# Appendices

## Appendix A.    Memory Maps

MAIN BANK  SYSTEM BANK  USER BANK 1    USER BANK 2 (option)

```
        0 ┌──────────┬──────────┬──────────┐   ┌──────────┐
      100 ├──────────┤          │          │   │          │
          │   TPA    │          │          │   │          │
          │          │          │          │   │          │
          │          │          │          │   │ USER'S   │
          │          │          │          │   │ AREA     │
          │          │          │          │   │          │
          │ USER'S   │  BIOS    │ USER'S   │   │          │
          │ AREA     │          │ AREA     │   │          │
          │          │          │ for      │   │          │
          │          │          │ MFBASIC  │   │          │
          │          │          │          │   │          │
          │          │          │ RAM DISK │   │ RAM DISK │
          │          │          │          │   │          │
          │          │          │          │   │          │
          │          │          │          │   │          │
    E000  ├──────────┼──────────┴──────────┘   └──────────┘
          │   CCP    │
    E800  ├──────────┤
          │          │
          │  BDOS    │
    F600  ├──────────┤
          │          │
          │  BIOS1   │
    FFFF  └──────────┘
```
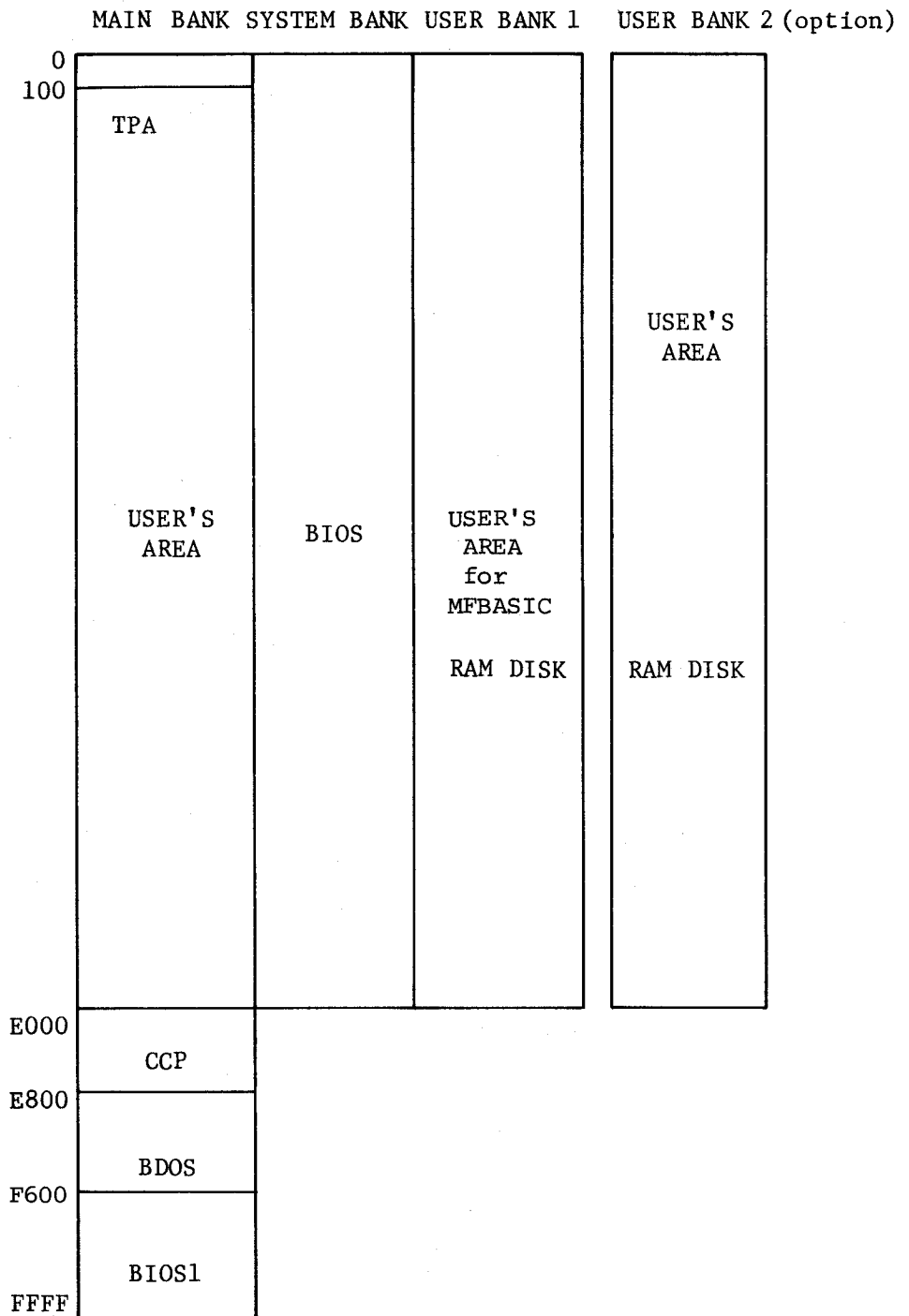
The value written
to I/O port address      (010H)      (020H)      (040H)         (080H)
018H or read from
030H.

| | |
|---|---|
| 0H | |
| | BIOS 2 |
| 00E00H | |
| | BIOS 3 |
| 03000H | |
| | BIOS 4 |
| 04000H | |
| | BIOS 5 |
| 05800H | ──640(H) x 20(V) dot matrix VRAM buffer (red) |
| 05E40H | ──640(H) x 20(V) dot matrix VRAM buffer (green) |
| 06480H | ──640(H) x 20(V) dot matrix VRAM buffer (blue) |
| 06AC0H | Not used |
| 07000H | ── Main board RS-232C receive buffer (default) |
| 07200H | Not used |
| 07600H | ── Data for converting various tables corresponding to 8 country character sets |
| 08E00H | ──Keyboard code to internal code conversion table |
| 09080H | |
| 09100H | ──Character generator code conversion table |
| 09800H | |
| 09900H | ──Character pattern table for 9 x 9-dot printer |
| 0A100H | |
| 0A300H | ──1 byte character to 2 byte character conversion table |
| | User defined character pattern table |
| | ──Character pattern table for 8 x 16-dot CRT display |
| | ──Programmable function key table |
| | Multiple fonts character printer buffer |
| 0DC00H | |
| 0E000H | ──Disk R/W buffer |

A-2

# Appendix B.    I/O Byte

| Logical Device | | | | | | | |
|---|---|---|---|---|---|---|---|
| LST : | | PUN : | | RDR : | | CON : | |
| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| [ 0  0 ]<br>TTY:<br>No assignment | | [ 0  0 ]<br>TTY:<br>Printer<br>for output | | [ 0  0 ]<br>TTY:<br>Keybord<br>for input | | [ 0  0 ]<br>TTY:<br>Keybord<br>for input<br>Printer<br>for output | |
| [ 0  1 ]<br>CRT:<br>CRT<br>for output | | [ 0  1 ]<br>PTP:<br>No assignment | | [ 0  1 ]<br>PTR:<br>No assignment | | [ 0  1 ]<br>CRT:<br>Keyboard<br>for input<br>CRT<br>for output | |
| [ 1  0 ]<br>LPT:<br>Printer<br>for output | | [ 1  0 ]<br>UP1:<br>RS-232C<br>for output | | [ 1  0 ]<br>UR1:<br>RS-232C<br>for input | | [ 1  0 ]<br>BAT:<br>RS-232C<br>for input<br>Printer<br>for output | |
| [ 1  1 ]<br>UL1:<br>RS-232C<br>for output | | [ 1  1 ]<br>UP2:<br>No assignment | | [ 1  1 ]<br>UR2:<br>No assignment | | [ 1  1 ]<br>UC1:<br>RS-232C<br>for I/O | |

