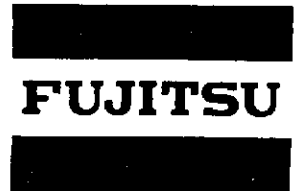


M3096E/F  
**Image Scanner**  
**OEM Manual**



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## CHAPTER 1 GENERAL

### 1.1 General Description

M3096E/F image scanners are compact, and cost effective. They are ideal input devices for electronic filing systems, facsimiles, optical character readers (OCR), computer aided design (CAD) and publishing systems.

The M3096E/F can scan up to Double letter size paper. The M3096E also has an automatic document feeder (ADF).

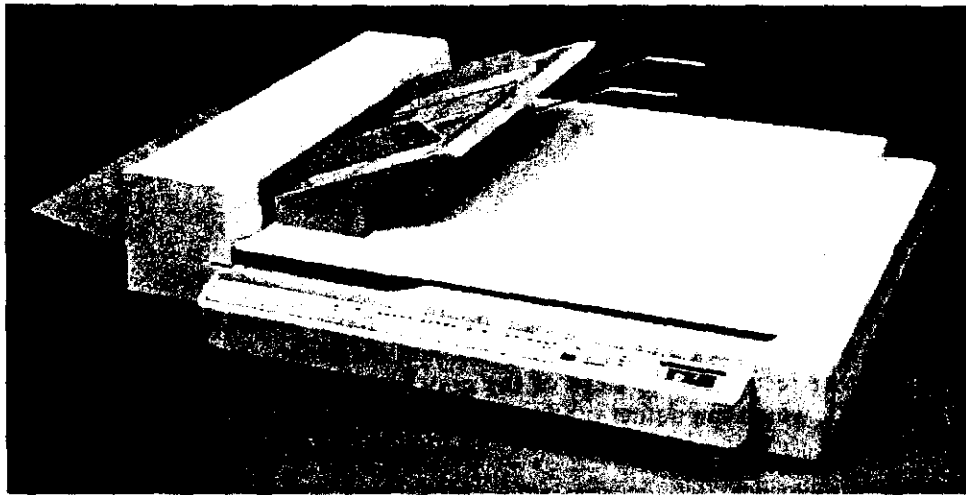


Figure 1.1 M3096E

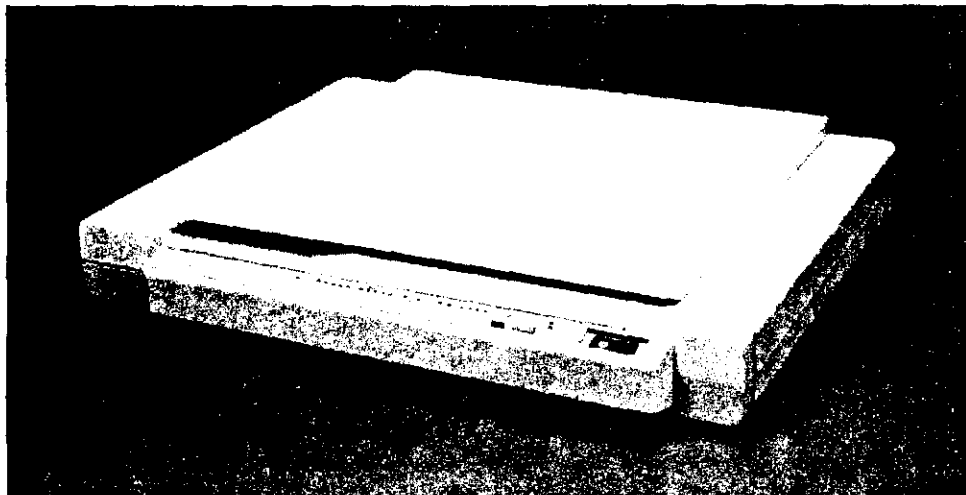


Figure 1.2 M3096F

## 1.2 Features

### (1) Rapid scanning

At a 200 pixels per inch resolution, a letter-size (8.5 in. × 11 in. or 216 mm × 279 mm) or A4 (8.3 in. × 11.7 in. or 210 mm × 297 mm) document is scanned in 2.1 to 2.3 seconds.

### (2) Multiple resolutions

The scanner offers multiple G IV standard resolutions of 200, 240, 300, and 400 pixels per inch, allowing a wide choice of quality and speed. The resolution can be selected by an interface signal or from the control panel.

### (3) Automatic document feeding

The standard flat-bed permits the scanning of a single page (including pages of a book). The M3096E also has an automatic document feeder (ADF) that can accommodate up to 50 pages.

### (4) Excellent quality scanning

This scanner incorporates the high quality image scanning technology of Fujitsu's advanced OCR's, and produces excellent electronic images from documents. It recognizes 64 gray scales and has an optional dynamic threshold circuit, which can detect even more subtle shade variations, further improving scanning quality.

### (5) Compact, lightweight

The scanner is very compact and light weight, making it easy to integrate into the workplace.

## CHAPTER 2 SPECIFICATIONS

### 2.1 Functional Specifications

**Table 2.1 Functional specifications**

		M3096E	M3096F
Technology		CCD contact image sensor	
Resolutions (pixels/inch)		200, 240, 300, 400	
Gray scale		64 steps	
Scanning speed (sec) (at 200 pixel/inch)	Letter	2.2	
	A4	2.3	
Document size (*1)		Min. A5, Max. Double letter	
Document feeding (*2)		Flat-bed + ADF	Flat-bed
Interfaces (*3)		RS232C (control signal) + local (video signal)	
Video output		Binary video or dithered video (selectable by half-tone switch)	
Option		Dynamic threshold circuit	

\*1: Document size

A5: 5.8 in. × 8.3 in. (148 mm × 210 mm)  
 Double Letter: 11 in. × 17 in. (279 mm × 432 mm)

\*2: ADF; automatic document feeder

\*3: For the details of interface specifications, refer to Chapters 4 and 5.

## 2.2 Physical Specifications

**Table 2.2 Physical specifications**

		M3096E	M3096F
Power requirements	Voltage	100 to 120 VAC, or 220 to 240 VAC	
	Phase	Single	
	Frequency	50/60 Hz	
Power consumption		220 VA	
Temperature	Operating	41°F to 95°F (5°C to 35°C)	
	Non-operating	32°F to 122°F (0°C to 50°C)	
Relative humidity	Operating	20% to 80% (no condensing)	
	Non-operating	8% to 95% (no condensing)	
Vibration	Operating	0.2 G	
	Non-operating	0.4 G	
Dimensions (Refer to Figs. 2.1 to 2.2.)	Height	6.5 in. (164 mm)	3.3 in. (85 mm)
	Width	26.7 in. (678.5 mm)	25.9 in. (659 mm)
	Depth	19.6 in. (497 mm)	
Weight		59.6 lb (27 kg)	48.6 lb (22 kg)

## 2.3 Connectors and Cables

### 2.3.1 Connectors

- (1) Control interface cable connectors.

Scanner connector: D-SUB 25-pin connector  
Host connector: CT-GM-25LMK (HONDA) or equivalent  
Pin assignment: See Figure 2.1.

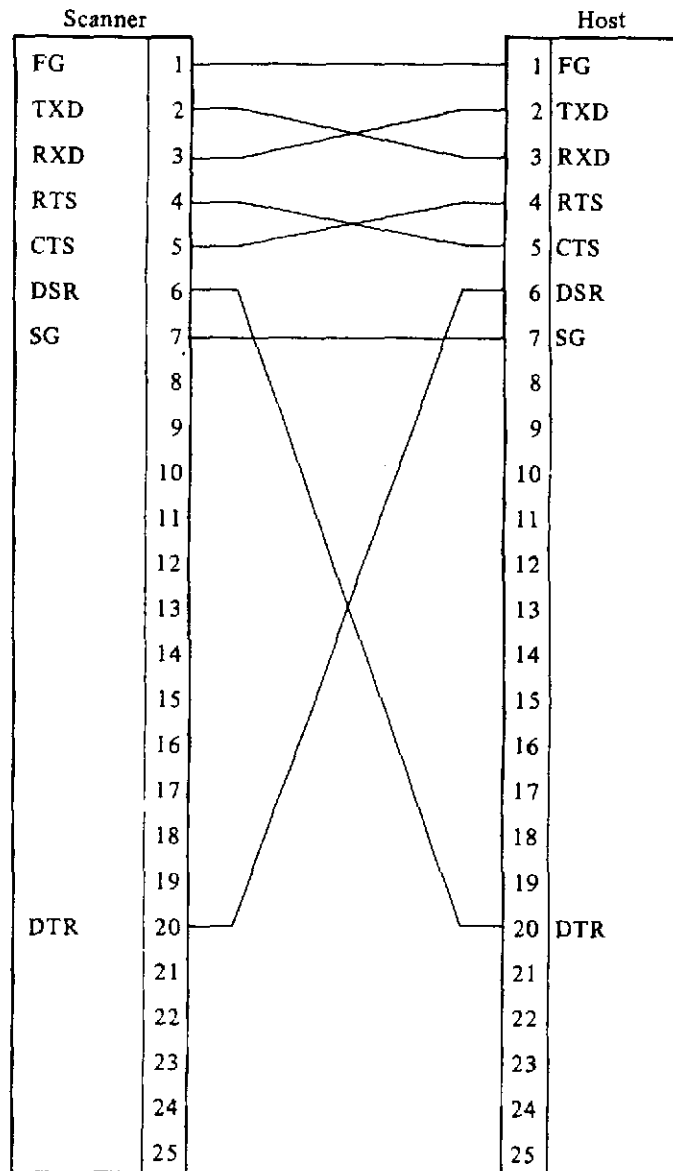


Figure 2.1 Control interface cable connector pin assignment

(2) Video interface cable connectors.

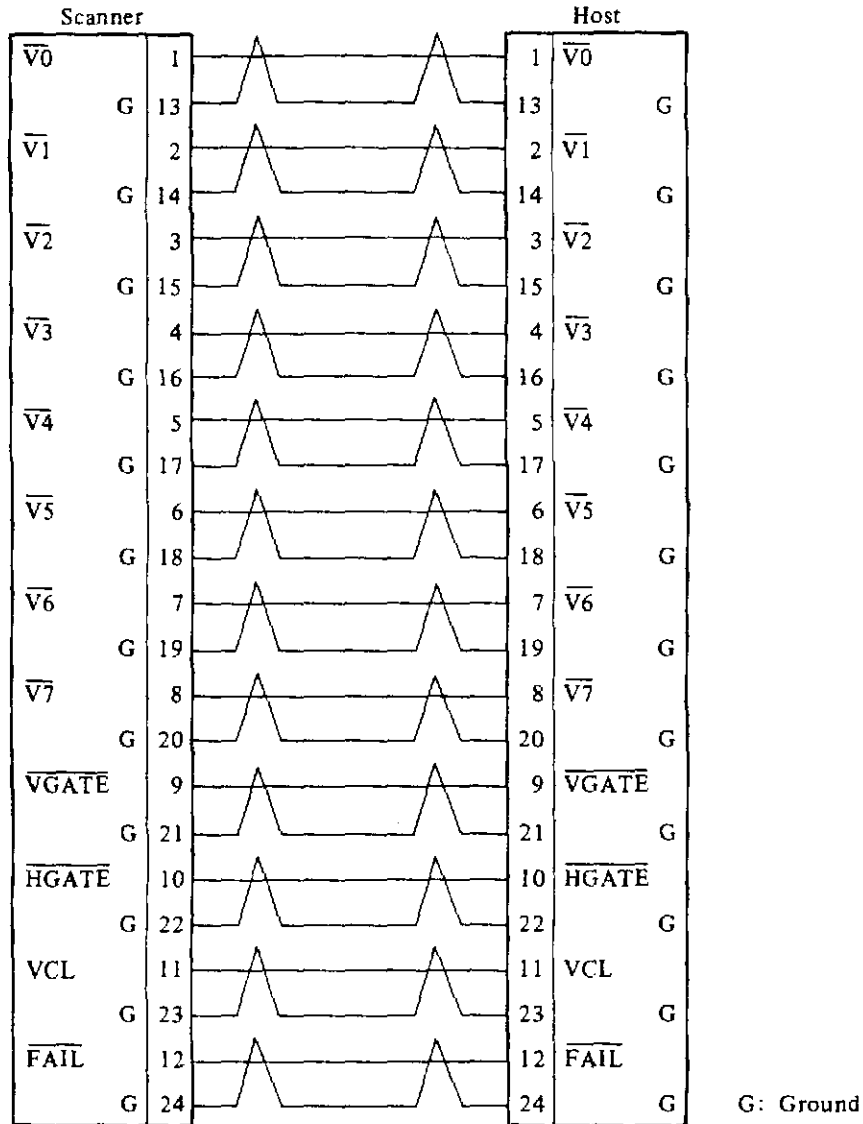
Scanner connector:

Host connector:

CT-57FE-30240-20N-DDK (D8)

Pin assignment:

See Figure 2.2.



G: Ground

Figure 2.2 Video interface cable connector pin assignment

### 2.3.2 Cables

- (1) Control interface cable

Impedance  $Z_0 = 100 \Omega$

- (2) Video interface cable

Impedance  $Z_0 = 100 \Omega$

## 2.4 Dynamic Threshold Circuit (Optional)

This circuit detects the density level at each part of the scanned document, and adjusts the thresholds for digitization according to the density level. This improves the contrast within the scanned image.

This circuit is especially useful for reading a complex image with enhanced resolution, and is also effective for character recognition from a wide variety of print sources.

This circuit has following functions.

- (1) Threshold curve setting

The contrast level of the automatic digitization circuit can be varied through setting 3 bits (8 levels).

- (2) Smoothing mode

The convex portion of the segment is removed and the concave portion is filled up to smooth the segment.

- (3) Filtering mode

- (a) Ball-point pen mode

This mode is used when the scanner is used as the input device of an OCR system. It compensates for the variation in density of handwritten ball point pen material.

- (b) Normal mode

This mode is used when scanning documents which are printed by inks other than ball point pen, (ex: Xerox copies, typed letters, etc.).

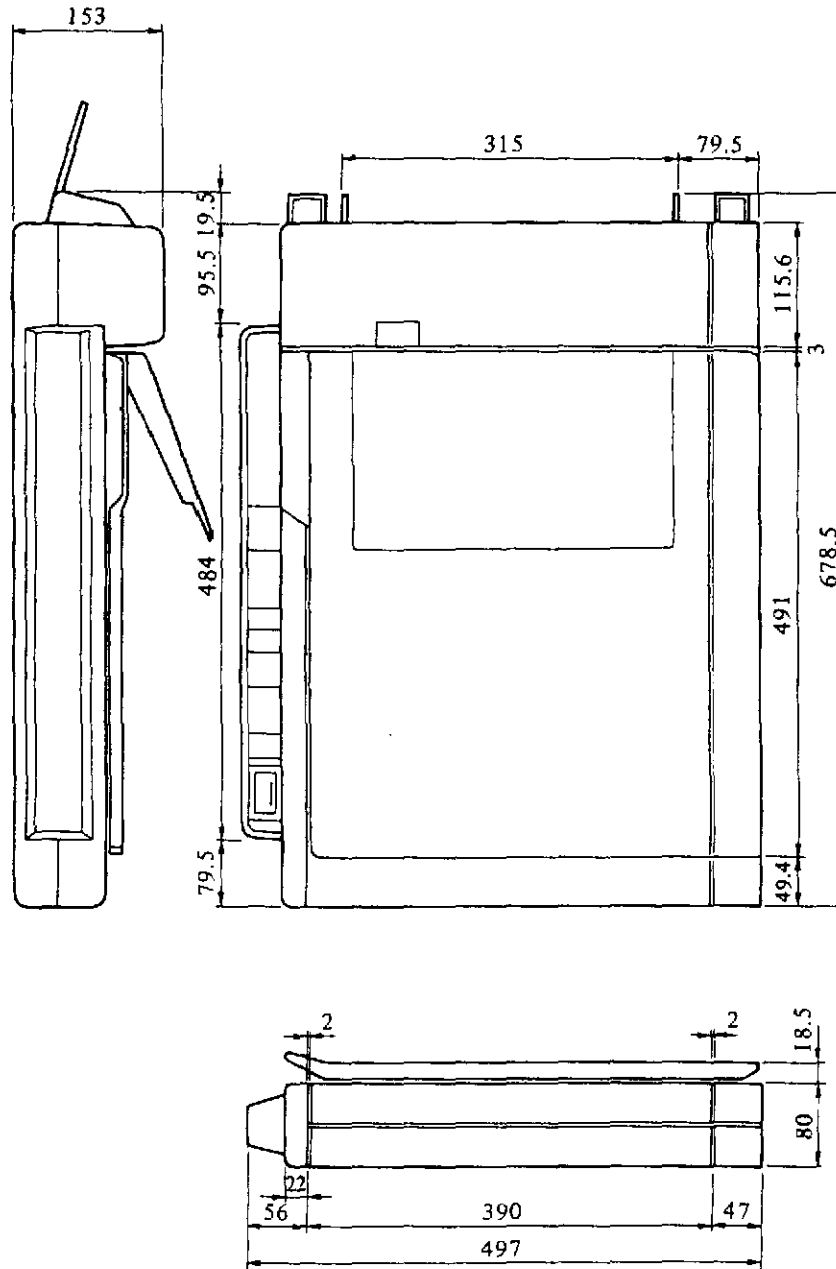
(4) Noise removing

Random small point gray scale interferences are removed from the scanned data, (ex: Small ink particles on a Xerox copy are removed using this mode).

# CHAPTER 3 CONFIGURATION

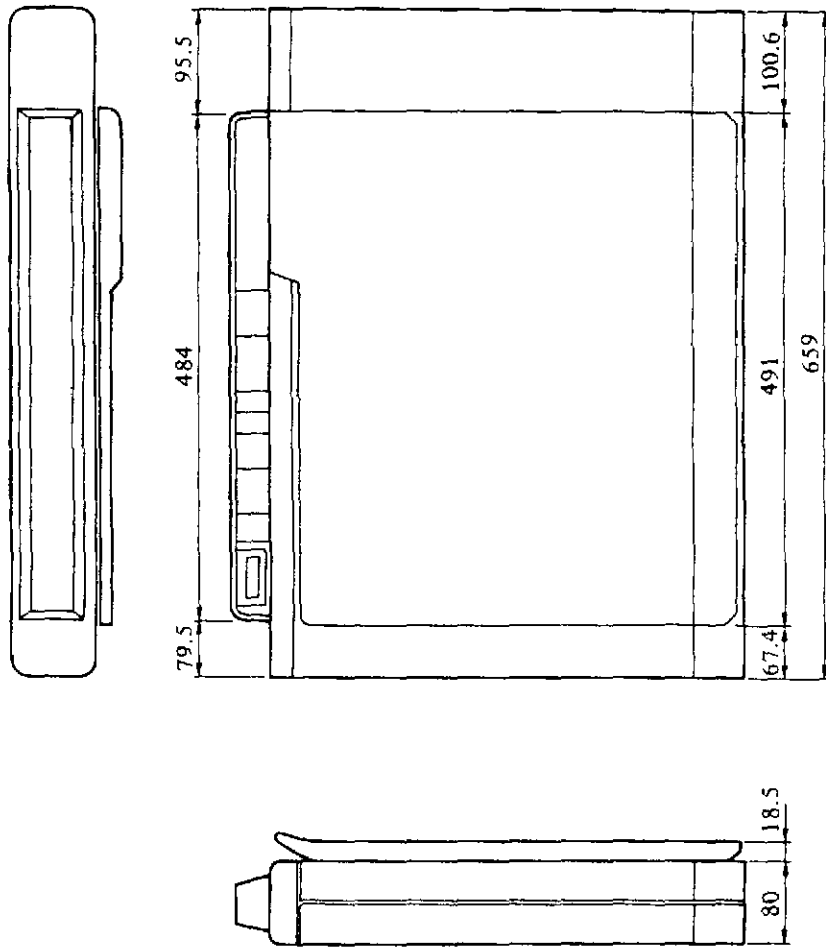
## 3.1 Outer Dimensions

Figures 3.1 and 3.2 show the outer dimension of M3096E/F.



Unit: mm

Figure 3.1 Outer dimensions of M3096E



Unit: mm

Figure 3.2 Outer dimensions of M3096F

### 3.2 Circuit Configuration

This scanner uses a flat-bed-CCD (Charge-Coupled Device) contact image sensor scanning system. This scanner consists of following sections;

- Optical system (including rod sense array, cold cathode discharge tube, and lenses)
- Video circuit (including CCD contact image sensor, amplifier, and A/D converter)
- Scanner driver (including stepping motor and motor driver circuit)
- Control circuit (MPU micro processor circuit)
- Power section

Figure 3.3 shows the functional block diagram.

