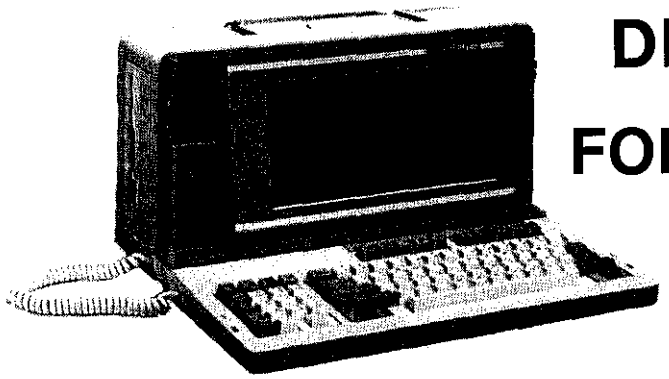
PC-7000A
PC-7100

SHARP SERVICE MANUAL

CODE : 00ZPC7000ADIA



DIAGNOSTIC MANUAL
FOR MODEL PC7000A/7100

CONTENTS

SHARP CORPORATION

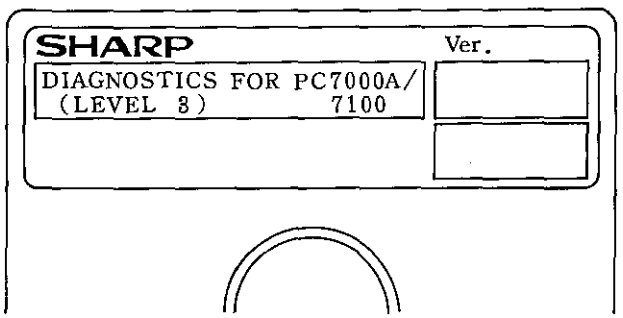
DIAGNOSTIC

1 GENERAL

(1) Introduction

This diagnostics disk serves for adjustment, aging, field maintenance and repair of this personal computer. Although the package employs an interactive entry system to prevent the personal computer from malfunctions such as missoperation, be very careful in handling this diagnostics package.

The diagnostics package is supplied in the form of a floppy disk which is labeled "DIAGNOSTICS FOR PC7000A/7100". The disk incudes the following diagnostics programs in accordance with devices. These diagnostics programs programs are loaded by the DIAG LOADER program described in item 2.



	File name	Device name
Standard	PCMEMDIG	Memory
	PCRTCDIG	Real Time Clock
	PCPRTDIG	Printer
	PCKEYDIG	Keyboard, Speaker
	PCFDDDIG	Floppy Disk Drive (s)
	PCSIODIG	Serial Interface Adaptor
	PCLCDDIG	Liquid Crystal Display
Option	PCCRTDIG	Color CRT Adaptor
	PCMONDIG	Monochrome CRT Adaptor
	PCMDMDIG	Modem Card
Expansion	PCEXPDIG	Expansion Unit
	PCDSKDIG	Hard Disk Drive (s)

(2) Notation in Manual

▣ represents the content of display and a digit being entered. A message is shown as " ". A key that the operator presses is depicted as [[ ]]. For example, a message is surrounded by a set of double-quotation marks like

"Mr. Yamada is fine."

In case of key entry, the sentence 'Press the ESC key.' is shown in the manual as 'Press [[ESC]]'.

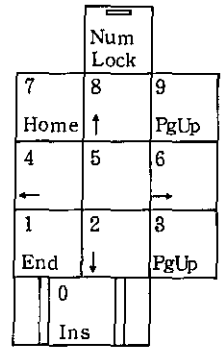
(3) Key Entry

(3.1) Decimal Code Entry

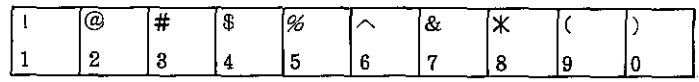
[0] to [9] can be entered by using the numeric keys [[0]] to [[9]] and those of the typewriter keys.

When entering decimal codes through the numeric keys, press [[Numeric Lock]] and check to see that the LED on the [[Numeric Lock]] lights on.

(i) Numeric Keys



(ii) Typewriter Keys



While a diagnostics program is executed, [[0]] to [[9]] of the typewriter keys function as data keys irrespective of [[Shift]]. For example, even if [[1]] is entered while the shift key of the typewriter keys is pressed, numeric data [1] is entered.

(3.2) Hexadecimal Code Entry

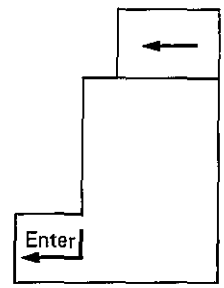
Codes from [0] to [9] can be entered in the same manner as the decimal numbers; codes [A], [B], [C], [D], [E], and [F] should be entered by using [[A]] to [[F]] of the typewriter keys.

Like the decimal code entry, while a diagnostics program is executed, [[A]] to [[F]] of the typewriter keys function as data keys irrespective of the state of [[Shift]]. For example, even if [a] is entered while the shift key is pressed, code [A] is entered.

(3.3) Terminate and Clear Entry Keys

(i) Numeric Keys

(ii) Typewriter Keys



[[←]] (Delete) . . . . . Deletes all the data entered through the data keys.

[[－]] (Minus) . . . . . This key functions to details, see the description of each program.

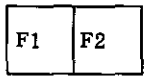
[[↵]] (Enter) . . . . . Completes data entry.

(3.4) Function Keys

The following keys can be used for function keys.

(i) Numeric Keys

(ii) Programmable Function Keys



[[ESC]] (BREAK)

Changes a running diagnostics program to another diagnostics program and immediately interrupts the execution of the diagnostics program. This key operation is available anytime. Whenever this key is pressed (even in key entry waiting state), control exits to the program being called.

[[F1]] (RUN)

Restarts the program being interrupted.

This key is used together with the [[F2]]. For details, see the description of each program.

[[F2]] (STOP)

Temporarily interrupts the execution of the aging program being looped.

For details, see the description of each program.

(4) Loading Diagnostics Disk

Since the diagnostics disk runs on MS-DOS, first of all, the personal computer should boot up the MS-DOS.

DOS.

For the booting procedure, refer to the instruction book chapter 4.

When the system is properly booted up, the opening message is displayed on the LCD as follows.

```
SHARP Personal Computer System
I/O Subsystem version X.XX
Copyright (C) 1985 by VADEM Inc.
All Rights Reserved

Microsoft MS-DOS version 2.11
Copyright 1981, 82, 83 Microsoft Corp.

Command v.2.11

A > path a: \bin;

A >
A > ▮
```

Figure DIAG-1 MS-DOS Opening Message

If another message appears on the screen, when the MS-DOS system is properly loaded to the computer, see Chapter 4. of instruction book and take the proper action.

```
Loading . . . . . Error !

Disk Error on Drive Not Ready reading Boot Sector !
Please Insert a System Disk and Press any Key : ▮
```

Figure DIAG-2 Example of Error Massage when MS-DOS is not properly loaded

After the MS-DOS is properly loaded, insert the diagnostics disk into the drive A or the drive B.

When inserting the diagnostics disk into the drive A, type "PCDIAG3" and press [[↵]].

Meanwhile, when inserting the disk into the drive B, type "B:PCDIAG3" and press [[↵]].

The LCD displays one of the following messages in accordance with the drive where the system disk is inserted and then the computer loads the diagnostics level 3 package from the disk.

```
A > pcdiag3
▮
```

```
A > b:pcdiag3
▮
```

(5) Input/Output Display

Input/output display is roughly classified into the following colors only when the color CRT adaptor is used.

CYAN	Represents an input request.
WHITE	Represents the version of the diagnostics program.
GREEN	Represents the existing execution phase of the program such as test mode.
RED	Represents an error concerning a device. If this display appears on the lower left screen, it represents an unrecoverable error.
YELLOW	Represents an error or an input request where careful entry operation is required.

(5.1) Input Display

[0x] represents data entry in hexadecimal notation; no [0x] represents data entry in decimal notation.

```
Binary [0x] = ▮▮▮▮▮▮
```

The preceding display requires data entry in hexadecimal notation.

When completing data entry by using [[↵]], if data entry has not been made or just after [[←]] is pressed, considering the [[0]] has been entered, the system causes

the screen to display "0" and executes the relating processing. (Default value is [0].)

(5.2) Output Display

Like the input display described above, [0x] represents data output in hexadecimal notation; no [0x] represents data output in decimal notation.

Count [0x] = ▒▒▒▒▒

The preceding display requires data output in hexadecimal notation.

Errors concerning program continuance such as a device error are displayed on the 24th and 25th lines on the lower left screen. At the time, the system only accepts [[ESC]]. (When the color CRT adapter is used, the error is displayed in red.)

Besides the above error, the screen displays the following output information.

1st line . . . . . Displays the title.
2nd to 20th lines . . . . . Displays information of each device.
21st to 23rd lines . . . . . Displays the error status of each device.

(6) Version of Diagnostics Programs

The version control is in charge of the third Engineering Section of Computer Division and Reliability Center of Sharp Corporation.

The diagnostics package is roughly classified into DIAG LOADER and various device diagnostics programs.

(6.1) Versions of Devices

The version of each device is displayed on the test menu when the diagnostics program of each device is specified. For example, when specifying the memory test, the following message appears on the screen.

SHARP Personal Computer System Diagnostics Level. 3

Date Jul/01/'85 ⟵ Represents the date on which the version of diagnostics program is updated

Memory [1.0] ⟵ Represents the version of this diagnostics program.

Memory size = ▒▒▒ KB (0 x 00000 – 0x ▒▒▒▒▒)

(0) Marching
(1) . . .

---

2 DIAGNOSTICS LOADER

(1) Introduction

The DIAG LOADER (named LOADER) serves to select and execute one of the diagnostics programs for individual devices (named DIAG program) provided as this parsonal computer diagnostics package.

(1.1) Starting up LOADER

For loading the LOADER program see PC-7000A/7100 DIAGNOSTIC power on diagnostic.

When the LOADER is properly loaded, the opening message of the DIAGNOSTICS Level. 3 is displayed.

The following message is reversed in the center of the opening message.

Please depress any key to start diagnostics.

Pressing any key causes the DIAG program to be executed.

(1.2) System Configuration Display

When the LOADER is started up, the system displays the device names which are accommodated on the screen.

SYSTEM BOARD
384 (512, 640, 768) KB MEMORY
LIQUID CRYSTAL DISPLAY
KEYBOARD
REAL TIME CLOCK
PRINTER ADAPTOR
SERIAL I/O ADAPTOR
2 FLOPPY DISK DRIVE (S), ADAPTOR
CO-PROCESSOR 8087
COLOR CRT ADAPTOR
MODEM CARD
EXPANSION UNIT
EXTERNAL HARD DISK DRIVE, ADAPTOR

Check whether the list displayed on the screen is correct or not. To proceed to the next step, press either [[ESC]] or [[↵]].

NOTE: "384 (512, 640, 768) KB MEMORY" represents the memory capacity available in the system. Actually, one of 384, 512, 640, and 768 KB is displayed.

For the PC-7100 the screen will be displayed "INTERNAL HARD DISK DRIVE, ADAPTOR"

(1.3) Flow of Control

After the LOADER is started up, it controls the system. The LOADER requires the selection of each condition and one of the DIAG programs. When the user properly makes such selections, the LOADER loads the test and data of the DIAG program from the floppy disk to the memory of the personal computer and then transfers the control to the DIAG program.

After that, execute the DIAG program in the operation procedure described in the manual of each device.

When control exits to (that is, is returned to) the LOADER

described in Paragraph (2.3) while the DIAG program is executed, control exits to the LOADER and it requires the selection of DIAG program.

(2) Operation

(2.1) Selection of Drive

After the system configuration is displayed, as shown in Figure LOAD-1 the system displays the title and inquires the selection of the floppy disk drive where the DIAGNOSTICS disk is inserted.

```
Which drive unit had you selected?
[0: Drive A, 1: Drive B] = ▮
```

Figure LOAD-1

If an improper disk drive selection is made, namely if the Drive B is selected while the DIAGNOSTICS disk is inserted into Drive A, the system displays the following message on the screen.

"Timeout error. [Not ready]"

If the inserted disk does not include the DIAGNOSTICS disk, the following message appears.

"This media is not DIAGNOSTICS"

When one of the preceding error messages appears on the screen, the system awaits [[↵]] or [[ESC]], followed by proper drive selection.

This drive selection is required only when the LOADER is started up. While a DIAG program runs, the drive selection is not required.

In order to conduct the drive selection once again, press [[ESC]] in the SELECTION OF THE DIAG PROGRAM described later.

In selecting the drive, pressing [[ESC]] causes control to exit to the system.

(2.2) Selection of DIAG Program

After individual selections are properly made, as shown in Figure LOAD-2, the system displays the selection screen of the DIAG programs.

```
What do you select the number of diagnostics program?
▮▮
    (00) Memory
    (01) Key board & Speaker
    .....
```

Figure LOAD-2

Enter the number in parenthesis of DIAG program to be executed.

If a number which is not displayed on the screen is entered, the system requires entering the required number on the screen.

After a DIAG program is properly selected, the system clears the screen and displays the following message.

"LOADING START !"

The system loads the DIAG program into the memory. Upon completion of loading the program, the system executes the DIAG program.

If the system cannot properly load the program from the diagnostics package, it displays the following message.

"Disk read error."

At the time, press either [[ESC]] or [[↵]] to exit to "Selection of DIAG Programs".

In the DIAG program selection mode, when pressing [[ESC]], control exits to "(2.1) Selection of Drive".

(2.3) Exit to LOADER

To try to execute another DIAG program while one DIAG program runs, it is necessary to exit to the LOADER. At the time, first exit the initial screen of each DIAG program (that is, menu screen of DIAG program) and then press [[ESC]] in order to return control back to the DIAG program selection screen (Figure LOAD-2) of LOADER. On the menu screen, select the required DIAG program.

To exit to the LOADER while the screen is not the initial screen, press [[ESC]] to exit to the initial screen by referencing the manual of related DIAG program.

(3) Memory Map

The memory capacity of the system should be structured in the range of 384 KB to 768 KB. In that range, the memory capacity can be freely expanded in the unit of 128 KB.

In the following description, 384 KB of memory capacity is exemplified. (see Figure LOAD-3.)

(a) VECTOR Area
Memory addresses $00000 to $003FF are used for vector area, which are set when the power on initialization by ROM.

(b) USER'S Area
Memory addresses $00400 to $55FFF are used for user's area, which serves to load a DIAGNOSTICS program selected by the LOADER from the diagnostic disk and execute the program.

Example: In case of 384 KB of memory capacity

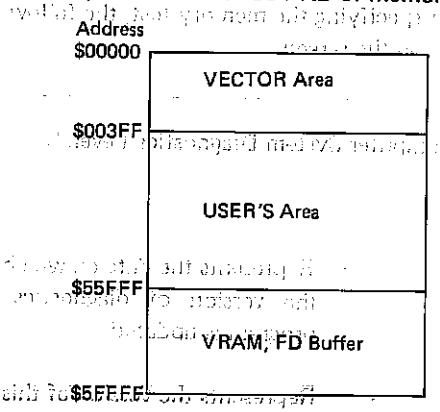


Figure LOAD-3 Memory Map

(4) Error Messages

Error messages available in the LOADER represent the following meanings.

- Timeout error [Not ready]
  The drive being specified was in the Not-ready state.
- Disk read error
  Read error occurred while the floppy disk was accessed.
- This disk is not DIAGNOSTIC.
  The disk did not include the DIAGNOSTICS package.

3 MEMORY DIAGNOSTICS

(1) Outline

The MEMORY DIAGNOSTICS program serves to test the function of the memory (referred to as MEM in the following explanation). The memory area which can be tested is the entire accommodable area except for the vector area and the area where the MS-DOS is loaded.

(1.1) Test Menu display

When this program is started up, the system displays the title and the memory test menu as shown in Figure MEM-1. This display is referred to as the MEM test menu.

```
SHARP Personal Computer System Diagnostics Level. 3


Data Dec/01/'85

   MEMORY [1.1]

Memory size =  ▒▒▒  KB (0x00000 – 0x▒▒▒▒▒)
   (0) Marching
   (1) Address complement
   (2) Aging [Marching and ADCOMP]

                          Please input command? ▒
```

Figure MEM-1 MEM Test menu

The MEM test menu shows the memory capacity accommodated in the system on the upper screen.

```
Memory size =  ▒▒▒  KB (0x00000 – 0x▒▒▒▒▒)
```

The maximum memory capacity of this personal computer is 768 KB.
Prior to conducting the test, check whether the memory capacity being displayed is the same as that being accommodated.
If the memory capacities are not identical, a part of the memory chip has been damaged. At that time, the system should be repaired.

(1.2) Selection of Test Menu

Enter the required test number on the test menu as follows: [[0]] to [[2]] (1 digit) + [[↵]] (When specifying [[0]], it is possible to press [[↵]] only.)
The number being entered is displayed on the screen. When pressing [[↵]], the specified diagnostics program is started up.
To change the test number, delete the number being entered by using [[←]] and then enter the correct number.

(1.3) Exiting Test Menu

When [[ESC]] is entered before entering [[↵]], control exits to the DIAG LOADER.

(1.4) Others

Parameters of each test program are entered through 10 key + [[↵]], When each test program is called, by pressing [[ESC]], control exits to the MEM test menu (Figure MEM-1).

(2) Description of Program

(2.1) Marching

(2.1.1) Outline

After writing fixed data to the entire memory area, the system sequentially reads data and compares it.
After reading data, the system writes other data.
The test procedure is outlined as follows:

1) 0 → M: "00" W
2) M → 0: "00" R, "FF" W
3) 0 → M: "FF" R, "EE" W
4) M → 0: "EE" R, "DD" W
5) 0 → M: "DD" R, "BB" W
6) M → 0: "BB" R, "77" W
7) 0 → M: "77" R, "11" W
8) M → 0: "11" R, "22" W
9) 0 → M: "22" R, "44" W
10) M → 0: "44" R, "88" W
11) 0 → M: "88" R

where test area 0 → M
data = "nn"
Memory read = R
Memory write = W

The program serves to test the entire memory area displayed as the memory size in the order listed above.

(2.1.2) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure MEM-2.
(a) Test
(a.1) Specification of Error Stop

```
Error stop ? [ 0: Yes, 1: No]=▒
```

If an error occurs while conducting this test, specify whether to abort or continue the test.

(a.2) Confirmation of Test Execution

```
Test start ? [0: Yes, 1: No] = ▒
```

Confirm whether to execute the test or not.
When entering [[1]], the test can be conducted from "Specifications of Error Stop" mentioned in (a.1). On the other hand, when entering [[0]], the system displays the screen as shown in Figure MEM-2 and starts the test.

The system displays the current area and total area in hexadecimal notation on the lower screen.

```
Current area [0x] = XXXXX - XXXXX
Total error [0x] = XXXX
```

The current area represents the area being tested in the unit of 4 KB physical address. The total error represents the number of times an error occurs.
This message is not displayed while V-RAM area is tested.

(2.1.3) Abortion and Completion of Test

Although [[ESC]] and [[F2]] are available while the test is conducted, a time lag occurs because these key operations are processed in the state where the executing program step is completed.
By pressing [[ESC]], control exits to the MEM test menu (Figure MEM-1).
By pressing [[F2]], the system displays the following message on the lower left screen and aborts the test.
"Test stopped by user."
At the time, by pressing [[F1]], the system continues the test; by pressing [[ESC]], control exits to the MEM test menu (Figure MEM-1).
When the following message appears on the lower screen, the system completes the test.

```
ESC: end, Enter: start ?
```

In this state, ESC: represents [[ESC]]. By pressing this key, control exits to the MEM test menu (Figure MEM-1). Enter: represents [[↵]]. By pressing this key, control returns to "Specification of Error Stop" mentioned in (a.1).

(2.1.4) Error Processing

When the total error is zero, the system does not detect an error in the test. On the other hand, if the system detects an error, it displays the following error message on the error message field.

"Memory error ! !"

In addition, if the Error Stop is specified as "Yes", the system displays the following message and stops the test.

"Test stopped ! !"

If the Error Stop is specified as "No", the system displays the address, data, and relating IC number where the error occurs.

(2.2) Address complement

(2.2.1) Outline

This test serves to write the lower 8 bits of data to the memory address and then lower the 8 bits of data to the address which is one's complement of the former address. With this procedure, after writing data to the entire area, the system reads the data in the order where data is written and compares them.

The test procedure is outlined as follows:

```
1)  0 → M
    1.1)  N      : "Lower 8 bits of N"      W
    1.2)  M — N  : "Lower 8 bits of M — N"  W
2)  0 → M
    2.1)  N      : "Lower 8 bits of N"      R
    2.2)  M — N  : "Lower 8 bits of M — N"  R
    Where   Test area 0 → M
            Data = "nn"
            Any address = "N"
            Memory read = R
            Memory write = W
```

The program serves to test the entire memory area displayed as the memory size in the preceding order.

(2.2.2) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure MEM-3.
(a) Confirmation of Test Execution

```
Test start ? [ 0: Yes, 1: No] = X
```

Confirm whether to execute the test or not.
When entering [[0]], the system starts the test. On the other hand, when entering [[1]], control exits to the MEM test menu (Figure MEM-1).
Only in this test, the test area being executed is not displayed. Instead, the system displays the following message.

"Test executing !! Don't touch me !!"

This message is not displayed while V-RAM area is tested.

(2.2.3) Abortion and Completion of Test

Although [[ESC]] and [[F2]] are available while the test is conducted, a time lag occurs because these key operations are processed in the state where the executing program step is completed.
By pressing [[ESC]], control exits to the MEM test menu (Figure MEM-1).
By pressing [[F2]], the system displays the following message on the lower left screen and aborts the test.

"Test stopped by user."

At the time, by pressing [[F1]], the system continues the test; by pressing [[ESC]], control exits to the MEM test menu (Figure MEM-1).
When the following message appears on the lower screen, the system completes the test.

```
ESC: end, Enter: start ?
```

In this state, ESC: represents [[ESC]]. By pressing this key, control exits to the MEM test menu (Figure MEM-1). Enter: represents [[↵]]. By pressing this key, control returns to "Confermation of Test Execution" mentioned in (a).

(2.2.4) Error Processing

When the total error is zero, the system does not detect an error in the test. On the other hand, if the system detects an error, it displays the following error message on the error message field and continues the test.

"Memory error ! !"

If the system detects an error, it displays the address, data, and relating IC number where the error occurs.

(2.3) Aging [Marching and ADCOMP] .

(2.3.1) Outline

This program serves as an aging test for the memory. It alternately conducts marching test and address complement test.

For details of the program, see Paragraphs (2.1) "Marching" and (2.2) "Address Complement".

(2.3.2.) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure MEM-4.

(a) Test

(a.1) Specification of Error Stop

```
Error stop ? [0: Yes, 1: No] = 0
```

If an error occurs while conducting the test, specify whether to abort or continue the test.

(a.2) Confirmation of Test Execution

```
Test start ? [0: Yes, 1: No] = 0
```

Confirm whether to execute the test or not.

When entering [[1]], the test can be conducted from "Specification of Error Stop" mentioned in (a.1). On the other hand, when entering [[0]], the system displays the screen as shown in Figure MEM-4 and starts the test.

The system displays the current area and total area in hexadecimal notation on the lower portion of the screen.

```
Test mode: Marching

Pass count [0x] =     0000
Current area [ 0x] = 00000 - 00000
Total error [0x] =    0000
```

The test mode represents the currently executing mode (Marching, Address complement). The pass count represents the number of times of test pass.

The current area represents the area being tested in the unit of 4 KB physical address. The total error represents the number of times an error occurs.

(2.3.3) Abortion and Completion of Test

Although [[ESC]] and [[F2]] are available while the test is conducted, a time lag occurs because these key operations are processed in the state where the executing program step is completed.

By pressing [[ESC]], control exits to the MEM test menu (Figure MEM-1).

By pressing [[F2]], the system displays the following message on the lower left screen and aborts the test.

"Test stopped by user."

At the time, by pressing [[F1]], the system continues the test; by pressing [[ESC]], control exits to the MEM test menu (Figure MEM-1).

Whenever one test is completed, the system increments the pass count and repeats the test.

(2.3.4) Error Processing

When the total error is zero, the system does not detect an error in the test. On the other hand, if the system detects an error, it displays the following error message on the error message field.

"Memory error ! !"

In addition, it the Error Stop is set to "Yes", the system displays the following message and aborts the test.

"Test stopped !!"

If the Error Stop is specified to "No", the system displays only the preceding message and continues the test.

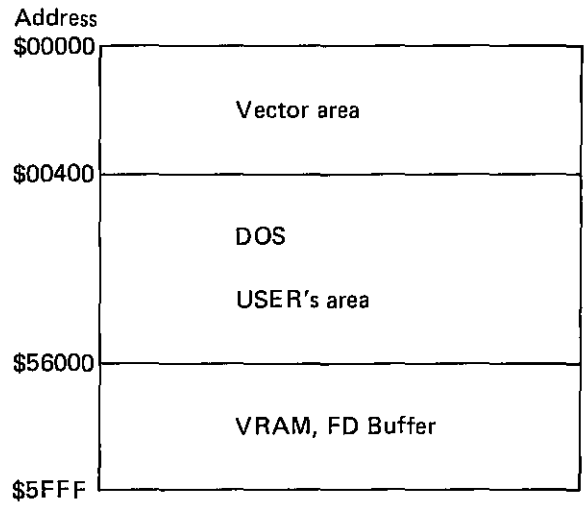
(3) Decision Standard

The system represents a compare error unless the total error is "0" when the test is completed. If the system detects an error, it displays the address, data, and the relating IC number where the error occurs.

All addresses being displayed are physical addresses of the memory.

(4) Supplementary Description of Test Function

In the following, this test is exemplified in detail by using 384 KB of memory capacity.



4 KEYBOARD & SPEAKER DIAGNOSTICS

(1) Outline

The KEYBOARD & SPEAKER DIAGNOSTICS program serves to test the function of the keyboard and speaker (referred to as KEY in the following discussion) of the personal computer.

(1.1) Test Menu Display

When this program is started up, the system displays the title and the key board and speaker test menu as shown in Figure KEY-1.

Input test for the keyboard and test for the speaker are executed by this program at the same time.

This display is referred to as the KEY test menu.

```
SHARP Personal Computer System Diagnostics Level. 3

Date Jul/01/'85

Keyboard & Speaker [1.0]

(0) Test Keyboard & Speaker

Please input command? _
```

Figure KEY-1 KEY Test Menu

(1.2) Selecting test menu

Enter the optional test No..

Input order is as follows:

[[0]] + [[↵]] (entering only [[↵]] is allowed.)

The entered numeric is displayed on the screen, and the test program specified by [[↵]] is started.

When the test No. is to be changed, after deleting input data by [[←]], enter the correct No..

(1.3) Exiting Test Menu

When [[ESC]] is entered before entering [[↵]], control exits the DIAG LOADER.

(2) Explanation of the program

(2.1) Test Execution

A simulation screen of the keyboard is displayed.

When the any key is pressed under this status, the appropriate key on the simulation screen is changed, and the hard code (direct data from the keyboard) of the pressed key is displayed in the key data position at the bottom of the screen.

"Key data = 0x ▯▯ "

When the any key is pressed, an asterisk "*" is displayed by inversion at the appropriate key position.

Keys with LEDs such as [[Caps Lock]] contain the function as given above, and the LED of the appropriate key is set to ON or OFF every time the key is pressed. When the LED on the keyboard is set to ON or OFF a message is displayed on the screen. For example, when [[Num Lock]] is pressed, and if the LED is set to ON, "Num Lock ON" is displayed.

This message is the newest message when the appropriate key is pressed.

Besides, the speaker in the main unit may be tested by this program using programmable definable keys from [[F1]] to [[F10]].

By [[F1]], the lowest sound is made, and by [[F10]], the highest sound is made. And for keys from [[F2]] to [[F9]], a sound between the lowest sound and the highest shound is divided into 8 steps.

(2.2) Interruption of termination of a test

While executing a test, if [[ESC]] is pressed twice consecutively, control exists to the KEY test menu (Fig. KEY-1) is returned.

5. L.C.D. DIAGNOSTICS

(1) Outline

The L.C.D DIAGNOSTICS program served to test the function of the L.C. D. of this personal computer.

For the monochrome mode, the control will automatically interrogate it and the test will not be applicable for the monochrome mode, and the following is displayed in the center of the screen.

```
This test works on GRAPHICS mode only.

Please change the display mode to GRAPHICS.
```

Depression of the [ESC] key causes the control to return to the DIAG LOADER program.

(1.1) Test Menu Display

When this program is started up, the system display the title and the LCD test menu shown in Figure LCD-1.

This display is referred to as LCD test menu.

```
SHARP Personal Computer System Diagnostics Level. 3

Data Oct/01/'86

Liquid Crystal Display [1.1]

(0) Check pattern
(1) Line move
(2) Stripe
(3) LCD RAM test

Please input command ? _
```

Fig. LCD-1 LCD Test Menu

(1-2) Selecting test menu

Enter the optional test No..

Input order is as follows:

[[0]] ~ [[3]] (1digit) + [[↵]]

(entering only [[↵]] is allowed in case of [[0]].

The entered numeric is displayed on the screen, and the test program specified by [[↵]] is started.

When the test No. is to be changed, after deleting input data by [[←]], enter the correct No..

(1.3) Exiting Test Menu

When [[ESC]] is entered before entering [[↵]], control exits to the DIAG LOADER.

(1.4) Others

Parameters of each test program are entered through key 10 + [[↵]]. When each test program is called, by pressing [[ESC]], control exits to the LCD test menu (Figure LCD-1).

(2) Explanation of each test program

(2.1) Check pattern

(2.1.1) Outline

A checker is displayed on the L.C.D.

(2.1.2) Operation

When this test is specified, display is started automatically. Therefore, operation is not neeeded.

(a) Test

(a.1) Displayed pattern

As a pattern, all dots of the L.C.D are displayed; then, each checker of 1, 2, 4 and 8 dots is displayed sequentially by inversion. Then, the initial display is returned.

(a.2) Interruption or termination of a test

While executing a test, if [[ESC]] is pressed, processing is terminated and control exits to the LCD test menu (Figure LCD-1); if [[F2]] is pressed;

"Test stopped by user."

is displayed to interrupt processing. Under this status, if [[F1]] is pressed, processing is restarted, and if [[ESC]] is pressed control exists to the LCD test menu (Figure LCD-1).

(2.2) Line move

(2.2.1) Outline

An ablique line is moved on to the L.C.D.

(2.2.2) Operation

When this test is specified, display is started automatically. Therefore, operation is not needed.

(a) Test

(a.1) Display pattern

An ablique line is moved from the upper left of the L.C.D. to the right by each dot. and when it has reached the right-most bottom, the screen is inverted, and a white oblique line is moved in the same way.

When these two displays are completed, the initial display is returned. Then, processing is repeated.

(a.2) Interruption and termination of a test

While executing a test, if [[ESC]] is pressed, processing is terminated and control exists to the LCD test menu (Fig. LCD-1) If [[F2]] is pressed;

"Test stopped by user."

is displayed to interrupt processing. Under this status, if [[F1]] is pressed, processing is restarted, and if [[ESC]] is pressed control exists to the LCD test menu (Figure LCD-1).

(2.3) Stripe

(2.3.1) Outline

A stripe is displayed on the L.C.D.

(2.3.2) Operation

When this test is specified, display is started automatically. Therefore, operation is not needed.

(a) Test

(a.1) Display pattern

Displays of a patterns containing horizontal, vertical, and each inversion are repeated on the L.C.D.

(a-2) Interruption and termination of a test

While executing test, if [[ESC]] is pressed, processing is terminated and control exists to the LCD test menu Figure LCD-1) is returned.

If [[F2]] is pressed;

"Test stopped by user".

is displayed to interrupt processing. Under this status, if [[F1]] is pressed, processing is restarted, and if [[ESC]] is pressed, control exists to LCD test menu (Figure LCD-1).

(2.4) LCD RAM test

(2.4.1) Outline

Write/read test of display buffer is executed.

(2.4.2) Operation

When this test is specified, the test is started automatically. Therefore, operation is not needed.

(a) Test

(a.1) Address complement

After writing address offset into LCD RAM as data, the system reads the data and compares them.

(a.2) Marching

After writing the fixed data into LCD RAM, the system sequentially reads data and compares it.

(a.3) Interruption or termination of a test.

While executing a test, if [[ESC]] is pressed, processing is terminated and control exists to LCD test menu (Figure LCD-1). If [[F2]] is pressed;

"Test stopped by user."

is displayed to interrupt processing. Under this status, if [[F1]] is pressed, processing is restarted, and if [[ESC]] is pressed control exists to the LCD test menu (Figure LCD-1). When the following display appears at the bottom of the screen, the test is terminated normally:

LCD RAM TEST OK ! !

When entering either [[ESC]] or [[↵]] is entered, control exists to the LCD test menu (Figure LCD-1).

(a.4) Error processing

When an error occurs while executing a test, the following display appears:

"Address complement error !!" or

"Marching error !!"

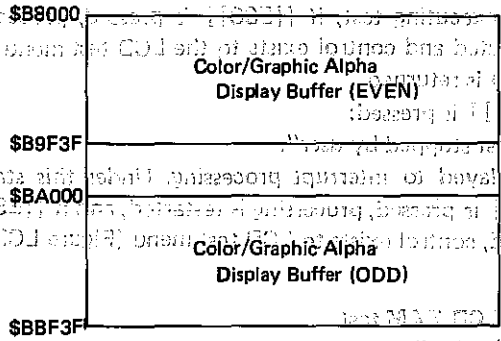
and an address or data in which an error occurs is displayed as follows:

V-RAM address location : 0x□□□□□
Write & Read data : 0x□□□□/0x□□□□

If [[ESC]] or [[↵]] is is entered, control exists to the LCD test menu (Figure LCD-1).

(a.5) Memory map

The area in which test is to be executed is given below.



6 REAL TIME CLOCK DIAGNOSTICS

(1) Outline

The REAL TIME CLOCK DIAGNOSTICS program serves to test the function of the clock (refered to as CLK in the following explanation) of this personal computer.

```
**********************************************
*  While executing one of the following programs, do  *
*  not turn off this personal computer. Otherwise,    *
*  it causes the clock to go wrong and the battery    *
*  backup time to be shortened.                       *
**********************************************
```

(1.1) Test Menu Display

When this program is started up, the system checks the battery and internal RAM chips. If the system detects an error, it displays an error message. At the time, by pressing [[ESC]] or [[↵]], control exits to the DIAG LOADER. When the system does not detect an error, it displays the title and clock test menu as shown in Figure CLK-1. This initial state is named CLK test menu.

```
SHARP Personal Computer System Diagnostics Level.3

Date Jul/01/'85

   Real Time Clock [1.0]

      (0) Clock reset & set
      (1) Clock read
      (2) Clock adjustment
      (3) RAM display

                    Please input command ? 
```

Figure CLK-1 CLK Test Menu

(1.2) Selection of Test Menu

Enter the required test number on the test menu as follows: [[0]] to [[3]] (1 digit) + [[↵]]. (When specifying [[0]], it is possible to press [[↵]] only.)

The number being entered is displayed on the screen. When pressing [[↵]], the specified diagnostics program is started up.

To change the test number, delete the number being entered by using [[←]] and then enter the correct number.

(1.3) Existing Test Menu

When [[ESC]] is entered before entering followed by [[↵]], control exits to the DIAG LOADER.

(1.4) Others

Parameters of each test program are entered through 10-keys + [[↵]]. When each test program is called, by pressing [[ESC]], control exits to the CLK test menu (Figure CLK-1).

(2) Description of Program

(2.1) Clock Reset & Set

(2.1.1) Outline

This program serves to set date (year, month, and day) and time (hour, minute, and second) and then to display time being set and the current time.

Date and time can be set in the range of "January 1, 1980 00:00:00" to "December 31, 2079 23: 59: 59".

Date and time are directly written and read to and from the hardware.

(2.1.2) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure CLK-2.

(a) Test

(a.1) Date Data Set (1) . . . Specify year, month, and day.

```
Date set (YYYYMMDD) = 
```

Set year, month, and day (YYYYMMDD) where year (YYYY) is four digits, month (MM) is two digits, and day (DD) is two digits. Note that the ten's digits of month and day (DD) is two digits. Note that the ten's digits of month and day should be filled with zero when the month number is in the range of "January" to "September" and when the day number is in the range of "1" to "9". For example, when specifying the date of September 9, 1985, enter "19850909". If date is improperly specified (such as February 30), the system cancels such data entry and inquires data entry once again.

(a.2) Time Data Set (2) . . . Specify hour, minute, and Second.

```
Time set (HHMMSS) = 
```

Set hour (HH), minute (MM), and second (SS) in each two digits in the 24-hour system.
For example, when specifying 7:9:9 pm, enter "190909".
If time is improperly specified (such as 19:60:51), the system cancels such data entry and inquires data entry once again.

(a.3) Confirmation of Date and Time Set

```
Set ok ? [0: Yes, 1: No] = 0
```

Confirm whether to execute the setting of data and time or not. When the system completes the setting of date and time, it also set the digits of second.
When entering [[1]], the test can be conducted from (a.1) "Date Set (1)" mentioned in (a.1).
On the other hand when entering [[0]], the system registers date and time data being set and displays date and time being set (set time) and current date and time (read time).

```
Set   time: SEP-09-1985   19:09:09
Read  time: SEP-09-1985   19:09:38
```

The program automatically converts the month display format from numeric digits to alphabet characters. Note that the system display "JAN-01-1980 00:00:00" just after "DEC-12-2079 23:59:59".

(2.1.3) Abortion and Completion of Test
If [[ESC]] or [[↵]] is entered control exits to the CLK test menu (Figure CLK-1).

(2.2) Clock Read
(2.2.1) Outline
This program serves to read data and time data and to display the current date and time.

(2.2.2) Operation
When this test is specified, the system immediately executes the program and displays the message as shown in Figure CLK-3.

(a) Test

```
Read Time: SEP-09-1985   19:09:09
```

The system always displays the current date and time. The program automatically converts the month display format from numeric digits to alphabet characters.

(2.2.3) Abortion and Completion of Test
If [[ESC]] or [[↵]] is entered, control exits to the CLK test menu (Figure CLK-1).

(2.3) Clock Adjustment
(2.3.1) Outline
This program serves to output the hardware signal 2048Hz for adjusting oscillating frequency of the clock circuit to the test terminals of SWQ terminals (pins No.23) of the RTC [MC146818].
This program calibrates time lag by setting the hardware signal to 2048 Hz by using of a frequency counter.
To conduct the frequency calibration, adjust the trimmer condenser [C11] on the circuit.

(2.3.2) Operation
When specifying this test, system immediately executes the program and displays the message as shown in Figure CLK-4.
Therefore, operation is not needed.

```
Adjusting clock [2048 Kz] ON !
```

(2.3.3) Abortion and Completion of Test
If [[ESC]] or [[↵]] is entered control exits to the CLK test menu (Figure CLK-1).

(2.4) RAM Display
(2.4.1) Outline
This program displays the contents of the internal RAM chips of the RTC.

(2.4.2) Operation
The system does not require the operator's intervention. It immediately executes the DIAG program and displays the message as shown in Figure CLK-5.
It dumps ASCII codes and characters in the range of 0x0E of 0x3F of the address register.

(2.4.3) Abortion and Completion of Program
By pressing either [[ESC]] or [[↵]], the control exits to the CLK test menu (Figure CLK-1).

7 SERIAL I/O DIAGNOSTICS

(1) Outline

The SERIAL I/O DIAGNOSTIC program serves to test the function of the RS-232C serial interface of personal computer.

Reffered to SIO in the following explanation.

```
*********************************************
* This diagnostics program is designed to conduct a *
* loop test. Consequently, it is necessary to connect the *
* connector, which is manufactured in accordance with *
* "(4) SIO Loop Test Use Connector Specification" *
* to the channel to be tested as a dummy load. *
*********************************************
```

(1.1) Test Menu Display

When the system starts-up this program, it displays the title and the SIO test menu as shown in Figure SIO-1.

```
SHARP Personal Computer Diagnostics Level 3

Date Jul/01/'85

   Serial IO [1.0]

      (0)  Test serial IO
      (1)  Character transport test
                              Please input command ? ⊠
```

Figure SIO-1 SIO Test Menu

(1.2) Selection of Test Menu

Enter the required test number on the test menu as follows. [[0]] or [[1]] + [[↵]] (When specifying [[0]], it is possible to press [[↵]] only.) The number being entered is displayed on the screen. When pressing [[↵]] key, the specified diagnostics program is started up.

To change the test number, delete the number being entered by using [[←]] and then enter the correct number.

(1.3) Exiting Test Menu

When [[ESC]] is entered before entering [[↵]], control exits to the DIAG LOADER.

(2) Description of Program

(2.1) Test Serial IO

(2.1.1) Outline

The program serves for conducting a loop test of a channel in order to test the condition of the hardware.

(2.1.2) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure SIO-2.

(a) Test

For details, see (2.4).

(a.1) Specification of Data Length

```
Data length ? [0: 7 bit, 1:8 bit] = ⊠
```

Specify the data length.

(a.2) Specification of Stop Bit

```
Stop bit ? [0: 1 bit, 1: 2 bit]
```

Specify the stop bit.

(a.3) Specification of Parity Type

```
Parity type ? [0: Odd, 1: None, 2: Even] = ⊠
```

Specify the parity type.

(a.4) Confirmation of Test Execution

```
Test start ? [0: Yes, 1: No] = ⊠
```

Confirm whether to excute the test or not.

When entering [[1]], control exits to (a.1) "Specification of Data Length". When entering [[0]], the system excute the test.

(a.5) Execution and Completion of Test

The program causes the system to conduct 4 types of tests for the port. If the system does not detect an error, it displays "OK !!" on the right field of the test item on the screen. Conversely, if the system detects an error, it displays an error message.

```
Good !!
ESC: end, Enter: start?
```

When one or more of the 4 types of tests are NG, the system displays the following message.

```
No good !
ESC: end, Enter: start?
```

When pressing [[ESC]], control exits to the SIO test menu as shown in Figure SIO-1.

When pressing [[↵]], control exits to (a.1) "Specification of Data Length".

(a.6) Description of Test Contents

Transmission rate is set to 9600 bps.

(a.6.1) SD ↔ RD

Tests the send data line and receive data line.

The system causes 256 bytes of data from 0X00 to 0XFF to be transmitted in the asynchronous mode, receives the data byte by byte from the receive data line, compares that the transmitted data is the same as the received data. When the system considers that both data are the same, it transmits the next data. If it determines that both data is not the same, it displays the following message.

SD timeout.

or

RD timeout.

For details of error messages, see (3).

(a.6.2) RTS ↔ CTS
Tests the RTS-CTS circuit.
By turning ON/OFF the RTS signal, the system reads these states by means of the CTS and tests them. If the system detects an error, it displays the following message.

RTS-CTS error.

(a.6.3) DTR ↔ DSR
Test the DRT-DSR circuit.
By turning ON/OFF the DTR signal, the system reads these states by means of the DSR and tests them. If the system detects an error, it displays the following message.

DTR-DSR error.

(a.6.4) PORT
Tests the CI and CD circuits.
By turning ON/OFF the DTR signal, the system reads these states by means of the CI and CD and tests them. If the system detects an error, it displays the following message.

Port error.

(2.2) Character transport test

(a) Test
This test is conducted by specifying the transmission rate and entering any characters to be transferred.
The data length, stop bit, and parity type are set to 8 bits, 1 bit, and odd, respectively.

(a.1) Specification of Transmission Rate

Baud rate ?
[0: 110, 1: 150, 2: 300, 3: 600, 4: 1200, 5: 2400, 6: 4800, 7: 9600] = ▯

Specify the transmission rate.

(a.2) Specification of Transmission Data

Input characters [Max 30 chara] =
▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯

Specify any characters up to 30 characters.
After pressing [[↵]], the system completes data entry and then immediately starts this test.

(a.3) Execution and Completion of Test
After starting the test, the system sequentially displays characters being transferred. Upon completion of the test, the system displays the following message.

ESC: end, Enter: start ?

When pressing [[ESC]], control exits to the SIO test menu as shown in Figure SIO-1.
When pressing [[↵]], control exits to (a.1) "Specification of Transmission Rate".
If the system detects an error, it completes the test even while it is conducting the test.
For example, if the system detects that TS reg is not empty, it displays the following message.

TSreg not empty.
ESC: end, Enter: start?

When pressing [[ESC]], control exits to the SIO test menu as shown in Figure SIO-1.
When pressing [[↵]], control exits to (a.1) "Specification of Transmission Rate".

(3) Error Message

Since the following error messages are the same as those of the 8250, it is advisable to also refer to them.

