# Using the QLogic EFI Configuration and Diagnostic Protocols

Version 1.14

# 1 Revision History

| Date | Rev | Reason | By | Comments |
|---|---|---|---|---|
| 9-6-02 | 1.0 | Initial | T. Leonard | |
| 10-7-02 | 1.1 | Feature additions | T. Leonard | Added boot options to configuration protocol. |
| 11-13-02 | 1.2 | Feature additions | T. Leonard | Added Scsi options, selective boot description. |
| 03-21-03 | 1.3 | Major Additions and revision | T. Leonard | |
| 07-01-03 | 1.4 | Added Boot Order List options | T. Leonard | |
| 09-25-03 | 1.5 | Change requests | J. Carnuccio | |
| 11-17-03 | 1.6 | Manufacture mode update | J. Carnuccio | Clarified manufacture mode with examples. |
| 11-18-03 | 1.7 | Added post command | J. Carnuccio | |
| 11-19-03 | 1.8 | Minor changes | d. Wagner | Manju changes |
| 08-09-04 | 1.9 | Major changes | T. Greene | Updated to describe the new user interface. Cleaned up header and footer. Fixed a few errors. |
| 09-16-04 | 1.10 | Minor changes | T. Greene | Removed references to the Boot Order List Enable switch. Updated the SAN Environment Features section. |
| 11-1-04 | 1.11 | Minor Changes | T. Greene | Removed “QLogic Confidential” |
| 07-11-05 | 1.12 | Minor changes | D. Wagner | Removed references to QLA23xx adapters for 4 GB. |
| 09-15-05 | 1.13 | Minor changes | T. Greene | Added info. about the following switches: LED Mode, OS Mode. Updated the Boot Order List Login behavior. Made a minor change to the Selective Login section. |
| 10-24-06 | 1.14 | Minor changes | T. Greene | Removed S/N from the Info description. Updated the WWN Database section. Added more detail to the Hard Loop Id description. Added Appendix A. |
| | | | | |
| | | | | |

## 2 Introduction

The QLogic EFI Driver Configuration protocol provides display and modification of configuration parameters stored in the adapter NVRAM. The QLogic EFI Driver Diagnostic protocol provides a minimal set of adapter diagnostics. Both protocols are provided as part of the QLogic EFI SCSI pass-thru (SPT) protocol driver. Either protocol may be invoked from the EFI shell. Each protocol uses a menu driven interface to allow the user to display and modify adapter configuration and diagnostic parameters.

## 3 EFI Driver Configuration

During the configuration process, all changes are made to a local copy of the NVRAM. The changes may be committed to the adapter NVRAM by using the **`Write`** selection on the Main Menu. Prior to using this selection, changes to the local copy may be abandoned by using the **`Abandon`** or **`Quit`** selections on the Main Menu.

### 3.1 Starting the Configuration Protocol

For a more detailed description of the EFI commands used in this procedure, refer to the EFI shell documentation provided with your computer or the EFI project documentation at:

http://www.intel.com/technology/efi/index.htm

The Configuration protocol is started from the EFI shell using the following procedure:

First, enter the following command:

**`drivers`**

A list of installed EFI drivers is displayed in table form. Under the heading **`DRIVER NAME`**, find the driver with name ***`OEM`*** **`Fibre Channel Driver`** (where ***OEM*** is QLogic or an OEM name). Take note of the driver's handle number in the **`DRV`** column (this number will be referred to as *`driverhandle`*).

There may be one or more driver instances listed. If only one driver instance is listed, then it is managing one or more adapters. If more than one driver instance is listed, then each instance is managing a subset of the available adapters.

Second, enter the following command:

**`drvcfg`** *`driverhandle`*

A list of adapters managed by this driver is displayed. Take note of the controller handle number inside the brackets labeled **`Ctrl[ ]`** (this number will be referred to as *`controllerhandle`*).

Third, enter the following command to start the Configuration protocol:

**drvcfg -s** *driverhandle controllerhandle*

The Driver Configuration Main Menu will be displayed.

Do not redirect the output of the Driver Configuration protocol. Redirecting console output may cause failures.