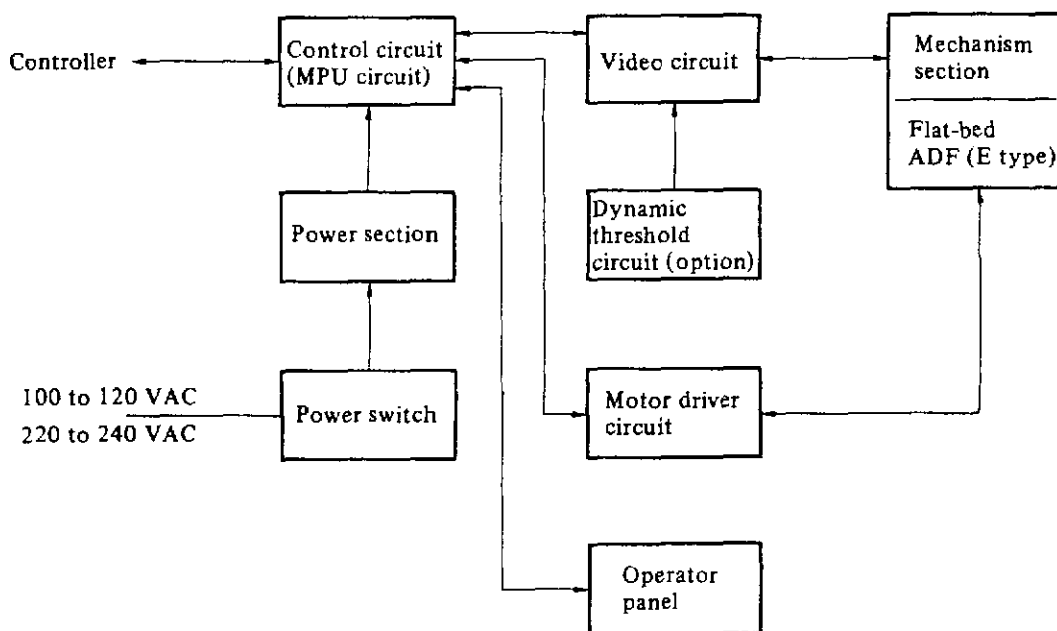


Figure 3.3 Functional block diagram

### 3.3 Operator Panel

Figures 3.4 and 3.5 show the operator panels for both scanners.

(1) Start switch

This switch is enabled when the Ready lamp illuminates. When this switch is pressed, the scanner starts reading.

(2) Stop switch

This switch is enabled during the scanner reading. When this switch is pressed, the scanner stops reading.

(3) Density switch and lamp (Green)

This switch is used to select the threshold level of the video signal or automatic threshold circuit. When this switch is pressed, the selected density level is indicated with the lamp.

(4) Resolution switch and lamp (Green)

This switch is used to select the resolution of scanning (200 to 400 pixels per inch). When this switch is pressed, the scanner steps through the available selections and the lamp for the selected resolution is illuminated.

(5) Mode switch and lamp (Green)

This switch is used to select the document type: photograph, or line-drawing.

(6) Half-tone switch and lamp (Green)

When this switch is pressed, the scanner dither-processes video signals.

(7) ADF (Automatic Document Feeder) switch and lamp (Green); provided for M3096E.

When this switch is pressed, the scanner reads the documents loaded in the ADF.

(8) Landscape switch and lamp (Green)

This switch is used to set the direction of the document. When the document is set so that the long side of the document comes toward the front side of the scanner, this switch must be pressed (the lamp illuminates). When the document is set so that the short side comes toward the front side, the switch should be in the off position.

(9) Size switch and lamp (Green)

Pressing the switch sequences through the available selections, and the indicator for the active selection illuminates. This switch is used to select the following document sizes: Double-letter (11 × 17 in.), Letter (8.5 × 11 in.), Legal (8.5 × 14 in.), A3, or A4.

(10) Power lamp (Amber)

When AC power is on, this lamp illuminates.

(11) Ready lamp (Green)

This lamp indicates that the scanner is ready for reading.

(12) Alarm lamp (Red)

When a scanner fault occurs, this lamp illuminates.

(13) Jam lamp (Red)

When the document jams in the ADF, or the scanner misfeeds the document, this lamp illuminates.

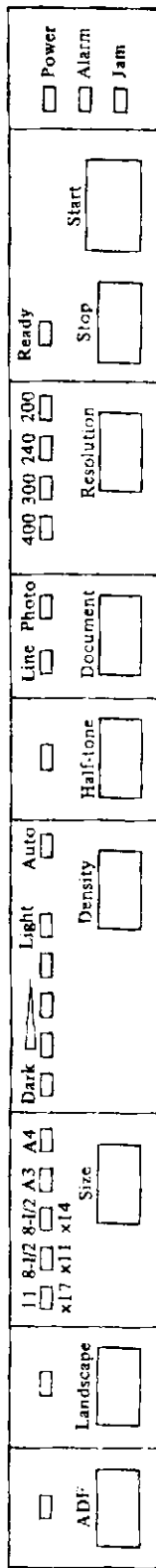


Figure 3.4 M3096E operator panel

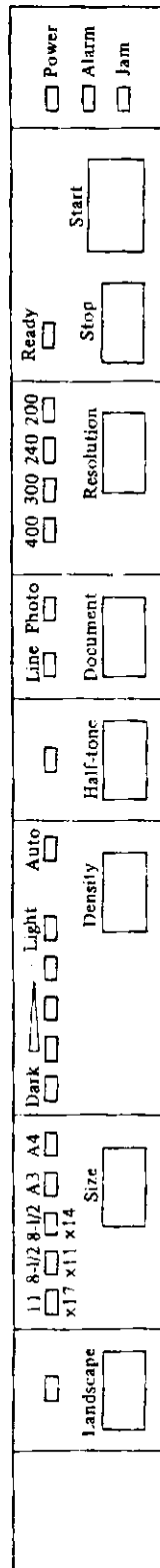
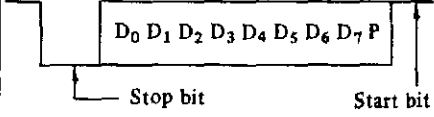


Figure 3.5 M3096F operator panel

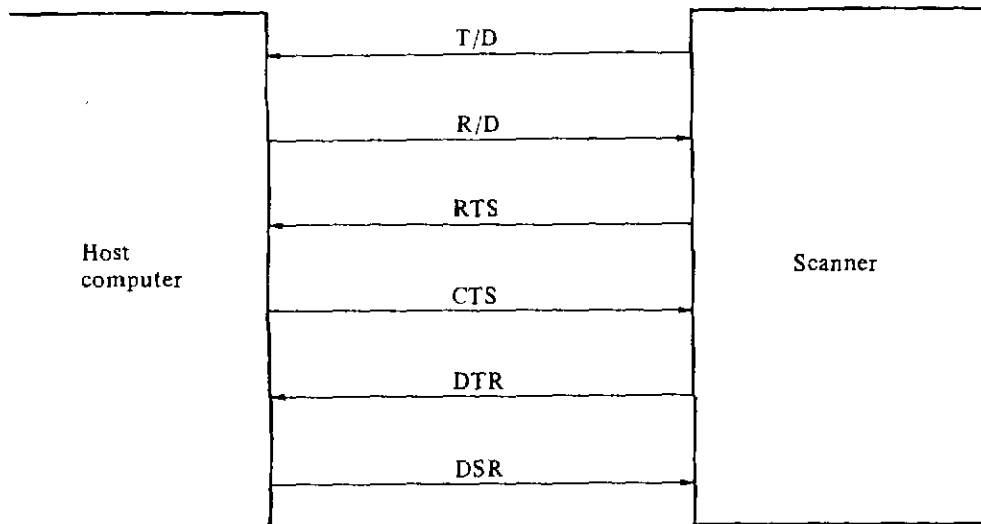
## CHAPTER 4 CONTROL INTERFACE

This chapter describes the control interface between the host computer and the scanner. For details of interface, refer to EIA RS-232C standard.

### 4.1 Connection Specifications

	Specification	Remarks
Transmission system	Half-duplex	
Synchronization system	Start-stop	
Data length	8 bits	
Stop bit	1 bit	
Data check	Odd parity check 	
Data transfer rate	2400, 4800, 9600 bps	Set by DIP switch on control PCA Default: 4800 bps
Maximum cable length	5 m (16 ft.)	
Standard	EIA RS-232C	

## 4.2 Control Interface Signals



**Figure 4.1 Control interface signal lines**

(1) Transmit Data (T/D)

This signal is the acknowledgement for the command sent on the Received Data line.

(2) Received Data (R/D)

This line sends acknowledgement for receipt of data.

(3) Request To Send (RTS)

This line requests to send data to the host.

(4) Clear To Send (CTS)

This line sends acceptance of RTS signal from the host.

(5) Data Terminal Ready (DTR)

This signal indicates that the scanner is ready for transmission and reception of commands. This signal is set to off when the scanner is turned off, when the scanner is initially checked at power-on, or a fault is detected.

(6) Data Set Ready (DSR)

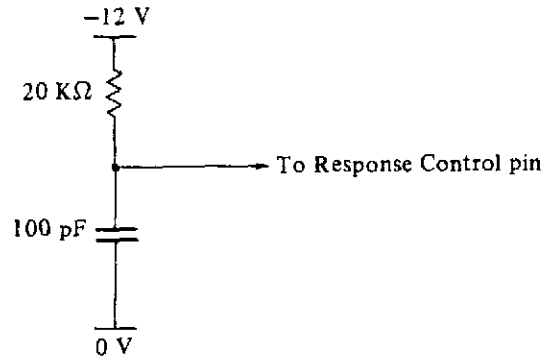
This signal indicates that the host computer is ready for transmission and reception.

### 4.3 Driver/Receiver

Driver: SN75188 or equivalent

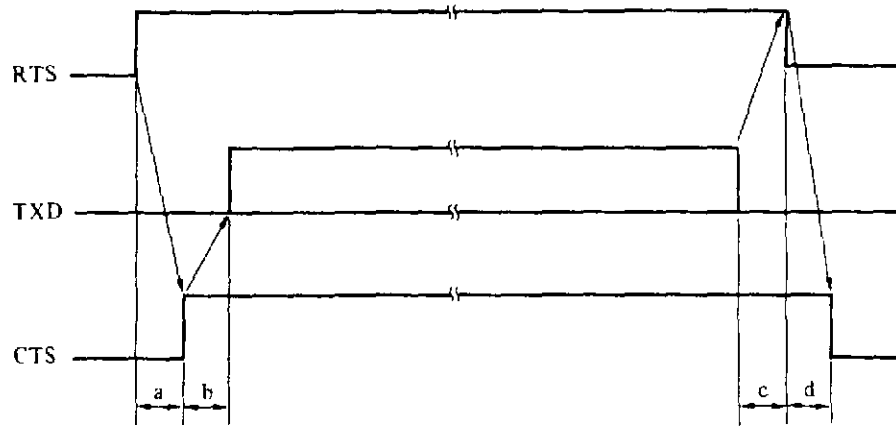
Receiver: SN75189 or equivalent

To determine the threshold level of the signal at the receiver, the following circuit must be connected to the response control pins.



## 4.4 Timing

Scanner → Host computer (At transmission)



- a: +0 ms
- b: +0 ~ 5 ms
- c: +0 ~ 10 ms (more than 1 word length)
- d: +0 ms

## CHAPTER 5 VIDEO INTERFACE

This chapter describes the video interface which transfers the scanning data from the scanner to the host computer.

### 5.1 Video Interface Signals

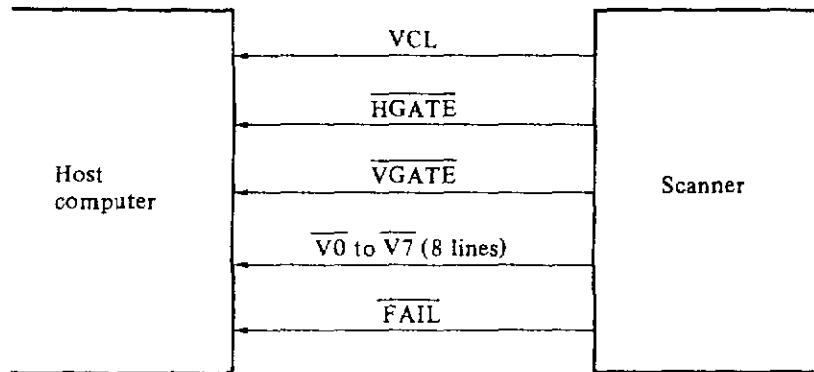


Figure 5.1 Video interface signal lines

(1)  $\overline{\text{VCL}}$

This signal is a sampling clock for the video data  $\overline{\text{V0}}$  to  $\overline{\text{V7}}$ .

(2)  $\overline{\text{HGATE}}$

This signal indicates that the main-scanning video data is valid.

(3)  $\overline{\text{VGATE}}$

This signal indicates that the subscanning video data is valid.

(4)  $\overline{\text{V0 to V7}}$

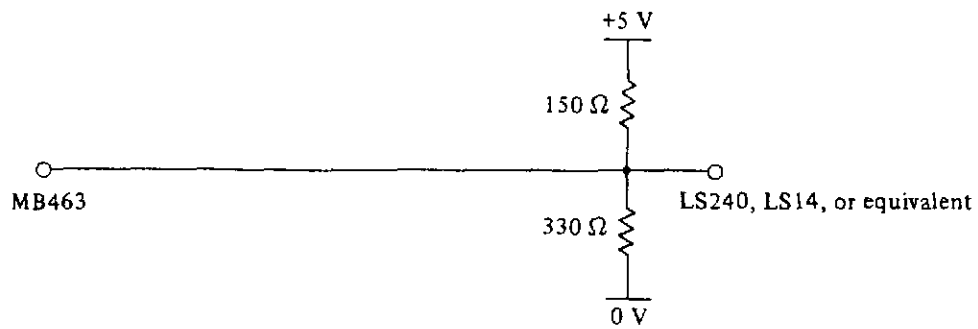
These signal lines carry the scanning video data. Logical "0" indicates a black pixel.

(5)  $\overline{\text{FAIL}}$

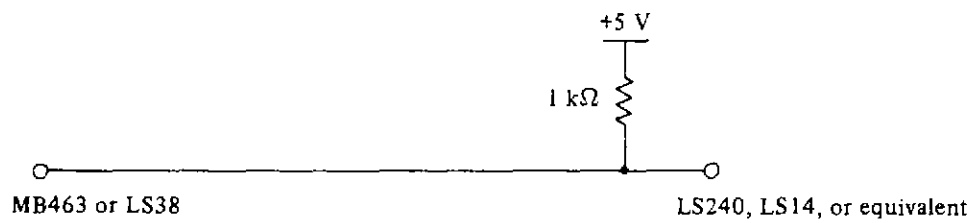
This signal indicates that a device error (MPU ROM/RAM error) occurred in the scanner.

## 5.2 Driver/Receiver

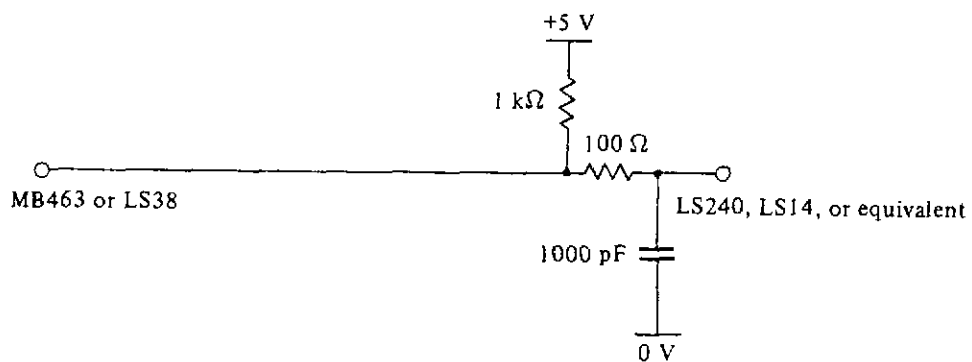
(1) VCL



(2)  $\overline{V0}$  to  $\overline{V7}$



(3)  $\overline{HGATE}$ ,  $\overline{VGATE}$ , and  $\overline{FAIL}$



### 5.3 Data Transfer

Scanning video data is transferred to the host computer through video data signal lines  $\overline{V0}$  to  $\overline{V7}$  in parallel, synchronized with VCL.

#### 5.3.1 Transfer sequence

Scanning is performed as shown in Figure 5.2. The scanned data is encoded to the video data signal as shown in Figure 5.3 and sent to the host computer in the scan sequence.

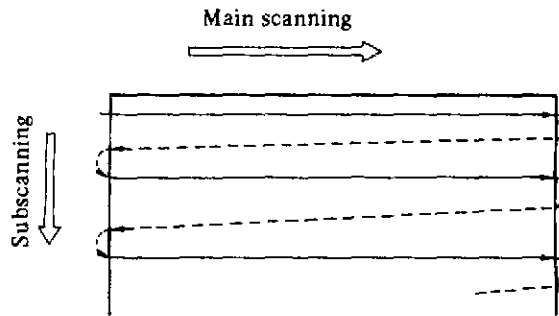
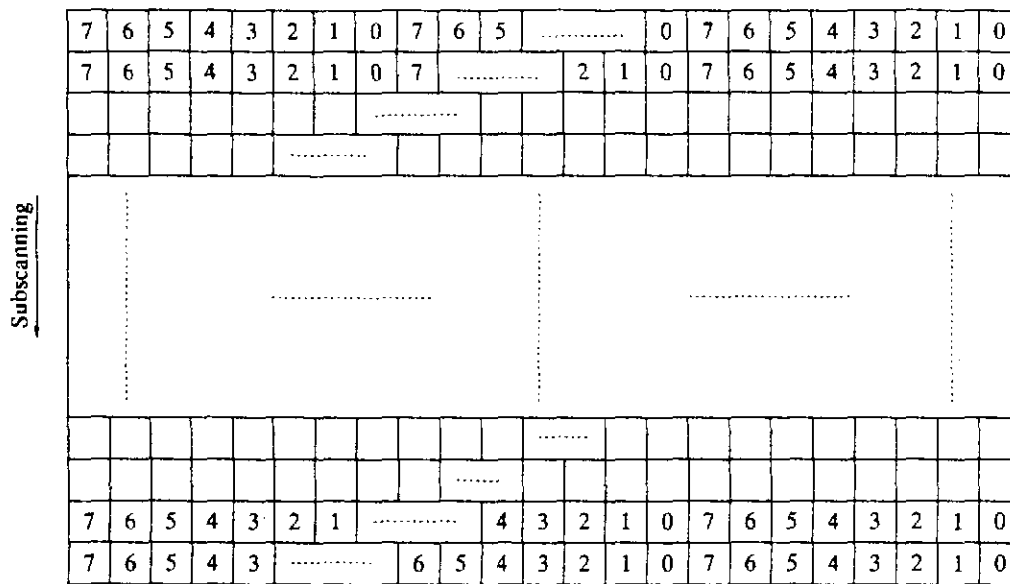


Figure 5.2 Scanning direction

Main scanning

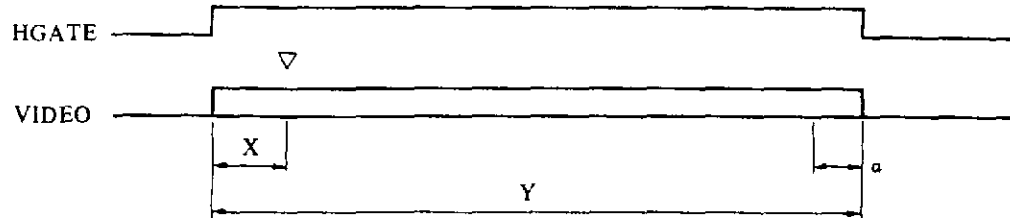


**Notes:**

1. "0" to "7" correspond to the video data signal V0 to V7 respectively.
2. The most significant bit (MSB) of each video data signal is read first.

**Figure 5.3 Scan data encoding**

### 5.3.2 Operations in main scanning



X: Offset dots  
Y: Transferred data  
 $\alpha$ : Dummy dots  
▽: Reference point of main-scanning

#### (1) Flat-bed

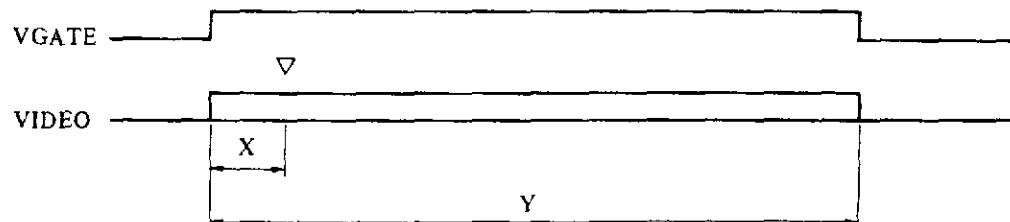
The values of X and Y and  $\alpha$  are shown in Table 5.1 and 5.2.

#### (2) ADF

The document size detector detects only two ranges of document size; greater than A4; or equal or less than A4. The document greater than A4 is scanned as B4, and equal or less than A4 is scanned as A4.

The values of X and Y and  $\alpha$  are same as the values of Flat-bed.

### 5.3.3 Operations in subscanning



X: Offset lines (Max.)  
Y: Transferred lines  
▽: Reference point of subscanning

#### (1) Flat-bed

The values of X and Y and are shown in Tables 5.3 and 5.4.

(2) ADF

The document size (VGATE) is set to off when the edge of the document passes the read position.

