SHARP SERVICE MANUAL

DIAGNOSTIC MANUAL
For MODEL MZ5600A

─── CONTENTS ───

SHARP CORPORATION

I. MZ-5600A service check program specifications

1) Applicable models
   MZ-5631A/5641A/5645A/5646A

2) Tools required
   - RS232C interface cable
   - Test program media (one)
   - Fresh media (two)

3) Check method
   - The test program is loaded from the test program media onto the main memory
     for test.

4) Check items
 I) Service check program (File name: S)
 (1) RAM & IPL ROM tests
  i) RAM
  ii) IPL ROM
 iii) Expansion RAM

 (2) Sound interface, audio out, speaker tests
  i) Single tone, chord
  ii) Volume

 (3) VRAM test (basic VRAM only)

 (4) Display functional tests
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  iii) Color priority function
  iv) Pallet function
  v) Background color function
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  vii) VDS function
  viii) Window priority function
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 (7) RS-232C interface test

 (8) Timer test
  i) Alarm
  ii) RTC RAM
  iii) Timer setup
  iv) Timer readout

(9) Key interface test

(10) Expansion DRAM (MZ-1R 22) test

(11) Expansion VRAM (MZ-1R09) test

(12) 8087(MZ-1M03)

II) Service check program (File name: T)
    RTC battery backup test

 Tests can be done for above test items. For the operational procedure, refer to
 the service check program operational procedure.

III) Service check program (File name: R)
     RAM file board (MZ1R32) test.

II. Mz-5600A service check program operational procedure.

This test program consists of the following two tests:
  1) Test program I with which twelve kinds of test can be chosen out of the menu.

  2) Test program II with which the RTC backup is tested by turning power on after turning power off upon completion of the test in above 1).

0. Procedure in general

The MZ-5600A service check program is run under the control of the CP/M 86 operating system, of which file names are as follows:
  - Service check program I: File name S
  - Service check program II: File name T
  - Service check program III: File name R

Ensure that the POWER indicator is on after power on and make entry of the file name following the prompt "A ", then depress the [ENTER] key. With this, it makes the test program started.

For an example, depression of [S] and [ENTER] next to "A " causes the service check program I to start running.

```
 ---------------------------------------------------
|    _____ |
|    MZ-5600A  SERVICE  CHECK  PROGRAM             |
|                        VERSION 1.0A              |
|    _____ |
|       * INPUT SET TYPE *                         |
|          MZ-6531A      = 0                       |
|          MZ-5641A      = 1                       |
|          MZ-5645A/46A = 2                        |
|          Please key IN   0/1/2=                  |
| _____ |
 ---------------------------------------------------
```

Fig. 0-1

In order to inform the model name to the system, enter one of 0, 1, or 2 on the keyboard according to the prompt. Pay attention at this stage for the version number of the check program.
Then, the model of the MFD must be specified using a number of 0, 1, or 2 and the size of the RAM using a number of 256.
With the above procedure, the main menu (Fig.0-2) comes displayed with which you can make choice of the function to be tested. Entering "R" before the entry of test parameter will cause the same test item to repeat automatically.
 Type [5] [ENTER] to start the VRAM test.
 Type [R] [5] [ENTER] to start the VRAM test in repetition.
It would be possible to perform the aging test with the prefix "R" in use.
To terminate the repetitive test, depress the [SHIFT]+[BREAK] keys. Upon completion of the test cycle currently in execution, the control then returns to the menu (Fig.0-2).

```
┌─────────────────────────────────────────────────────────────────┐
│                                                                   │
│           *** SERVICE CHECK PROGRAM MAIN MENU ***                 │
│                                                                   │
│     1. RAM & IPL ROM              2. SOUND                         │
│     3. V-RAM                      4. DISPLAY                       │
│     5. MFD                        6. PRINTER I/F                   │
│     7. RS 232C I/F                8. TIMER                         │
│     9. KEY I/F                   10. EXPANSION DRAM (MZ-1R22)      │
│    11. EXPANSION V-RAM (MZ-1R09) 12. 8087 (MZ-1MO3)               │
│                                  "E" (END)                        │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```

Fig.0-2 Main menu

Now, discussion is provided for the RTC battery backup test. Though the RTC battery backup test is carried out under the service check program II (file name: T), it becomes mandatory that the test item No.6 has been assigned in the service check program I.

Figure 0-3 shows the flow of the RTC battery backup test. Since the test is carried out on the basis of the time and data entered for the timer test, the timer test should have been executed prior to this test item. However, it should not be necessarily done immediately before the RTC battery backup test.

You must note that it becomes necessary to turn power off and on and should have a wait of about ten seconds.

Repetition of the service check program II more than once will result in an error, because the RTC data have been cleared after the execution of the check program II. In order to repeat the test again, it becomes to start from the timer test again.

See sections to follow for details of tests. Successful test is indicated on the display with the message "OK" with short beeps, and unsuccessful test is indicated on the display with the message "ERROR" with a long continuous buzzer alert.

```
        ( START )
            │
  ┌──────────────────────────┐
  │ SERVICE CHECK PROGRAM I   │
  │ (6) Execute timer test    │
  └──────────────────────────┘
            │           POWER OFF
           (1)
     LAPSE OF TEN SECONDS
           (1')
                        POWER OFF
  ┌──────────────────────────┐
  │ SERVICE CHECK PROGRAM II  │
  │ EXECUTION OF THE FILE NAME T │
  │ PERMITS THE RTC BATTERY   │
  │ BACKUP TEST               │
  └──────────────────────────┘
            │
        ( END )
```
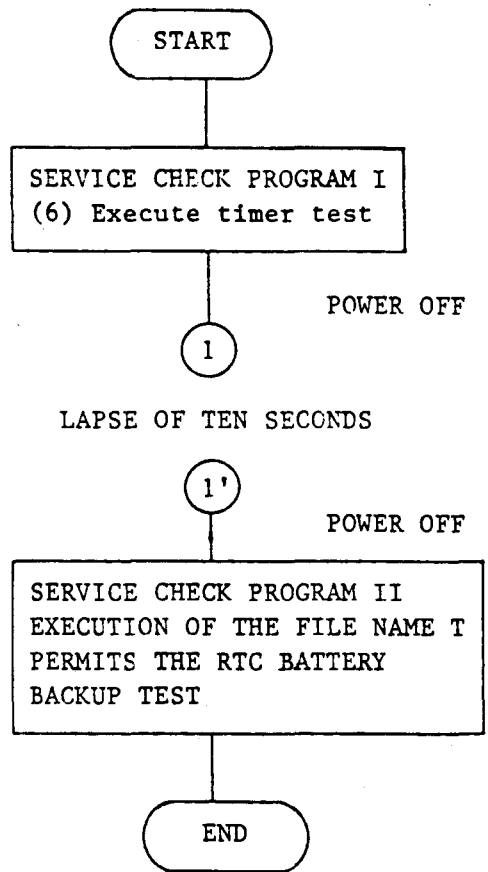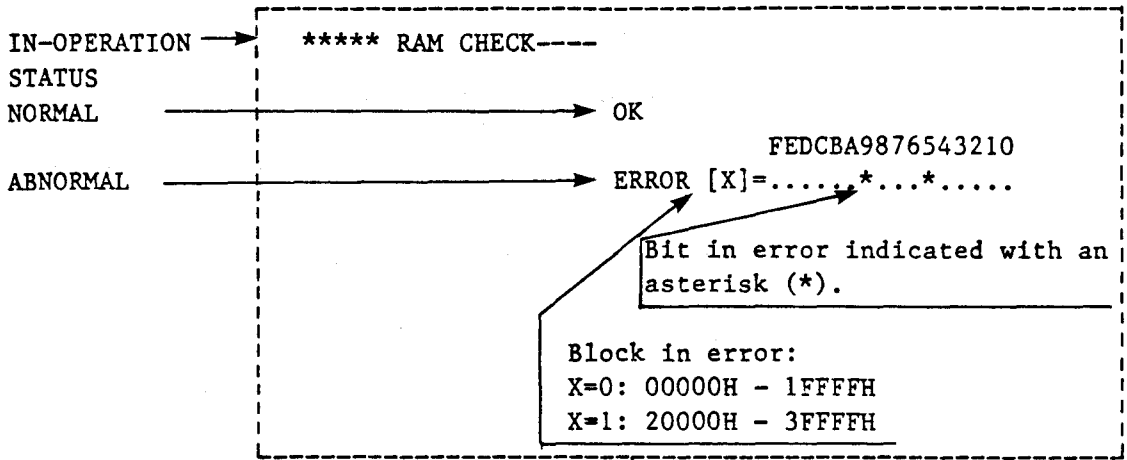
Fig. 0-3 RTC test flow

1. RAM & IPL ROM test
This mode is assigned upon depression of the [1] key.

i) RAM test

---Depression of the [1] key---

```
IN-OPERATION ──────►   ***** RAM CHECK----
STATUS
NORMAL       ─────────────────────►  OK
                                               FEDCBA9876543210
ABNORMAL     ─────────────────────►  ERROR [X]=......*...*.....

                                     Bit in error indicated with an
                                     asterisk (*).

