

F²MC FAMILY EMULATOR MB2140 SERIES

LAN INSTALLATION MANUAL

F²MC FAMILY EMULATOR
MB2140 SERIES LAN INSTALLATION
USER'S MANUAL

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PREFACE

This manual describes LAN terms and the equipment required for connecting to a LAN. It is for those people installing a LAN for the first time.

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1. GENERAL

The MB2142 LAN Adapter is a network adapter conforming to IEEE802.3. It allows the emulator to be operated from a workstation or personal computer connected to the LAN.

■ **Features**

- TCP/IP support for reliable communications
- Standard LAN used with workstations
- InetBIOS* interface allows LAN connection of personal computers.
- Conforms to 10BASE2 and 10BASE-T

* InetBIOS is a LAN interface standard advocated by ASCII.



2. NETWORK FACILITIES

2.1 Network Facility Requirements	2-3
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2.1 Network Facility Requirements

Network cables and LAN adapters are required on the host-computer side as well as the MB2142 LAN Adapter and host computer for LAN connection of the MB2140 emulator. All should be purchased from the host computer vendor or LAN vendor.

(1) When connecting emulator to personal computer

The emulator debugger uses a LAN interface called InetBIOS as shown in Figure 2.1. InetBIOS-compliant LAN adapters and network cables are required on the personal-computer side.

Personal-computer LAN adapters and network cables are available from most LAN equipment manufacturers as well as from personal-computer vendors.

Note: Some personal-computer LAN adapters do not comply with the InetBIOS standard. Specify an ***InetBIOS-compliant product*** when purchasing.

(2) When connecting emulator to workstation

Normally, a workstation has a LAN interface as standard. Therefore, only network cables are required. Network cables are available from most LAN equipment manufacturers as well as from workstation vendors.

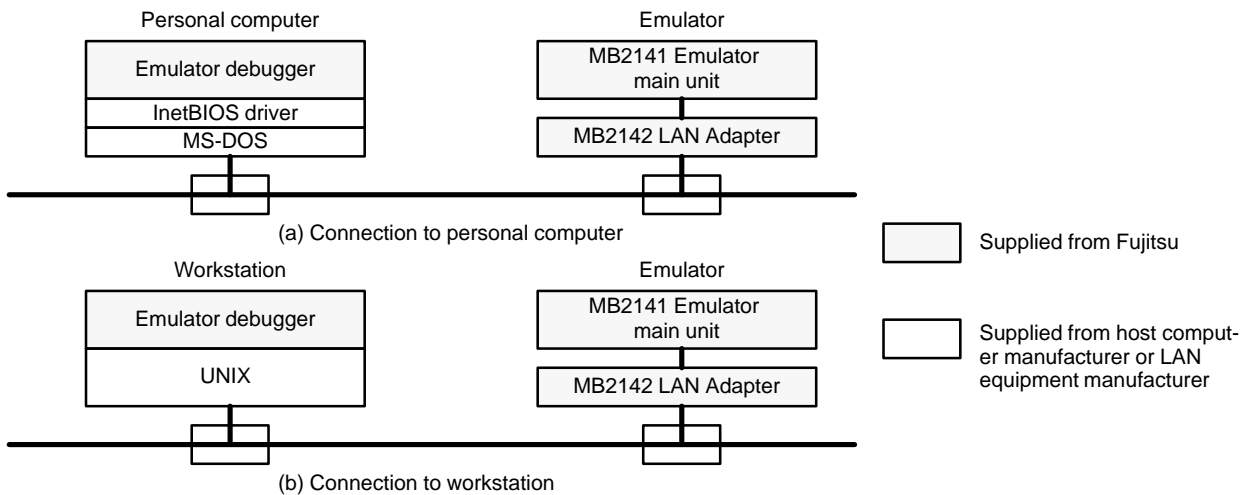


Fig. 2.1 Connection to Host Computer

2.2 Network Types

Three types of networks are available: 10BASE5, 10BASE2 and 10BASE-T, each of which has the same baud rate but different cables or connectors. The major differences in the specifications are listed in Table 2-1.

Two types of MB2142 LAN adapters are available: for 10BASE2, and for 10BASE-T. The adapters should be selected to the LAN. Connection to a 10BASE5 LAN requires an interface for 10BASE2 or 10BASE-T.

(1) 10BASE5

This LAN uses a thick coaxial cable with a diameter of about 10 mm. The cable can be run up to 500 m, but its inflexibility makes cabling difficult.

A transceiver is used to connect the host computer or emulator. Depending on the transceiver type, installation tools may be required.