Table 5.1 Transferred data length in main scanning (portrait mode)

Paper size		A3	B4	A4	B5	A5	Legal	Letter	Double Letter
400 dpi	Offset dots	12±12	12±12	12±12	12±12	12±12	12±12	12±12	12±12
	Transferred data	4864	4096	3456	3456	2304	3456	3456	4400
	Dummy dots	100~116	-	-	-	-	-	-	-
300 dpi	Offset dots	9±9	9±9	9±9	9±9	9±9	9±9	9±9	9±9
	Transferred data	3648	3072	2592	2592	1728	2592	2592	3304
	Dummy dots	75~87	-	-	-	-	-	-	-
240 dpi	Offset dots	8±8	8±8	8±8	8±8	8±8	8±8	8±8	8±8
	Transferred data	2920	2464	2080	2080	1384	2080	2080	2640
	Dummy dots	60~70	-	-	-	-	-	-	-
200 dpi	Offset dots	6±6	6±6	6±6	6±6	6±6	6±6	6±6	6±6
	Transferred data	2432	2048	1728	1728	1152	1728	1728	2200
	Dummy dots	50~58	-	-	-	-	-	-	-

(unit : dots)

**Note:**

Data of dummy dots are sent as white.

**Table 5.2 Transferred data length in main scanning (landscape mode)**

Paper size		A3	B4	A4	B5	A5	Legal	Letter	Double Letter
400 dpi	Offset dots	—	—	12±12	12±12	12±12	—	12±12	—
	Transferred data	—	—	4680	4048	3312	—	4400	—
	Dummy dots	—	—	—	—	—	—	—	—
300 dpi	Offset dots	—	—	9±9	9±9	9±9	—	9±9	—
	Transferred data	—	—	3512	3040	2480	—	3304	—
	Dummy dots	—	—	—	—	—	—	—	—
240 dpi	Offset dots	—	—	8±8	8±8	8±8	—	8±8	—
	Transferred data	—	—	2808	2432	1984	—	2640	—
	Dummy dots	—	—	—	—	—	—	—	—
200 dpi	Offset dots	—	—	6±6	6±6	6±6	—	6±6	—
	Transferred data	—	—	2344	2024	1656	—	2200	—
	Dummy dots	—	—	—	—	—	—	—	—

(unit : dots)

**Note:**

Data of dummy dots are sent as white.

**Table 5.3 Transferred data line in subscanning (portrait mode)**

Paper size		A3	B4	A4	B5	A5	Legal	Letter	Double Letter
		400 dpi	Offset lines	32	32	32	32	32	32
	Transferred lines	6614	5732	4677	4048	3307	5600	4400	6912
300 dpi	Offset lines	24	24	24	24	24	24	24	24
	Transferred lines	4961	4300	3508	3036	2480	4200	3300	5148
240 dpi	Offset lines	20	20	20	20	20	20	20	20
	Transferred lines	3969	3440	2806	2429	1984	3360	2640	4160
200 dpi	Offset lines	16	16	16	16	16	16	16	16
	Transferred lines	3307	2886	2339	2024	1654	2800	2200	3456

(unit : dots)

**Table 5.4 Transferred data line in subscanning (landscape mode)**

Paper size		A3	B4	A4	B5	A5	Legal	Letter	Double Letter
		400 dpi	Offset lines	—	—	32	32	32	—
	Transferred lines	—	—	3456	3456	2304	—	3456	—
300 dpi	Offset lines	—	—	24	24	24	—	24	—
	Transferred lines	—	—	2592	2592	1728	—	2592	—
240 dpi	Offset lines	—	—	20	20	20	—	20	—
	Transferred lines	—	—	2080	2080	1384	—	2080	—
200 dpi	Offset lines	—	—	16	16	16	—	16	—
	Transferred lines	—	—	1728	1728	1152	—	1728	—

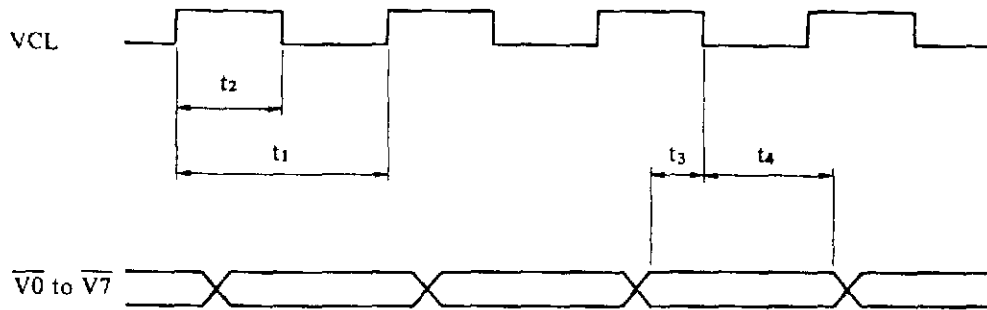
(unit : dots)

**Note:**

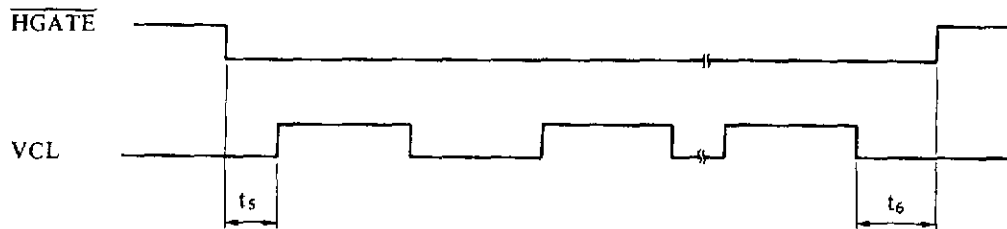
If the ADF is used, transferred lines are determined by the real size of the document. (VGATE is set to '0' when the document end passes through the reading position.)

## 5.4 Timing

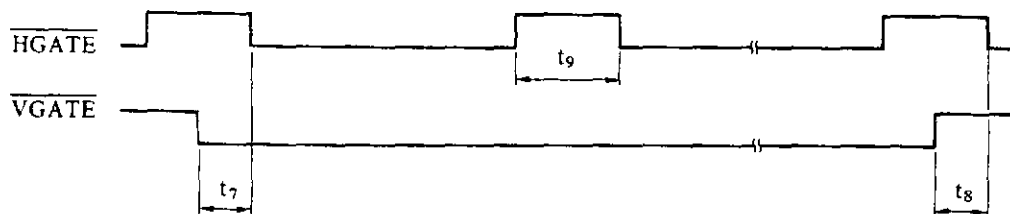
### (1) VCL and $\overline{V0}$ to $\overline{V7}$



### (2) VCL and $\overline{HGATE}$



### (3) $\overline{HGATE}$ and $\overline{VGATE}$



The values of  $t_1$  to  $t_9$  are shown in Table 5.5.

**Table 5.5 Timing specification**

	400 dpi			300 dpi			240 dpi			200 dpi		
	min	typ	max	min	typ	max	min	typ	max	min	typ	max
t <sub>1</sub>	1.53	1.6	$\frac{33.66}{1.67}$	1.99	2.2	$\frac{34.25}{2.27}$	2.33	2.8	$\frac{34.86}{2.87}$	3.13	3.2	$\frac{36.26}{3.27}$
t <sub>2</sub>	0.53	0.6	0.66	0.53	0.6	0.66	0.53	0.6	0.66	0.53	0.6	0.66
t <sub>3</sub>	0.53	0.6	0.66	0.53	0.6	0.66	0.53	0.6	0.66	0.53	0.6	0.66
t <sub>4</sub>	0.87	1.0	$\frac{33.13}{1.07}$	1.33	1.6	$\frac{33.72}{1.67}$	1.67	2.2	$\frac{34.33}{2.27}$	2.47	2.6	$\frac{34.73}{2.67}$
t <sub>5</sub>	1.56	1.6	33.67	2.16	2.2	34.27	2.76	2.8	34.87	3.16	3.2	35.27
t <sub>6</sub>	0.14	0.4	0.86	0.14	0.8	1.46	0.14	1.2	2.06	0.14	0.8	2.26
t <sub>7</sub>	0.75	$\frac{6.6}{1.4}$	—	0.75	$\frac{6.6}{1.4}$		0.75	$\frac{6.6}{1.4}$		0.75	$\frac{6.6}{1.4}$	
t <sub>8</sub>	0.75	$\frac{13.0}{12.8}$	—	0.75	$\frac{13.0}{12.8}$		0.75	$\frac{13.0}{12.8}$		0.75	$\frac{13.0}{12.8}$	
t <sub>9</sub>	$\frac{12.0}{6.0}$	$\frac{19.6}{14.2}$	—		$\frac{19.6}{14.2}$			$\frac{19.6}{14.2}$			$\frac{19.6}{14.2}$	

(Unit : μs)

## CHAPTER 6 COMMANDS AND RESPONSES

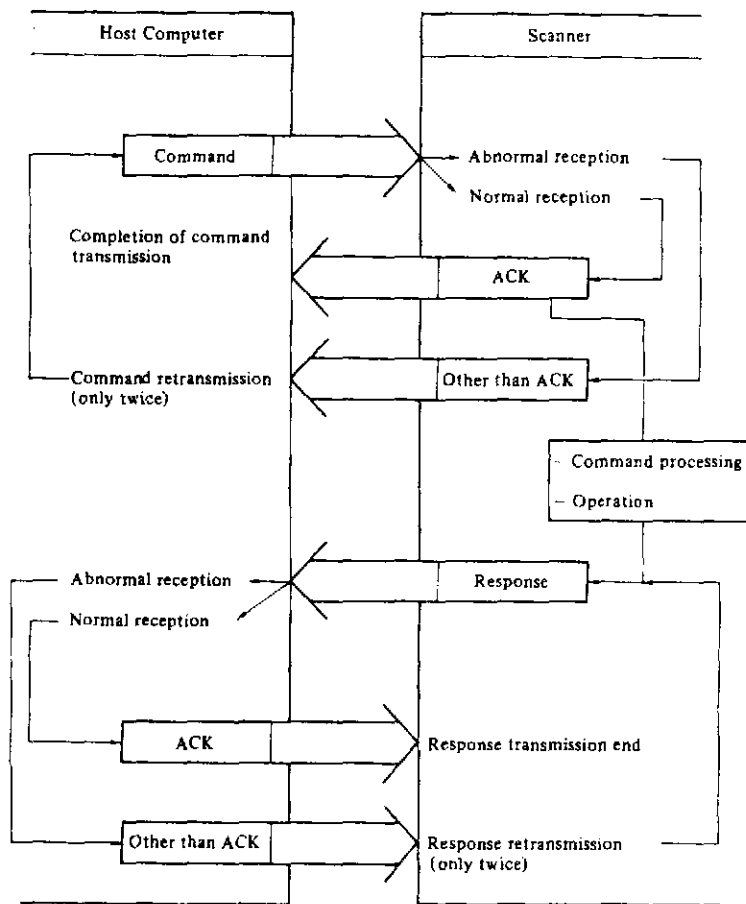
### 6.1 Basic Command/Response Sequence

Data is transmitted between the host computer and the image scanner in the form of commands and responses. Figure 6.1 shows the basic command/response sequence.

Table 6.1 shows the meaning of the response data and its code (indicated in hexadecimal).

**Table 6.1 Response data**

Response data		Meaning	Code (Hex)
ACK (Acknowledge)		A command or response has been received normally.	'FF'
Reception error	Parity error	A parity error has been detected in received data.	'80'
	Framing error Overrun error	A framing error or an overrun error has been detected in received data.	'81'
	Count error	The byte count for the command or response does not match the number of bytes transferred.	'82'



**Notes:**

1. Abnormal reception means a parity error, framing error, overrun error, or count error has occurred.
2. Command or response transmission is retried only twice.
3. Upon reception, a command or response is checked for transmission errors. When the check result is normal, ACK is returned immediately to the originating source. When the check result detects an error, data other than ACK is returned after all data have been received.
4. The originating source of the command/response monitors the response from the receiving side. ACK indicates that command/response transmission is completed. Data other than ACK causes the command/response to be transmitted again. The transmission is retried only twice. After that, the scanner waits for a new command.
5. Response data such as ACK must be returned to the originating source within 0.5 second.
6. The interval between words in the data steam must be no more than 10 ms.

**Figure 6.1 Basic command/response sequence**

## 6.2 Command/Response Format

The command/response format is as follows.



(1) CNT(count) field

The total number of bytes in the command/response to be transmitted is represented.

(2) CMD/RPS field

A command or response code is indicated.

(3) TEXT field

Additional information for a command or response, called control or device information, is indicated.

(4) Additional field

In some commands, additional field exists next to TEXT field.

## 6.3 Commands

The host computer can send the following commands to the scanner.

**Table 6.2 Commands**

Name	Code (Hex)	Function
Clear	'44'	Initializes the scanner. This command can be issued at any time.
Control	'58'	Sets the scanner to operation mode.
Start	'53'	Reports the size of document being read.
Read	'54'	Specifies the start of reading. The scanner starts reading based on the previously set operation mode.
Sense	'41'	Reports the scanner status.
Return Sense	'42'	Reports the return status when a flat-bed mechanism is used.



### 6.3.2 Control command

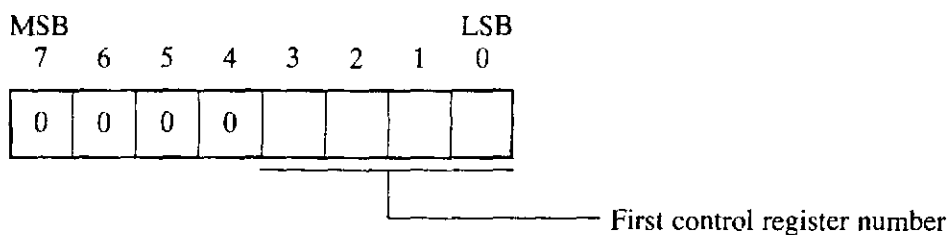
This command sets the scanner to the operation mode.

Byte 1 CNT	Byte 2 CMD	Byte 3 TEXT	Byte 4 or later
X'0x'*	X'58'	Control register start number	Control register

\*: x = 04 or more (relating with number of control registers)

#### Control register start number

Byte 3 (control register start number) specifies the starting control register.



#### Control register

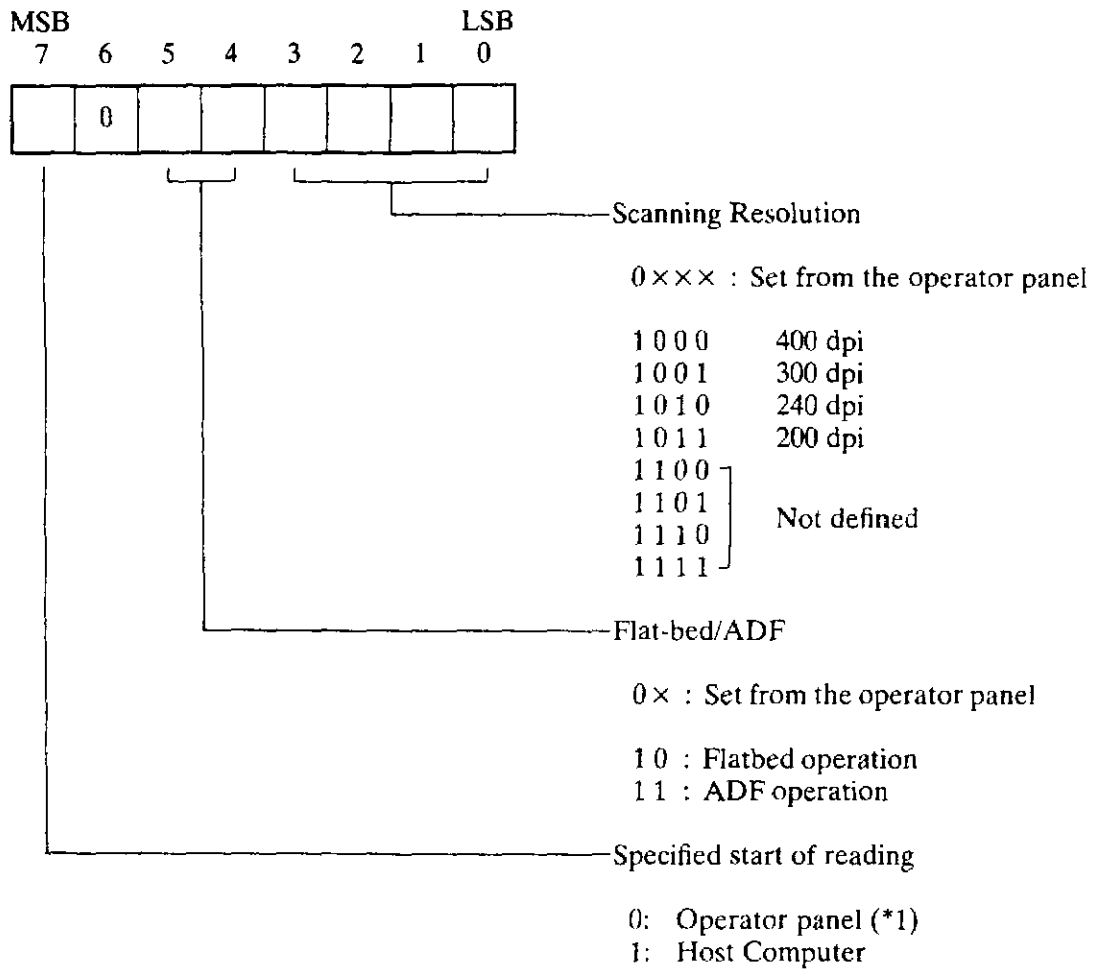
The control register specifies the scanner operation mode. Byte 4 and higher specify the control registers used in this command.

#### **Note:**

Control registers #6 to #9, and #18 are not defined.

(a) Control register #0

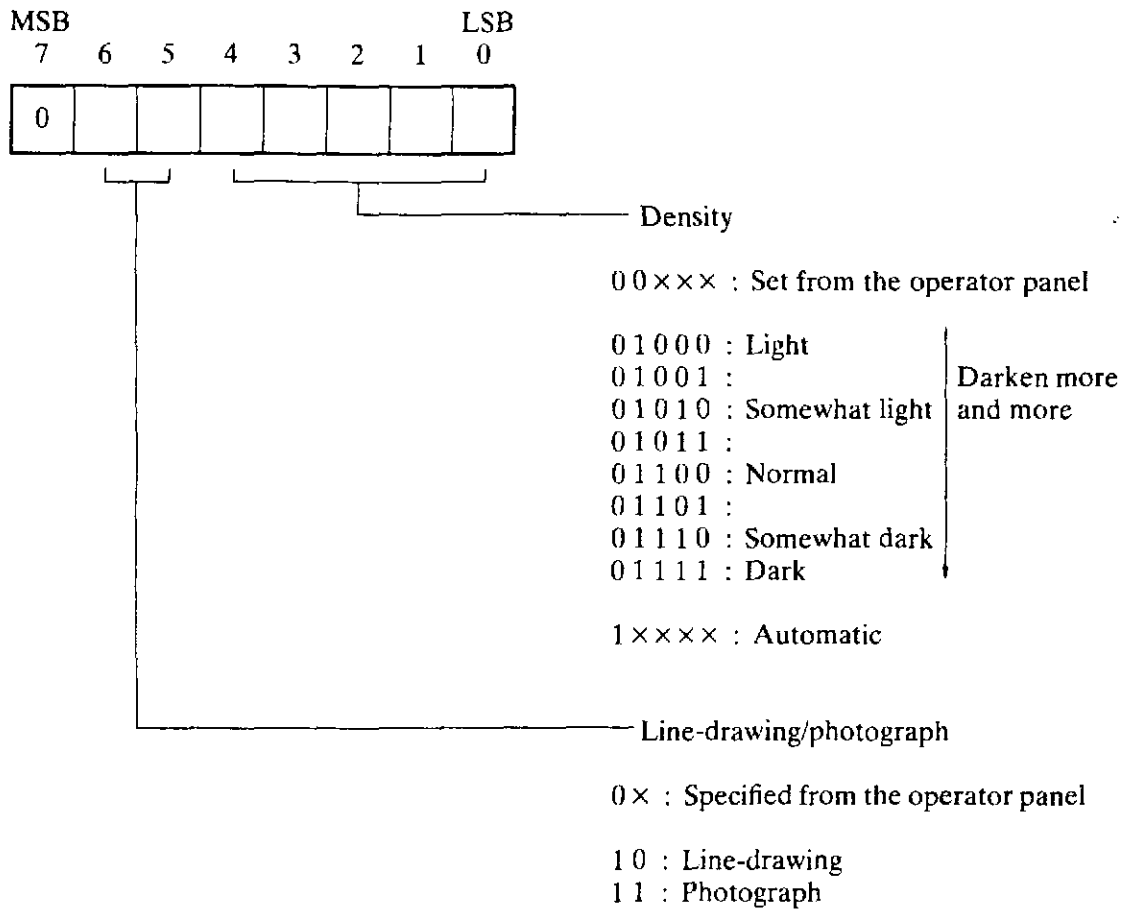
X'00' is set when the power is turned on or a Clear command is issued for initialization.



\*1 When the start of reading is specified from the operator panel, the READ ENABLE lamp lights at reception of a Start command.

