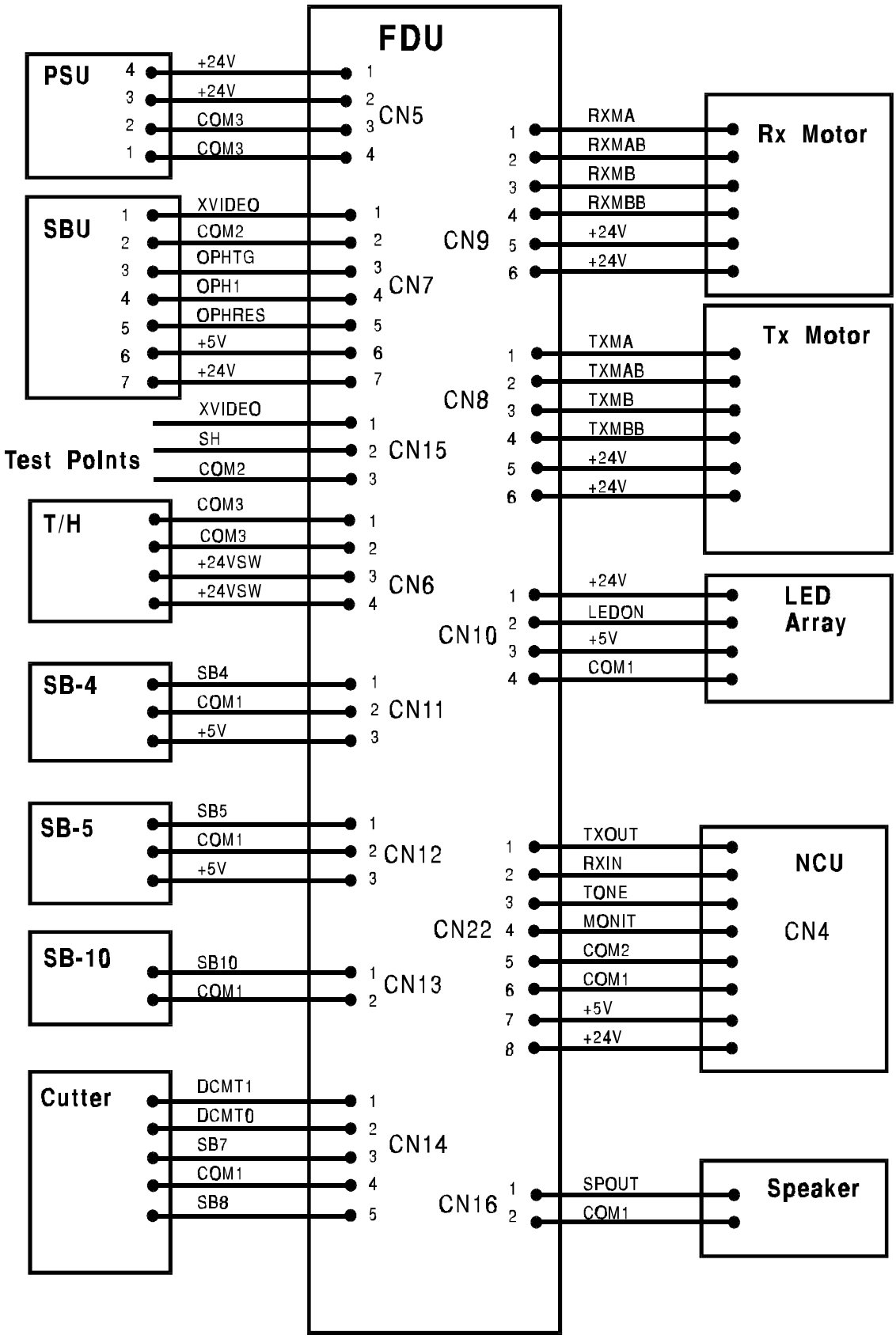


6-1-4. FCE - NCU

CN4			
No	**Name**	**Function**	**V**
1	N.C.	No connection	0
2	OH	OH relay control	0
3	INTHK	Internal hook SW detect	5
4	HOOK	Current detect	5
5	RI	Ringing detect	5
6	COM1	Ground	0
7	ONHK	On hook relay control	0
8	LIUSCK	Serial clock and rest	C
9	SOD	Sereal output data	C
10	SID2	Serial input data	C

