

EP-78083

Emulation Probe

EP-78083GB-R

EP-78083CU-R

The information in this document is subject to change without notice.

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or of others.

INTRODUCTION

Target users

This manual is intended for users who intend to use the in-circuit emulator and the EP-78083 emulation probe to debug microcontroller applications.

For the emulation probe and target device combinations, refer to the documentation for the device or the development tool selection guide.

Objectives

The objective of this manual is to provide the user with an understanding of how to connect the EP-78083 to an in-circuit emulator.

Organization

This manual consists of the following major sections:

General Description

Connection Methods

How to Read this Manual

Before reading this manual, read the relevant in-circuit emulator manuals for an understanding of the composition and functions of the debugged systems.

- To gain a general understanding of the functions and methods of connecting the EP-78083, read this manual in the sequence indicated in the table of contents.
- To gain an understanding of the operating environment and configuration, read the "General Description" in chapter 1.
- To gain an understanding of the specific connection methods, read "Connection Methods" in chapter 2.

In this manual, EP-78083 also refers to the EP-78083GB-R and the EP-78083CU-R as long as there are no significant differences. When using this manual as for the EP-78083GB-R, read EP-78083 as EP-78083GB-R. When using it for the EP-78083CU-G, read EP-78083 as EP-78083CU-G.

Note

In general, in this manual the following terms are used as described below:

- (1) The term "note" placed in the text indicates that an explanation will be provided somewhere below.
- (2) The term "caution" indicates an explanation that the reader should pay particular attention to.
- (3) The term "remarks" indicates that a supplemental explanation of the text is provided.

Confirmation of Packing List The items listed below are contained in the EP-78083 packing container. In the event that a part is missing or damaged, please contact your NEC sales representative or dealer.

- One emulation probe
- One connector board
 - Used to connect the in-circuit emulator and emulation probe to the emulation board (see table below).

Connector Board Correspondence Table

Emulation probe	Connector board
EP-78083GB-R	44GB CONNECTOR
EP-78083CU-R	42CU CONNECTOR

- One user's manual (this manual)
- Two installation screws
 - Used to connect the emulation probe and in-circuit emulator.
- One conversion socket (EV-9200G-44)
 - Used to connect the emulation probe and the target system.
 - Comes with the EP-78083GB-R only.

CONTENTS

CHAPTER 1	GENERAL DESCRIPTION	1
1.1	Operating Environment	1
1.2	Composition	2
CHAPTER 2	CONNECTION METHODS	5
2.1	Connecting the In-circuit Emulator and Target System	6
2.2	Power-On and Power-Off Sequence	13
2.3	Disconnecting the Emulation Probe from the Target System	14
APPENDIX A	PIN CORRESPONDENCE OF EMULATION PROBES	17
A.1	44-Pin GB Emulation Probe	17
A.2	42-Pin CU Emulation Probe	18
APPENDIX B	CONVERSION SOCKET (EV-9200G-44) DRAWING AND FOOTPRINT	19

LIST OF FIGURES

Figure	Title	Page
1-1.	Operating Environment	1
1-2.	EP-78083 and Connector Board	3
2-1.	Connecting the EP-78078-R-EM and Connector Board	7
2-2.	Connecting the In-circuit Emulator and Emulation Probe	8
2-3.	Connecting the 44-Pin GB Emulation Probe	9
2-4.	Connecting the 42-Pin CU Emulation Probe	10
2-5.	Connecting the External Sense Clips	12
2-6.	Disconnecting the 44-Pin GB Emulation Probe	14
2-7.	Disconnecting the 42-Pin CU Emulation Probe	15
B-1.	EV-9200G-44 Drawing (For reference only) (Units: mm)	19
B-2.	EV-9200G-44 Footprint (For reference only) (Units: mm).....	20

CHAPTER 1 GENERAL DESCRIPTION

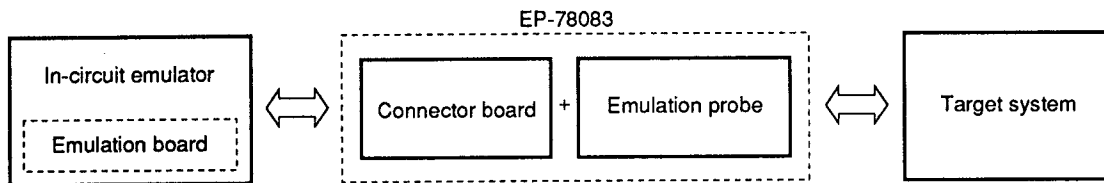
This chapter will provide a general description of the EP-78083.

1.1 Operating Environment

The EP-78083 is a probe set for connecting an in-circuit emulator system and a target system. Using the EP-78083 for such a connection creates a microcontroller debugging environment and allows the comprehensive debugging of the target system hardware and software. For the specific methods of connection, refer to **CHAPTER 2**.

Figure 1-1. Operating Environment

- Connecting the in-circuit emulator and target system



1.2 Composition

The EP-78083 is a set that consists of an emulation probe and a connector board.

(1) Emulation probe

The emulation probe is composed of the following three items:

Probes

The probes connect the in-circuit emulator and the target system.

- EP-78083GB-R : 44-pin GB probe
- EP-78083CU-R : 42-pin CU probe

Grounding clip

The grounding clip is connected to the grounding pin of the target system. The ground potential of the in-circuit emulator and target system become the same, resisting static electricity and noise.

External sense clips

The external sense clips consist of eight clips. They are used to check the voltage levels of the pins on the ICs in the target system.

(2) Connector board

The connector board is the board used to connect the in-circuit emulator and emulation probe to the emulation board.