- SD timeout
  Represents that a response to send data could not be detected in the specified period.
- RD timeout
  Represents that an interrupt of receive data in response to send data could not be detected in the specified period.
- TSreg not empty
  The transmitter shift register was not empty.
- Overrun error
  The SIO received 4 or more characters because the CPU retrieved receive data with a delay. In other words, the system received characters while all RX buffers became full.
- Framing error
  Represents that the system detected "0" in a stop bit.
- Parity error
  Represents that the system detected a parity error.
- Compare error
  Represents that the transmit data did not accord with the receive data.
- RTS-CTS error
  Represents that this control line was not properly connected.
- DTR-DSR error
  Represents that this control line was not properly connected.

- Port error
  Represents that the CD and CI which using this line did not properly function.

(4) SIO Loop Test Connector Specification

This specification deals with the connector which is used as a dummy load to conduct a loop test for executing the SIO test program.

(4.1) Connector Type

25 pins, solder-type, female connector (Hirose HDBB-25S or equivalent output connector)

(4.2) Wiring Procedures

Connect the following portions (a) to (c).

(a) No. 2 (SD) <–> No. 3 (RD)
(b) No. 4 (RTS) <–> No. 5 (CTS)
(c) No. 20 (DTR) <–> No. 8 (CD) <–> No. 22 (CI) <–> No. 6 (DSR)
where No.xx represents connector pin number.

8 FLOPPY DISK DIAGNOSTICS

(1) Outline

The FLOPPY DISK DIAGNOSTICS program serves to test the function of the floppy disk drive(s) (referred to as FDD in the following explanation). This program is applicable only for an MD5201 device with is equipped with the standard of this model.

only for an MD5201 device with is equipped with the standard of this model.

If a single deck drive unit is used, drive unit assignment is not enabled and no test could be carried out to the drive unit B. No display message will come in connection with the drive unit B.

```
**********************************************
*  Mini-floppy disks applicable only for the MD5201  *
*  should be double sided double density type.       *
**********************************************
```

(1.1) Test Menu Display

When this program is started up, the system displays the title and the floppy disk program test menu as shown in Figure FDD-1.

This display is referred to as the FDD test menu.

```
SHARP Personal Computer Diagnostics Level 3
Date Oct/01/'86

    Floppy disk [1.1]

        (0) Read drive status
        (1) FDD Write, read & compare
        (2) FDD Read only
        (3) 00 Track sensor adjustment
        (4) Tracking adjustment

                        Please input command ? 
```

Figure FDD-1 FDD Test Menu

(1.2) Selection of Test Menu

Enter the required test number on the test menu as follows. [[0]] to [[4]] (1 digit) + [[↵]] (When specifying [[0]], it is possible to press [[↵]] only.)

The number being entered is displayed on the screen. When pressing [[↵]] key, the specified diagnostics program is started up.

To change the test number, delete the number being entered by using [[←]] and then enter the correct number.

(1.3) Exiting Test Menu

When [[ESC]] is entered before entering [[↵]], control exits to the DIAG LOADER.

(1.4) Inserting Test Disk

When selecting one diagnostics program except for (0) Read drive status, the system displays the following message. At the time, insert the test disk to the FD drive to be tested. When testing two FD drives, insert the two test disks.

```
Please set testing media.
```

When inserting the test disk(s) into the FD drive(s) and pressing [[↵]], the system starts testing the FD drive (s). While the system is testing the FD drive(s) under this status, it [[ESC]] is pressed, control exists to the FDD test menu (Figure FDD-1).

Capacity and number of Sector in the Both Drive A and Drive B will be indicated on the CRT Display as shown below, then each menu will start.

```
Drive A: 360KB: 9sec/trk   Drive B: 160KB: 8sec/trk
```

(1.5) Others

Parameters of each test program are entered through 10 key + [[↵]]. When each test program is called, by pressing the [[ESC]], control exits to the FDD test menu (Figure FDD-1).

(2) Description of Program

(2.1) Read Drive Status

(2.1.1) Outline

This program serves to display the status of the FD drive on the screen.

(2.1.2) Operation

When specifying this test, the system displays the current status of the FD drive as shown in Figure FDD-2. While this program is executing, the system periodically senses the status of the FD drive. If the system detect some status change, it causes the buzzer to sound and displays the new status on the screen.

With this test, the status of the FD drive is displayed. When [[ESC]] or [[↵]] is entered, control exits to the FDD test menu (Figure FDD-1).

(2.2) FDD Write, Read & Compare

(2.2.1) Outline

This program serves to check that the write/read operation is properly performed in such a manner that the system writes data to the floppy disk, reads the same data from the floppy disk, and then compares them. (The data to be written is 00 to FF increment pattern when the number of times test pass is 000; otherwise the data is 4-byte repetitive pattern of "EB6DB6DB".)
The program causes all cylinders from 01 to 39 to be tested.

```
**********************************************
*  When this test is conducted, all the contents stored in  *
*  the disk are destroyed. So be very careful with this  *
*  test.                                                 *
*  In addition, it is necessary to release "Write Protect",  *
*  when excute this test.                                *
**********************************************
```

(2.2.2) Operation

(a) Specification of Device

(a.1) Specification of Test Drive

```
Test drive ?
[0: Drive A, 1: Drive B, 2: Drive A & B] = 0
```

Specify the FD drive name(s) to be tested.
Press [[0]] to test only the FD drive A; press [[1]] to test only the FD drive B; press [[2]] to test both the FD drives A and B. (However, note that when both the FD drives are tested, their disk formats should be the same. If their disk formats are not the same, separately conduct the test by specifying a single FD drive (A or B)).
If the FD drive being specified is in the Not ready state, the system displays the following message on the lower screen and stops testing the FD drive.

"Drive not ready."

At the time, by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).

(a.2) Specification of Range of Cylinders to Be Tested

```
Cylinder scope ?
[01 <-> 39] = 00 - 00
```

Specify the range (scope) of the cylinder to be tested by entering the first cylinder number and the last cylinder number. For example, when entering "10 – 12" if the test disk is the 09 sectors/track format, the test range from 10.0.01 to 12.1.09 is specified.
When entering both cylinder number are [[↵]] only or [[0]] + [[↵]], the entire range of cylinders is specified. In this case, if a 09 sectors/track format disk is used, cylinders from 00.1.01 to 39.1.09 are specified.

(a.3) Specification of Counting Sectors

Specify the number of counting sectors capable of being processed by one instruction.
This counting value depends on the disk format for use. For example, when a 09 sectors/track format disk is used, the system displays the following message.

```
Sector count?
[1, 3, 9] = 0
```

When a 08 sectors/track format disk is used, the system displays the following inquiry.

"[1, 2, 4, 8] = 0 "

If other value which is not displayed is entered, the system does not accept such a value and requires proper data entry once again.
When entering [[0]] to [[↵]] or only [[↵]], assiumig that the maximum value of the sector count is specified, the system executes the next program.

(a.4) Specification of Read after Write

```
Read after write ?
[0: Yes, 1: No] = 0
```

Specify whether to perform the read-after-write procedure. To perform the read-after-write procedure, press [[0]]. Otherwise, press [[1]].

(b) Test

(b.1) Specification of Number of Times Retry

```
Retry count ? [0 <-> 4] = 0
```

Specify the number of times retry.
While the system reads/writes data from/to the disk, if it detects an error (including an error caused in the read-after-write test), it tries to perform the same operation for the number of times specified.

(b.2) Specification of Error Stop

```
Error stop ? [0: Yes, 1: No] = 0
```

If an error occurs while conducting the test, specify whether to abort or continue the test.

(b.3) Confirmation of Test Execution

```
Test start ? [0: Yes, 1: No] = 0
```

Confirm whether to execute the test or not. When entering [[1]], control exits to (a.1) "Specification of Test Drive" mentioned in (a.1). On the other hand, when entering [[0]], the system displays the screen as shown in Figure FFD-3 and starts the test.

The lower left screen shows the number of times test pass and physical address [[TTHSS]]; the lower right screen shows the test mode. (Note that the number of times test pass is denoted in hexadecimal notation and the physical address in decimal notation.)

```
Pass N [0x] = ××××
TTHSS = ×××××
Test mode: Write  Test drive: Drive A
```

In addition, the right end of the screen shows the number of occurrences of errors in each type. (The number of occurrences of errors is also denoted in hexadecimal notation.)

(b.4) Abortion and Completion of Test

By pressing [[ESC]] while the system executes the test, control exits to the FDD test menu (Figure FDD-1); by pressing [[F2]], the system displays the following message on the lower left screen and aborts the test.

"Test stopped by user!"

At the time, by pressing [[F1]], the system continues the test; by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).

(c) Error Processing

(c.1) Read/Write Error

If the system detects an error after it conducts the test until it starts the seek operation, it stops the test irrespective of "Yes" or "No" of the error stop described in (b.2). At the time; by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).

If the system detects an error while it conducts the read/write check test, it displays the command parameter and status where the error occurs (Figure FDD-4) and increments the right-hand error counter. If the error stop is set to "No", the system updates the error counter every time an error occurs and continues to conduct the test (the system only displays the newest error information).

On the other hand, if the error stop is set to "Yes", the system stops the test if an error occurs. At the time, by pressing [[↵]], the system continues the test.

On the other hand, by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).

For details of error messages, see (3).

(c.2) Compare Error

If the system detects an error when it writes data in the write mode, reads the data, and compares them, it displays the error on the lower right screen.

```
Compare error
Adrs [0x] = ××××
Data [0x] = EB6DB6DB <-> ××××××××
```

When the error stop is set to "No", the system updates the error message whenever it detects an error. (The screen shows the newest error information.)

The system updates the error counter whenever it detects an error. Therefore, it displays the number of occurrences of errors in the unit of 4 bytes.

While the Error Stop is set to "Yes", the system stops the test when it detects an error. In this state, when pressing [[↵]], the system compares the next data. If the system does not detect an error, it continues the test. On the other hand, when pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).

In order to abort the data compare test and to execute the next command, press [[−]] instead of [[↵]].

Data comparison is conducted every 4 bytes. In the following the meaning of the display is described.

Adrs [0x] = 0004 . . . . . Top address at which the system detects a comparison error.

Data = EB6DB6DB <-> EB00B6DB
(Write data / Read data)

In the preceding example, the data includes an error at the second byte. This address becomes address 0005.

(2.3) FDD Read Only

(2.3.1) Outline

This program serves to check that data is properly read from the floppy disk.

The system tests the entire area of cylinders from 01 to 39.

(2.3.2) Operation

(a) Specification of Device

(a.1) Specification of Test Drive

```
Test drive ?
[0: Drive A, 1: Drive B, 2: Drive A & B] = ×
```

Specify the FD drive name(s) to be tested.

Press [[0]] to test only the FD drive A; press [[1]] to test only the FD drive B; press [[2]] to test both the FD drives A and B. (However, note that when both the FD drives are tested, their disk formats should be the same. If their disk formats are not the same, separately conduct the test by specifying a single FD drive (A or B).)

If the FD drive being specified is in the Not ready state, the system displays the following message on the lower screen and stops testing the FD drive.

"Drive not ready."

At the time, by pressing [[ESC]], control exits to the FDD test mode (Figure FDD-1).

(a.2) Specification of Range of Cylinders to Be Tested

```
Cylinder scope ?
[01 <-> 39] = ▒▒ - ▒▒
```

Specify the range (scope) of the cylinder to be tested by entering the first cylinder number and the last cylinder number. For example, when entering "10 – 12" if the test disk is the 09 sectors/track format, the test range from 10.0.01 to 12.1.09 is specified.
When entering both cylinder number are [[↵]] only or [[0]] + [[↵]], the entire range of cylinders is specified. In this case, if a 09 sectors/track format disk is used, cylinders from 00.1.01 to 39.1.09 are specified.

(a.3) Specification of Counting Sectors
Specify the number of counting sectors capable of being processed by one instruction.
This counting value depends on the disk format for use. For example, when a 09 sectors/track format disk is used,

```
Sector count?
[1, 3, 9] = ▒
```

When a 08 sectors/track format disk is used, the system displays the following inquiry.
"[1, 2, 4, 8] = ▒ "
If other value which is not displayed is entered, the system does not accept such a value and requires proper data entry once again.
When pressing [[0]] + [[↵]] or only [[↵]], assuming that the maximum value of the sector count is specified, the system executes the following program.

(b) Test
(b.1) Specification of Number of Times Retry

```
Retry count ? [0 <-> 4] = ▒
```

Specify the number of times retry.
When the system reads data from the disk, if it detects an error, it tries to perform the same operation for the number of times specified.

(b.2) Specification of Error Stop

```
Error stop ? [0: Yes, 1: No] = ▒
```

If an error occurs while conducting the test, specify whether to abort or continue the test.

(b.3) Confirmation of Test Execution

```
Test start ? [0: Yes, 1: No] = ▒
```

Confirm whether to execute the test or not.
When entering [[1]], control exits to (a.1) "Specification of Test Drive mentioned in (a.1)". On the other hand, when entering [[0]], the system displays the screen as shown in Figure FDD-3 and starts the test.
The lower left screen shows the number of times test pass and physical address [[TTHSS]; the lower right screen shows the test mode. (Note that the number of times test pass is denoted in hexadecimal notation and the physical address in decimal notation.)

```
Pass N [0x] = ▒▒▒▒
THSS = ▒▒▒▒▒ Test mode: Read Test drive: Drive A
```

In addition, the right end of the screen shows the number of occurrences of errors in each type. (The number of occurrences of errors is also denoted in hexadecimal notation.)

(b.4) Abortion and Completion of Test
By pressing [[ESC]] while the system executes the test, control exits to the FDD test menu (Figure FDD-1); by pressing [[F2]], the system displays the following message on the lower left screen and stops the test.
"Test stopped by user."
At the time, by pressing [[F1]], the system continues the test. Whereas, by pressing [[ESC]], control exits the FDD test menu (Figure FDD-1).

(c) Error Processing
If the system detects an error after it conducts the test until it starts the seek operation, it stops the test irrespective of "Yes" or "No" of the error stop described in (b.2). At the time, when pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).
If the system detects an error while it conducts the read check test, it displays the command parameter and status where the error occurs (Figure FDD-4) and increments the right-hand error counter. If the Error Stop is set to "No", the system updates the error counter every time an error occurs and continues the test (the system only displays the newest error information).
On the other hand, while the error stop is set to "Yes", the system stops the test if an error occurs. At the time, when pressing [[↵]], the system continues to conduct the test. Whereas, when pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).
For details of error messages, see paragraph (3).

(2.4) 00 Track Sensor Adjustment

(2.4.1) Outline

This program serves to check that the 00 track sensor, which detects the cylinder 0 by seeking the head positioned at the cylinder 0 to cylinder 4 and by returning the head back to the cylinder 0, properly functions and does not go wrong.

(2.4.2) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure FDD-6.

(a) Specification of Device

(a.1) Specification of Test Drive

```
Test drive ? [0: Drive A, 1: Drive B] = X
```

Specify the FD drive name to be tested.
Press [[0]] to test the Drive A; press [[1]] to test the Drive B. If the FD drive being specified is in the Not ready state, the system displays the following message on the lower screen and stops testing the FD drive.

"Drive not ready."

At the time, by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).

(a.2) Specification of Head

```
Head select ? [0: side 0, 1: Side 1] = X
```

Specify which head is tested.
When testing the side 0, enter [0]; when testing the side 1, enter [1].

(a.3) Confirmation of Test Execution

```
Test start ? [0: Yes, 1: No] = X
```

Confirm whether to execute the test or not.
When entering [[1]], control exits to (a.1) "Specification of Test Drive" mentioned in (a.1). On the other hand, when entering [[0]], the system starts the test.

(b) Test

(b.1) Moving Head

The system moves the head from the cylinder 0 to cylinder 4 and returns the head to the cylinder 0. With such an operation, the system can observe a signal from the 00 track sensor as a pulse.
While the FDD is operating, the system does not accept [[ESC]] and only displays the following message on the center screen.

"[[Head moving]]"

(b.2) Specification of Repetitive Test

Once the system completes the test, it displays the following message on the lower left screen.

```
ESC: end, Enter: continue, Minus: start?
```

ESC: represents [[ESC]]. By pressing this key, control exits to the FDD test menu (Figure FDD-1).
Enter: represents [[↵]]. By pressing this key, control proceeds to Paragraph (b.1).
Minus: represents [[−]]. By pressing this key, the system restarts the test from Paragraph (a.1) "Specification of Test Drive".

(c) Error Processing

While the FDD is operating or while the system executes the program, if an error occurs, the system displays the command parameter and status when the error occurs.

```
Error occurred.
Param = XXXXXXXXXXX
Status = XXXXXXXXXXXXXXXXXXXXXXXXXXXX
   (error message)
```

In this state, by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).
For details of error messages, see (3).

(2.5) Tracking Adjustment

(2.5.1) Outline

This program serves to adjust the tracking of the head in such a manner that data where the system seeks the head from the outermost cylinder 00 to the innermost cylinder 39 is compared with the data where the system seeks the head in the reverse order.

(2.5.2) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure FDD-7.

(a) Specification of Device

(a.1) Specification of Test Drive

```
Test drive ? [0: Drive A, 1: Drive B] = X
```

Specify the FD drive name to be tested.
Press [[0]] to test the Drive A; press [[1]] to test the Drive B. If the FD drive being specified is in the Not ready state, the system displays the following message on the lower screen and stops testing the FD drive.

"Drive not ready."

At the time, by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).

(a.2) Specification of Cylinder to be Tested

Cylinder No. ? [01 <-> 39] = ▨▨

Specify the cylinder number to be tested in the range of 00 to 39. The system does not accept other cylinder numbers and requires reentry.

(a.3) Specification of Head

Head select ? [0: Side 0, 1: Side 1] = ▨

Specify which head is tested.
When testing the side 0, enter [0] when testing the side 1, enter [1].

(a.4) Specification of Sector Range

Sec. scope ? [1 <-> 9] = ▨ - ▨

Specify the range of the sectors to be read, namely the first sector number and the last sector number. For example, when entering "5-7", data is read from the sector 5 to the sector 7.

(b) Test
(b.1) Specification of Error Stop

Error stop ? [0: Yes, 1: No] = ▨

Specify whether to abort or continue the test if the system detects a read error when the seek operation is complete.

(b.2) Confirmation of Test Execution

Test start ? [0: Yes, 1: No] = ▨

Confirm whether to execute the test or not.
When entering [[1]], control exits to "Specification of Test Drive" mentioned in (a.1). On the other hand when entering [[0]], the system starts the test.

(b.2.1)
From cylinder 00 to target cylinder. The system displays the following message and seeks the head to the cylinder specified in Paragraph (a.2). And then system reads data from the sectors specified in Paragraph (a.4).

Data reading. [seek to cyl. from 00]

In this state, the system displays the following message on the screen.

ESC: end, ESC: end, Enter: next ?

ESC: represents [[ESC]]. By pressing this key, control exits to the FDD test menu (Figure FDD-1).
Enter: represents [[↵]]. By pressing this key, control proceeds to Paragraph (b.2.2).

(b.2.2)
From inner most cylinder 39 to target cylinder, the system displays the following massage on the screen, seeks the head to the innermost cylinder 39. And then system seeks the cylinder specified in Paragraph (a.2), and reads the sectors being specified in Paragraph (a.4).

Data reading. [seek to seek to cyl. from 39]

In this state, the system displays the following message on the screen.

ESC: end, ESC: end, Enter: continue, Minus: start ?

ESC: represents [[ESC]]. By pressing this key, control exits to the FDD test menu (Figure FDD-1).
Enter: represents [[↵]]. By pressing this key, the system continues to conduct the test.
Minus: represents [[-]]. By pressing this key, the system restarts the test from Paragraph (a.1) "Specification to Test Drive".

(c) Error Processing
If an error occurs before the system seeks the head while conducting the test, it aborts the test regardless of whether the error stop is set to "Yes" or "No" specified in Paragraph (b.1). In this state, by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1).
There are the following seek errors.

- Drive not ready
- Equipment check
- Seek error

If the system detects an error while checking data being read, it displays the command parameter and status just when the error occurs.

Error occurred.
Param = ▨▨▨▨▨▨▨▨▨▨
Status = ▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨
(error message)

At that time, when the Error Stop is set to "No", the system updates the screen whenever an error occurs and then continues the test.
On the other hand , while the Error Stop is set to "Yes", the system aborts the test when an error occurs. In this state, by pressing [[ESC]], control exits to the FDD test menu (Figure FDD-1); by pressing [[↵]], the system continues to conduct the test.
For details of error messages, see the following paragraph (3).

(3) Error Messages

- Seek error
  The system received a FAULT signal from the device or the seek operation was abnormally completed.
- Cylinder number over
  A cylinder number exceeding the innermost value of the drive was tried to be accessed.
- FDC communication error (FDC failed error)
  Handshake error occurred between the 80C86 and FDC (part of SC7976).
- FDC interrupt error (Time out error)
  An interrupt response from the FDC was not received in the specified time period.
- FDC equipment check
  The system received a FAULT signal from a device or did not detect a track 00 signal in the specified time period while the recalibrate operated.
- Invalid command
  A command written to the FDC (part of SC7976) was invalid.
- Drive not ready
  The device being specified was in the Not ready state.
- CRC err. in ID field
  A CRC error occurred in the ID field.
- CRC err. in DATA field
  A CRC error occurred in the DATA field.
- Record not found
  The sector specified in the ID field could not be detected in the track.
- Not Writable (Write protected error)
  The system detected write protection.
- End of Cylinder
  Data was tried to be accessed in a disk exceeding the maximum sector.
- Missing address mark (Address mark not found)
  The system could not detect the address mark of the ID field until it detected an index signal twice. When the system read data, which could not detect the address mark of the DATA field.
- Overrun (DMA command error)
  The device could not read/write data from the system in the specified time period.
- Bad command error
  A command was specified which was not in BIOS.
- Compare error
  Data being written did not accord with data being read.
- Others
  Other error occurred.

9 PRINTER DIAGNOSTIC

(1) Outline

A PRINTER DIAGNOSTIC program serves to test the function of a printer adapter (referred to as PRT I/F in the following discussion) and a printer which is connected to the printer adapter.
Printers which can be connected are only pallarel style printers.

(1.1) Test Menu Display

When this program is started up, the system displays the title and the test menu of the PRT as shown in Figure. PRT-1.
This display is referred to as the PRT test menu.

```
SHARP Personal computer System Diagnostics Level.3

Data Jul/01/'85

Printer [1.0]

(0) Sense Printer Status
(1) Print Character
(2) Print Bit Image
(3) Print Table

Please input command ? 
```

Figure PRT-1 PRT test Menu

(1.2) Selection Test Menu

Enter the required test number on the test menu as follows: [[0]] to [[3]] (1 digit) + [[↵]] (When specifying [[0]], it is possible to press [[↵]] only.)
The number being entered is displayed on the screen. When pressing [[↵]], the specified diagnostic program is started up.
To change the test number, delete the number being entered by using [[←]] and then enter the correct number.

(1.3) Exiting Test Menu

When [[ESC]] is entered before entering [[↵]], control exits to the DIAG LOADER.

(1.4) Others

Parameters of each test program are entered through key + [[↵]]. When each test program is called, by pressing [[ESC]], control exits to the PRT test menu (Figure PRT-1).

(2) Description of Program

(2.1) Sense printer status

(2.1.1) Outline

Printer status is read and displayed on a screen.
When the printer status is changed, the buzzer sound is made, and the new status is displayed.

(2.1.2) Operation

When specifying this test, display is started automatically. Therefore, operation is not needed.

a. Test
(a.1) Status display
Screen display is given below. In this display, if asterisks (*) are displayed for all statuses, processing is normal and printing may be executed from the host computer.

```
Printer status

  Bsy  Ack  Pe  Sel  IOe  ---  ---  Toe

   *    *    *   *    *    *    *    *

  The signal is OK if the symbol * is displayed.
```

Figure. PRT-2 Status display screen (Centronics PRT I/F)

The meanings of each status are as follows:

Bsy:	Printer is not busy.
Ack:	Response from a printer is available.
Pe:	Paper is set to the printer.
Sel:	Printer is in on-line status.
IOe:	Printer does not contain a mechanical abnormality or the error of memory.
Toe:	Interface of the printer is normal.

In above cases, asterisks are displayed.
When CE-700P is connected. Sel is not changed.

(2.1.3) Abortion and Completion of test

After displaying the printer status, if [[ESC]] or [[↵]] is entered control exits to the PRT test menu (Figure PRT-1).

(2.2) Print character

(2.2.1) Outline

Characters are printed in each mode of a printer.
By this test, whether PRT I/F is normal or not, or the grace of the printing may be checked.
For reference, a sample of print is appended. (Figure. PRT-6).

(2.2.2) Operation

When specifying this test, enter the proper data to prompts displayed sequentially as shown in Figure PRT-3.

a. Test
(a.1) Specification of Printing Speed

```
Select mode [0: VNLQ, 1: Draft] = ▩
```

- Print speed for test is specified.
- When [[0]] is entered, a standard speed is set, and if [[1]] is entered, a high speed is set.

(a.2) Specification of Both-direction Print

```
Bo-direction ? [0: Yes, 1: No] = ▩
```

Whether both-direction print is to be executed or not is specified.
When [[0]] is entered, both-direction print is executed, and when [[1]] is entered, it is not executed.
However, when print is executed in the CE-700P by using a ribbon, this specification is invalid.

(a.3) Confirmation of Test Execution

```
Test start ? [ 0: Yes, 1: No] = ▩
```

Confirm whether to execute the test or not.
When entering [[1]], control exits to (a.1) "Specification of Printing speed." When entering [[0]], the system execute the test.

(a.4) Explanation of each mode

1.	Normal:	Standard characters of a printer are printed.
2.	Elite:	12 characters are printed per inch.
3.	Proportional:	Proportional characters are printed.
4.	Enlarged:	Enlarged characters are printed.
5.	Emphasized:	Emphasized characters are printed.
6.	Condensed:	Condensed characters are printed.
7.	Superscript:	Superscripts are printed.
8.	Under lined:	Underlined characters are printed.
9.	Italic:	Italics are printed.

(2.2.3) Abortion and Completion of Test

Although [[ESC]] and [[F2]] are available while the test is conducted, a time lag occurs because these key operations are processed in the state where the executing program step is completed.
By pressing [[ESC]], control exits to the PRT test menu (Figure PRT-1).
By pressing [[F2]], the system displays the following

message on the lower left screen and aborts the test.

"Test stopped by user."

At the time, by pressing [[F1]], the system continues the test; by pressing [[ESC]], control exits to the PRT test menu (Figure PRT-1).

(2.2.4) Error processing

When an error occurs during test execution, an error message and the current printer status are displayed in hexadecimal digits at the left bottom of the screen, and the test is interrupted.

For example, when printing is to be executed, or when paper is used up during printing, the following display appears:

```
Printer status error. [0x20]
```

Error messages are discussed collectively later.

Print bit image

(2.3.1) Outline

Bit images of 8 dot or 32 dot are printed as print data.

A sample for printing is appended for reference. (Figure PRT-6).

(2.3.2) Operation

When specifing this test enter the proper data to prompts displayed sequentially as shown in Figure PRT-4.

a. Test

(a.1) Specification of the Repear Frequency

```
Loops count? [0: Endless] = ▒▒▒
```

The frequency of repeating a test is specified in the range of 1 ~ 999.

When [[0]] is entered, processing is repeated endlessly.

(a.2) Specification of a Print Density

```
Density ? [ 0: 8 bot, 1:32 dot] = ▒
```

Whether a print density is 8 dot or 32 dot is specified.

When [[0]] is entered, processing is repeated endlessly.

(a.3) Confirmation of Test Execution

```
Test start ? [ 0: Yes, 1: No] = ▒
```

Confirm whether to execute the test or not.

When entering [[1]], control exits to (a.1) "Specification of Repeat Frequency". When entering [[0]], the system execute the test.

(a.4) Test interruption and termination

Depression of the [[ESC]] key in middle of operation forces it to terminate and the control returns to the PRT test menu (Fig. PRT-1). And, depression of the [[F2]] key brings the following message on the display and the test is interrupted temporarily.

"Test Stopped by user."

Depress the [[F1]] key to resume the operation or depress the [[ESC]] key to return to the PRT test menu (Fig. PRT-1).

The following will be displayed upon the termination of the test.

"Test end."

Depression of the [[ESC]] or [[↵]] key in this state causes the control to return to the PRT test menu (Fig. PRT-1).

(2.3.3) Abortion and Completion of Test

Although [[ESC]] and [[F2]] are available while the test is conducted, a time lag occurs because these key operations are processed in the state where the executing program step is completed.

By pressing [[ESC]], the system display the following message on the lower left screen and aborts the test.

"Test stopped by user."

At the time, by pressing [[F1]], the system continues the test; by pressing [[ESC]], control exits to the PRT test menu (Figure PRT-1).

When the test is completed:

"Test end."

is displayed. In this status, if [[ESC]] or [[↵]] is pressed, PRT test menu (Figure PRT-1) is returned.

(2.3.4) Error processing

When an error occurs during test execution, an error message and the current printer status is displayed in hexadecimal digits at the left bottom of the screen, and the test is interrupted.

For example, when an interface of a printer is abnormal during printing, the following display appears:

```
Printer status error. [0x01]
```

- Error messages are discussed collectively later.

(2.4) Print table

(2.4.1) Out line

A list of international characters is printed.

A print sample is appended for reference. (Figure PRT-6)

(2.4.2) Operation

When specifying this test, enter the proper date to prompt as shown in Figure PRT-5.

(a) Test

(a.1) Confirmation of Test Execution

```
Test start ? [ 0: Yes, 1: No] = ▒
```

- Confirm whether to execute the test or not.
- When entering the system execute the test.

(2.4.3) Abortion and Completion of Test

Although [[ESC]] and [[F2]] are available while the test is conducted, a time lag occurs because these key operations are processed in the state where the executing program step is completed.

By pressing [[ESC]], control exits to the PRT test menu (Figure PRT-1).

By pressing [[F2]], the system displays the following message on the lower left screen and aborts the test.

"Test stopped by user."

At the time, by pressing [[F1]], the system continues the test; by pressing [[ESC]], control exits to the PRT test menu (Figure PRT-1) is returned.

When the test is completed:

"Test end"

is displayed. In this status, if [[ESC]] or [[↵]] is pressed, the PRT test menu (Fig. PRT-1) is returned.

(2.4.4) Error processing

When an error occurs during test execution, an error message and the current printer status are displayed in hexadecimal digits at the left bottom of the screen, and the test is interrupted. For example, when an error occurs in internal memory of the printer during printing, the following display appears:

```
Printer status error. [0x08]
```

Error messages are discussed collectively later.

(3) Error messages

All errors are represented by the statuses.

A status consists of 8 bit, and corresponds to the display contents of 2-1 "Sense printer status" as given below.

```
Bit 7 (0 x 80): Bsy
    6 (0 x 40): Ack
    5 (0 x 20): Pe
    4 (0 x 10): Sel
    3 (0 x 08): IOe
    2 (0 x 04): ---
    1 (0 x 02): ---
    0 (0 x 01): Toe
```

For the meanings of each status, see 2-1 Sense printer status.

10 COLOR CRT ADAPTER DIAGNOSTIC

(1) Outline

A COLOR CRT ADAPTER DIAGNOSTIC program serves to test the function of the Color CRT display (referred to as CRT in the following discussion) of this computer.

(1.1) Color CRT mode selection

When this program is specified, the title is displayed, and specifying color CRT mode is required.

```
Please select the color mode.
[0:8 colors, 1: 16 colors] = ▩
```

If input error occurs, correct color display does not appear. This specification is required only when a program is started.

(1.2) Test Menu Display

After specifying color CRT mode, the system displays the title and the CRT test menu as shown in Figure CRT-1. This display is referred to as the CRT test menu.

```
SHARP Personal Computer System Diagnostics Level.3

Date Oct/01/'86

   Color CRT Adapter [1.1]

      (0) CRT size test
      (1) CRT focus check
      (2) CRT Color bar test

                        Please input command ? ▩
```

Fig. CRT-1 CRT test menu

(1.3) Selection of Test Menu

Enter the required test number on the test menu as follows: [[0]] to [[2]] (1 digit) + [[↵]] (When specifying [[0]], it is possible to press [[↵]] only.)

The number being entered is displayed on the screen. When pressing [[↵]], the specified diagnostics program is started up.

To change the test number, delete the number being entered by using [[←]] and then enter the correct number.

(1.4) Exiting Test Menu

By pressing [[ESC]] followed by [[↵]]; control exits to the DIAG LOADER.

(1.5) Others

Parameters of each test program are entered through 10 key + [[↵]]. When each test program is called, by pressing [[ESC]], control exits to the MEM test menu (Figure CRT-1).

(2) Description of program

(2.1) CRT size test

(2.1.1) Outline

The screen size and the distortion of CRT display are tested.

(2.1.2) Operation

As soon as this test is specified, test processing is started. The size test screen (Figure. CRT-2) is displayed.

(a) Test

Screen sizes, distortions or center slipping are adjusted or checked on the size test screen.

(2.1.3) Abortion of Test

While executing a test, if pressing [[ESC]], control exits to the CRT test menu (Figure CRT-1).

(2.2) CRT focus check

(2.2.1) Summary

Display characters on CRT display are checked.

(2.2.2) Operation

As soon as this test is specified, test processing is started. Adjustment for focus check screen (Figure CRT-3) is displayed.

(a) Test

CRT display characters are adjusted or checked on the "adjustment for focus check" screen.

(2.2.3) Abortion of Test

While executing a test, if pressing control exits to [[ESC]] the CRT test menu (Figure CRT-1).

(2.3) CRT color bar display

(2.3.1) Outline

Color display at color monitor time is tested.

(2-3-2) Operation

Operation is not needed. As soon as this test is specified, test processing is started.

(a) Test

Color display appears on the screen as shown in Figure CRT-4, and the colors are checked by visual inspection.

(2.3.3) Abortion of Test

While executing a test, if pressing control exits to [[ESC]] the CRT test menu (Figure CRT-1).

11. MONOCHROME CRT ADAPTER DIAGNOSTIC

(1) Outline

A MONOCHROME CRT ADAPTER DIAGNOSTIC program serves to test the function of the Monochrome CRT display (referred to as MONO in the following discussion) of this computer.

(1.1) Test menu display

After specifying MONO CRT mode, the system displays the title and the CRT test menu as shown in Figure MONO-1. This display is referred to as the CRT test menu.

```
SHARP Personal Computer System Diagnostics Level 3
Date Oct/01/'86
Monochrome CRT [1.0]

(0) CRT size test
(1) CRT focus check
(2) CRT attribute check

Please input command ? 
```

Fig. MONO-1 MONO test menu

(1.3) Selection of Test Menu

Enter the required test number on the test menu as follows: [[0]] to [[2]] (1 digit) + [[↵]] (When specifying [[0]], it is possible to press [[↵]] only.)

The number being entered is displayed on the screen. When pressing [[↵]], the specified diagnostics program is started up.

To change the test number, delete the number being entered by using [[←]] and then enter the correct number.

(1.4) Exiting Test Menu

By pressing [[ESC]] followed by [[↵]], control exits to the DIAG LOADER.

(1.5) Others

Parameters of each test program are entered through 10 key + [[↵]]. When each test program is called, by pressing [[ESC]], eontrol exits to the MONO test menu (Figure MONO-1).

(2) Description of program

(2.1) CRT size test

(2.1.1) Outline

The screen size and the distortion of CRT display are tested.

(2.1.2) Operation

As soon as this test is specified, test processing is started. The size test screen (Figure. MONO-2) is displayed.

(a) Test
Screen sizes, distortions or center slipping are adjusted or checked on the size test screen.

(2.1.3) Abortion of Test
While executing a test, if pressing [[ESC]] control exits to the MONO test menu (Figure MONO-1).

(2.2) CRT focus check
(2.2.1) Summary
Display characters on CRT display are checked.

(2.2.2) Operation
As soon as this test is specified, test processing is started. Adjustment for focus check screen (Figure MONO-3) is displayed.

(a) Test
CRT display characters are adjusted or checked on the "adjustment for focus check" screen.

(2.2.3) Abortion of Test
While executing a test, if pressing control exits to [[ESC]] the MONO test menu (Figure MONO-1).

(2.3) CRT attribute check
(2.3.1) Outline
Attribute patern.

(2.3.2) Operation
Operation is not needed. As soon as this test is specified, test processing is started.

(a) Tests

(a-1) CRT attribute check-1
As the attribute patterns are displayed in the blink enabled state as in Fig. MONO-4, it permits visual check.

(a-2) Test interruption and termination
Depression of the [F2] key upon termination of the test causes it to advance to the CRT attribute check-2. If the [ESC] key is depressed, the control returns to the MONO test menu (Fig. MONO-1).

(a-3) CRT attribute check-2
As the attribute patterns are displayed in the background intensity enabled state as in Fig. MONO-5, it permits visual check.

(a-4) Test interruption and termination
Depression of the [ESC] or [[↵]] key after the termination of the test, the control returns to the MONO test menu (Fig. MONO-1).

12 MODEM CARD DIAGNOSTIC

(1) General

The modem card diagnostics are the program used to test functions of the PC-7000 modem interface unit, which will be simply referred to MDM I/F, hereinafter.

(1-1) Test menu display

When the program is started, the MDM test menu is displayed along with the caption (Fig.MDM-1). This display message is called "MDM test menu".

```
SHARP Personal Computer System Diagnostics Level.3
        Date Dec/01/'85
                        Modem Card [1.0]

                          (0) Modem loop back test



                                        Please input command ?  █
```

Fig.MDM-1 MDM test menu

(1-2) Test menu choice

Enter the test item number in the following manner:

Enter [0] followed by a carrier return.

Only a carrier return may be used.

The number entered is displayed and the test commences with the carrier return.
To change the number, delete the number with the BACKSPACE key and enter the number again.

(1-3) Cancellation of choice

The control returns to the diagnostic loader if [ESC] key is pushed prior to a carrier return depression.

(2) Test item description

(2-1) Modem loopback test

(2-1-1) General

The modem interface hardware is tested with the test data in the loopback mode.

(2-1-2) Operational procedure

As the control comes asking for the entry of baud rate (Fig.MDM-2) after specifying the test, enter either [0] or [1].

(a) Test

1) After the baud rate has been set in the SIO LSI (8250), the command "AT Z" is executed to initialize and set the baud rate in the modem LSI (8051).

2) After the execution of "AT S13=16", "AT S16-1", and "AT D0"; it goes into the loopback mode (data mode).

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        Now loop back mode
        Connect !

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

3) Test data, 0 thru 7F, are sent and received for verification.

4) When "+++" is executed, the control returns to the command entry mode, and, finally, the modem is initialized after execution of "AT Z".

(b) Termination

When the test has been complete, the following message is displayed.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        ESC:end, Enter:start ?

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Depression of the [ESC] key causes the control to return to the MDM test menu (Fig.MDM-1).
Depression of the carrier return causes the control to return to the entry of the baud rate.

(3) Error message

(3-1) SIO (8250) related error

The error message is displayed under the left corner of the screen. For the error messages described below are identical to those of the 8250, refer to the description.

SD timeout:
Indicates that the response against the send data was not detected within the predetermined time.

RD timeout:
Indicates the receive data interrupt against the send data was not detected within the predetermined time.

TSReg not empty:
Indicates that the transmitter shift register did not go empty within the predetermined time.

Overrun error:
This error is established when the SIO received more than four characters as the receive data read is delayed by the CPU. In other words, more characters are tried to send when the Rx buffer is fully occupied.

Framing error:
Indicates that "0" is found in the stop bit.

Parity error:
Indicates detection of a parity error.

(3-2) Model LSI (8051) related error

Indicates that there was no response against the command with the following message displayed under the right of the screen.

```
Error occurred . . AT Z
```

The above indicates that the 8051 has not returned with "OK" to the command "AT Z" within the predetermined time.

(3-3) Compare error

Indicates that the send data do not match the received data.

13 EXPANTION UNIT DIAGNOSTIC

(1) General

The expansion unit diagnostics are the program used to test functions of this computer expansion units.
For the loopback test is conducted with this diagnostic program, it needs the expansion unit option slot check board in the slot.

(1-1) Test menu display

When the program is started, the expansion unit test menu is displayed along with the caption (Fig.EXP-1). This display message is called "Expansion unit test menu".

```
SHARP Personal Computer System Diagnostics Level.3
     Date Oct/21/'85
          Expansion unit [1.0]

               (0) Test all
               (1) Test clock line
               (2) Test oscillator line
               (3) Test external t/c line
               (4) Test IREQ, DREQ line

                                   Please input command ?

*** WARNING ***
The dummy card specially designed must be used as this diagnostic program
is designed for loopback test.
```

Fig.EXP-1 Exp.unit test menu

(1-2) Test menu choice

Enter the desired test item number in the following manner:

Single digit of [0] thru [4] followed by a carrier return.

Only a carrier return may be entered for the test item 0.

The number entered is displayed and the test commences with the carrier return.

To change the number, delete the number with the BACKSPACE key and enter the number again.

(1-3) Cancellation of choice

The control returns to the diagnostic loader if [ESC] key is pushed prior to a carrier return depression.

(1-4) Others

Parameters for the test must be done with a ten key keyboard key and the carrier return key.
The control will return to Fig.EXP-1 with depression of the [ESC] key when the test program is on.

(2) Test item description

(2-1) Test all

(2-1-1) General

All test items are executed one after another with test results on display for each test item.

(2-1-2) Operational procedure

Nothing is required as the tests start automatically.

(a) Test

(a-1) Test contents and results

When this test item is started, Fig.EXP-2 comes displayed.

```
Test all

     Clock              line ... OK !!
     Oscillator         line ... Failed !!
     External t/c line  line ... Failed !!
     IREQ, DREQ         line ... OK !!
```

Fig.EXP-2 Test all screen

(a-2) Termination

If the test has been successful, "OK !!" is displayed to the right of the respective test item.
If not, "Failed !!" is displayed.

When all tests have been successful altogether, the following will be displayed.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        Expansion unit OK !!

    Test end.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

If there is any error, the following will be displayed.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        Expansion unit Failed !!

    Test end.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

The following prompt appears when the tests has been complete, regardless whether it be successful or not.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    ESC:end, Enter:start ?

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Depression of the [ESC] key causes the control to return to the expansion unit test menu (Fig.EXP-1).
Depression of the carrier return causes the control to return to "(a-1) Test contents and results" and then the tests are started all over again.

(2-2) Test clock line

(2-2-1) General

The clock line of the expansion unit is tested.
It is possible to assign test repeat and error stop modes for observing the waveform at the time of a repair or adjustment.

(2-2-2) Operational procedure

When this test item is specified, the prompts (Fig.EXP-3) are displayed one at a time, to which you must answer with the choice.

(a) Test

(a-1) Test repeat choice

```
Loops count ? [ 0:Endless ] = ▒▒▒
```

Number of tests to be repeated must be specified with a number of 1 to 999.
Entry of [0] will continue the test indefinitely.

(a-2) Error stop choice

```
Error stop ? [0:Yes, 1: No] =  ▒
```

It must be specified whether the test is to be interrupted or not when an error is encountered in a middle of the test.

(a-3) Start

```
Test start ? [0:Yes, 1: No] =  ▒
```

Start of the test must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the test.

(a-4) Termination

Depression of the [ESC] key terminates the test unconditionally and the control returns to the expansion unit test menu (Fig.EXP-1).
Depression of the [F2] key interrupts the test with the following message on display.

"Test stopped by user."

If the [F1] key is pressed while the above message is on, the test resumes.
If the [ESC] key is pressed, the control returns to the expansion unit test menu (Fig.EXP-1).

The test will terminate, unless the repeated test is assigned at (a-1).

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    Test end.
      ESC:end, Enter:start ?

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Depression of the [ESC] or [CR] key causes the control to return to the expansion unit test menu (Fig.EXP-1).

(2-2-3) Error processing

Every time the test has been completed, the message "OK !!" is displayed if the test has been successful. If an error has been involved, "Failed !!" is displayed.

If the error stop choice was specified "No", the test will continue even if an error was encountered.
If "Yes" was specified, the test will then be terminated and the control returns to (a-4) "Termination".

(2-3) Test oscillator line

(2-3-1) General

The oscillator line of the expansion unit is tested.
It is possible to assign test repeat and error stop modes for observing the waveform at the time of a repair or adjustment.

(2-3-2) Operational procedure

When this test item is specified, the prompts (Fig.EXP-4) are displayed one at a time, to which you must answer with the choice.

(a) Test

(a-1) Test repeat choice

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

          Loops count ? [ 0:Endless ] = ▒▒▒

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Number of tests to be repeated must be specified with a number of 1 to 999.
Entry of [0] will continue the test indefinitely.

(a-2) Error stop choice

```
Error stop ? [0:Yes, 1: No] =  0
```

It must be specified whether the test is to be interrupted or not when an error is encountered in a middle of the test.

(a-3) Start

```
Test start ? [0:Yes, 1: No] =  0
```

Start of the test must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the test.

(a-4) Termination

Depression of the [ESC] key terminates the test unconditionally and the control returns to the expansion unit test menu (Fig.EXP-1).
Depression of the [F2] key interrupts the test with the following message on display.

"Test stopped by user."