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

6-2. CONNECTION FROM FDU



6-2-1. FDU - PSU

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

6-2-2. FDU - SBU

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

6-2-3. Scanner Test Points

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

6-2-4. FDU - Thermal Head

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

6-2-5. FDU - FCE

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

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

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

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

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

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

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

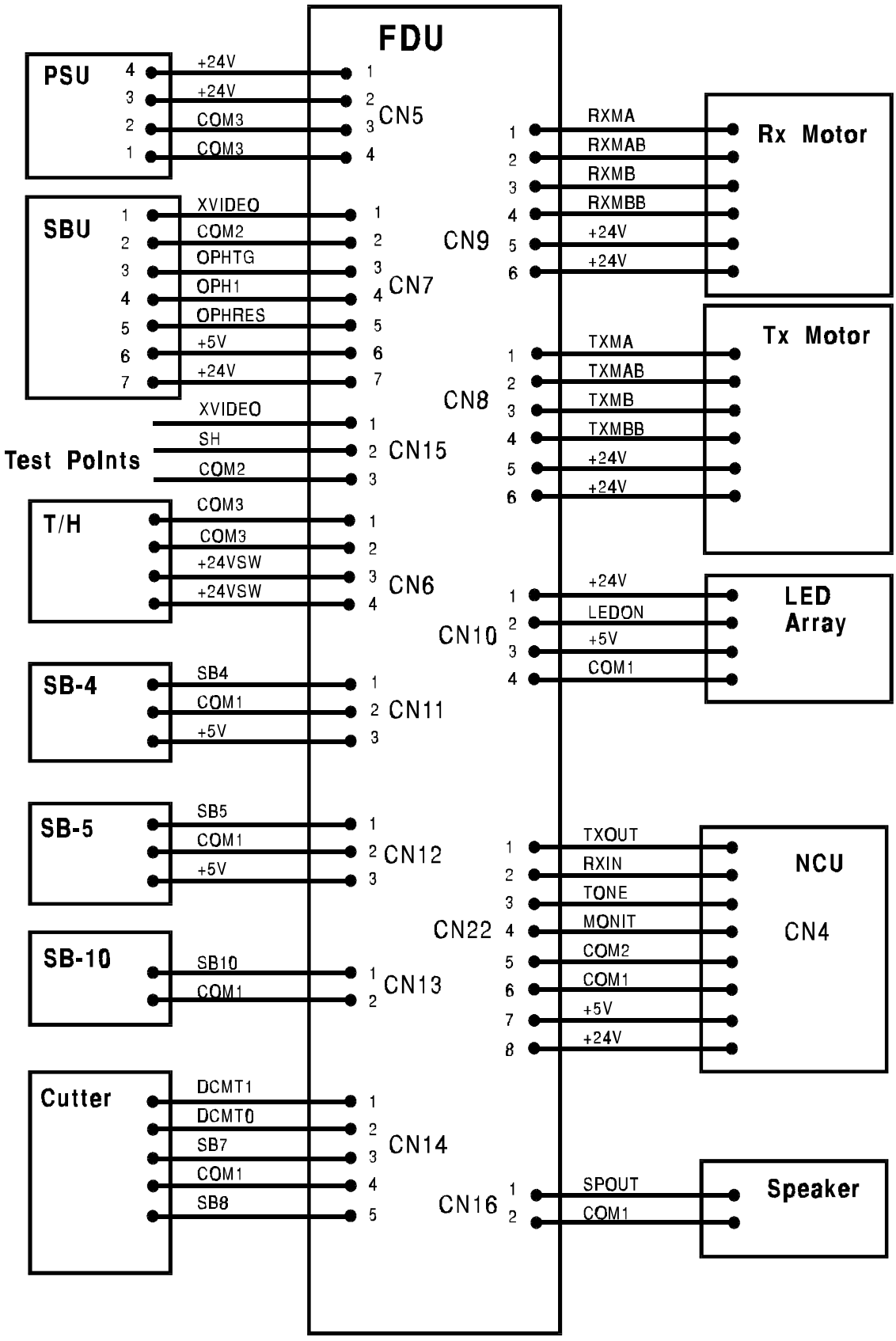
6-2-9. FDU - Cutter

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

6-2-10. FDU - Rx Motor

CN9			
No	**Name**	**Function**	**V**
1	RXMA	Rx motor phase 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

