



**IN-CIRCUIT EMULATOR
Probe Conversion Board**

NP-K907

User's Manual

NAITO DENSEI MACHIDA MFG. CO., LTD.
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[MEMO]

CHAPTER 1 OVERVIEW

This chapter gives an overview of the NP-K907.

1.1 Operating Environment

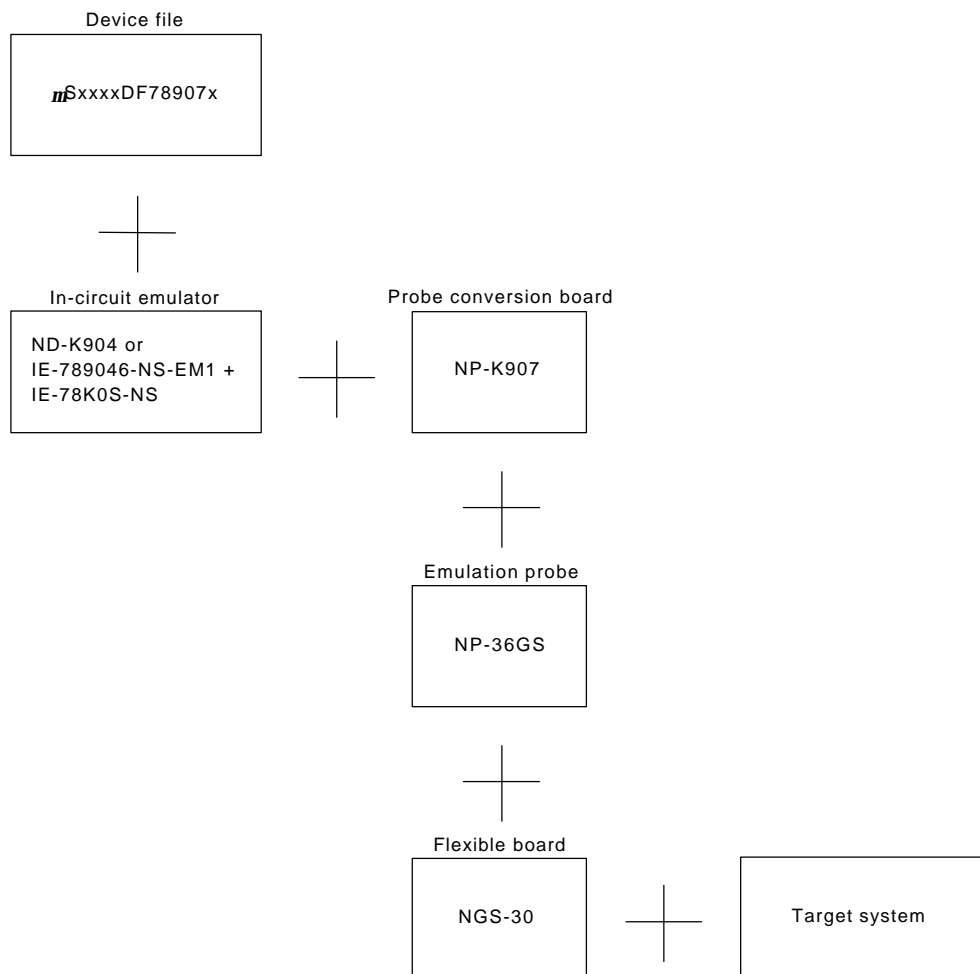
The NP-K907 is a development support device that when connected to an in-circuit emulator, ND-K904 (sold separately)^{Note 1} or IE-789046-NS-EMI (product of NEC) + IE-78K0S-NS (product of NEC)^{Note 2}, can be used to increase the efficiency when debugging hardware or software in which the **m**PD78907X Series of 8-bit single-chip microcontrollers are used.

The NP-K907 can be connected to the target system via the emulation probe [NP-36GS (sold separately) + NGS-30 (sold separately)].

- Notes 1** Same as the EM-K904 (sold separately) + MB-K9 (sold separately) combined in-circuit emulator
2. IE-789046-NS-EM1 + IE-78K0S-NS combined in-circuit emulator

Figure 1-1. Operating Environment

Connection between in-circuit emulator and target system



1.2 Target Devices

The target devices of the NP-K907 are NEC's 8-bit single-chip microcontrollers **m**PD789071/72/74 and **m**PD78F9076.

CHAPTER 2 CONNECTION

This chapter explains how to connect the NP-K907 and the procedure for turning on and off the power.