Figure 1-2. EP-78083 and Connector Board (1 of 2)

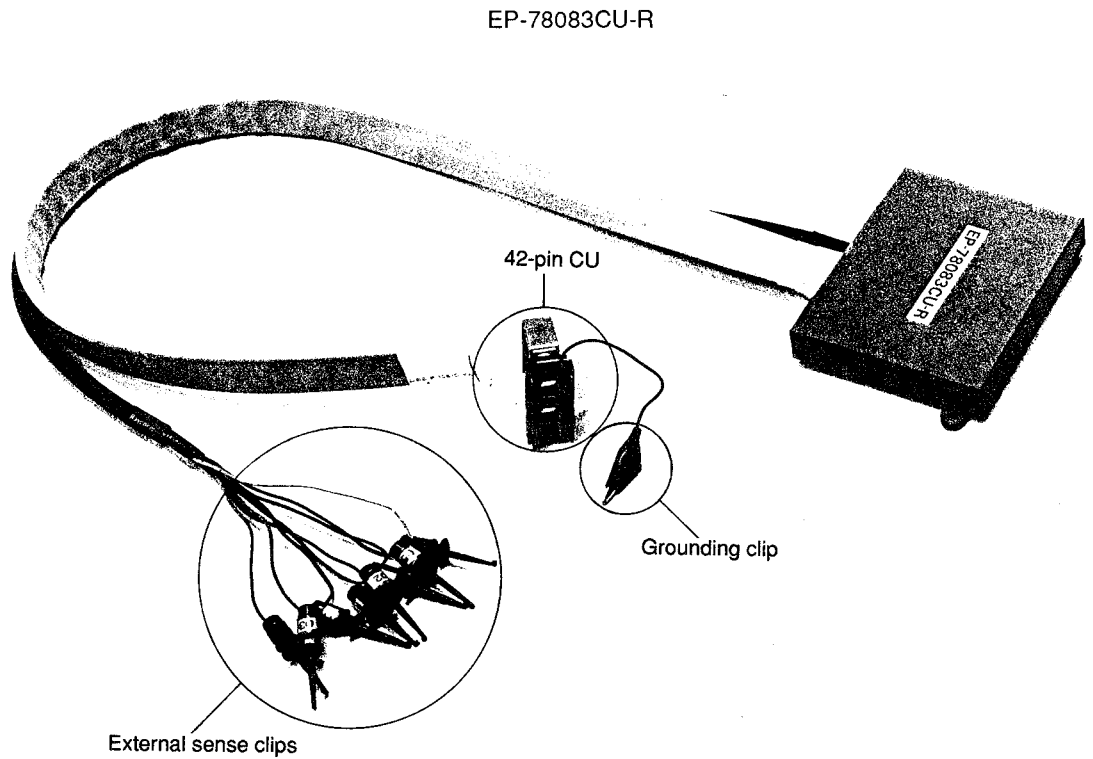
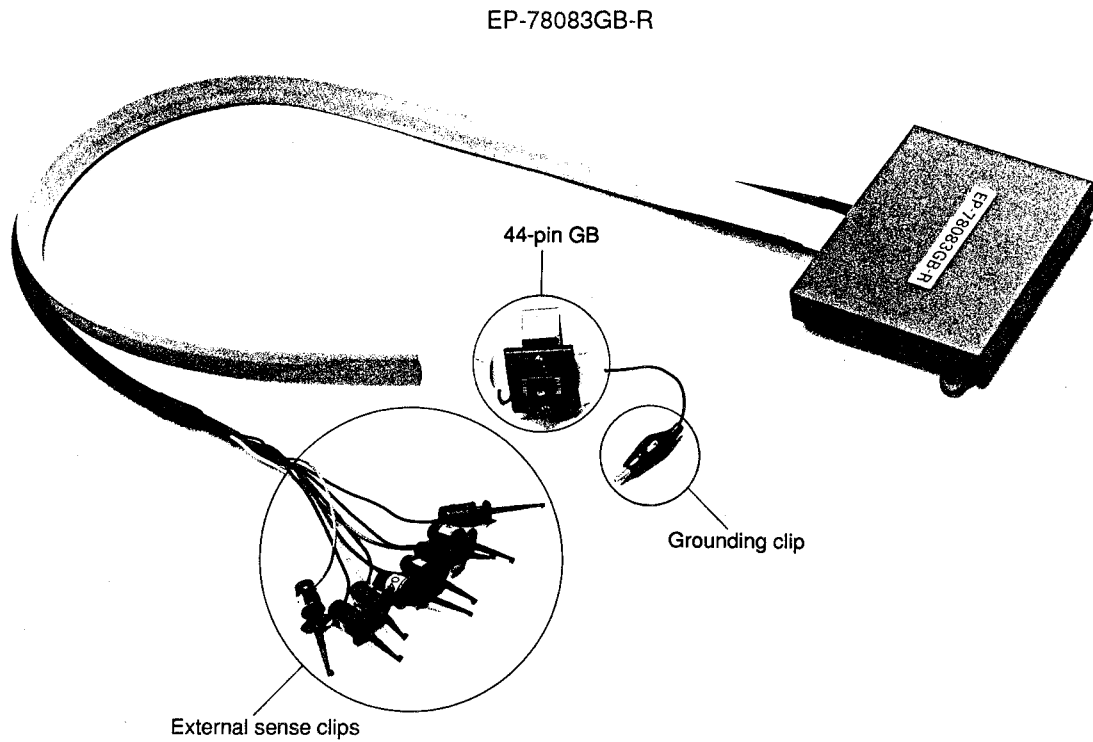
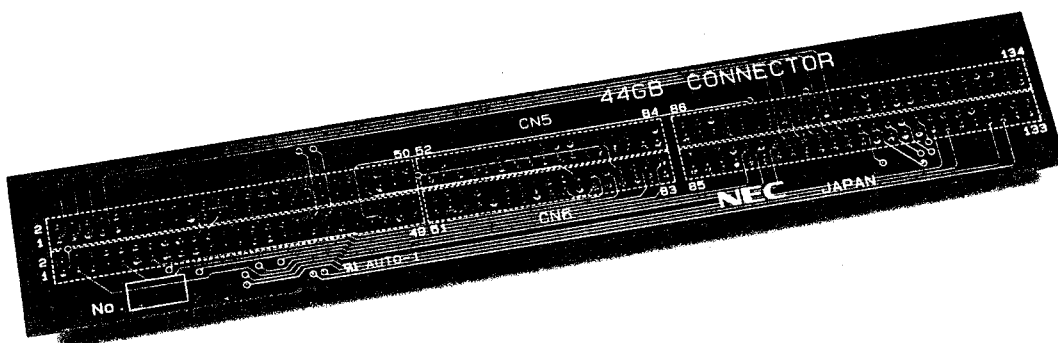
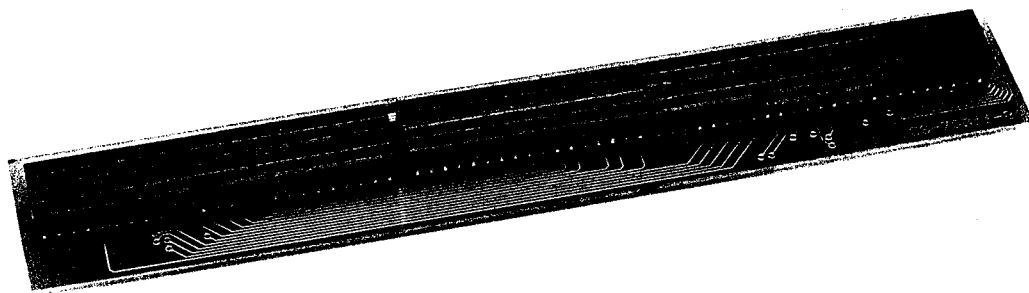
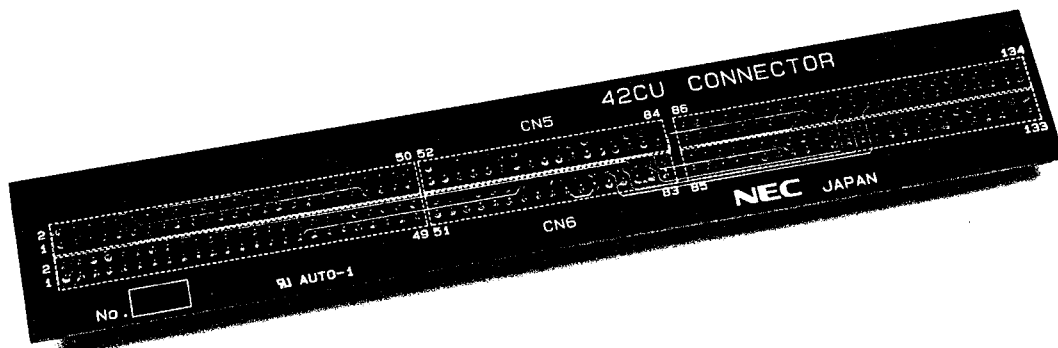
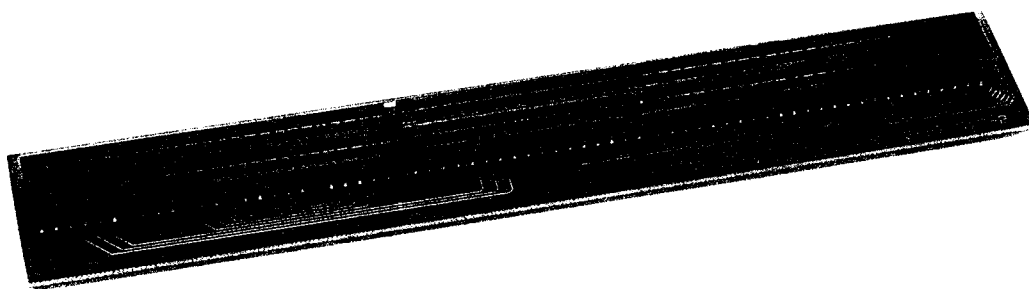