Physical Device

[ 1  0 ] ————2 bits of I/O byte
LPT: ————Physical device name
Printer
for output ————Function supported by BIOS

☐ Settings enclosed in inlay boxes are
those set at a cold start.
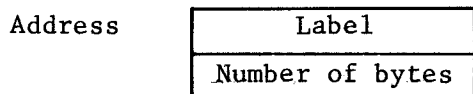
Address
```
┌─────────────────────┐
│       Label         │
├─────────────────────┤
│  Number of bytes    │
└─────────────────────┘
```
This symbol indicates a memory area whose contents are constantly changed. Such areas are used by certain programs; their contents cannot be changed by the user.
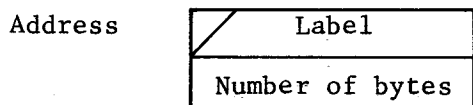
Address
```
┌─────────────────────┐
│ /     Label         │
├─────────────────────┤
│  Number of bytes    │
└─────────────────────┘
```
This symbol indicates a memory area whose contents are changed when mode transitions are made (e.g., when the width is changed); its contents can be changed by the user.
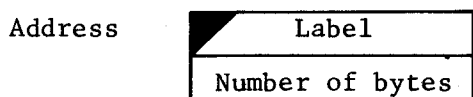
Address
```
┌─────────────────────┐
│ ◣     Label         │
├─────────────────────┤
│  Number of bytes    │
└─────────────────────┘
```
This symbol indicates a memory area whose contents are fixed or changed only by CONFIG. Its contents can be changed by the user.
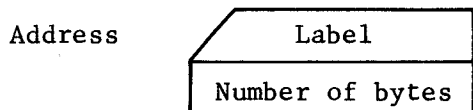
Address
```
┌─────────────────────┐
│ /     Label         │
├─────────────────────┤
│  Number of bytes    │
└─────────────────────┘
```
This symbol indicates a memory area whose contents must be set by the user (e.g., the memory bank number in LDIRX).
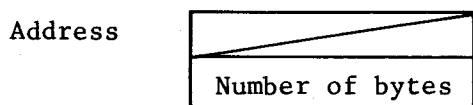
Address
```
┌─────────────────────┐
│                     │
├─────────────────────┤
│  Number of bytes    │
└─────────────────────┘
```
This symbol indicates an area which is not used.

| | |
|---|---|
| OFC40H | SEKDSK |
| | 1 |

This area contains the drive number selected by BIOS routine SELDSK. Its contents range from 0 to 4.

| | |
|---|---|
| OFC41H | SEKTRK |
| | 2 |

This area contains the track number selected by BIOS routine SETTRK. Its contents range from 0 to 39.

| | |
|---|---|
| OFC43H | SEKSEC |
| | 1 |

This area contains the sector number selected by BIOS routine SETSEC (1 sector=128 bytes). Its contents range from 0 to 63.

| | |
|---|---|
| OFC44H | HSTDSK |
| | 1 |

This area contains the drive number of the disk which was read or written by BIOS.

| | |
|---|---|
| OFC45H | HSTTRK |
| | 2 |

This area contains the track number which was read or written by BIOS.

OFC47H

| HSTSEC |
|--------|
| 1 |

This area contains the sector
number which was read or
written by BIOS.


OFC48H

| SEKHST |
|--------|
| 1 |

This area contains the number
of the first sector of the
8-sector block which contains
SEKSEC (0FC43H).  ((SEKSEC)/8)


OFC49H

| HSTACT |
|--------|
| 1 |

This area contains the flag
which is used (1) to check
whether a flexible disk has
been accessed or (2) to check
validity of the 2K bytes which
were previously accessed.


OFC4AH

| HSTWRT |
|--------|
| 1 |

This area contains the flag
which is used to check whether
the last 2K bytes which were
previously accessed are to be
written to the flexible disk.


OFC4BH

| UNACNT |
|--------|
| 1 |

This area contains the number
of sectors to be allocated when
data is written to the flexible
disk.

0FC4CH

| UNADSK |
|--------|
| 1      |

This area contains the drive number to be allocated when writing data to a flexible disk.

0FC4DH

| UNATRK |
|--------|
| 2      |

This area contains the track number to be assigned for writing data to the flexible disk.

0FC4FH

| UNASEC |
|--------|
| 1      |

This area contains the sector number to be assigned when writing data to the flexible disk.

0FC50H

| ERFLAG |
|--------|
| 1      |

This area contains the flag which is set to 0 when a read/write is normally completed, and which is set to a value other than 0 when an error occurs.

0FC51H

| RSFLAG |
|--------|
| 1      |

This area contains the flag which indicates whether a 2K area is to be read.

| OFC52H | READOP |
|--------|--------|
|        | 1      |

This area contains the flag which distinguishes between write and read operations.

| OFC53H | WRTYPE |
|--------|--------|
|        | 1      |

This area contains the value which is set in register C when calling BIOS entry WRITE.

| OFC54H | DMAADR |
|--------|--------|
|        | 2      |

This area contains the DMA address which is set by BIOS routine SETDMA.

| OFC56H | DIRBUF |
|--------|--------|
|        | 294    |

This area is used by BDOS.

| OFE00H | RWFLG |
|:---:|:---:|
| | 1 |
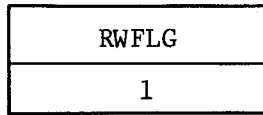
This area is set to 1 when data
is read from the flexible disk,
and is set to 0 when data is
written to the flexible disk.

| OFE01H | DRIVE |
|:---:|:---:|
| | 1 |
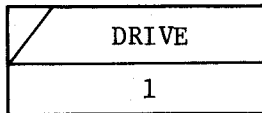
This area is set with the
number of the drive containing
the flexible disk to be read or
written.
Drive A --> 0
      B --> 1
      C --> 2
      D --> 3
      E --> 4   (Disk image RAM)
      F --> 5   (Disk image RAM
               (option))

| OFE02H | TRACK |
|:---:|:---:|
| | 1 |
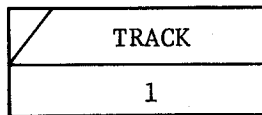
This area contains the track
number of the flexible disk
which is to be read or written.
Its contents range from 0 - 39.

| OFE03H | HEAD |
|:---:|:---:|
| | 1 |
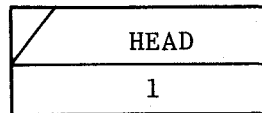
This area contains the head
number which is to be used.
(Head 0 when the logical sector
is 0 to 31; otherwise head 1.)

| OFE04H | SECTOR |
|:---:|:---:|
| | 1 |
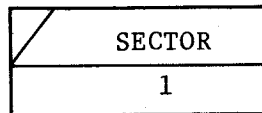
This area contains the physical
sector number which is to be
read or written. (1 sector=256
bytes)