The connection procedure is outlined below.

- Cautions**
- 1. Be careful not to invert the pins during connection. Incorrect connection may damage the in-circuit emulator.**
 - 2. Ensure all the power supplies have been turned off before connecting the NP-K907. Also, failure to follow the correct procedure when turning on and off the power could cause damage to the connected devices.**

(1) Connecting to the in-circuit emulator

- <1> Turn off the power supply to the in-circuit emulator.
- <2> Remove the screws (× 4) at the bottom of the in-circuit emulator's main board and take off the cover.
- <3> Connect the NP-K907 following the procedure in I or II, in accordance with the in-circuit emulator used.

I. When using the ND-K904 (see Figure 2-1)

Fix the long spacers (included) with screws (included) at the two corner holes on the side of the NP-K907.
Connect CN2 (connector for asmis) on the NP-K907 to CN1 on the G-789046 EM1 board.

Caution Connect as follows to prevent the G-789046 EM1 board from buckling when the NP-K907 is connected.
Keep a finger on the soldered surface of the G-789046 EM1 board during connection.
Alternatively, remove the G-789046 EM1 board from the G-789000 board, connect CN2 on the NP-K907 to CN1 on the G-789046 board, and then reconnect the G-789046 EM1 board to the G-789000 board.

II. When using the IE-789046-NS-EM1 + IE-78K0S-NS (see Figure 2-2)

Fix the short spacer (included) with a screw (included) at the hole in the center of the NP-K907.
Connect CN3 (connector for NEC-IE (NS)) on the NP-K907 to CN1 on the G-789046 EM1 board.

- <4> Replace the in-circuit emulator main board cover and fix with screws (× 4).

(2) Connecting the emulation probe

- <1> Turn off the power supply to the target system.
- <2> Connect the emulation probe NP-36GS to CN1.

(Request to users)

Users are advised to read the manuals included with the NP-36GS (sold separately) and the NGS-30 (sold separately) for details of how to use these products.

Figure 2-1. Diagram of Connection When Using ND-K904 (CN2 Connected to EM1 Board)