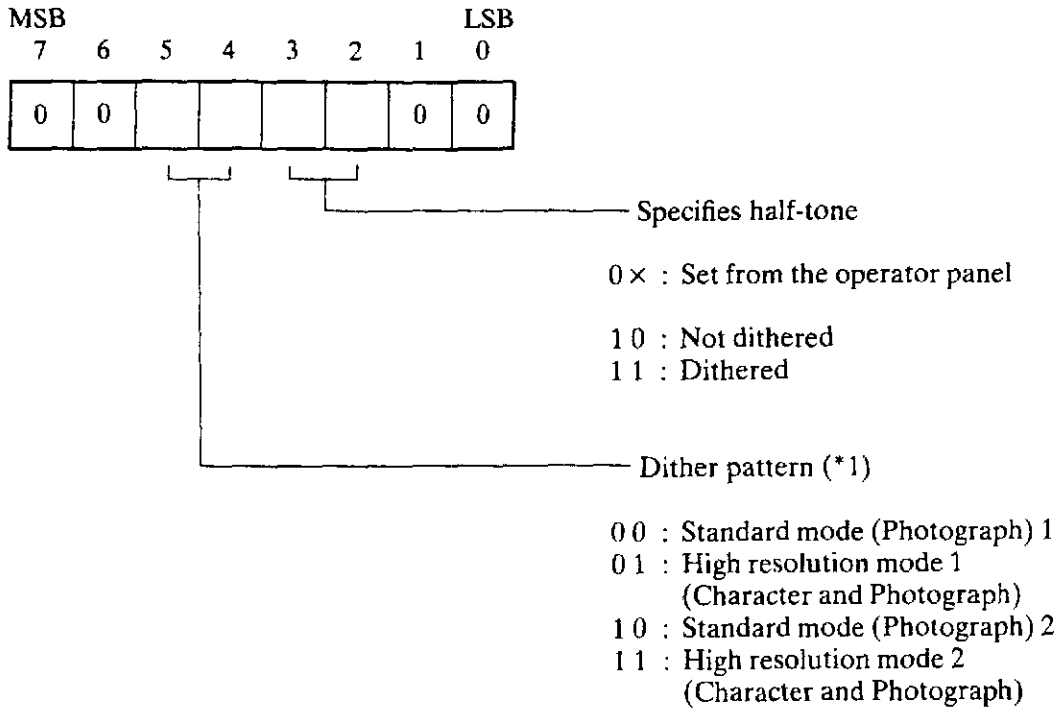
(b) Control register #1

X'00' is set when the power is turned on, or a Clear command is issued for initialization.



(c) Control register #2

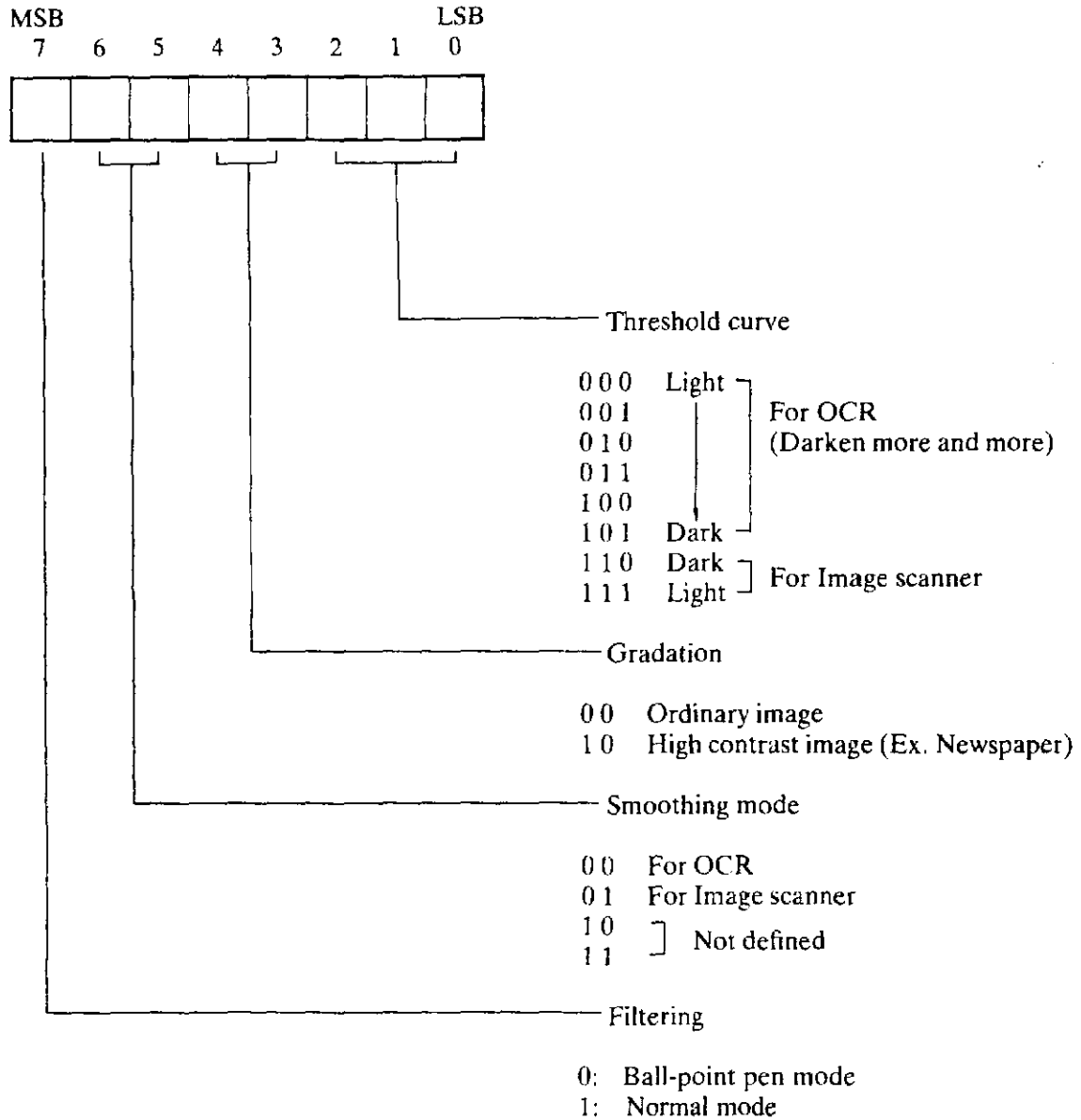
X'00' is set when the power is turned on, or a Clear command is issued for initialization.



\*1 Dither process is a method of converting a gray-scale image into a binary image.

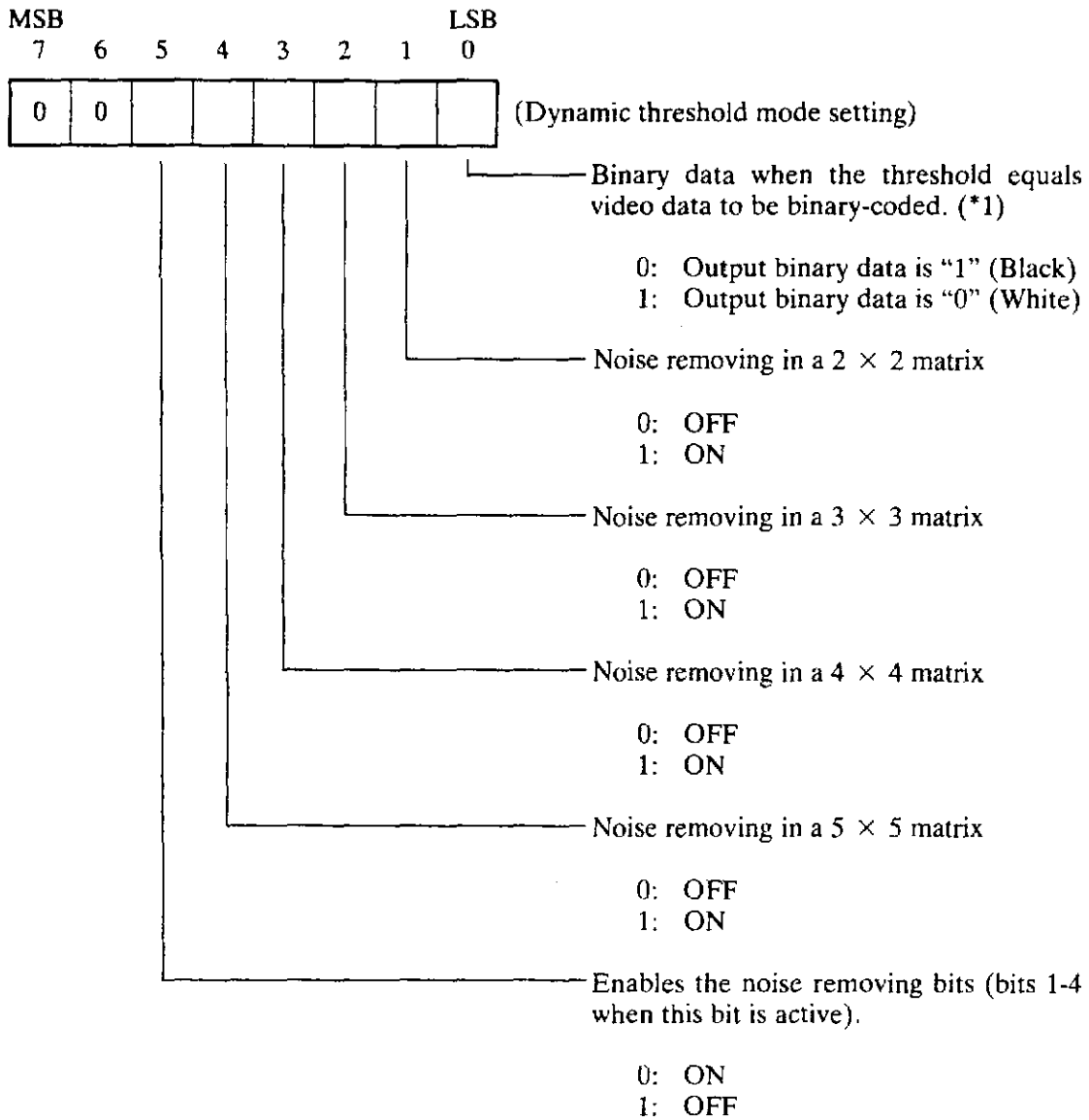
(d) Control register #3

X'A6' is set when the power is turned on, or a Clear command is issued for initialization.



(e) Control register #4

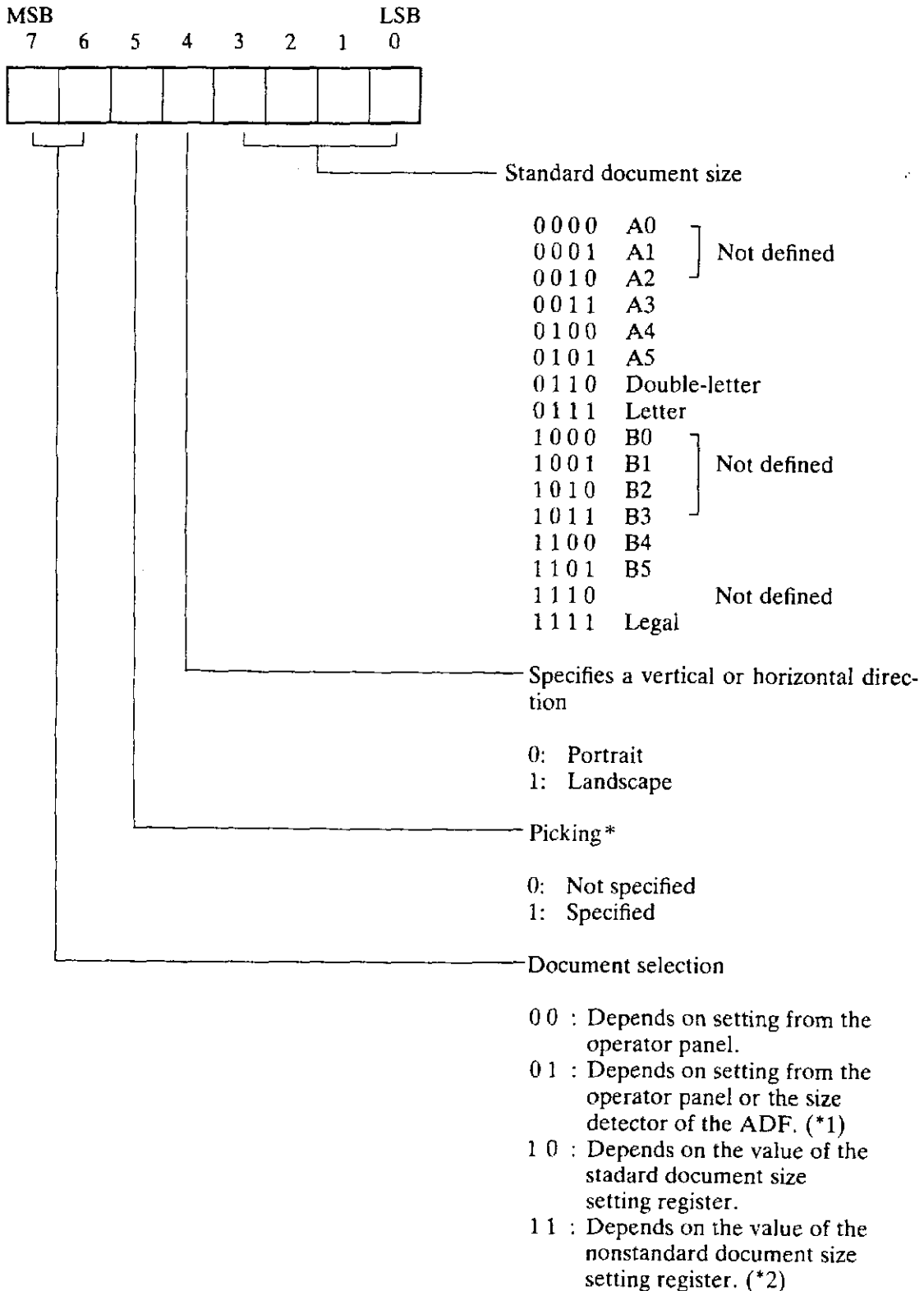
X'20' is set when the power is turned on, or a Clear command is issued for initialization.



\*1 The video data of the optional dynamic threshold circuit have 16 steps of gradation. When bit is '0', the output video data is black if the gradation of the video data is equal to or larger than threshold. When this bit is '1', the output video data is white if the gradation of the video data is equal to or larger than threshold.

(f) Control register #5

X<sub>0</sub>X<sub>1</sub>; is set when the power is turned on or a Clear command is issued for initialization. X<sub>j</sub> is depend on the DIP switch setting. (Refer to Section C.2.)



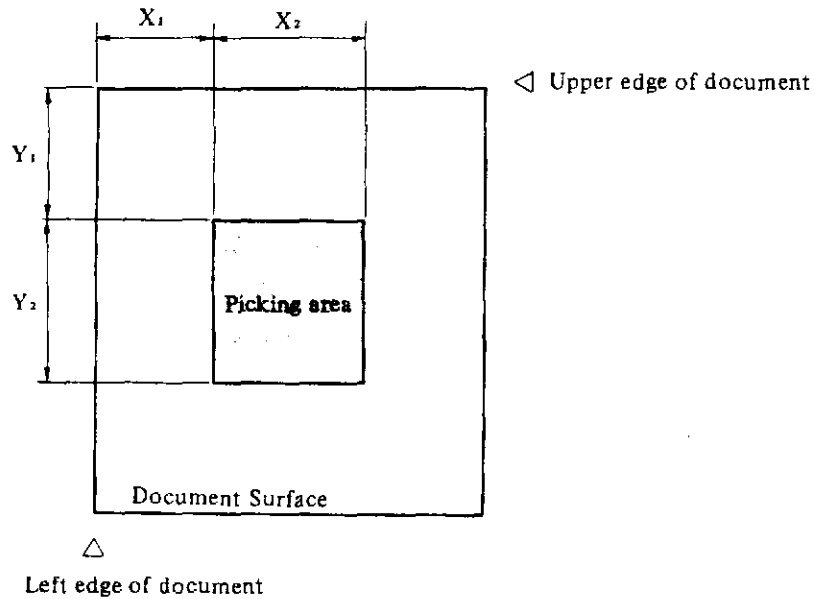
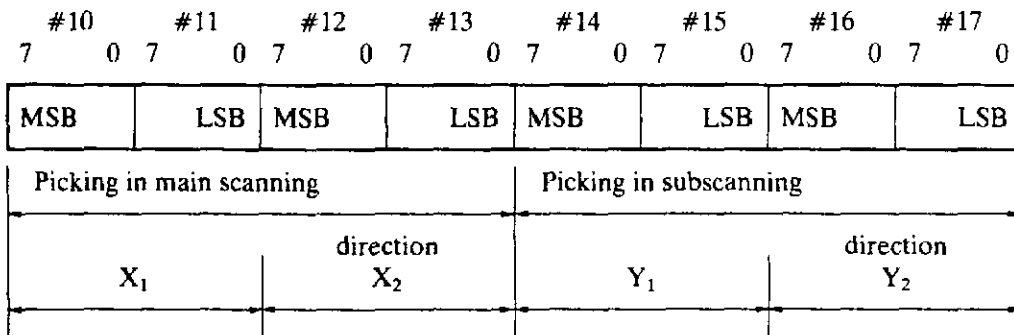
\* Allows scanning of only a defined area of the document.

\*1 For the flat-bed mechanism, this setting depends on what is set by the operator panel. For the ADF, this setting depends on the size detector of the ADF. For a model without an operator panel, document selection depends on the size detector of ADF. For flat-bed, document selection depends on the standard document size specification.

\*2 Not specified for this scanner.

(g) Control registers #10 to #17

Picking area setting register



Operation error occurs when the values of  $X_1 + X_2$  ((#10, #11) - (#12, #13)) and  $Y_1 + Y_2$  ((#14, #15) + (#16, #17)) are more than the values shown below.

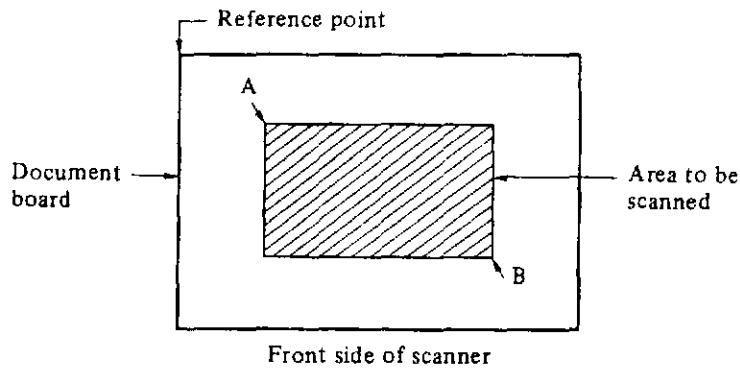
$X_1 + X_2$	$Y_1 + Y_2$
4364	6912

The above values must be specified in units of 1/400 inch, in binary.

**Notes:**

1. When the picking is specified, only specified area of the document is read. However, when the ADF is used, and the document length is shorter than the specified area, read operation is stopped at the edge of document.
2. When the specified area is larger than Double letter size, Read area specification error occurs.

Picking is specified when the scanner is required to read special area as shown below.



Picking is applied when bit 5 of the control register #5 is '1' and address of points A and B is specified in the control registers #10 to #17.

**Note:**

When these registers are specified, four consecutive registers (#10 to #13 or #14 to #17) must be specified.

Ex.

CNT	CND	REG. No.	#10	#11	#12	#13
			(#14)	(#15)	(#16)	(#17)

Or.

CNT	CMD	REG. No.	#10	#11	#12	#13	#14	#15	#16	#17
-----	-----	----------	-----	-----	-----	-----	-----	-----	-----	-----

**6.3.3 Start command**

When the scanner receives this command, the scanner reports the size of document being read.

Byte 1 CNT	Byte 2 CMD	Byte 3 and later
X'02'	X'53'	-

### 6.3.4 Read command

When the scanner receives this command, the scanner starts reading based on the previously set operation mode.

Issuing a response other than Read Complete during read operation causes an error.

Byte 1 CNT	Byte 2 CMD	Byte 3 and later
X'02'	X'54'	-

### 6.3.5 Sense command

When the scanner receives this command, the scanner status is reported.

The Sense command can be issued at any time if another command does not require the response from the scanner.

Byte 1 CNT	Byte 2 CMD	Byte 3 and later
X'02'	X'41'	-

## 6.4 Responses

Table 6.3 lists the responses for the commands sent from the scanner to the host computer.

Table 6.3 Responses

Response	Code (Hex)	Explanation
Ready	'52'	Completion of scanner initialization
Normal status	'4E'	Response to command reception
Read Complete	'46'	Completion of Read command reception
Operation Error	'55'	Occurrence of error related to operation specification program
Temporary Error	'54'	Occurrence of temporary error
Equipment Error	'50'	Occurrence of device fault

#### 6.4.1 Ready

This response indicates that the scanner initialization is completed.

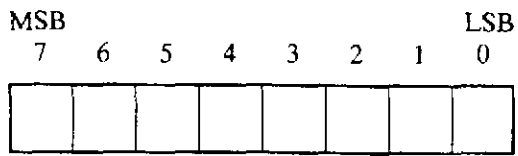
Byte 1 CNT	Byte 2 CMD	Byte 3 and later
X'02'	X'52'	—

#### 6.4.2 Normal Status

This response is for command reception, and includes device information. Device information indicates the status of scanner operation.