                                     Block in error:
                                     X=0: 00000H - 1FFFFH
                                     X=1: 20000H - 3FFFFH
```

ii) IPL ROM test

```
IN-OPERATION ──────►   ***** IPL ROM CHECK----
STATUS
NORMAL       ─────────────────────►  HIGH=OK      LOW=OK

ABNORMAL     ─────────────────────►  HIGH=ERROR  LOW=ERROR
```
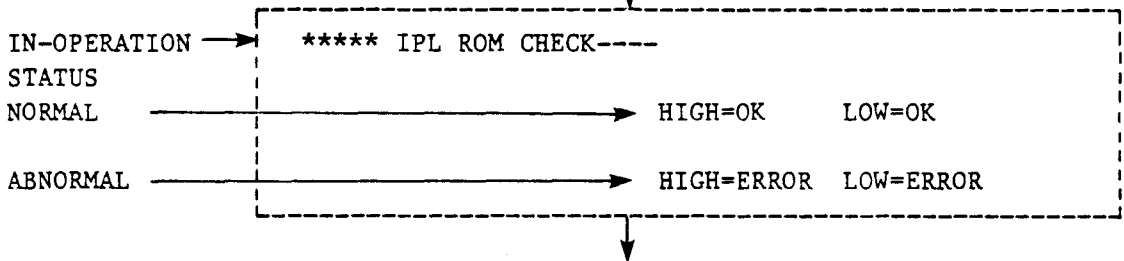
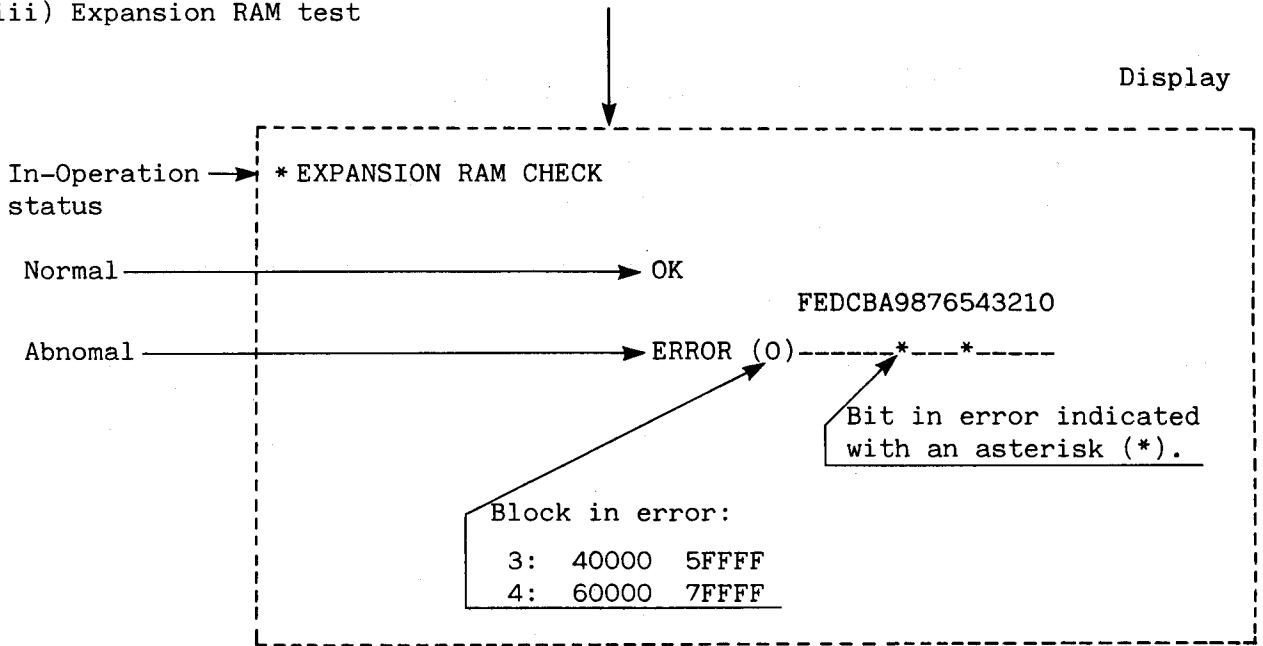The high order bits and low
order bits are tested.

Depression of the space bar
after completion of above i)
and ii) makes the control
then proceed expansion

RAM test.

```
             (       SPACE BAR       )
```

To the expansion RAM test

iii) Expansion RAM test

Display

In-Operation → * EXPANSION RAM CHECK
status

Normal ─────────────────────→ OK

FEDCBA9876543210

Abnomal ─────────────────────→ ERROR (0) ──────*───*─────

Bit in error indicated
with an asterisk (*).

Block in error:

    3:   40000   5FFFF
    4:   60000   7FFFF

iii) Depression of the space bar makes the control returned to the main
     menu.

Space bar
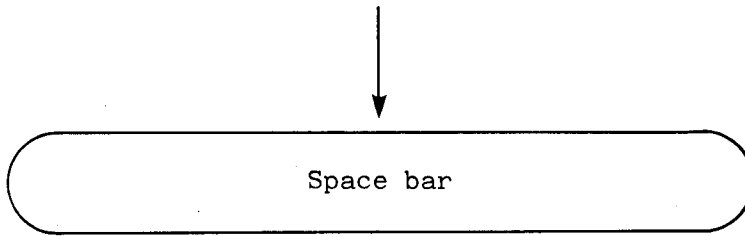
To the main menu.

2. Sound interface, audio output, speaker tests
This mode is assigned upon depression of the [2] key.

1) Single tone and chord tests

---Depression of the [2] key---

IN-OPERATION →
STATUS

```
***** SOUND CHECK----
```

Upon the above display,
combination of the next
sounds are repeated three
times. Then, test terminates.

DO...MI...SO...(SO)(MI)(DO)

Single tone

```
* CHECK END *
```

NOTE: Test result must be
evaluated by the ears of the
inspector.
The following items must be
confirmed while the sounds
are being generated.
  i) Sounds generated as
     specified.
 ii) Manipulation of the
     volume control permits
     regular volume change.

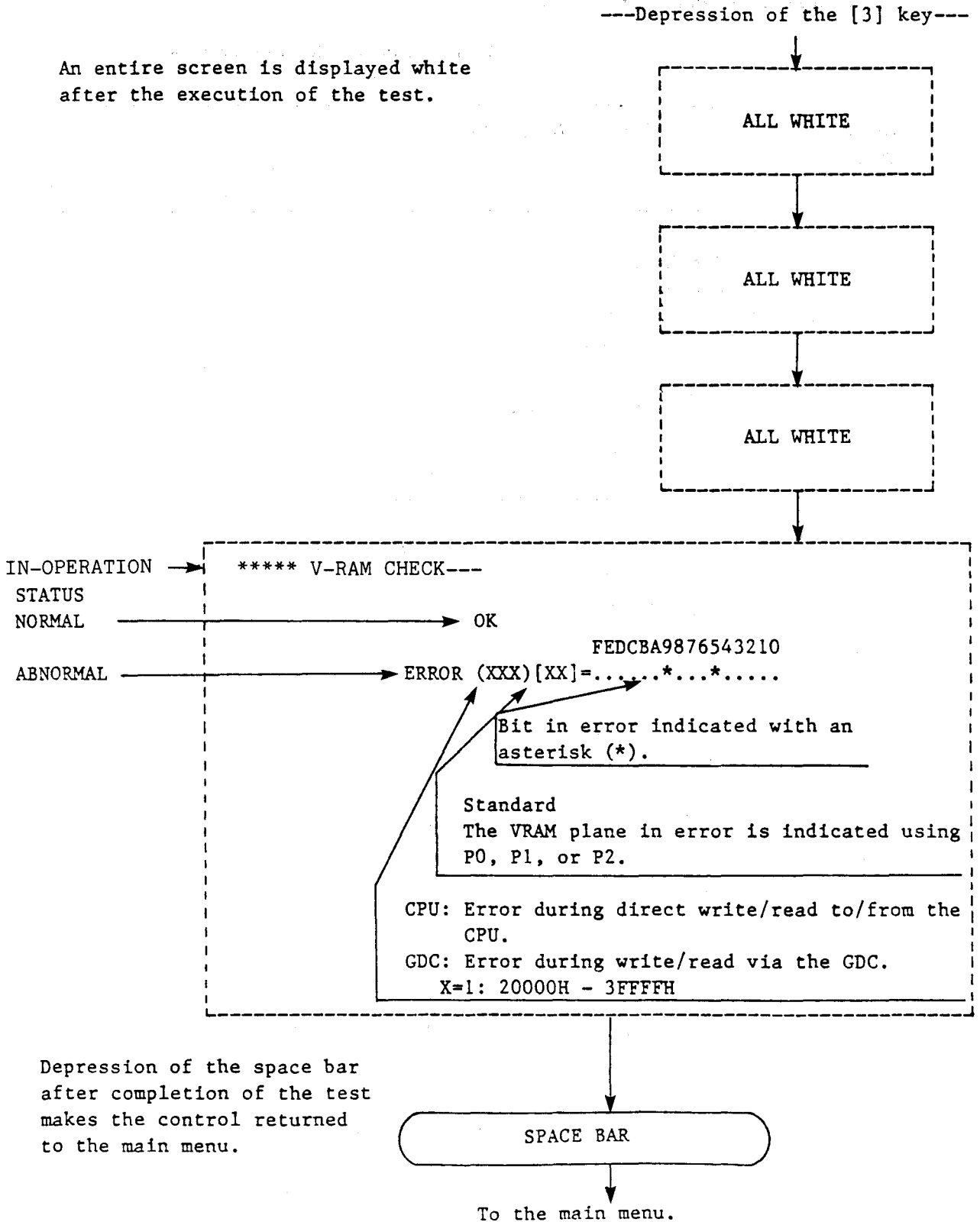Depress the space bar to
return to the main menu.

SPACE BAR

To the main menu.

3. VRAM test

This mode is assigned upon depression of the [3] key.

1) VRAM test

An entire screen is displayed white
after the execution of the test.

---Depression of the [3] key---

```
ALL WHITE
```

```
ALL WHITE
```

```
ALL WHITE
```

IN-OPERATION →   ***** V-RAM CHECK---
STATUS
NORMAL ─────────────────────→ OK

                              FEDCBA9876543210
ABNORMAL ────────────────→ ERROR (XXX)[XX]=......*...*.....

Bit in error indicated with an
asterisk (*).

Standard
The VRAM plane in error is indicated using
P0, P1, or P2.

CPU: Error during direct write/read to/from the
     CPU.
GDC: Error during write/read via the GDC.
   X=1: 20000H - 3FFFFH

Depression of the space bar
after completion of the test
makes the control returned
to the main menu.