Figure 1-2. EP-78083 and Connector Board (2 of 2)

44GB CONNECTOR



42CU CONNECTOR



CHAPTER 2 CONNECTION METHODS

This chapter will discuss the methods of connecting the EP-78083 emulation probe, the sequence for turning the power on and off, and disconnecting the emulation probe from the target system.

2.1 Connecting the In-circuit Emulator and Target System

The general connection sequence is as follows:

- (1) Connect the emulation board and the connector board
 - <1> Turn off the in-circuit emulation board power.
 - <2> Connect the emulation board and the connector board.
 - <3> Insert the emulation board (with connector board attached) into the in-circuit emulator.
- (2) Connect the in-circuit emulator and emulation probe
- (3) Connect the emulation probe and the target system
 - (a) When using the EP-78083GB-R probe, the sequence is as follows:
 - <1> Turn off the power of the target system.
 - <2> Solder the conversion socket to the target system.
 - <3> Insert the front end of the emulation probe into the conversion socket.
 - (b) When using the EP-78083CU-R probe, the sequence is as follows:
 - <1> Turn off the power of the target system.
 - <2> Solder the shrink DIP socket to the target system.
 - <3> Insert the front end of the emulation probe into the shrink DIP socket.
- (4) Connect the external sense clips (when the external sense clips are to be used)
- (5) Turn on the power

Next, a detailed description of the connection procedures will be provided.