Byte 1 CNT	Byte 2 CMD	Byte 3 TEXT	Byte 4
X'04'	X'46'	Device information I	Device information II

Device information I



Resolution

0 0 0	400 dpi
0 0 1	300 dpi
0 1 0	240 dpi
0 1 1	200 dpi
1 0 0	] Not defined
1 0 1	
1 1 0	
1 1 1	

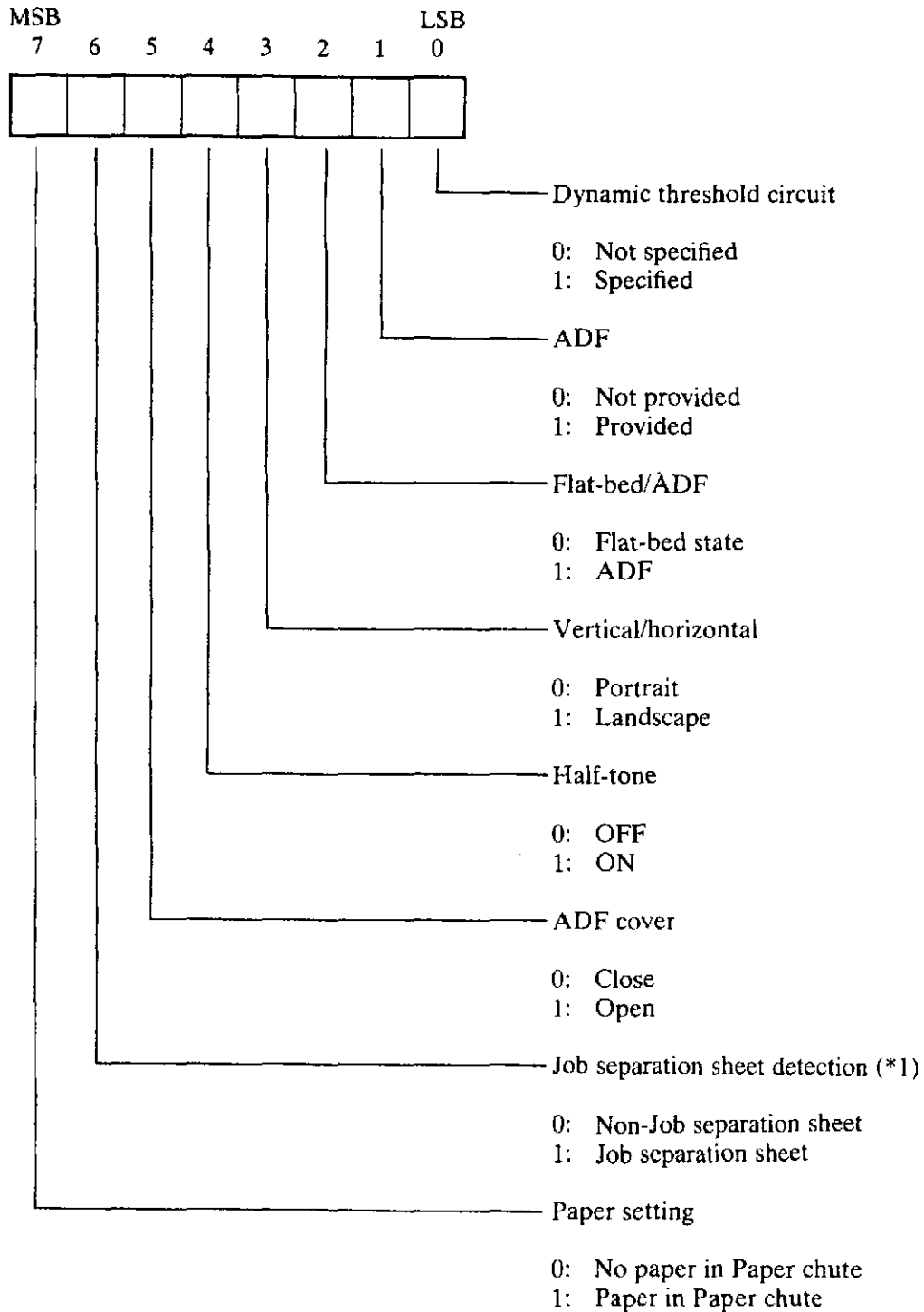
Document size (\*1)

0×××× Invalid (Not defined)

1 0 0 0	A0	] Not defined
1 0 0 1	A1	
1 0 0 1 0	A2	
1 0 0 1 1	A3	
1 0 1 0 0	A4	
1 0 1 0 1	A5	
1 0 1 1 0	Double-letter	
1 0 1 1 1	Letter	
1 1 0 0 0	B0	] Not defined
1 1 0 0 1	B1	
1 1 0 1 0	B2	
1 1 0 1 1	B3	
1 1 1 0 0	B4	
1 1 1 0 1	B5	
1 1 1 1 0		Not defined
1 1 1 1 1	Legal	

\*1 The document size is no longer valid when a nonstandard size is specified.

## Device information II



\*1 When a Job Separation sheet is detected, the threshold must be set.

This bit is valid when it is specified in Normal Status response for Start command.

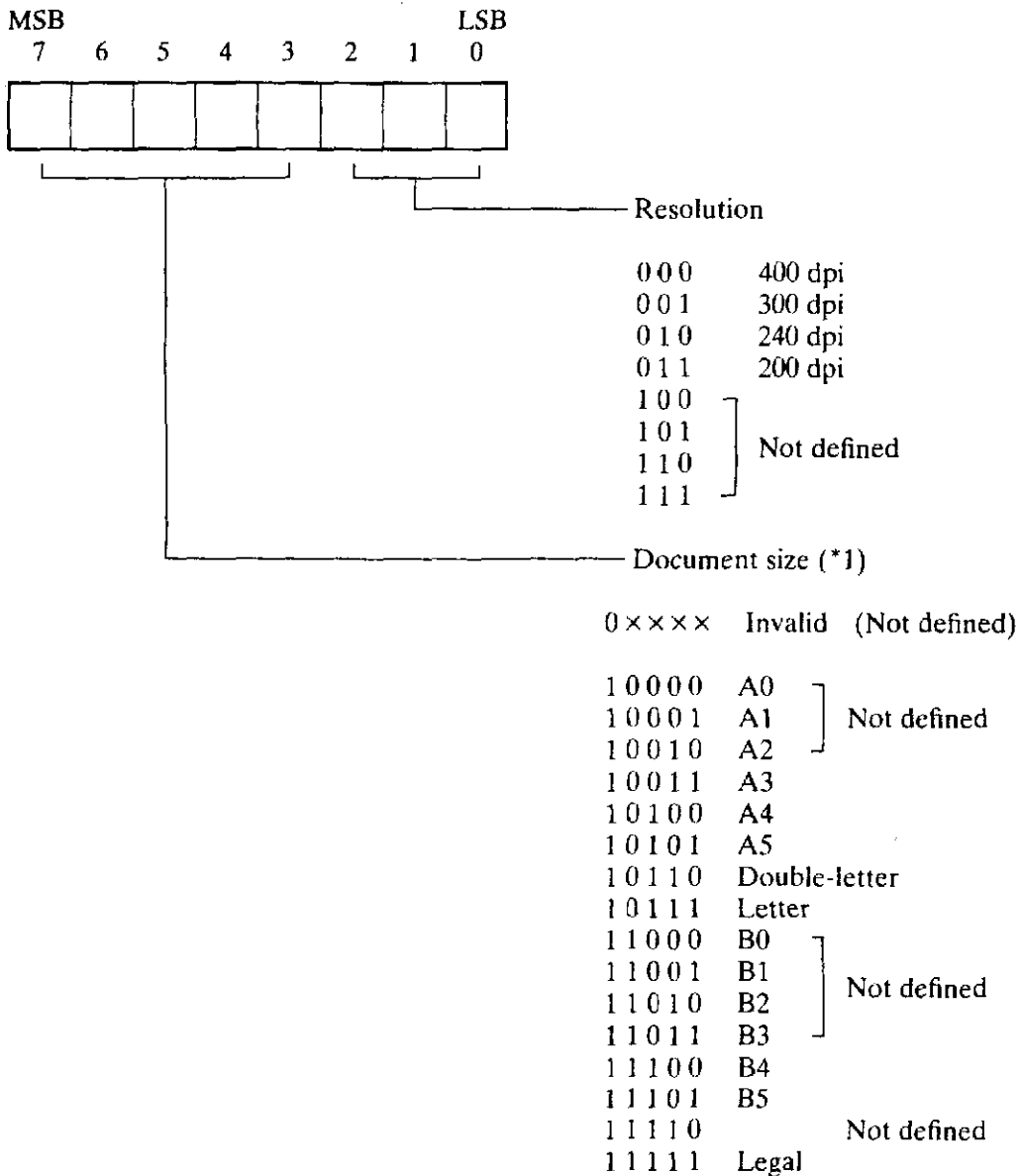
### 6.4.3 Read Complete

This response indicates that Read command execution terminates normally.

Byte 1 CNT	Byte 2 RPS	Byte 3 TEXT	Byte 4
X'04'	X'46'	Device information I	Device information II

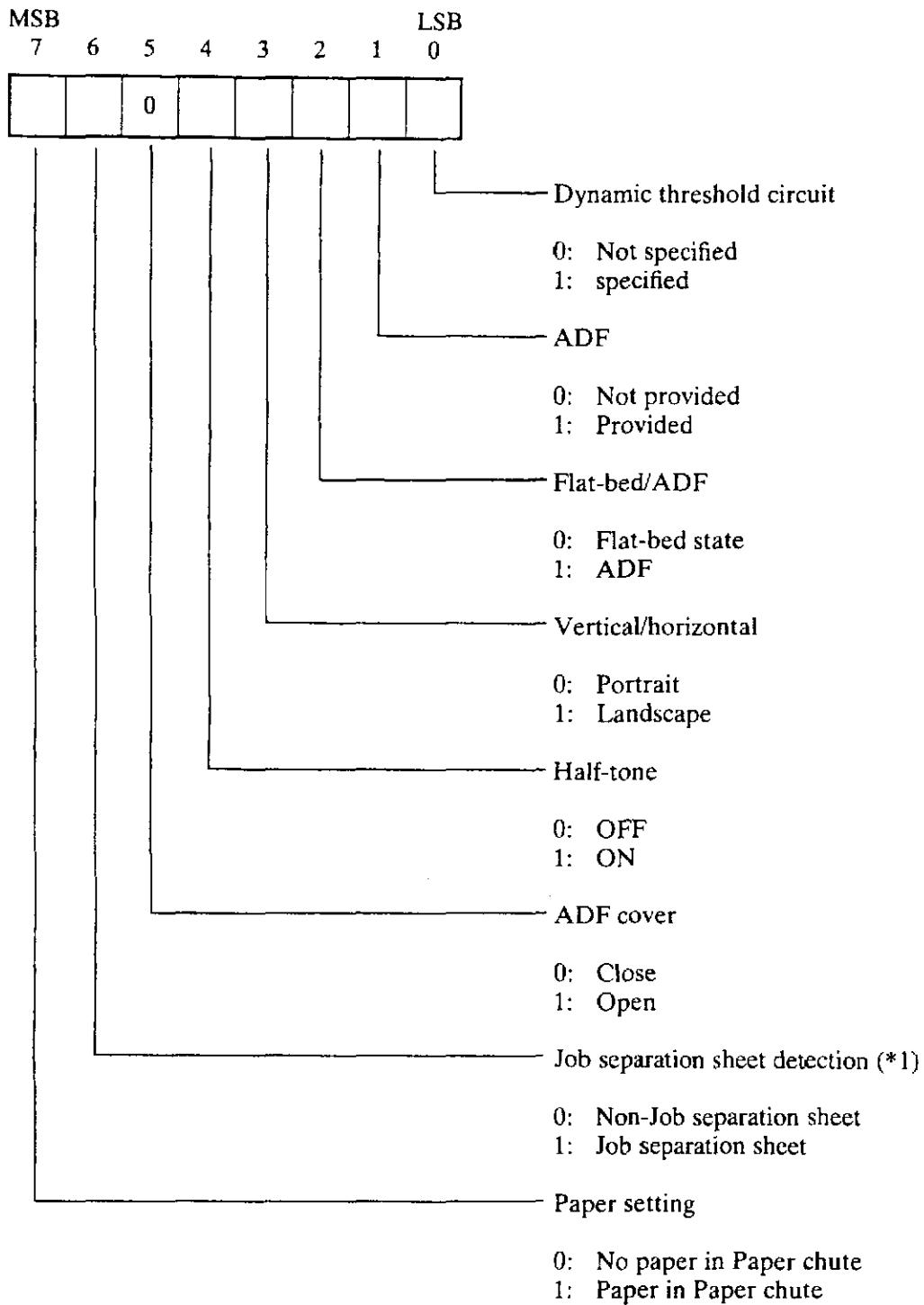
Device information indicates the status of the scanner operation.

#### Device information I



\*1 The document size is no longer valid when a nonstandard size is specified.

Device information II



\*1 When a Job Separation sheet is detected, the threshold must be set.

This bit is valid when it is specified in Normal Status response for Start command.

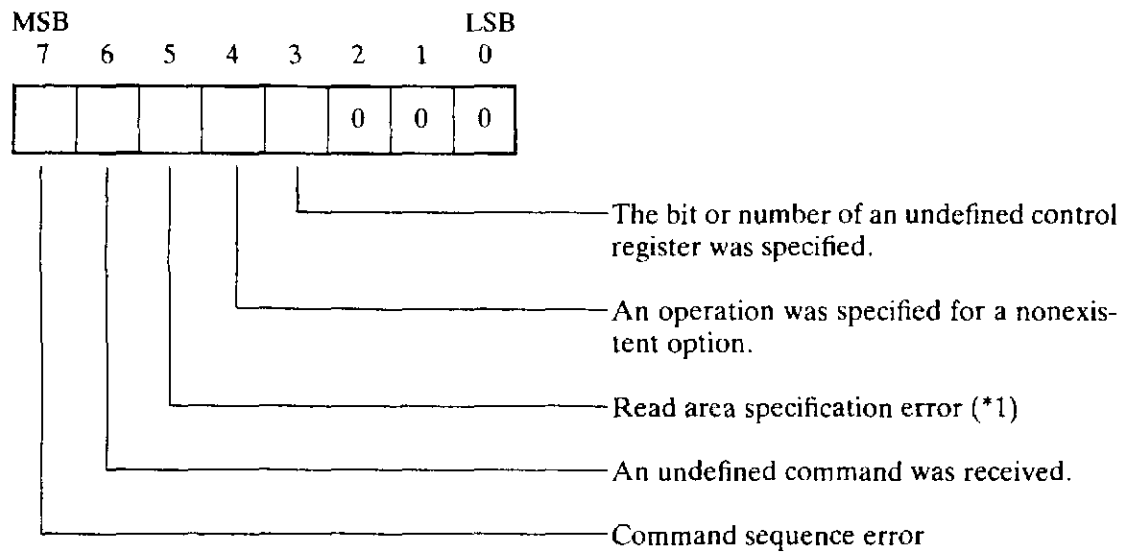
#### 6.4.4 Operation Error

This response indicates that the error related to operation specification program occurs.

Byte 1 CNT	Byte 2 RPS	Byte 3 TEXT
X'03'	X'55'	Detailed error information I

##### Detailed error information I

Detailed error information I gives details on errors in command/response transmission and reception to and from the host computer.



\*1 Although standard paper size bit on control register 5 is on (Bit 7 takes '1' and bit 6 takes '0'), the size specifying bits (Bits 0 to 4) aren't defined.

Control register contents do not change even if the above errors are detected.

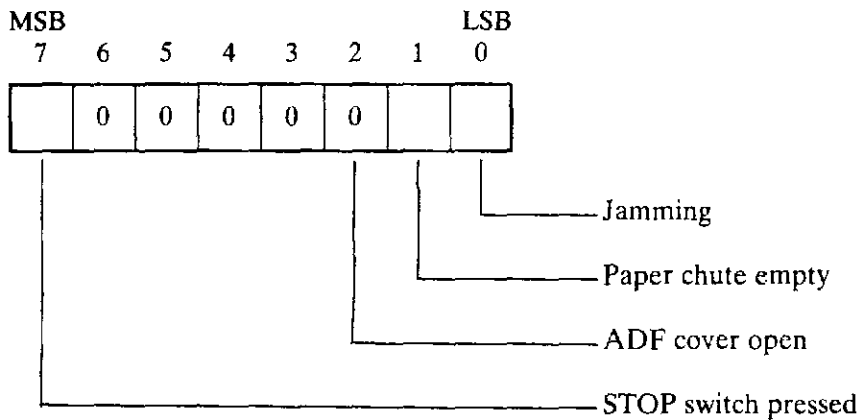
### 6.4.5 Temporary Error

This response indicates that the temporary error occurs.

Byte 1 CNT	Byte 2 RPS	Byte 3 TEXT
X'03'	X'54'	Detailed error information II

#### Detailed error information II

Detailed error information II provides details of temporary errors that can be corrected by operator intervention.



#### (a) Jamming

Paper jammed in the paper path during ADF operation.

- ① Paper already existed in ADF before the Read command was executed.
- ② Paper did not pass the sensor in ADF within the specific time.

#### (b) Paper chute empty

There was no paper on the paper chute when the Read command was received during ADF operation.

#### (c) STOP switch pressed

The STOP switch was pressed during reading or while the device was waiting for the operator to press the READ START switch.

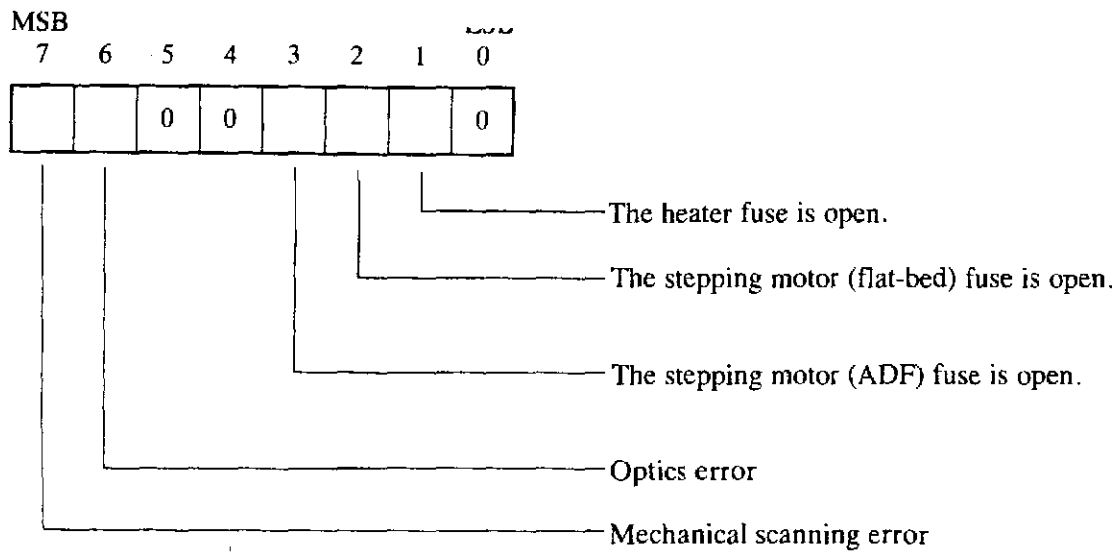
### 6.4.6 Equipment Error

This response indicates that a device fault has occurred.

Byte 1 CNT	Byte 2 RPS	Byte 3 TEXT
X'03'	X'50'	Detailed error information III

#### Detailed error information III

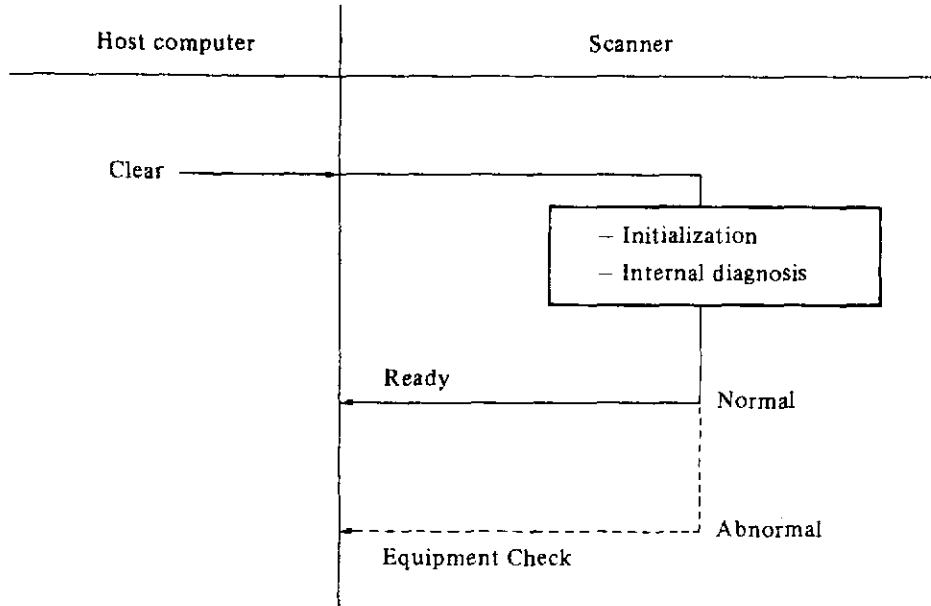
Detailed error information III provides details of device errors which require a service call.