# Physical flexible disk layout

Head

| 00 | 01 |

Sector

| 00 | 16 | 31 |

Track

| 00 |
| 01 |
| 02 |
| 03 |
| 04 |

| 38 |
| 39 |
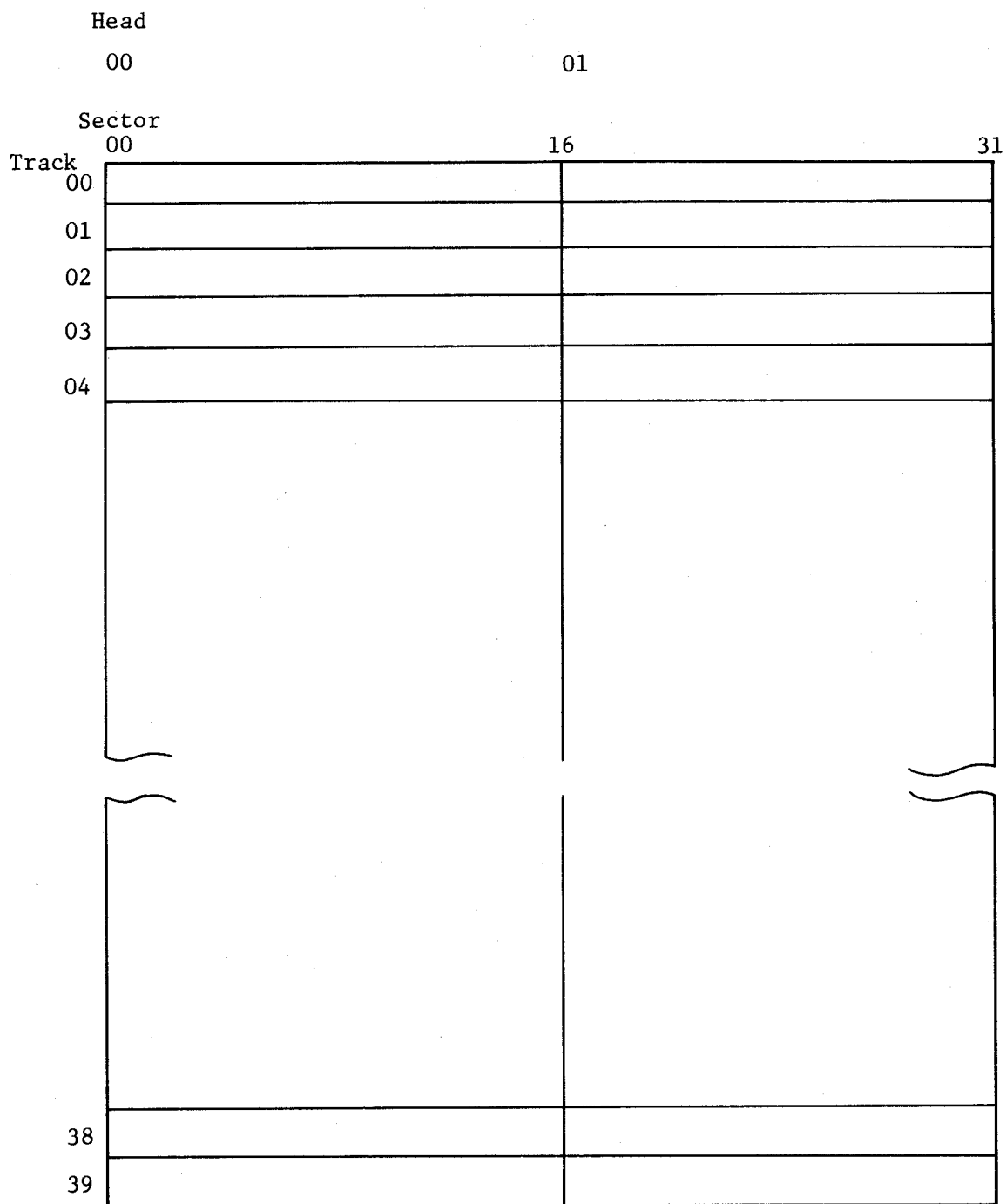
OFE05H

| / SECTCT |
|---|
| 1 |

This area contains the number of physical sectors to be read or written. (1 sector=256 bytes)

OFE06H

| / DBADDR |
|---|
| 2 |

This area contains the starting address of the RAM area into which data read is loaded when a read is made, or in which write data is stored when a write is made.

OFE08H

| / FDCOM |
|---|
| 1 |

This area indicates the type of command output to the FDD controller.

Read      --> 46H
Write     --> 45H
Calibrate --> 07H
Seek      --> 0FH

OFE09H

| / PDRIVE |
|---|
| 1 |

This area contains the first parameter (HEAD)x2+(DRIVE) of the command to the FDD controller.

OFE0AH

| / PTRACK |
|---|
| 1 |

This area contains the second parameter of the command to the FDD controller; it indicates the cylinder number to be accessed. (TRACK)

OFEOBH

```
┌──────────────┐
│╱    PHEAD    │
├──────────────┤
│      1       │
└──────────────┘
```
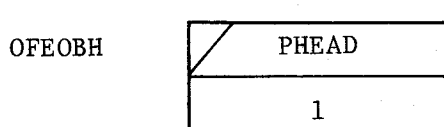
This area contains the third prameter of the command to the FDD controller; it indicates the head number to be used.

OFEOCH

```
┌──────────────┐
│╱   PSECTOR   │
├──────────────┤
│      1       │
└──────────────┘
```
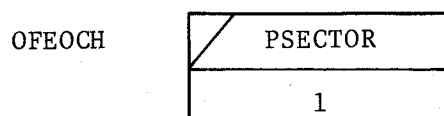
This area contains the fourth parameter of the command to the FDD controller; it indicates the sector number to be used.
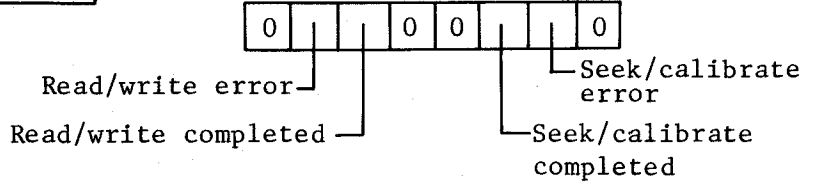
OFEODH

```
┌──────────────┐
│    FDPRM     │
├──────────────┤
│      4       │
└──────────────┘
```
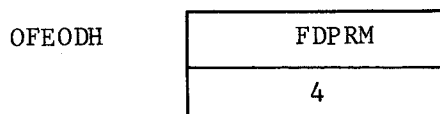
This area contains the 5th to 8th parameters of the command to the FDD controller.

| Address | Fixed value | Meaning |
|---------|-------------|---------|
| OFEODH | 01H | Data length of each sector |
| OFEOEH | 10H | Number of the last sector of a track |
| OFEOFH | OEH | Length of GAP3 after removing VFO SYNC (bytes) |
| OFE1OH | OFFH | Data length per sector to be processed |

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OFF11H

| FDBSY |
|-------|
| 1 |

This area contains the results of seek, calibrate, read and write.

| 0 | | | 0 | 0 | | | 0 |

Read/write error ⌐
Read/write completed ⌐
⌐ Seek/calibrate error
⌐ Seek/calibrate completed

OFE12H

| STO |
|-----|
| 3 |

This area contains the result status after a command has been sent to the FDD controller.

OFE15H

| STRACK |
|--------|
| 1 |

This area contains the track number following execution of an FDD command.

OFE16H

| SHEAD |
|-------|
| 1 |

This area contains the head number following execution of an FDD command.

0FE17H

| SSECTOR |
|---------|
| 1 |

This area contains the sector number accessed when a FDD command was executed (1 sector=256 bytes).