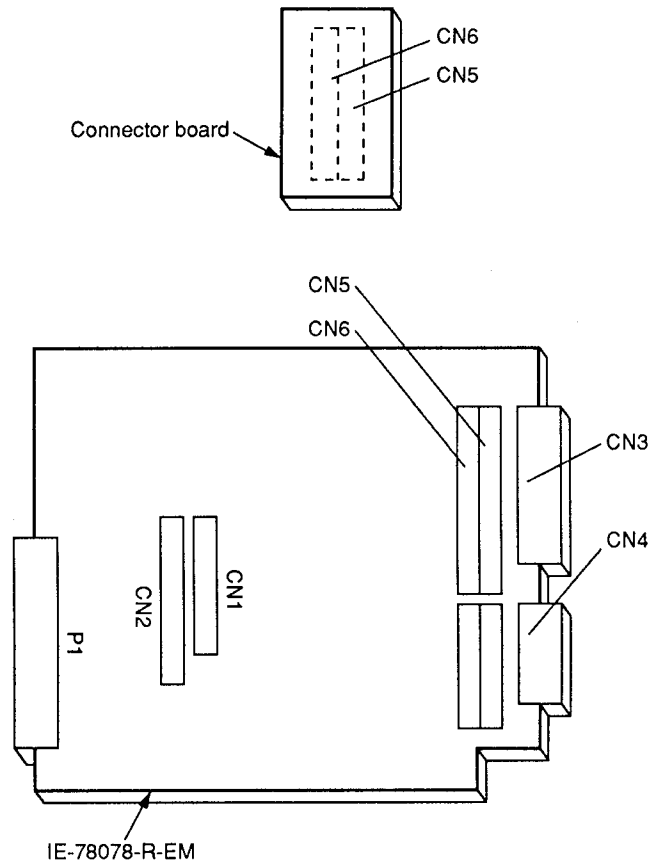
(1) Connecting the emulation board and connector board

The following example uses the EP-78078-R-EM.

Caution Inserting the in-circuit emulator in the wrong location may damage it.

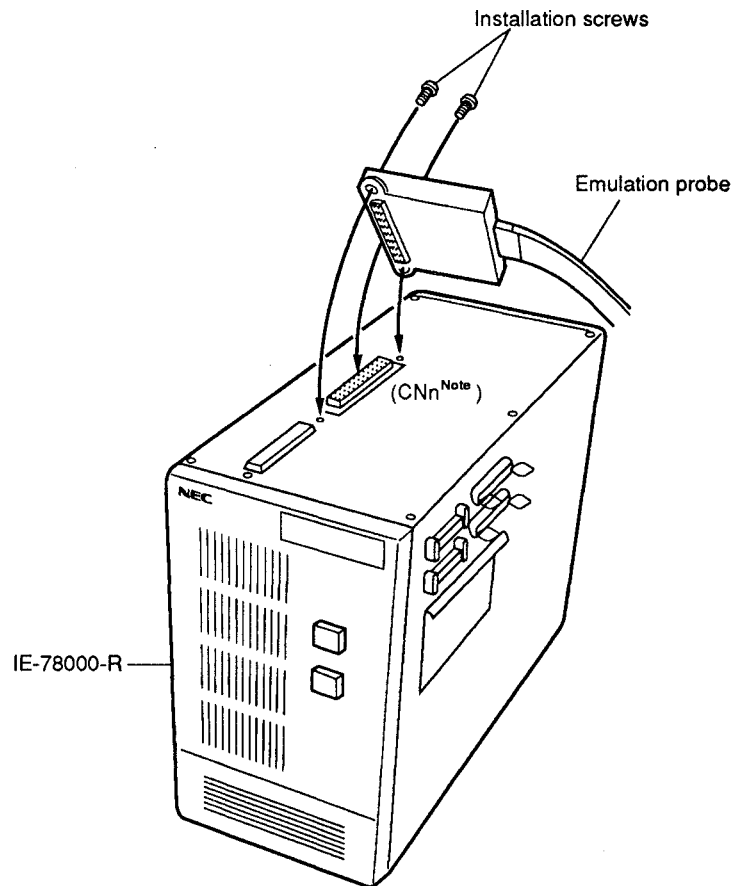
- <1> Connect connectors CN5 and CN6 of the EP-78078 to connectors CN5 and CN6 of the connector board.
- <2> Turn off the power of the IE-78000-R.
- <3> Remove the six screws (six locations) from the top of the IE-78000-R cabinet and open the top cover.
- <4> Pull the card pullers, located on either side of the board, towards you and remove the IE-78000-R-BK.
- <5> Attached the IE-78078-R-EM to the IE-78000-R-BK using the screws provided.
- <6> Return the IE-78000-R-BK, with the IE-78078-R-EM attached, to its original position in the IE-78000-R cabinet.

Figure 2-1. Connecting the EP-78078-R-EM and Connector Board



(2) Connecting the In-circuit Emulator and the Emulation Probe

- <1> Connect the emulation probe to the DIN connector, which is for connecting the emulation probe to the top of the in-circuit emulator.
- <2> After making this connection, be sure to fasten down the emulation probe and in-circuit emulator with the installation screws provided.

Figure 2-2. Connecting the In-circuit Emulator and Emulation Probe

Note The location of the connection will vary with the emulation board. Refer to either the in-circuit emulator or emulation board user's manual.