### 3.2 Main Menu

The Driver Configuration Main Menu is shown below:

```
Main Menu

 NVRAM Parameters
   1. Edit Adapter Settings
   2. Edit Advanced Settings
   3. Edit Database
   4. Edit Boot Settings
 Information
   5. Show Database
   6. Show Translation
   7. Show NVRAM Buffer
   8. Info
   9. Help
 Operation
  10. Abandon
  11. Write
  12. Quit
```

The Main Menu is divided into three sections: NVRAM Parameters, Information, and Operation. The NVRAM Parameters section allows the user to modify settings that are stored in the adapter's NVRAM. The Information section shows the user device, adapter, and help information. The Operation section allows the user to write/discard NVRAM data and quit the Configuration protocol.

Below is a description of each selection in the Main Menu:

**Edit Adapter Settings.** Displays the Edit Adapter Settings Menu.

**Edit Advanced Settings.** Displays the Edit Advanced Settings Menu.

**Edit Database.** Displays the Edit Database screen.

**Edit Boot Settings.** Displays the Edit Boot Settings Menu.

**Show Database.** Displays the contents of the WWN database in table form.

**Show Translation.** Displays the SCSI target id translation table. This table is a list of SCSI tid and fibre channel loop id mapping pairs. Each entry in the table consists of the following for each device:

- SCSI id (tid)
- Fibre channel loop id (lid)
- World wide port name (WWPN)
- World wide node name (WWNN)

All numbers are in hexadecimal. Tid values from `0x00` to `0x0A` are persistent, and tid values above `0x0A` are assigned sequentially as devices are discovered. Tid values above `0x80` are fabric attached while those below `0x7F` are arbitrated loop attached.

**Show NVRAM Buffer.** Displays the contents of the local NVRAM buffer in hexadecimal. This is the local buffer containing changes made prior to using the **`Write`** selection to commit them to the adapter NVRAM.

**Info.** Displays the following adapter information:

- Adapter EFI device path
- Adapter WWPN
- Adapter WWNN (4Gb card only)

The device path may be used to determine which adapter configuration is being displayed.

**Help.** Displays a brief description of the Main Menu selections.

**Abandon.** Abandons the changes in the current Configuration protocol local buffer and reloads its contents from the adapter NVRAM.

**Write.** Writes the current Configuration protocol local buffer to the adapter NVRAM. It may be used any time a menu selection has been used to modify configuration data. When the NVRAM has been successfully written, the Configuration protocol local buffer is reloaded from the adapter NVRAM.

**Quit.** Quits the Configuration protocol and returns to the EFI shell. The **`Write`** selection must be used to write any changes to the adapter NVRAM prior to quitting.

### 3.3 Edit Adapter Settings Menu

The Edit Adapter Settings Menu is shown below:

```
Edit Adapter Settings

  0. Previous Menu
  1. Enable Hard Loop Id [n]
  2. Hard Loop Id (hex) [0]
  3. Reset Delay (dec) [5]
  4. Enable FC Tape [y]
  5. Frame Size [2048]
  6. Connection Option [Loop Preferred, Otherwise Point To Point]
  7. Data Rate [Auto]
```

Below is a description of each selection in the Edit Adapter Settings Menu:

**Previous Menu.** Return to the previous menu.

**Enable Hard Loop Id.** If this setting is enabled, the adapter will attempt to use the Loop ID specified in the Hard Loop ID setting.

**Hard Loop Id.** If the Enable Hard Loop ID setting is enabled, the adapter attempts to use the Loop ID specified in this setting. Legal values for this setting are 0 - 7Dh. To convert an AL_PA to a Loop ID, see the table in Appendix A.

**Reset Delay.** After resetting the loop, the firmware refrains from initiating any loop activity for the number of seconds specified in this setting.

**Enable FC Tape.** This setting enables FCP-2 recovery.

**Frame Size.** This setting specifies the maximum frame length supported by the HBA.

**Connection Option.** This setting defines the type of connection (loop or point-to-point) or connection preference.

**Data Rate.** This setting determines the Fibre Channel data rate.

### 3.4 Edit Advanced Settings Menu

The Edit Advanced Settings Menu is shown below:

```
Edit Advanced Settings

  0. Previous Menu
  1. Operation Mode [Interrupt for every I/O completion]
  2. Interrupt Delay Timer (dec) [0]
  3. Execution Throttle (dec) [16]
  4. Login Retry Count (dec) [8]
  5. Port Down Retry Count (dec) [16]
  6. Link Down Timeout (dec) [8]
  7. Luns Per Target (dec) [512]
  8. Enable Extended Logging [n]
  9. Enable LIP Reset [n]
 10. Enable LIP Full Login [y]
 11. Enable Target Reset [y]
 12. LED Mode [QLogic]
```

Below is a description of each selection in the Edit Advanced Settings Menu:

**Previous Menu.** Return to the previous menu.

**Operation Mode.** This setting specifies the reduced operation (RIO) modes, if supported by the software driver. RIO modes allow posting multiple command completions in a single interrupt.