```
SPACE BAR
```

To the main menu.

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4. Display functional test

This mode is assigned upon depression of the [4] key.

---Depression of the [4] key---

4-1. Pattern generation

i) Upon start of the test program, the pattern
   shown in Fig.4-1 is displayed.

012345....789
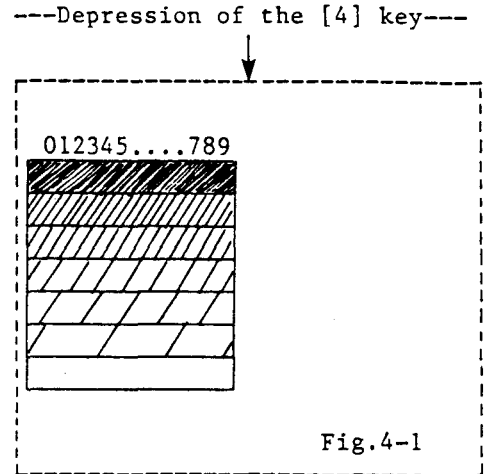
Fig.4-1

SPACE BAR X 4

4-2. Window display functional test
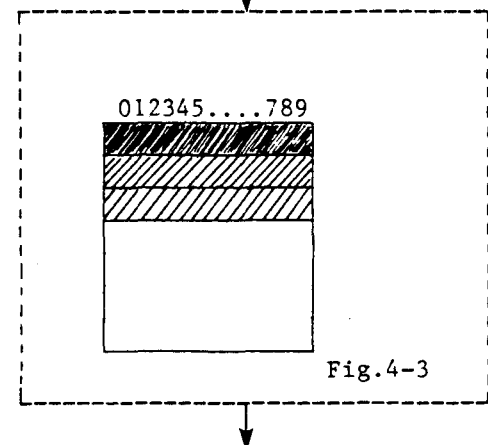
i) After depression of the space bar
   four times, patterns shown in Fig.
   4-1 appears on the display one at
   a time in the order shown in Fig.
   4-2.
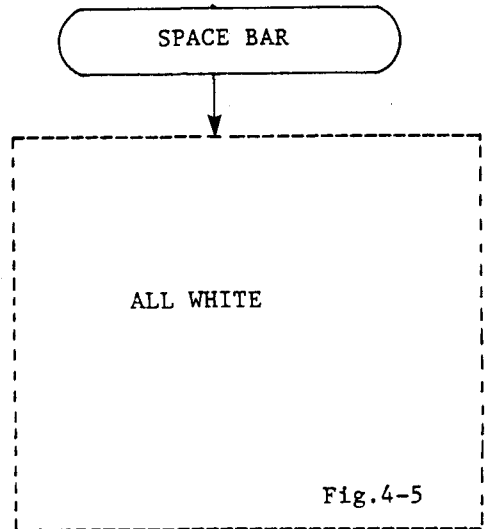

Fig.4-2
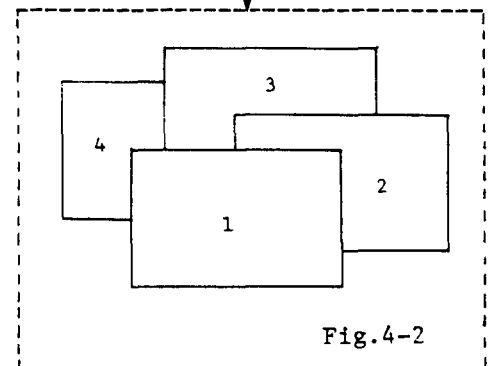
SPACE BAR

4-3. Color priority functional test

i) Depress the space bar and check to see that
   the pattern shown in Fig.4-3 is displayed.

012345....789

Fig.4-3

4-4. Pallet functional test

i) Depress the space bar and make sure that an entire screen goes all white.

```
  ┌─────────────────┐
  │   SPACE BAR     │
  └─────────────────┘
           │
           ▼
  ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐

  │                     │

         ALL WHITE
  │                     │

  │            Fig.4-5  │
  └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
           │
           ▼
  ┌─────────────────┐
  │   SPACE BAR     │
  └─────────────────┘
           │
           ▼
  ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐

  │            Fig.4-6  │
  └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
           │
           ▼
```

Fig.4-5

Fig.4-6

i) Depress the space bar, then the control returns to the window display functional test screen.
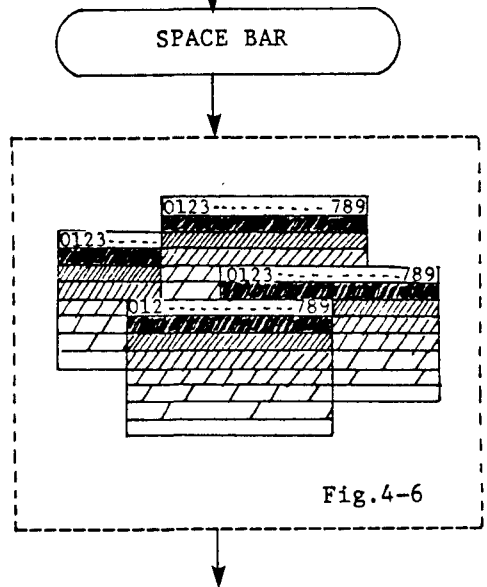
4-5. Background color functional test

i) Depress the space bar to pad every window
   with numbers. Then the background color
   is replaced by white. Make sure that all
   are in white as shown in Fig.4-8.
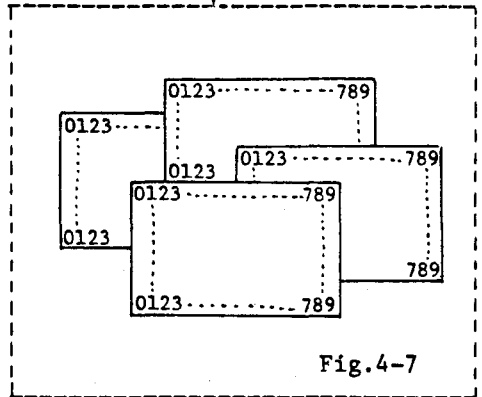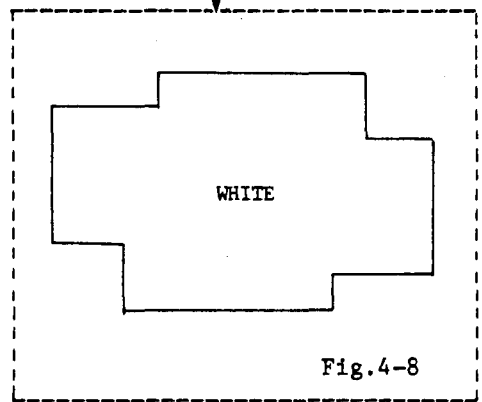
4-6. Monochrome mode, reverse functional test

i) Depress the space bar and make sure that
   the white portion of Fig.4-8 is replaced by
   numbers.
   NOTE: Numbers are displayed in white and
         and the background in black.
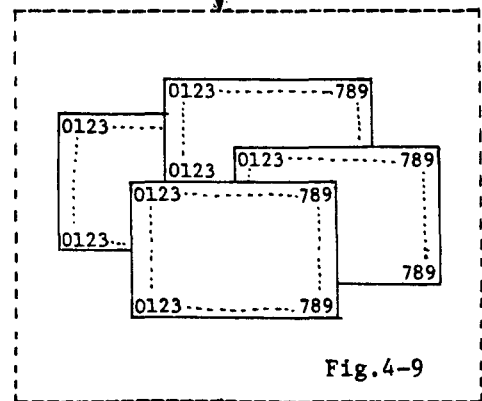
ii) As the space bar is depressed, it inverts
    white into black and block into white, which
    as a result numbers are highlighted.

    NOTE: Numbers are displayed in black and
          the back ground in white.

SPACE BAR

Fig.4-7

Fig.4-8

SPACE BAR

Fig.4-9

SPACE BAR

Black/white inversion
of the preceding figure
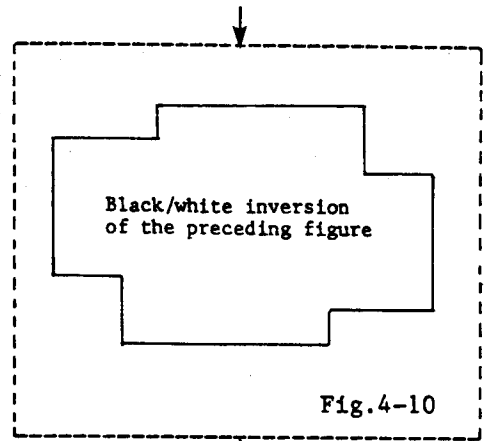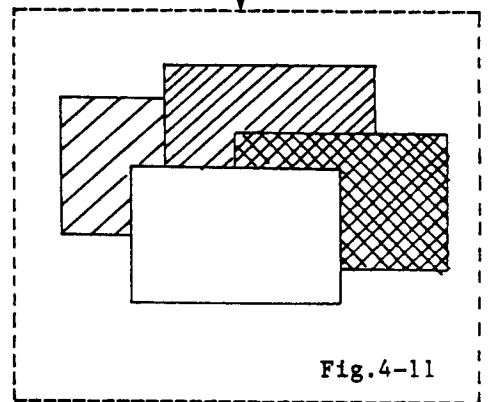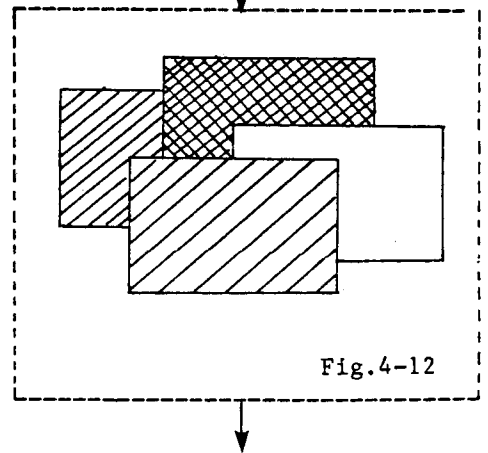
Fig.4-10

SPACE BAR

4-7. VDS functional test
i) Depression of the space bar brings four
kinds of figures having different
brightness degree (Fig.4-11) on display.
NOTE: Make sure that the brightest area is
in the bottom portion.

Fig.4-11

SPACE BAR

ii) Depression of the space bar causes the
brightness of each portion to change.
NOTE: Make sure that the brightest
area is at right.

Fig.4-12

iii) Depress and check to see that brightness
     of each area changes.
     NOTE: Make sure that the brightest area is
           at the top.

SPACE BAR

Fig.4-13
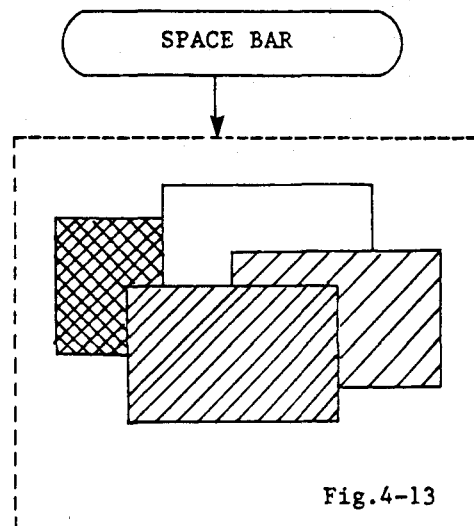
iv) Depress the space bar to check to see that
    brightness of each portion changes.
    NOTE: Make sure that the brightest area is
          at left.

    Also, make sure for a successive window
    priority test that the brightest area is
    fourth (at the bottom) window from the
    above.

SPACE BAR

Fig.4-14
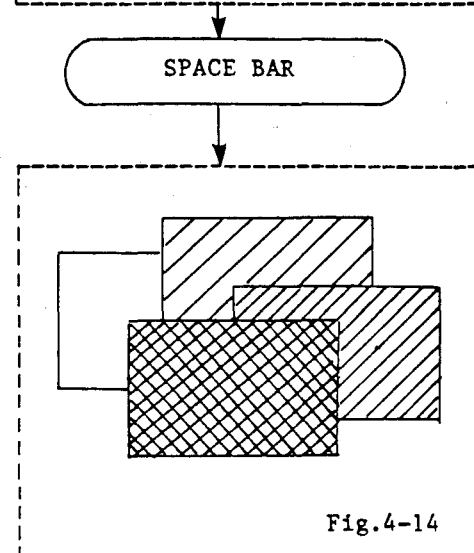
4-8. Window priority functional test
i) Depress the space bar to check to see that
   the window display priority changes as in
   Figure 4-15.
   NOTE: Make sure that the brightest area is
         at third from the top.
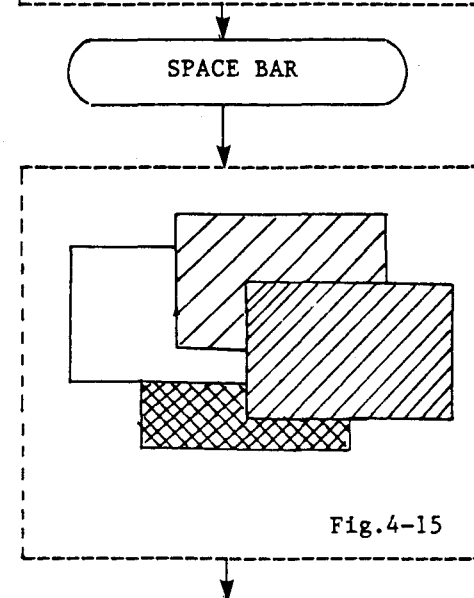
SPACE BAR

Fig.4-15

ii) Depress the space bar to check to see that the window display priority changes as in Figure 4-16.
NOTE: Make sure that the brightest area is second from the top.
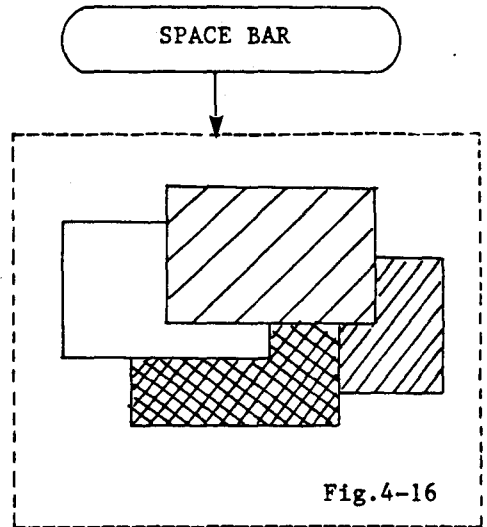
iii) Depress the space bar to check to see that the window display priority changes as in Figure 4-17.
NOTE: Make sure that the brightest area at the top.
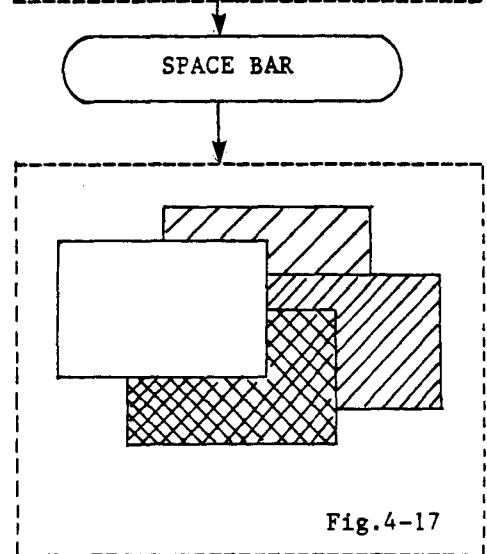
4-9. Display resolution select functional and border color functional tests
i) Depression of the space bar brings the menu in Figure 4-18 on the display.
Make choice of items 1, 2, or 3.
Note that 3 is the subset of Item 2.

```
┌───────────────────────┐
│       SPACE BAR       │
└───────────┬───────────┘
            ↓
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐

            Fig.4-16
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
            ↓
┌───────────────────────┐
│       SPACE BAR       │
└───────────┬───────────┘
            ↓
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐

            Fig.4-17
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
            ↓
┌───────────────────────┐
│       SPACE BAR       │
└───────────┬───────────┘
            ↓
```

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
  ***** DISPLAY MODE ------
  1: 640*400 → 640*200 → 320*400
  2: 640*200 → 320*200
              → Border color (blue)
  3: 640*200→ Border color (blue)

  INPUT CRT TYPE[1-3], "E"(end)=

                    Fig.4-18
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
            ↓
```
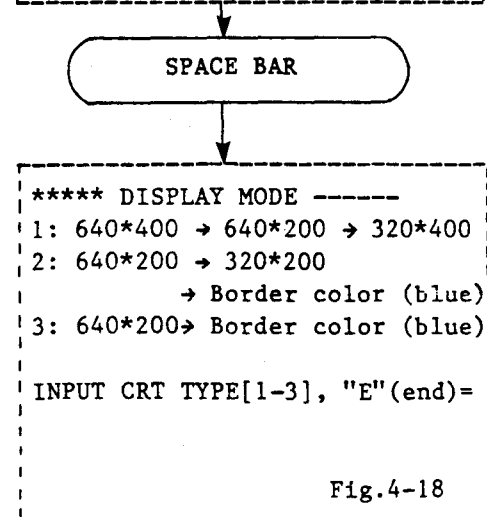
ii) With depression of the [1] key, numbers
are displayed within four windows in the
640*400 mode.
NOTE: The brightest window must be at the
bottom.
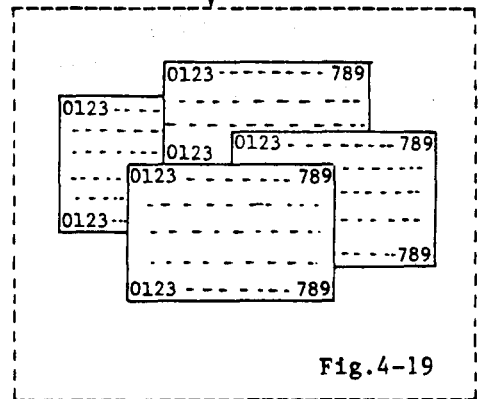
iii) Depress the space bar to perform display
under the 640*200 mode as in Fig.4-19
and check to see that display characters
become coarse.
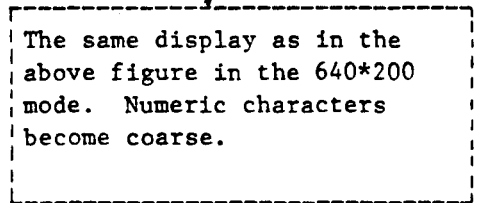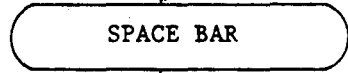
iv) Depression of the space bar performs the
the same display under the 320*400 mode
as in Fig.4-19. But, display characters
are expanded double towards the horizontal
direction. Make sure that half the
characters are put on the display.
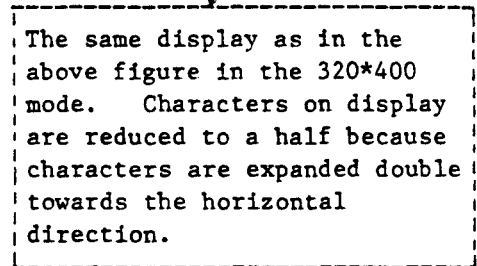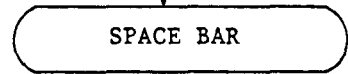
v) Depression of the space bar terminates the
test and the control returns to the menu
(Fig.4-18).