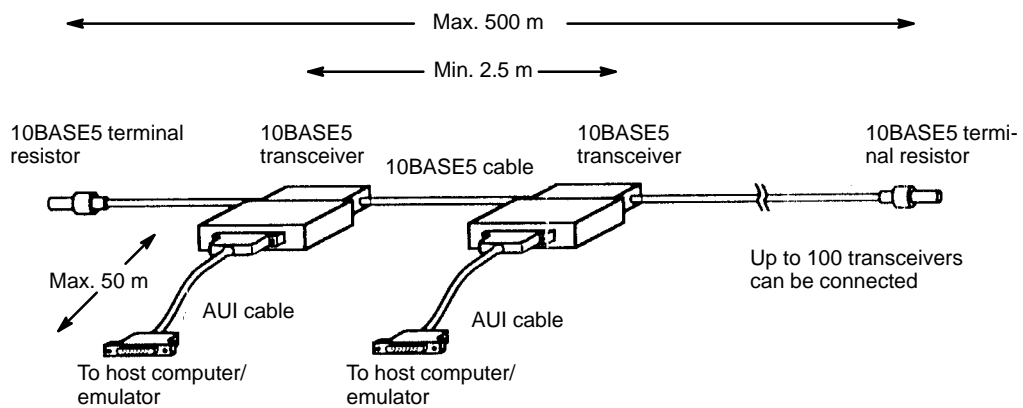


Fig. 2.2 10BASE5 Configuration

Table 2-1 Network Standards

	10BASE5	10BASE2	10BASE-T
Cable	Coaxial cable of about 10-mm dia.	Coaxial cable of about 5-mm dia.	Twisted pair cable of about 3-mm dia.
Maximum segment length	500 m	185 m	100 m
Maximum number of terminals connected	100	30	1
Minimum distance between terminals	2.5 m	0.6 m	—

(2) 10BASE2

This LAN uses a thin coaxial cable (like home TV antenna cable) with a diameter of about 5 mm. Its flexibility eases cabling. A connector is used for cable connection, thus requiring no special tools.

A BNC-T type branch connector is used to connect the emulator to the host computer. For connection of additional equipment, the cable is connected serially using a BNC-T type connector. The cable can be run up to 185 m.

If the number of hosts or cable length exceeds the limits, a multi-port repeater can be used to connect multiple LANs.

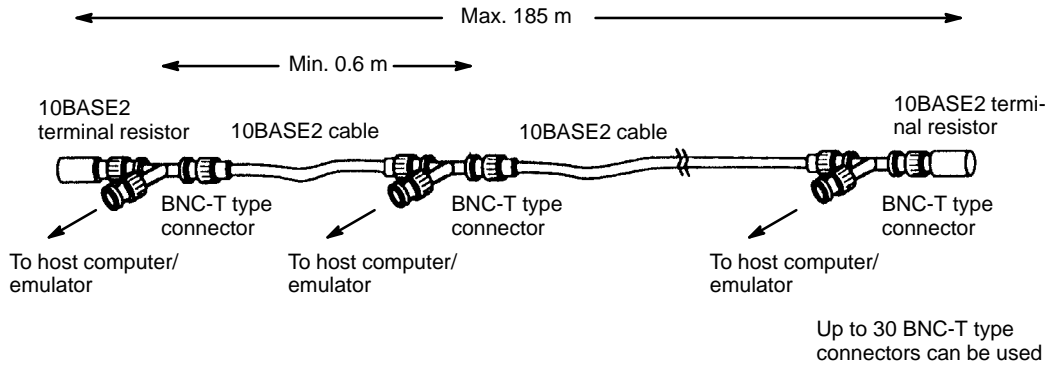


Fig. 2.3 10BASE2 Configuration

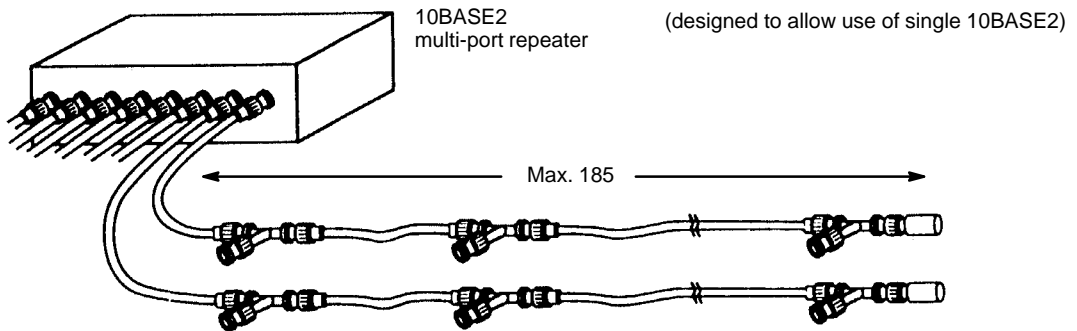


Fig. 2.4 10BASE2 Extension

(3) 10BASE-T

This LAN uses a slender twisted pair cable (about 3-mm diameter). Its high flexibility makes cabling very easy. The cable can be run up to 100 m, but a malfunction may occur in noisy environments because it is unshielded.