**Interrupt Delay Timer.** This setting contains the value (in 100-microsecond increments) used by a timer to set the wait time between accessing (DMA) a set of handles and generating an interrupt.

**Execution Throttle.** This setting specifies the maximum number of commands executing on any one port. When a port's execution throttle is reached, no new commands are executed until the current command finishes executing. The valid options for this setting are 1–256.

**Login Retry Count.** This setting specifies the number of times the software tries to log in to a device.

**Port Down Retry Count.** This setting specifies the number of seconds the software retries a command to a port returning port down status.

**Link Down Timeout.** This setting specifies the number of seconds the software waits for a link to come up.

**Luns Per Target.** This setting specifies the number of LUNs per target. Multiple LUN support is typically for RAID boxes that use LUNs to map drives.

**Enable Extended Logging.** This setting provides additional error and debug information to the operating system.

**Enable LIP Reset.** This setting determines the type of loop initialization process (LIP) reset that is used when the operating system initiates a bus reset routine. When this setting is Yes, the driver initiates a global LIP reset to clear the target device reservations. When this setting is No, the driver initiates a global LIP reset with full login.

**Enable LIP Full Login.** This setting instructs the ISP chip to re-login to all ports after any LIP.

**Enable Target Reset.** This setting enables the drivers to issue a Target Reset command to all devices on the loop when a SCSI Bus Reset command is issued.

**LED Mode.** This setting specifies which LED mode the adapter will use. The adapter uses LEDs to indicate the current adapter state. Each LED mode uses different LED definitions.

### 3.5 Edit Database Screen

Displays and modifies a particular entry in the WWN database. The first parameter is the number of the entry in the database to be displayed; this is an integer between 0 and 4. The second parameter is the port WWN (WWPN) for the selected entry; this is a 16 digit hex number with the current value displayed in parenthesis. If database entries 0 or 1 are selected, a third parameter, the node WWN (WWNN) is displayed. This is a 16 digit hex number also. Entering 0 for the node WWN causes the EFI SPT driver to treat this database entry like a port WWN only entry.

### 3.6 Edit Boot Settings Menu

The Edit Boot Settings Menu is shown below:

```
Edit Boot Settings

  0. Previous Menu
  1. Enable Alternate Boot Device [n]
  2. Enable Selective Login [n]
  3. Enable Selective LUN Logins [n]
  4. OS Mode [Windows/Linux/Other]
  5. EFI Variable EFIFCScanLevel [1]
  6. Enable World Login [n]
```

Below is a description of each selection in the Edit Boot Settings Menu:

**Previous Menu.** Return to the previous menu.

**Enable Alternate Boot Device.** Specifies that the driver is to use WWN database entries 0 and 1 as the primary and alternate boot devices. If this option is enabled, the device with WWPN and WWNN in database entry 1 will be reported to EFI as the primary boot device if the device with WWPN and WWNN in database entry 0 is not found. If the primary boot device is found, the secondary boot device is not reported to EFI. When this option is not selected, entries 0 and 1 are both reported if found.

**Enable Selective Login.** Specifies that the driver is to use the WWN database as a list of devices that the adapter is permitted to login. Enable this option to limit the adapter device discovery to devices matching those in the WWN database.

**Enable Selective LUN Logins.** Used with **`Selective Login`** which logs in only those devices in the adapter WWN database. If this option is not enabled, all LUNs present on any logged in device will be presented to EFI. If this option is enabled, only the LUN specified in the WWN database associated with the device will be logged into. This eliminates scanning and presenting a large number of LUNs to EFI when only one is desired.

**OS Mode.** Used to enable/disable the **`Boot Order List Login`** feature. If this option is set to `Windows/Linux/Other`, **`Boot Order List Login`** is disabled. If this option is set to `HP-UX/OpenVMS`, **`Boot Order List Login`** is enabled.