## 6.5 Details Sequence

### 6.5.1 Initialization

Figure 6.2 shows the command/response sequence for initialization.



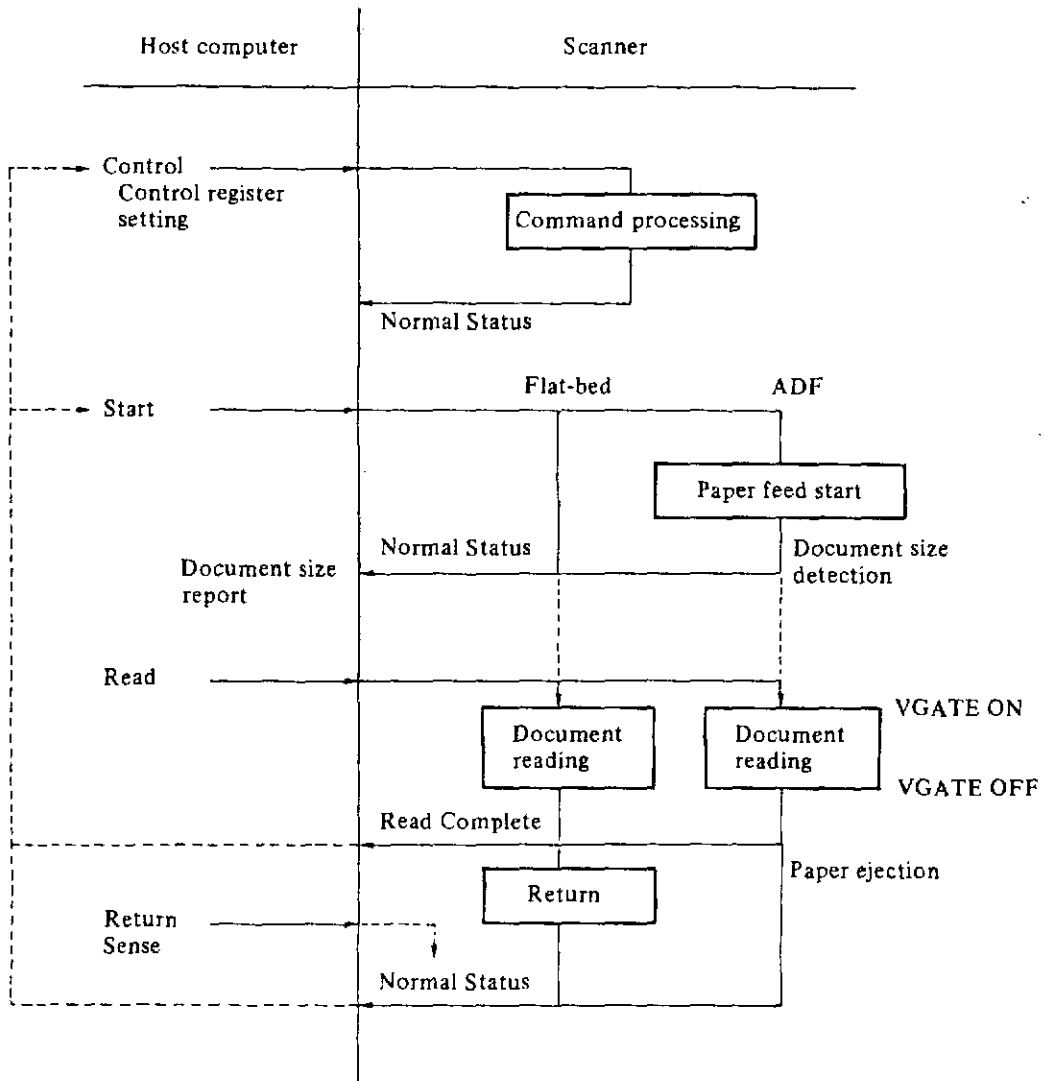
**Note:**

The maximum time from the Clear command reception to the returning of a response is 5 seconds.

**Figure 6.2 Initialization sequence**

### 6.5.2 Read operation

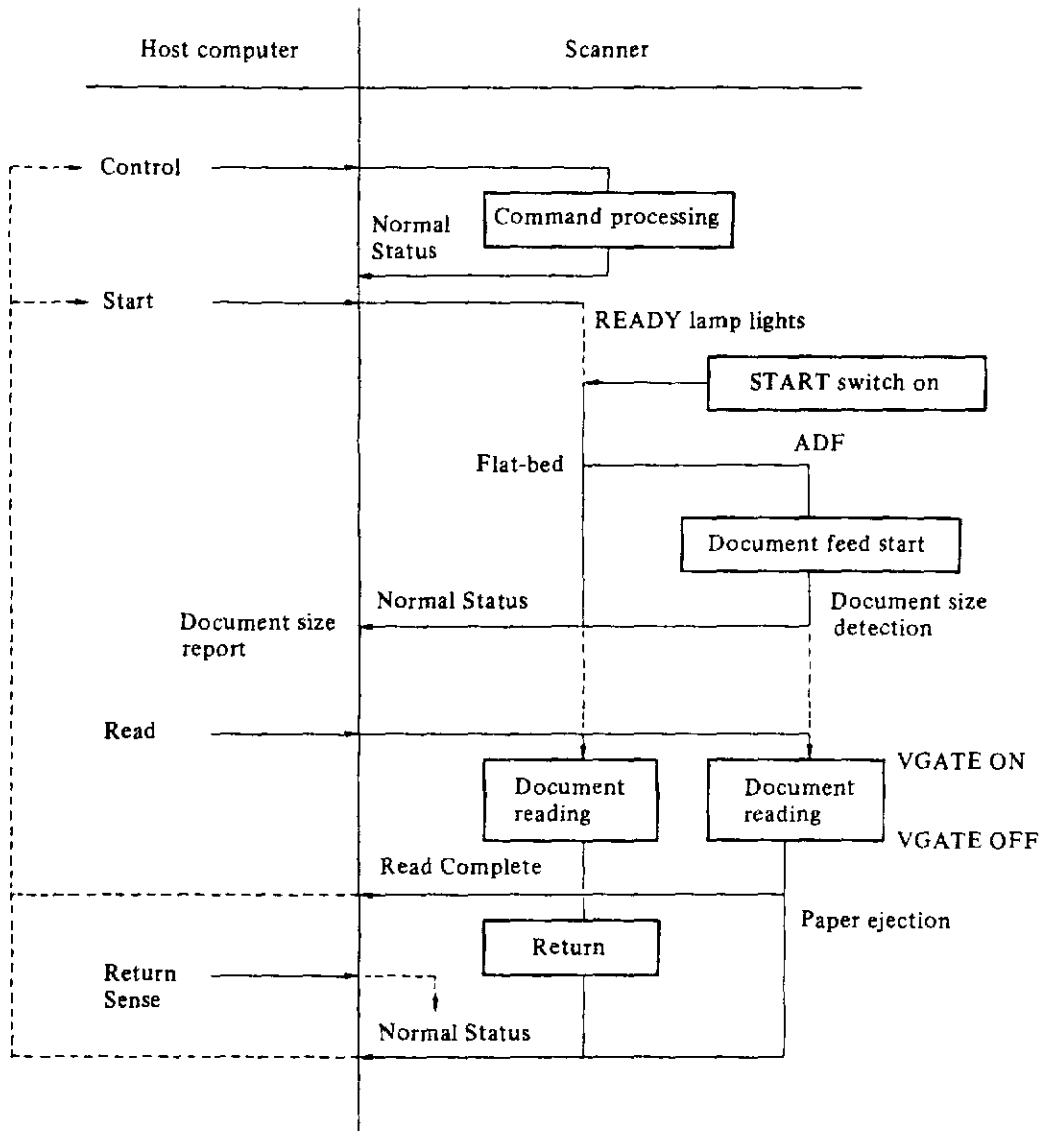
Figures 6.3 and 6.4 show the command/response sequences for Read operation.



**Notes:**

1. The Control command can be issued more than once.
2. The response to the Return Sense command is made after returning.
3. The Return Sense command need not always be issued.

**Figure 6.3 Read operation sequence (automatic mode)**



**Notes:**

1. The Control command can be issued more than once.
2. The response to the Return Sense command is made after returning.
3. The Return Sense command is not always issued.

**Figure 6.4 Read operation sequence (manual mode)**

## 6.6 Command/Response Correspondence

Response Command	Ready	Normal Status	Read Complete	Operation Error	Temporary Error	Equipment Error
Clear	①			②		③
Control		④		⑤		
Start		⑥		⑧	⑨	⑭
Read			⑦	⑧	⑨	⑩
Sense		⑪		⑫	⑬	⑭
Return Sense		⑮		⑧	⑨	⑭

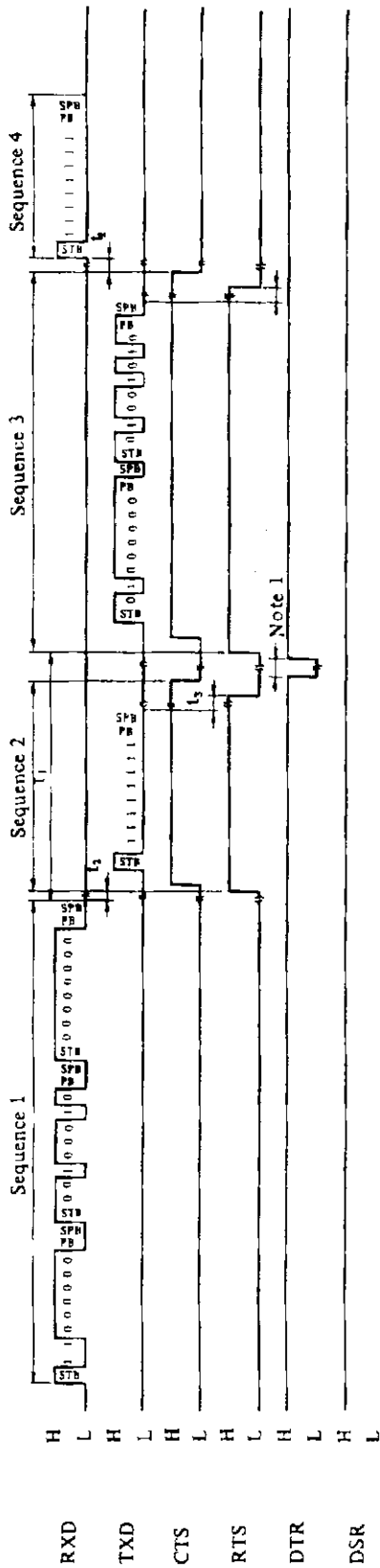
- ① Initialization terminated normally.
- ② An undefined command due to a transmission error was detected.
- ③ A device fault was detected during initialization.
- ④ A command was executed normally.
- ⑤ An undefined command due to an operation or transmission error was detected.
- ⑥ A command was executed normally.
- ⑦ Read operation terminated normally.
- ⑧ An undefined command due to a sequence or transmission error was detected.
- ⑨ Jamming or chute empty was detected.
- ⑩ A device error was detected during reading.
- ⑪ Response when there is no error.
- ⑫ An undefined command due to a transmission error was detected.
- ⑬ Previous paper jamming was not fixed.
- ⑭ A device fault was detected. This was reported in response to the Clear or Read or command.
- ⑮ Return operation terminated normally.

## 6.7 Command/Response Timing Chart

These timing charts are in the normal sequence at connector pins of the scanner. In these charts, STB, PB, and SPB mean start bit, parity bit, and stop bit respectively.

Figures 6.5 to 6.10 show the timing chart for each command.

- Figure 6.5 Clear command
- Figure 6.6 Control command
- Figure 6.7 Start command
- Figure 6.8 Read command
- Figure 6.9 Sense command
- Figure 6.10 Return Sense command



t<sub>1</sub>: more than 1 word length (changed by data transfer rate)  
 t<sub>2</sub>: less than 500 ms  
 t<sub>3</sub>: less than 5 s

Sequence 1: The host computer sends the Clear command to the scanner.

X'03', '44', '00'

Sequence 2: ACK for the Clear command is sent to the host computer.

X'FF'

Sequence 3: Response for the Clear command is sent to the host computer.

X'02', '52'

Sequence 4: ACK for the Response (Issued at Sequence 3) is sent to the scanner.

X'FF'

Note 1. During the Clear command execution, DTR signal takes low level.

Figure 6.5 Clear command sequence

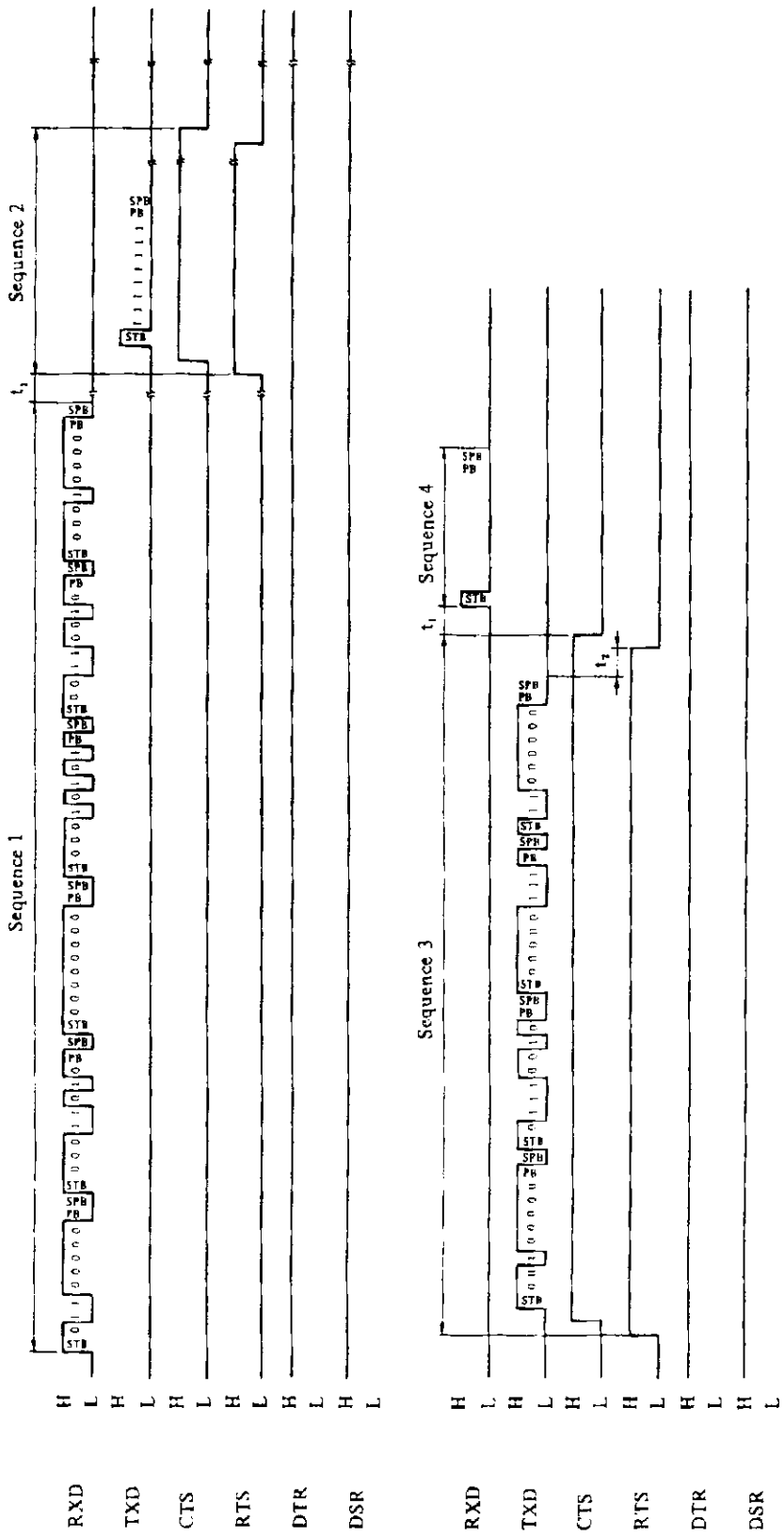


Figure 6.6 Control command sequence (1/3)

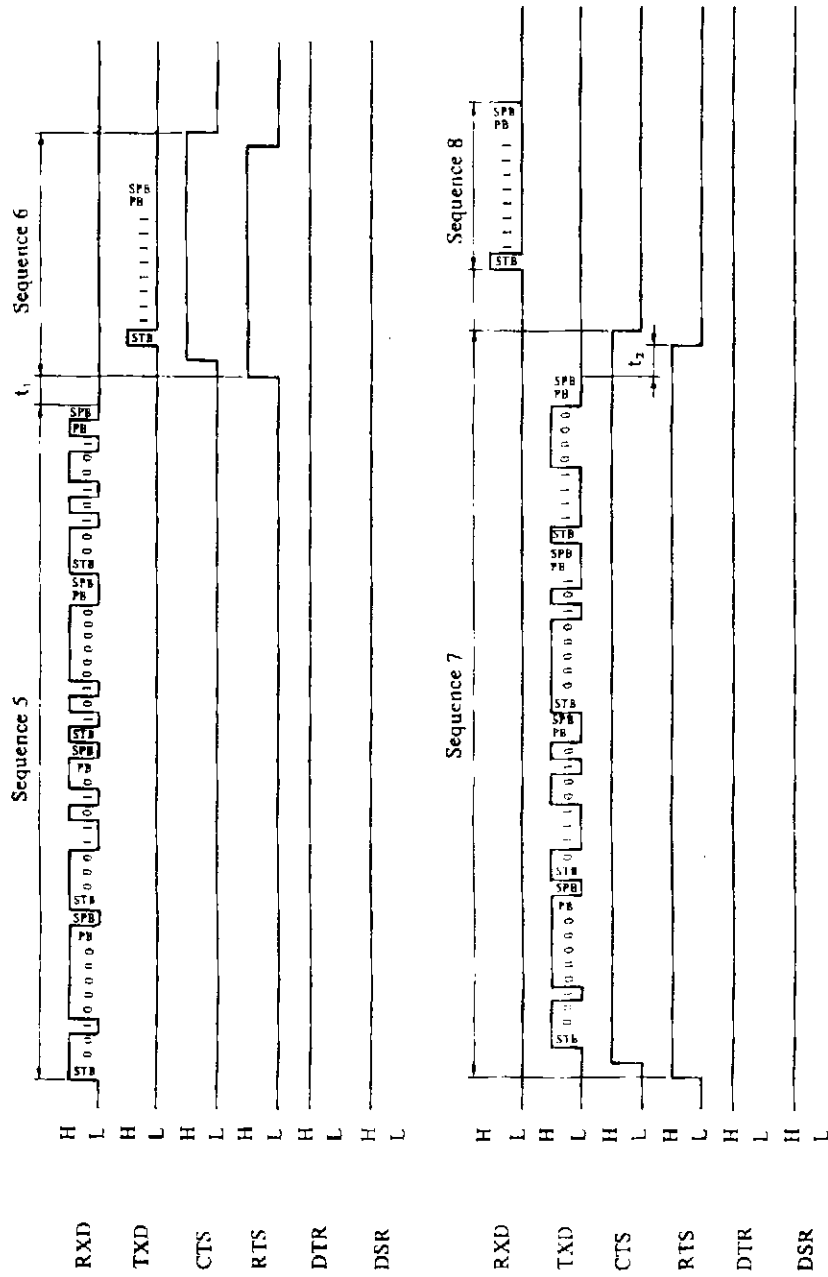


Figure 6.6 Control command sequence (2/3)

- Sequence 1: The host computer sends the Control command to the scanner.  
*t*<sub>1</sub>: Less than 500 ms  
*t*<sub>2</sub>: More than 1 word length  
 X'06', '58', '00', 'A8', '4C', '08', X'FF'
- Sequence 2: ACK for the Control command is sent to the host computer.  
 X'04', '4E', 'E0', '03', X'FF'
- Sequence 3: The host computer sends the Control command to the scanner.  
 X'04', '58', '05', '94', X'FF'
- Sequence 4: ACK for the Control command is sent to the scanner.  
 X'04', '4E', 'E0', '03', X'FF'
- Sequence 5: The host computer sends the Control command to the scanner again.  
 X'04', '58', '05', '94', X'FF'
- Sequence 6: ACK for the Control command (Issued at Sequence 5) is sent to the host computer.