CONNECTION FROM FDU



6-2-11. FDU - Tx Motor

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

6-2-12. FDU - LED Array

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

6-2-13. FDU - NCU

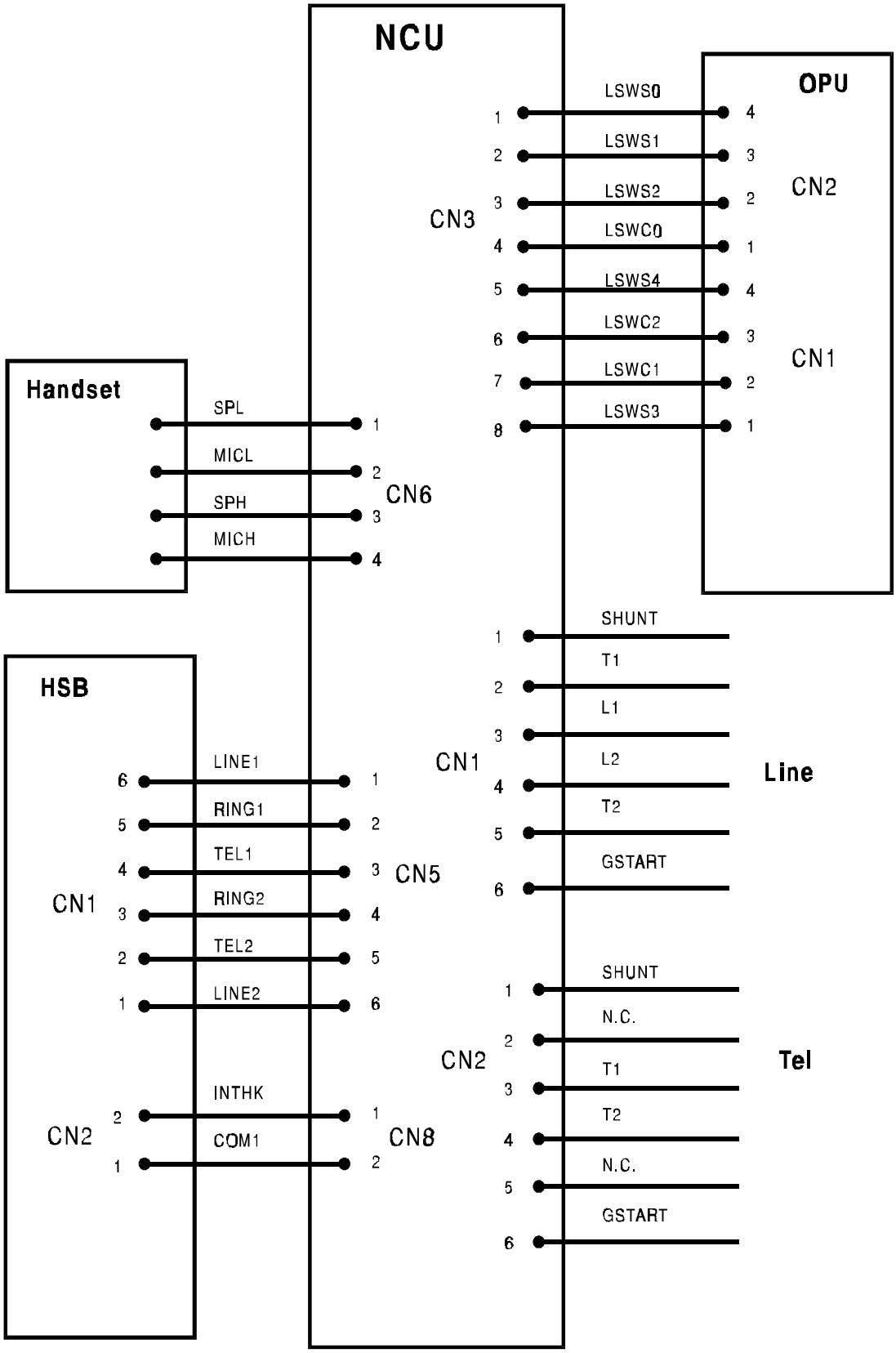
CN22			
No	**Name**	**Function**	**V**
1	TXOUT	Transmit data	0
2	RXIN	Receive data	0
3	TONE	Tone input	0
4	MONIT	Monitor input	0
5	COM2	Analog ground	0
6	COM1	Ground	0
7	+5V	+5V DC power	5
8	+24V	DC power	24