**EFI Variable EFIFCScanLevel.** Used with **`Boot Order List Login`**. The variable **`EFIFCScanLevel`** is maintained by EFI in the system NVRAM. If the variable is not defined or set to 0, then only devices in the Boot Order List will be logged in and reported to EFI. If the variable is set to any non zero value, then all devices found on the SAN will be logged in and reported to EFI. The Driver Configuration protocol allows this variable to be created if it does not exist. If the variable does not exist, the menu will display a message asking if it should be created.

**Enable World Login.** Used to force a World Login. This option will overide all of the other login methods. If this option is enabled, the adapter will login to all connected devices. This option is frequently used to troubleshoot connectivity problems. This option is only availabe on the 4Gb card.

# 4 SAN Environment Features

There are three methods of controlling the adapter login of SAN devices. The first method, **Boot Order List Login**, searches the Boot Order List for device paths matching the adapters that contain fibre channel device path nodes. The second method, **Selective Login**, uses a list of device WWNs and LUNs created and maintained in the adapter WWN database. The third method, **World Login**, will login to all devices connected to the adapter. The adapter will try all three methods, in the order listed above. **Boot Order List Login** and **Selective Login** can be enabled/disabled using the Driver Configuration protocol.

The **Selective Login** method also provides **Selective LUN Logins**, persistent binding, and **Alternate Boot Device** selection. All these features use the adapter WWN database.

## 4.1 Boot Order List Login

This login method uses the Boot Order List to determine which devices the adapter will login to. If the Boot Order List contains device paths pointing to fibre channel devices, and the fibre channel devices are attached to the adapter, the adapter will login to those devices. If the Boot Order List contains no device paths pointing to fibre channel devices attached to the adapter, the adapter will not login to devices. **Boot Order List Login** can be enabled/disabled with the **OS Mode** option.

## 4.2 Selective Login

**Selective Login** allows the system administrator to select which fabric devices the adapter will login to and report to the system. When this feature is enabled, up to 5 devices may be specified. At driver binding start time, the driver queries the fabric simple name server (SNS) for devices. Each WWN received from the SNS is compared against the entries in the WWN database. The adapter will only login those WWNs that are found in the database. This limits the number of devices that are logged in. **Selective LUN Login** is used to select only one LUN on each device that was selected using the WWN database. When **Selective LUN Login** is disabled, all LUNs on all logged in devices are reported to EFI. Enabling **Selective LUN Login** limits the number of LUNs per device reported to one. So, at most 5 device/LUN combinations will be reported to EFI.

## 4.3 World Login

This login method will login to all devices connected to the adapter. If **Boot Order List Login** and **Selective Login** are disabled, **World Login** is used. If the **Enable World Login** option is enabled, **World Login** is used. The **Enable World Login** option overrides all other login methods.

## 4.4 WWN Database

The EFI Driver Configuration protocol is used to create and maintain the WWN database for each adapter. Each adapter reserves the first 6 SCSI target ids (tids) for use with persistent binding. The default tid for the adapter is 0. The next 5 tids are bound to the entries in the WWN database. Database entry 0 corresponds to tid 1, database entry 1 corresponds to tid 2, and so on.

All database entries have a port WWN field. Entry 0 has an 8 bit LUN field (The 4Gb card has a 16 bit LUN field). Entry 1 uses the LUN field of entry 0. Entries 2 to 4 have 16 bit LUN fields.

In the Driver Configuration protocol, the **`Show Database`** selection displays the WWN database, and the **`Edit Database`** selection is used to display and modify any particular database entry.

## 4.5 Persistent Binding

Persistent binding allows the system administrator to bind a device to a particular SCSI id. To use this feature, the system administrator places the WWPN of the device to be bound in the WWN database of the adapter. At driver binding start time, the driver searches for devices on both the fabric and loop. Each WWPN that is found is compared to the WWN database and any match assigns to the device the SCSI id corresponding to the entry in the database.

## 4.6 Alternate Boot Device Selection

**`Alternate Boot Device`** selection allows the system administrator to define and bind a primary and an alternate device to a single SCSI id. Both the port and node WWNs of each device may be specified. At driver binding start time, the driver looks for the primary device. If it is found, the device is bound to a fixed SCSI id and the alternate device is ignored. If the primary device is not found, the driver searches for the alternate device, and if found, the alternate device is bound to the same fixed SCSI id as the primary device.