---Depression of the [1] key---

Fig.4-19

SPACE BAR

The same display as in the
above figure in the 640*200
mode. Numeric characters
become coarse.

SPACE BAR

The same display as in the
above figure in the 320*400
mode. Characters on display
are reduced to a half because
characters are expanded double
towards the horizontal
direction.

SPACE BAR

Menu in Fig. 4-18

vi) Depression of the [2] key switches to the
    200-raster mode. Make sure now that
    numbers are displayed in white, blue, red,
    and green in each of four windows under
    the 640*200 mode.

---Depression of the [2] key---

200-raster CRT

Fig.4-20
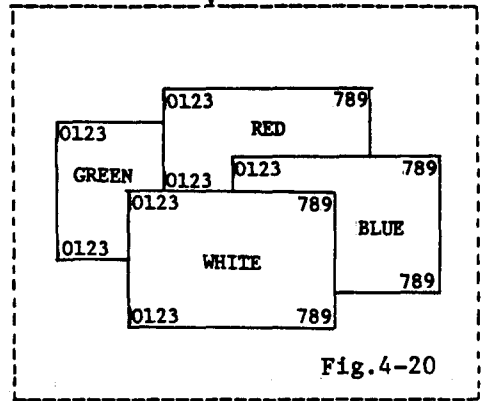
SPACE BAR

vii) Numbers in white, blue, red, and green are
     displayed under the 320*200 mode in each of
     four windows. Make sure that each
     is expanded to double in the horizontal
     direction.

The same display in the 320*300
mode as in the above figure.
Characters displayed reduced to
a half because characters on
display are expanded in the
horizontal direction.

SPACE BAR

viii) Border color test
      Depress the space bar to check to see that
      the border section turns blue as in
      Fig.4-21.

200-raster CRT

Turns blue.

Fig.4-21
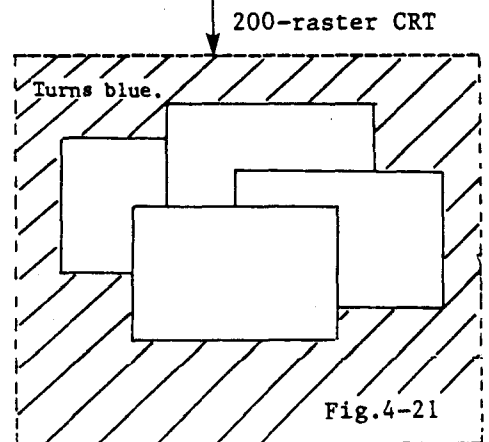
ix) Depression of the space bar terminates the
    test and the control returns to the menu
    in Fig.4-18.

```
                              ┌──────────────────┐
                              │    SPACE BAR     │
                              └──────────────────┘
                                       │
                                       ▼
                              ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                              │ Menu of Fig.4-18  │
                              └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                                       │
                                       ▼
                     ---Depression of the [E] key---
                                       │
                                       ▼
                              ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                              │ V-RAM PROGRAM RUN OK
                              │
                              │ ─────────────────
                              │
                              └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                                       │
                                       ▼
                              ┌──────────────────┐
                              │    SPACE BAR     │
                              └──────────────────┘
                                       │
                                       ▼
                              ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                              │ Main menu display │
                              └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```
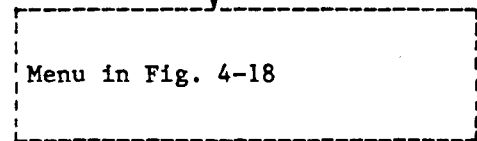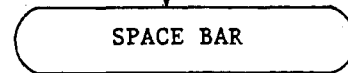
x) Depress the [E] key to terminate the
   resolution select functional and border
   color functional tests.

4-10. Program run on the VRAM
i) Make sure that "V-RAM PROGRAM RUN OK" is
   displayed.
   Although unnecessary line is displayed at
   the same time, it is not an error.

4-11. Termination of display functional tests
i) Depression of the space bar terminates the
   display functional tests and the control then
   returns to the main menu.
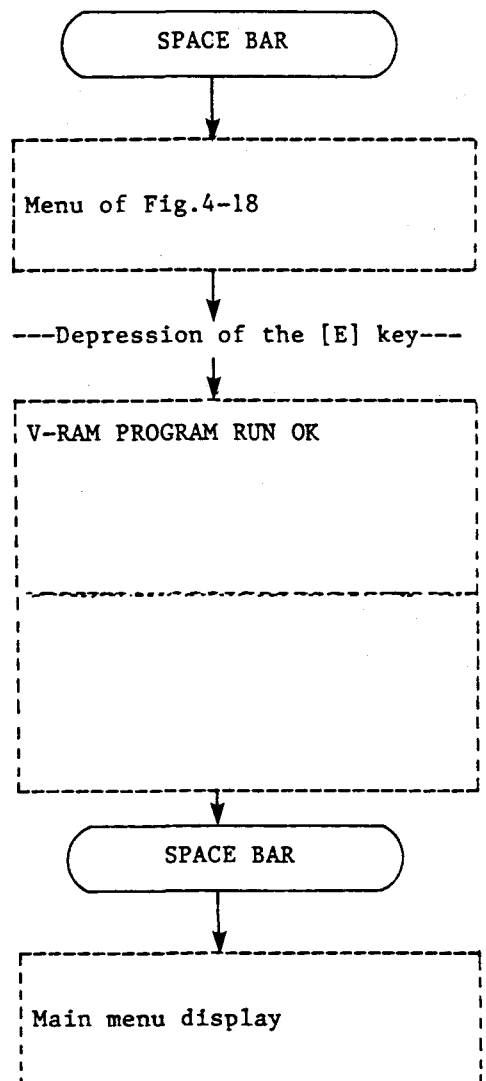
5. MFD test
   This mode is assigned upon depression of the [5] key at the main menu.

                   ---Depression of the [5] key---

```
                    ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                    │   SET 640KB DISK & ENTER    │
                    └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                                   │
                                   ▼
                    ┌──────────────────────────────┐
                    │         SPACE BAR            │
                    └──────────────────────────────┘
                                   │
                                   ▼
```

    Set the blank media on two (one)
    mini-floppy disk drive unit(s).
    Push the space bar when media
    have been set.

```
IN-OPERATION ──▶  640KB MFD CHECK────                    MFD unit A or B
STATUS
NORMAL      ─────────────────────▶ OK

ABNORMAL    ─────────────────────▶ ERROR ON(X)
```
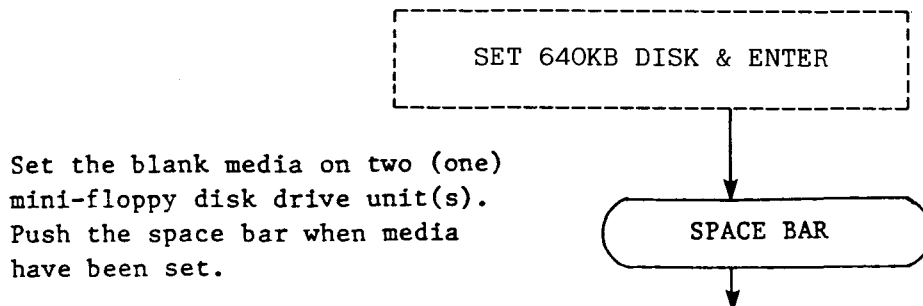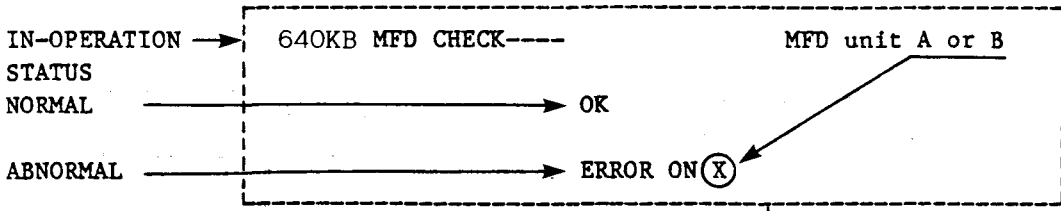
Upon completion of the test,
push the space bar to return   (SPACE BAR)
to the main menu.

                                                To the main menu.

NOTE: Following error messages other than above may be displayed depending on
      the case.
        i)   ***HARDWARE ERROR ON(X)
        ii)   ***READ/WRITE ERROR ON(X)
        iii) ***DRIVE NOT READY ON(X)
        iv)   ***WRITE PROTECT ERROR ON(X)   MFD unit A or B

Even after the display of the error message, depression of the space bar may
cause the control to return to the main menu.

6. Printer interface test

ASCII codes 20H through FFH are issued on the CRT and the printer.
Because of the printer implemented character generator, some of characters may differ on the CRT and the printer.
Check to see that characters corresponding to the character codes pertinent to the printer are printed.

This mode is assigned upon depression of the [7] key.

---Depression of the [7] key---

Display and printer