Only one terminal can be connected to a single cable. Connection of many pieces of equipment requires a 10BASE-T hub. The number of pieces of equipment that can be connected to one hub depends on the hub type. Purchase a hub tailored to the number of pieces of equipment to be connected. If more equipment must be connected, up to four hubs can be added as shown in Figure 2.6.

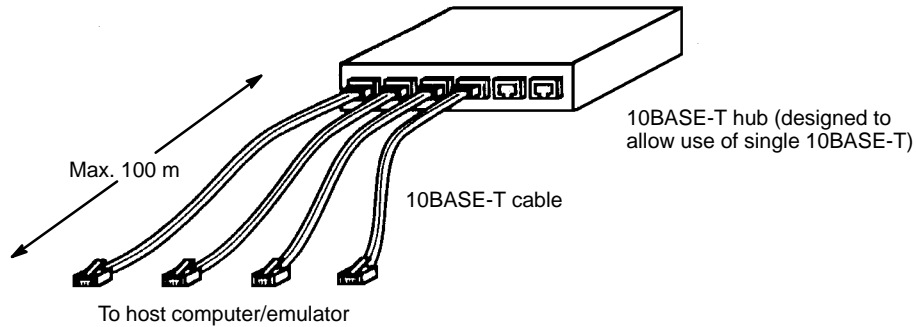


Fig. 2.5 10BASE-T Configuration

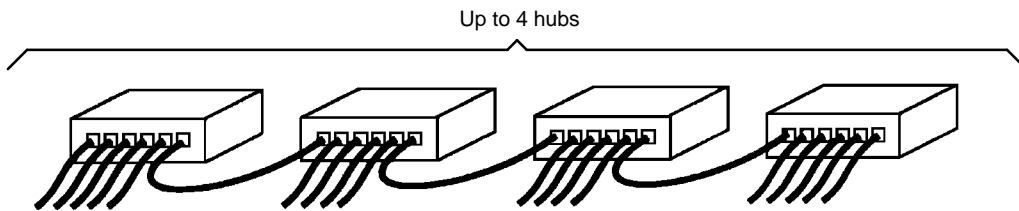


Fig. 2.6 10BASE-T Extension

2.3 Connection Examples

2.3.1 Shapes of host-computer connectors

Three types of LAN connectors for personal computers/workstations are available as shown in Figure 2.7. The transceiver external connection type requires a 10BASE2 or 10BASE-T transceiver. Various products such as an AUI cable and transceiver integrated type are available. For more information, ask the LAN manufacturer.

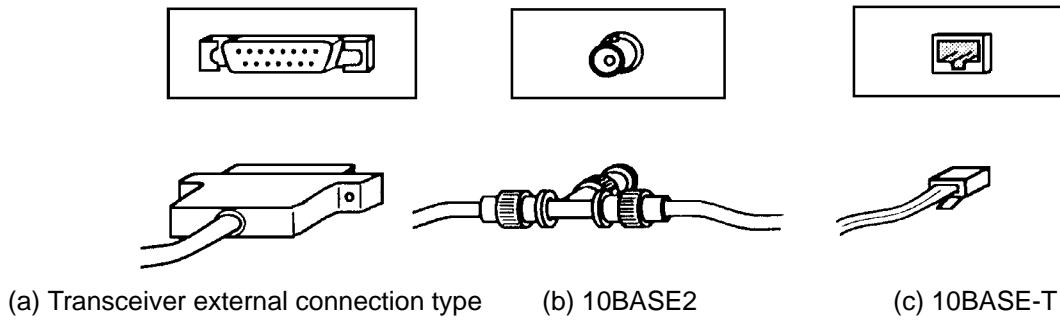


Fig. 2.7 Shapes of LAN Connectors

2.3.2 LAN interconnection

10BASE2, 10BASE5 and 10BASE-T can be interconnected using a repeater or hub. As shown in Figure 2.8, different types of established LANs can be interconnected.