6-2-14. FDU - Speaker

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

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

6-3. CONNECTION FROM NCU



6-3-1. NCU-Line

CN1			
No	**Name**	**Function**	**V**
1	SHUNT	Shunt signal	0(L)
2	T1	External phone tip	L
3	L1	Phone line tip	L
4	L2	Phone line ring	L
5	T2	Extermal phone ring	L
6	GSTART	Tel ground	0(L)

6-3-2. NCU - Handset

CN6			
No	**Name**	**Function**	**V**
1	SPL	Speaker -	0
2	MICL	Microphone -	0
3	SPH	Speaker +	0
4	MICH	Microphone +	0

6-3-3. NCU - FCE

CN7: See FCE CN4 (section 6-1-4).

6-3-4. NCU - FDU

CN4: See FDU CN22 (section 6-2-13).

6-3-5. NCU - HSB

CN5			
No	**Name**	**Function**	**V**
1	LINE1	Connection from the line	L
2	RING1	Connection to the ring detection circuit	L
3	TEL1	Connection to the handset	0
4	RING2	Connection to the ring detection circuit	L
5	TEL2	Connection to the handset	0
6	LINE2	Connection from the line	L

6-3-6. NCU - HSB

CN8			
No	**Name**	**Function**	**V**
1	INTHK	Handset off-hook	5
2	COM1	Ground	0

6-3-7. NCU - OPU Dialpad

CN3			
No	**Name**	**Function**	**V**
1	LSWS0	Key input	3
2	LSWS1	Key input	3
3	LSWS2	Key input	3
4	LSWC0	Common signal to the dialpad	0 - 4
5	LSWS4	Key input	3
6	LSWC2	Common signal to the dialpad	0 - 4
7	LSWC1		0 - 4
8	LSWS3	Key input	3

6-3-8. NCU-Tel

CN2			
No	**Name**	**Function**	**V**
1	SHUNT	Shunt signal	0(L)
2	N.C.	No connection	
3	T1	Phone line tip	L
4	T2	Phone line ring	L
5	N.C.	No connection	
6	GSTART	Tel ground	0(L)

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

7. TROUBLESHOOTING

7-1. COPY QUALITY PROBLEMS

7-1-1. 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.

7-1-2. Printouts Made in Copy Mode

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

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

7-1-3. Effects of Line Problems on Copy Quality

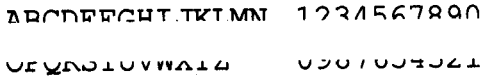
Missing lines; shrinkage in the sub scan direction

- 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.

7-2. 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.

7-2-1. 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 step 5.	Reassemble or replace the actuator. Go back to step 3.
5. Do the two red LEDs on the left hand 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 step 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.		

7-2-2. 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 NCU.
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 (left hand 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.

7-3. 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 NCU - FDU - FCE connectors. The machine at other end may be incompatible. Replace the FDU or NCU. 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 NCU - FDU -FCE connectors. Try changing the tx level (use NCU parameter 10). Replace the FCE, FDU or NCU. 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 - NCU - FDU connectors. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, FDU or NCU. Check for line problems.
0-06	The other terminal did not reply to DCS	Check the line connection. Check the FCE - FDU - NCU connectors. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, NCU 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 - NCU connectors. Replace the FCE, NCU 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 - NCU connectors. Replace the FCE, NCU 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 - NCU connection. Replace the FCE, NCU 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 - NCU 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, NCU or FDU.
0-20	Facsimile data not received within 6 s of retraining	Check the line connection. Check the FCE - FDU - NCU connectors. Replace the FCE, NCU 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, NCU, & line. Check for line noise or other line problems. Replace the FCE, NCU 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 - NCU connectors. Replace the FCE, NCU 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 - NCU connectors. Replace the FCE, NCU 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 NCU. Check for line problems. Replace the FDU, the FCE or the NCU.
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 NCU - 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 NCU - 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 NCU. Check for a bad line or defective remote terminal. Replace the FCE or NCU. 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.