```
***** PRINTER I/F CHECK *****
ASCII CODE (20H) - (FFH)

(20)(21)(22)(23)(24)(25)(26)(27)(28)(29)(2A)(2B)(2C)(2D)(2E)(2F)
(30)                                                          .
(40)                                                          .
(50)                                                          .
(60)                                                          .
(70)                                                          .
(80)                                                          .
(90)                                                          .
(A0)                                                          .
(B0)                                                          .
(C0)                                                          .
(D0)                                                          .
(E0)                                                          .
(F0).......................................................(FF)

** PRINT END **
```

Characters corresponding to these codes are printed.

SPACE BAR

TO THE MAIN MENU
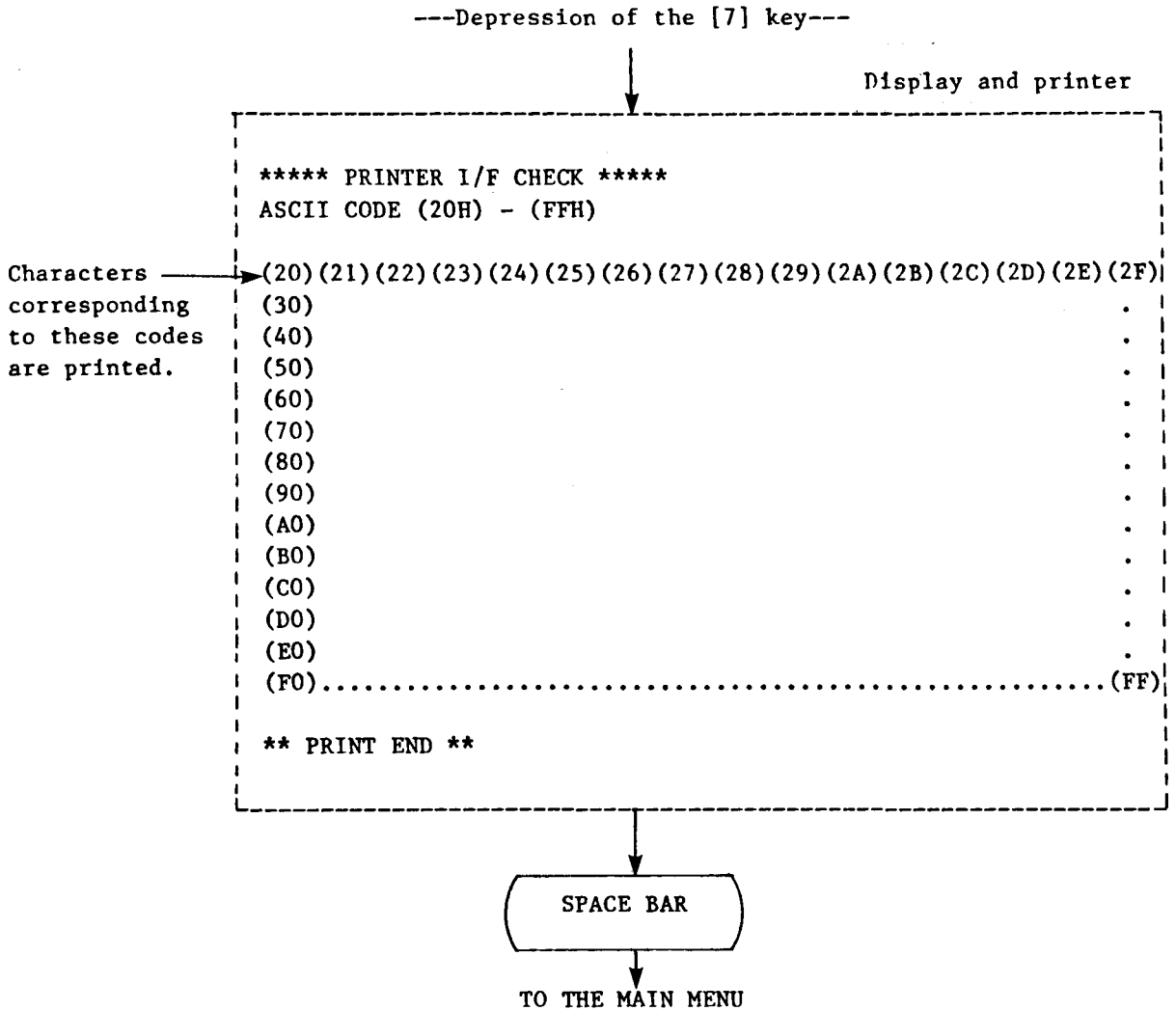
IMPORTANT: The printer should have been connected and assigned before the test.

7. RS-232C interface test

This mode is assigned upon depression of the [8] key.

```
                         ---Depression of the [8] key---
                                        │
                                        ▼
  ┌──────────────────────────────────────────────────────────────┐
  │                                                                │
  │   ##### RS-232C I/F CHECK #####                                │
  │           PLEASE CONNECT RS-232C CABLE.                        │
  │                       AND                                      │
  │           PUSH ANY KEY                                         │
  │                                                                │
  └──────────────────────────────────────────────────────────────┘
                                        │
   After connection of the RS-232C      ▼
   cable, press the space bar.    ╭──────────────╮
                                  │   SPACE BAR   │
                                  ╰──────────────╯
                                        │
                                        ▼
  ┌──────────────────────────────────────────────────────────────┐
  │                                                                │
IN-OPERATION ──────▶   ***** RS-232C I/F CHECK----                 │
STATUS       │                                                    │
             │                                                    │
NORMAL ──────┼─────────────────────────────▶  OK                   │
             │                                                    │
             │                                                    │
ABNORMAL ────┼─────────────────────────────▶  ERROR               │
             │                                                    │
  └──────────────────────────────────────────────────────────────┘
                                        │
   Depress the space bar upon           ▼
   completion of the test to      ╭──────────────╮
   return to the main menu.       │   SPACE BAR   │
                                  ╰──────────────╯
                                        │
                                        ▼
                               TO THE MAIN MENU
```
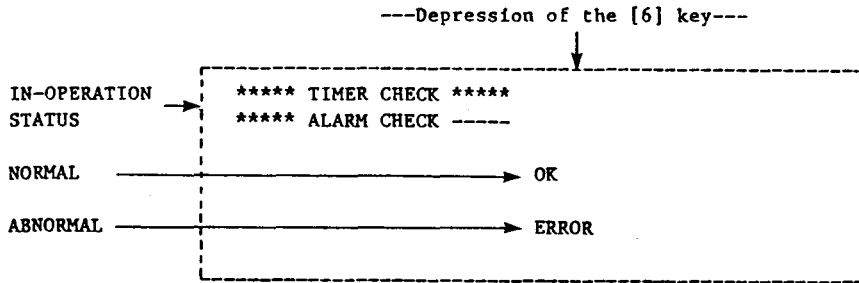
NOTE: As the channel A of the MZ-5500 is connected with the channel B for test, it needs to have the cable to connect the channel A with B. See VIII-9 of the OWNER's MANUAL for schematic.

8. Timer test
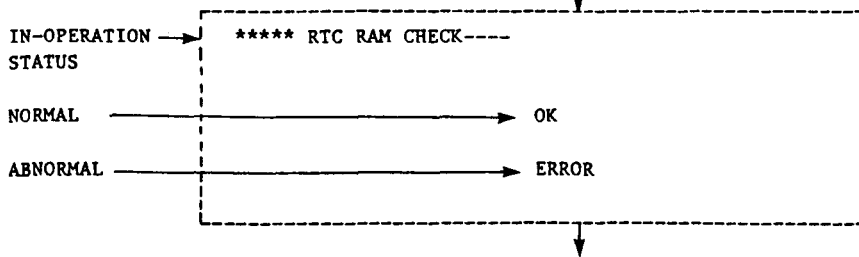This mode is assigned upon depression of the [6] key.

i) Alarm test

---Depression of the [6] key---

```
IN-OPERATION  →   ***** TIMER CHECK *****
STATUS            ***** ALARM CHECK -----

NORMAL   ─────────────────────────→  OK

ABNORMAL ─────────────────────────→  ERROR
```

NOTE: It may take about five seconds
to complete the alarm test.

ii) RAM test