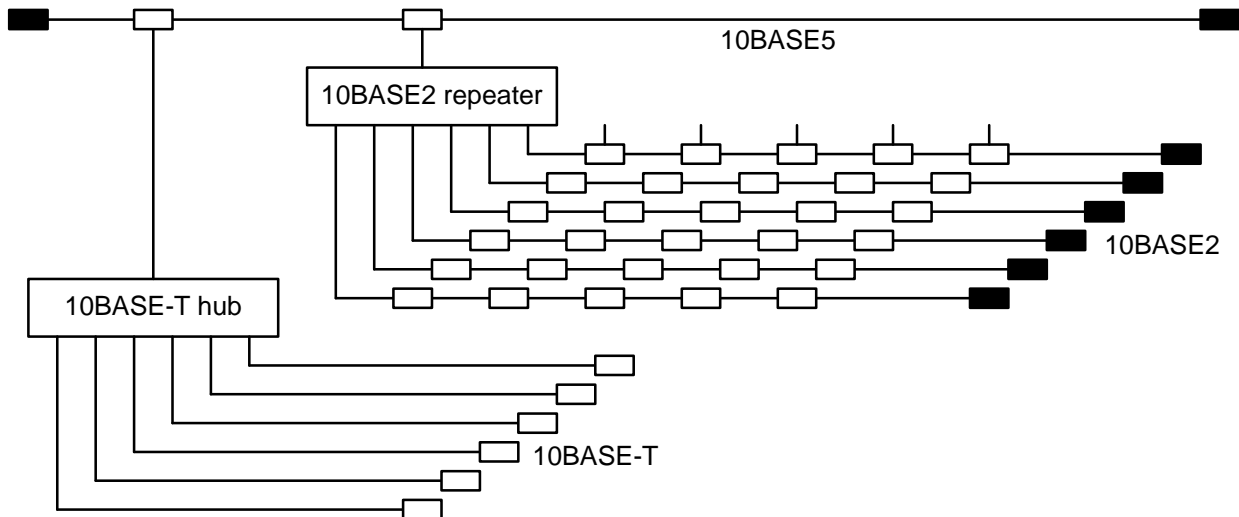
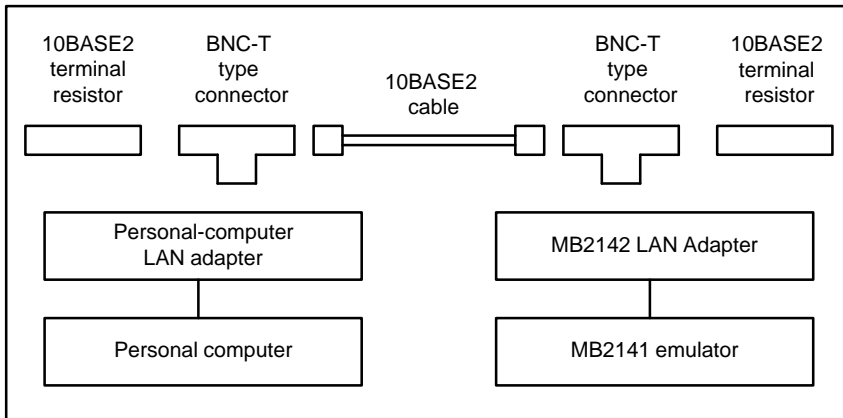


Fig. 2.8 LAN interconnection

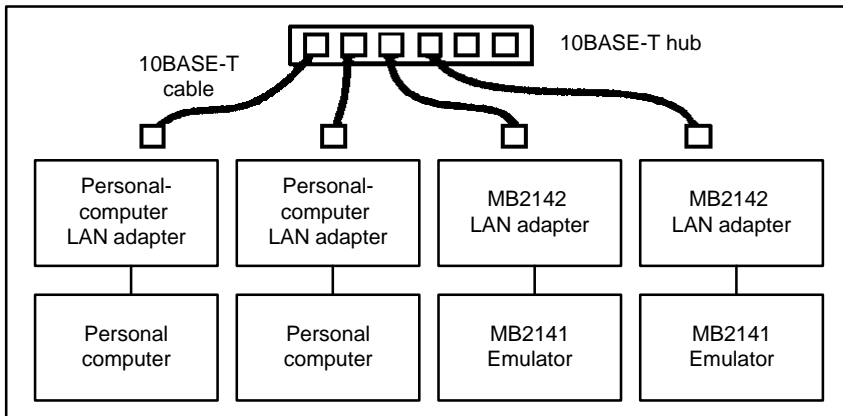
2.3.3 Examples of connection to personal computers