Figure 6.6 Control command sequence (3/3)





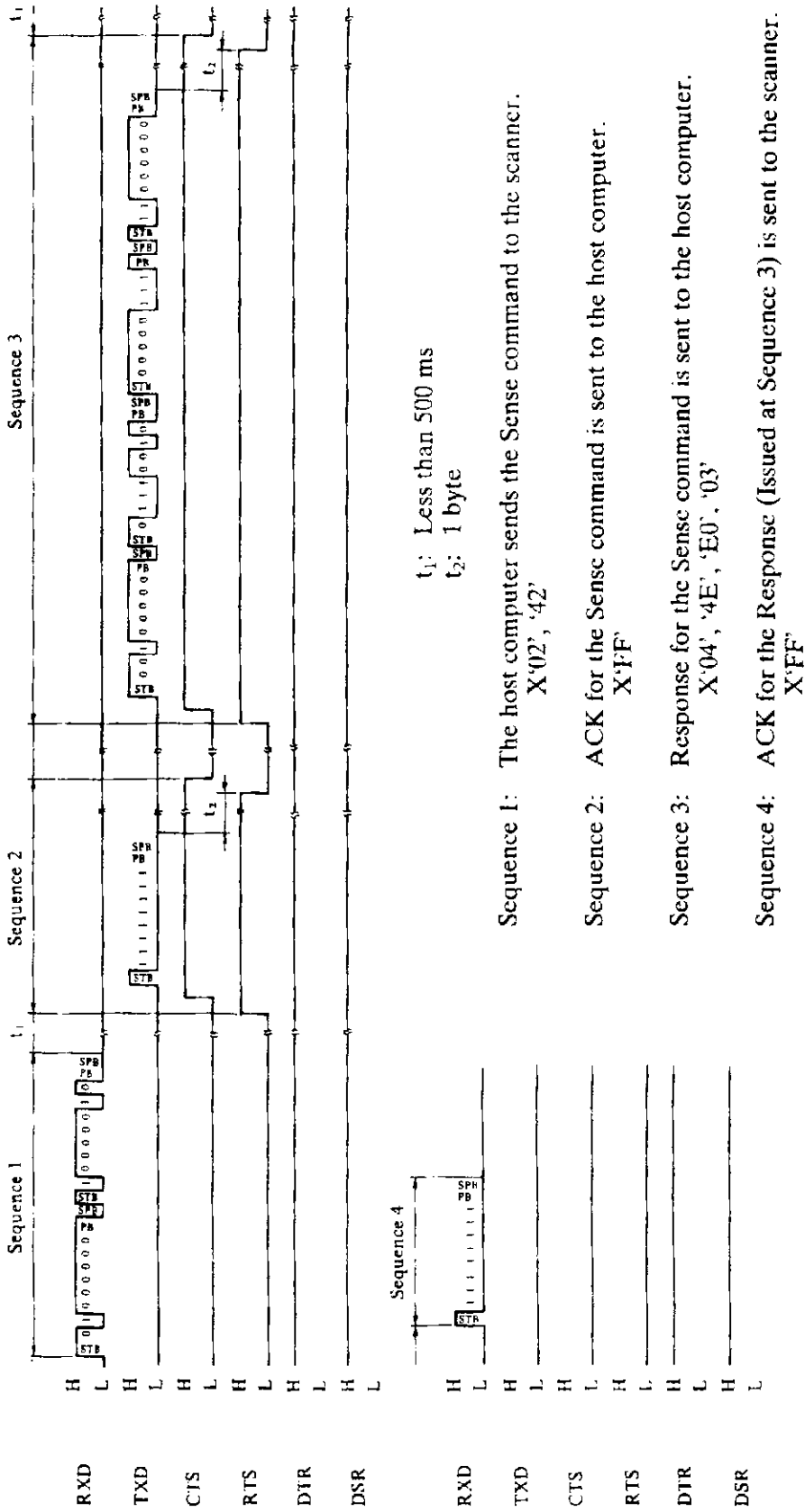


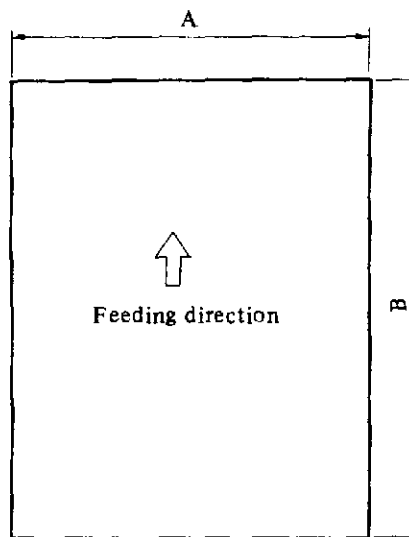
Figure 6.9 Sense command sequence



## APPENDIX A PAPER SPECIFICATIONS

When using the flat-bed, any condition paper can be read. Only background color specification (Section A.4) must be met. The rest of this appendix provides the readable paper specification when using the automatic document feeder (ADF).

### A.1 Paper size



Maximum		Minimum	
A	B	A	B
297	432	148	210
		210	148

(Unit : mm)

Figure A.1 Paper size specification

## A.2 Paper Conditions

### A.2.1 Paper quality

- Woodfree paper
- PPC paper; Specified by XEROX Corporation
- Pressure-fixing paper; specified by Fujitsu
- OCR paper

When using another paper, check that it is successfully fed by ADF before scanning.

### A.2.2 Ream weight

45 kg to 90 kg/ream

**Note:**

Ream weight is weight of 1,000 pieces of paper, sheet size 788 mm × 1,091 mm.

### A.2.3 Prohibited items

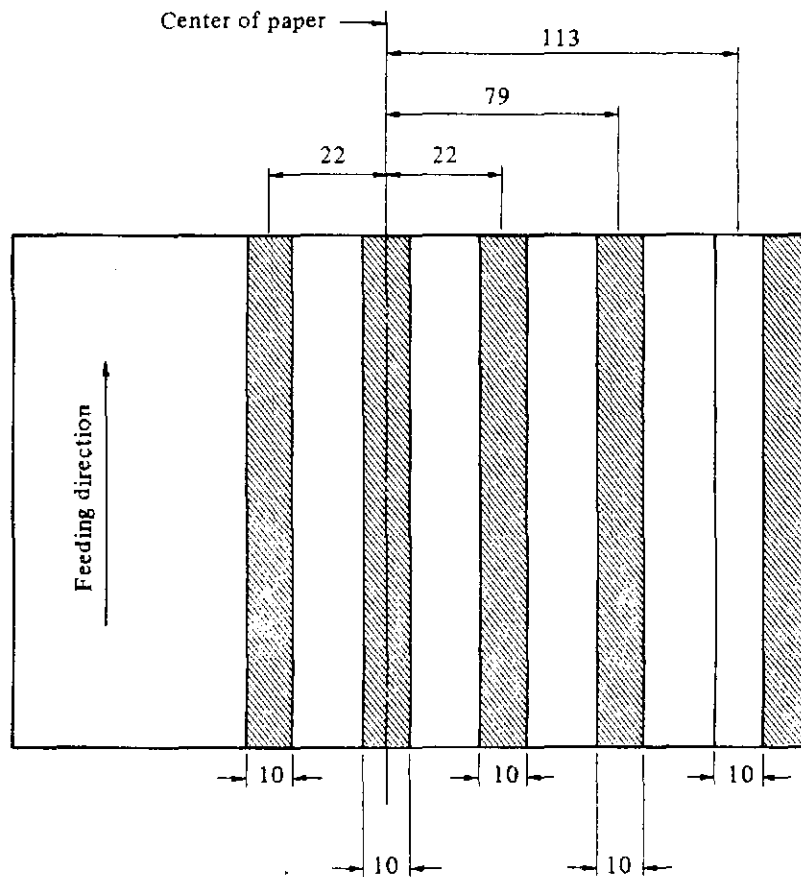
Following paper cannot be fed by the ADF:

- ① With clip or staple, etc.
- ② Ink, etc. is not dry.
- ③ Paper thickness is not constant (like an envelope).
- ④ Paper has large rumples or curl.
- ⑤ Paper has folds or tears.
- ⑥ Tracing paper
- ⑦ Coated paper
- ⑧ Carbonless paper (NCR)
- ⑨ Paper size; smaller than A5 size, or larger than A3 width
- ⑩ Other than paper; metal sheet, OHP film, etc.
- ⑪ Photographic paper
- ⑫ Paper with notches on its side.
- ⑬ Shape is other than square.

When reading the paper of items ④ to ⑬, use the flat-bed.

### A.3 Binding Hole Prohibited Area

Binding holes should not be in the following (shaded) area. If there is a binding hole in the shaded area, misoperation may occur. When reading this paper, use the flat-bed.



(Unit: mm)

Figure A.2 Binding hole inhibit area

#### A.4 Background Color Area

The color of the top (shaded) area should be the paper background color (white or drop-out color). If there is no background color area, select "photograph" on the operator panel when reading.

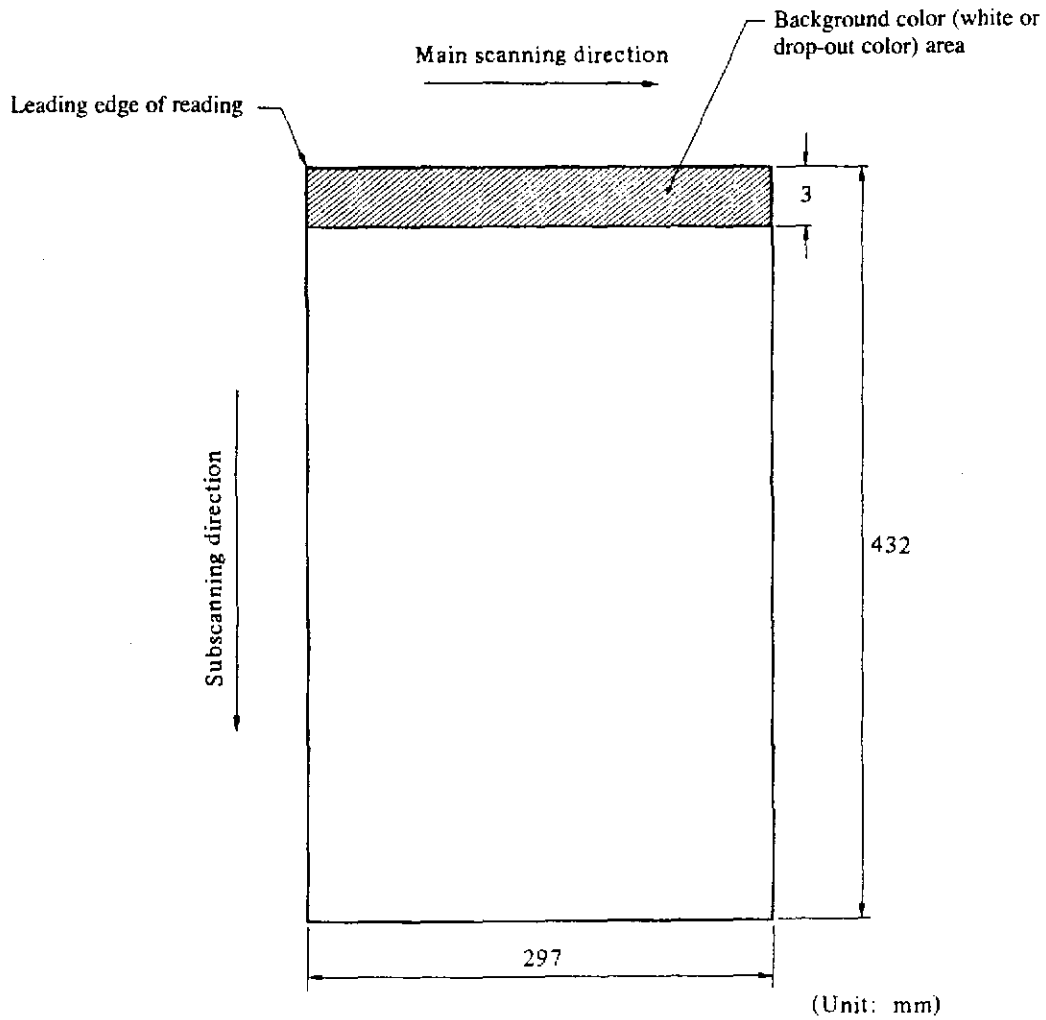
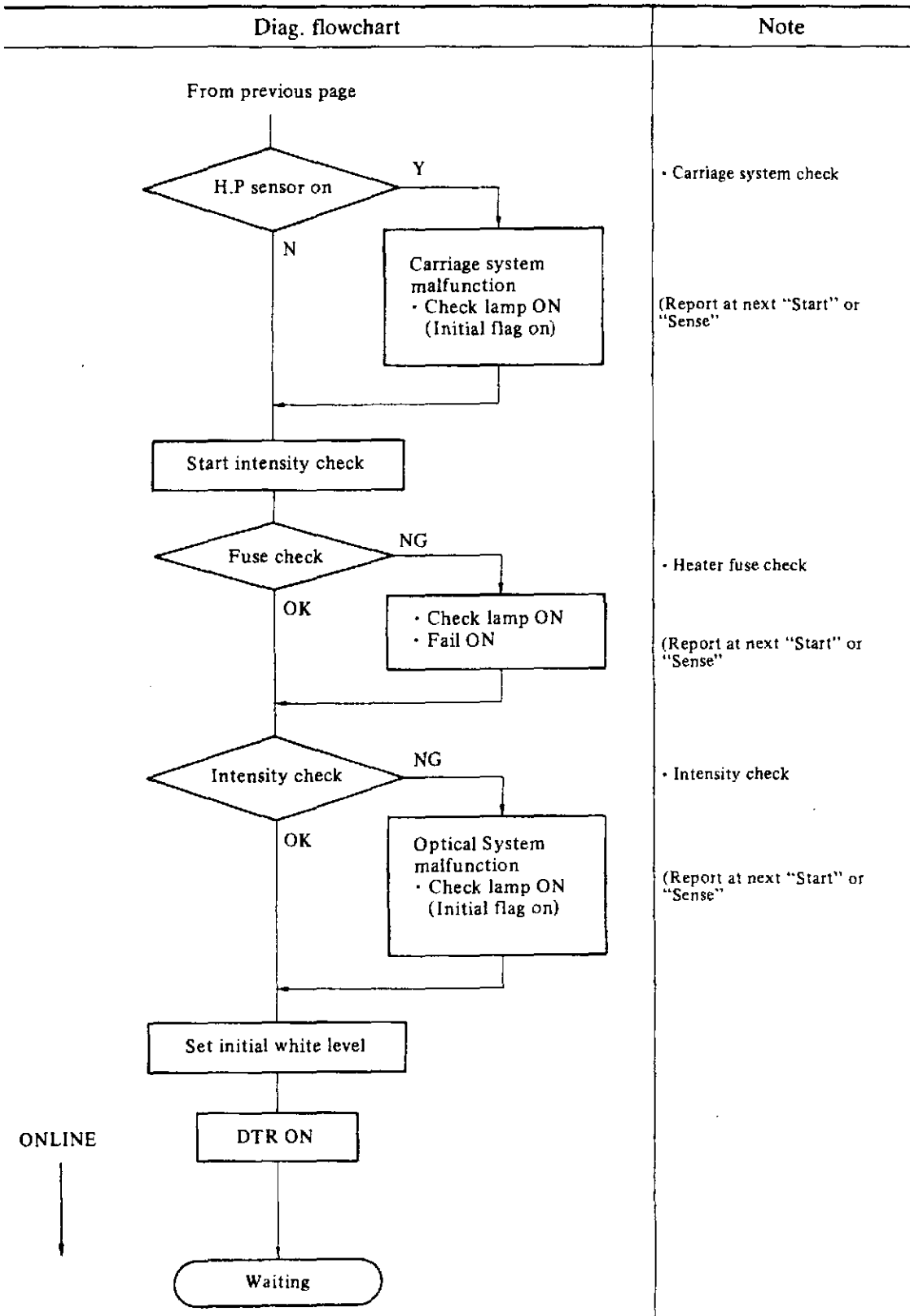


Figure A.3 Background color area

# APPENDIX B DIAGNOSTICS

## B.1 Power-On Diagnostics

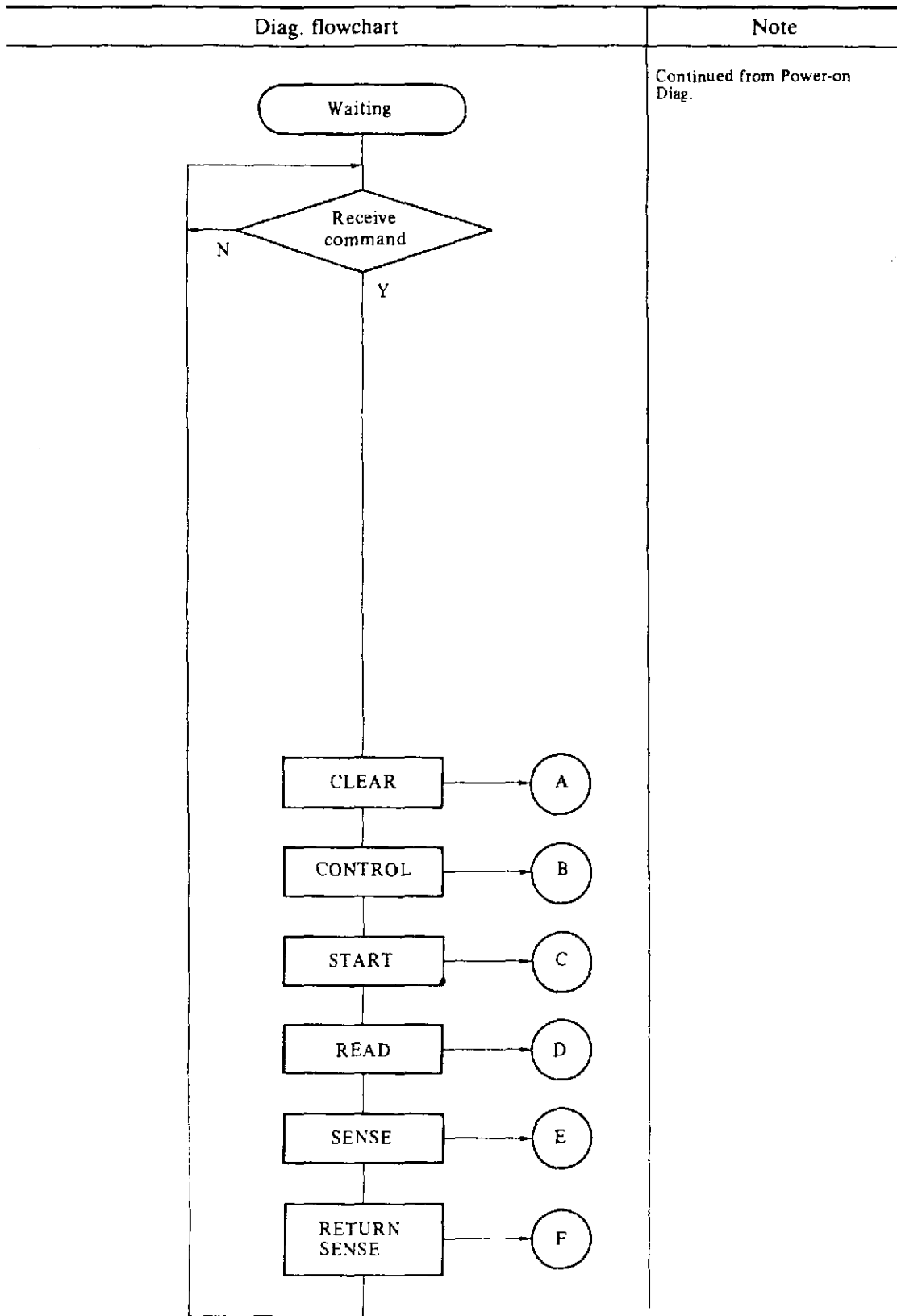
Diag. flowchart	Note
<pre> graph TD     Start[Power ON] --&gt; ROM{ROM Check}     ROM -- NG --&gt; Fail1[Check lamp ON Fail ON]     ROM -- OK --&gt; RAM{RAM Check}     RAM -- NG --&gt; Fail1     RAM -- OK --&gt; Paper{Paper in ADF}     Paper -- NO --&gt; FuseFB{FB fuse check}     Paper -- Y --&gt; FuseADF{ADF fuse check}     FuseADF -- NG --&gt; Eject[Eject papers]     Eject --&gt; FuseFB     FuseADF -- OK --&gt; FuseFB     FuseFB -- NG --&gt; Fail2[Check lamp ON Initial flag on]     FuseFB -- OK --&gt; Restore[Start carriage restore]     </pre> <p>For the model with ADF only</p> <p>Next page</p>	<ul style="list-style-type: none"> <li>• MPU CS ROM check } Report with "FAIL ON"</li> <li>• MPU CS ROM check }</li>   <li>• ADF motor fuse check</li> <li>(Report at next "Start" or "Sense")</li>   <li>• Carriage motor fuse check</li> <li>(Report at next "Start" or "Sense")</li> </ul>



ONLINE



## B.2 Online Diagnostics



Ⓐ Receive CLEAR;

X'00' ——— Perform the check as the power-on Diag.  
X'01' ——— Initialization of Control REG  
X'10' ——— Abort "Ready" and switch VGATE-OFF

Ⓑ Receive CONTROL;

Interface (undefined REG, Sequent) check only

Ⓒ START;

· FB Manual mode After pressing Start SW, send "Normal Status"  
Auto mode Send "Normal Status", then  
· Intensity check  
· Carriage motor fuse check  
If malfunction, report at next "Read" or "Sense".  
· ADF Manual mode ① Send "Normal Status" when a paper is set at  
(After pressing size Detection Sensor  
Start SW.) ② If not, feed a paper and perform  
Auto mode · ADF motor fuse check  
· Jam check  
then, sense the paper size.  
If no paper on the bed, report "Empty".