```
IN-OPERATION →   ***** RTC RAM CHECK----
STATUS

NORMAL   ─────────────────────────→  OK

ABNORMAL ─────────────────────────→  ERROR
```
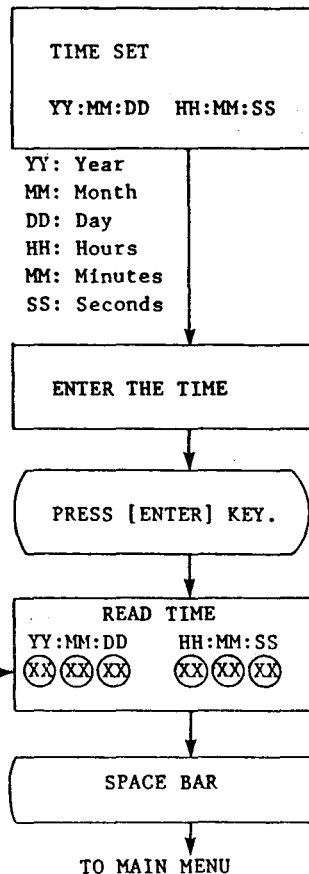
iii) Time setup
Set the current time.

EX:
To enter 13 hours, 5 minutes, 15 seconds,
for February 8th, 1977:
Enter [7] [7] [0] [2] [0] [0] [8] [0] [5]
[1] [5].

- The time is indicated in the twenty
  four hours system and two digits are
  required for entry of each item.
- An entry error can be corrected with
  the [CURSOR LEFT] and [CURSOR RIGHT]
  key.
- Push the [ENTER] key upon successful
  completion of entry.

```
┌─────────────────────────┐
│      TIME SET           │
│                         │
│  YY:MM:DD   HH:MM:SS    │
└─────────────────────────┘
```

YY: Year
MM: Month
DD: Day
HH: Hours
MM: Minutes
SS: Seconds

```
┌─────────────────────────┐
│     ENTER THE TIME      │
└─────────────────────────┘
```

```
(     PRESS [ENTER] KEY.     )
```

iv) Time readout

```
┌─────────────────────────┐
│       READ TIME         │
│  YY:MM:DD    HH:MM:SS   │
│ (XX)(XX)(XX) (XX)(XX)(XX)│
└─────────────────────────┘
```

Make sure that the correct time is on
display.

```
(        SPACE BAR        )
```

Depress the space bar to return to the
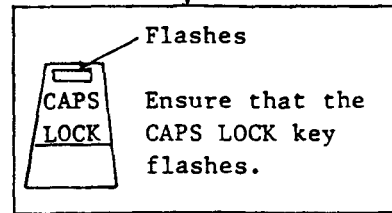main menu.

TO MAIN MENU

9. Key interface test

Even if the KEY INTERFACE TEST is assigned by the depression of the [1] [0] keys at the main menu, the control then returns to the main menu without any action. The key interface test must be done in the following manner:

i) Push the [BREAK] key.
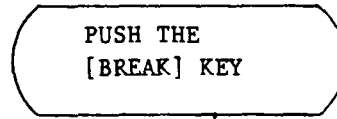
ii) Make sure that the LED embedded in the CAPS LOCK key flashes.

10. Expansion DRAM (MZ-19R11) test
This mode is assigned upon depression of the [1] [3] keys.

Procedure and display contents are similar as the section 1, RAM test.
But, the following indications are used to indicate the block in error.
  3: 40000H – 5FFFFH
  4: 60000H – 7FFFFH

11. Expansion VRAM test (MZ-1R09)
This mode is assigned upon depression of the [1] [2] keys.

Procedure and display contents are similar as the section 3, VRAM test.
But, EP0, EP1, and EP2 are used for the symbol of VRAM plane during error occurrence.

12. 8087 (MZ-1M03) test
This mode is assigned upon depression of the [1] [5] keys.

---Depression of the [1] [5] keys---

IN-OPERATION → ***** 8087 (MZ-1M03) CHECK----
STATUS
NORMAL ──────────────────→ OK

ABNORMAL ──────────────────→ ERROR

Push the space bar to return to the main menu.

SPACE BAR

TO THE MAIN MENU
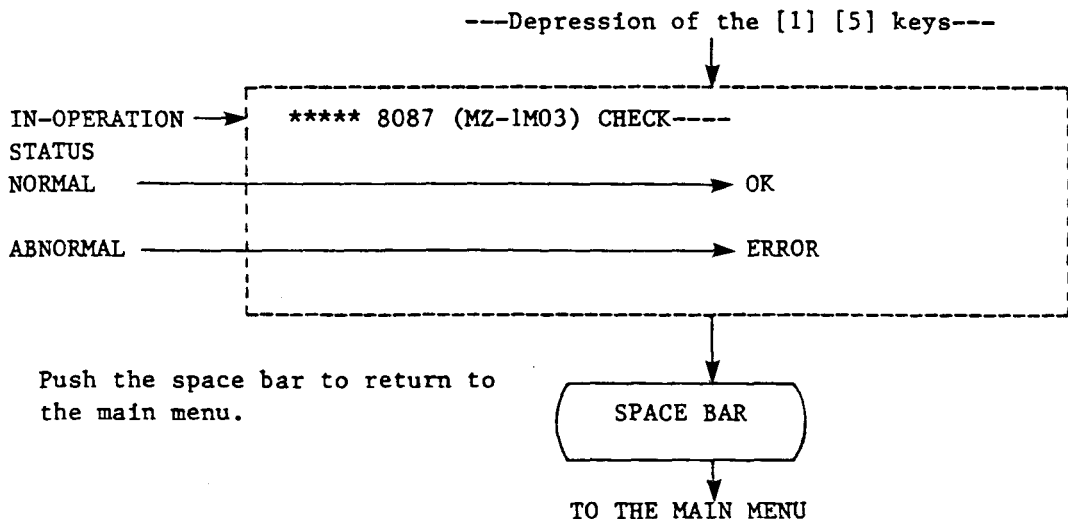
III. RTC battery backup test (service check program II)

Enter the [T] [ENTER] keys following to the prompt "A>" which appears immediately after power on.

i) Time read

```
+-----------------------------------------+
|                                         |
|    %%%%% BATTERY CHECK %%%%%             |
|                                         |
|            READ TIME                     |
|      YY:MM:DD     HH:MM:SS               |
|                                         |
+-----------------------------------------+
```
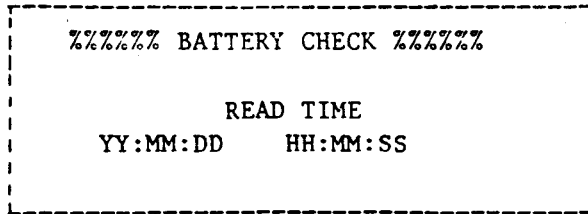
Make sure that the current time has been read.

(SPACE BAR)

ii) RAM test