# 5 EFI Driver Diagnostics

## 5.1 Starting the Diagnostic Protocol

For a more detailed description of the EFI commands used in this procedure, refer to the EFI shell documentation provided with your computer or the EFI project documentation at:

http://www.intel.com/technology/efi/index.htm.

There are three levels of diagnostics available:

Standard

Extended

Manufacturing

The selection of the diagnostic level is made using a command line switch.

The Diagnostic protocol is started from the EFI shell using the following procedure:

First, enter the following command:

**drivers**

A list of installed EFI drivers is displayed in table form. Under the heading **DRIVER NAME**, find the driver with name ***OEM* Fibre Channel Driver** (where ***OEM*** is QLogic or an OEM name). Take note of the driver's handle number in the **DRV** column (this number will be referred to as *driverhandle*).

There may be one or more driver instances listed. If only one driver instance is listed, then it is managing one or more adapters. If more than one driver instance is listed, then each instance is managing a subset of the available adapters.

Second, enter the following command:

**drvdiag** *driverhandle*

A list of adapters managed by this driver is displayed. Take note of the controller handle number inside the brackets labeled **Ctrl[ ]** (this number will be referred to as *controllerhandle*).

Third, refer to the sections below describing the level of diagnostics required.

Do not redirect the output of the Driver Diagnostic protocol. Redirecting console output may cause failures.

## 5.2 Standard Level Diagnostics

Enter the following command to start the standard interactive diagnostic:

**drvdiag -s** *driverhandle controllerhandle*

This performs a mailbox test on the adapter registers followed by a loopback test at the 10-bit interface. At the end of the test, a disconnect/connect sequence is done to restart the adapter.

Example:

```
fs0:\> drvdiag -s 1d 1e
Run Diagnostics
  Drv[1D]  Ctrl[1E]  Lang[eng]


Fibre Channel Driver Diagnostics Utility

NOTE: Do not redirect console output to a file.

  Mailbox Test:
   Mailbox test passed
  FC Loopback Test: 1 iterations,  Loopback point: 10 bit interface
   Loopback Test Passed
- PASSED
```

## 5.3 Extended Level Diagnostics

Enter the following command to start the extended interactive diagnostic:

**drvdiag -e** *driverhandle controllerhandle*

This performs a mailbox test on the adapter registers followed by loopback tests at both the 10-bit interface and the 1-bit interface, and then runs an SRAM memory test. At the end of the test, a disconnect/connect sequence is done to restart the adapter.

Example:

```
fs0:\> drvdiag -e 1d 1e
Run Diagnostics
  Drv[1D]  Ctrl[1E]  Lang[eng]


Fibre Channel Driver Diagnostics Utility

NOTE: Do not redirect console output to a file.

  Mailbox Test:
   Mailbox test passed
  FC Loopback Test: 10 iterations,  Loopback point: 10 bit interface
   Loopback Test Passed
  FC Loopback Test: 10 iterations,  Loopback point: 1 bit interface
   Loopback Test Passed
  Memory Test
   Sizing SRAM...
    Testing Address 00010000
    Testing Address 00018000
    Testing Address 00020000
   RISC SRAM size: 131072 words
   Starting Test:
   Pattern  Result
   0000     PASS
   FFFF     PASS
   5555     PASS
   AAAA     PASS
   Address  PASS
- PASSED
```

## 5.4 Manufacturing Level Diagnostics

Enter the following command to start the manufacturing interactive diagnostic protocol:

**drvdiag -m** *driverhandle controllerhandle*

The Driver Diagnostics Main Menu will be displayed.

### 5.4.1 Main Menu

The Driver Diagnostics Main Menu is shown below:

```
Main Menu

  1. Show Adapter Connection Mode
  2. Set Loopback Test Point [10 bit Loopback]
  3. Set Loopback Test Iteration Count [1]
  4. Run Loopback Test
  5. Run Mailbox Test
  6. Show Adapter Path
  7. Run POST (Power On Self Test)
  8. Quit
```

Below is a description of each selection in the Main Menu:

**Show Adapter Connection Mode.** Displays the state of the adapter's fibre channel connection; there are two states:

- UP
- DOWN

If the connection is `UP`, then the type of connection is displayed:

- LOOP
- POINT-POINT

**Set Loopback Test Point.** Displays and sets the test interface point for the loopback test. The selections are:

- 10-bit
- 1-bit
- External Loopback

The External Loopback setting requires a special Loopback Connector.