(3) Connecting the Emulation Probe and the Target System

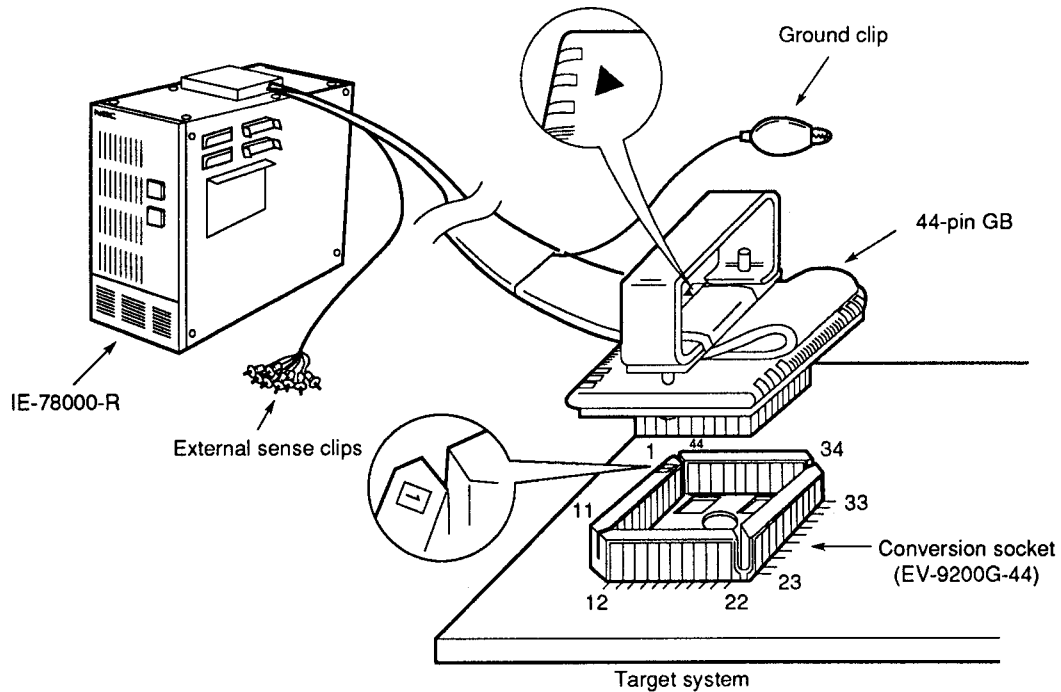
Connect the emulation probe and the target system using the sequence indicated below.

- Cautions**
1. Be sure to connect the grounding clip before connecting the emulation probe and the target system. If the grounding clip is not connected first, static electricity or some other electrical phenomenon may damage the in-circuit emulator.
 2. Be careful not to reverse the connection. Making an incorrect connection may damage the in-circuit emulator.

(a) When using the EP-78083GB-R, the sequence is as follows:

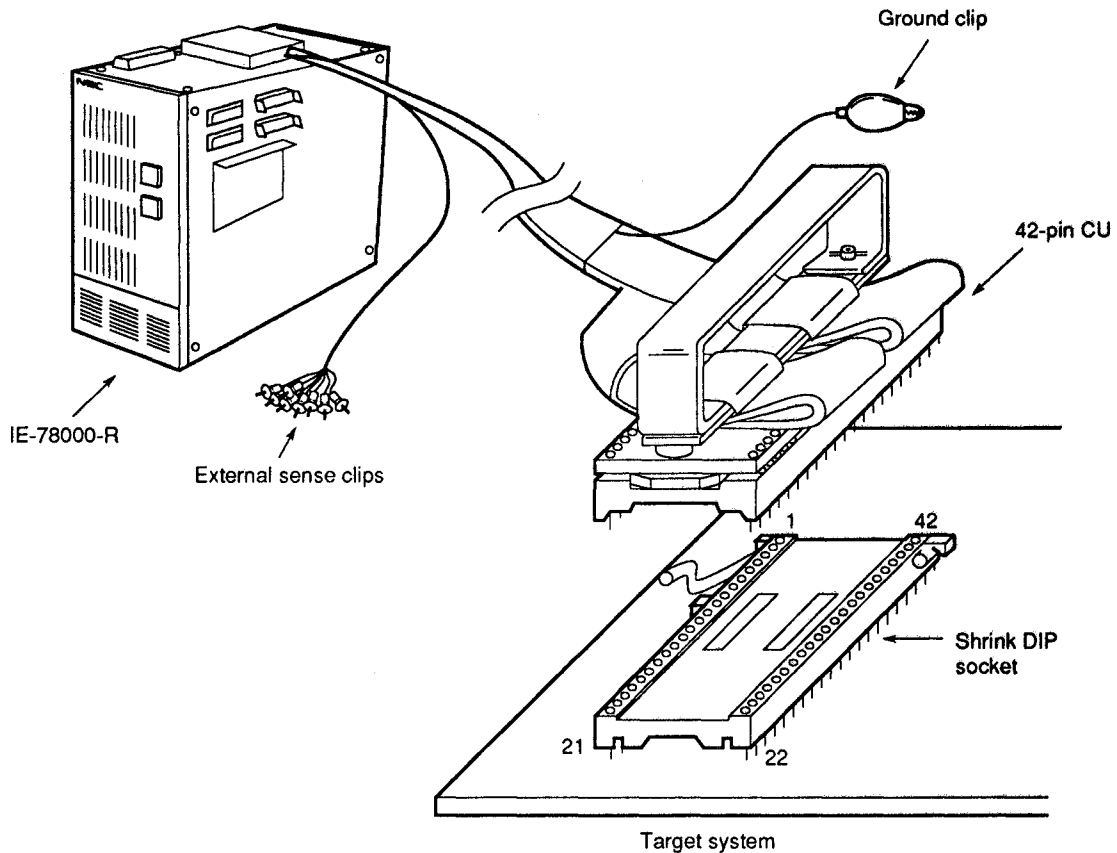
- <1> Turn off the power of the target system.
- <2> Solder the conversion socket (accessory EV-9200G-44) to the target system.
- <3> Connect the emulation probe grounding clip to the grounding pin of the target system.
- <4> Insert the 44-pin GB on the front end of the emulation probe into the conversion socket, soldered to the target system as in step <2> above, so that pin number 1 of the GB and socket number 1 of the conversion socket match.