If the [F1] key is pressed while the above message is on, the test resumes.
If the [ESC] key is pressed, the control returns to the expansion unit test menu (Fig.EXP-1).
The test will terminate, unless the repeated test is assigned at (a-1).

```
Test end.

  ESC:end, Enter:start ?
```

Depression of the [ESC] or [CR] key causes the control to return to the expansion unit test menu (Fig.EXP-1).

(2-3-3) Error processing

Every time the test has been completed, the message "OK !!" is displayed if the test has been successful. If an error has been involved, "Failed !!" is displayed.

If the error stop choice was specified "No", the test will continue even if an error was encountered.
If "Yes" was specified, the test will then be terminated and the control returns to (a-4) "Termination".

(2-4) Test external t/c line

(2-4-1) General

The external t/c line of the expansion unit is tested.
It is possible to assign test repeat and error stop modes for observing the waveform at the time of a repair or adjustment.

(2-4-2) Operational procedure

When this test item is specified, the prompts (Fig.EXP-5) are displayed one at a time, to which you must answer with the choice.

(a) Test

(a-1) Test repeat choice

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         Loops count ? [ 0:Endless ] = XXX
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Number of tests to be repeated must be specified with a number of 1 to 999.
Entry of [0] will continue the test indefinitely.

(a-2) Error stop choice

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         Error stop ? [0:Yes, 1: No] =   X
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

It must be specified whether the test is to be interrupted or not when an error is encountered in a middle of the test.

(a-3) Start

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         Test start ? [0:Yes, 1: No] =   X
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Start of the test must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the test.

(a-4) Termination

Depression of the [ESC] key terminates the test unconditionally and the control returns to the expansion unit test menu (Fig.EXP-1).
Depression of the [F2] key interrupts the test with the following message on display.

"Test stopped by user."

If the [F1] key is pressed while the above message is on, the test resumes.
If the [ESC] key is pressed, the control returns to the expansion unit test menu (Fig.EXP-1).

The test will terminate, unless the repeated test is assigned at (a-1).

Test end.

ESC:end, Enter:start ?

Depression of the [ESC] or [CR] key causes the control to return to the expansion unit test menu (Fig.EXP-1).

(2-4-3) Error processing

Every time the test has been completed, the message "OK !!" is displayed if the test has been successful. If an error has been involved, "Failed !!" is displayed.

If the error stop choice was specified "No", the test will continue even if an error was encountered.
If "Yes" was specified, the test will then be terminated and the control returns to (a-4) "Termination".

(2-5) Test IREQ, DREQ line

(2-5-1) General

The external IREQ and DREQ lines of the expansion unit are tested.
It is possible to assign test repeat and error stop modes for observing the waveform at the time of a repair or adjustment.

Testing order is as follows, "IREQ2, IREQ3, IREQ4, IREQ5, IREQ6, IREQ7, DREQ3, DREQ1".

(2-5-2) Operational procedure

When this test item is specified, the prompts (Fig.EXP-6) are displayed one at a time, to which you must answer with the choice.

(a) Test

(a-1) Test repeat choice

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

         Loops count ? [ 0:Endless ] = XXX

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Number of tests to be repeated must be specified with a number of 1 to 999.
Entry of [0] will continue the test indefinitely.

(a-2) Error stop choice

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

         Error stop ? [0:Yes, 1: No] =   X

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

It must be specified whether the test is to be interrupted or not when an error is encountered in a middle of the test.

(a-3) Start

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

         Test start ? [0:Yes, 1: No] =   X

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Start of the test must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the test.

(a-4) Termination

Depression of the [ESC] key terminates the test unconditionally and the control returns to the expansion unit test menu (Fig.EXP-1).
Depression of the [F2] key interrupts the test with the following message on display.

"Test stopped by user."

If the [F1] key is pressed while the above message is on, the test resumes.
If the [ESC] key is pressed, the control returns to the expansion unit test menu (Fig.EXP-1).

The test will terminate, unless the repeated test is assigned at (a-1).

```
Test end.
------------------------------------------------
  ESC:end, Enter:start ?
```

Depression of the [ESC] or [CR] key causes the control to return to the expansion unit test menu (Fig.EXP-1).

(2-5-3) Error processing

Every time the test has been completed, the message "OK !!" is displayed if the test has been successful. If an error has been involved, "Failed !!" is displayed.

When an error is involved, the signal name will be displayed next to the warning message.
For an instance, error in IREQ2 and DREQ3 will be displayed as follows:

```
                    Failed !!    IREQ2  DREQ3
```

If the error stop choice was specified "No", the test will continue even if an error was encountered.
If "Yes" was specified, the test will then be terminated and the control returns to (a-4) "Termination".

14 HARD DISK DIAGNOSTIC

(1) General

The Hard Disk diagnostics are the program used to test functions of this computer hard disk.
The drive units, internal Hard Disk for PC7100 and in the expansion box are tested.

(1-1) Test menu display

When the program is started, the hard disk test menu is displayed along with the caption (Fig.DSK-1). This display message is called "DSK test menu".

```
SHARP Personal Computer System Diagnostics Level.3
     Date Oct/01/'86
          Internal hard disk drive [1.7]

               (0) Read drive type
               (1) Write, read & compare
               (2) Read only
               (3) Hard initializer
               (4) Bad initializer
               (5) Random seek
               (6) Ascii/Hexa dump
               (7) Dump and Patch
               (8) Check Sector buffer & Disk controller
               (9) Error table display

                              Please input command ? 
```

Fig.DSK-1 DSK test menu

If two hard disk drives are connected, choice of the drive to be tested will be prompted in the display before the test menu is displayed.
Depression of the [0] + [CR] keys or mere depression of the [CR] key starts to test the internal drive.
Depression of the [1] + [CR] keys starts to test the external drive.
Depression of the [ESC] key before the depression of the [CR] key causes the control to return to the DIAG LOADER program.

```
SHARP Personal Computer System Diagnostics Level.3

Date Oct/01/'86

Hard disk drive(s) [1.7]

Test drive : [0:Internal drive, 1:External drive] = 0
```

Fig.DSK-0 Test drive select mode

(1-2) Test menu choice

```
Enter the desired test item number in the following manner:-

Single digit of [0] thru [9] followed by a carrier return.

Only a carrier return may be entered for the test item 0.

The number entered is displayed and the test commences with the carrier
return.
To change the number, delete the number with the BACKSPACE key and enter the
number again.
```

(1-3) Cancellation of choice

The control returns to the diagnostic loader if [ESC] key is pushed prior to a carrier return depression. In the case of 2 Hard disk system, will be return to the test drive select mode (Fig.DSK-0).

(1-4) Others

Parameters for the test must be done with a ten key keyboard key and the carrier return key.
The control will return to Fig.DSK-1 with depression of the [ESC] key when the test program is on.

(2) Test item description

(2-1) Read drive type

(2-1-1) General

This test item checks the hard disk drive and interrogates the disk type.

(2-1-2) Operational procedure

When this test item is chosen, it checks if the disk drive is ready (Fig.DSK-2).
The disk capacity, cylinder numbers, head numbers, and cylinder numbers are displayed.

With this program, the hard disk drive information are obtained.

Depression of the [ESC] or [CR] key causes the control to return to th DSK test menu (Fig.DSK-1).

(2-2) Write, read, & compare

(2-2-1) General

After writing the test data on the hard disk, the data are then read and compared if the write and read have been conducted successfully.
Incremental pattern of 00 thru FF is used for the test data when the test count is "0000", then four bytes of "EB6DB6DB" are used thereafter.

All cylinders from the cylinder 000 thru 613 can be tested.
The test required time may vary depending on the type of the drive unit.
It takes about 4 minutes and 50 seconds (sector count at 128) to test all areas of the D3116.

Pay attention before the execution of this task, as it destructs an entire contents of the hard disk once the test is done.

(2-2-2) Operational procedure

Normally, the test will be carried out for cylinder range 0 thru 613, sector count at 128, single retrial, and without an error stop (1: No).

(a) Test

(a-1) Cylinder test range

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        Cylinder scope ?
          [ 000  --  613 ] = ▒▒▒ - ▒▒▒

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

The cylinder testing range must be specified.
The test takes place from the beginning of the first specified cylinder number to the end of the second specified cylinder number.

(a-2) Sector count

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        Sector count ?
          [ 001  --  128 ] = ▒▒▒

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Enter the sector testing range to be tested with a single command.
Depression of the [0] key with the [CR] or mere depression of the [CR] key will assume the maximum range which is "128".

(a-3) Retrials

```
Retry count ?  [ 0  --  4 ] = 0
```

The number of retrials must be specified.
When an error has been encountered during the read/write test, retrials will be conducted as many times as specified here.

(a-4) Error stop choice

```
Error stop ? [0:Yes, 1: No] = 0
```

It must be specified whether the test is to be interrupted or not when an error is encountered in a middle of the read/write test.

(a-5) Start

```
Test start ? [0:Yes, 1:No] = 0
```

Start of the test must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the test with Fig.DSK-3 on display.

Test pass count, binary address, and physical address [CCCHHSS] are displayed on the lower left side of the screen with the test to the right of it.
A hexadecimal number is used to represent the pass count and the binary address, and an octal number is used to represent the physical address.

```
Pass N
Binary adrs [Ox] = 0000
CCC.HH.SS        = 000.00.00
                                  Test mode: Write
```

On the right side of the screen is displayed the number of errors by error kinds using hexadecimal figure.

(a-6) Termination

Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).
Depression of the [F2] key interrupts the test with the following message on display.

"Test stopped by user."

If the [F1] key is pressed while the above message is on, the test resumes.
If the [ESC] key is pressed, the control returns to the DSK test menu (Fig.DSK-1).

(b) Error processing

(b-1) Read/write related error

If an error occurred before the seek operation after the test started, the test will be terminated irrespective of (a-4) "Error stop choice".
Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).
When an error was met during the read/write test, the command parameter and the status of the error are displayed (Fig.DSK-11) and the error count displayed to the right is then incremented. If the error stop choice is "No", the test continues after revising the display every time an error occurred. (In this case, only the currently encountered error is displayed.)
If the error stop choice is "Yes", the test is interrupted immediately upon occurrence of an error. In this case, the test can be resumed with the depression of the [CR] key. If the [ESC] key is pressed, the control then returns to the DSK test menu (Fig.DSK-1).
If printer is connected, command parameter of the error will be printed.

See the error message list which is attached to this text.

(b-2) Compare related error

When an unmatch is encountered in verifying the test data, the location and the unmatch data are displayed.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        Compare error
         Adrs [0x] = ▒▒▒▒
         Data [0x] = 6DEB  -  ▒▒▒▒

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

If the error stop choice is "No", the test continues after revising the display every time an error occurred. (In this case, only the currently encountered error is displayed.)
The error count is revised every time an error is met, whose count is in terms of two bytes.

If the error stop choice is "Yes", the test is interrupted immediately upon occurrence of an error. In this case, the test can be resumed with the depression of the [CR] key. If the [ESC] key is pressed, the control then returns to the DSK test menu (Fig.DSK-1).

As verification is done in terms of two bytes, its significance is explained below for an example above.

Adrs [0x] = 0004

The top address where the unmatch is met

Data [0x] = 6DEB 7DEB

Write data Read data

In this example, it indicates there is an unmatch in the high order bytes (in the address "0005".

(2-3) Read only

(2-3-1) General

By reading the data on the hard disk, test is conducted to check if the reading operation is normal.

The test can be done to all cylinders, 000 thru 613.

Although the test required time may vary depending on the drive unit, it may be about 1 minute and 20 seconds to test all area of the D3116.

(2-3-2) Operational procedure

Normally, the test will be carried out for cylinder range 0 thru 613, sector count at 128, single retrial, and without an error stop (1: No).

(a) Test

(a-1) Cylinder test range

Cylinder scope ?

[000 -- 613] = ▒▒▒ - ▒▒▒

The cylinder testing range must be specified.

The test takes place from the beginning of the first specified cylinder number to the end of the second specified cylinder number.

(a-2) Sector count

Sector count ?

[001 -- 128] = ▒▒▒

Enter the sector testing range to be tested with a single command.
Depression of the [0] key with the [CR] or mere depression of the [CR] key will assume the maximum range which is "128".

(a-3) Retrials

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Retry count ?  [ 0  --  4 ] = X
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

The number of retrials must be specified.
When an error has been encountered in reading the data, retrials will be conducted as many times as specified here.

(a-4) Error stop choice

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Error stop ? [0:Yes, 1: No] = X
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

It must be specified whether the test is to be interrupted or not when an error is encountered in a middle of the read/write test.

(a-5) Start

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Test start ? [0:Yes, 1: No] = X
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Start of the test must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the test with Fig.DSK-4 on display.

Test pass count, binary address, and physical address [CCCHHSS] are displayed on the lower left side of the screen with the test to the right of it.
A hexadecimal number is used to represent the pass count and the binary address, and an octal number is used to represent the physical address.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Pass N           = XXXX
        Binary adrs [0x] = XXXX              Test mode: Read
         CCC.HH.SS       = XXX.XX.XX
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

On the right side of the screen is displayed the number of errors by error kinds using hexadecimal figure.

(a-6) Termination

Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).
Depression of the [F2] key interrupts the test with the following message on display.

"Test stopped by user."

If the [F1] key is pressed while the above message is on, the test resumes.
If the [ESC] key is pressed, the control returns to the DSK test menu (Fig.DSK-1).

(b) Error processing

If an error occurred before the seek operation after the test started, the test will be terminated irrespective of (a-4) "Error stop choice".
Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).

When an error was met during the read test, the command parameter and the status of the error are displayed (Fig.DSK-11) and the error count displayed to the right is then incremented. If the error stop choice is "No", the test continues after revising the display every time an error occurred. (In this case, only the currently encountered error is displayed.) If the error stop choice is "Yes", the test is interrupted immediately upon occurrence of an error. In this case, the test can be resumed with the depression of the [CR] key. If the [ESC] key is pressed, the control then returns to the DSK test menu (Fig.DSK-1).
If printer is connected, command parameter of the error will be printed.
See the error message list which is attached to this text.

(2-4) Hard initializer

(2-4-1) General

This item is used to initialize the hard disk.

<u>Pay attention before the execution of this task, as it destructs an entire contents of the hard disk once the test is done.</u>

(2-4-2) Operational procedure

(a) Initializing

(a-1) Interleaving

```
Interleave factor ? [ 01  -  16 ] = 
```

Enter the interleave factor with a number of 01 to 16.
Normally, enter 03.

(a-2) Start of initialization

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Initialize start ? [0:Yes, 1:No] = 0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Start of the test must be acknowledged.
Entry of [1] will cause the control to return to (a-1) "Interleaving" for an entry all again.

Entry of [0] starts the initialization with the following message on display.

"Initialize start."

(a-3) Termination

While the initialization is under way, the [ESC] key depression is not accepted.
Although the time required for the initialization may vary depending on the disk unit, it may be about 50 seconds for the D3116.

If the initialization has ended successfully, the following is displayed.

"Initialize successful."

Depression of the [ESC] or [CR] key in this stage causes the control to return to the DSK test menu (Fig.DSK-1).

(b) Error processing

If an error is met during the initialization, the following is displayed in a middle of the screen.

"Initialize error."

And the command parameter and the status of the error are displayed (Fig.DSK-11).
Depression of the [ESC] or [CR] key causes the control to return to the DSK test menu (Fig.DSK-1).

See the error message list which is attached to this text.

(2-5) Bad initializer

(2-5-1) General

With this item is set the flag in the bad sector to prohibit it from being used.
This operation is applicable to a track.

Pay attention before the execution of this task, as it destructs an entire contents of the hard disk once the test is done.

(2-5-2) Operational procedure

(a) Bad initialize

(a-1) Cylinder

```
Cylinder ?
  [ 000  --  613 ] = ▒▒▒
```

The cylinder number in which the bad sector exists must be specified with a number 000 to 613.

(a-2) Head

```
Head ? [0:Yes, 1:No] = ▒
```

The head number must be specified.

(a-3) Start of the operation

```
Start ? [0:Yes, 1:No] = ▒
```

Start of the task must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the task.

(a-4) Termination

The task is conducted to a track. After the task has been done, accessing of the track is prohibited thereafter.

If the task has ended successfully, the following is displayed.

"Bad initialize complete."

Depression of the [ESC] or [CR] key in this stage causes the control to return to the DSK test menu (Fig.DSK-1).

(b) Error processing

(b) Error processing

If an error is met during the task, the following is displayed in a middle of the screen.

"Bad initialize error."

And the command parameter and the status of the error are displayed (Fig.DSK-11).
Depression of the [ESC] or [CR] key causes the control to return to the DSK test menu (Fig.DSK-1).

See the error message list which is attached to this text.

(2-6) Random seek

(2-6-1) General

The head seeks sectors at random to check proper seek and read operations of the sectors.

(2-6-2) Operational procedure

(a) Test

(a-1) Error stop choice

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Error stop ? [0:Yes, 1: No] = 0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

It must be specified whether the test is to be interrupted or not when an error is encountered in a middle of the read/write test.

(a-2) Start

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Test start ? [0:Yes, 1: No] = 0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Start of the test must be acknowledged.
Entry of [1] causes the control to return to (a-1) for an entry again.
Entry of [0] starts the test with Fig.DSK-7 on display.

Binary address, physical address [CCCHHSS], and error count are displayed on the middle of the screen.
A hexadecimal number is used to represent the binary address and error count, and an octal number is used to represent the physical address.

```
Binary adrs [Ox] = ▒▒▒▒
CCC.HH.SS       = ▒▒▒.▒▒.▒▒
Error count [Ox] = ▒▒▒▒
```

Fig.DSK-7

(a-3) Termination

Depression of the [ESC] key in a middle of the operation causes the control to return to the DSK test menu (Fig.DSK-1).
Depression of the [F2] key interrupts the test with the following message on display.

"Test stopped by user."

If the [F1] key is pressed while the above message is on, the test resumes.
If the [ESC] key is pressed, the control returns to the DSK test menu (Fig.DSK-1).

(b) Error processing

If an error occurred before the seek operation after the test started, the test will be terminated irrespective of (a-1) "Error stop choice".
Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).

When an error was met during the read or seek operation, the command parameter and the status of the error are displayed (Fig.DSK-11).
If the error stop choice is "Yes", the test resumes after incrementing the error count.
If it is "No", the test is interrupted, immediately upon occurrence of an error. In this case, the test can be resumed with the depression of the [CR] key. If the [ESC] key is pressed, the control then returns to the DSK test menu (Fig.DSK-1).

See the error message list which is attached to this text.

(2-7) Ascii/Hexa dump

(2-7-1) General

The contents of the disk are displayed (dumped) on the screen.
The contents of a sector (512KB) is displayed in two parts, the first half (256KB) and the second half (256KB).
On the left of the screen is displayed in the hexadecimal figure with the character itself to right of it.

(2-7-2) Operational procedure

(a) Dump

(a-1) Choice of dump address

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        Physical address [CCC.HH.SS] = ▒▒▒.▒▒.▒▒
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Enter the dumping disk address in terms of the physical address.
Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).
When the entry has been complete, the screen (Fig.DSK-8) appears with the data of the specified sector on display.

(a-2) Termination

The following is displayed on the lower left of the screen, when the task is complete.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        ESC:end, Enter: next half,  Minus:start ?
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Or,

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        ESC:end, Enter: next sector,  Minus:start ?
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

"ESC:" indicates the [ESC] key which causes the task terminated when depressed and the control then returns to the DSK test menu (Fig.DSK-1).
"Enter:" indicates the [CR] key which brings on the screen a next sector or a second half of the sector now on display.
"Minus:" indicates the [-] key which permits to start the entry from (a-1) all over again.

(b) Error processing

The task terminates unconditionally when an error is met, and the command parameter and the error status are displayed on the lower right of the screen (Fig.DSK-11).
Depression of the [CR] key in this stage resumes the test.
Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).

See the error message list which is attached to this text.

(2-8) Dump and patch

(2-8-1) General

With this task, the contents of the disk are displayed on the screen to be patched up.

The contents of a sector (512KB) is displayed in the hexadecimal figure in two parts; the first half (256KB) on the left side of the screen and the second half (256KB) on the right side.

(2-8-2) Operational procedure

(a) Patch

(a-1) Choice of patch address

Physical address [CCC.HH.SS] = ■■■ .■■. ■■

Enter the disk address in which patchup is required in terms of the physical address.

Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).

When the entry has been complete, the screen (Fig.DSK-9) appears with the dump data on display.

(a-2) Termination

The following is displayed on the lower left of the screen, when the task is complete.

Write address [0x] = ■■■ ESC:end, Minus:write

And the control now waits for an entry of the write address. Function keys displayed on the right are valid. "ESC:" indicates the [ESC] key which causes the task terminated when depressed and the control then returns to the DSK test menu (Fig.DSK-1).

"Minus:" indicates the [-] key which writes the data currently on display, after which time the control moves to (a-4).

(a-3) Data write mode

As it is repetitive in the data write mode, continuous entry becomes possible if the data address is consecutive.

To change the data in "0x145", enter [1], [4], [5], and [CR]. With this, the part of the respective ASCII screen is erased and the entry is then requested.

For the data are still remaining even after the erasure of the ASCII screen, it permits to restore the previous data with the depression of the [-] key. The following message appears in the lower right side of the screen when the entry is complete.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        ESC:end, Enter:store Minus:exit

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

"ESC:" indicates the [ESC] key which causes the task terminated when depressed and the control then returns to the DSK test menu (Fig.DSK-1).
"Enter:" indicates the [CR] key which completes the entry.
"Minus:" indicates the [-] key which permits to exit from the data write mode and the control returns to (a-2).

(a-4) Patch termination and write to disk

When write is commanded to the disk with the [-] key, the following screen is displayed.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        Write start ? [0:Yes, 1:No] = 0

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Depression of [0] brings the following message displayed after writing data onto the disk.
Depression of [1] the same is displayed without any action.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        ESC:end, Enter:next, Minus:start ?

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

"ESC:" indicates the [ESC] key which causes the task terminated when depressed and the control then returns to the DSK test menu (Fig.DSK-1).
"Enter:" indicates the [CR] key which comes to dump a next data on the screen for patchup, then it moves to (a-2).
"Minus:" indicates the [-] key which causes the control to return to (a-1) for an entry again from the address entry.

(b) Error processing

The task terminates unconditionally when an error is met, and the command parameter and the error status are displayed on the lower right of the screen (Fig.DSK-11).
Depression of the [CR] key in this stage resumes the test.
Depression of the [ESC] key causes the control to return to the DSK test menu (Fig.DSK-1).

See the error message list which is attached to this text.

(2-9) Check sector buffer and disk controller

(2-9-1) General

This task checks the sector buffer and the disk controller.

(2-9-2) Operational procedure

(a) Test

(a-1) Start

```
Test start ? [0:Yes, 1:No] = 0
```

Start of the test must be acknowledged.
Entry of [0] starts the test.

(a-2) Termination

The following displayed after successful termination of the test.

```
Sector buffer ... OK !!
Controller    ... OK !!
```

Above message will be displayed, at this stage [ESC] key is depressed, then following message will be appeared.

```
Test end.
```

Depression of the [ESC] or [CR] key causes the control to return to the DSK test menu (Fig.DSK-1).
If an error was met, it will be alerted with "Compare error !" or "Error !", instead of "OK !!".

(b) Description

(b-1) Sector buffer

The sector buffer (512KB) is checked by comparing the test data written and read.
The test data of an incremental pattern of "00" to "FF" are used for the first time, "55" for the second time, and "AA" for the third time.

(b-2) Disk controller

Register within the disk controller is checked.

(2-10) Error table display

(2-10-1) General

All error kinds, error locations, and error counts are displayed for (1) Write, read, compare, (2) Read only, and (5) Random seek tests. However, error information is limited to 50 locations.

(2-10-2) Operation

The test starts immediately without any key operation.
(a) Error information are displayed (Fig.DSK-12).

When no error is occured, the error massage will not be displayed.

(2-10-3) Termination

Depression of the (ESC) or (CR) key causes the control to return to the DSK test menu (Fig. DSK-1).

(3) Error message

(3-1) Error before the start of the task

If the hard disk unit were not ready in executing a task, any task thereafter will not be executed with the following message on the lower left side of the screen.

"Drive not ready."

(3-2) Error during the execution of test

The following is displayed on the lower right side of the screen when an error is occurred during the execution of the task (Fig.DSK-11).

```
Error occurred.
 AX: ▒▒▒▒ , BX:▒▒▒▒, CX:▒▒▒▒, DX:▒▒▒▒, ES:▒▒▒▒
 Status = ▒▒
          (error message)
```

The contents of the register at the error occurrence are represented by AX to ES. The high order byte of AM indicates the error code. For more details, refer to the Service Manual.
Status represents the contents of the disk controller status register.

(3-3) Error message

Bad command [hex 01]
Shows that an invalid command is received.

Bad address mark [hex 02]
Shows the occurrence of an address mark read error.

Record not found [hex 04]
Shows that the specified record is not found.

Bad sector [hex 0A]
Shows that a bad sector is found.

Bad ECC on disk read [hex 10]
Shows the occurrence of an ECC error during data read.

Bad seek [hex 40]
Shows the occurrence of a seek error during seek.

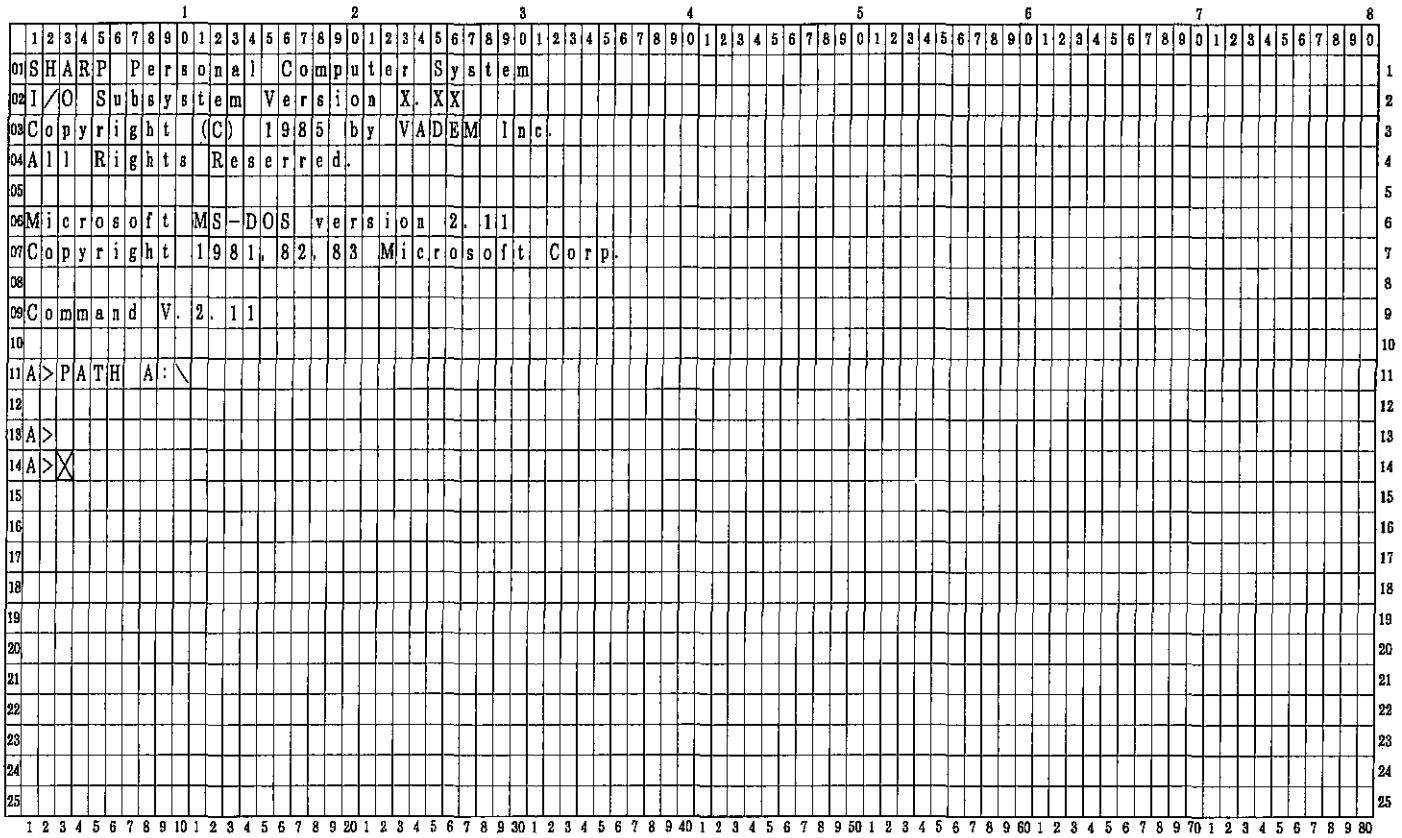
Others
Other kind of error.

Compare error
Shows an unmatch of the write data with the read data.