(1) 10BASE2 minimum configuration



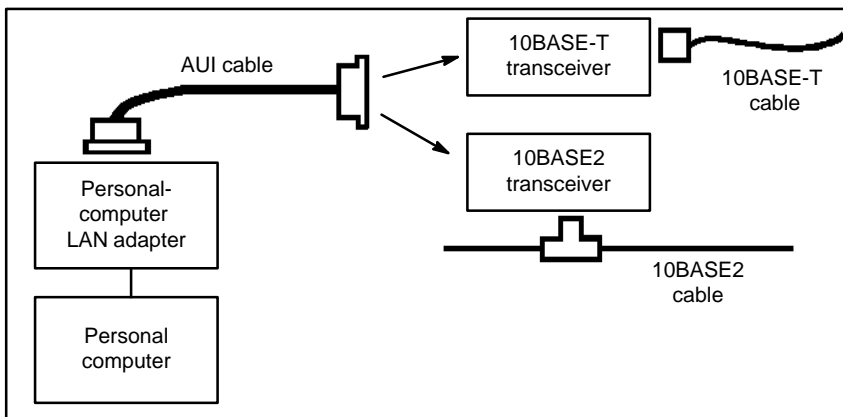
- 10BASE2 cable × 1
- 10BASE2 BNC-T type connector × 2
- 10BASE2 terminal resistor (male) × 2
- 10BASE2 personal-computer LAN adapter × 1
- 10BASE2 MB2142 LAN adapter × 1

(2) Connection of n host personal computers to m emulators on 10BASE-T



- 10BASE-T cable × n + m
- 10BASE-T personal-computer LAN adapter × n
- 10BASE-T MB2142 LAN adapter × m
- 10BASE-T hub (with more than n+m ports) × 1

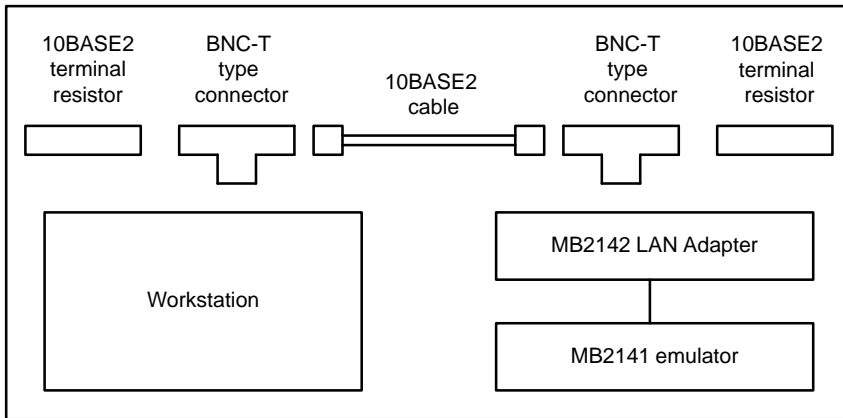
(3) Connection to transceiver outer connection type



- 10BASE2 or 10BASE-T transceiver × 1
- AUI cable × 1
- Other set

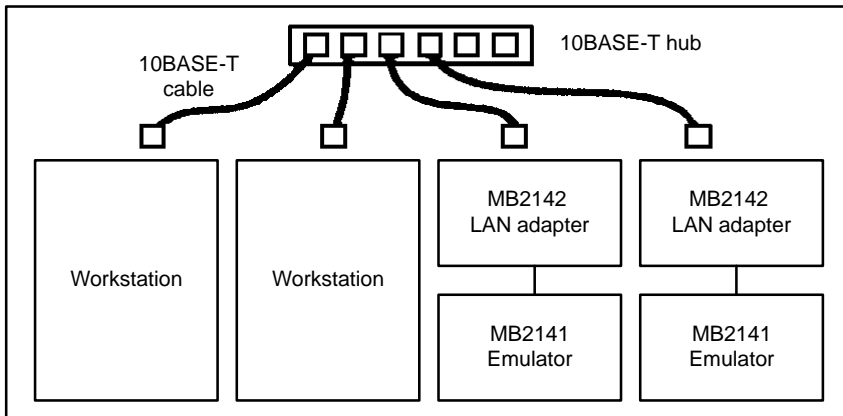
2.3.4 Examples of connection to workstations