Figure 2-3. Connecting the 44-Pin GB Emulation Probe



- (b) When using the EP-78083CU-R, the sequence is as follows:
- <1> Turn off the power of the target system.
 - <2> Solder the shrink DIP socket (commercially available) to the target system.
 - <3> Connect the emulation probe grounding clip to the grounding pin of the target system.
 - <4> Insert the 42-pin CU on the front end of the emulation probe into the shrink DIP socket, soldered to the target system as in step <2> above, so that pin number 1 of the CU and socket number 1 of the shrink DIP socket match.

Figure 2-4. Connecting the 42-Pin CU Emulation Probe



(4) Connecting the External Sense Clips

The emulation probe is equipped with eight external sense clips that can trace the hardware signals on the target system in real time.

The external sense clips are TTL-level inputs because they connect directly to the HCT244 input buffer in the in-circuit emulator.

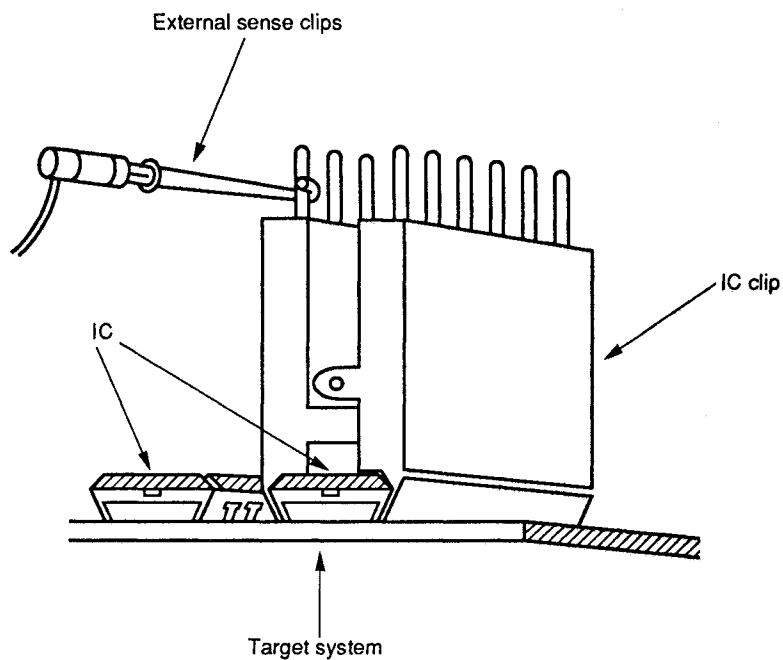
Although the eight external sense clips are usually used for input signals, by executing an OUT command from the emulator, the number 1 sense clip can be set to trigger output when an event is generated. For details, refer to the in-circuit emulator manual.

- | |
|--|
| <p>Cautions</p> <ol style="list-style-type: none">1. Connect the external sense clips to the TTL-level signal lines only. If they are connected to lines other than TTL-level signal lines, accurate high levels and low levels cannot be detected. In addition, depending on the voltage level, the in-circuit emulator sensor may be damaged.2. When external sense clip number 1 is used for external trigger output, make sure that it is not connected to a signal output line. This may cause a malfunction. |
|--|

When using the external sense clips, connect them in the sequence indicated below:

- <1> Turn off the power in the order of target system and then in-circuit emulator.
- <2> Attach an IC clip (commercially available) to an IC you desire to trace on the target system.
- <3> Connect an external sense clip to the attached IC clip.
- <4> Turn on the power in the sequence of in-circuit emulator and target system.

Figure 2-5. Connecting the External Sense Clips



Remark Use an IC clip as much as possible when connecting the external sense clips. This will prevent inadvertent contacts and increase operability.

2.2 Power-On and Power-Off Sequence

After the emulation probe and target system have been connected, turn on the power. The sequence for turning the power on and off is as follows:

Caution	Be sure to adhere to the sequence for turning the power on and off. A mistake in the sequence may damage the in-circuit emulator.
----------------	--

(1) Power-on sequence:

- <1> Turn on the in-circuit emulator power.
- <2> Turn on the target system power.

(2) Power-off sequence:

- <1> Turn off the target system power.
- <2> Turn off the in-circuit emulator power.

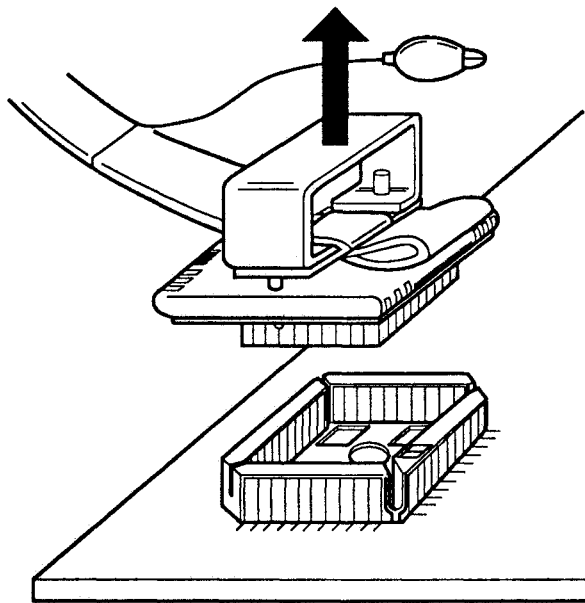
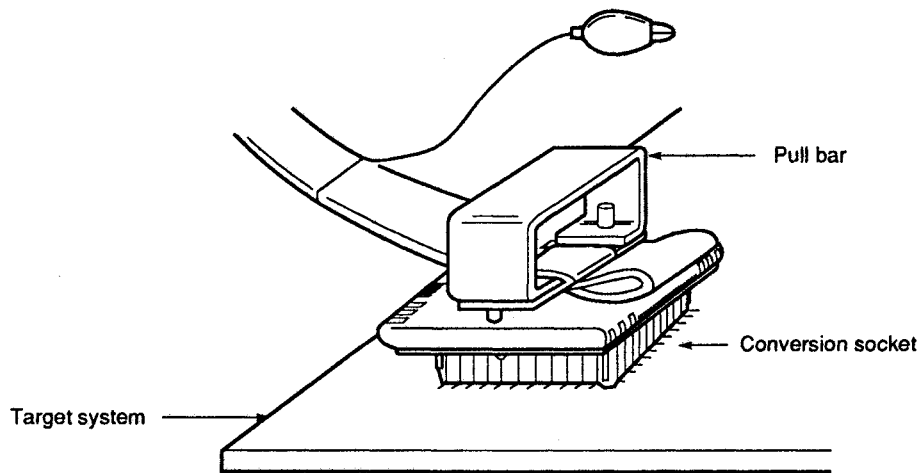
2.3 Disconnecting the Emulation Probe from the Target System