0FE18H

| SLENGTH |
|---------|
| 1 |

This area contains the number of sectors following execution of an FDD command (1 sector=256 bytes).

0FE19H

| ST3 |
|-----|
| 1 |

This area contains status information applicable to the FDD controller at the time a command was issued.

$b_0$

| Fault | Write pro- tect | Ready | | | | | |
|-------|------------------|-------|---|---|---|---|---|

0FE1AH

| |
|---|
| 2 |

Not used.

OFF1CH

| |
|---|
| 2 |

This address is the call address to the routine which issues a calibrate command to the FDD controller.
An appropriate drive number (0 to 3) must be set in DRIVE (0FE01H) before calling this address.
The routine sets the zero flag as return information as follows.

Zero flag=1: Normal completion
       =0: Abnormal completion


OFE1EH

| |
|---|
| 2 |

This address is the call address of the routine which issues a read command to the FDD controller.
This routine makes it possible to read the contents of flexible disks faster than the BIOS READ routine when DRIVE (0FE01H) to DBADDR(0FE06H) are set before calling this address.
The routine sets the zero flag as return information as follows.

Zero flag=1: Normal completion
       =0: Abnormal completion

| OFE20H | KBDATA |
|--------|--------|
|        | 1      |

This area contains the hardware code generated by the keyboard when a key is pressed.

| OFE21H | INTPTR |
|--------|--------|
|        | 2      |

This is a pointer for KBUF (key buffer).
This pointer indicates the address which stores the hardware code corresponding to the key pressed last. If it reaches KBUFEND, the next address indicated is the beginning of KBUF. Therefore, if the number of characters in KBUF exceeds 16, the first character in the buffer is discarded. The pointer indicates the beginning of KBUF when the BREAK key is pressed.

| OFE23H | KSYPTR |
|--------|--------|
|        | 2      |

This is a pointer for KBUF.
This pointer indicates the address from which data is to be read by BIOS routine CONIN.
It is assumed that no key entry is made when this pointer indicates the same address as INTPTR.
The pointer indicates the beginning of KBUF when the BREAK key is pressed.

| OFE25H | XPFKSTR |
|--------|---------|
|        | 2       |

This area contains the starting address of the programmable function key area for CP/M and MFBASIC. The address of the area assigned to each programmable function key is given by the following equation.

$$(XPFKSTR) \div 16 \times (PFK\ No.-1)$$

The address indicates the starting address of the PFK area for CP/M after a warm boot.

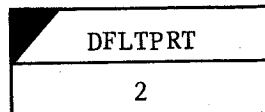| OFE27H | PFKPTR |
|--------|--------|
|        | 2      |

This area contains the pointer which indicates the address of the character string corresponding to the programmable function or "000" ("00" for the German keyboard) key pressed.

C-13

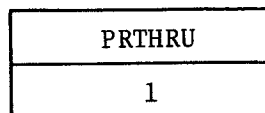OFE29H

| / |
|---|
| 1 |

Not used.

OFE2AH

| ◤ DFLTPRT |
|---|
| 2 |
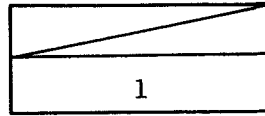
This area contains the flag
which indicates the printer
used. The contents are copied
into PRINTER (OFE55H) when a
warm boot is made.
For correspondence between bits
and printers, see the
description of PRINTER (OFE55H).
The default printer is the
MX-80.

OFE2CH

| PRTHRU |
|---|
| 1 |

This area contains the flag
which is turned on (≠0) when
the BREAK key is pressed while
printing. The print routine
does nothing until the QX-10
enters the key input wait
state.

OFE2DH

| CURDRIV |
|---|
| 1 |

This area contains the drive number specified by command sent to the FDD controller.

OFE2EH

| KBUF |
|---|
| 16 |

This area is a 16-byte ring buffer which stores hardware codes input from the keyboard. After the buffer has become full, the next data is stored in the first location of KBUF and prior data is discarded.

OFE3EH

| KBUFEND |
|---|
| 1 |

The end of the keyboard buffer (Fixed value)=0FFH

OFE3FH

| PFKCNT |
|---|
| 1 |

This area contains the number of characters input when a programmable function key or "000" ("00") is pressed.

OFE40H

| DFLTFLG |
|---|
| 1 |

This area contains the flag which indicates the current mode (non-MFBASIC or MFBASIC).

1) 0: Non-MFBASIC mode

2) 0FFH: MFBASIC mode

The contents of this area are copied into MBFLG (0FE50H) when a warm boot is made. They are not used for any other purpose.

OFE41H

| DFLTILCH |
|---|
| 2 |

This area contains the MFROM location for the code which is displayed instead of an inappropriate MF code.

(Default value)=111 ( ▌▌ )

OFE43H

| BRKFLG |
|---|
| 1 |

This area contains the flag which indicates whether the BREAK key is pressed.
This area is set to other than zero when the BREAK key is pressed, and is cleared (or zeroed) if CONST or CONIN is called and no key entry is detected.

OFE44H

| SCRLTIM |
|---|
| 2 |

This area contains the scroll delay time for the green CRT in the non-MFBASIC normal mode. Scrolling is delayed by about 1 ms as the contents of this area increase by 1.

(Default value)=8

OFE46H

| |
|---|
| 2 |

This is the call address of the routine which issues commands to the FDD controller.
Call this address with the command string set in the area from FDCOM (0FE08H) on and the number of bytes of the string set in register B.
The return information is set in FDBSY (0FE11H).

OFE48H 

| ◣ | DFLTUP |
|---|--------|
| | 1 |

This area contains the internal code corresponding to the cursor up ( ↑ ) key.
The contents of this area are copied into XCHUP (OFE58H) when a warm boot is made.

(Default value)=01EH


OFE49H

| ◣ | DFLTDN |
|---|--------|
| | 1 |

This area contains the internal code corresponding to the cursor down ( ↓ ) key.
The contents of this area are copied into XCHDOWN (OFE59H) when a warm boot is made.

(Default value)=01FH


OFE4AH

| ◣ | DFLTRT |
|---|--------|
| | 1 |

This area contains the internal code corresponding to the cursor right ( → ) key.
The contents of this area are copied into XCHRIGHT (OFE5AH) when a warm boot is made.

(Default value)=01CH


OFE4BH

| ◣ | DFLTLT |
|---|--------|
| | 1 |

This area contains the internal code corresponding to the cursor left ( ← ) key.
The contents of this area are copied into XCHLEFT (OFE5BH) when a warm boot is made.
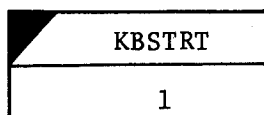
(Default value)=01DH

0FE4CH    KBREPT
          1
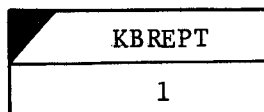
This area contains the flag
used to control the keyboard
repeat function.

1) When it contains 0, the
   repeat function is inhibited
   and current repeat is
   interrupted.

2) When it contains other than
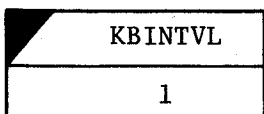   0, the repeat function is
   enabled.

(Default value)=0FFH

0FE4DH    KBSTRT
          1

This area contains data which
indicates the time from the
moment when a key is pressed to
the moment when the first
repeat is made.

300+25x(KBSTRT) ms

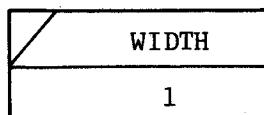The maximum period is 1075 ms.