```
+-----------------------------------------------------------+
IN-OPERATION  ->|   ***** RTC RAM CHECK----                  |
STATUS          |                                            |
NORMAL  --------+---------------------> BACK UP OK           |
                |                                            |
ABNORMAL  ------+---------------------> BACK UP ERROR        |
                |                                            |
+-----------------------------------------------------------+
```

Returns to CP/M automatically.
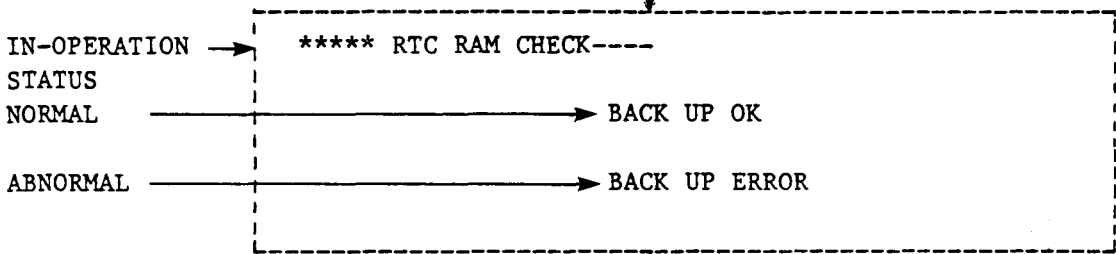
IV. RAM File (MZ1R32) Test procedure

  i) Operating

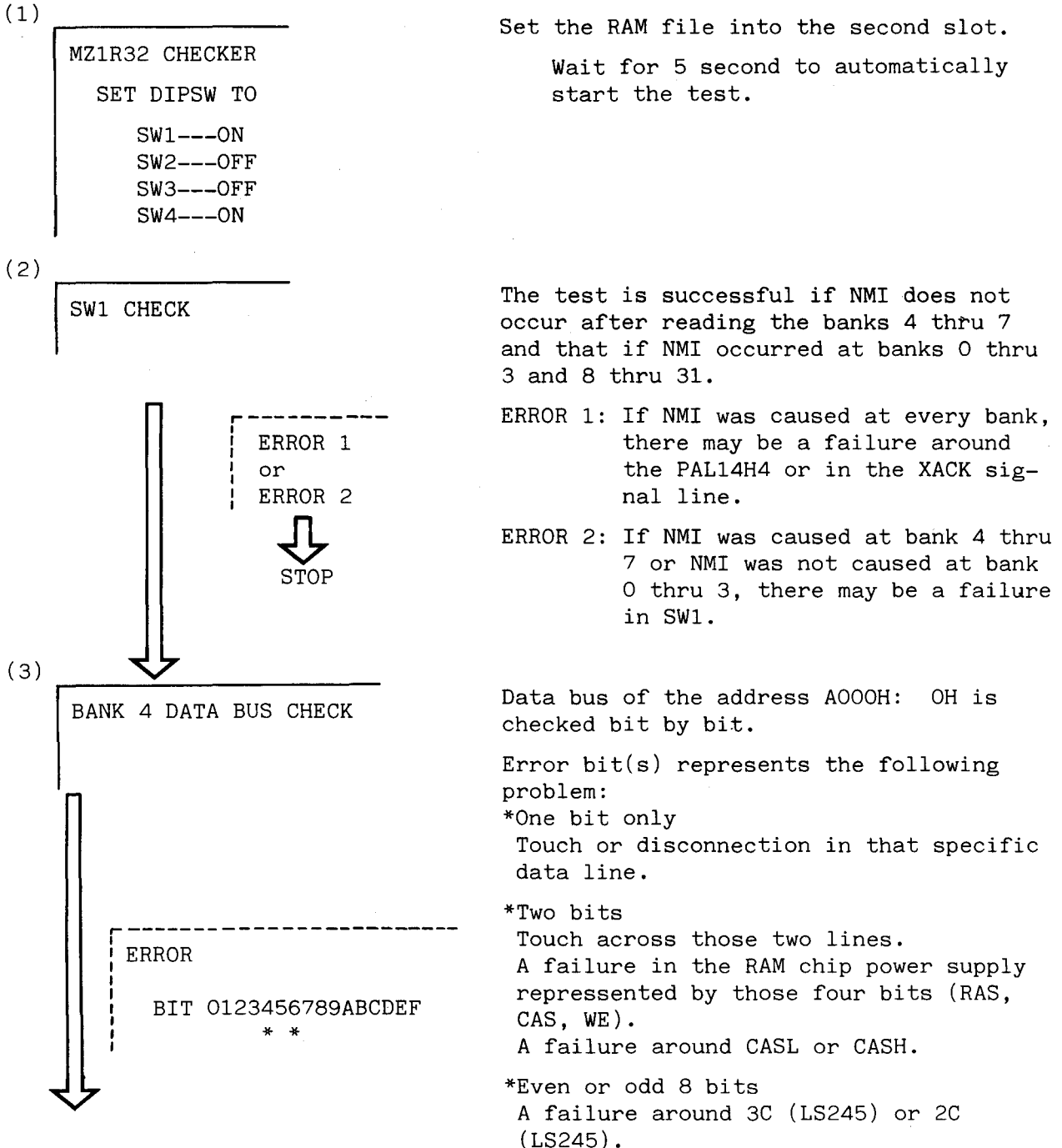   Enter "R" key and ⏎ key, then test program will be started.

 ii) Description

    Test takes place in the following order.

    As the test is interrupted when an error occurred, either the space key or any other must be pressed incase a next test should be conducted disregarding the error.

Display   Test item

(1)

```
MZ1R32 CHECKER

  SET DIPSW TO

     SW1---ON
     SW2---OFF
     SW3---OFF
     SW4---ON
```

Set the RAM file into the second slot.

    Wait for 5 second to automatically start the test.

(2)

```
SW1 CHECK
```

The test is successful if NMI does not occur after reading the banks 4 thru 7 and that if NMI occurred at banks 0 thru 3 and 8 thru 31.

```
ERROR 1
  or
ERROR 2

  ⇩

 STOP
```

ERROR 1: If NMI was caused at every bank, there may be a failure around the PAL14H4 or in the XACK signal line.

ERROR 2: If NMI was caused at bank 4 thru 7 or NMI was not caused at bank 0 thru 3, there may be a failure in SW1.

(3)

```
BANK 4 DATA BUS CHECK
```

Data bus of the address A000H: 0H is checked bit by bit.

Error bit(s) represents the following problem:
*One bit only
  Touch or disconnection in that specific data line.

```
ERROR

  BIT 0123456789ABCDEF
        *  *
```

*Two bits
  Touch across those two lines.
  A failure in the RAM chip power supply repressented by those four bits (RAS, CAS, WE).
  A failure around CASL or CASH.

*Even or odd 8 bits
  A failure around 3C (LS245) or 2C (LS245).

(4)

```
BANK 4 ADDRESS BUS CHECK
```

A single bit of the address line is checked for the area of the address A000H: FFFFH.

Error bit(s) represents the following problem:

*One bit only
  A failure in the LS257 input side.

*Bit combination like A1 and A9, A3 and A11
  A failure in the LS257 output side.

*All bits A1 thru A8 or A9 thru A16
  A failure in the S input of the LS257.

*All bits
  A failure in the LS257 itself.

```
ERROR
   Bit 0123456789ABCDEF
        *
```

(5)

```
BANK 4 READ/WRITE CHECK
```
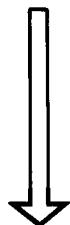
The read/write test is conducted for the entire bank 4 area of the address A0000H: thru B000H: FFFFH, in a manner that bits should be alternately constituted "0" and "1".

ERROR   The memory chip marked is in failure.

```
ERROR
   BIT 0123456789ABCDEF
```

(6)

```
BANK CHECK
```

Tests switching of the bank signal MB0 and MB1.

ERROR 1: The contents of the bank 4 changed in writing to the bank 5. A failure in the MB0 signal line.

ERROR 2: The contents of the bank 4 changed in writing to the bank 6. A failure in the MB1 signal l line.

```
ERROR 1
or
ERROR 2
```

(7)

```
BANK 5 DATA BUS CHECK
```

(8)

```
BANK 5 ADDRESS BUS CHECK
```

See items (3), (4), and (5)

(9)

```
BANK 5 READ/WRITE CHECK
```

(10)

| BANK 6 DATA BUS CHECK |
---

(11)

| BANK 6 ADDRESS BUS CHECK | See items (3), (4), and (5).
---

(12)

| BANK 6 READ/WRITE CHECK |
---

(13)

| BANK 7 DATA BUS CHECK |
---

(14)

| BANK 7 ADDRESS BUS CHECK | See item (3), (4), and (5).
---

(15)

| BANK 7 READ/Write check |
---

(16)

| REFRESH CHECK |

After accessing the RAM for 15 seconds, the contents of the RAM are read to check that the data written last are retained.

ERROR: A failure in the RAM chip marked.

If all banks are shown in error, it is a failure in the DACK 2 signal line.
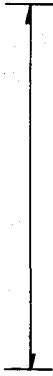
```
ERROR

   BIT 0123456789ABCDEF
            ****

   BANK    4567
              *
```

(17)

SET DIPSW TO

    SW1---OFF
    SW2---OFF
    SW3---OFF
    SW3---ON

Set the RAM file in the slot 1.

Wait for 5 second to automatically start the test.

(18)

```
┌──────────────────────────┐
│ BANK CHECK 2             │
│                          │
```

Checking the bank signal MB2
  Check that NMI is not caused at bank 0
  thru 3.
  Check that NMI is caused at bank 4 thru
  31.

ERROR: A failure in the MB2 line or SW1.

┌─ ─ ─ ─ ─ ─ ─┐
¦ ERROR   ¦
└─ ─ ─ ─ ─ ─ ─┘

(19)

```
┌──────────────────────────┐
│ DIPSW INPUT CHECK        │
│                          │
```

As the dip switch setup becomes possible
for the first unit, switch to the first
board to check that the dip switch setup
is enabled.

ERROR: A failure around the LS125.

┌─ ─ ─ ─ ─ ─ ─┐
¦ ERROR   ¦
└─ ─ ─ ─ ─ ─ ─┘

(20)

```
┌──────────────────────────┐
│ BANK 0-3   CHECK         │
│                          │
```

Data check carried out for banks 0, 1, 2,
and 3.

ERROR: A failure in the MB0 thru 2 line
       or 7A (LS174).

┌─ ─ ─ ─ ─ ─ ─┐
¦ ERROR   ¦
└─ ─ ─ ─ ─ ─ ─┘

(21)

```
┌──────────────────────────┐
│ SET DIPSW TO             │
│                          │
│     SW1---OFF            │
│     SW2---OFF            │
│     SW3---OFF            │
│     SW4---OFF            │
```
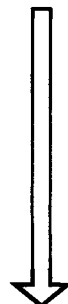
Set the SW4 to OFF position.

(22)

```
┌──────────────────────────┐
│ MAP CHANGE CHECK         │
│                          │
```

Check now that the map changed.

ERROR 1: Mapping is not permitted for
         80000H thru 9FFFFH.
         A failure around the PAL, SW4,
         and A49, etc.

ERROR 2: Bank 0 map does not disappear.
         Mapping is not permitted for
         80000H thru 9FFFFH.
         A failure around the PAL, SW4,
         and A49, etc.

┌─ ─ ─ ─ ─ ─ ─┐
¦ ERROR 1   ¦
¦ or   ¦
¦ ERROR 2   ¦
¦ or   ¦
¦ ERROR 3   ¦
└─ ─ ─ ─ ─ ─ ─┘

ERROR 3: Off state of the SW4 is not
         sensed after a dip switch set-
         ting.
         A failure in SW4.

(23)

```
┌──────────────────────────
│  CAP BANK CHECK
│
│         ⇓
│              ┌ ─ ─ ─ ─ ─
│              │ ERROR
│              │
```

(24)

```
┌──────────────────────────
│  CHECK OK
│
│
```

Test data comprised of 1, 2, and 4 are written in the I/O address 0D5H to check that it does not permit accessing of the area 80000H thru 9FFFFH.

ERROR: A failure around 6A (LS174).

SHARP