15 SCREEN FORMAT

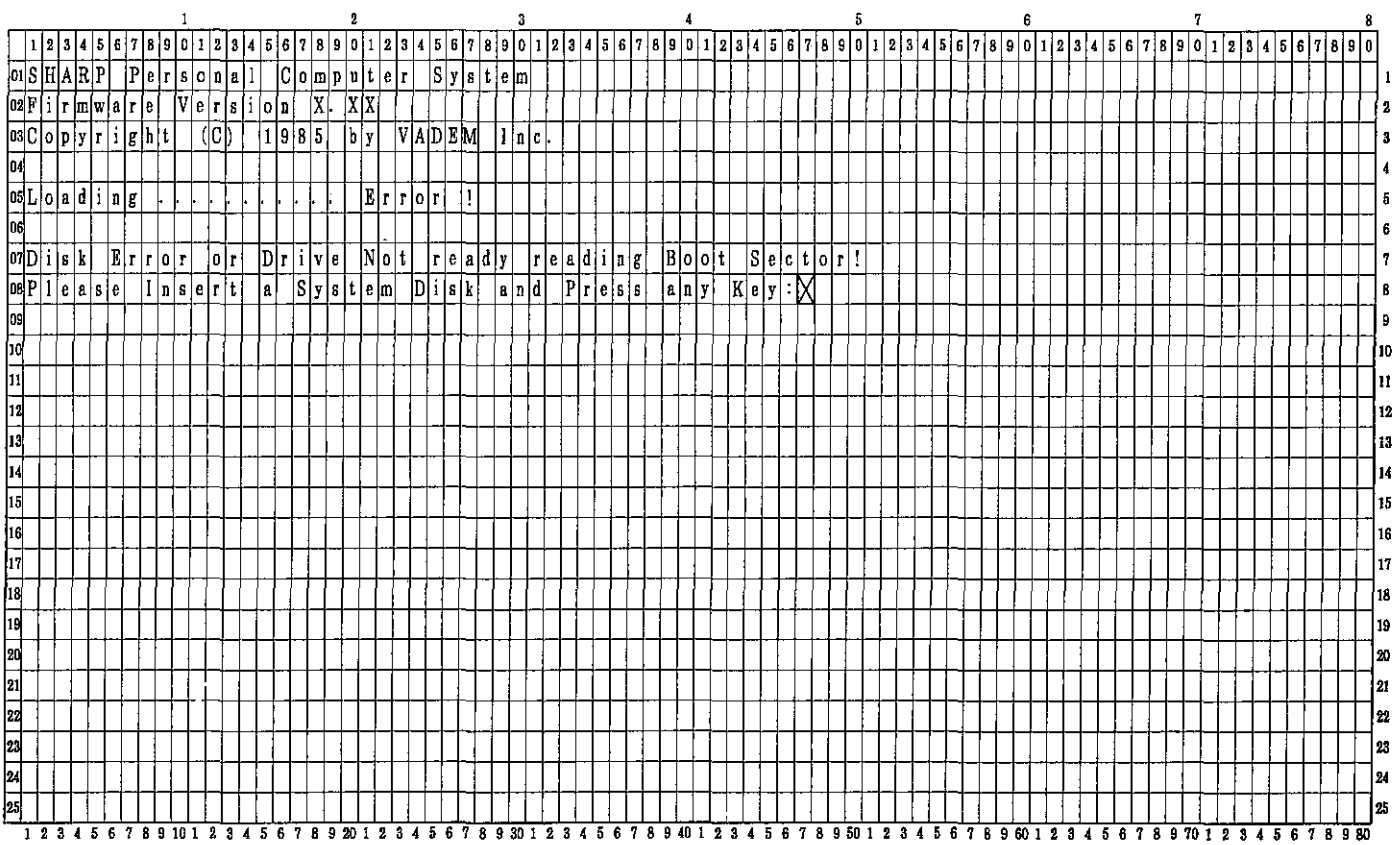
Screen Format

Fig. DIAG－1



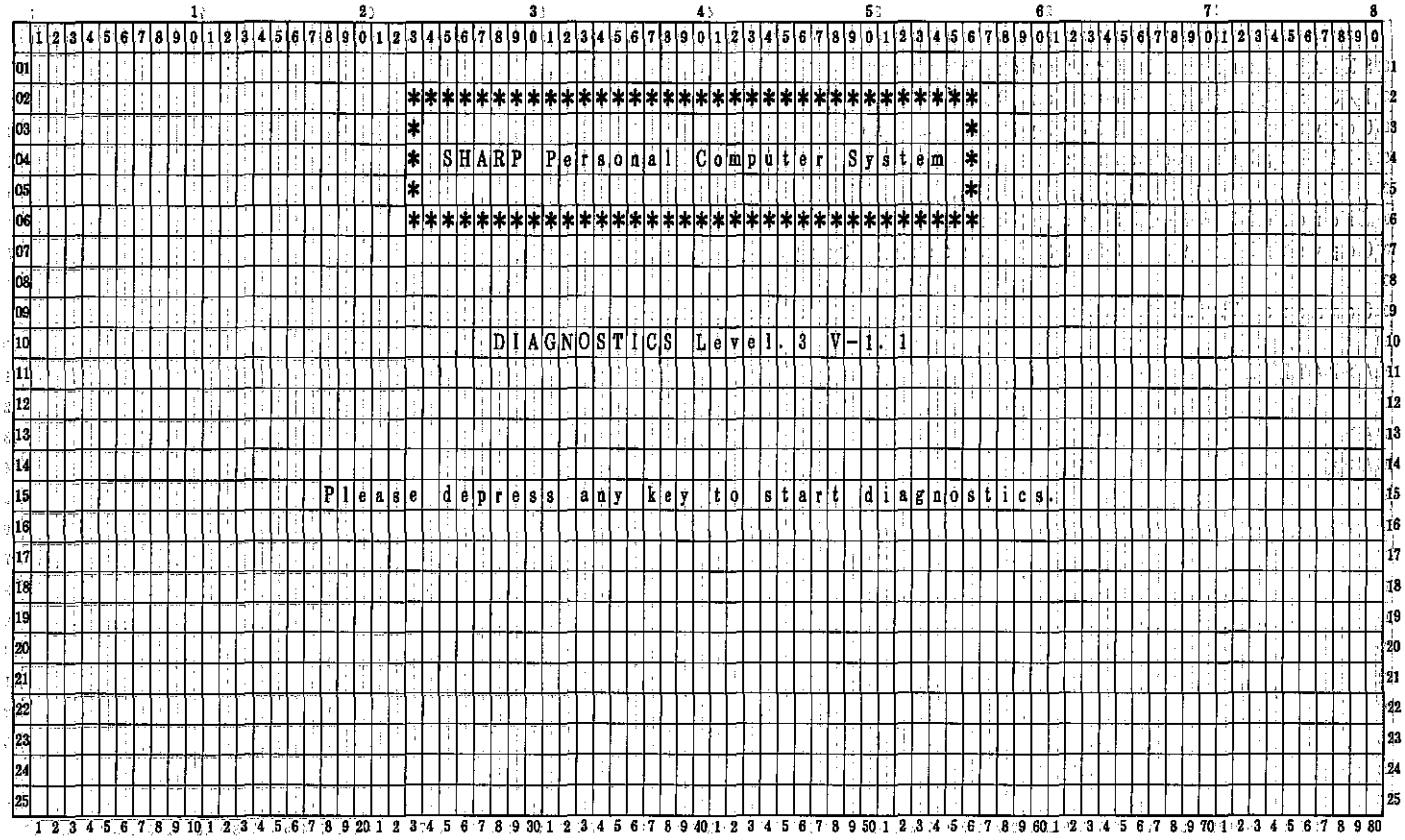
Screen Format

Fig. DIAG－2



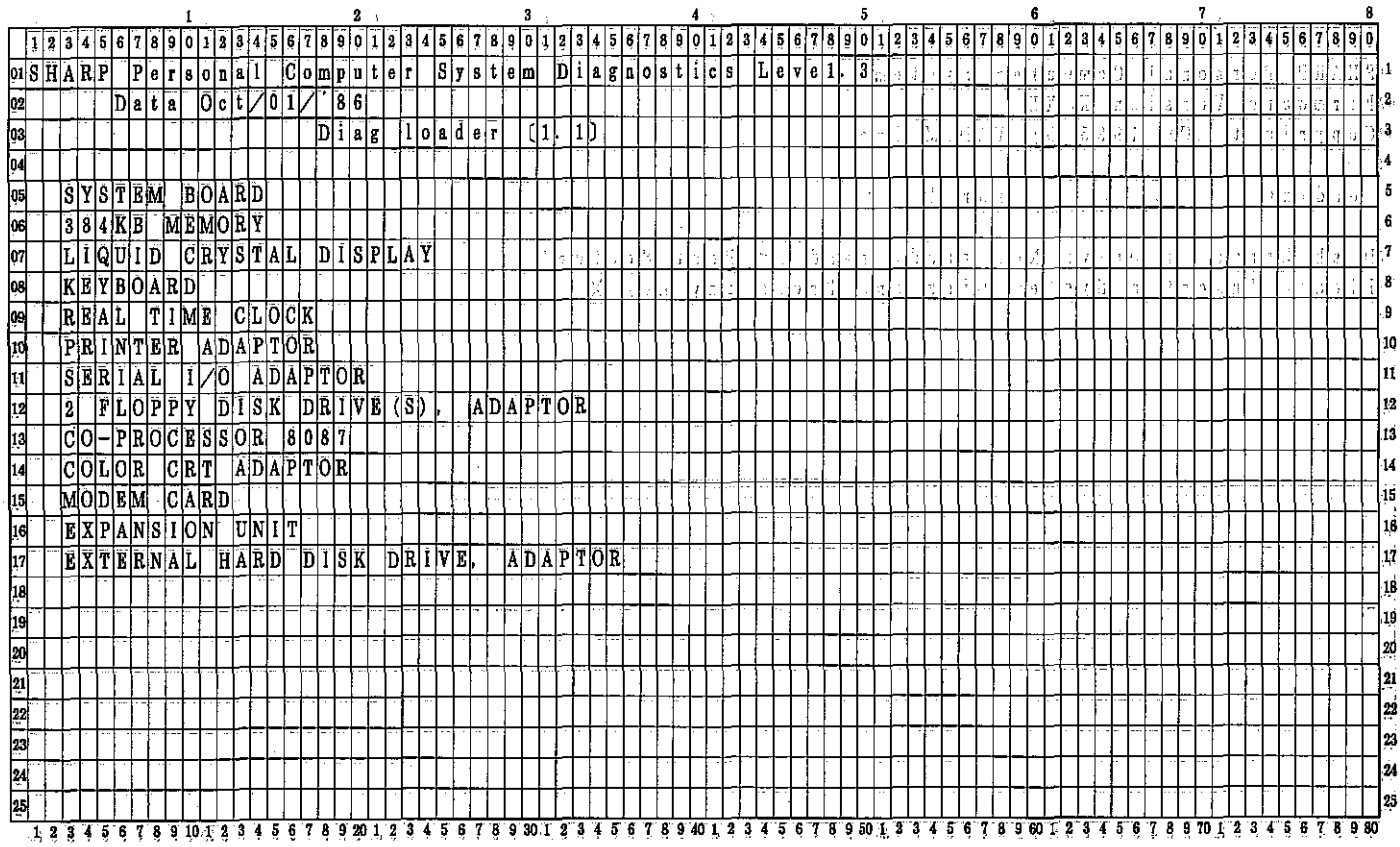
Screen Format

Fig. TITLE-



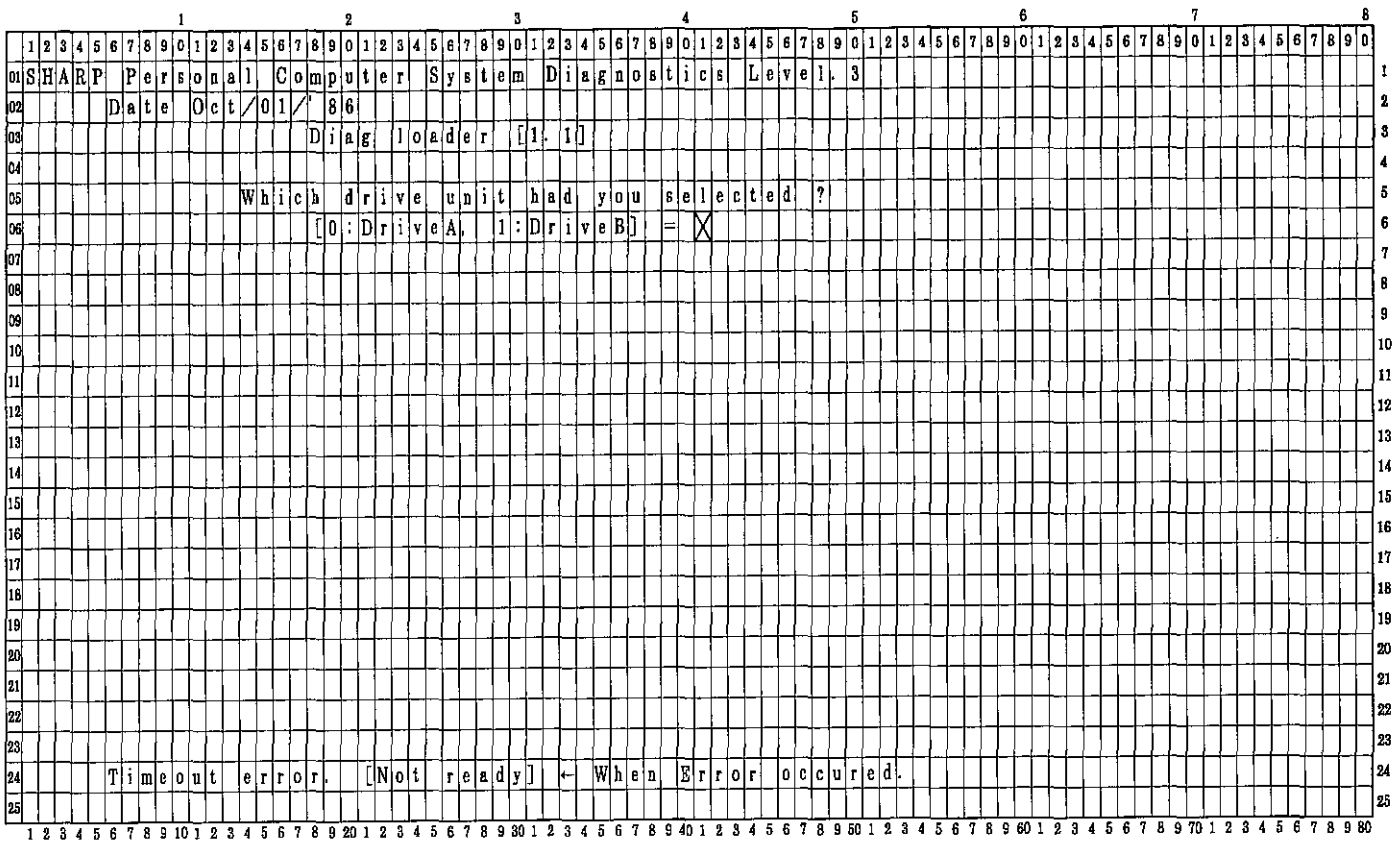
Screen Format

Fig. SYSTEM-



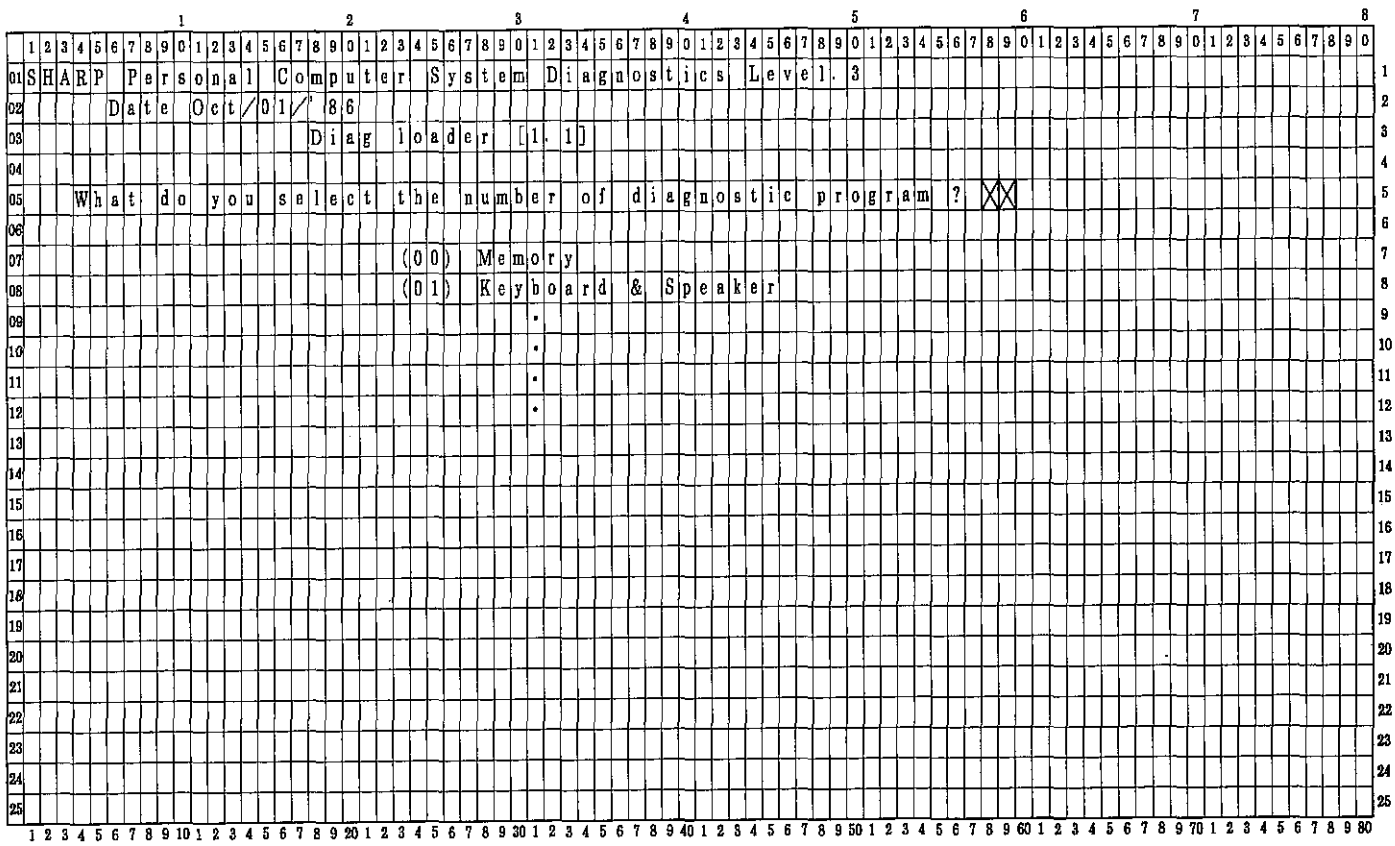
Screen Format

Fig.LOAD－1



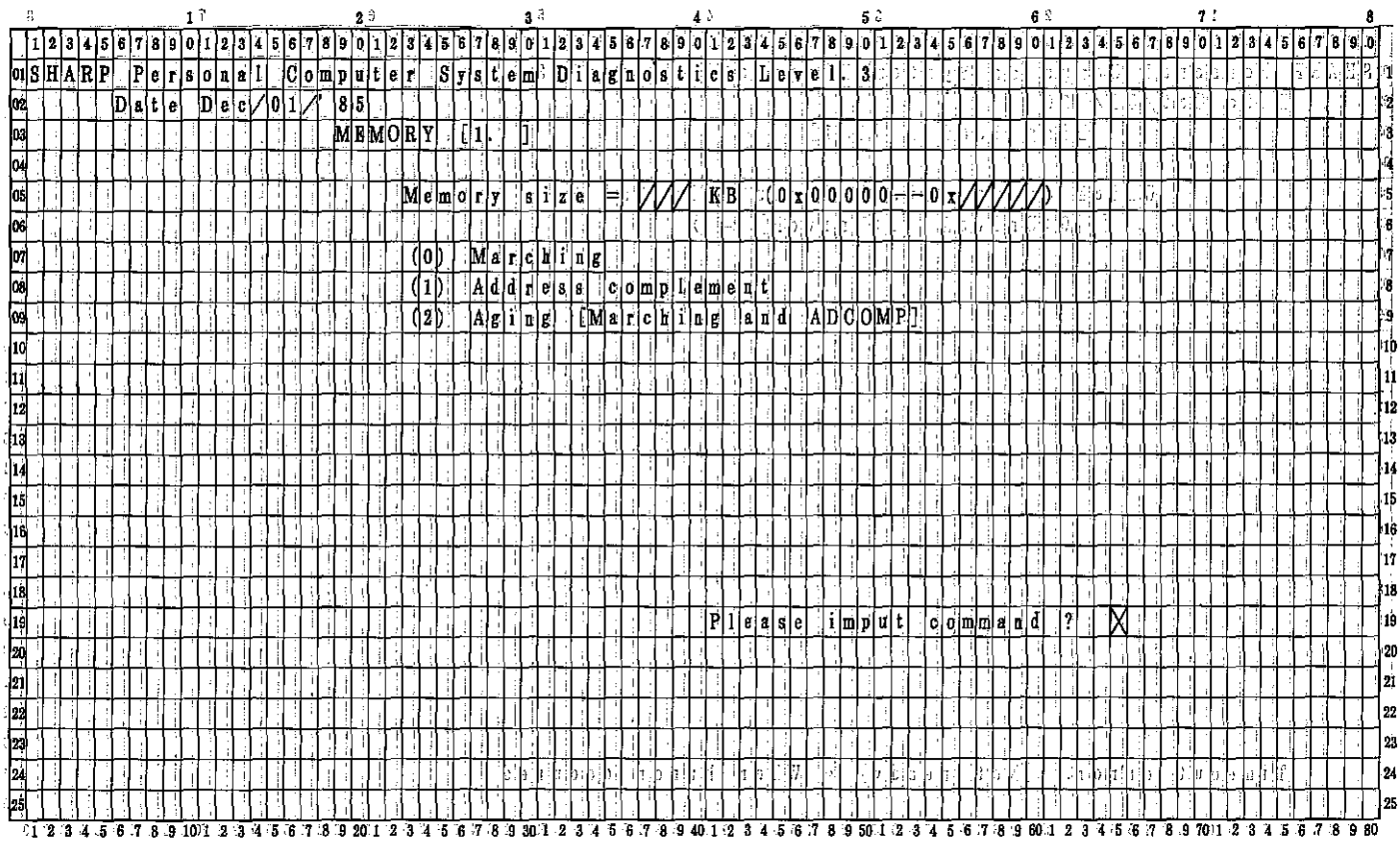
Screen Format

Fig.LOAD－2



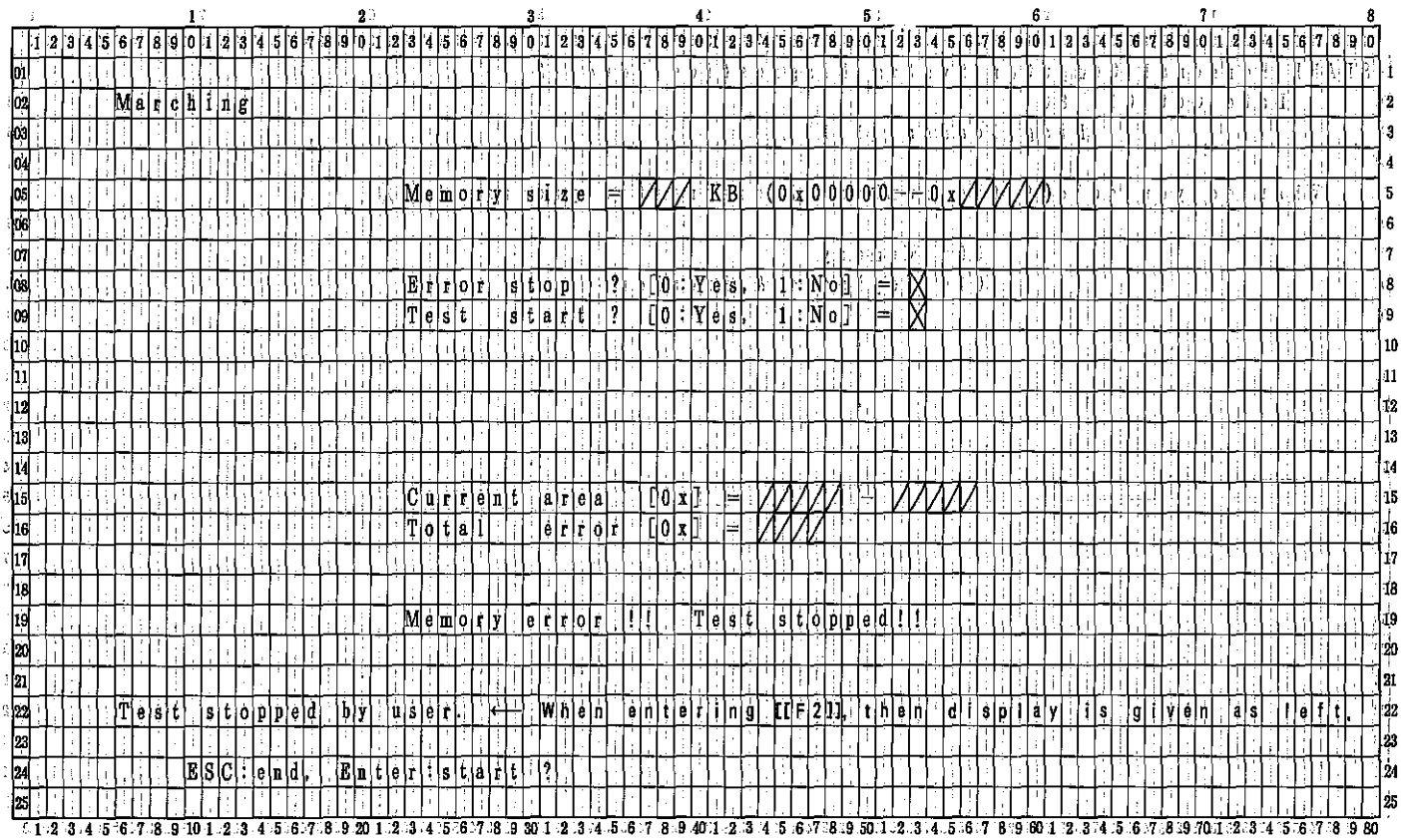
Screen Format

Fig.MEM-1



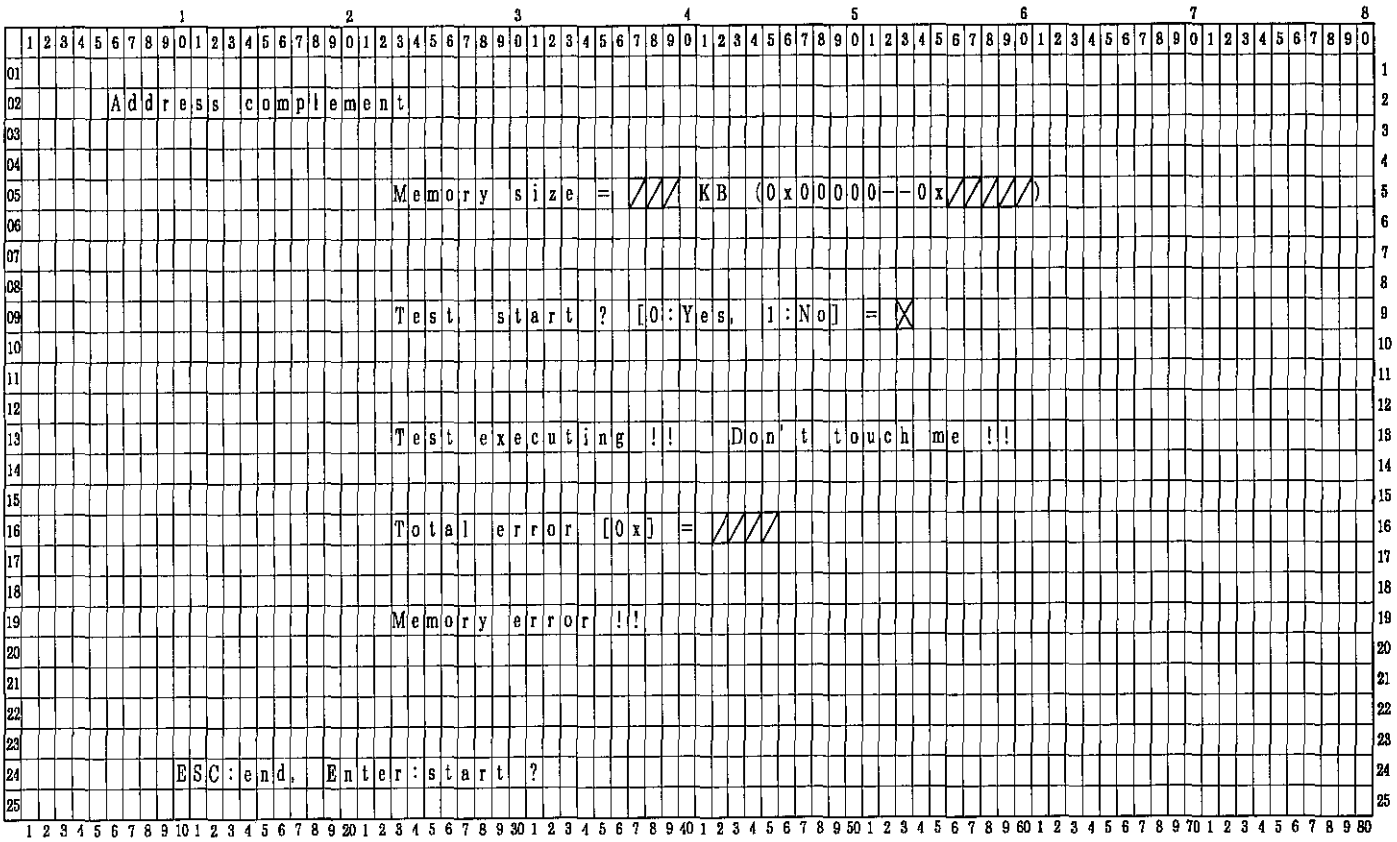
Screen Format

Fig.MEM-2



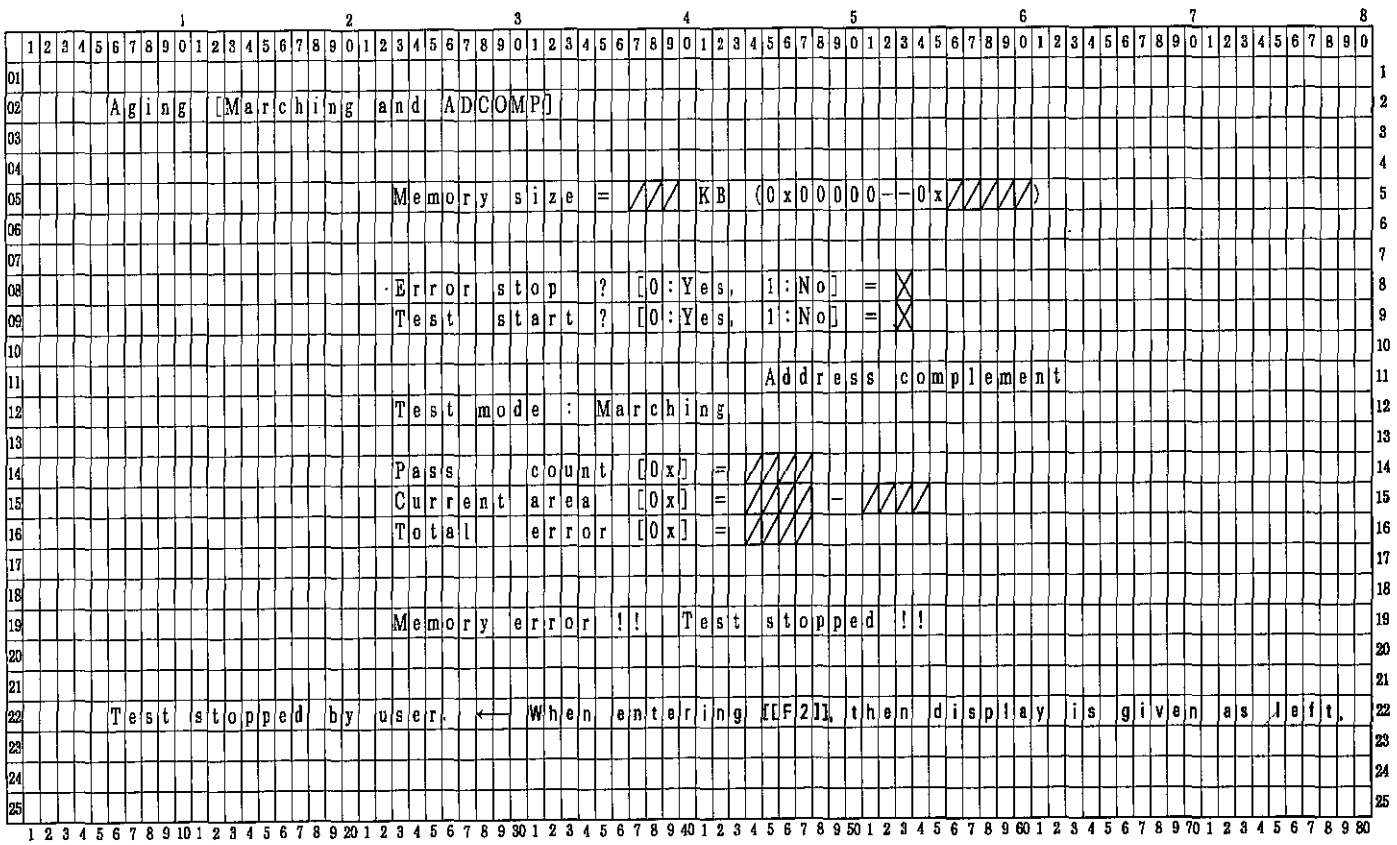
Screen Format

Fig.MEM－3



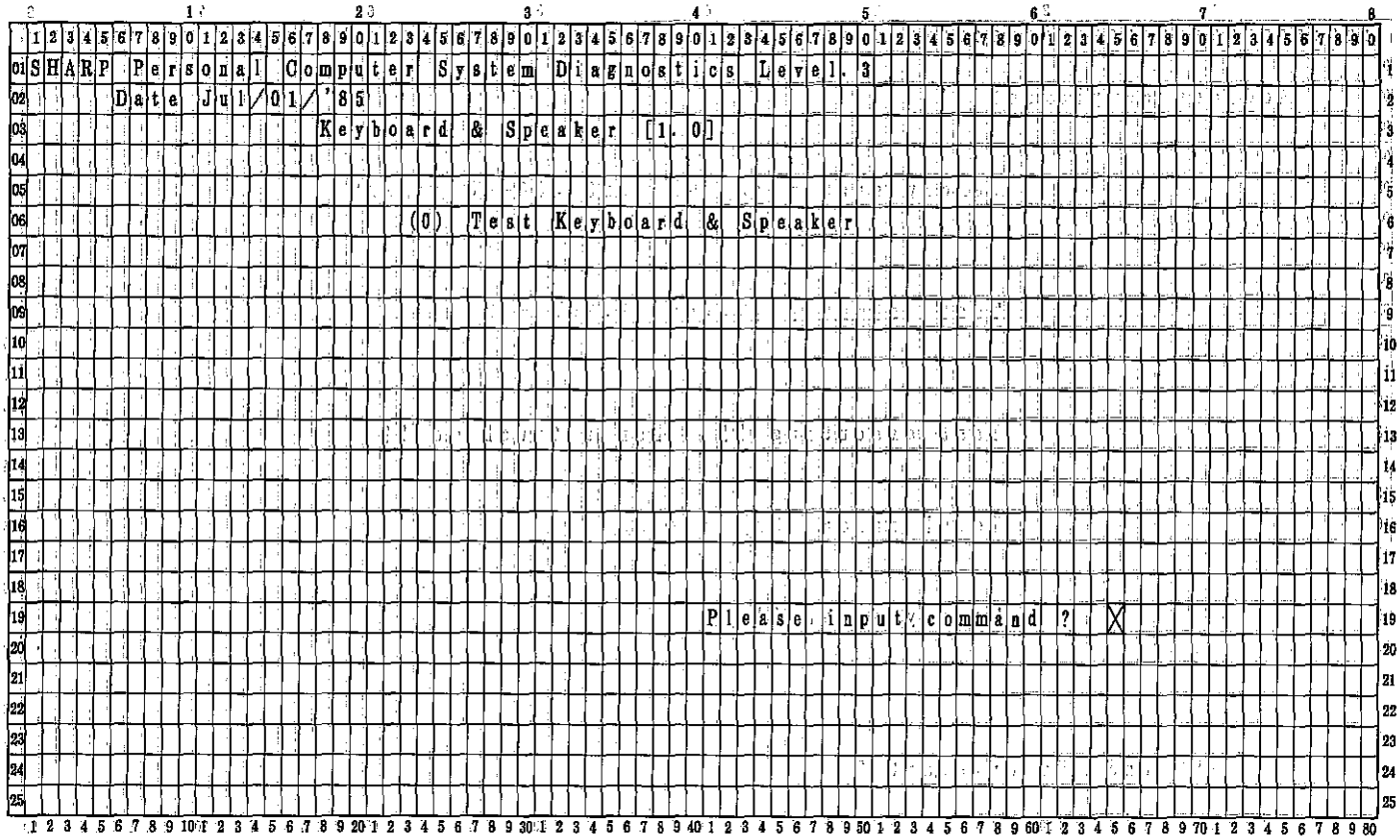
Screen Format

Fig.MEM－4



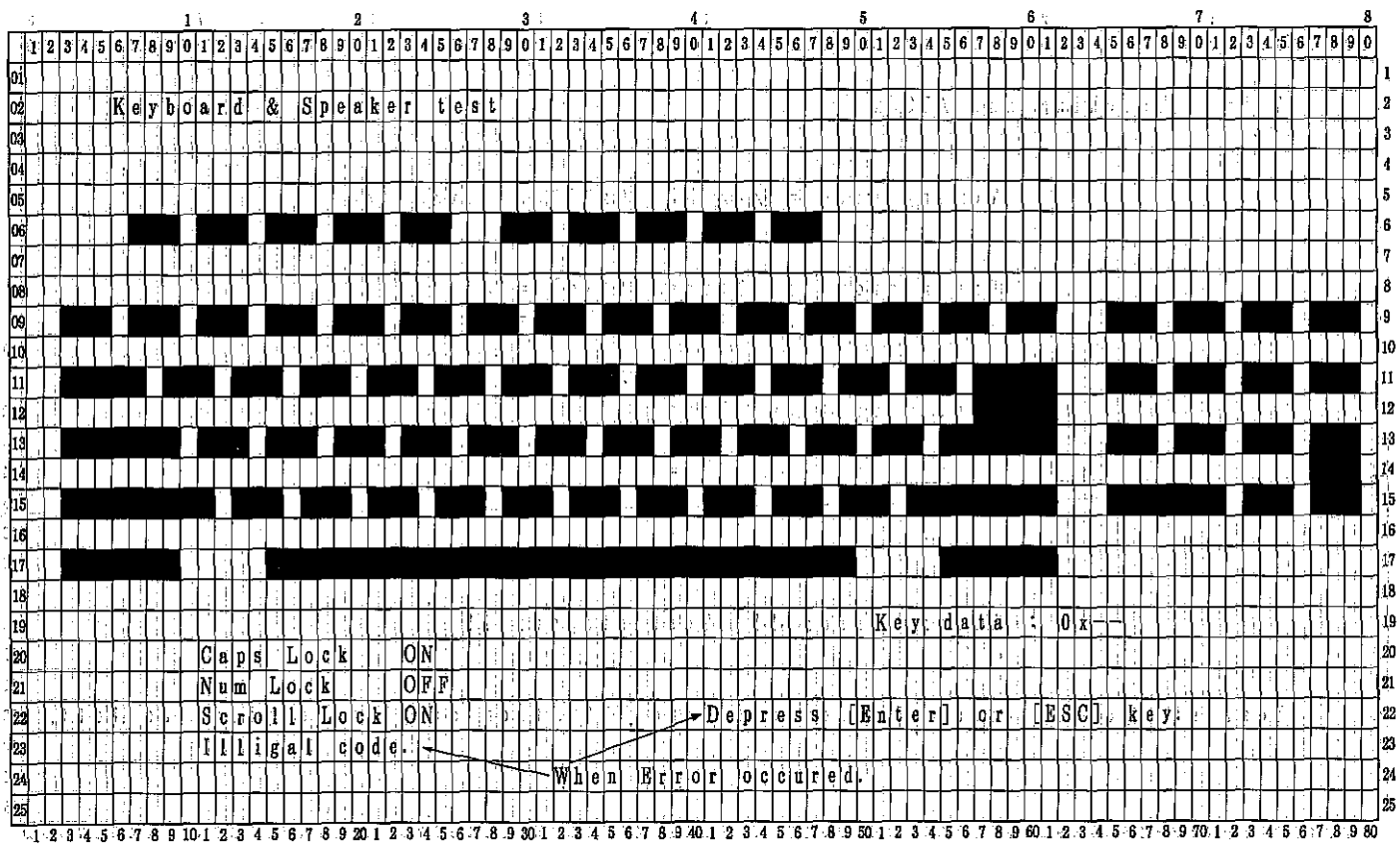
Screen Format

Fig.KEY-1



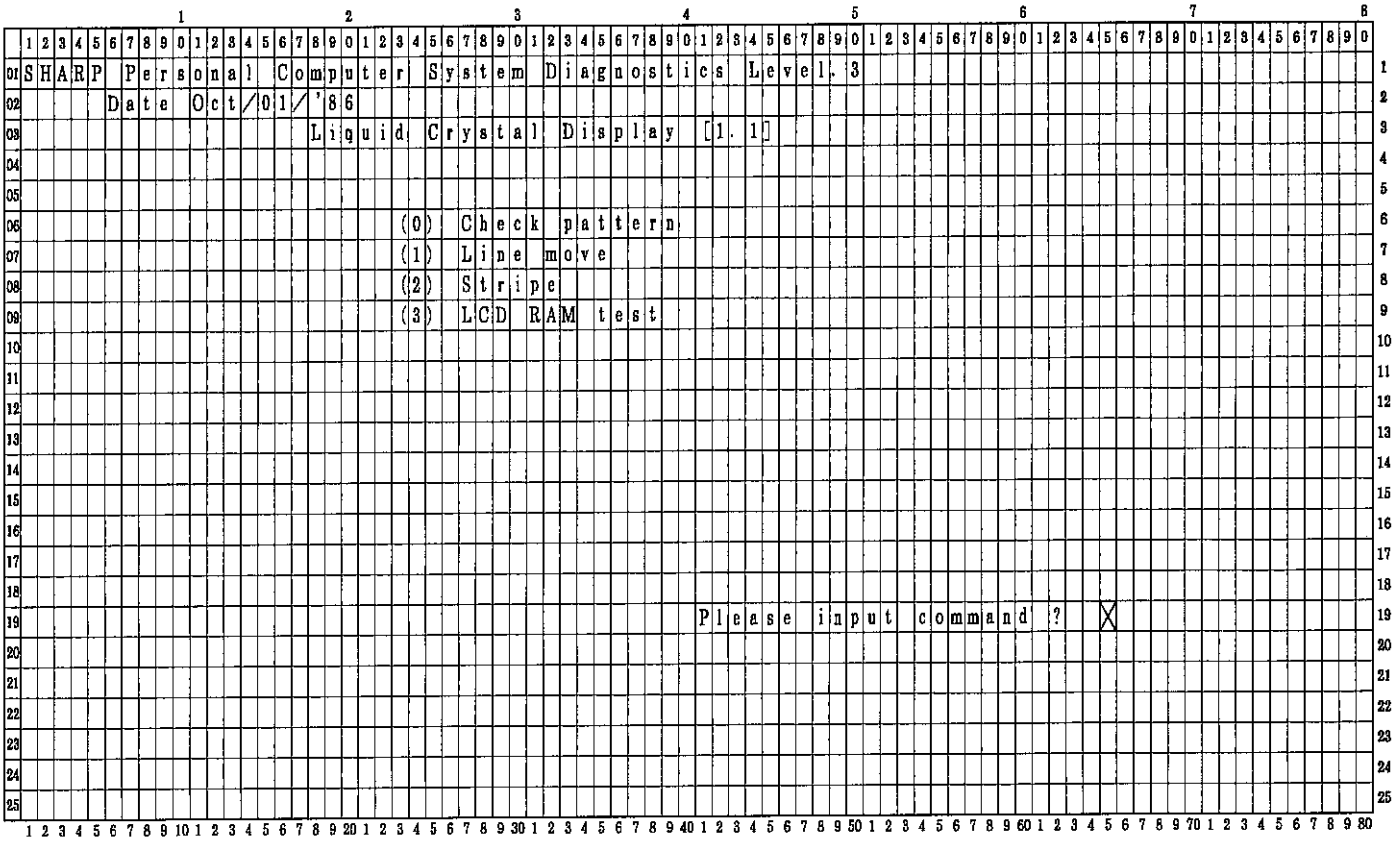
Screen Format

Fig.Key-2



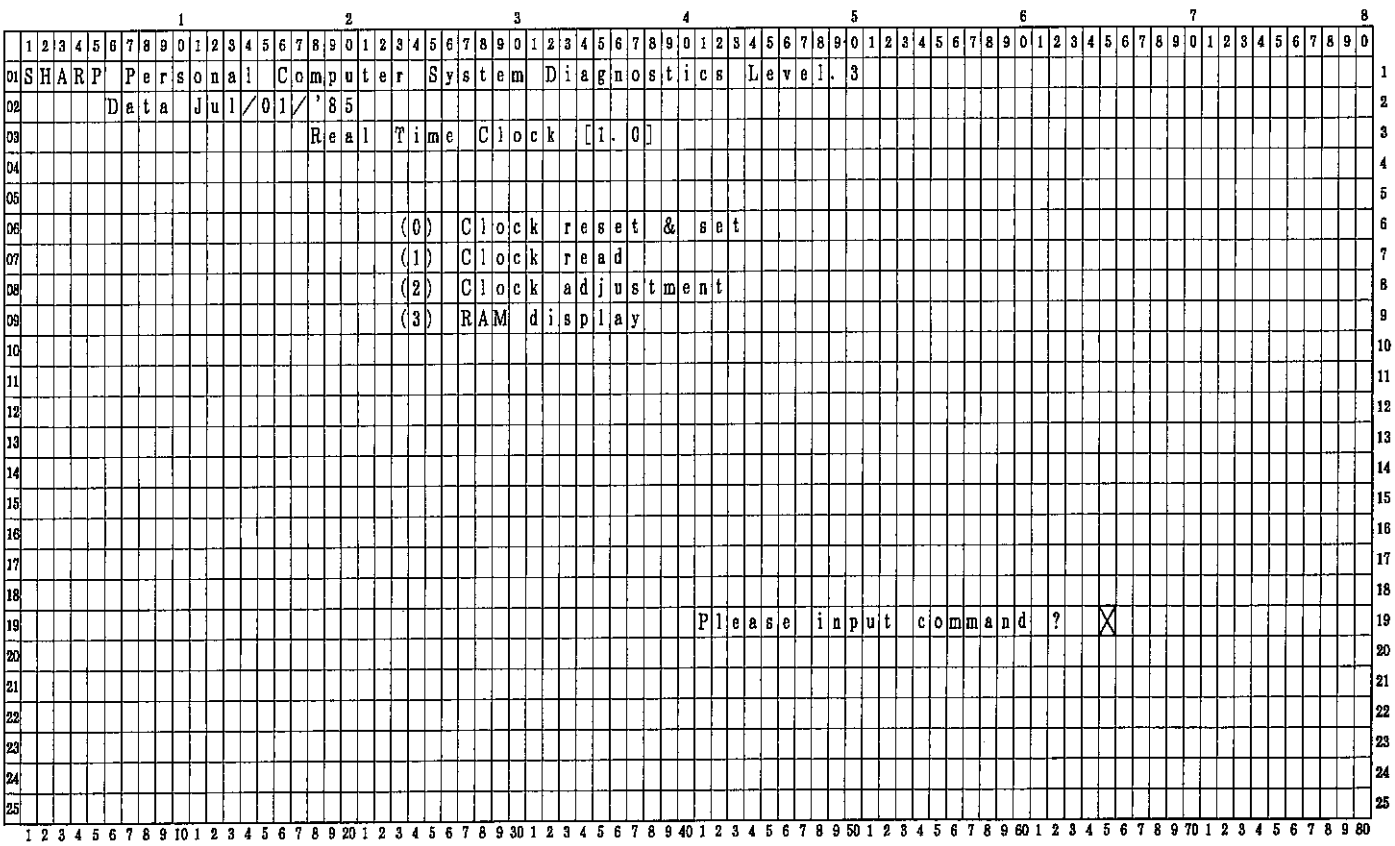
Screen Format