(Default value)=0EH   (650 ms)

0FE4EH    KBINTVL
          1

This area contains data
indicating the repeat interval.

30+5x(KBINTVL) ms
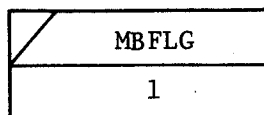
The maximum interval is 185 ms.

(Default value)=8   (70 ms)

0FE4FH    WIDTH
          1

This area contains a value (40
or 80) which indicates the
display width. The value is
valid only in the MFBASIC mode
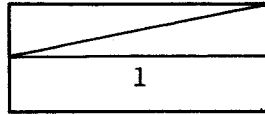and is changed with the WIDTH
command of BASIC.

0FE50H    MBFLG
          1

This area contains the flag
which indicates the mode as
follows.

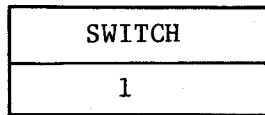1) 0: Non-MFBASIC mode

2) 0FFH: MFBASIC mode

The contents of this area are
rewritten with the contents of
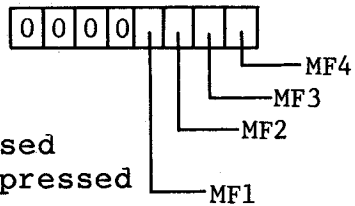DFLTFLG (0FE40H) when a warm
boot is made.

OFE51H

```
┌──────────────┐
│         ╱    │
│    ╱         │
├──────────────┤
│       1      │
└──────────────┘
```
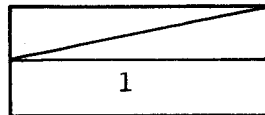
Not used.


OFE52H

```
┌──────────────┐
│   SWITCH     │
├──────────────┤
│       1      │
└──────────────┘
```

This area contains the status of the style selection keys.

```
┌─┬─┬─┬─┬─┬─┬─┬─┐
│0│0│0│0│ │ │ │ │
└─┴─┴─┴─┴─┴─┴─┴─┘
              └───MF4
             └────MF3
            └─────MF2
        └─────────MF1
```

1: Pressed
0: Not pressed


OFE53H

```
┌──────────────┐
│         ╱    │
│    ╱         │
├──────────────┤
│       1      │
└──────────────┘
```

Not used.


OFE54H

```
┌──────────────┐
│   XSHFDT     │
├──────────────┤
│       1      │
└──────────────┘
```
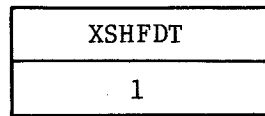
This area contains the shift key status.
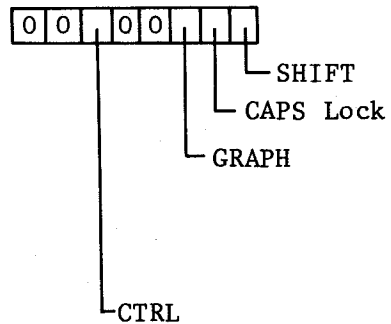
```
┌─┬─┬─┬─┬─┬─┬─┬─┐
│0│0│ │0│0│ │ │ │
└─┴─┴─┴─┴─┴─┴─┴─┘
              └─ SHIFT
            └─ CAPS Lock
          └─ GRAPH
    └─ CTRL
```

1: Pressed
2: Not pressed


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OFE55H

```
┌─────────────┐
│◣   PRINTER  │
├─────────────┤
│      2      │
└─────────────┘
```

This area contains a flag which indicates the printer used.

```
                               ┌─BIT ON/OFF
                               │
OFE55H  ┌─┬─┬─┬─┬─┬─┬─┬─┐      OFE56H ┌─┬─┬─┬─┬─┬─┬─┬─┐
        │ │ │ │ │ │ │*│ │             │0│0│0│0│0│0│0│ │
        └─┴─┴─┴─┴─┴─┴─┴─┘             └─┴─┴─┴─┴─┴─┴─┴─┘
         │ │ │ │ │ │ └── MX-80                └─RX-80
         │ │ │ │ │ └── MX-80 TYPE-2, 3
         │ │ │ │ └─MX-82, MX-82 TYPE-3
         │ │ │ └── MX-100, MX-100 TYPE-3
         │ │ └── FX-80
         │ └──FX-100
```
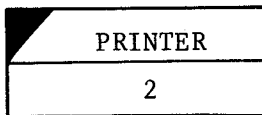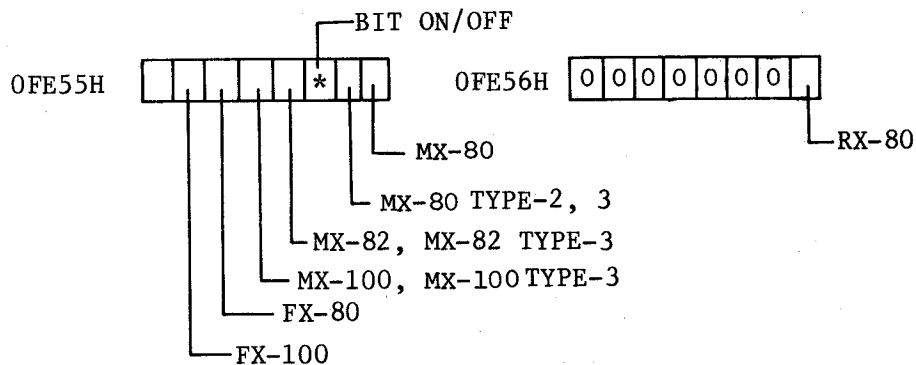
When bit 2 of OFE55H is "1" (BIT ON), the meanings of control codes and character sets are those specified for each printer.
The contents of this area are rewritten with the contents of DFLTPRT (OFE2AH and OFE2BH) when a warm boot is made.

OFE57H

```
┌─────────────┐
│╱   CRTPASS  │
├─────────────┤
│      1      │
└─────────────┘
```
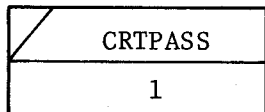
The contents of this area are valid only in the non-MFBASIC normal mode.

1) When this area contains OFFH, special characters can be displayed by sending codes from 0 to 1FH to the console. Only one character is effective.

2) When this area contains 0, codes from 0 to 1FH are used as control codes. The value in this area is changed to OFFH by sending control sequence ESC "%". After one character has been displayed, the value in this area is changed to OH.

| 0FE58H | XCHUP |
|--------|-------|
|        | 1     |

This area contains the internal code corresponding to the cursor up ( ↑ ) key.
The contents of DFLTUP (0FE48H) are copied into this area when a warm boot is made.

(Default value)=01EH

| 0FE59H | XCHDOWN |
|--------|---------|
|        | 1       |

This area contains the internal code corresponding to the cursor down ( ↓ ) key.
The contents of DFLTDN (0FE49H) are copied into this area when a warm boot is made.

(Default value)=01FH

| 0FE5AH | XCHRIGT |
|--------|---------|
|        | 1       |

This area contains the internal code corresponding to the cursor right ( → ) key.
The contents of DFLTRT (0FE4AH) are copied into this area when a warm boot is made.

(Default value)=01CH

| 0FE5BH | XCHLEFT |
|--------|---------|
|        | 1       |

This area contains the internal code corersponding to the cursor left ( ← ) key.
The contents of DFLTLT (0FE4BH) are copied into this area when a warm boot is made.