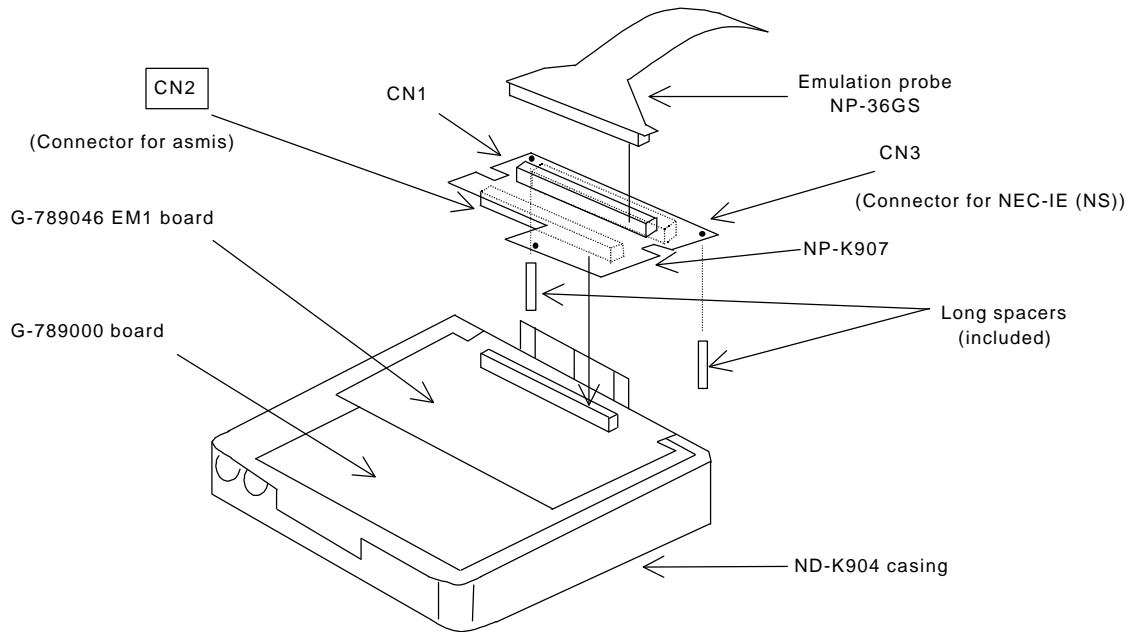
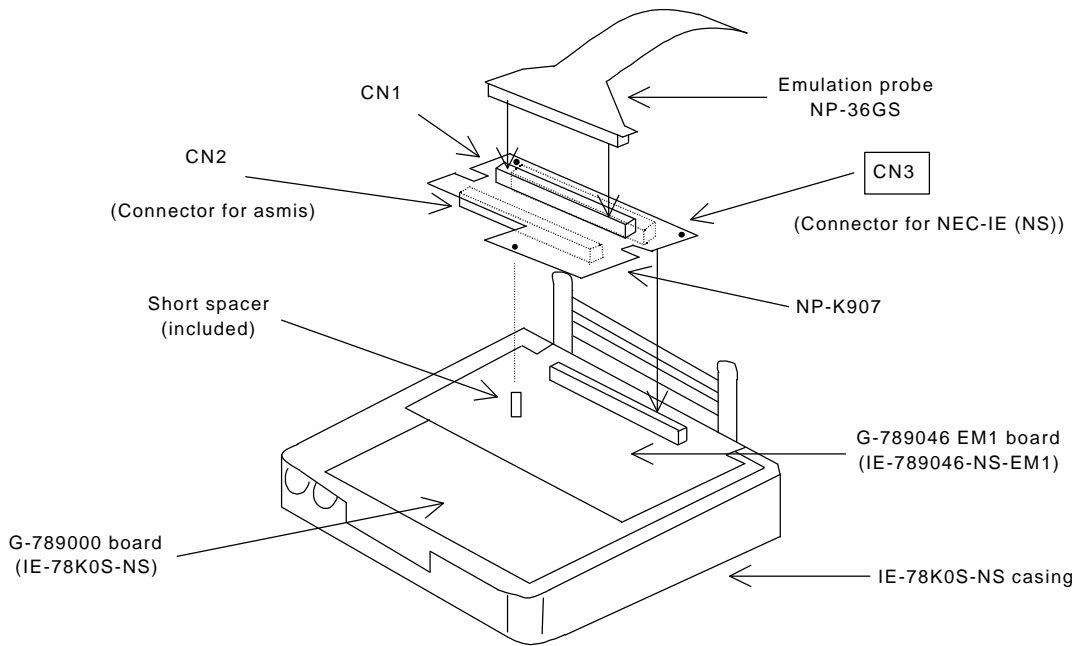


Figure 2-2. Diagram of Connection When Using IE-789046-NS-EM1 + IE-78K0S-NS (CN3 Connected to EM1 Board)



CHAPTER 3 DIFFERENCES BETWEEN CONNECTED IN-CIRCUIT EMULATOR AND TARGET DEVICE

This chapter explains the differences between the in-circuit emulator connected to the NP-K907 and the target device (*n*PD78907X Series).

For details of debugging in the operating environment of the NP-K907, refer to the user's manual of the in-circuit emulator to be connected.

The differences between the in-circuit emulator and the target device are as follows.

- (1) The connection between the in-circuit emulator and the target device differs as shown in **1.1 Operating Environment**.
- (2) Set the G-789046 EM1 board as follows.
 - **Short 2-3 on JP1 (initial setting at factory shipment)**

[MEMO]

CHAPTER 4 DIFFERENCES BETWEEN TARGET DEVICES AND TARGET INTERFACE CIRCUITS

This chapter describes the differences in signal lines between the target devices (*n*PD789071/72/74 and *n*PD78F9076) and the target interface circuit of this system (i.e. the system configured when the NP-K907 is connected to an in-circuit emulator). The target device is a CMOS circuit, whereas the this system's target interface circuit consists of an emulation circuit made up of an emulation CPU, CMOS-IC, etc.

When debugging while this system is connected to the target system, this system performs emulation so as to operate as the actual target device would operate. However, some minor differences exist since the operations are performed via this system's emulation.

- (1) Signals directly input/output from the emulation chip and peripheral evaluation chip
- (2) Signals input from the target system via a gate
- (3) Other signals

The circuits of this system regarding signals (1) to (3) above are described below.