**Set Loopback Test Iteration Count.** Displays and sets the iteration count for the loopback test. The available range is 1 to 65535.

**Run Loopback Test.** Executes the loopback test. The loopback test builds and transmits a known 4096 byte pattern, and compares the received pattern with the transmitted pattern. There are several loopback test failure reasons:

- **Loopdown**: External loopback point was selected but the loop connection is down.
- **Failure due to loop errors**: Displays the CRC error count and the loopback point where the failure occurred.
- **Data miscompare**: Received data does not match transmitted data.

**Run Mailbox Test.** Executes the mailbox register test on the adapter's ISP chip.

**Show Adapter Path.** Displays the adapter EFI path. Used to verify that diagnostics are running on the correct adapter.

**Run POST (Power On Self Test).** Execute the POST diagnostic test on the current adapter.

**Quit.** Quits diagnostic mode and returns to the EFI shell.

## Appendix A

### AL_PA To Loop ID Conversion Table

| AL_PA | Loop Id |
|---|---|
| EFH | 00 |
| E8H | 01 |
| E4H | 02 |
| E2H | 03 |
| E1H | 04 |
| E0H | 05 |
| DCH | 06 |
| DAH | 07 |
| D9H | 08 |
| D6H | 09 |
| D5H | 0A |
| D4H | 0B |
| D3H | 0C |
| D2H | 0D |
| D1H | 0E |
| CEH | 0F |
| CDH | 10 |
| CCH | 11 |
| CBH | 12 |
| CAH | 13 |
| C9H | 14 |
| C7H | 15 |
| C6H | 16 |
| C5H | 17 |
| C3H | 18 |
| BCH | 19 |
| BAH | 1A |
| B9H | 1B |
| B6H | 1C |
| B5H | 1D |
| B4H | 1E |
| B3H | 1F |

| AL_PA | Loop Id |
|---|---|
| B2H | 20 |
| B1H | 21 |
| AEH | 22 |
| ADH | 23 |
| ACH | 24 |
| ABH | 25 |
| AAH | 26 |
| A9H | 27 |
| A7H | 28 |
| A6H | 29 |
| A5H | 2A |
| A3H | 2B |
| 9FH | 2C |
| 9EH | 2D |
| 9DH | 2E |
| 9BH | 2F |
| 98H | 30 |
| 97H | 31 |
| 90H | 32 |
| 8FH | 33 |
| 88H | 34 |
| 84H | 35 |
| 82H | 36 |
| 81H | 37 |
| 80H | 38 |
| 7CH | 39 |
| 7AH | 3A |
| 79H | 3B |
| 76H | 3C |
| 75H | 3D |
| 74H | 3E |
| 73H | 3F |

| AL_PA | Loop Id |
|---|---|
| 72H | 40 |
| 71H | 41 |
| 6EH | 42 |
| 6DH | 43 |
| 6CH | 44 |
| 6BH | 45 |
| 6AH | 46 |
| 69H | 47 |
| 67H | 48 |
| 66H | 49 |
| 65H | 4A |
| 63H | 4B |
| 5CH | 4C |
| 5AH | 4D |
| 59H | 4E |
| 56H | 4F |
| 55H | 50 |
| 54H | 51 |
| 53H | 52 |
| 52H | 53 |
| 51H | 54 |
| 4EH | 55 |
| 4DH | 56 |
| 4CH | 57 |
| 4BH | 58 |
| 4AH | 59 |
| 49H | 5A |
| 47H | 5B |
| 46H | 5C |
| 45H | 5D |
| 43H | 5E |
| 3CH | 5F |

| AL_PA | Loop ID |
|---|---|
| 3AH | 60 |
| 39H | 61 |
| 36H | 62 |
| 35H | 63 |
| 34H | 64 |
| 33H | 65 |
| 32H | 66 |
| 31H | 67 |
| 2EH | 68 |
| 2DH | 69 |
| 2CH | 6A |
| 2BH | 6B |
| 2AH | 6C |
| 29H | 6D |
| 27H | 6E |
| 26H | 6F |
| 25H | 70 |
| 23H | 71 |
| 1FH | 72 |
| 1EH | 73 |
| 1DH | 74 |
| 1BH | 75 |
| 18H | 76 |
| 17H | 77 |
| 10H | 78 |
| 0FH | 79 |
| 08H | 7A |
| 04H | 7B |
| 02H | 7C |
| 01H | 7D |