(Default value)=01DH

| 0FE5CH |   |
|--------|---|
|        | 4 |
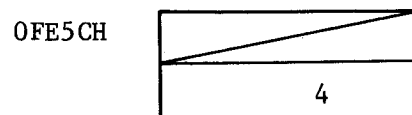
Not used.

```
0FE60H    ┌──────────────┐
          │ ◣   RSDAT    │
          ├──────────────┤
          │      4       │
          └──────────────┘
```

This area contains the bit rate, bit/character, parity and stop bit values set by the CONFIG command.

When BIOS entry RSOPEN is called to use the main board RS-232C interface, the contents of this area are copied into memory erea 0FE69H to 0FE6CH.

Default values:
| | |
|---|---|
| Bit rate: | 6=300 bps |
| Bit/character: | 3=8 bit/char |
| Parity: | 0=No parity |
| Stop bit: | 1=1 |

```
OFE64H  ┌─────────────────┐
        │     RSDFOP      │
        ├─────────────────┤
        │        1        │
        └─────────────────┘
```

This area contains the flag indicating which of the default buffer (system bank: 7000H to 71FFH) and the user specified buffer is used.

```
OFE65H  ┌─────────────────┐
        │◣    MRSDATA     │
        ├─────────────────┤
        │        9        │
        └─────────────────┘
```

This area contains the parameters which are referred to when BIOS entry RSOPEN is called to use the main board RS-232C interface.
The contents of RSDAT (OFE60H to OFE63H) specified by CONFIG are copied into the area from OFE69H to OFE6CH.

OFE65H, OFE66H: Receive buffer
                        address
  (Fixed value)=7000H
                        (system bank)

OFE67H, OFE68H: Receive buffer
                        size
  (Fixed value)=200H

Call RSIOX to change the receive buffer address and size.

```
OFE69H  ┌─────────────────┐
        │◣    BITRATE     │
        ├─────────────────┤
        │        1        │
        └─────────────────┘
```

This area contains the bit rate value.

        9600 bps -> OEH
        4800 bps -> ODH
        2400 bps -> OCH
        1800 bps -> OBH
        1200 bps -> OAH
         900 bps -> 09H
         600 bps -> 08H
         400 bps -> 07H
         300 bps -> 06H
         200 bps -> 05H
         150 bps -> 04H
         135 bps -> 03H
         110 bps -> 02H
          75 bps -> 01H
          50 bps -> 00H

OFE6AH
```
DATACHR
   1
```

This area contains the number of significant bits in each byte.

                5 bits or less -> 0
                6 bits         -> 1
                7 bits         -> 2
                8 bits         -> 3


OFE6BH
```
PARITY
   1
```

This area contains the parity specification.
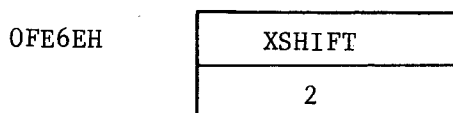
                No parity      -> 0
                Odd parity     -> 1
                Even parity    -> 3


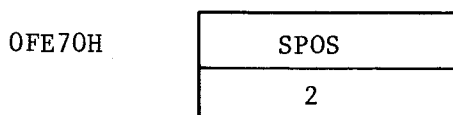OFE6CH
```
STOPBIT
   1
```

This area contains the stop bit specification.

                1      --> 1
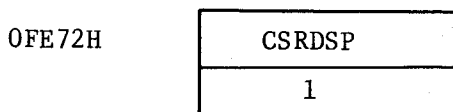                1.5    --> 2
                2      --> 3

```
0FE6DH    ┌──────────┐        This area contains 0FFH.
          │◤    RSV   │
          ├──────────┤
          │    1     │
          └──────────┘


0FE6EH    ┌──────────┐        This area is used when a
          │  XSHIFT  │        keyboard hardware code is
          ├──────────┤        converted into the
          │    2     │        corresponding internal code.
          └──────────┘        This area is used to
                              temporarily store the relative
                              address of the code from the
                              keyboard table address in each
                              shift state.


0FE70H    ┌──────────┐        This area contains the VRAM
          │   SPOS   │        address indicating the home
          ├──────────┤        position (left top corner) of
          │    2     │        the current screen.
          └──────────┘


0FE72H    ┌──────────┐        This area contains the flag
          │  CSRDSP  │        which indicates whether or not
          ├──────────┤        the cursor is displayed.
          │    1     │
          └──────────┘        1) When it is 0, the cursor is
                                 not displayed.

                              2) When it is other than 0, the
                                 cursor is displayed.

                              The contents of this area can
                              be changed by the following
                              escape sequences.

                                  ESC "2"
                                  ESC "3"

                              The contents of this area are
                              set to other then zero when a
                              warm boot is made.
```

| | |
|---|---|
| 0FE73H | CRTPOS |
| | 2 |

This area contains the VRAM address of the cursor.

| | |
|---|---|
| 0FE75H | HPOS |
| | 1 |

This area contains the horizontal position of the cursor. It ranges from 1 to 80.

| | |
|---|---|
| 0FE76H | VPOS |
| | 1 |

This area contains the vertical position of the cursor. It ranges from 1 to 25 in the non-MFBASIC normal mode and from 1 to 20 in other modes (the non-MFBASIC MF mode and MFBASIC mode).
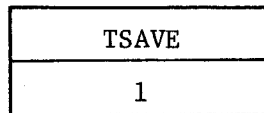
| | |
|---|---|
| 0FE77H | CRFLG |
| | 1 |

The contents of this area are set to other than 0 when the cursor moves from the right end of the screen to the left end. This area is used to control CR and LF.

| | |
|---|---|
| 0FE78H | TIST |
| | 1 |

This area is used in the MFBASIC mode. This area is set to other than 0 when the first byte of a MF code is sent to the console and cleared when the second byte is sent.
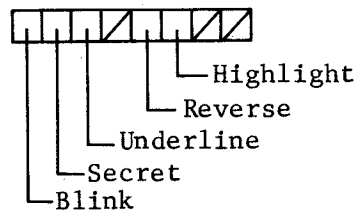
OFE79H

| TSAVE |
|-------|
| 1 |

This area is used by the output routine to CRT in the MFBASIC mode. This area stores the first byte of a MF code sent to the console.
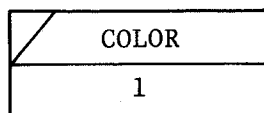
OFE7AH
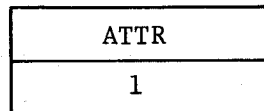
| ATTR |
|------|
| 1 |

This area contains the attribute of the character to be displayed on the CRT screen.

```
┌─┬─┬─┬─┬─┬─┬─┬─┐
│ │ │ │▨│ │ │▨│▨│
└─┴─┴─┴─┴─┴─┴─┴─┘
                └─Highlight
              └─Reverse
            └─Underline
          └─Secret
        └─Blink
```

The character is displayed with an attribute set when the corresponding bit is "1".
The contents of this area can be changed by the following escape sequences.
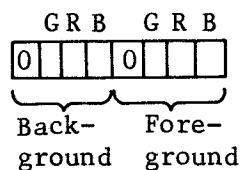
ESC "0", "1", "4" – "9", 07BH or 07DH

OFE7BH

| COLOR |
|-------|
| 1 |

This area is valid only when the color CRT is used.
This area contains the foreground and background colors. The contents of this area can be changed by the following escape sequences.