- (1) Signals directly input/output from the emulation chip and peripheral evaluation chip (equivalent circuit 1 of emulation circuit)

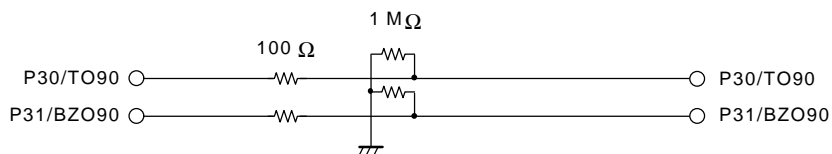
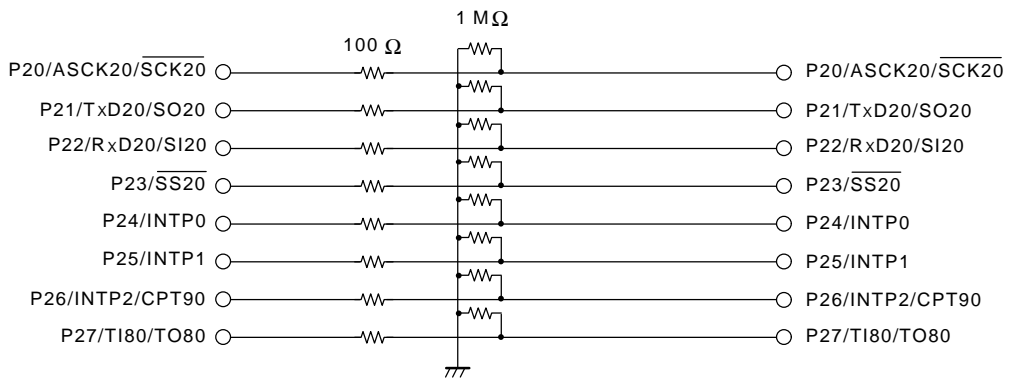
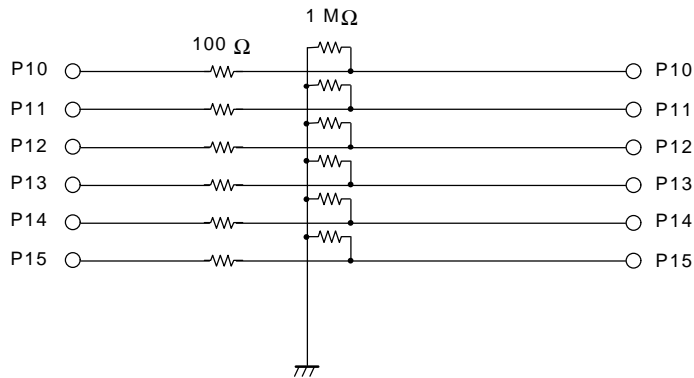
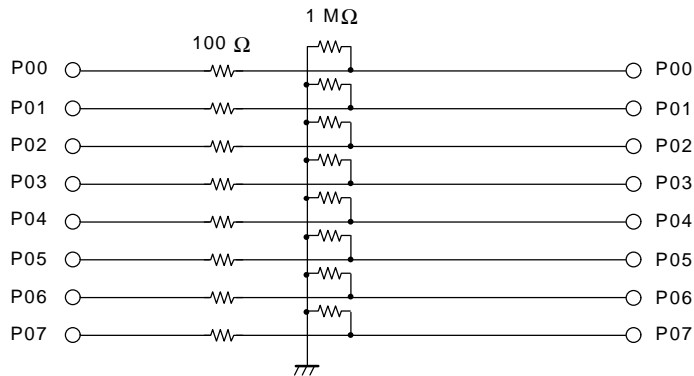
The following signals operate in the same way as those in the *n*PD789071/72/74 and *n*PD78F9076. However, for the signals related to ports, 1 M Ω pull-down resistors and 100 Ω resistors are connected in series.

- Signal related to port 0
- Signal related to port 1
- Signal related to port 2
- Signal related to port 3

<Equivalent Circuit 1 of Emulation Circuit>

● Probe side

● In-circuit emulator side



(2) Signals input from the target system via a gate (equivalent circuit 2 of emulation circuit)