Fig.LCD－1



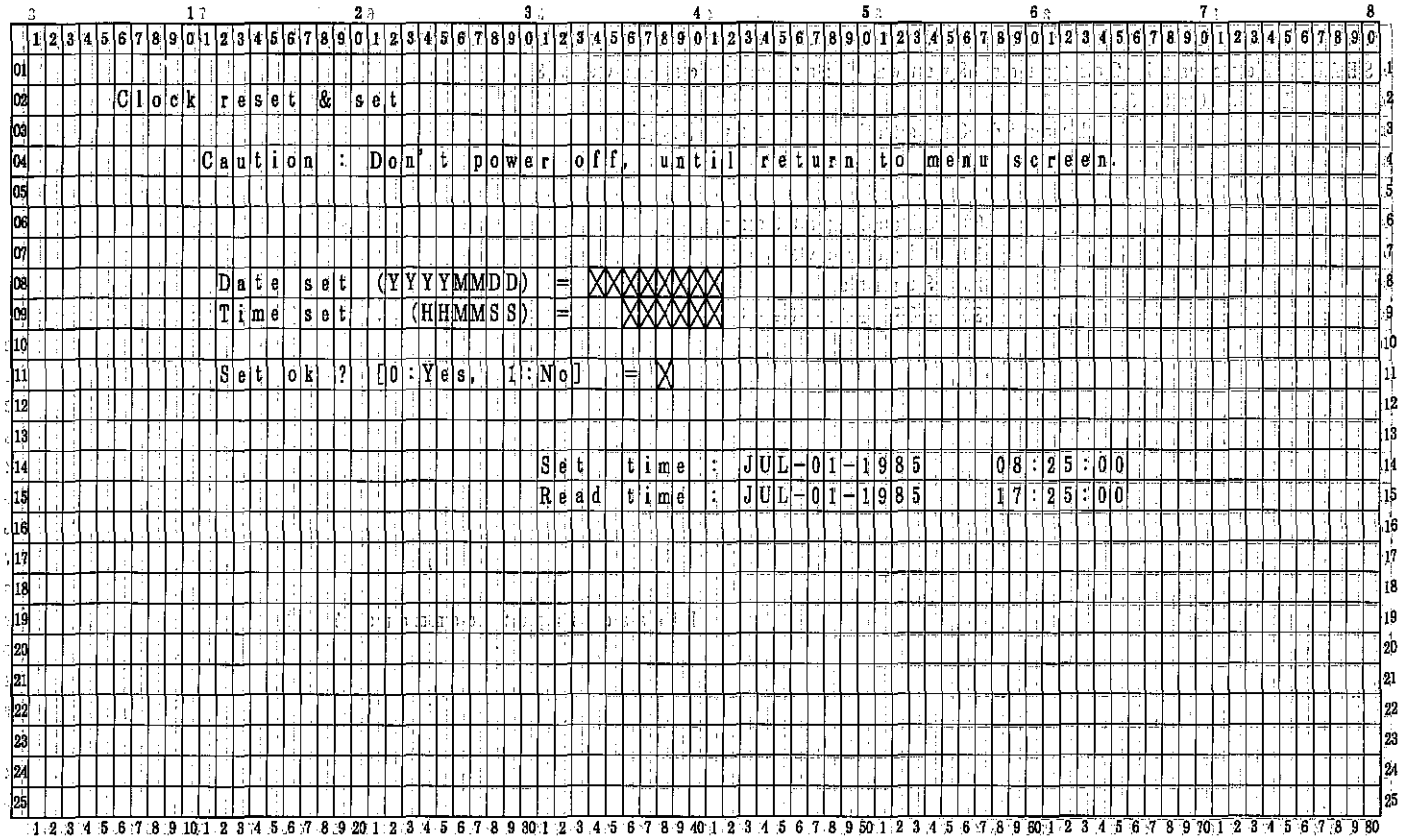
Screen Format

Fig.CLK－1



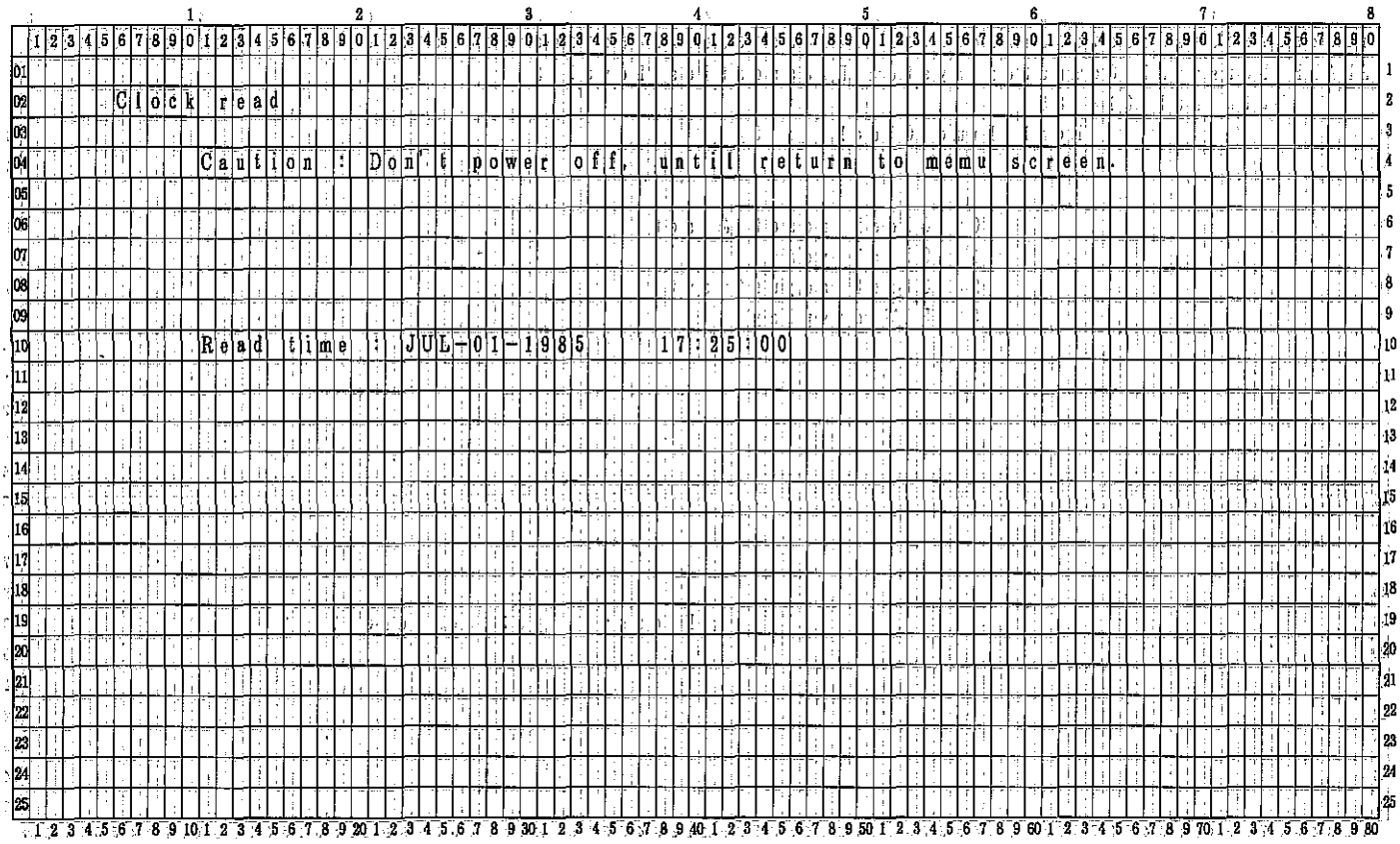
Screen Format

Fig.CLK-2



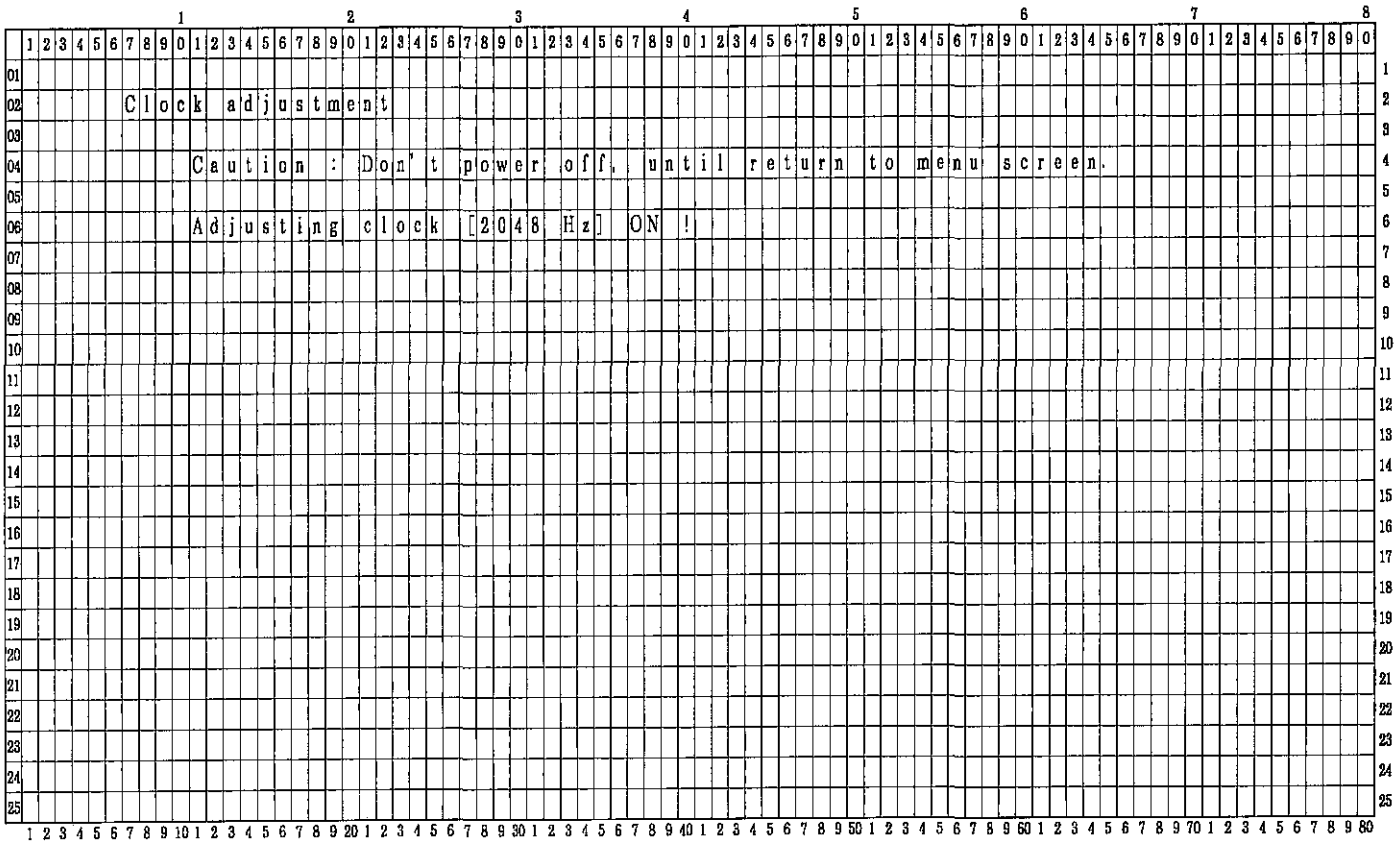
Screen Format

Fig.CLK-3



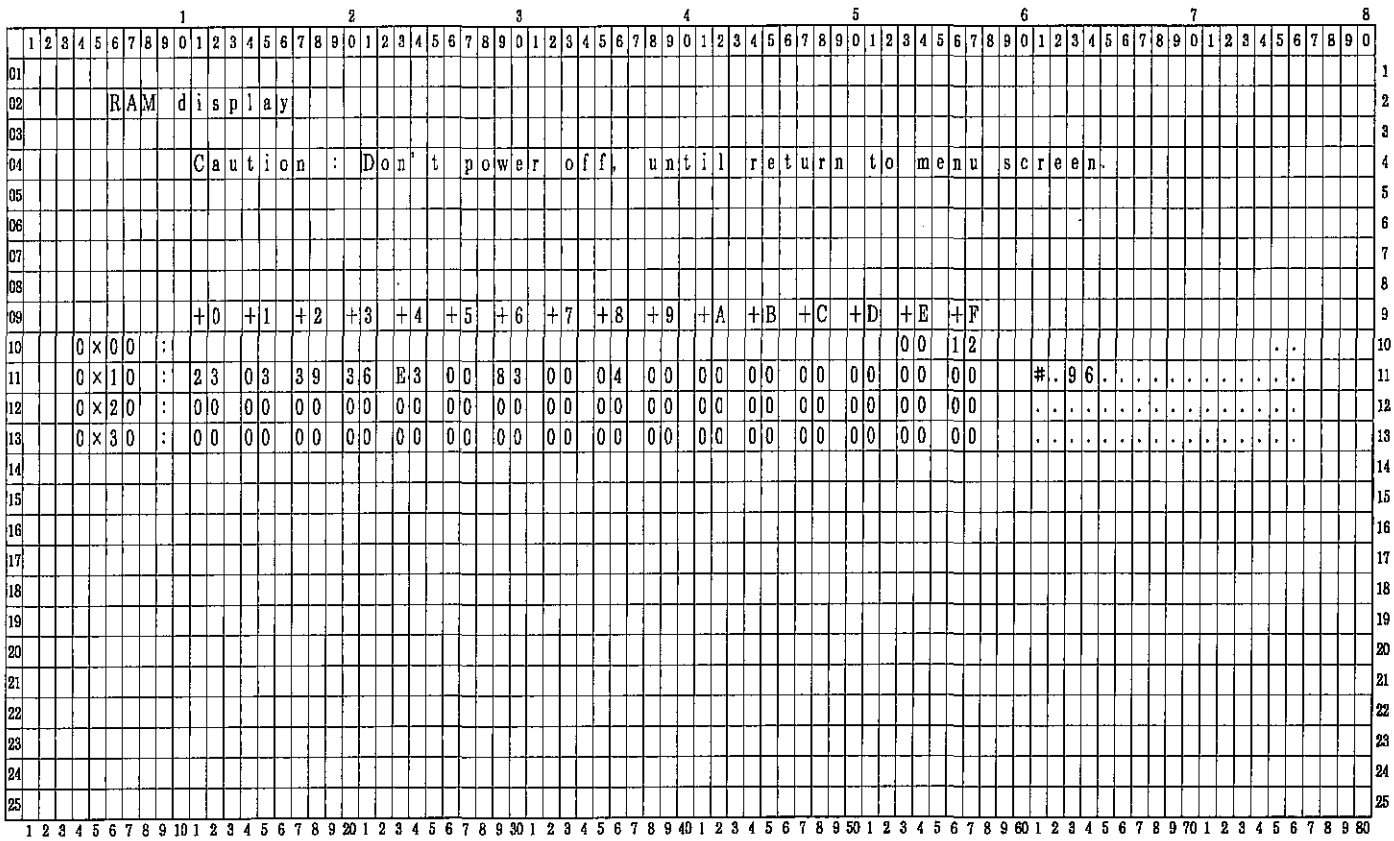
Screen Format

Fig.CLK－4



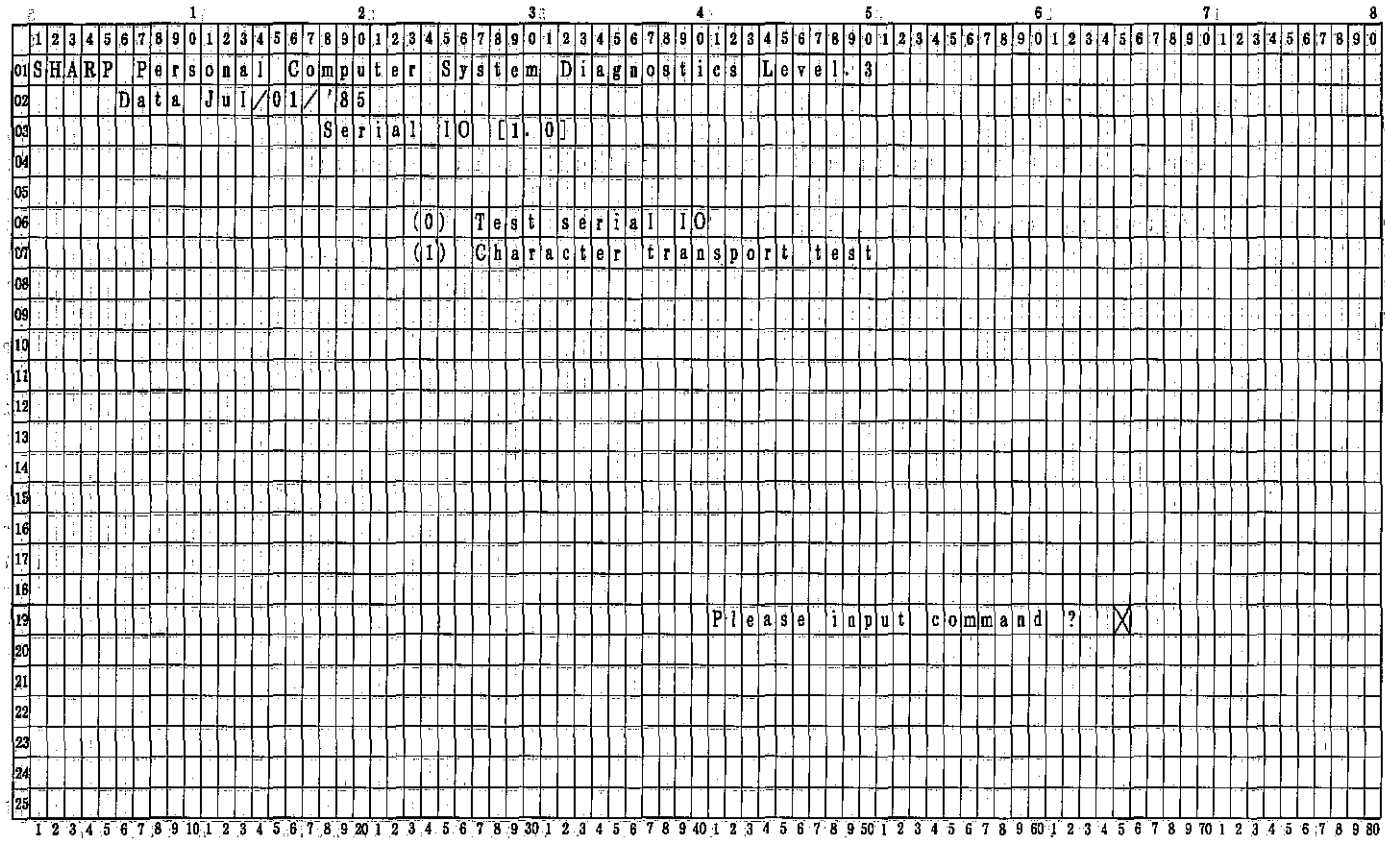
Screen Format

Fig.CLK－5



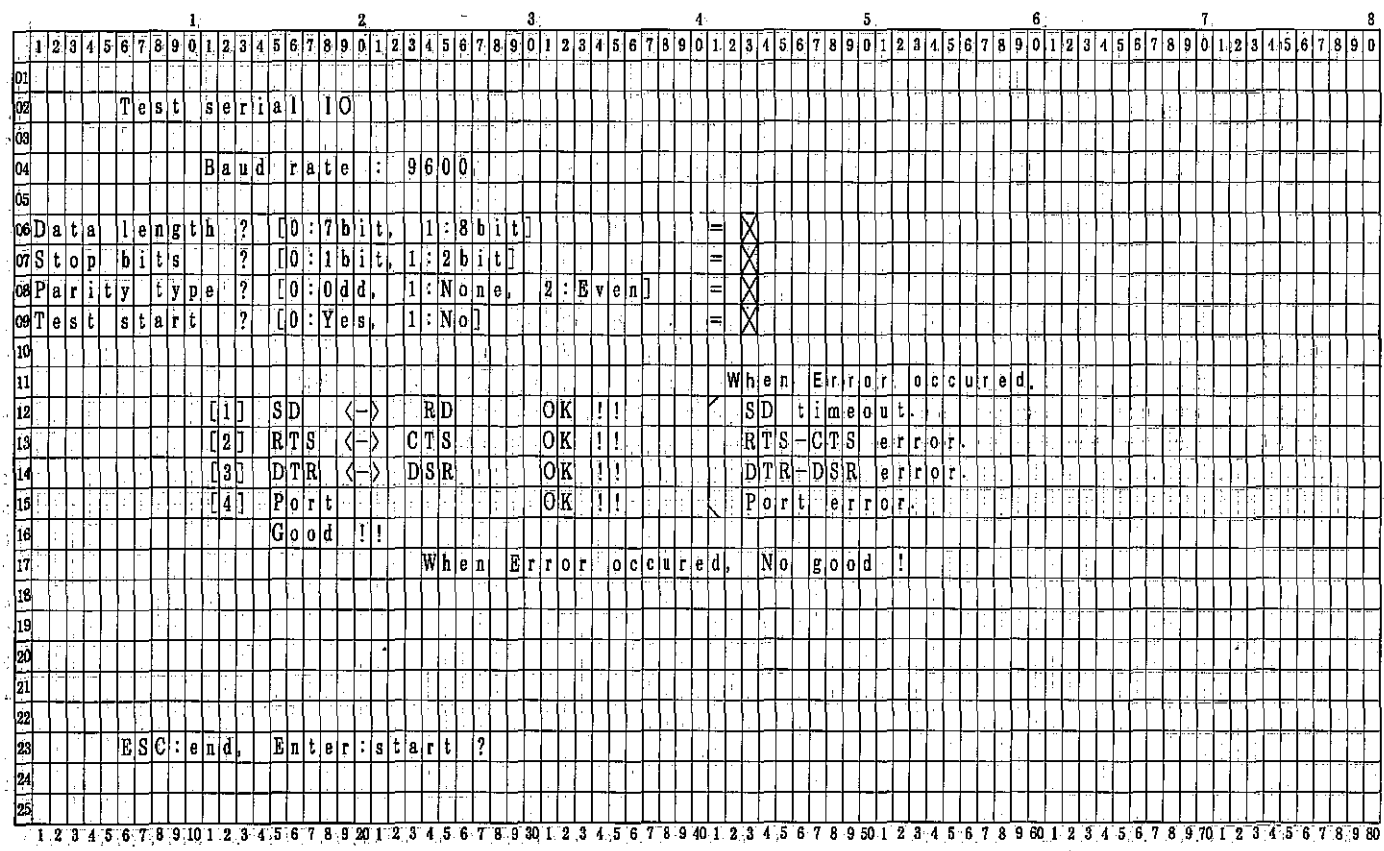
Screen Format

Fig.SIO-1



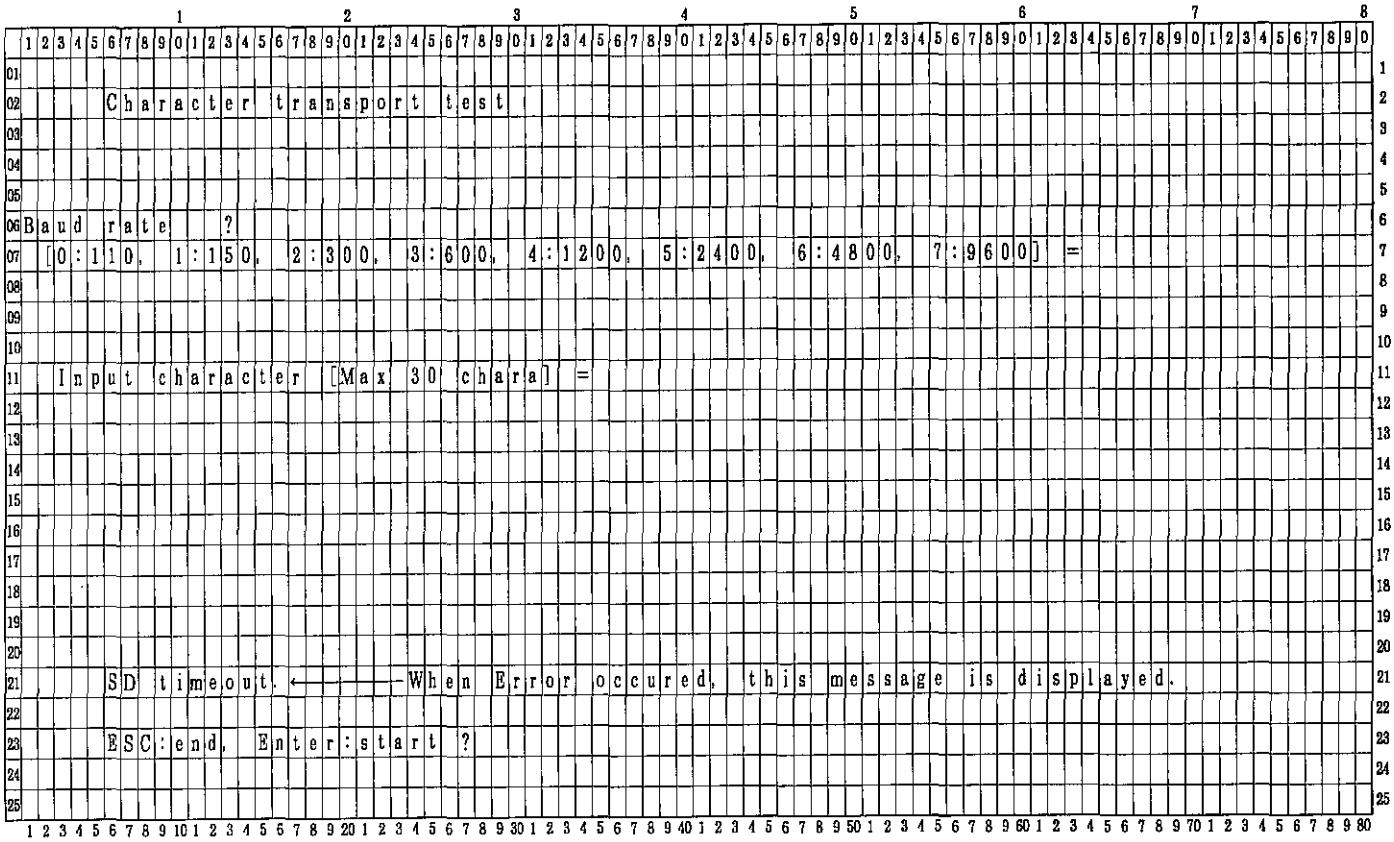
Screen Format

Fig.SIO-2



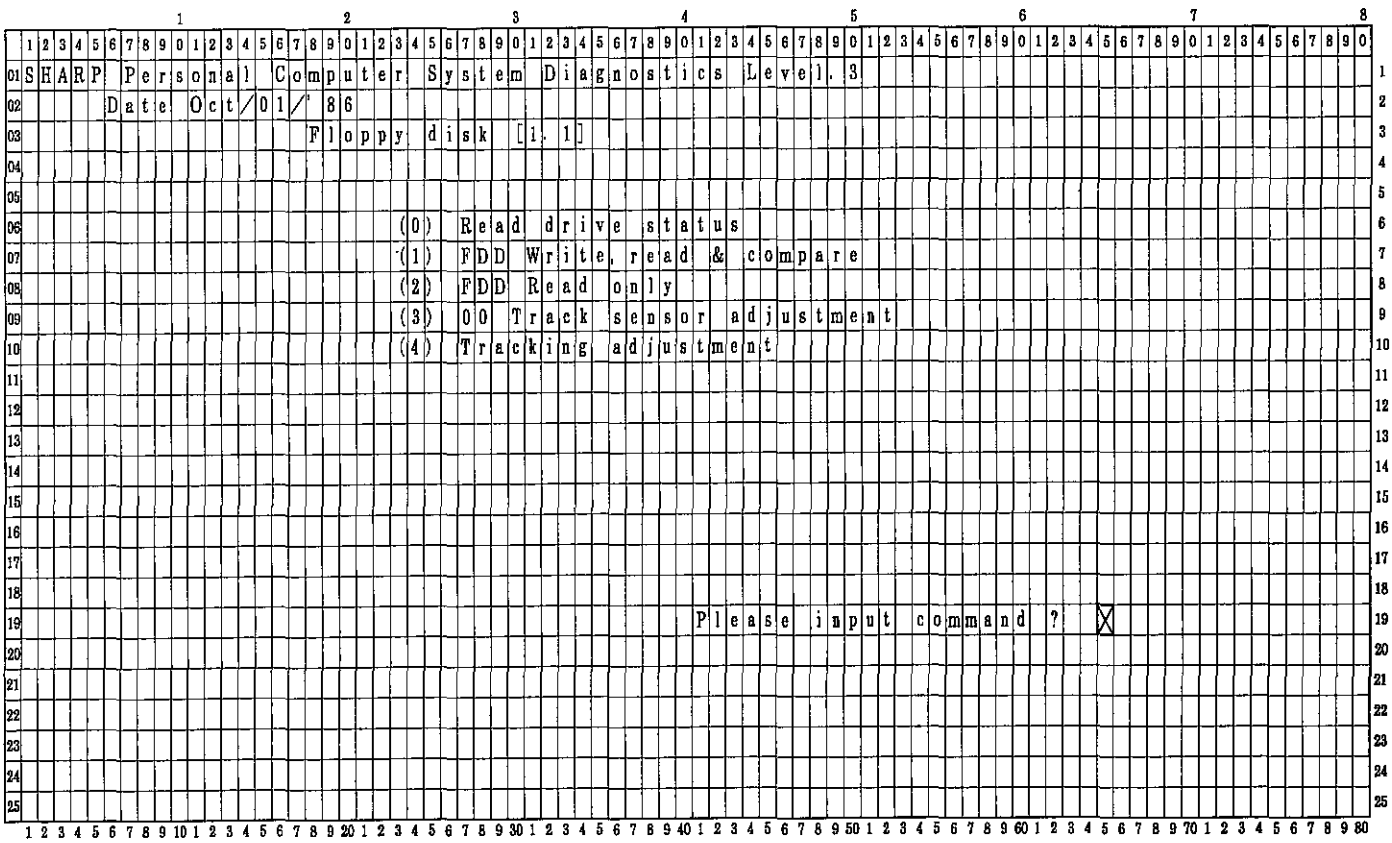
Screen Format

Fig.SIO－3



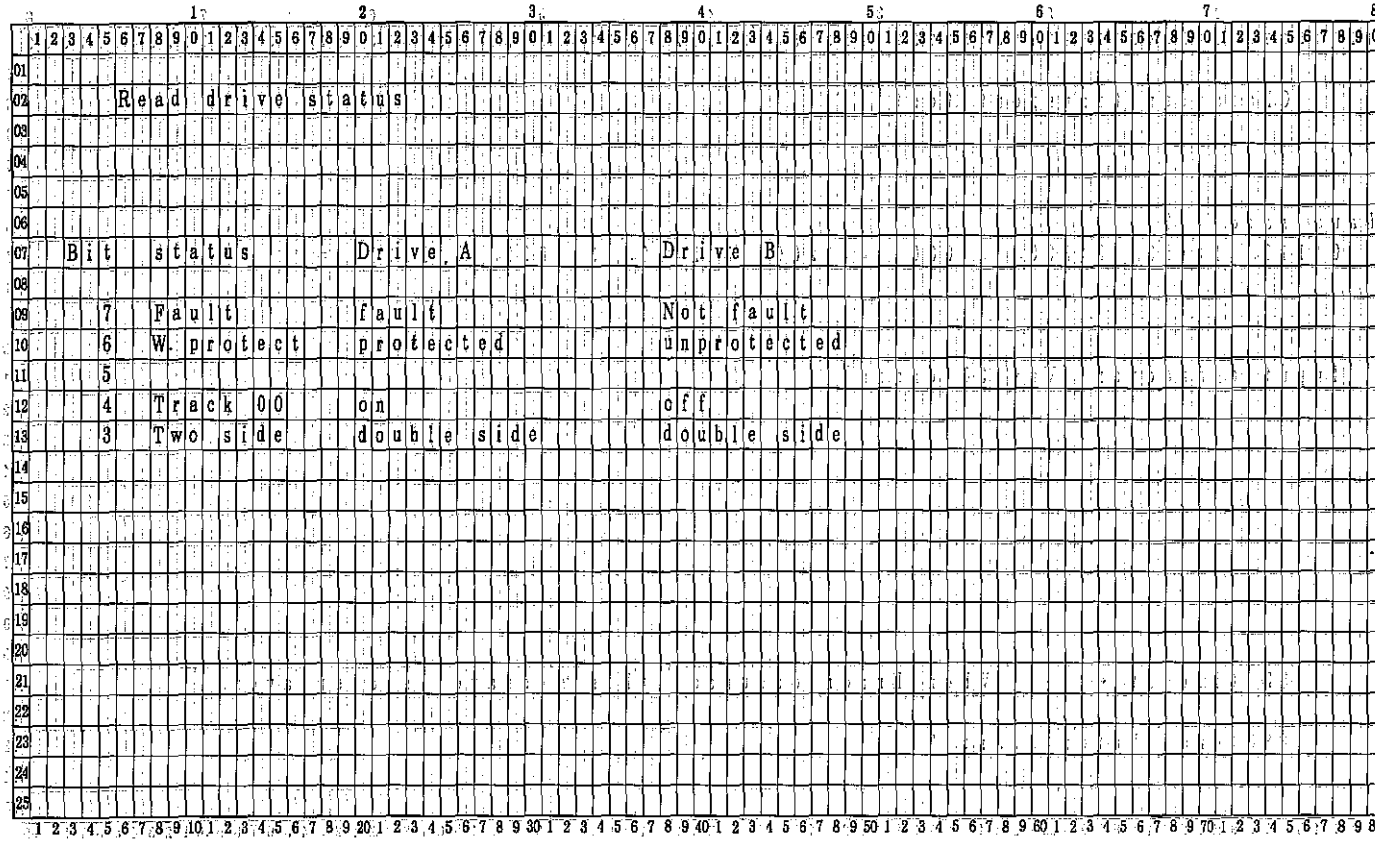
Screen Format

Fig.FDD－1



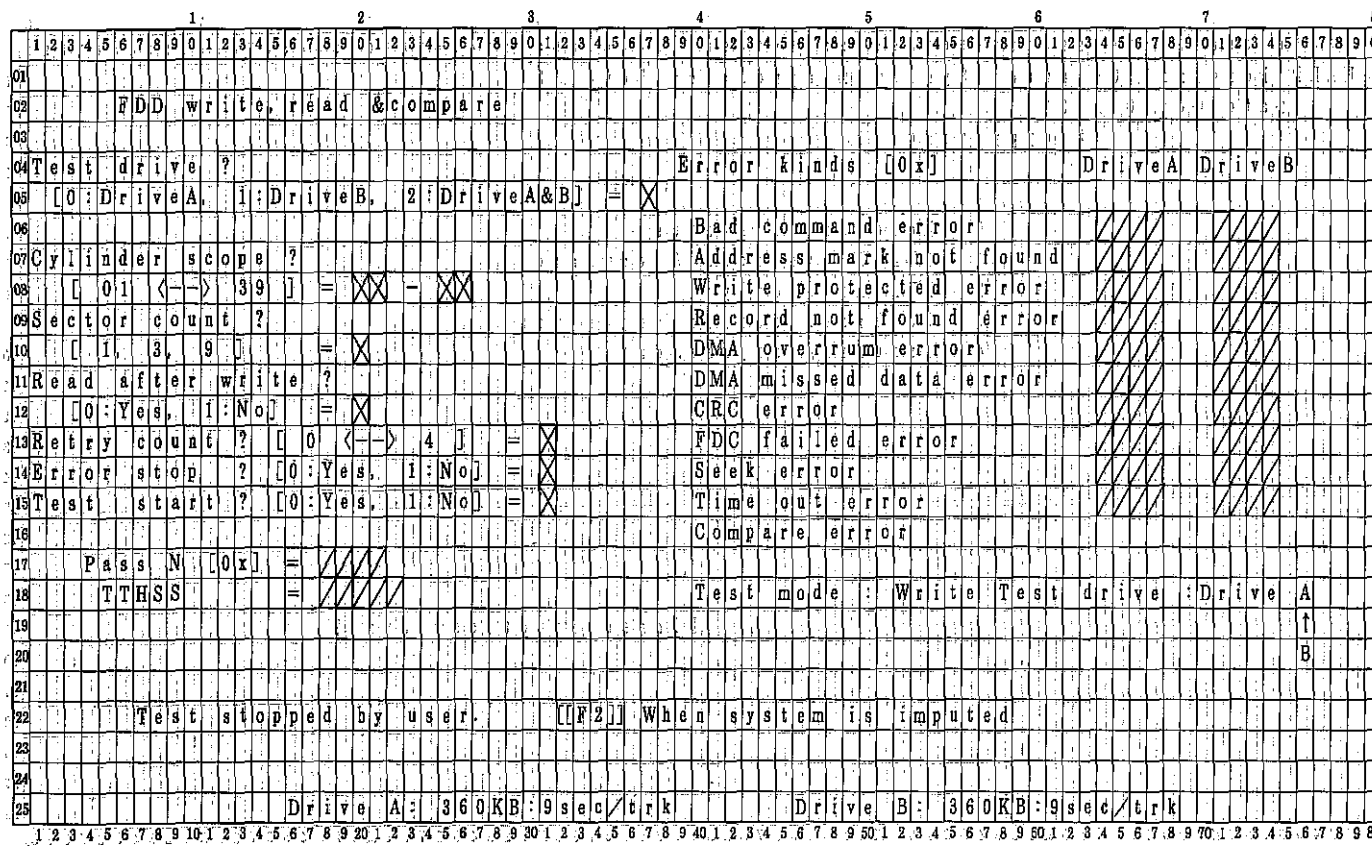
Screen Format

Fig. FDD-2



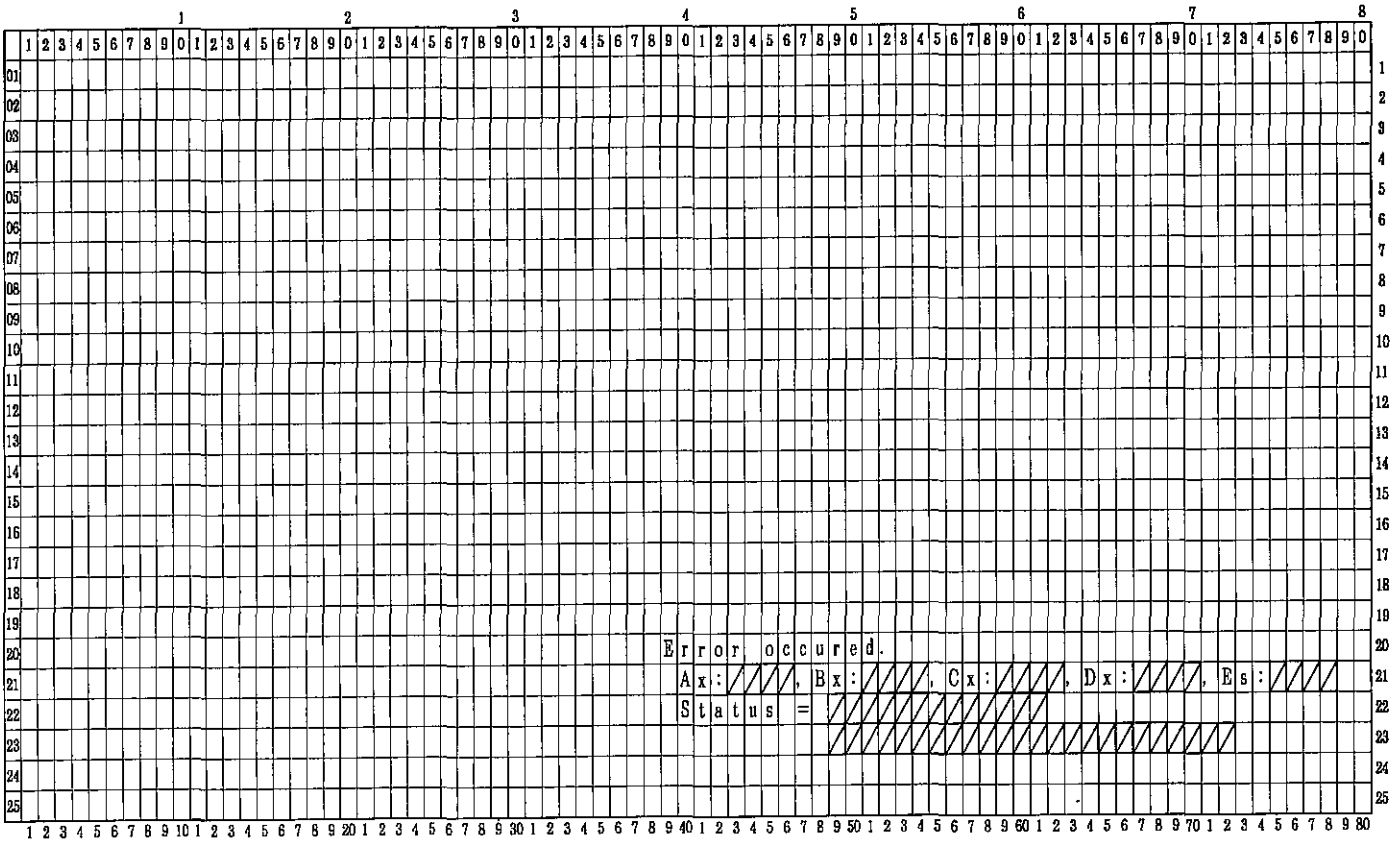
Screen Format

Fig. FDD-3



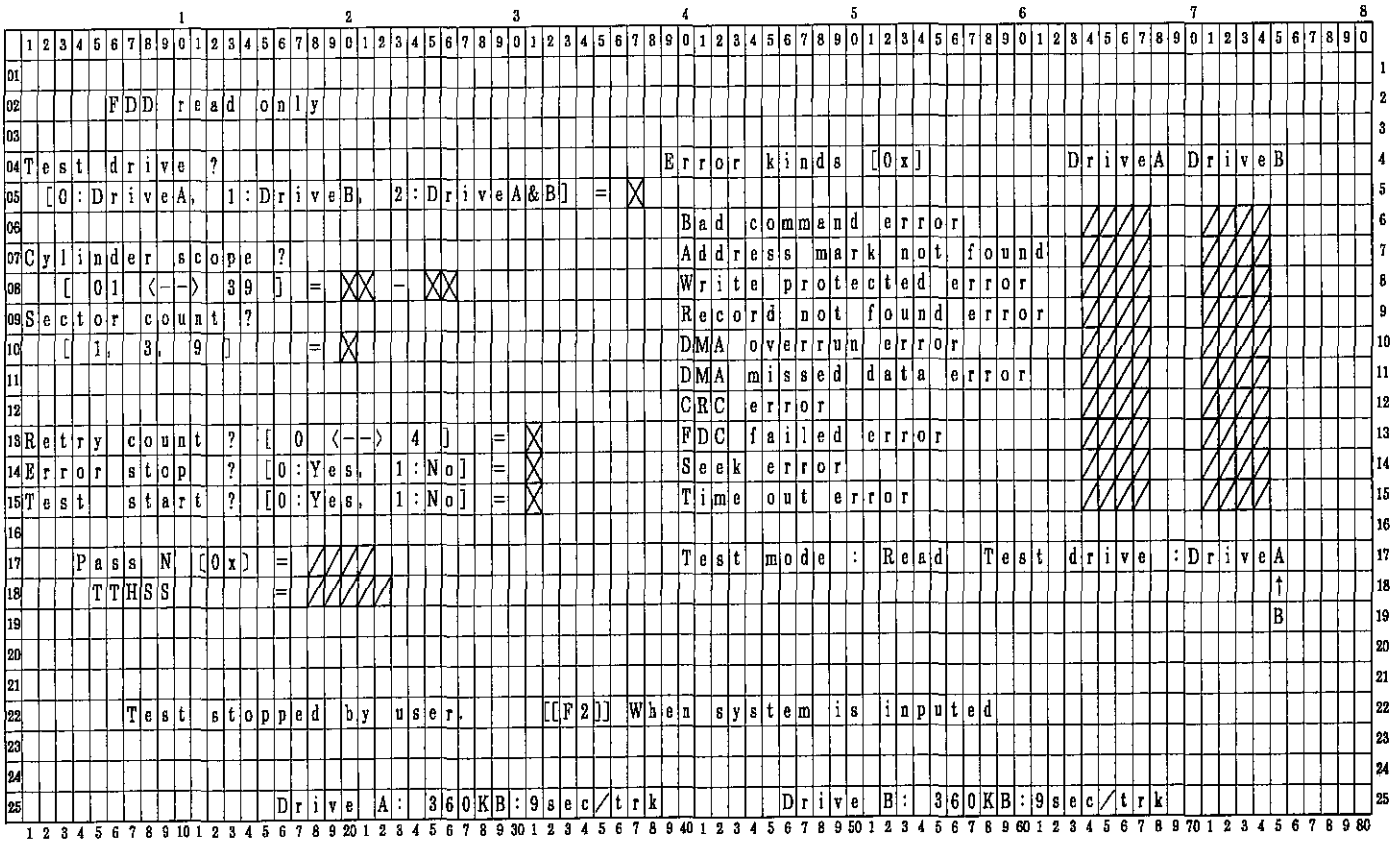
Screen Format

Fig. FDD－4



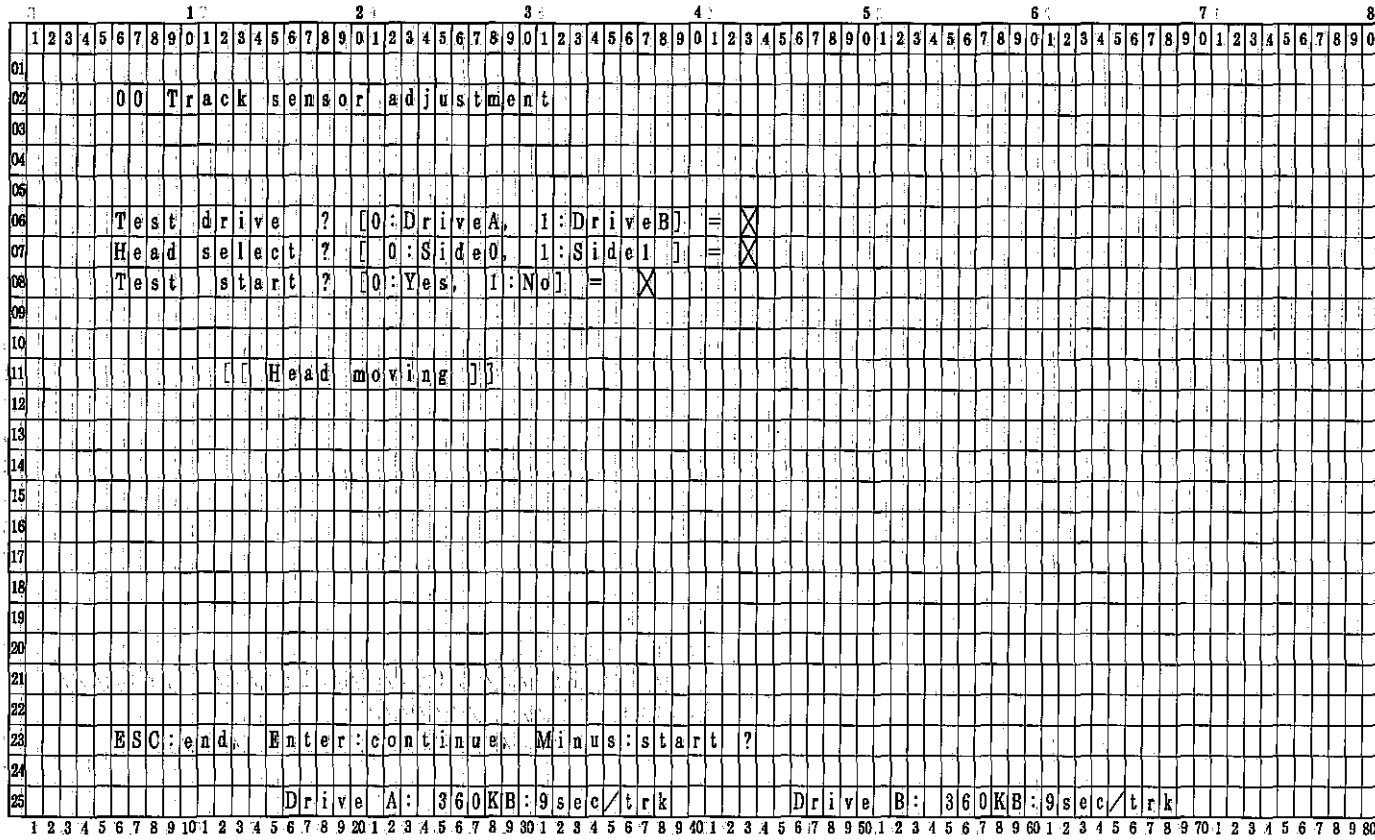
Screen Format

Fig. FDD－5