ESC "L" "0" n

ESC "L" "1" n

```
G R B   G R B
┌─┬─┬─┬─┬─┬─┬─┐
│0│ │ │0│ │ │ │
└─┴─┴─┴─┴─┴─┴─┘
└──┬──┘ └──┬──┘
Back-    Fore-
ground   ground
```

| Green | Red | Blue | Color |
|-------|-----|------|-------|
| 0 | 0 | 0 | Black |
| 0 | 0 | 1 | Blue |
| 0 | 1 | 0 | Red |
| 0 | 1 | 1 | Violet |
| 1 | 0 | 0 | Green |
| 1 | 0 | 1 | Light blue |
| 1 | 1 | 0 | Yellow |
| 1 | 1 | 1 | White |

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0FE7CH     **KBSTS** / 2     This area contains the keyboard status.

$b_0$

| Break/Abort | TX under-run EOM | CTS | $\overline{\text{SYNC}}$/Hunt | DCD | TX buff empty | Int. pend-ing | Rx. chr. Available |
|---|---|---|---|---|---|---|---|
| End of Frame (SDLC) | CRC/Framing error | RX overrun error | Parity error | Result Code | | | All send |

0FE7CH (row 1)
0FE7DH (row 2)

0FE7EH     **KBOBF** / 1     This area is set to 0 when the keyboard transmit buffer contains data.

0FE7FH     **KEYDATA** / 1     This area is used to store data read from the keyboard buffer when BIOS entry CONIN is called.

0FE80H     **COUNTRY** / 1     This area contains the language code.
- 0: US ASCII
- 1: FRENCH
- 2: GERMAN
- 3: ENGLISH
- 4: DANISH
- 5: SWEDISH
- 6: ITALIAN
- 7: SPANISH

OFE81H
```
┌─────────────────┐
│      MFNO       │
├─────────────────┤
│        1        │
└─────────────────┘
```

This area contains the MultiFonts style number (which is used by the keyboard input routine). It ranges from 0 to 15.

OFE82H
```
┌───/─────────────┐
│  /    MFLG      │
├─────────────────┤
│        1        │
└─────────────────┘
```

This area contains the flag which distinguishes between the non-MFBASIC normal mode and non-MFBASIC MF mode.

1) 0:     Normal mode
2) OFFH: MF mode

The contents of DFLTMF (OFE99H) are loaded into this area when a warm boot is made.

OFE83H
```
┌─────────────────┐
│      STYLE      │
├─────────────────┤
│        1        │
└─────────────────┘
```

This area contains the MultiFonts style number (which is used by the CRT output routine). It ranges from 0 to 15.

OFE84H
```
┌─────────────────┐
│     PRTRNT      │
├─────────────────┤
│        2        │
└─────────────────┘
```

This area contains the printer character code buffer pointer.

OFE86H
```
┌─────────────────┐
│      KSAVE      │
├─────────────────┤
│        1        │
└─────────────────┘
```

This area is used by the printer output routine in the MFBASIC mode to save the first byte of a multiple fonts character.

| OFE87H | LCRFLG |
|---|---|
| | 1 |

This area is set to other than 0 when a return is to be made by the printer whenever the number of dots in a line is exceeded.

| OFE88H | ╱ LSP |
|---|---|
| | 1 |

This area indicates the number of dots' space to the left of MultiFonts characters. This can be set by the printer escape sequence ESC 81H n, but is reset to the default value whenever a warm boot is made.

| OFE89H | ╱ RSP |
|---|---|
| | 1 |

This area indicates the number of dots' space to the right of MultiFonts characters. This can be set by the printer escape sequence ESC 82H+n, but is reset to the default value (1) whenever a warm boot is made.

| OFE8AH | LPESC |
|---|---|
| | 1 |

This area contains the character counter for printer escape sequences.

| OFE8BH | MFDOT |
|---|---|
| | 2 |

This area indicates the relative address indicated by the pointer with respect to the beginning of the bit image print buffer.

| 0FE8DH | MFPT1 | This area contains the buffer pointer for bit image print path 1. |
|---|---|---|
| | 2 | |

| 0FE8FH | MFPT2 | This area contains the buffer pointer for bit image print path 2. |
|---|---|---|
| | 2 | |

| 0FE91H | MFPT3 | This area contains the buffer pointer for bit image print paths 3 and 4. |
|---|---|---|
| | 2 | |

| 0FE93H | PTMAX | This area contains the number of effective bytes of data in the bit image print buffer. |
|---|---|---|
| | 2 | |

| 0FE95H | KETA | This area indicates the number of bytes per line for the printer used. |
|---|---|---|
| | 1 | |

0FE96H

| DOTPL |
|:---:|
| 2 |

This area indicates the number of dots per line for the printer used.

0FE98H

| PREF |
|:---:|
| 1 |

This area indicates the language code used the last time data was output to the printer. Set to 0FFH when a hot start is made.

0FE99H

| ⟋ DFLTMF |
|:---:|
| 1 |

This area contains a flag for differentiating between the non-MFBASIC normal mode and the MF mode. Operation is in the normal mode when 0 and in the MF mode when 0FFH. Copied to MFLG (0FE82H) when a warm boot is made; otherwise, not used.

0FE9AH

| ⟋ |
|:---:|
| 1 |

Not used.

0FE9BH

| ⟋ GLPBIAS |
|:---:|
| 2 |

This area contains a correction value for the light pen (for a green monitor in the non-MFBASIC MF mode and the MFBASIC mode).
The default value is -2.

OFE9DH

| LISTERR |
|---------|
| 1 |

This area is used for storing the printer status when an error occurs during output to the printer or the printer becomes not ready while using MFBASIC.

|       |       |       |       |       | | | $b_0$ |
|-------|-------|-------|-------|-------|---|---|---|
| Select Out | Power Failure Detection | $\overline{\text{Ready}}$ | Out of Paper | $\overline{\text{Error}}$ | 0 | 0 | 1 |

OFE9EH

| MEMPTR |
|--------|
| 2 |

This area indicates the pointer position in MEMBUF (OFEAOH to OFEBFH).

OFEAOH

| MEMBUF |
|--------|
| 32 |

This area is a buffer for storage of the memory bank number and stack pointer when memory banks are switched during BIOS operation. Provides up to 10 levels of storage.

OFECOH

| |
|----|
| 16 |

Not used.

OFEDOH

| ESCFLG |
|--------|
| 1      |

This area contains the character counter for console escape sequences.

OFED1H

| / FUNCFLG |
|-----------|
| 1         |

This area is a flag which indicates whether keyboard operation is in the special PF key/ten-key check mode (the function key check mode). This mode is switched by console escape sequences ESC 0B0H and ESC 0B1H. Operation is in the function key check mode when the value of this flag is OFFH; in the non-function key check mode, the value of this flag is OH.
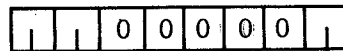
OFED2H

| MFROM |
|-------|
| 1     |

This area is a flag which indicates whether the MFROM is installed. The MFROM is not installed when the value of this flag is OH, and is installed when it is OFFH. The applicable value is stored when a warm boot is made.

OFED3H

| FDSTAT |
|--------|
| 1      |

This area indicates the result of a flexible disk access operation.

| | | 0 | 0 | 0 | 0 | 0 | |

Read    0
Write   1

"1" when a write protect tab is affixed to the disk

When BASIC (OFED4H) is other than 0, this bit is set to 1 without the FDD TIME OUT message (even if the drive door is open).