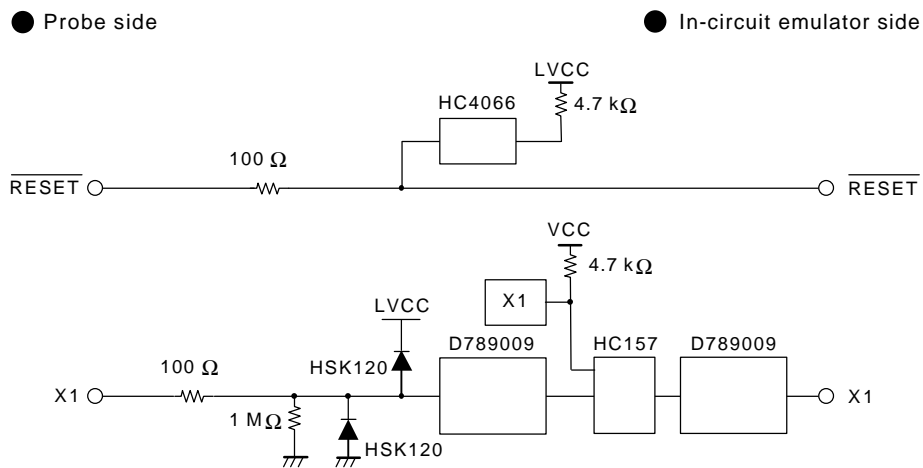
Since the following signals are input via a gate, their timing shows a delay compared to the **mPD789071/72/74** and **mPD78F9076**.

Their AC and DC characteristics are therefore different from those of the above products, making it necessary to observe a stricter timing design.

- $\overline{\text{RESET}}$ signal
- Signals related to clock input

Out of the input signals from the target systems, the $\overline{\text{RESET}}$ signal and signals related to clock input are input to the evaluation chip via a logic IC. Accordingly, the DC characteristics are different from those of the **mPD789071/72/74** and **mPD78F9076**, and since the signals show a delay due to being input via a gate, the AC characteristics also differ.

<Equivalent Circuit 2 of Emulation Circuit>



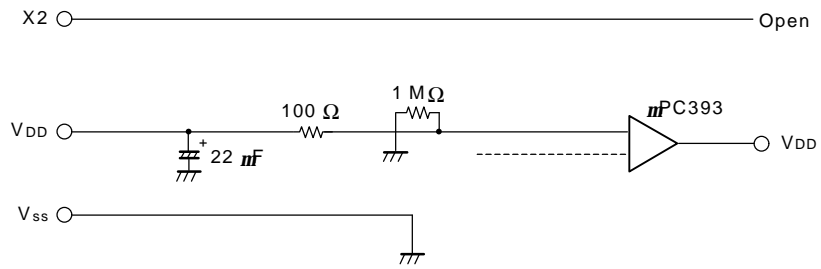
(3) Other signals (equivalent circuit 3 of emulation circuit)

- V_{DD} pin
When the emulation CPU is operating at 5 V, its power is supplied from inside the in-circuit emulator, but when operating on low voltage, its power is supplied from the low-voltage supply pin (TP1).
- V_{SS} pin
The V_{SS} pin is connected to GND inside the in-circuit emulator.
- IC0/ V_{PP} pin
This pin is not used in this system.
- X2 pin
This pin is not used in this system.

<Equivalent Circuit 3 of Emulation Circuit>

● Probe side

● In-circuit emulator side



APPENDIX EMULATION PROBE PIN ASSIGNMENT TABLE

Table A-1. Pin Assignment Table for NP-K907, NP-36GS, NGS-30

NGS-30 Emulation Device Side	NP-36GS CN5 Pin No.	NP-K907 CN1 Pin No.	NP-K907 CN2, CN3 In-Circuit Emulator Side
1	19	58	100
2	20	56	47
3	21	49	48
4	22	55	55
5	23	19	51
6	24	18	52
7	25	22	57, 64
8	33	62	58, 63
9	32	65	56
10	31	66	49
11	30	92	18
12	29	91	17
13	28	98	22
14	27	97	21
15	26	21	28
16	11	99	27
17	10	63	92
18	9	64	91
19	8	70	98
20	7	69	97
21	6	72	102
22	5	102	73
23	4	71	72
24	12	94	69
25	13	93	70
26	14	30	65
27	15	29	66
28	16	24	71
29	17	23	104
30	18	20	103

- Remarks**
1. NP-36GS and NGS-30 are products of Naito DENSEI Machida Mfg. Co., Ltd.
 2. The values in the NGS-30 Emulation Device Side column indicate the number of the first pin on the NGS-30 target system side.
 3. The values in the NP-36GS CN5 Pin No. column indicate the pin number of the NP-36GS connector on the side connected to the NGS-30.
 4. The values in the NP-K907 CN1 Pin No. column indicate the pin number of the NP-K907 connector on the side connected to the NP-36GS.
 5. The values in the NP-K907 CN2, CN3 In-Circuit Emulator Side column indicate the pin number of the NP-K907 connector on the side connected to CN1 on the G-789046 board.