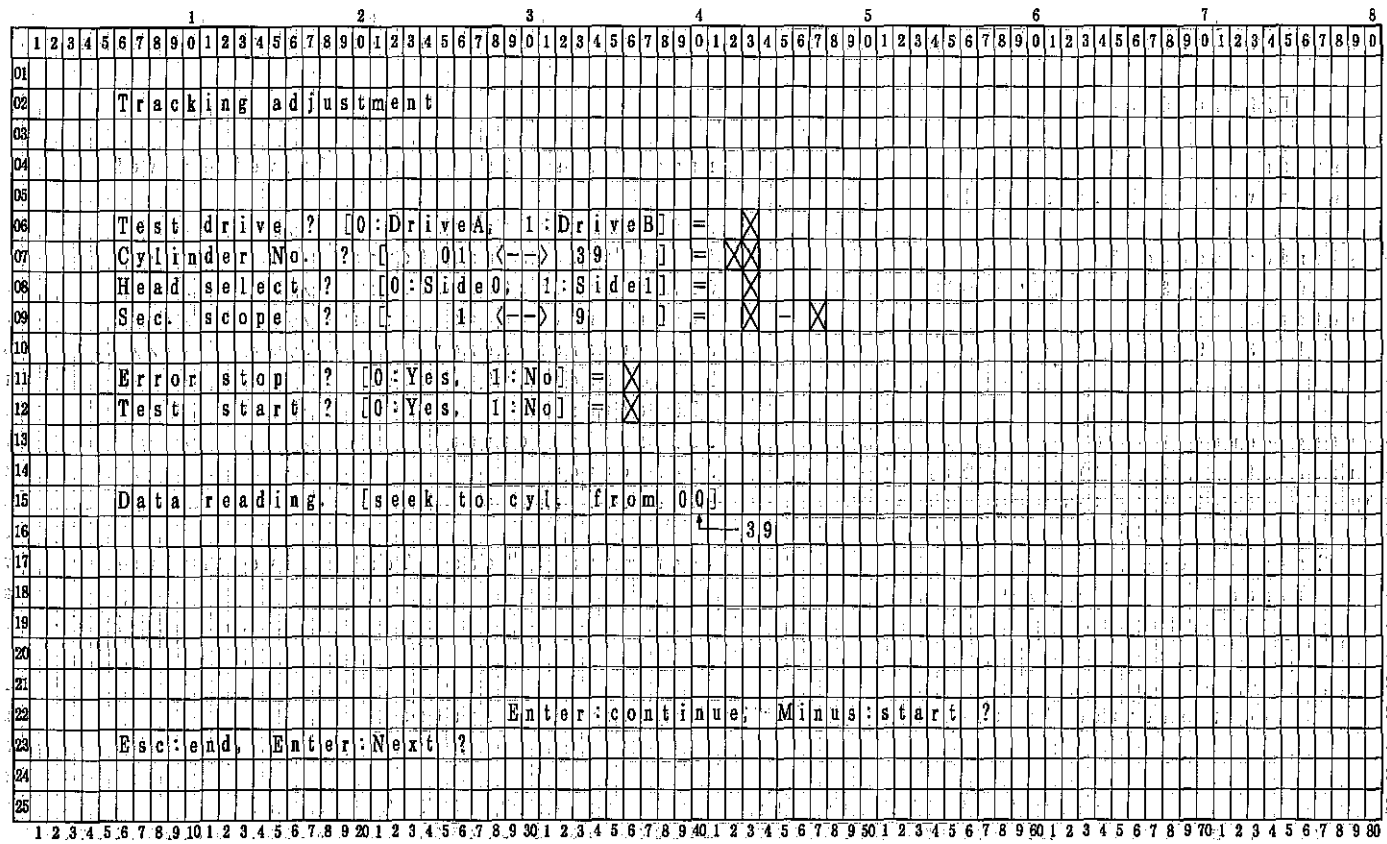
Screen Format

Fig. FDD-6



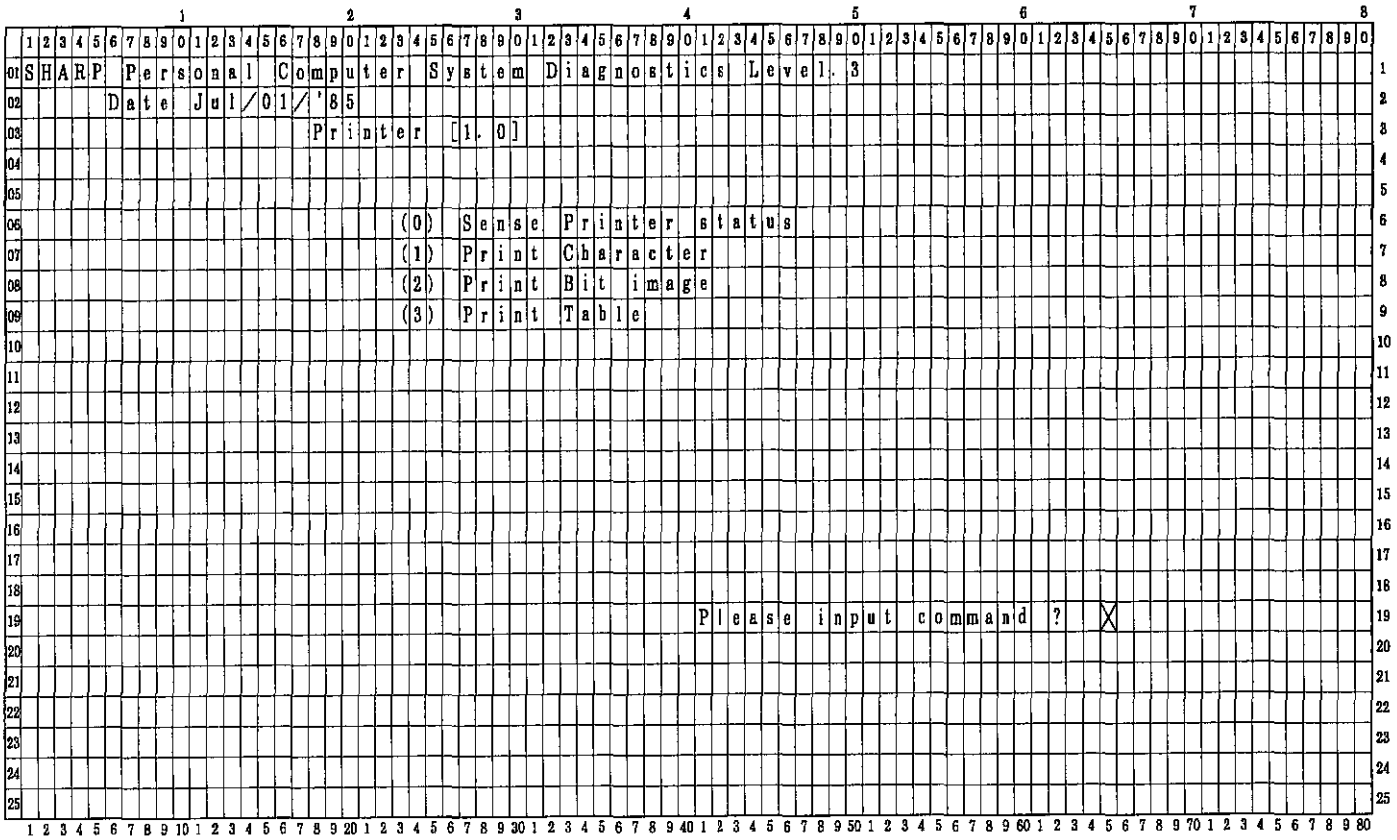
Screen Format

Fig. FDD-7



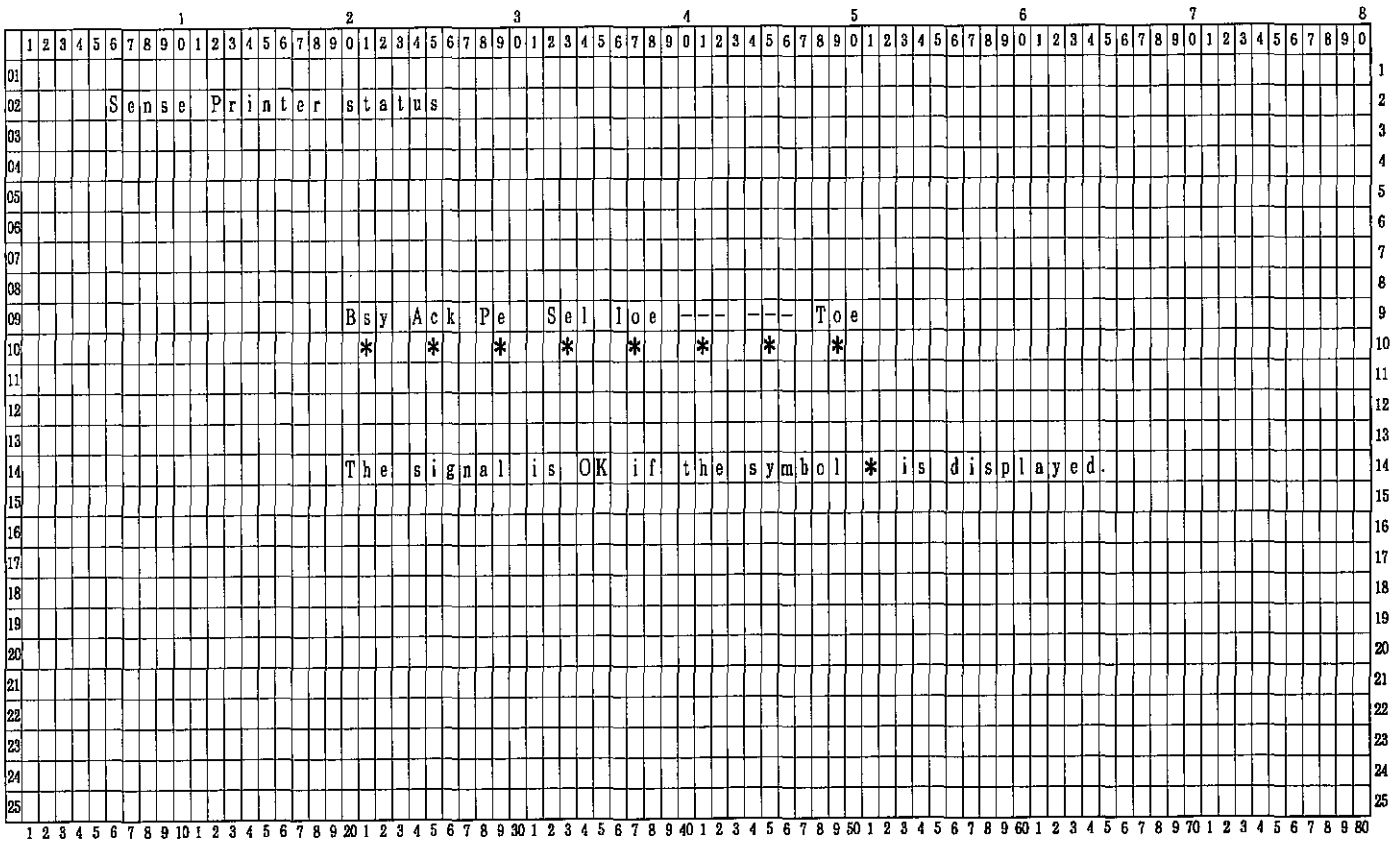
Screen Format

Fig. PRT－1



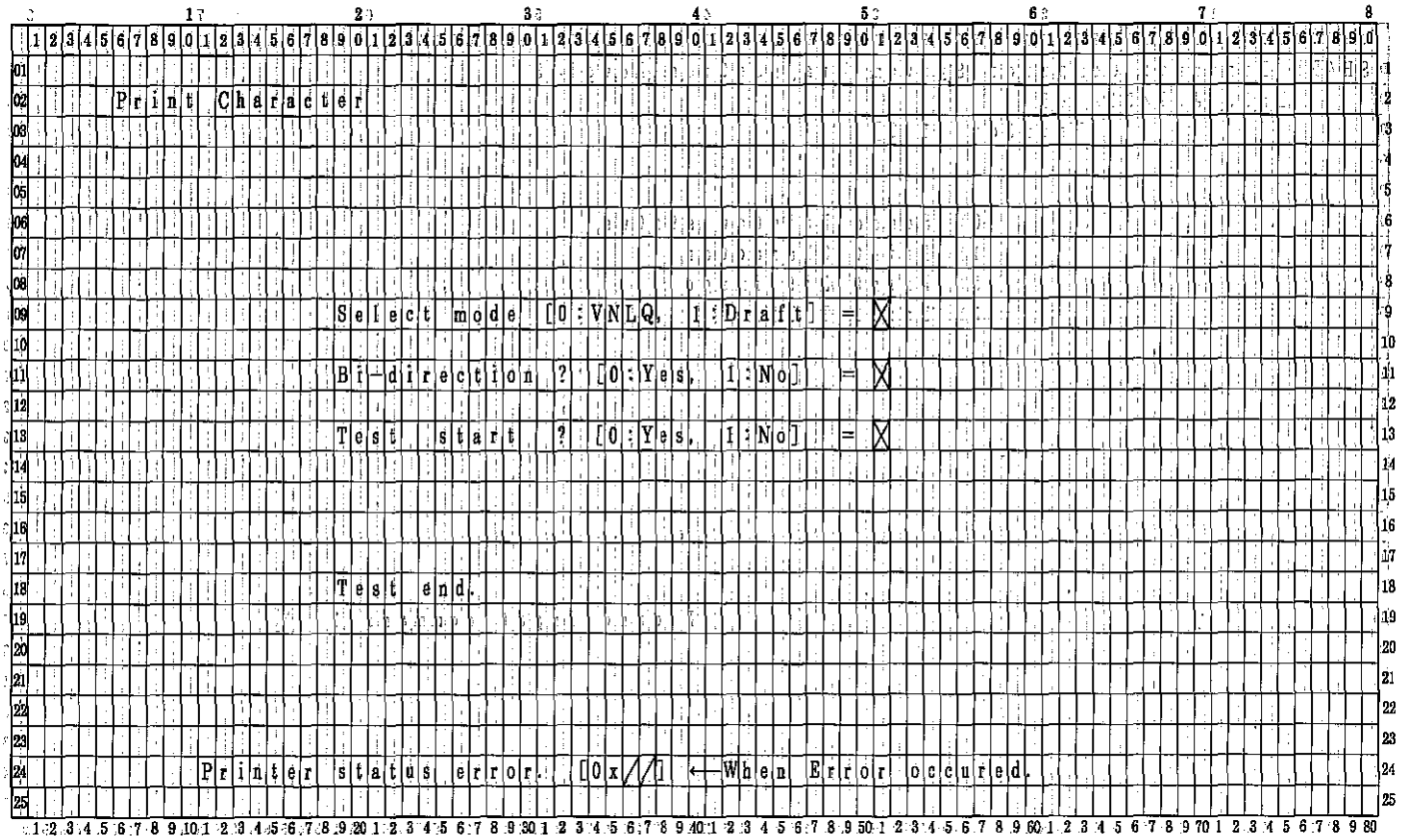
Screen Format

Fig. PRT－2



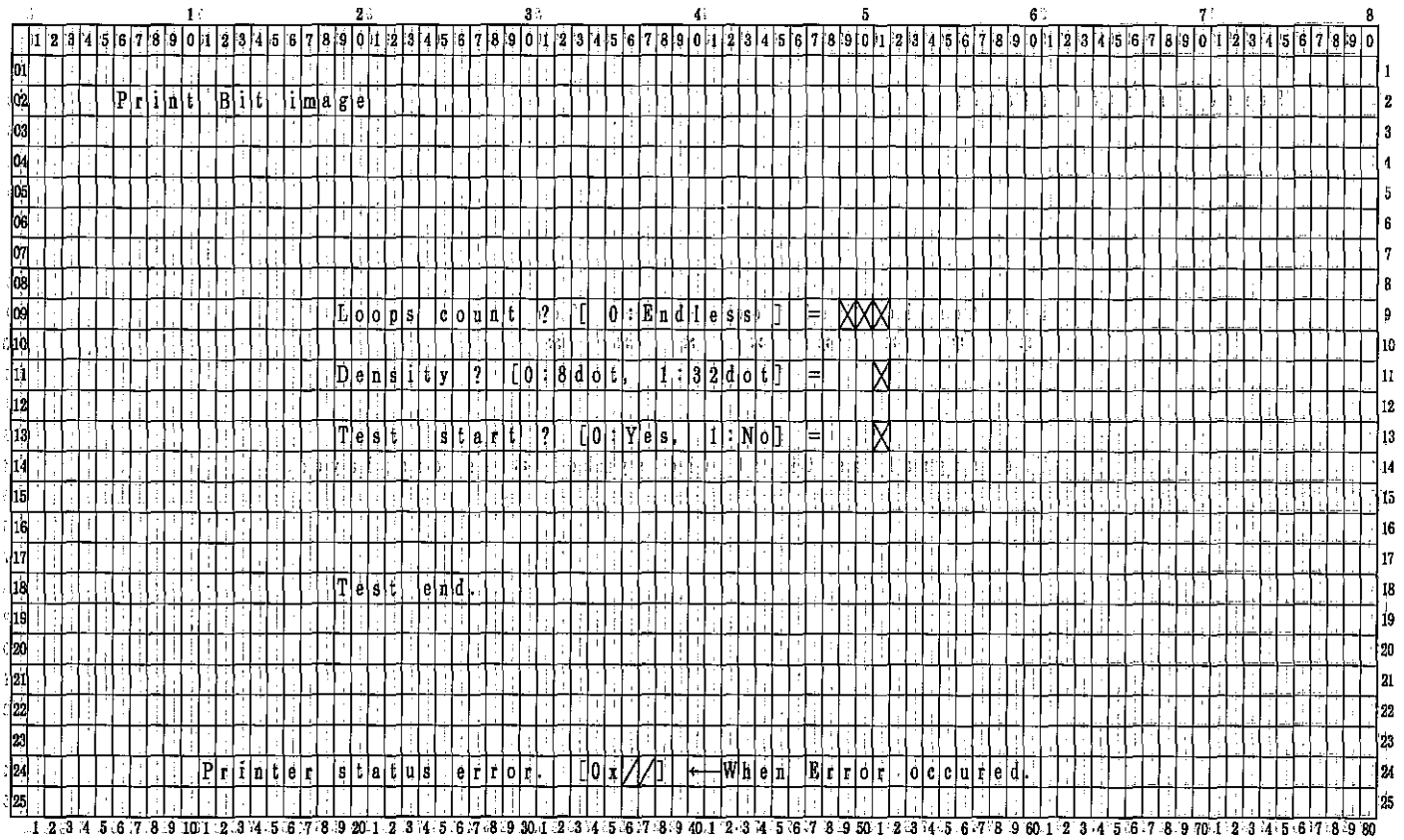
Screen Format

Fig. PRT-3



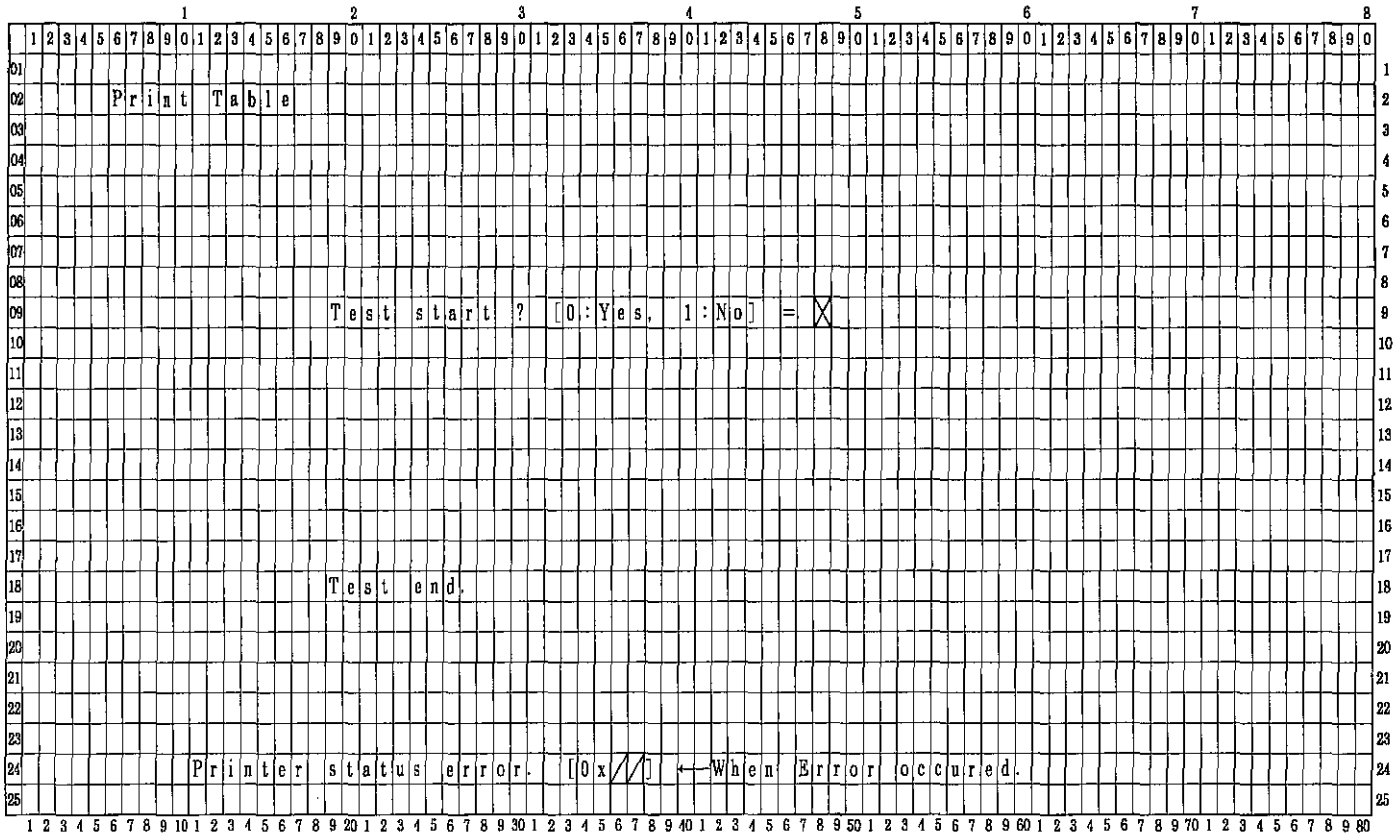
Screen Format

Fig. PRT-4



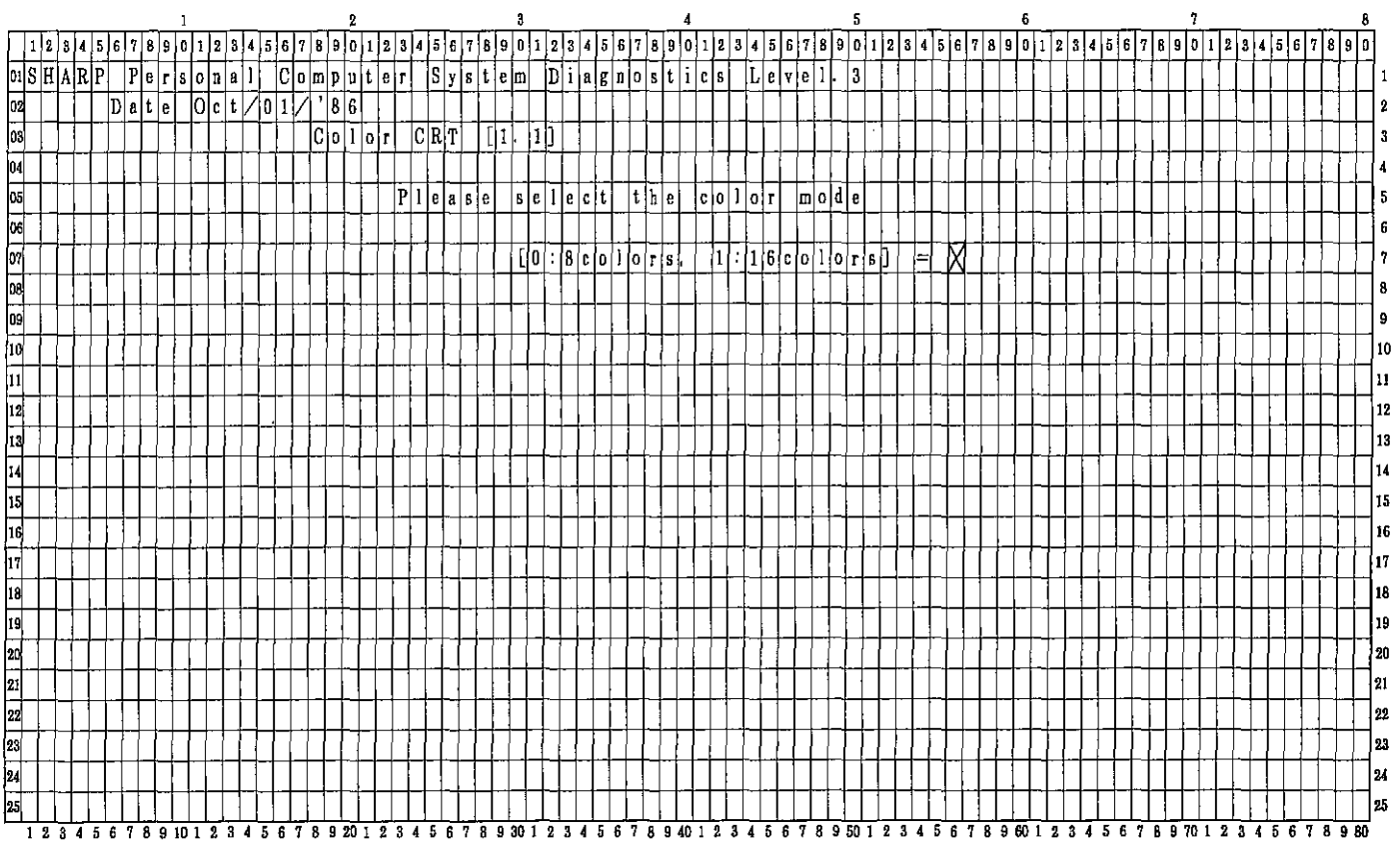
Screen Format

Fig. PRT－5



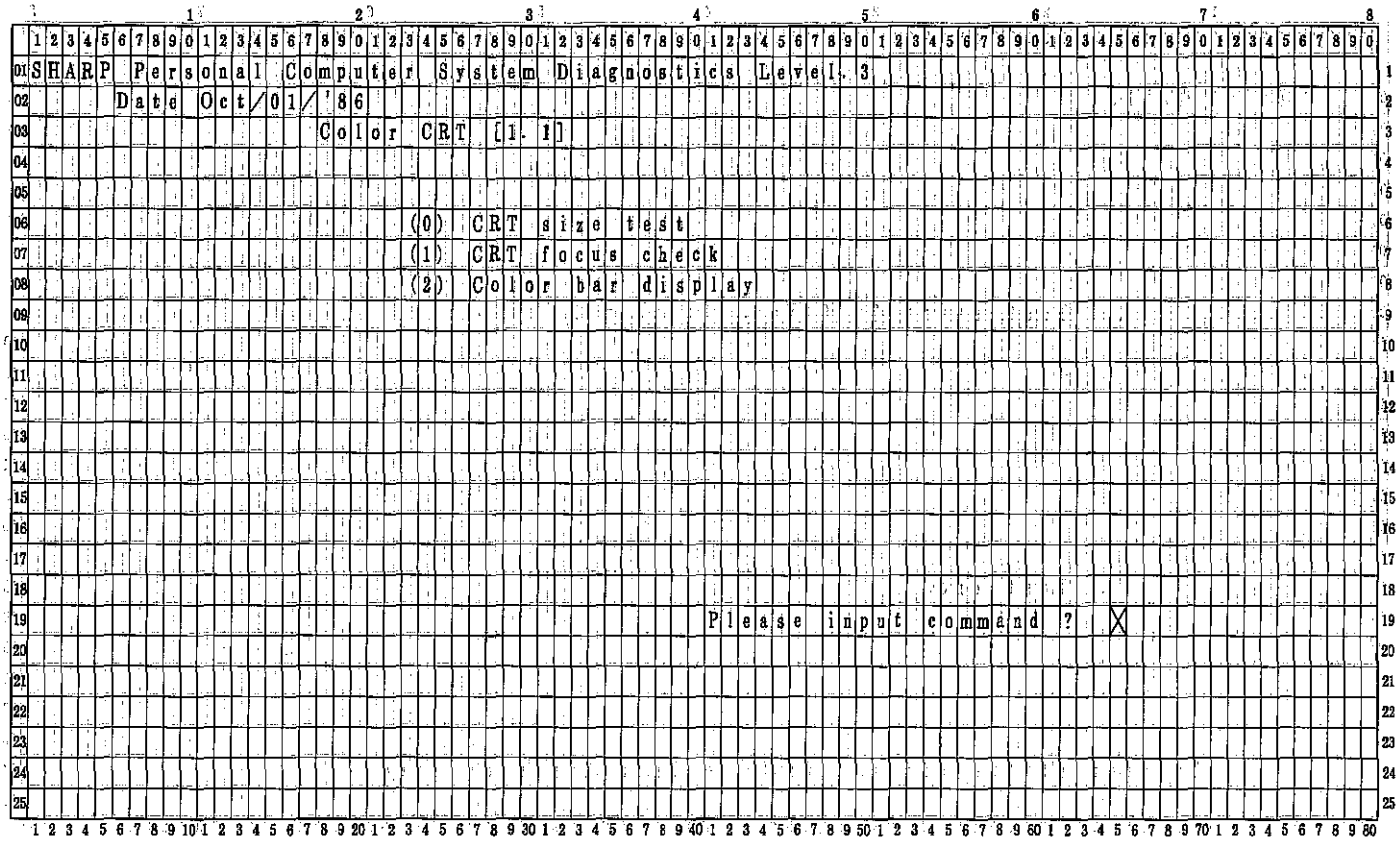
Screen Format

CRT color mode



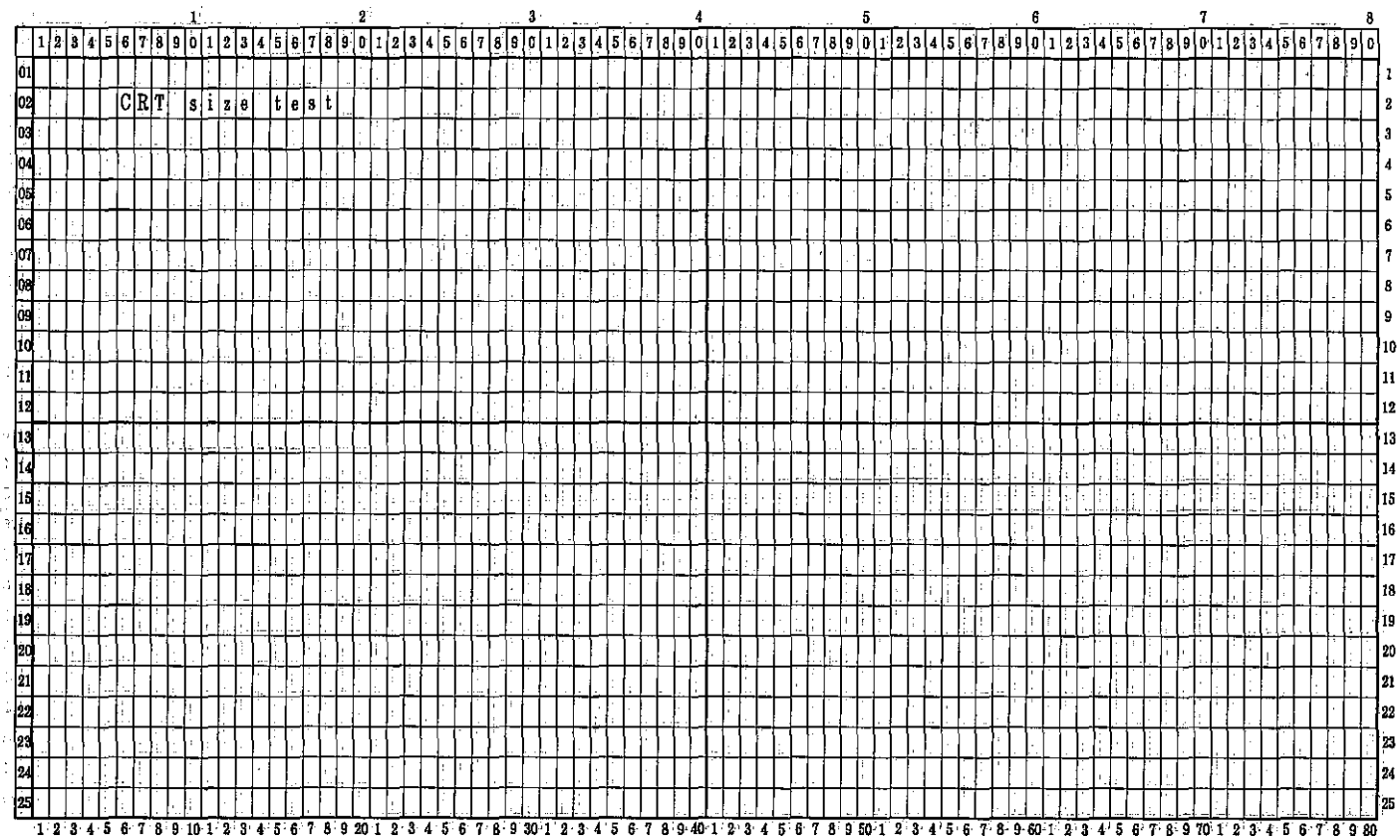
Screen Format

Fig. CRT－1



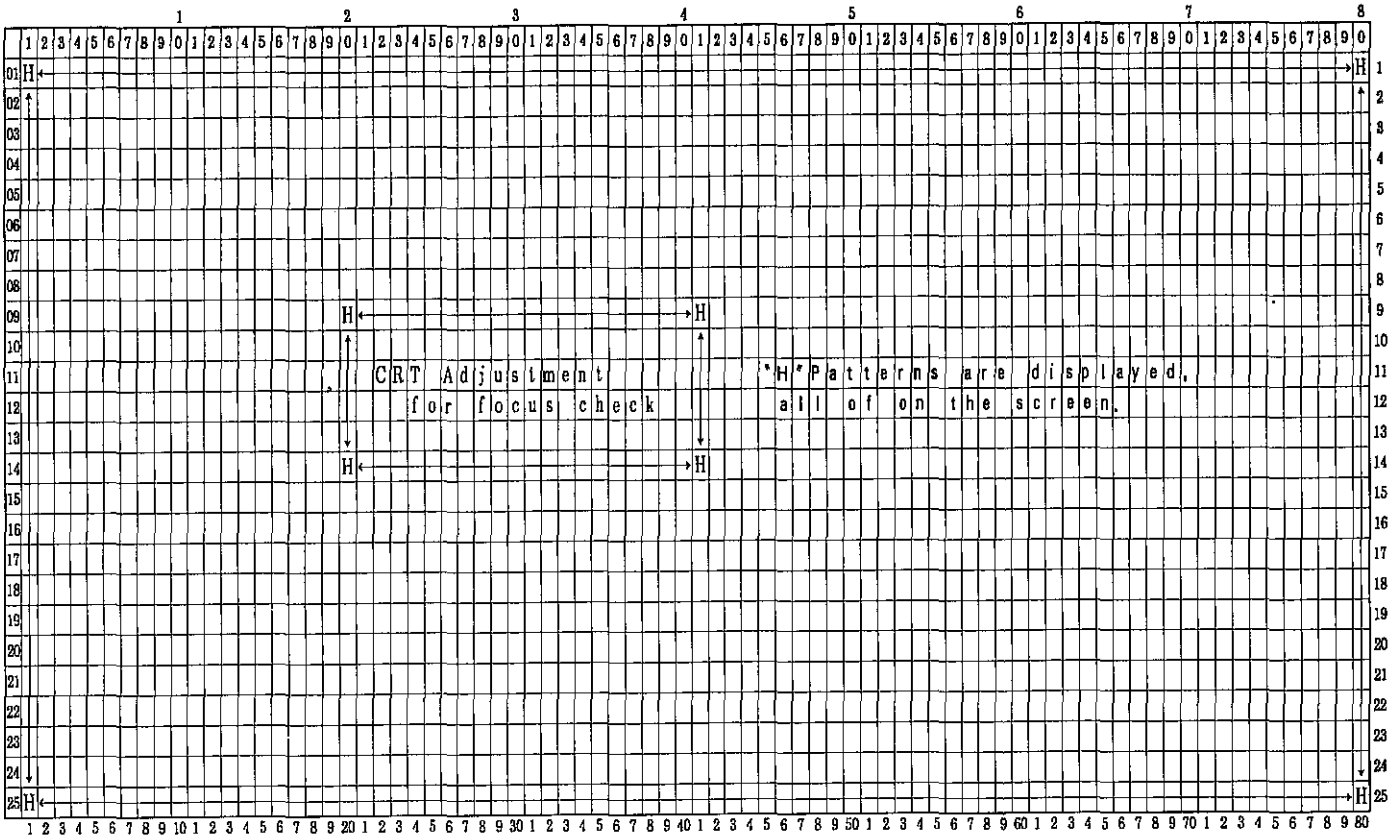
Screen Format

Fig. CRT－2



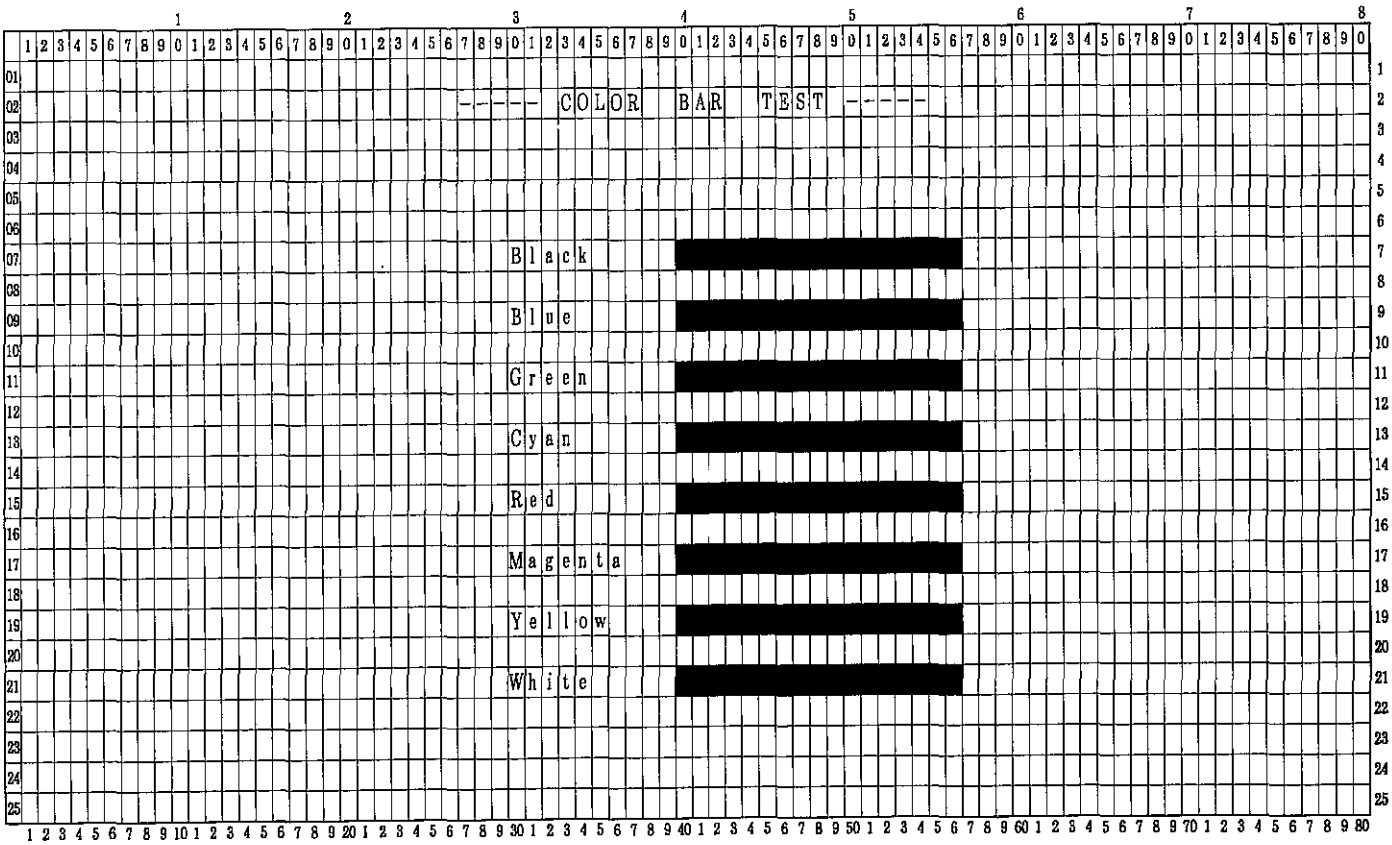
Screen Format

Fig. CRT-3



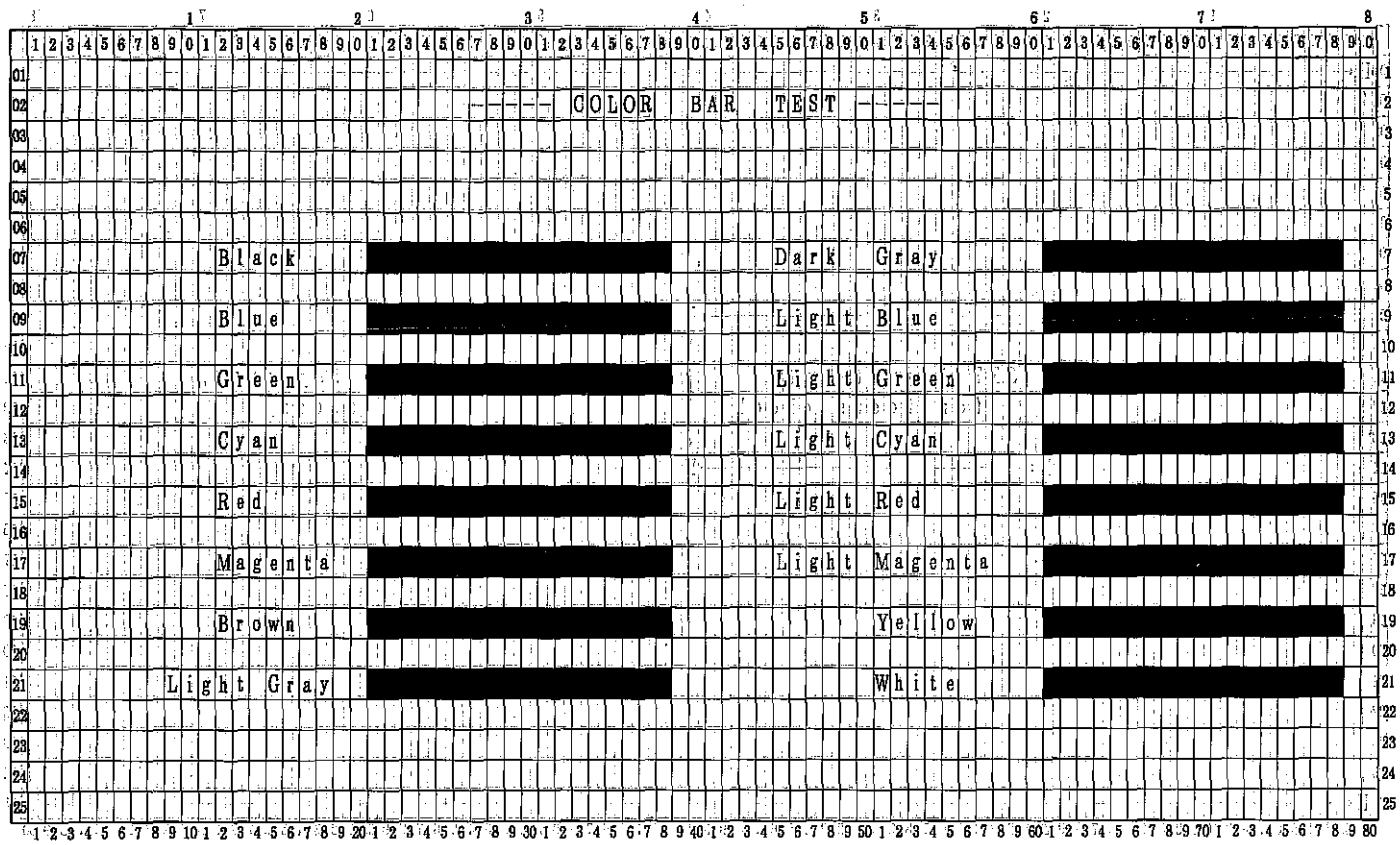
Screen Format

Fig. CRT-4.1



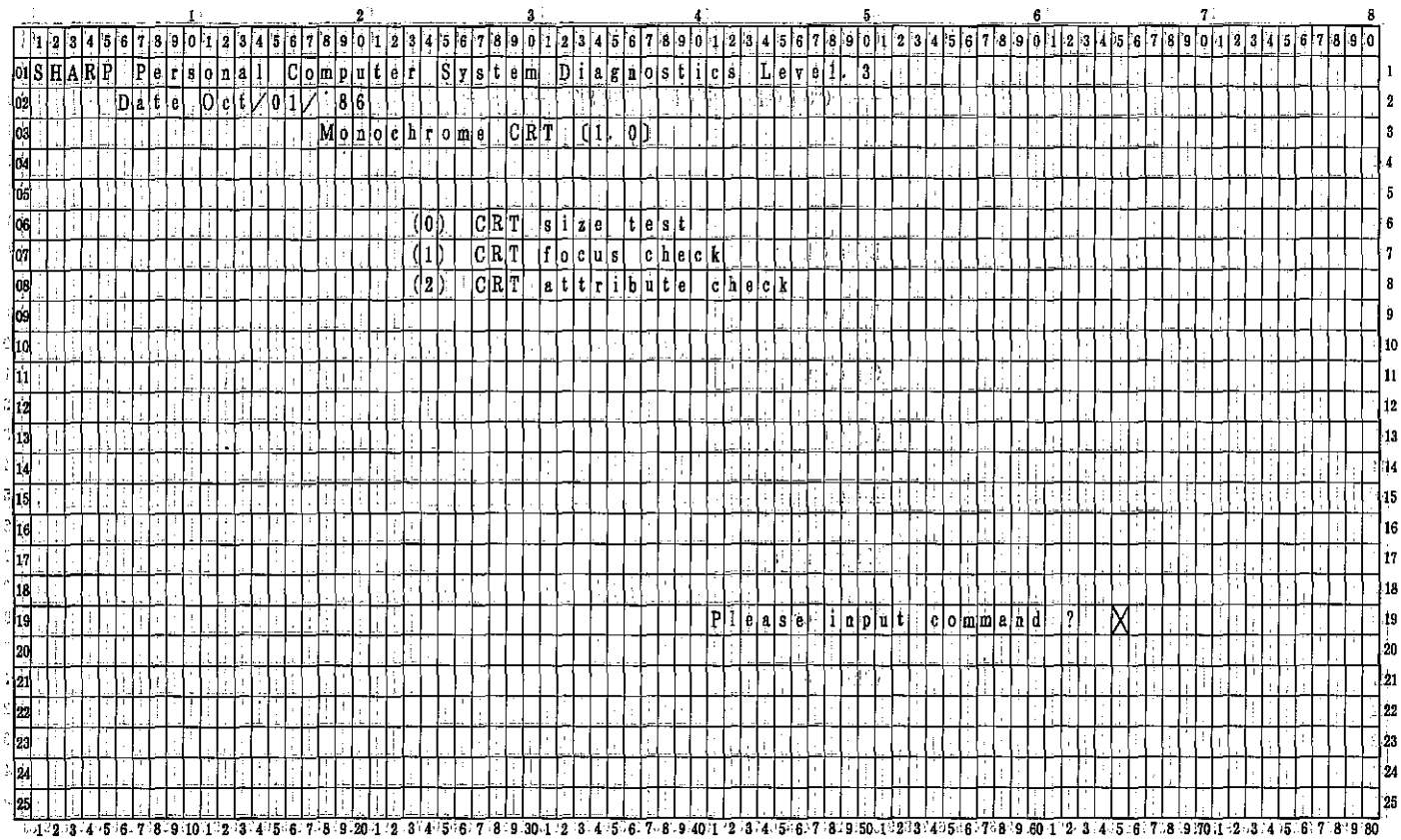
Screen Format

Fig. CRT-4.2