Ⓓ READ;

· FB Manual mode Scan after the following checks  
· Intensity check  
· Heater fuse check  
· Carriage motor fuse check  
Auto mode If malfunction at "Start", report it. If normal, scan  
after the following checks  
· Intensity check  
· Heater fuse check  
· Carriage motor fuse check  
Report abnormality in  
intensity or heater fuse ... before and after scan  
Report carriage motor  
fuse abnormality ... at occurrence  
· ADF · Intensity check  
· Heater fuse check  
· ADF motor fuse check  
Report in the same manner as FB.

Ⓔ SENSE;

Report errors occurred before receiving this command.

Ⓕ RETURN SENSE;

- FB Carriage system check and motor fuse check at carriage reset
- ADF ADF motor fuse check

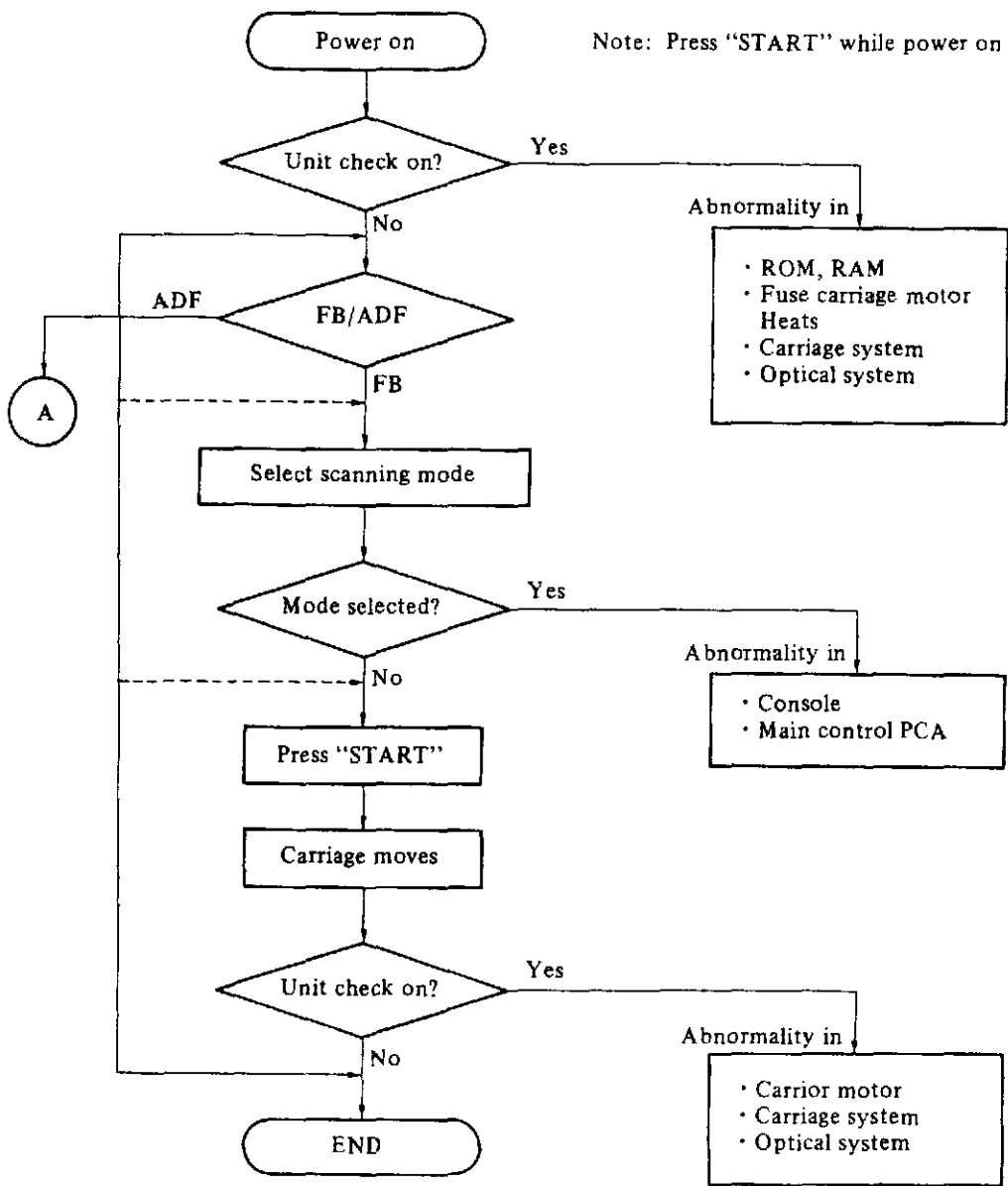
**B.3 Offline Diagnostics**

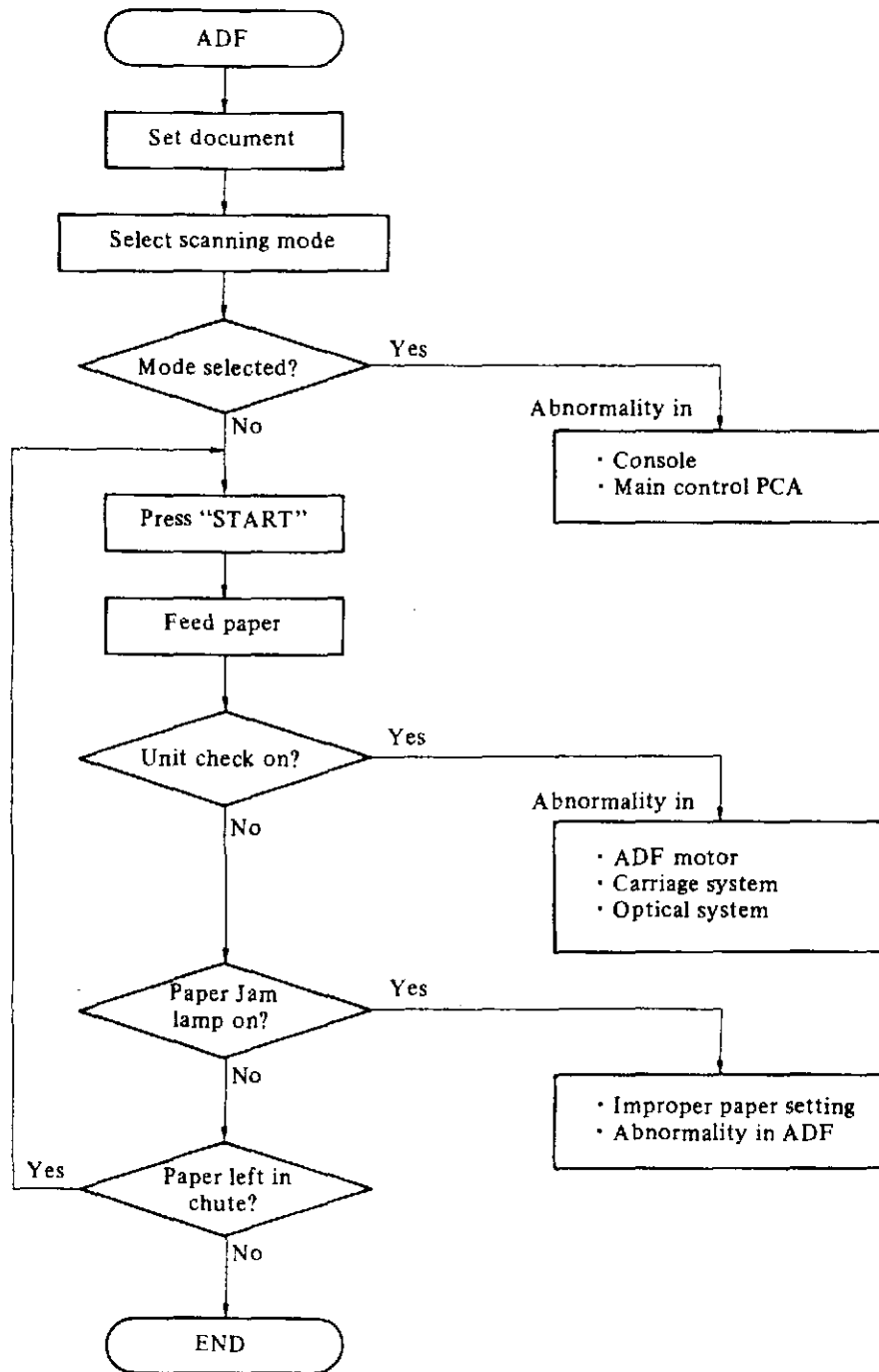
The following functions are diagnosed with the offline diagnostics.

- Control ROM, RAM
- Fuse
  - FB carriage motor fuse
  - Heater fuse
  - ADF motor fuse
- Optical system
- Carriage system
- Paper jam

(1) Operation

- ① Turn Power switch on while pressing "Start" switch.
- ② Confirming that the two density lamps (200, 240) blink, release "Start" switch.  
These operation brings the unit to offline mode.
- ③ Wait until the density lamp stops blinking (400 lamp on).
- ④ Select density, document size and ADF, then press "START".
  - Press "START" each time for the flat bed operation.
  - Press "START" after setting documents to ADF.One page is fed with one "START" operation.





Details of the problem with "Unit Check" on

Operator Panel Display								Error
ADF	Half-tone	Document		Density				
		Line drawing	Photo	400	300	240	200	
○	○	○	○	○	○	×	○	Heater Fuse
○	○	○	○	○	×	○	○	FB Motor Fuse
○	○	○	○	×	○	○	○	ADF Motor Fuse
○	○	×	○	○	○	○	○	Operator System
×	○	○	○	○	○	○	○	Carriage System

Details of the problem with "Paper Jam" on

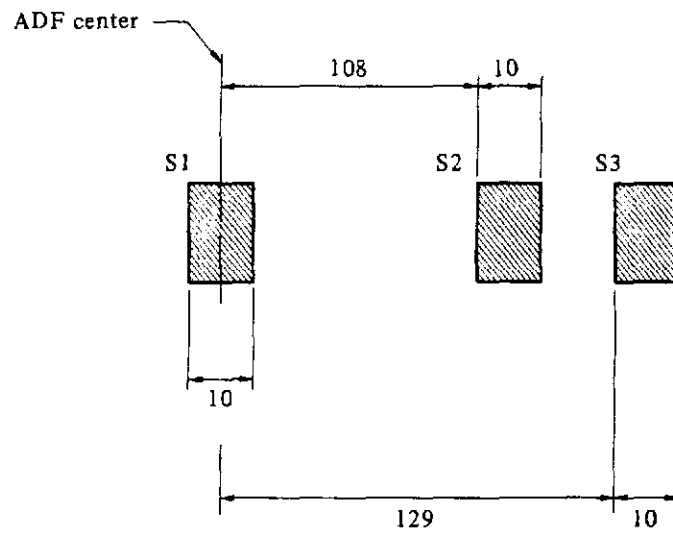
Operator Panel Display								Error
ADF	Half-tone	Document		Density				
		Line drawing	Photo	400	300	240	200	
○	○	○	○	○	○	○	×	Paper Jam
○	○	○	○	○	○	×	○	Paper Chute Empty

**B.4 Difference between Online and Offline Diagnostics**

- Online      Check detailed error information I, II, III
- Offline     Check detailed error information II, III  
 ("Stop switch pressed" in II is not checked.)

## B.5 Detection of Document Size

Document size detection point



Sensors locations are shown in the above chart.

- S1: Job separation sheet detection
- S2: A4/B4 detection
- S3: B4/A3 detection

S2	S3	Scanning size
OFF	OFF	A4
ON	OFF	B4
ON	ON	A3

## APPENDIX C DIP SWITCH SETTING

### C.1 Preparation for DIP Switch Setting

The DIP switch is located on the main control PCA. It is necessary to remove the main control PCA from the scanner.

- ① Loosen the front cover screw and remove the front cover from the base unit.
- ② Remove the connector to the POWER switch.
- ③ Remove the board support.
- ④ Remove all connectors on the front end of the main control PCA.
- ⑤ Hold clamps at both ends of the PCA with hands and pull it toward you.

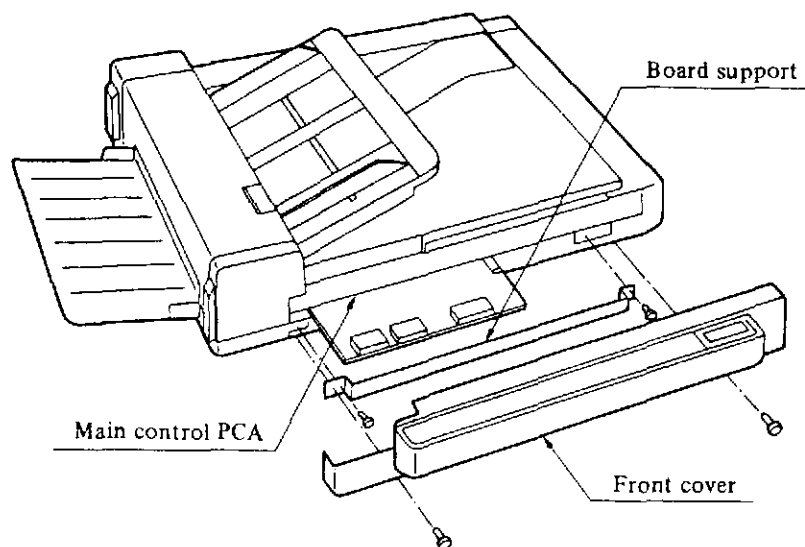


Figure C.1 Main control PCA removal

## C.2 DIP Switch Setting

Figure C.2 shows the DIP switch location on the main control PCA. Set the DIP switch according to Table C.1 if necessary.

After setting, reverse the order in Section C.1 to re-install the main control PCA.

**Table C.1 M3096 DIP switch setting**

Bit	Setting				Factory setting	
1	Always OFF				OFF	
2	Always OFF				OFF	
3	Paper size default value	bit	3	4	Paper size	OFF
4			OFF	OFF	Double letter	
			OFF	ON	Letter	OFF
			ON	OFF	Legal	
			ON	ON	A3	
5	Resolution default value	bit	3	4	Resolution	OFF
6			OFF	OFF	400 dpi	
			OFF	ON	300	OFF
			ON	OFF	240	
			ON	ON	200	
7	Baud rate default value	bit	3	4	Baud rate	OFF
8			OFF	OFF	4800 bps	
			OFF	ON	9600	OFF
			ON	OFF	2400	
			ON	ON	1200	

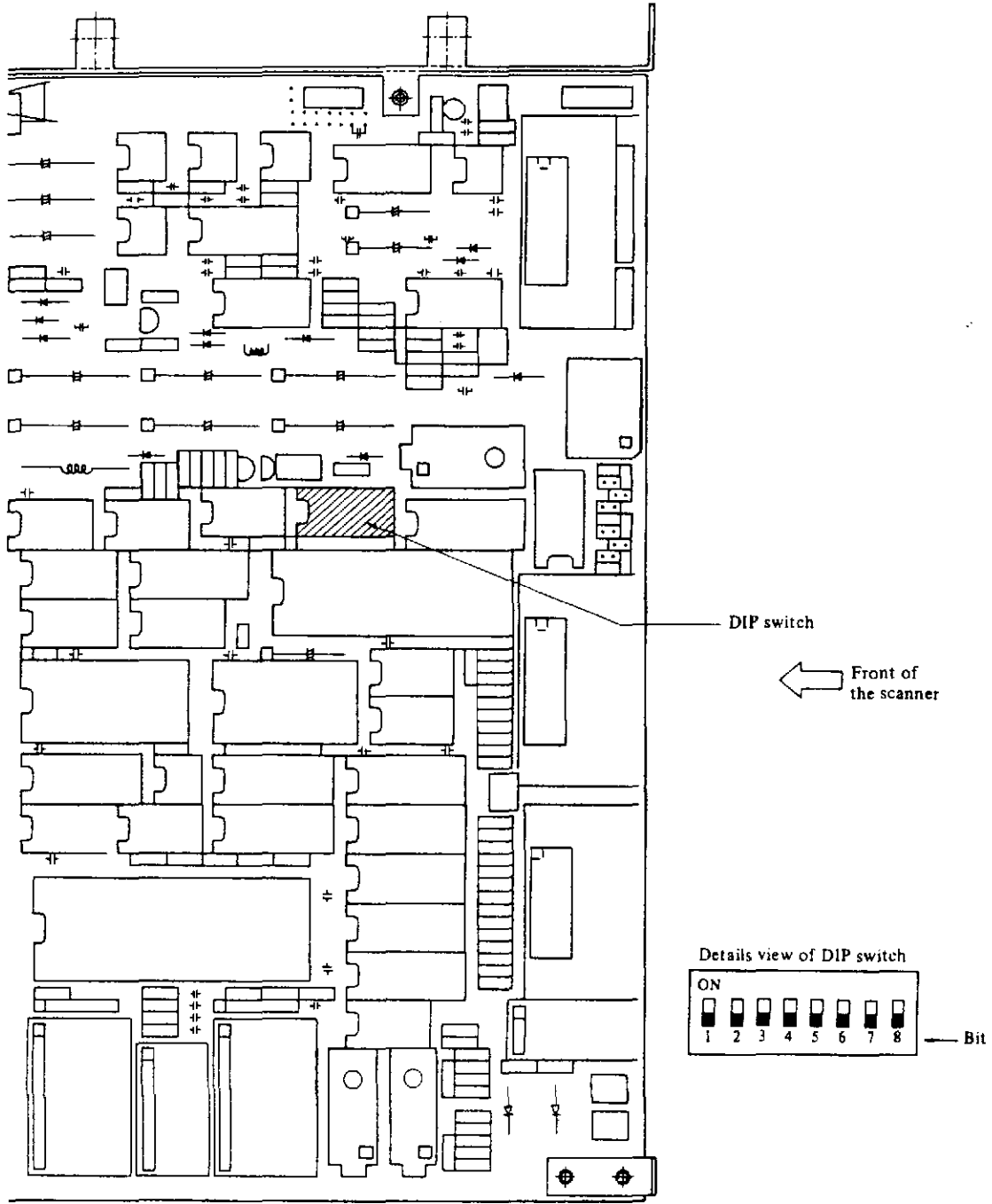


Figure C.2 DIP switch location

## APPENDIX D DROP-OUT COLOR

### D.1 Print Density Measurement

- (1) The spectrum band shown in Figure D.1 is used for measurement.
- (2) A black is used for measuring sufficiently large areas.
- (3) The measurement must be made in one of the following ways:
  - a. A light source using fluorescent material G54 is used.
  - b. Macbeth PCS meter PCMII is used. A special filter is required.

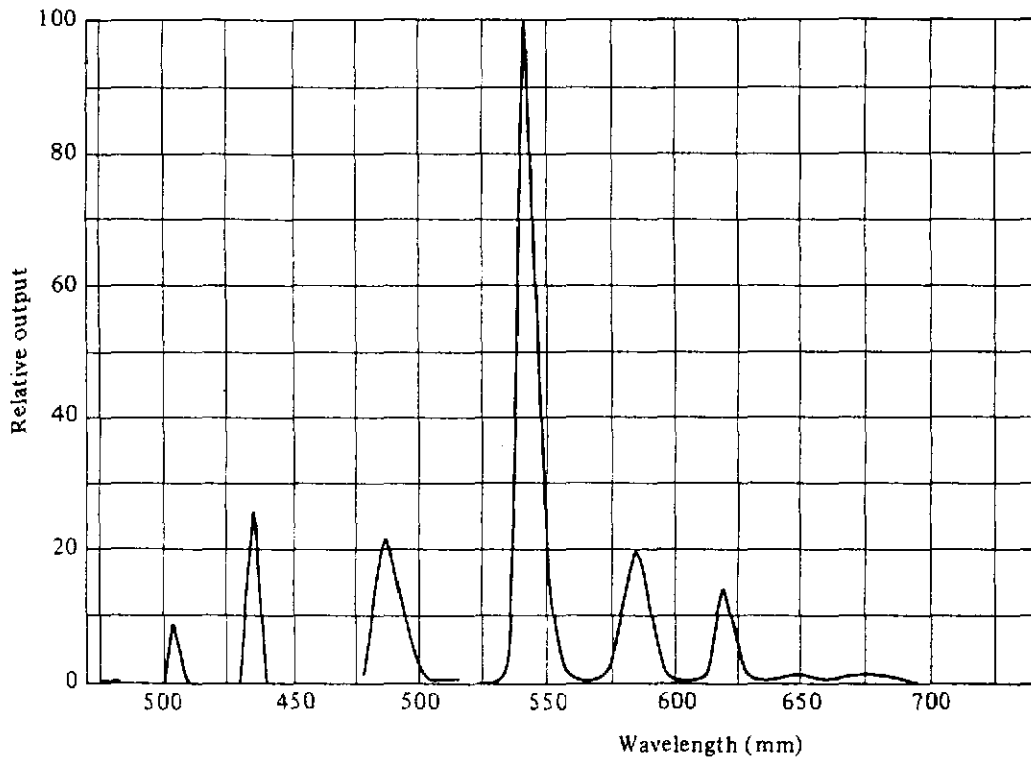


Figure D.1 Spectrum band

### D.2 Drop-Out Color

The drop-out color refers to a printing color visible to people but which cannot be recognized by the scanner. If characters other than the read characters are printed in the background color area, it must be printed in the drop-out color.

As the drop-out color, a printing color (Green) whose maximum PCS value is 0.14 or less and average value is 0.10 or less in the spectrum band shown in Figure D.1 is used.