(1) 10BASE2 minimum configuration



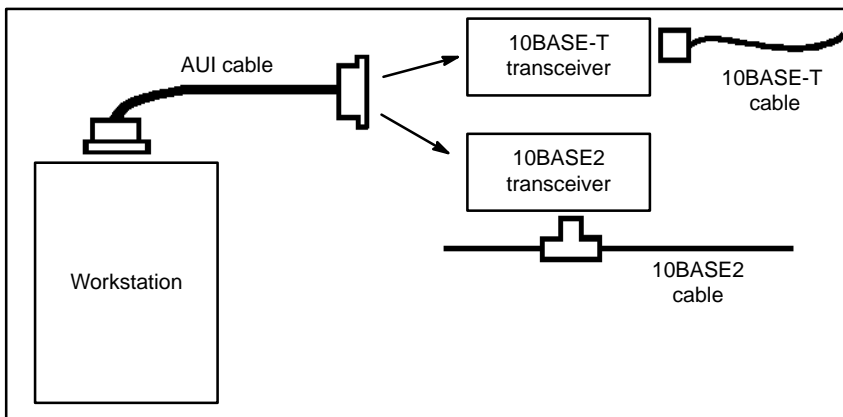
- 10BASE2 cable × 1
- 10BASE2 BNC-T type connector × 2
- 10BASE2 terminal resistor (male) × 2
- 10BASE2 MB2142 LAN adapter × 1

(2) Connection of n workstations to m emulators on 10BASE-T

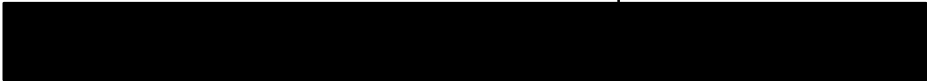


- 10BASE-T cable × n + m
- 10BASE-T MB2142 LAN adapter × m
- 10BASE-T hub (with more than n+m ports) × 1

(3) Connection to transceiver external connection type



- 10BASE2 or 10BASE-T transceiver × 1
- AUI cable × 1
- Other set



3. INSTALLATION

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3.1 Network Addressing

Many pieces of equipment can be connected to a LAN. Specification is required to decide which host computer uses which emulator. Therefore, network addresses are used. Each piece of equipment on the LAN is called a *host* and has a unique network address. When a new host computer/emulator is connected to the LAN, its network address must be specified as shown in Figure 3.1.

(1) MAC address (or physical address)

The MAC address is 48 bits long and is generally represented in hexadecimal code (e.g., 0000E1F0010). All the MB2142 LAN adapters have been assigned addresses at shipment, so addressing is not required. Recently, most host-computer LAN adapters have been pre-addressed. If addressing is required, see the Appendix 1 for the correct addressing.

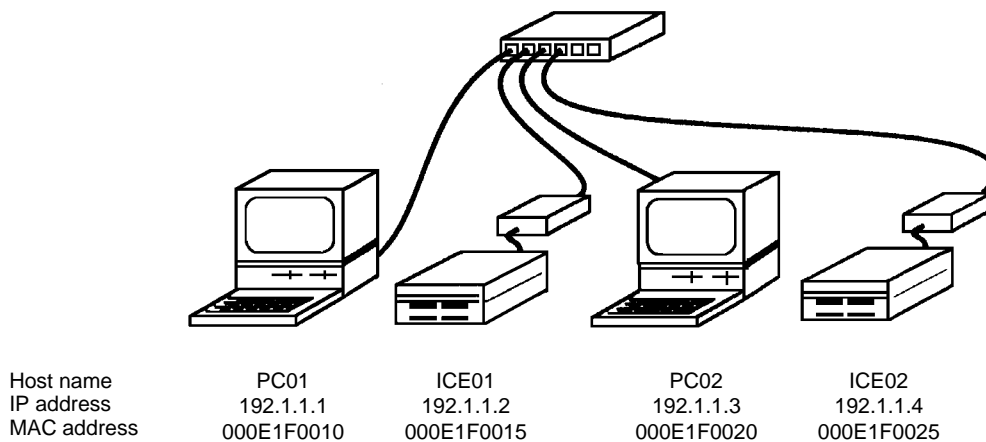


Fig. 3.1 Example of Network Addresses

(2) IP address (or INET address)

The IP address is 32 bits long and is generally represented in decimal code by delimiting on an 8-bit basis by a dot (.). This is called a *dot format* (e.g., 192.1.2.254). The address range is 0.0.0.0 to 255.255.255.255. However, some restrictions apply to available addresses in terms of network scale or communication protocol regulations. For connection to an established LAN, consult the network manager. If planning to connect just emulators to a new LAN, use the following addresses.

192.1.1.1 to 223.254.254.254 (Up to 254 hosts)

The above addressing range is restricted as follows:

- The upper 24 bits of one address match those of others.
All the hosts connected to the LAN must have the same upper 24 bits when addressed.