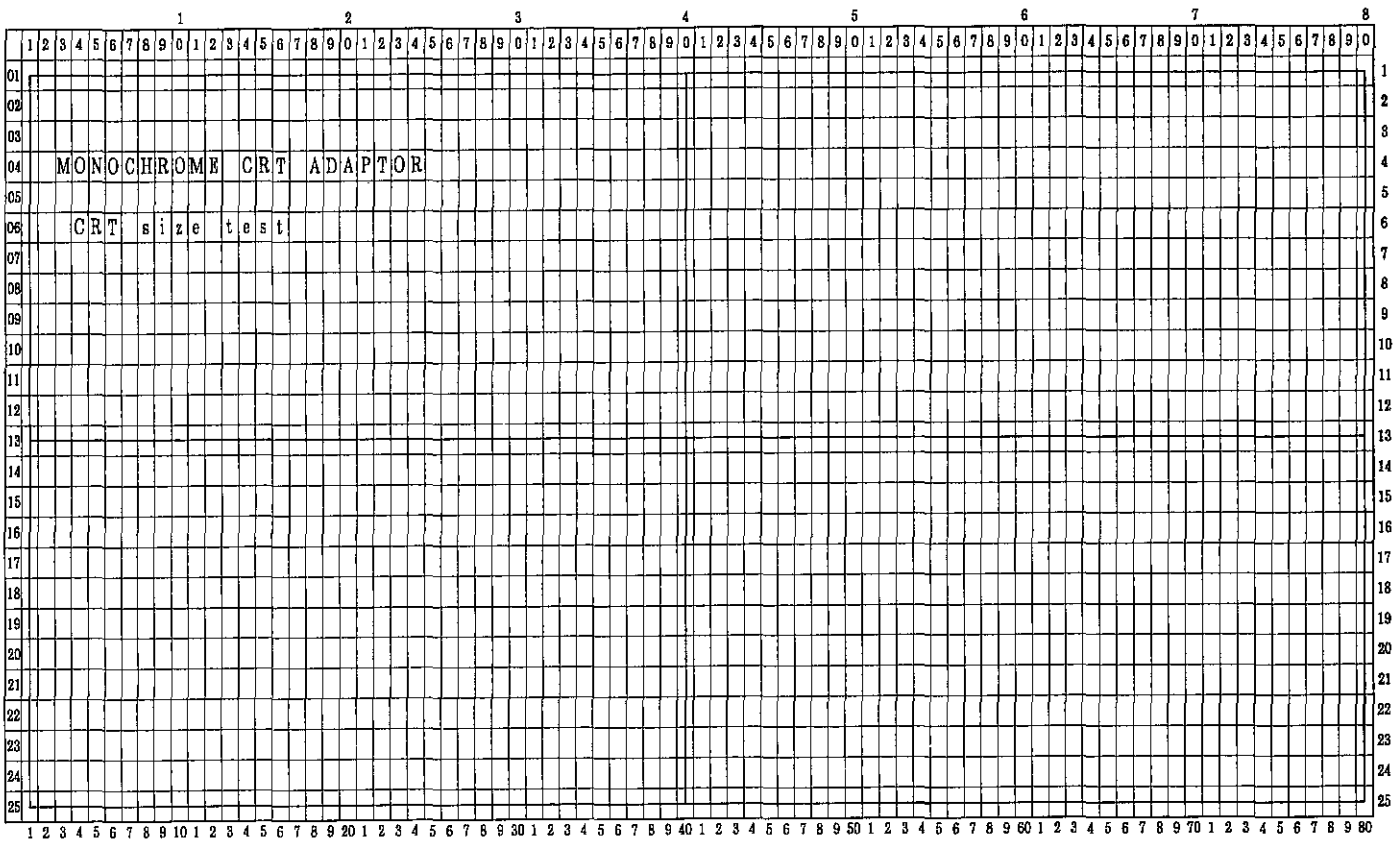
Screen Format

Fig. MONO-1



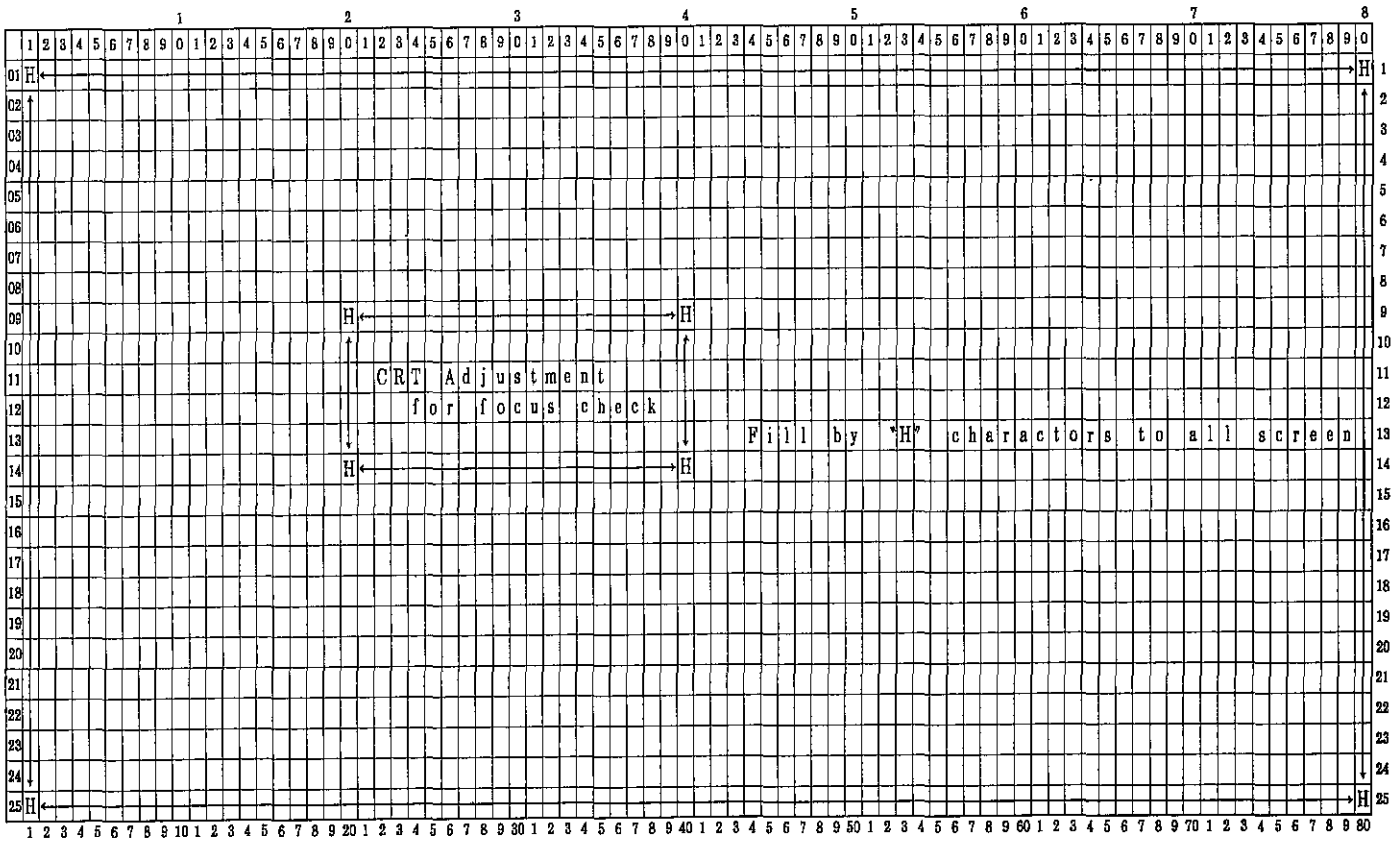
Screen Format

Fig. MONO－2



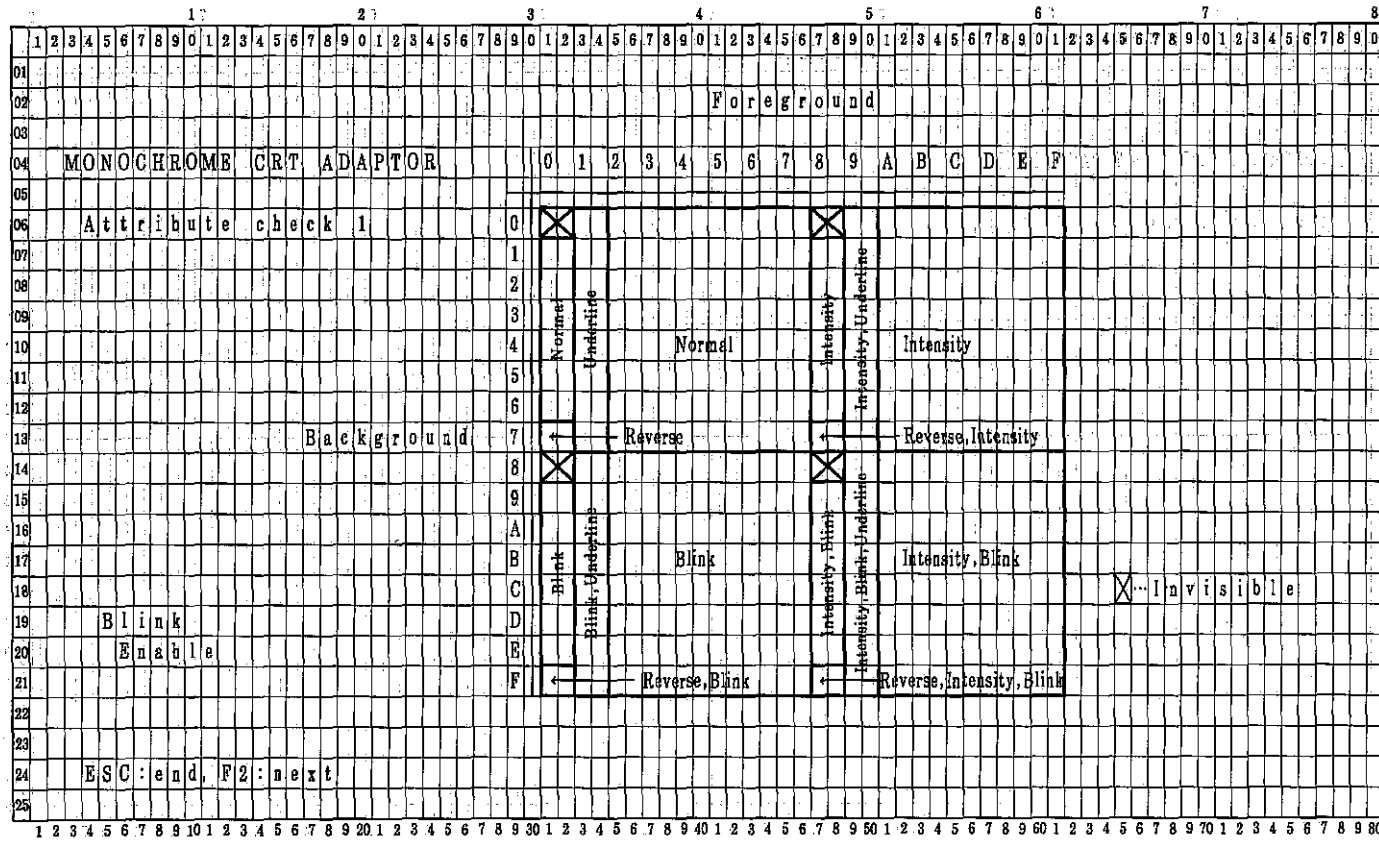
Screen Format

Fig. MONO－3



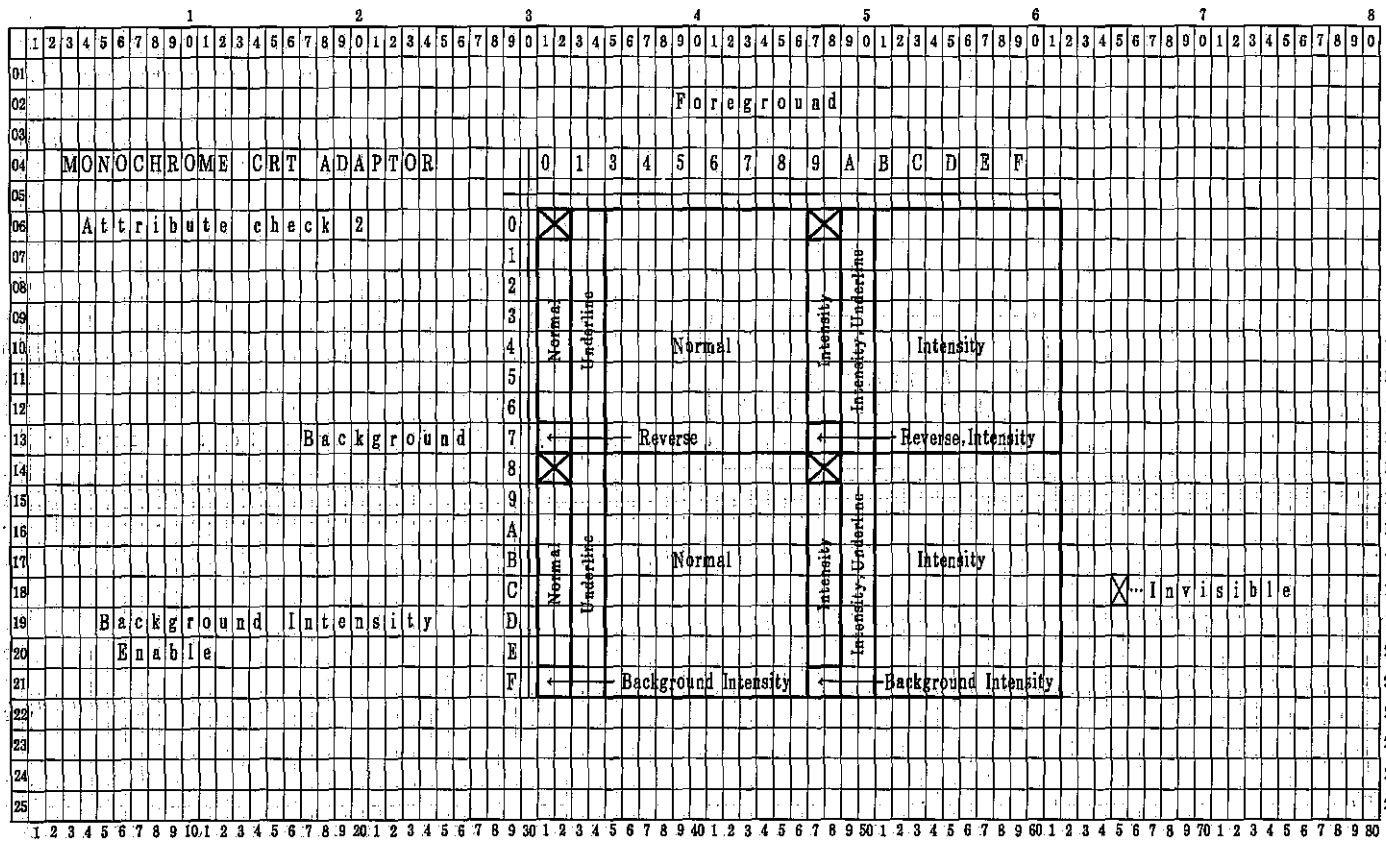
Screen Format

Fig. MONO－4



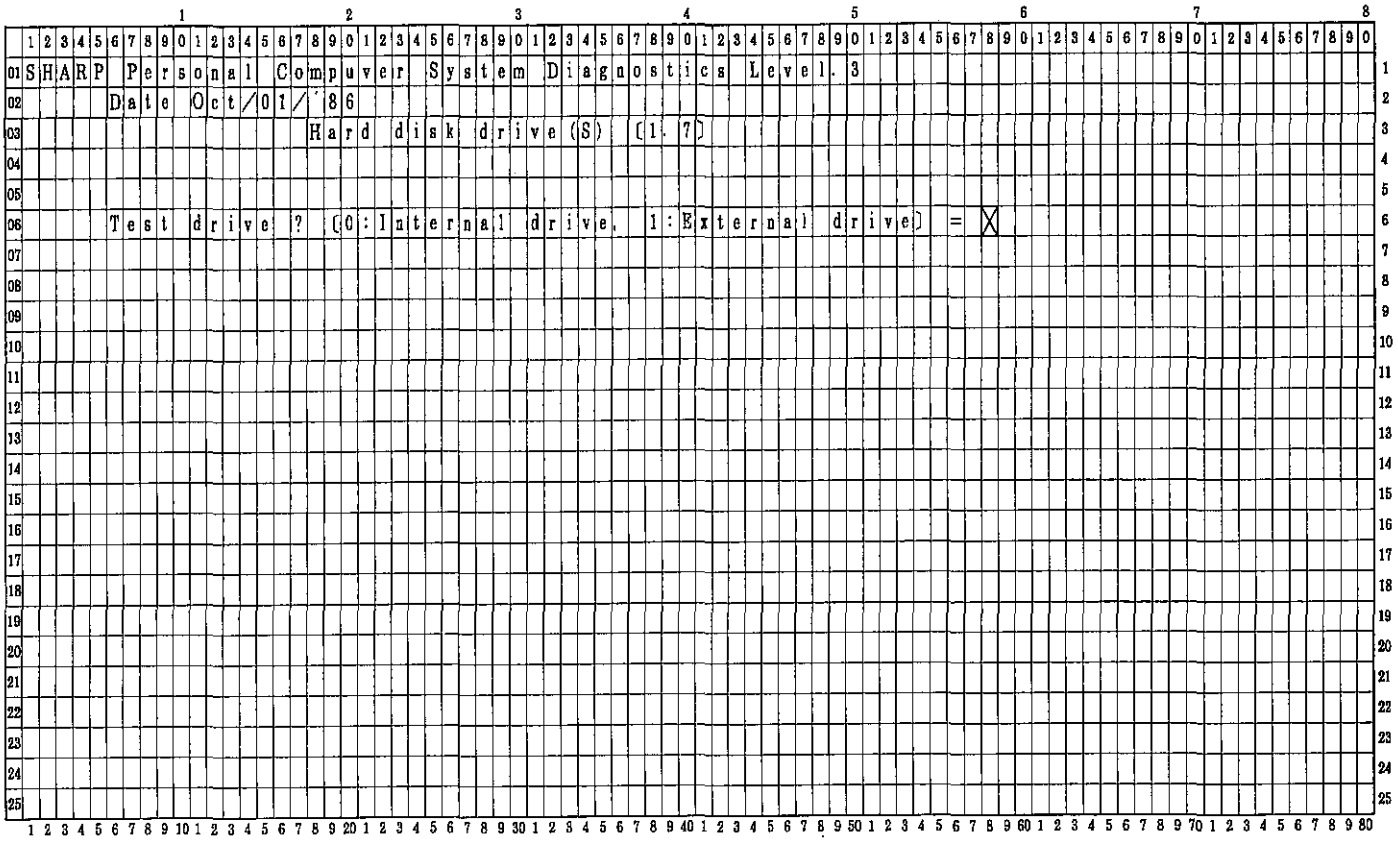
Screen Format

Fig MONO－5



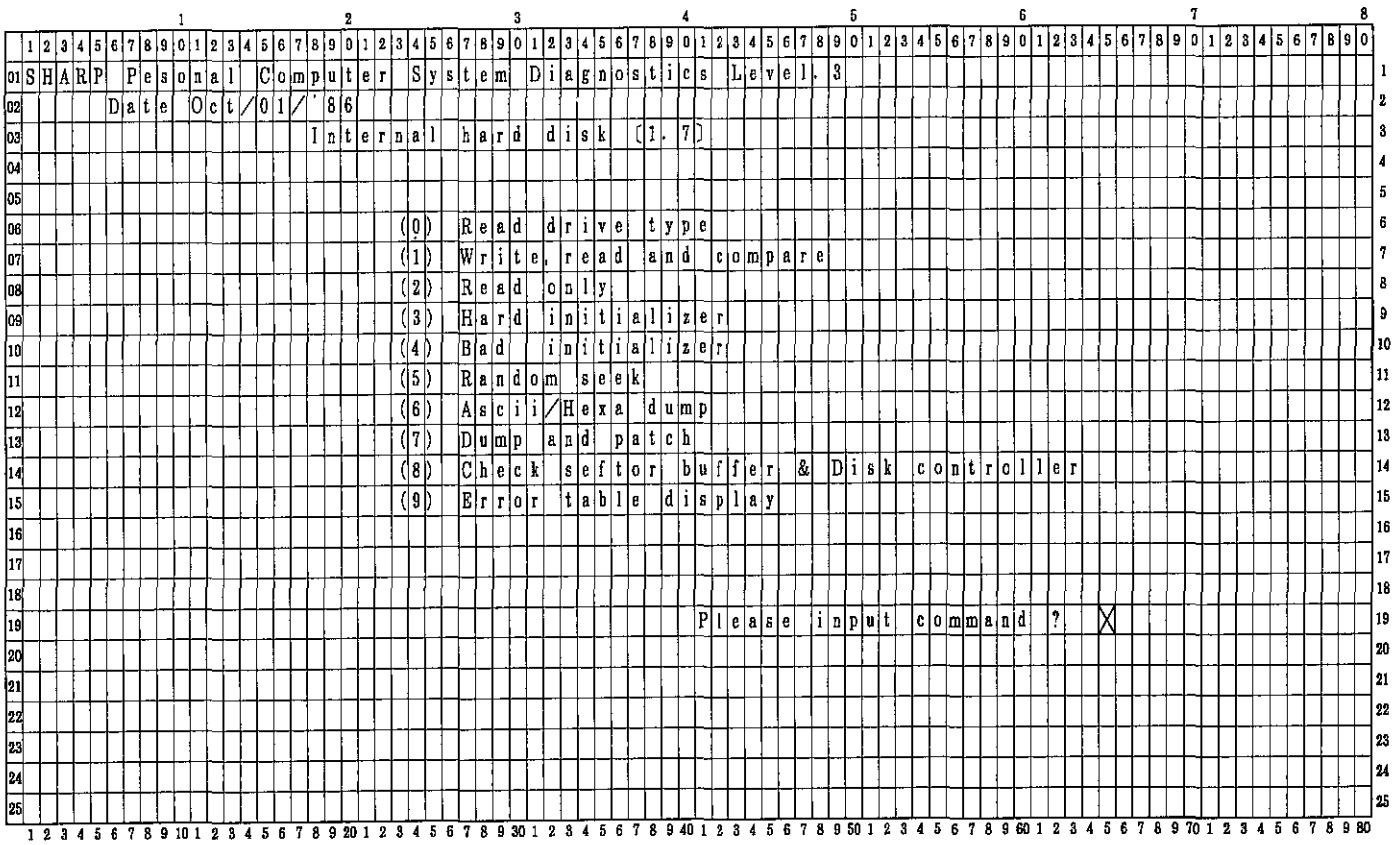
Screen Format

Fig. DSK-0



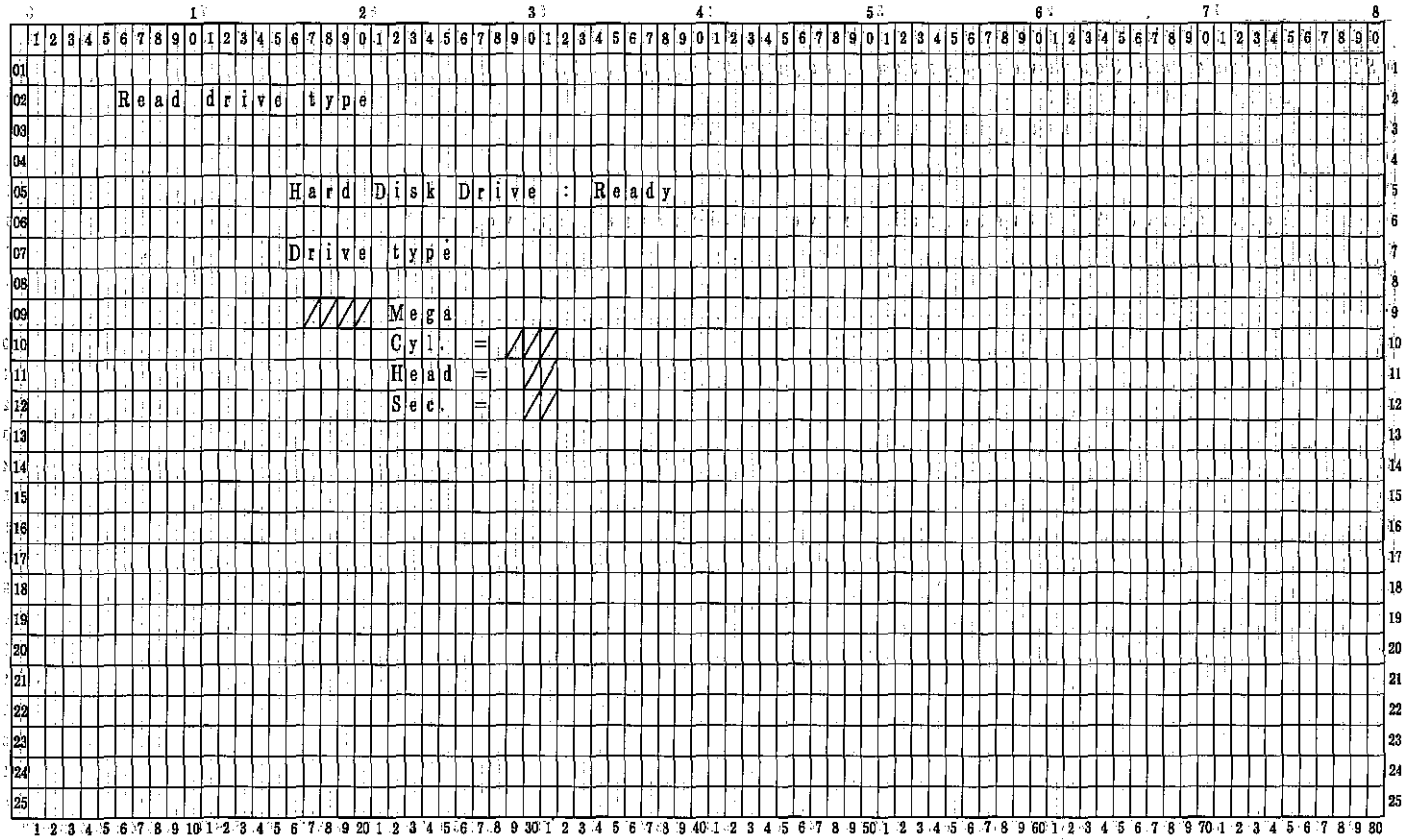
Screen Format

Fig. DSK-1



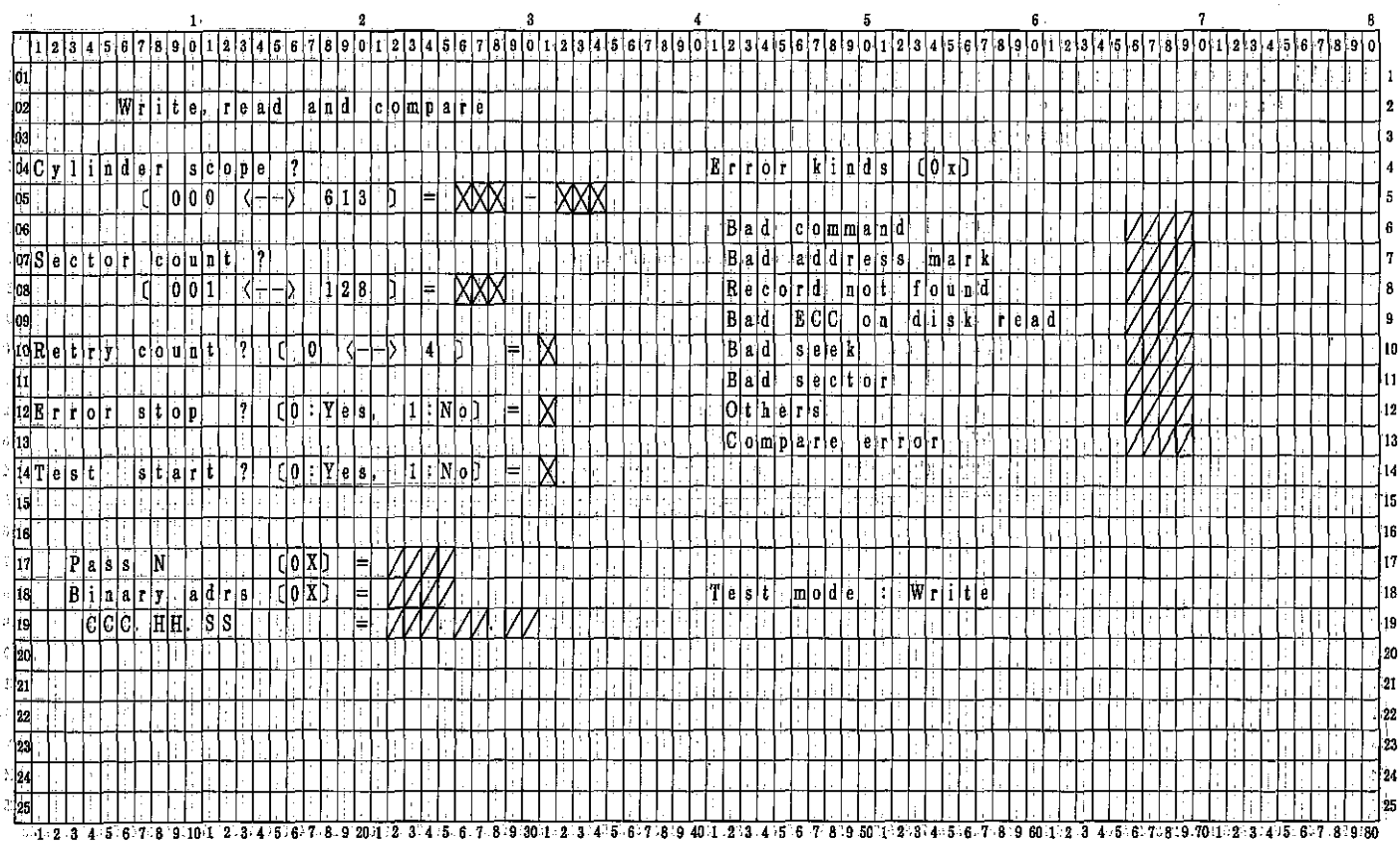
Screen Format

Fig. DSK-2



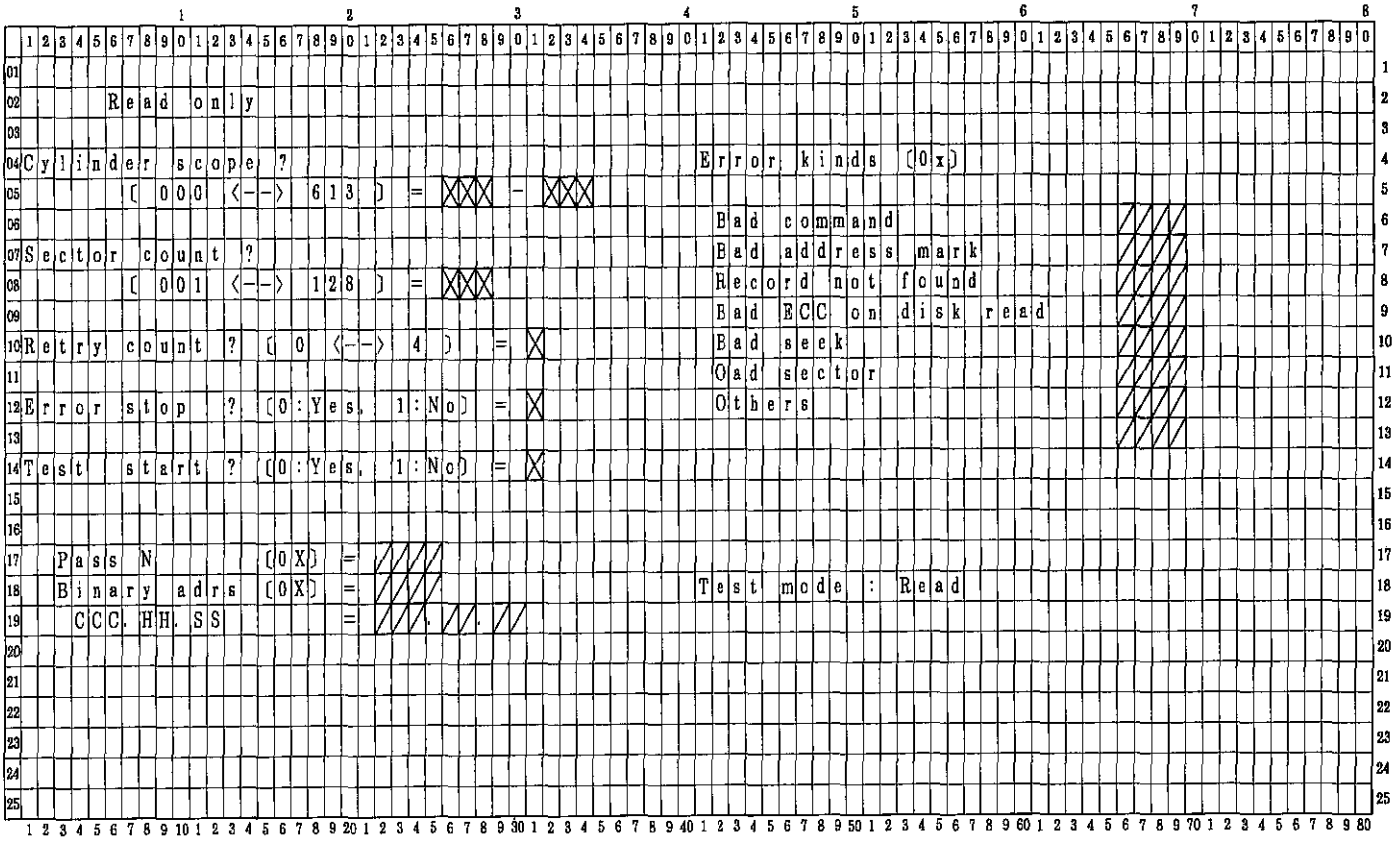
Screen Format

Fig. DSK-3



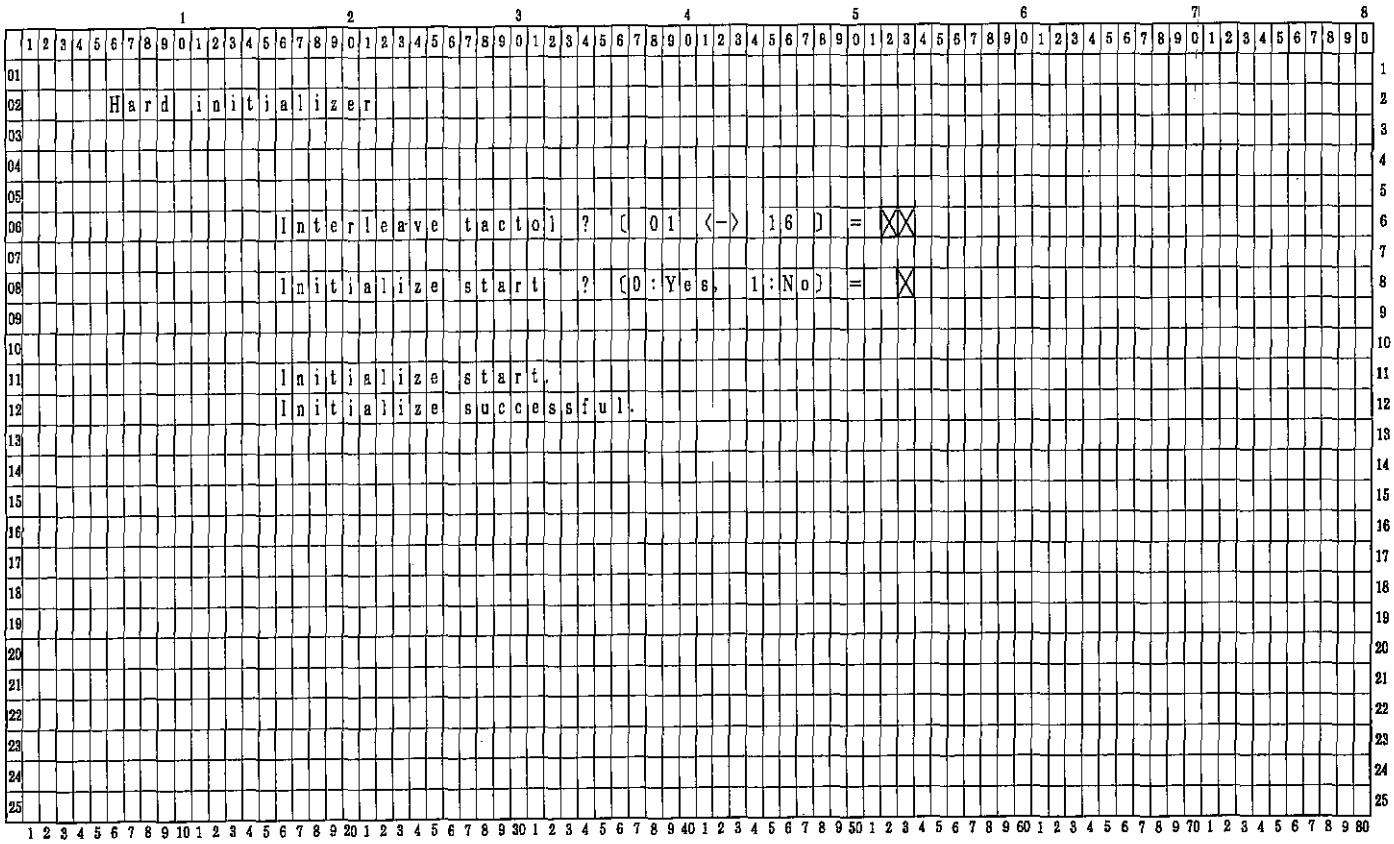
Screen Format

Fig. DSK-4



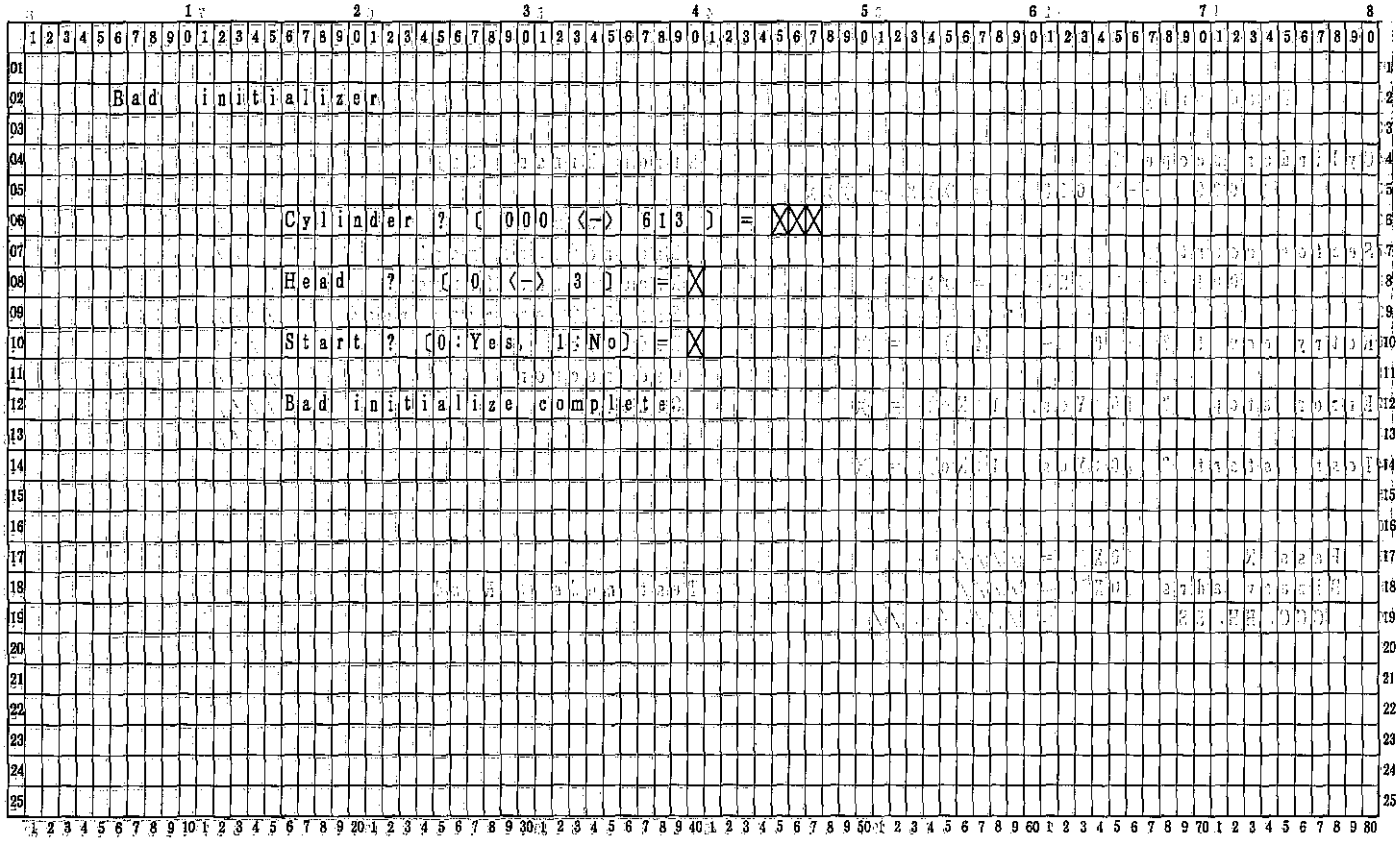
Screen Format

Fig. DSK-5



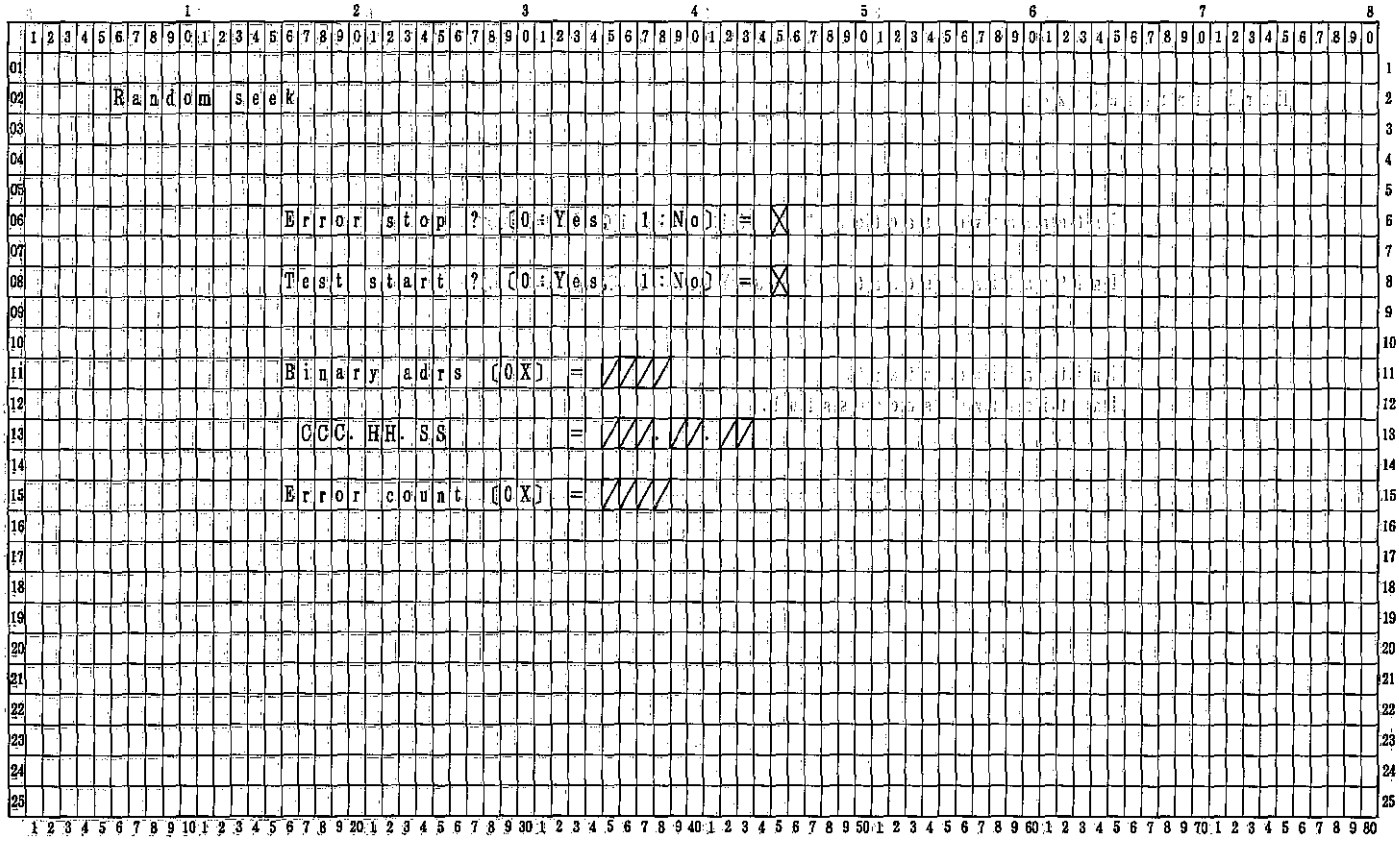
Screen Format

Fig. DSK-6



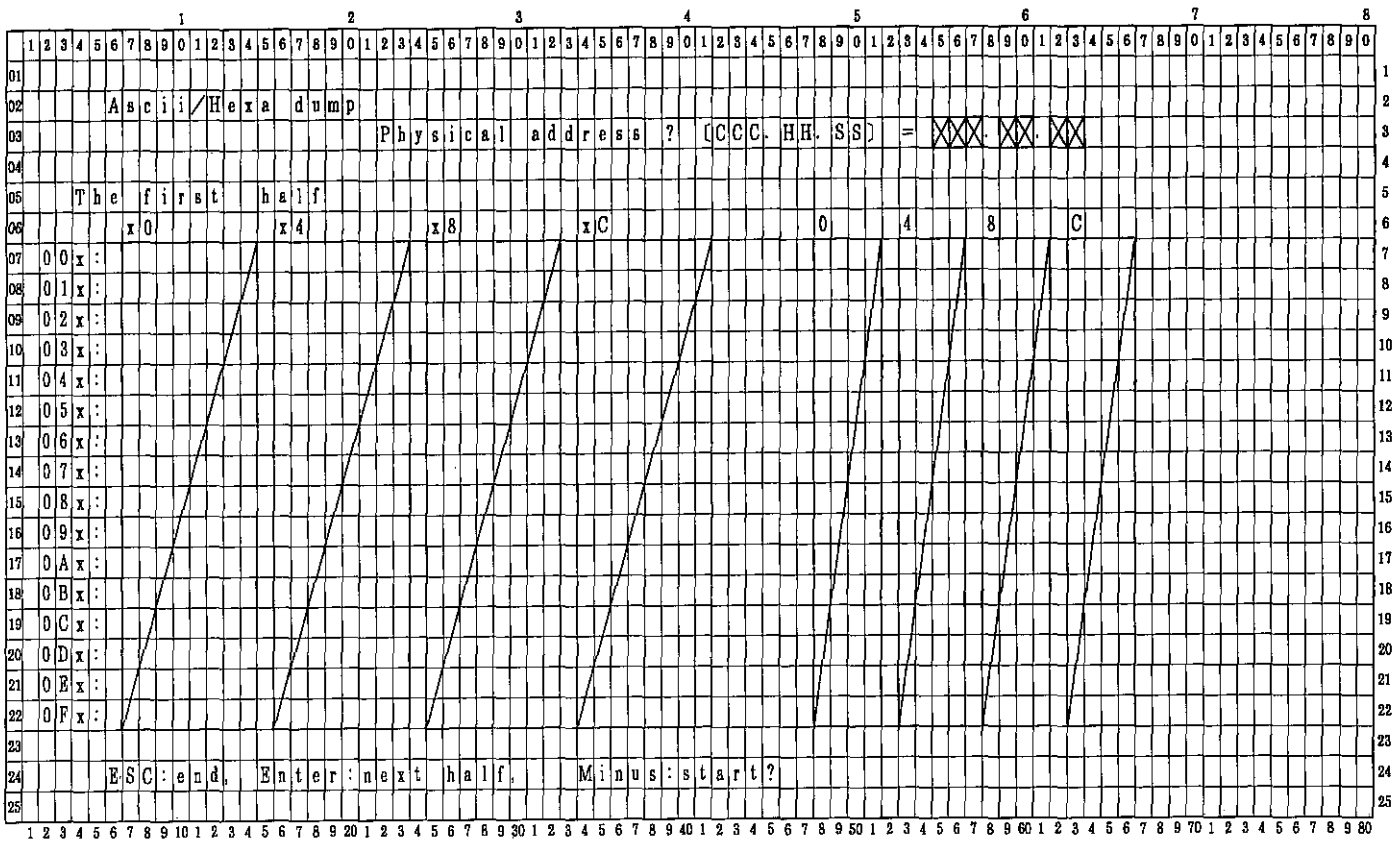
Screen Format

Fig. DSK-7