Disconnect the emulation probe from the target system in the following sequence:

(a) **When using the EP-78083GB-R:**

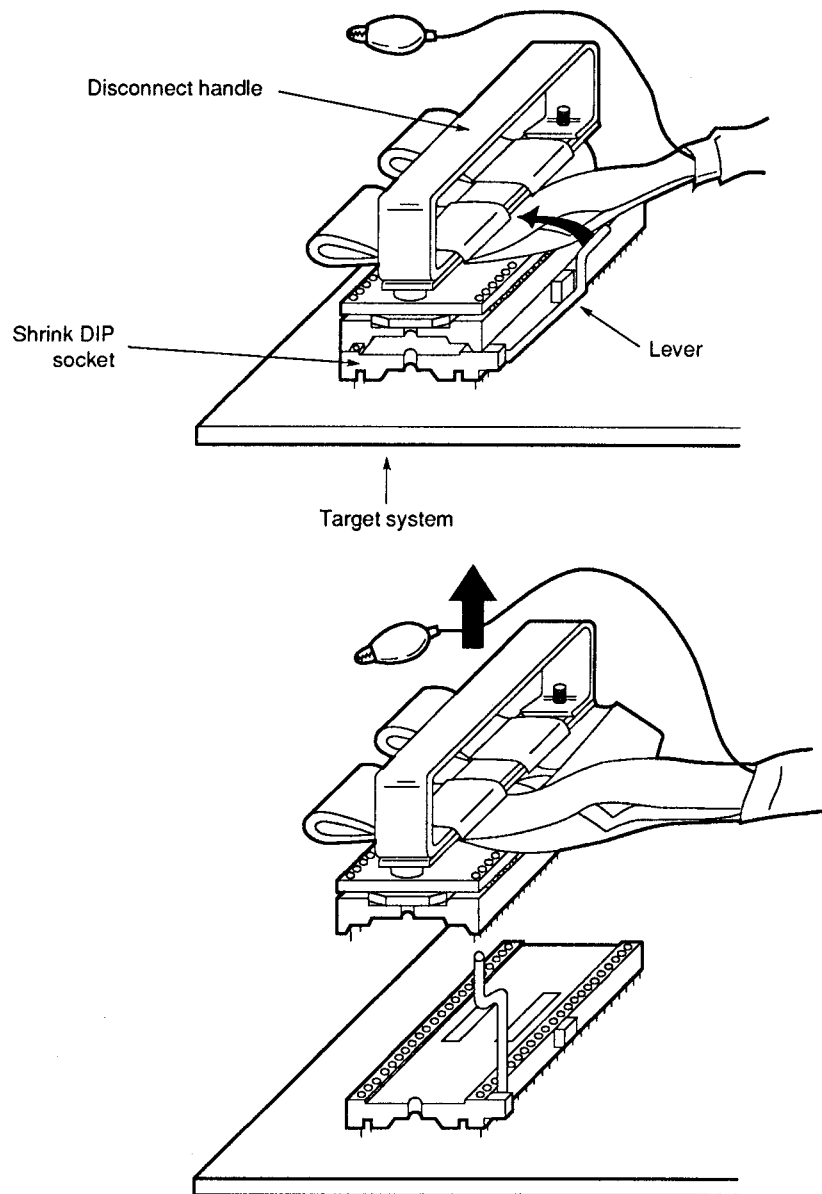
- <1> Turn off the target system power.
- <2> Turn off the in-circuit emulator power.
- <3> Pull straight up on the disconnect handle on the front end of the emulation probe to disconnect the emulation probe from the conversion socket.

Figure 2-6. Disconnecting the 44-Pin GB Emulation Probe



(b) When using the EP-78083CU-R:

- <1> Turn off the target system power.
- <2> Turn off the in-circuit emulator power.
- <3> Pull up on the lever of the shrink DIP socket.
- <4> Pull straight up on the disconnect handle on the front end of the emulation probe to disconnect the emulation probe from the shrink DIP socket.

Figure 2-7. Disconnecting the 42-Pin CU Emulation Probe

[MEMO]

APPENDIX A PIN CORRESPONDENCE OF EMULATION PROBES

A.1 44-Pin GB Emulation Probe

CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe
1	GND	25	NC	49	37	73	NC
2		26		50	38	74	22
3	EXT1	27		51	39	75	NC
4	EXT2	28	20	52	40	76	
5	EXT3	29	21	53	41	77	
6	EXT4	30	22	54	42	78	
7	EXT5	31	23	55	43	79	
8	EXT6	32	24	56	44	80	
9	EXT7	33	25	57	1	81	
10	EXT8	34	26	58	2	82	
11	6	35	27	59	3	83	
12	7	36	28	60	4	84	
13	8	37	29	61	5	85	
14	9	38	30	62	NC	86	
15	10	39	31	63		87	
16	11	40	32	64		88	
17	12	41	33	65		89	
18	13	42	34	66		90	
19	14	43	35	67		91	
20	15	44	36	68		92	
21	16	45	NC	69		93	
22	17	46		70		94	
23	18	47		71		95	GND
24	19	48		72	96		

Remarks 1. CNn pin numbers

CNn: Emulation probe connector. The value of n will change with the emulation board to be connected.