(Example) 192.1.1.1 to 192.1.1.10 are allowed for connection; 192.1.1.1 to 192.1.2.3 are not allowed.

- In the dot format, each digit other than 0 and 255 are used as an address.
192.0.0.0 and 192.1.2.255 are used as special addresses.

(3) Host name

When the equipment on the LAN is actually operating, addresses are inconvenient. Therefore, any host name can be entered instead of an address. MB2140 emulators also use host names.

Characters used as host names are not restricted but depend on the network manufacturer. Generally, it is safe to decide a host name based on the following restrictions.

- 1 to 9 alphanumeric characters
- Begins with alphabetic character

(Example) PC01
ICE02

3.2 Host-Computer Settings

3.2.1 UNIX workstation

The super user should perform the following work.

(1) Setting host-computer network address

Normally, the host computer is network-addressed when its OS is installed. For more information on addressing, refer to the OS manual.

Unless otherwise specified, set the **subnet masks** and **gateways** to the not-ready state.

(2) Entering emulator network addresses

Enter the IP address and host address of the desired emulator in the `/etc/hosts` file. Add the following one line using an editor.

```
IP address  Host name
```

Delimit the IP address and host name with a blank or tab character. When using several emulators, describe each emulator on a single line.

(Example)

```
192.1.1.2 ICE01
192.1.1.4 ICE02
```

(3) Entering service number and service name of emulator

The service number and service name are used internally for communication over a LAN. Enter them in the `/etc/services` file.

The emulator defaults to service No. 5001 and service name `fjicesv`. Therefore, use an editor to ensure that the character string `5001/tcp` is not contained in the `/etc/services` file. Then, add the following line (in lower-case characters).

```
fjicesv  5001/tcp
```

If `5001/tcp` is already contained in the `/etc/services` file, replace it with an unused number beginning with 5002 or greater (such as `fjicesv 5002/tcp`).

The emulator retrieves the `/etc/services` files with the name `fjicesv` and uses the service number described in the line to communicate with itself.

(4) Rebooting system

Reboot the system after completing the above work.

3.2.2 Personal computer

(1) Installing personal-computer LAN adapter

Install the personal-computer LAN adapter according to the users manual to activate InetBIOS. The user may be prompted for entry of a network address during installation.

Unless otherwise specified, set the **subnet masks** and **gateways** to the not-ready state.

(2) Setting network address of personal computer

Normally, the user is prompted for entry of a network address during installation of the personal-computer LAN adapter. Enter the host name and IP address of the personal computer. Generally, the personal computer is called a **local host**.

Recently, MAC addresses have already been assigned to most host-computer LAN adapters. If addressing is required, see Appendix 1 for proper addressing.

(3) Entering emulator network addresses

Enter the IP address and host address of the emulator in the `HOSTS` file of the directory indicated by the environmental variable `INETBIOS`. If setting of a **remote host** is required during installation of the personal-computer LAN adapter, enter the emulator's IP address and host name at that time a `HOSTS` file is created automatically; otherwise, use an editor to add the following line to the `HOSTS` file.

```
IP address  Host name
```

Delimit the IP address and the host name with a blank or tab character. When using several emulators, describe each emulator on a single line.

(Example)

```
192.1.1.2 ICE01  
192.1.1.4 ICE02
```

(4) Entering service number and service name of emulator

The service number and service name are used internally for communication over the LAN. Enter them in the `SERVICES` file of the directory indicated by the environmental variable `INETBIOS`.

The emulator defaults to service No. 5001 and service name `fjicesv`. Therefore, use an editor to ensure that the character string `5001/tcp` is not contained in the `SERVICES` file. Then, add the following line (in lower-case characters).

```
fjicesv  5001/tcp
```

If `5001/tcp` is already contained in the `SERVICES` file, replace it with an unused number beginning with 5002 or greater (such as `fjicesv 5002/tcp`).

The emulator retrieves the `SERVICES` files with the name `fjicesv` and uses the service number described in the line to communicate with itself.

3.3 Emulator Addressing

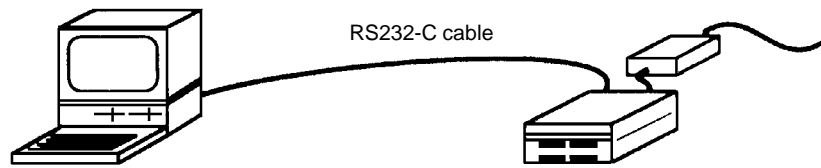


Fig. 3.2 Emulator Network Addressing

Connect the emulator to the host computer through the RS232-C port. Set the MAC address, IP address and port number of the emulator as described in the installation manual.