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| OFED4H | BASIC |
|:---:|:---:|
| | 1 |

This area contains a flag which indicates whether MFBASIC is operating. MFBASIC is operating if the indicated value is other than 0.

| OFED5H | CPMSW |
|:---:|:---:|
| | 1 |

This area contains a flag which indicates the version of CP/M being used (Japanese CP/M or MultiFonts CP/M). The value for Japanese CP/M is 0, and that for MultiFonts CP/M is 1.

| OFED6H | RSLTBUF |
|:---:|:---:|
| | 12 |

This area is used for storing the result status information following output of a command to the FDD controller.

| OFEEEH | |
|:---:|:---:|
| | 2 |

Not used.

OFEFOH    | MEMBANK |
          |    1    |

This area is used for storing
the currently selected memory
bank and speaker status

| User bank 2 | User bank 1 | System bank | Main bank | / | Speaker power ON | Software timer trigger | Speaker timer trigger |
|---|---|---|---|---|---|---|---|

The value of this byte must be
rewritten whenever memory banks
are changed without using the
MEMORY routine of BIOS.

OFEF1H    | MBANKS |
          |   1    |

This area is used for storing
the number of the memory bank
from which data is transferred
when the LDIRX routine of BIOS
is called.

    0:   Main bank

    1:   User bank #1

   -1:   System bank

    2:   User bank #2

OFEF2H    | MBANKD |
          |   1    |

This area is used for storing
the memory bank number when
calling BIOS routines LDIRX or
CALLX or jumping to JUMPX.  The
value stored is the same as for
MBANKS.

OFEF3H    | SVIBANK |
          |    1    |

This area is used for saving
the number of the memory bank
being used prior to switching
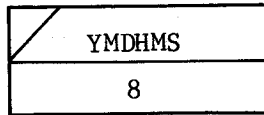memory banks for interrupt
processing.

OFEF4H

| ╱ CLPBIAS |
| :-: |
| 2 |

This area contains the correction value for the light pen (when using a color monitor); default value is -3.

OFEF6H

| ╱ MLPBIAS |
| :-: |
| 2 |

This area contains the correction value for the light pen (when using a green monitor in the non-MFBASIC normal mode); default value is -5.

C-37

```
0FEF8H    ┌──────────┐
          │ ╱ YMDHMS │
          ├──────────┤
          │    8     │
          └──────────┘
```

This area is used for storing the calendar clock data in BCD code.

| Address | Data | |
|---------|------|---|
| 0FEF8H | Year (last 2 digits) | |
| 0FEF9H | Month | 01-12 |
| 0FEFAH | Day | 01-31 |
| 0FEFBH | Hour | 00-23 |
| 0FEFCH | Minute | 00-59 |
| 0FEFDH | Second | 00-59 |
| 0FEFEH | Weekday | 00-06 (00:Sunday) |
| 0FEFFH | Fixed value 00 | |

OFF00H

| |
|---|
| 256 |
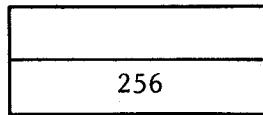
This area is the command line buffer for AUTOST. Contents are copied to the CCP command buffer when a cold start is made; afterwards, it is used as the BIOS stack area.

OFF00H

| |
|---|
| 256 |
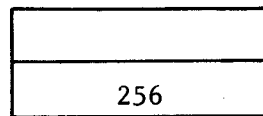
This area is the BIOS stack area.

| | | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|
| 0 0 | | Speaker timer | SOFT timer No.2 | SOFT timer No.1 | 8253 No.1 command |
| 0 4 | | Speaker Freq. | Keyboard clock | RS232C clock | 8253 No.2 command |
| 0 8 | | 8259 (Master) | | | |
| 0 C | | 8259 (Slave) | | | |
| 1 0 | | Keyboard data | RS232C data | Keyboard command | RS232C command |
| 1 4 | | Printer data | Printer status | Printer control | 8255 command |
| 1 8 | | DIP./SW./Mem. bank reg. | | | |
| 1 C | | P.ROM select | | | |
| 2 0 | | C.MOS select | | | |
| 2 4 | | | | | |
| 2 8 | | | | | |
| 2 C | | CRT. PCB TYPE | | | |
| 3 0 | | FDD motor control | | | |
| 3 4 | | FDC status | FDC data | | |
| 3 8 | | GDC7220 | GDC | Zoom | Lightpen |
| 3 C | | Clock data | Clock address | | |

| | | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|
| 4 0 | | 8237 DMA controller #1 | | | |
| 4 4 | | | | | |
| 4 8 | | | | | |
| 4 C | | | | | |
| 5 0 | | 8237 DMA controller #2 | | | |
| 5 4 | | | | | |
| 5 8 | | | | | |
| 5 C | | | | | |
| 6 0 | | | | | |
| 6 4 | | | | | |
| 6 8 | | | | | |
| 6 C | | | | | |
| 7 0 | | | | | |
| 7 4 | | | | | |
| 7 8 | | | | | |
| 7 C | | | | | |

| | | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|
| 8 0 | | | | | |
| 8 4 | | | | | |
| 8 8 | | GIPB I/F card | | | |
| 8 C | | Q10IE | | | |
| 9 0 | | | | | |
| 9 4 | | Optical Fiber I/F card | | | |
| 9 8 | | Q10OF | | | |
| 9 C | | Pulse Transformer Interface | | | |
| A 0 | | AD/DA I/F Q10AD | | | |
| A 4 | | RS-232C I/F Q10RS | | | |
| A 8 | | | | | |
| A C | | | | | |
| B 0 | | Direct Modem I/F card Q10DM | | | |
| B 4 | | | | | |
| B 8 | | | | | |
| B C | | | | | |

| | | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|
| C 0 | | Bar-code Reader Interface | | | |
| C 4 | | | | | |
| C 8 | | | | | |
| C C | | | | | |
| D 0 | | | | | |
| D 4 | | | | | |
| D 8 | | | | | |
| D C | | | | | |
| E 0 | | | | | |
| E 4 | | | | | |
| E 8 | | | | | |
| E C | | | | | |
| F 0 | | | | | |
| F 4 | | | | | |
| F 8 | | | | | |
| F C | | MultiFonts CG ROM card Q10MF | | | |

# Appendix E.    Interrupt Levels

The QX-10 supports 15 interrupt levels.  If an interrupt occurs, the QX-10 compares the priority of the program currently being executed with that of the interrupt to determine whether or not interrupt processing is started immediately.  Different option slots have different interrupt levels as shown below.  Select the slot for installation of the option card from among slots 1 to 4 after considering the frequency of use of the interface and data transfer rate.

| Connection | | Relative address | Level | Cause of interrupt |
|---|---|---|---|---|
| Master | IR0 | 0000 | High | Power failure |
| | IR1 | 0004 | | Software timer (#1) |
| | IR2 | 0008 | | Option (#1) |
| | IR3 | 000C | | Option (#2) |
| | IR4 | 0010 | | Keyboard/RS232C |
| | IR5 | 0014 | | Monitor/lightpen |
| | IR6 | 0018 | | Flexible disk controller |
| | | | Priority | |
| Slave | IR0 | 0020 | | Printer |
| | IR1 | 0024 | | Option (#3) |
| | IR2 | 0028 | | Calender clock |
| | IR3 | 002C | | Option (#4) |
| | IR4 | 0030 | | Option (#5) |
| | IR5 | 0034 | | Software timer (#2) |
| | IR6 | 0038 | | Option (#6) |
| | IR7 | 003C | Low | Option (#7) |

Option slot 1   Option slot 2   Option slot 3   Option slot 4   Option slot 5

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