Refer to the **emulation board or in-circuit emulator user's manual**.

2. The definitions of the abbreviations and numbers in the probe column are as follows:

GND : Grounding clip

EXT1 to EXT8 : External sense clips

1 to 44 : Pin numbers of the emulation probe connector pins

NC : No connection

A.2 42-Pin CU Emulation Probe

CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe	
1	GND	25	NC	49	7	73	NC	
2		26		50	8	74	11	
3	EXT1	27		51	9	75	12	
4	EXT2	28		52	10	76	13	
5	EXT3	29		53	NC	77	14	
6	EXT4	30		54		78	15	
7	EXT5	31		55		79	16	
8	EXT6	32		32		56	80	17
9	EXT7	33		33		57	81	18
10	EXT8	34		34		58	82	19
11	NC	35	35	59		83	20	
12		36	36	60		84	21	
13		37	37	61		85	22	
14		38	38	62		86	23	
15		39	39	63		87	24	
16		40	40	64		88	25	
17		41	41	65		89	26	
18		42	42	66		90	27	
19		43	1	67	91	28		
20		44	2	68	92	29		
21		45	3	69	93	30		
22		46	4	70	94	31		
23		47	5	71	95	GND		
24		48	6	72	96			

Remarks 1. CNn pin numbers

CNn: Emulation probe connector. The value of n will change with the emulation board to be connected.

Refer to the **emulation board** or **in-circuit emulator user's manual**.

2. The definitions of the abbreviations and numbers in the probe column are as follows:

GND : Grounding clip

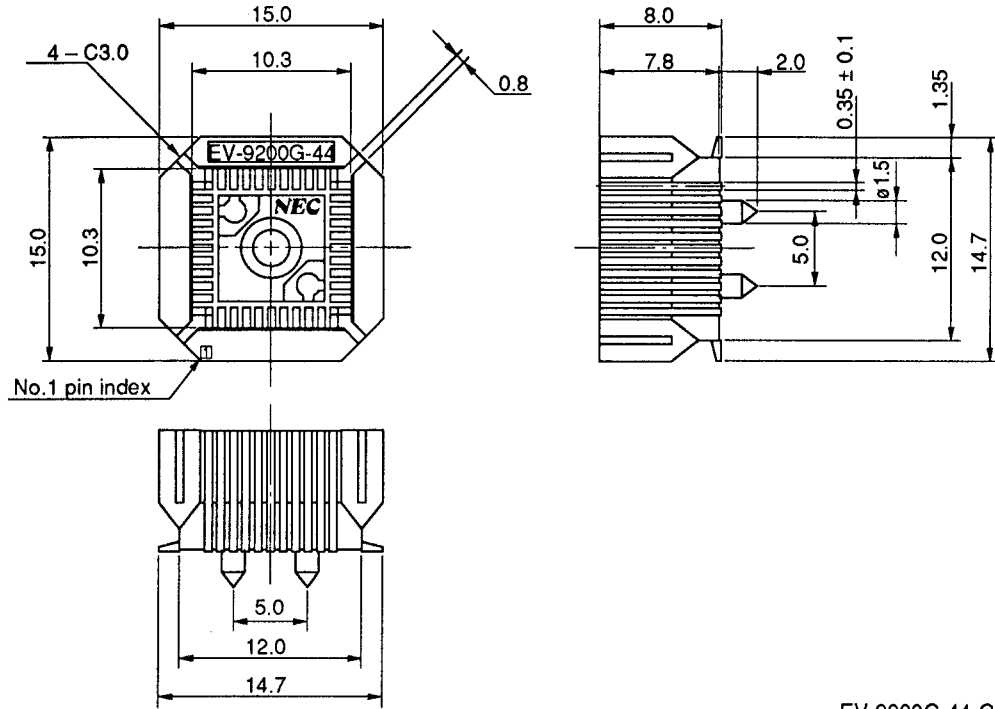
EXT1 to EXT8 : External sense clips

1 to 42 : Pin numbers of the emulation probe connector pins

NC : No connection

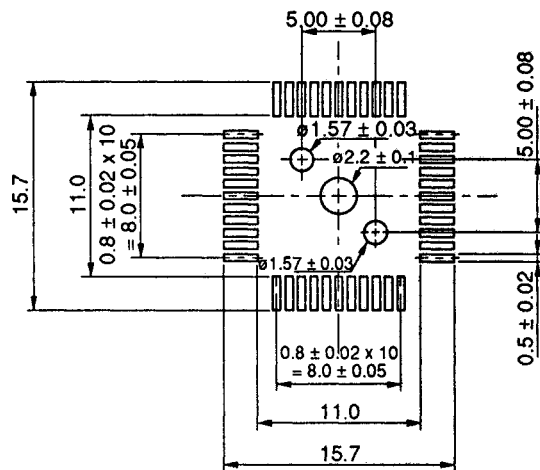
APPENDIX B CONVERSION SOCKET (EV-9200G-44) DRAWING AND FOOTPRINT

Figure B-1. EV-9200G-44 Drawing (For reference only) (Units: mm)



EV-9200G-44-G0

Figure B-2. EV-9200G-44 Footprint (For reference only) (Units: mm)



EV-9200G-44-P0

Caution Dimensions of mount pad for EV-9200 and that for target device (QFP) may be different in some parts. For the recommended mount pad dimensions for QFP, refer to "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (IEI-1207).