For installation, use the LAN address installation program (`lanins` for UNIX workstations and `LANINS.EXE` for personal computers). Refer to the *Installation Manual* for the procedure.

(MAC address)

When a universal address is selected, the initial address at emulator shipment is used. The address is guaranteed unique. Normally, use the specified address.

If a special MAC address is required, select a local address and enter a correct address. Remember that if the local address is used for connection to a large-scale LAN, an address conflict may occur.

(IP address)

Specify the IP address assigned to the emulator.

(Port number)

Specify the port number entered in the `SERVICES` file. The default is 5001.



APPENDIX

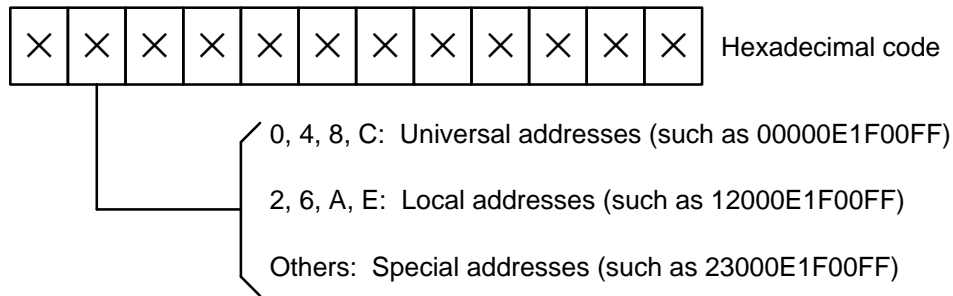
APPENDIX DETAILS OF NETWORK ADDRESSES

1. MAC Address (or Ethernet Address/Physical Address)

A MAC address is 48 bits long and is generally represented in hexadecimal code.

(Example) 00000E1F00FF

The address is classified by using its second digit in hexadecimal code in order to avoid overlap on the same network.



Universal addresses are assigned by the IEEE and are guaranteed unique.

Local addresses are used for self-addressing without address assignment. Remember that using local addresses on a large-scale network may cause an overlap.

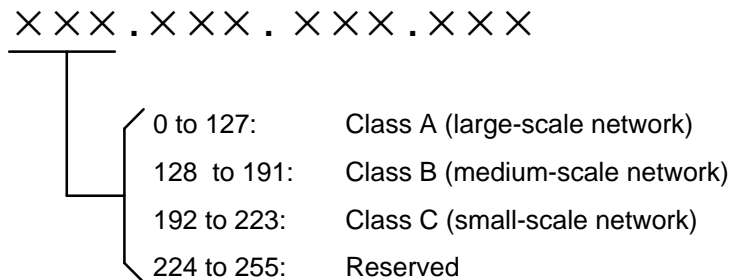
The MB2142 LAN adapters have been pre-addressed at shipment with the universal addresses assigned by the IEEE. Normally, use the LAN adapters as they are without changing the universal addresses.

2. IP Address (or INET Address)

An IP address is 32 bits long and is generally represented in decimal code by delimiting on an 8-bit basis by a dot (.). This is called a **dot format**.

(Example) 192.1.2.128

IP addresses are classified into three according to the network scale. Each class is identified by the first digit group in the dot format.



Class C permits up to 254 hosts to be connected to one network. If the number of hosts is less than 254, use class-C addresses. For connection to a larger network, consult the network manager.

Class C is described below.

- In the dot format, 0 and 255 are used as special addresses. Normally, use addresses 1 to 254.
(Example) 192.0.0.0, 192.1.1.0 and 192.1.2.255 are not available.
- When specifying class-C addresses, match the upper 24 bits of all the hosts connected to the same network.

(Example)

192.1.1.1, 192.1.1.2 and 192.1.1.254 are allowed for connection; 192.1.1.1, 192.1.2.1 and 192.2.3.254 are not allowed.

3. Host Name

In network communication, an IP address is used to specify the host to communicate with. However, addresses are inconvenient for actual use. Therefore, any host name can be used instead of an IP address.

(Example) HOST1 HOST2 ICE01

The emulator debugger specifies the host name of an emulator to be connected to a network.

Characters used as a host name depend on the host computer type or LAN adapter manufacturer. Some manufacturers have no special restrictions but, generally, it is safe to decide the host name based on the following restrictions.

- The host name should be 1 to 9 alphanumeric characters long.
- The host name should consist of alphabetic or numeric characters.
- The host name should begin with an alphabetic character.

Consult the network manager.

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