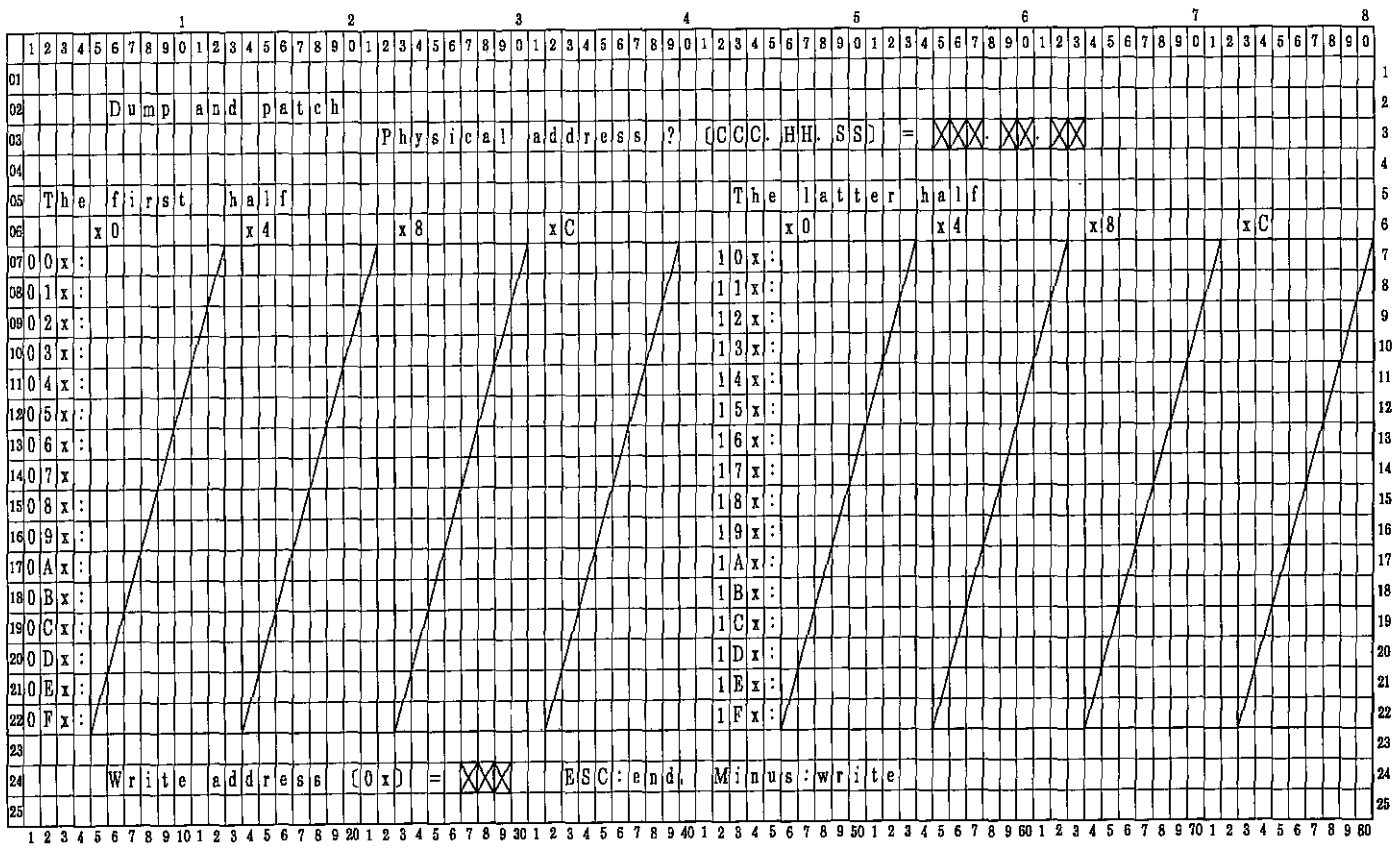
Screen Format

Fig. DSK－8



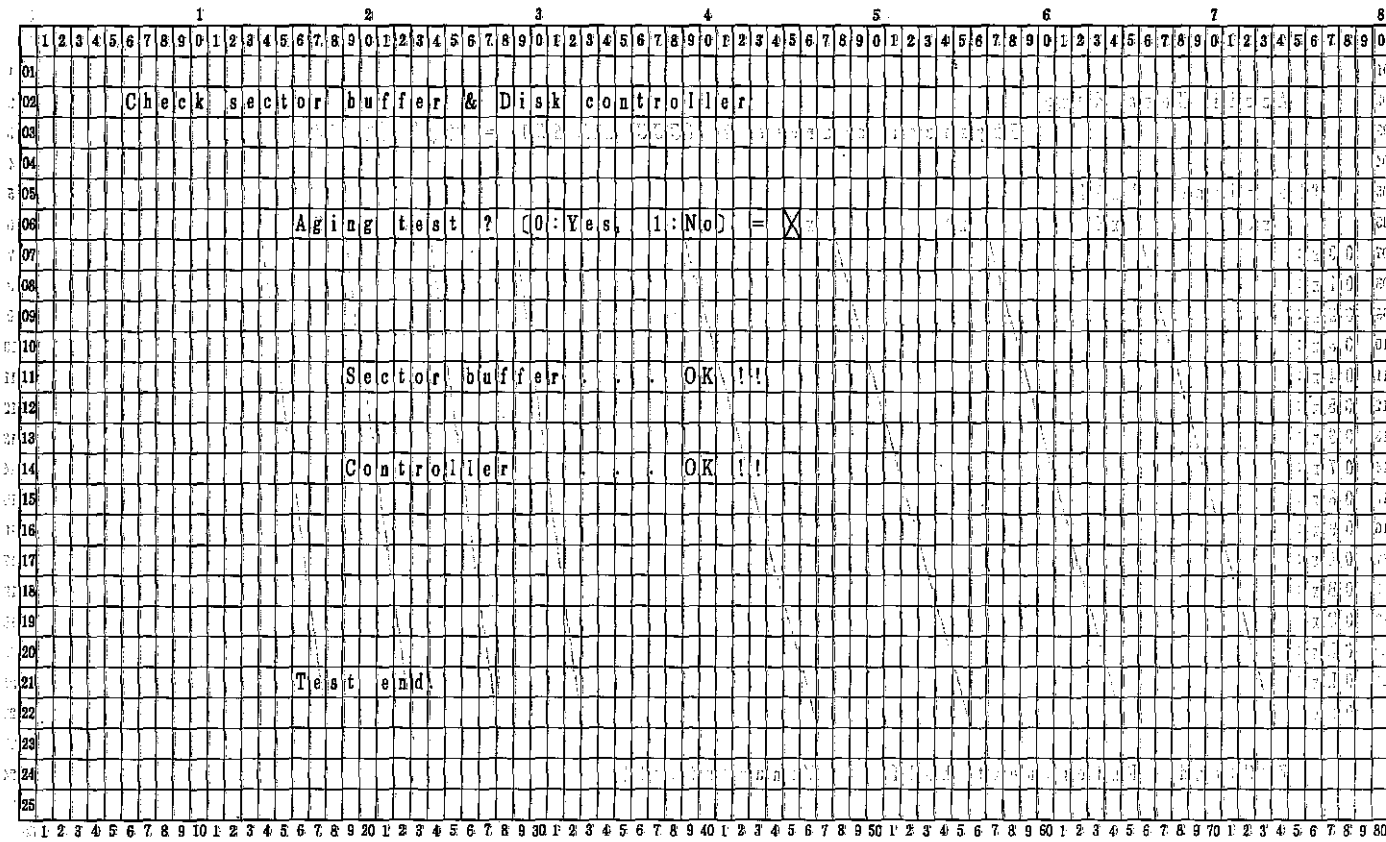
Screen Format

Fig. DSK－9



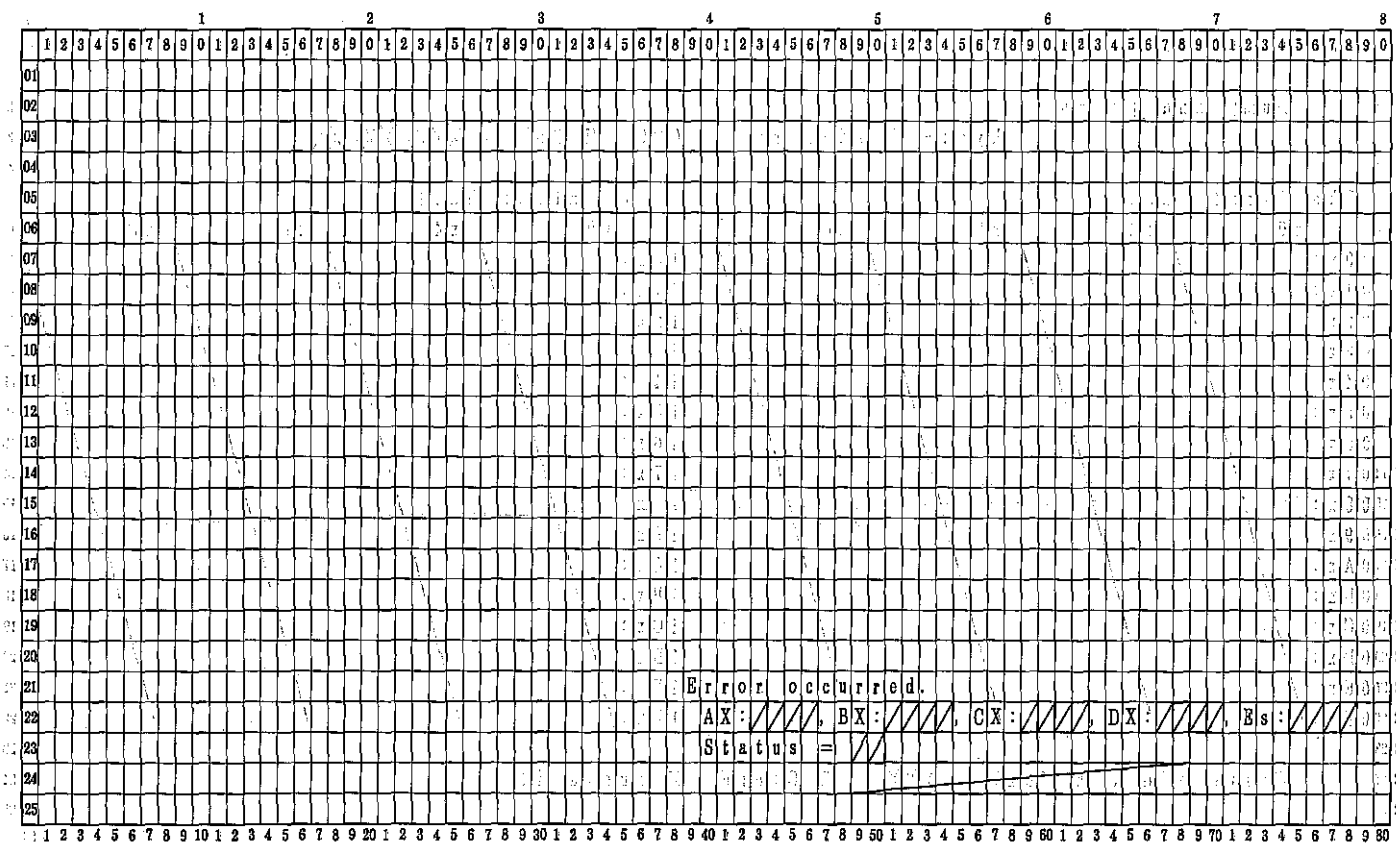
Screen Format

Fig. DSK-10



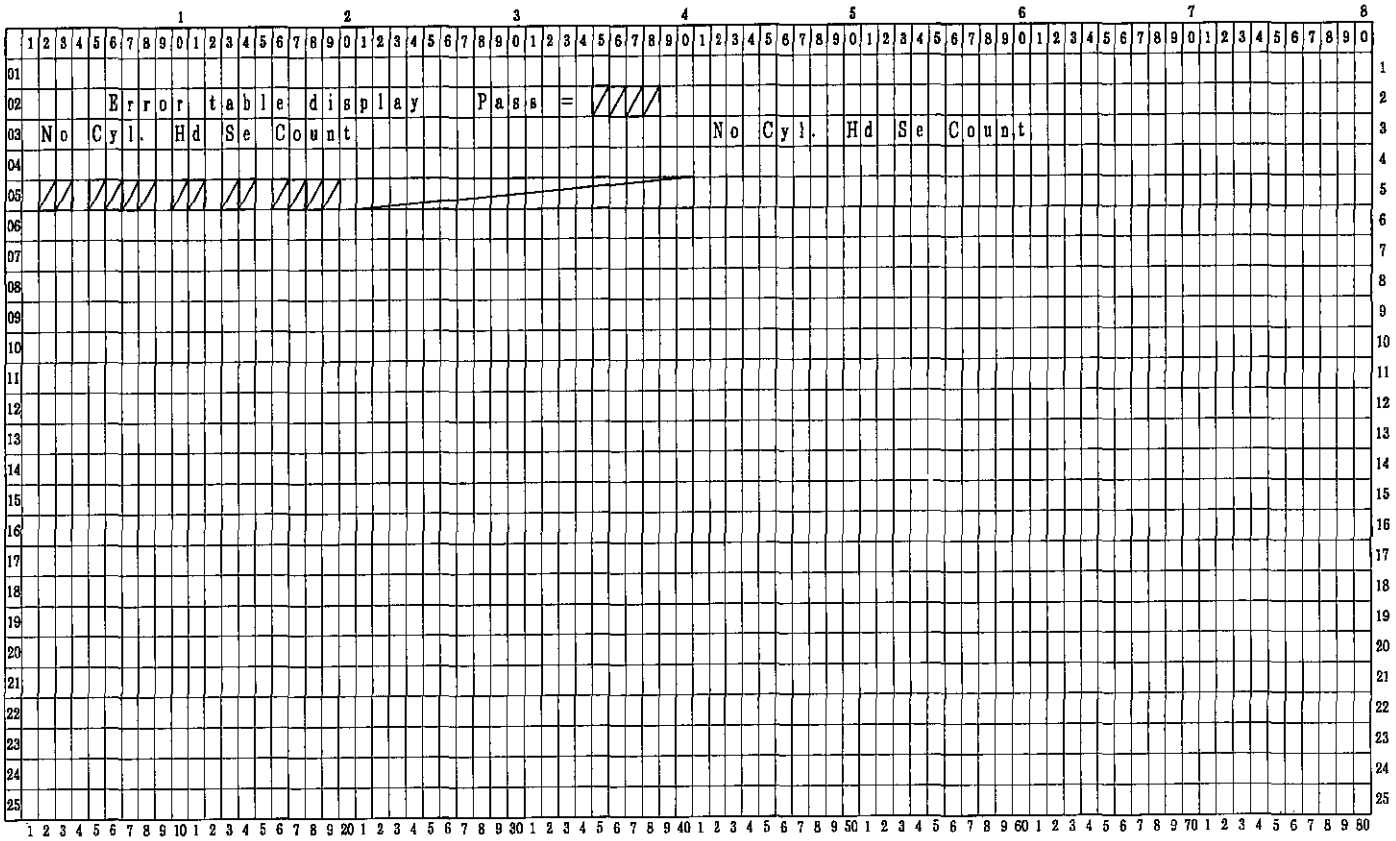
Screen Format

Fig. DSK-11



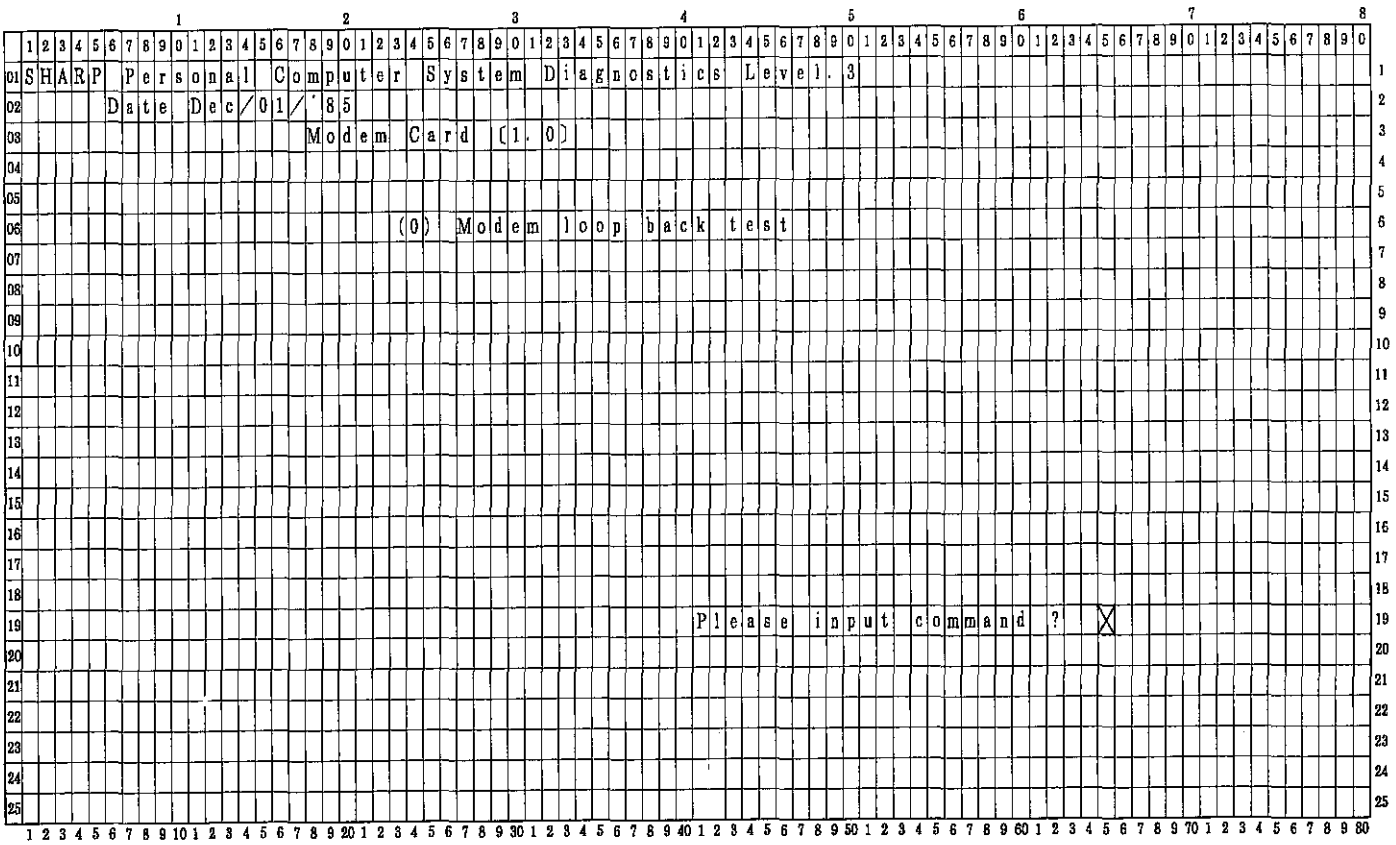
Screen Format

Fig. DSK－12



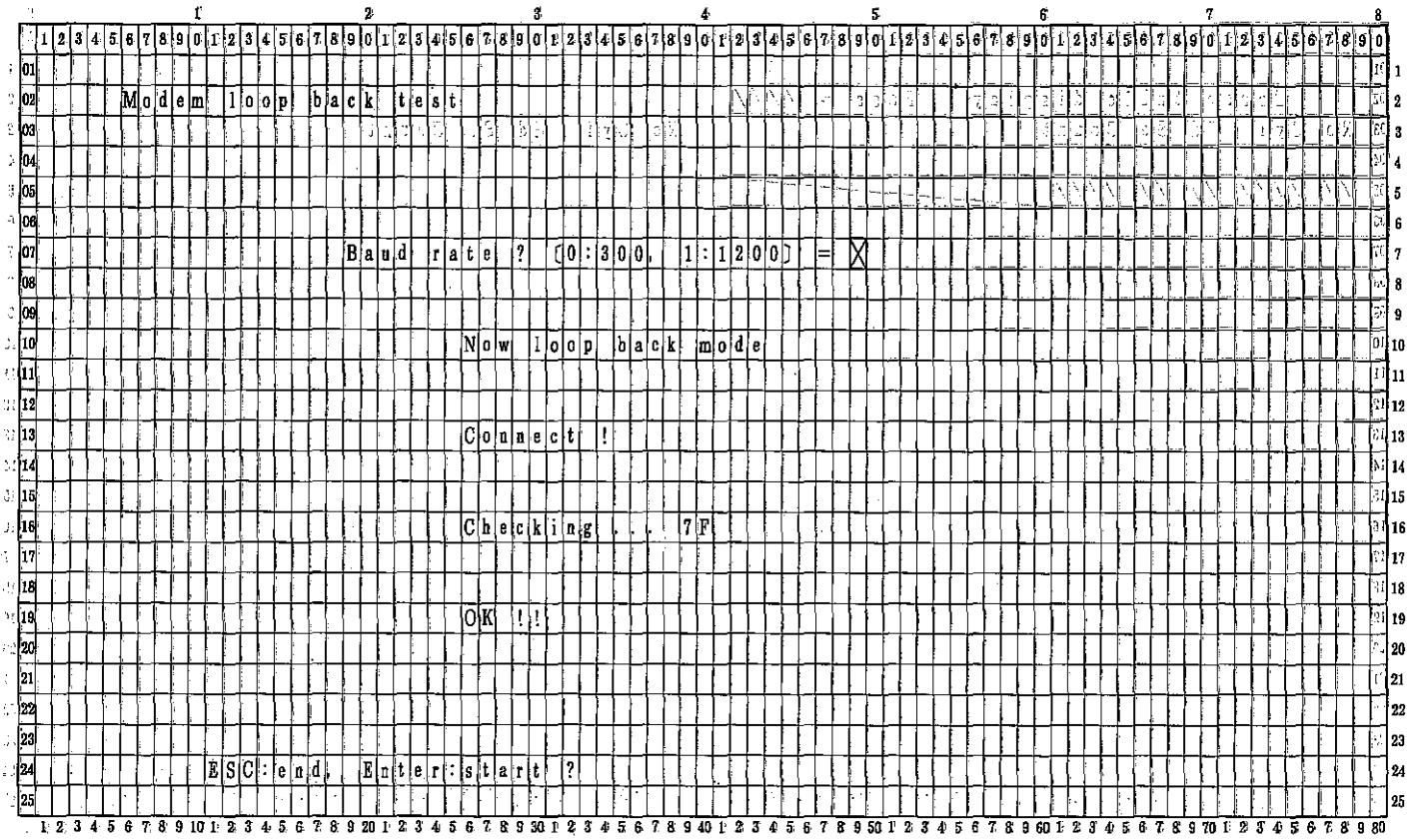
Screen Format

Fig. MDM－1



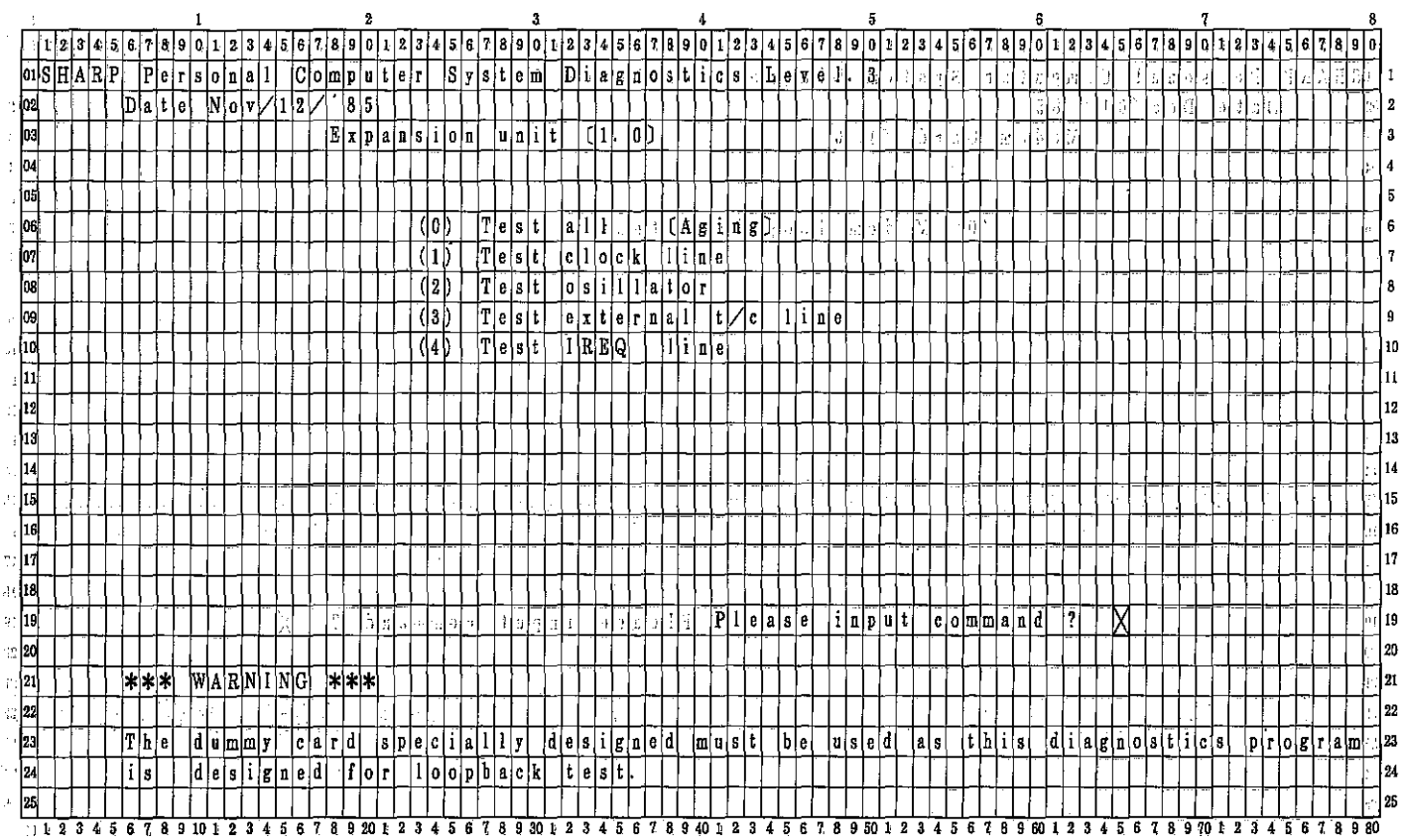
Screen Format

Fig. MOM-2



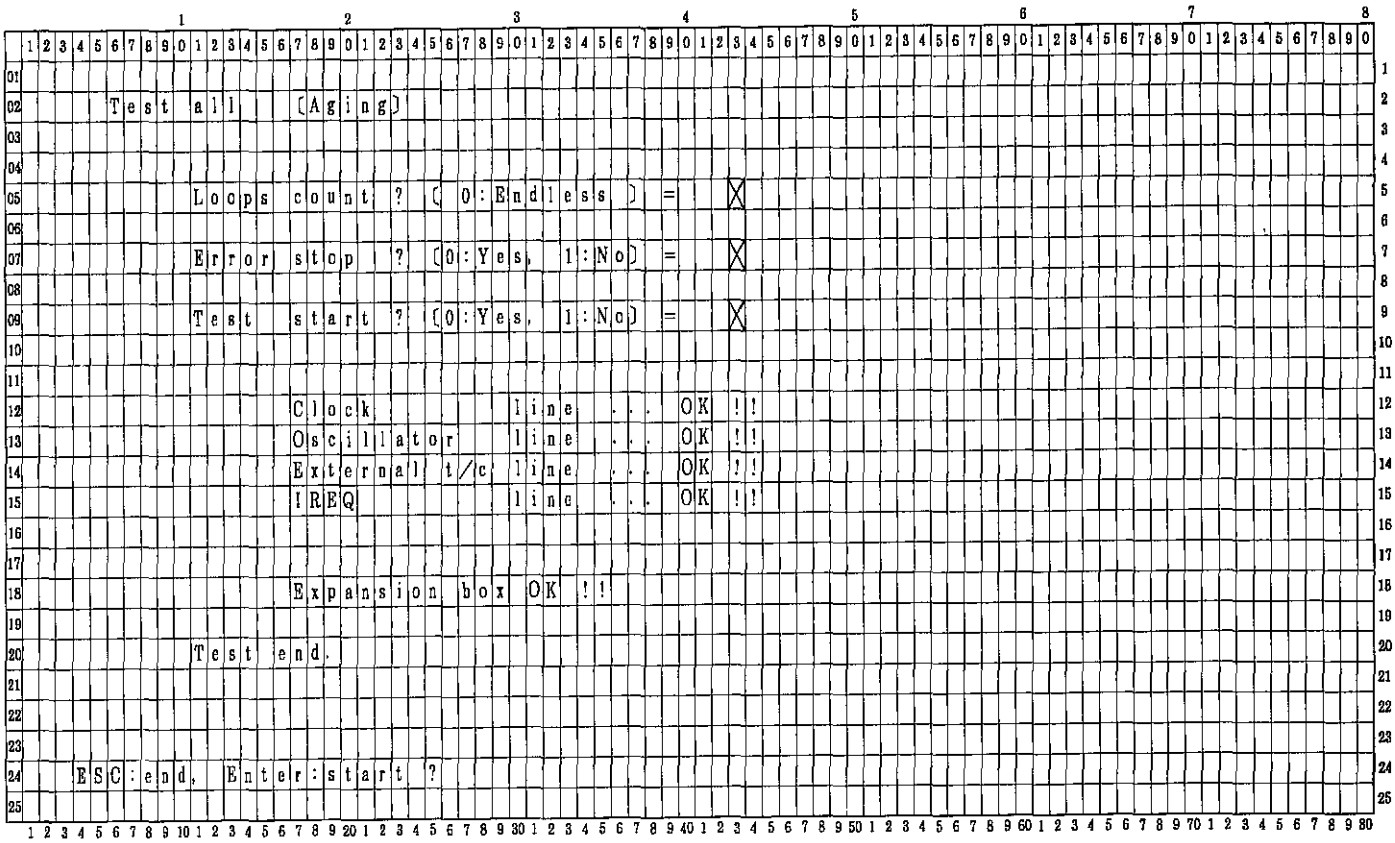
Screen Format

Fig. EXP-1



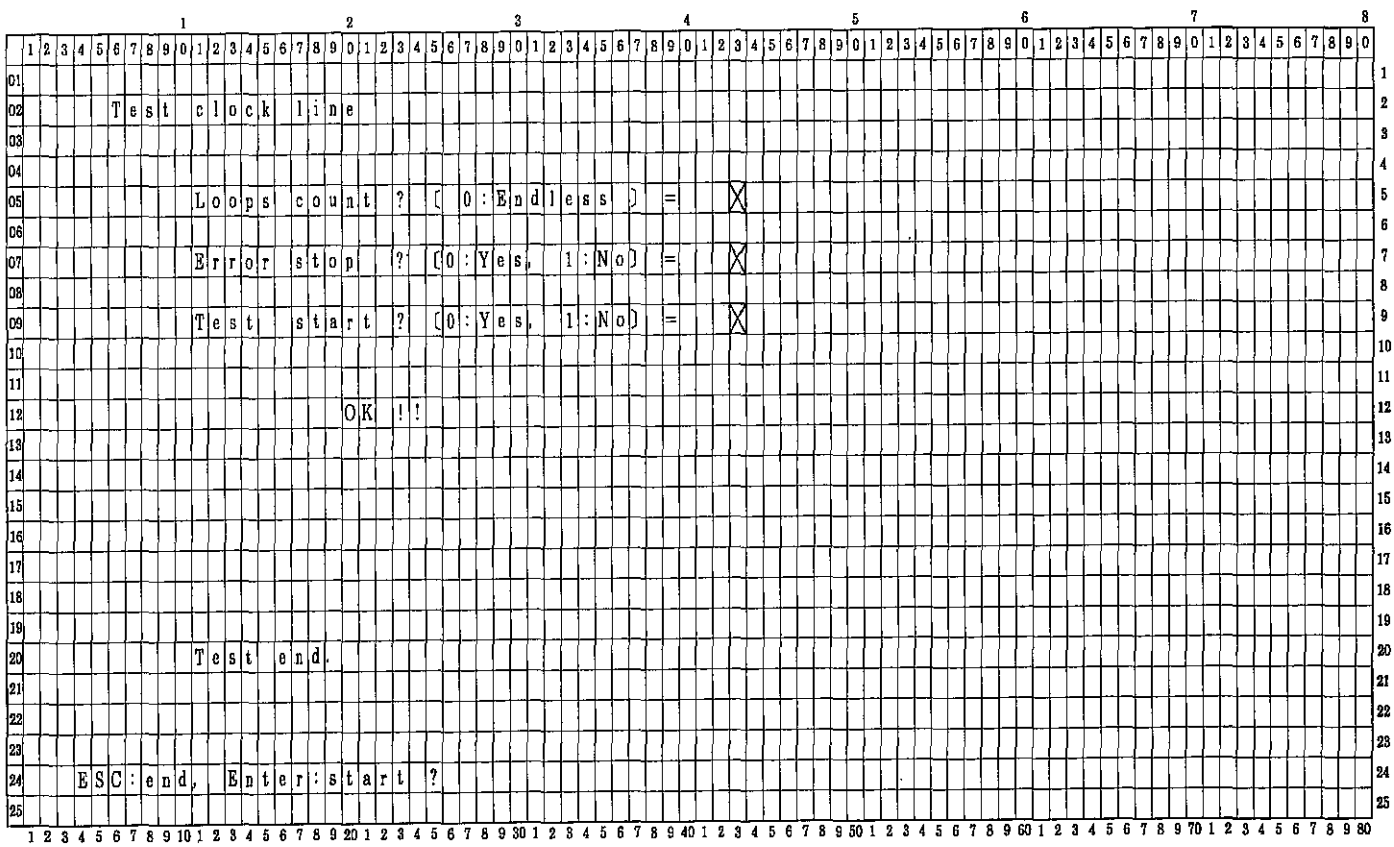
Screen Format

Fig. EXP-2



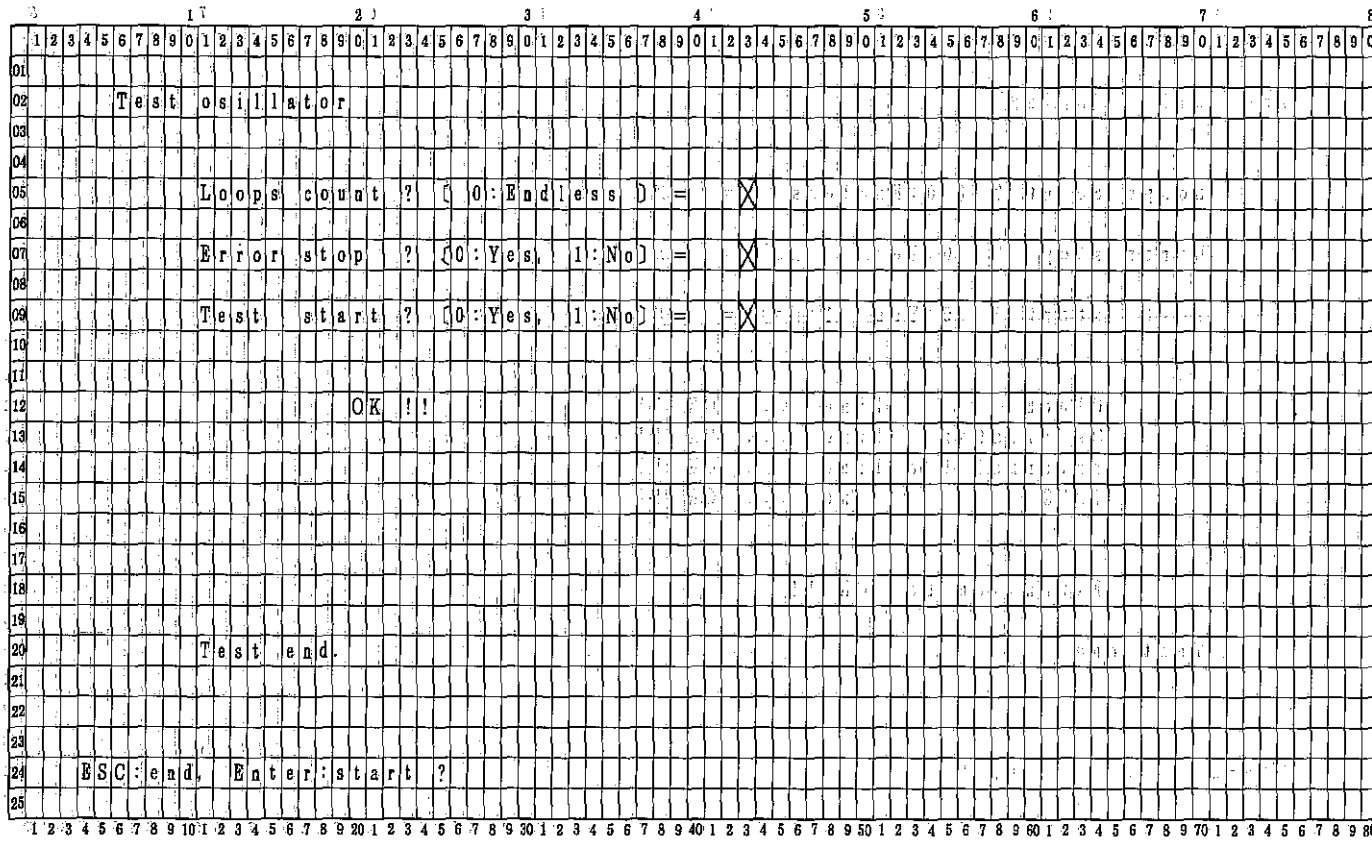
Screen Format

Fig. EXP-3



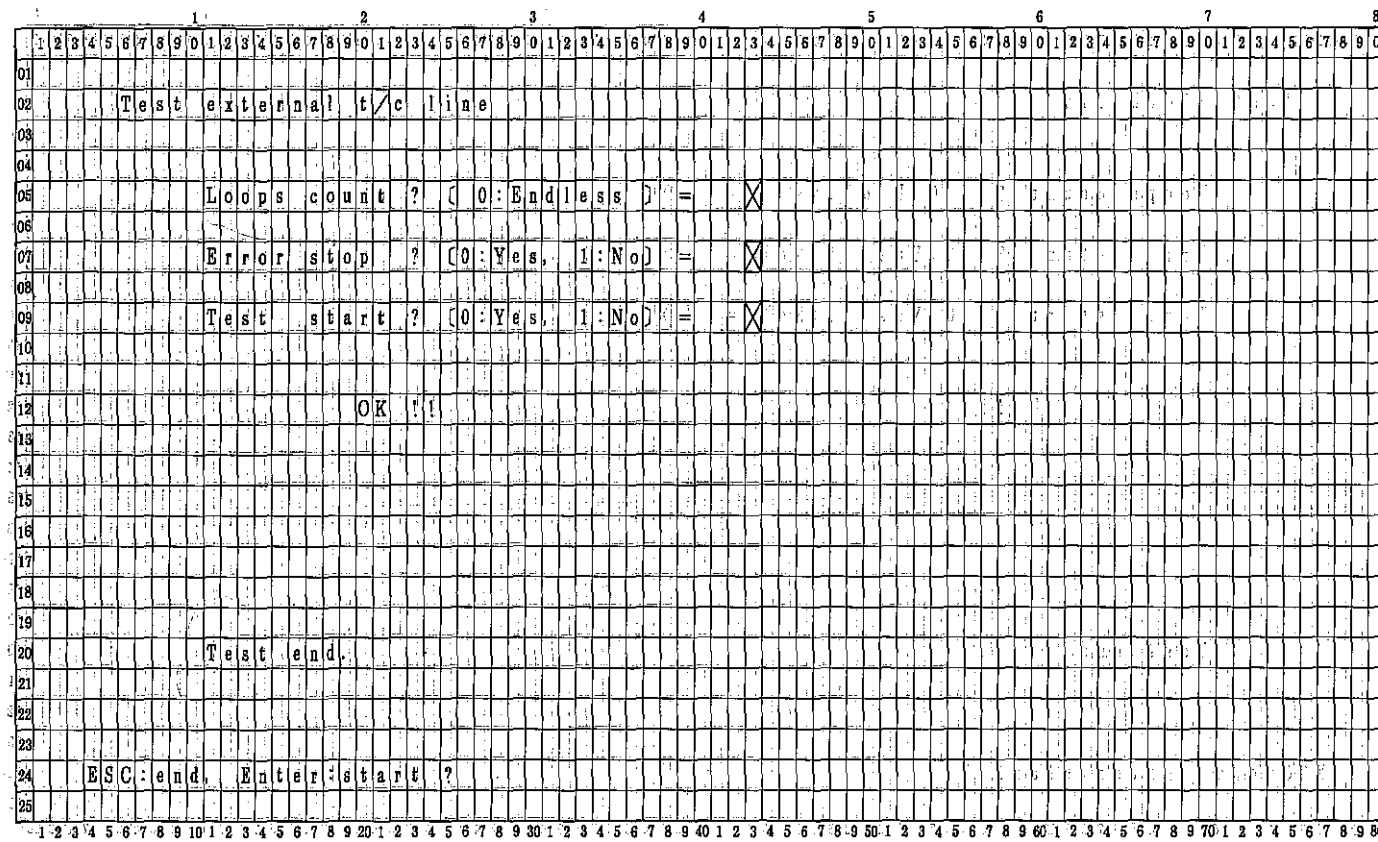
Screen Format

Fig. EXP-4



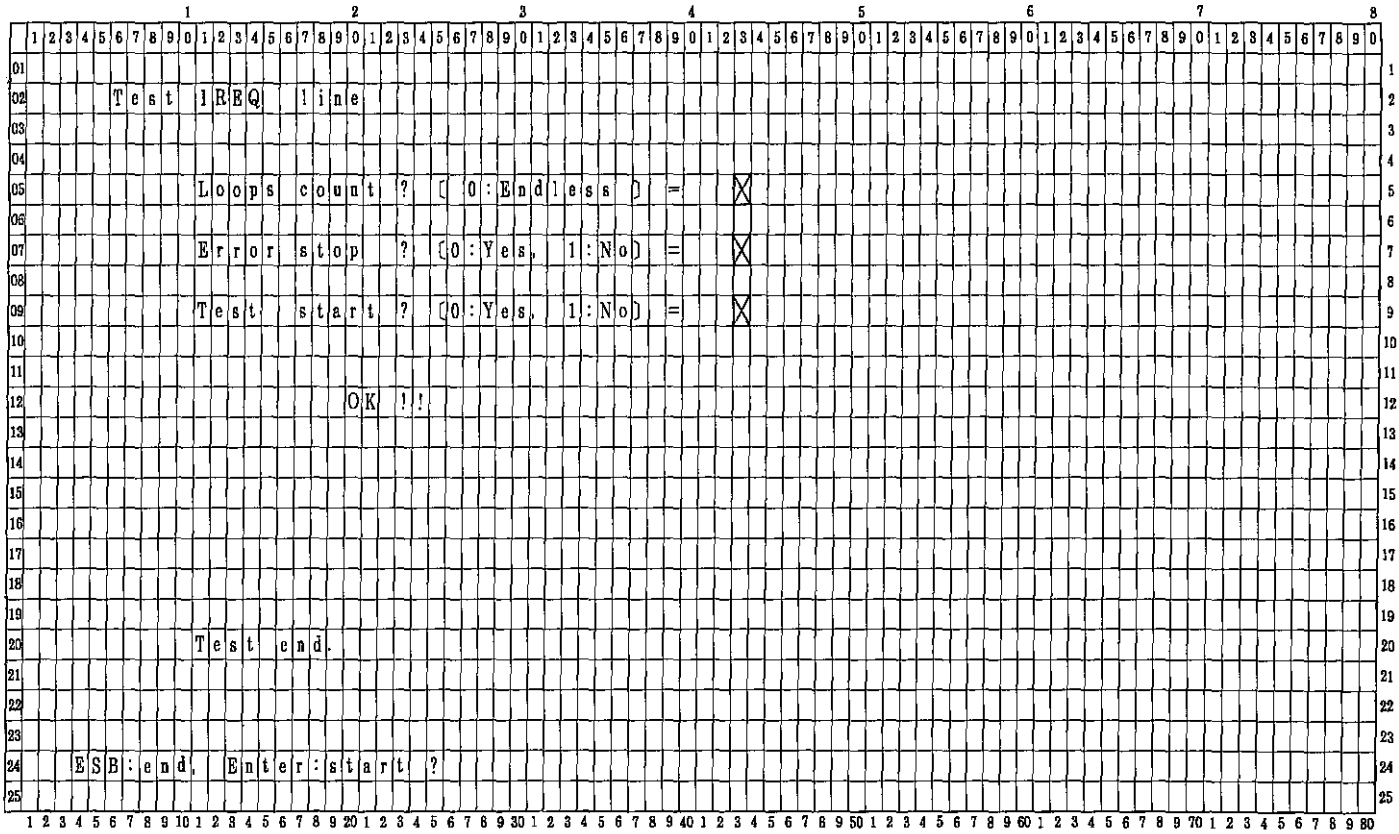
Screen Format

Fig. EXP-5



Screen Format

Fig. EXP-6



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