To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

Send any inquiries to http://www.renesas.com/inquiry.

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: “Standard”, “High Quality”, and “Specific”. The recommended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as “Specific” without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as “Specific” or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is “Standard” unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   “Standard”: Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   “High Quality”: Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   “Specific”: Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

LCE-789177-EM
Emulation Board for
LCE-K0S Development System

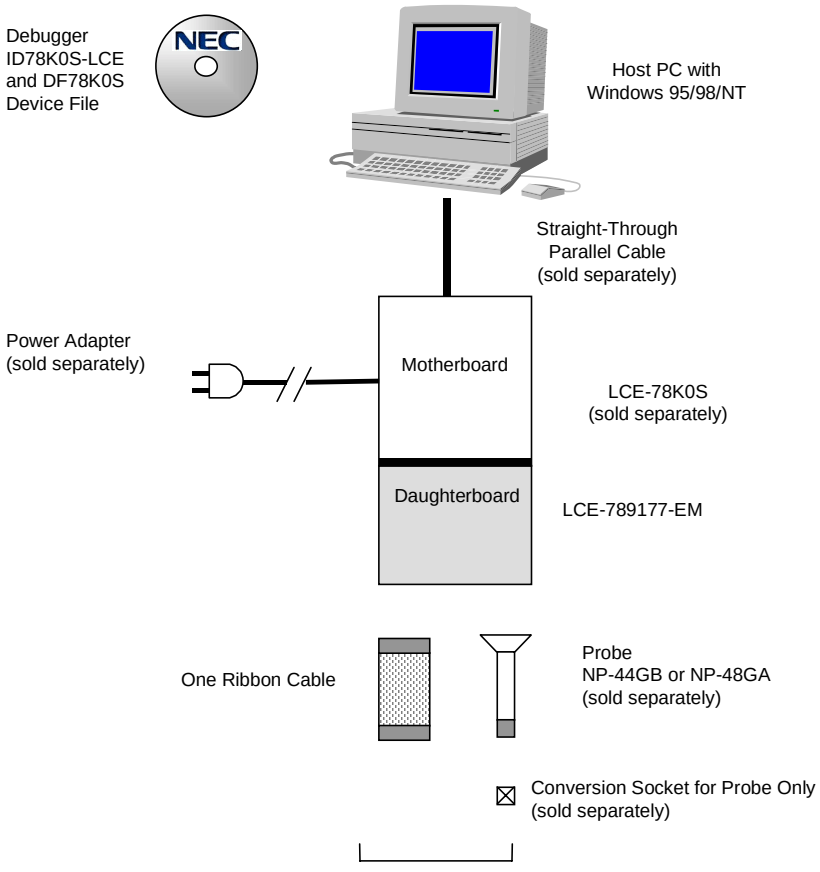
User's Manual ***July 2000***

Introduction

The LCE-789177-EM is an emulation board or daughterboard for the LCE-K0S development system for NEC's 8-bit μPD789177 subseries microcontrollers. Combining this board with the LCE-78K0S allows you to efficiently emulate any μPD789177 subseries device. The LCE-789177-EM is shipped with the following contents:

- LCE-789177-EM daughterboard
- User's manual
- 50-pin ribbon cable
- CD-ROM containing debugger, compiler, assembler, and documentation

Figure 1. System Configuration



Two Methods of Connecting the LCE-K0S to the User Target

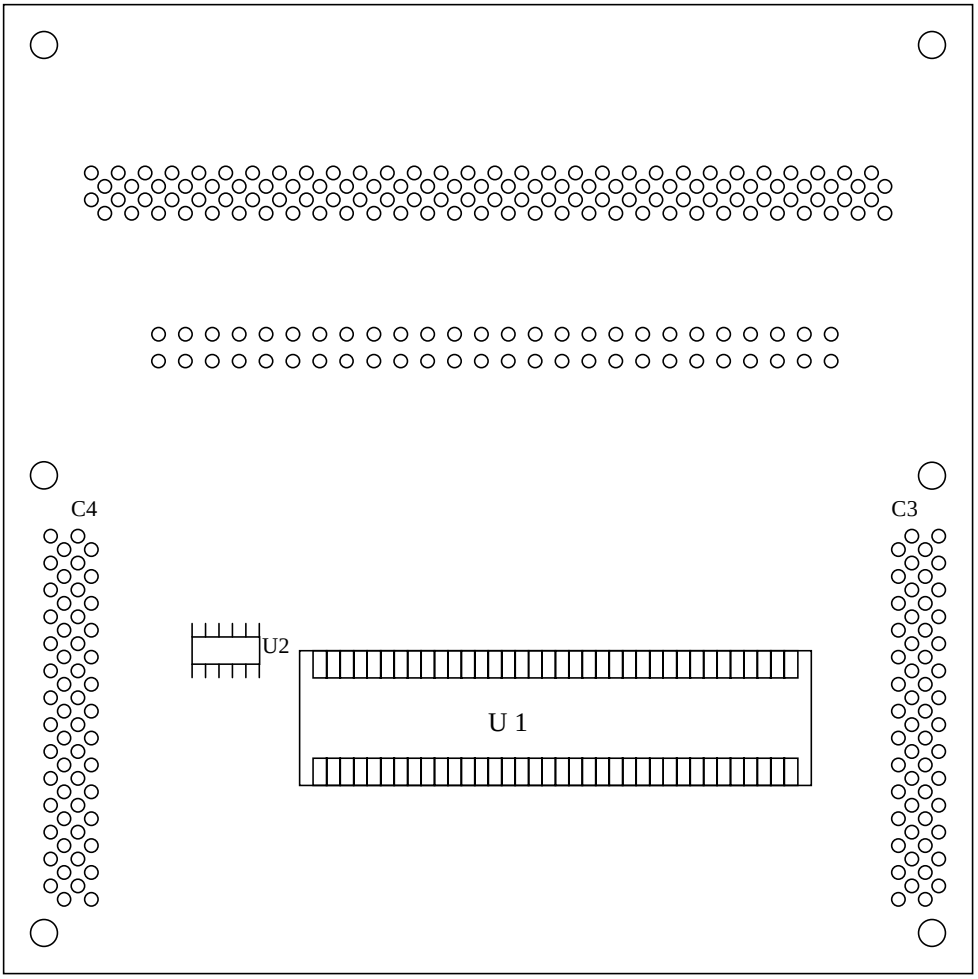
Table 1. Basic Specifications

Parameter	Description
Target device	µPD789166
	µPD789167
	µPD789176
	µPD789177
	µPD78F9177
Clock supply	Internal: installed on the motherboard
	External: pulse input
Low-voltage compatible	1.8 to 5.5 volts

Components

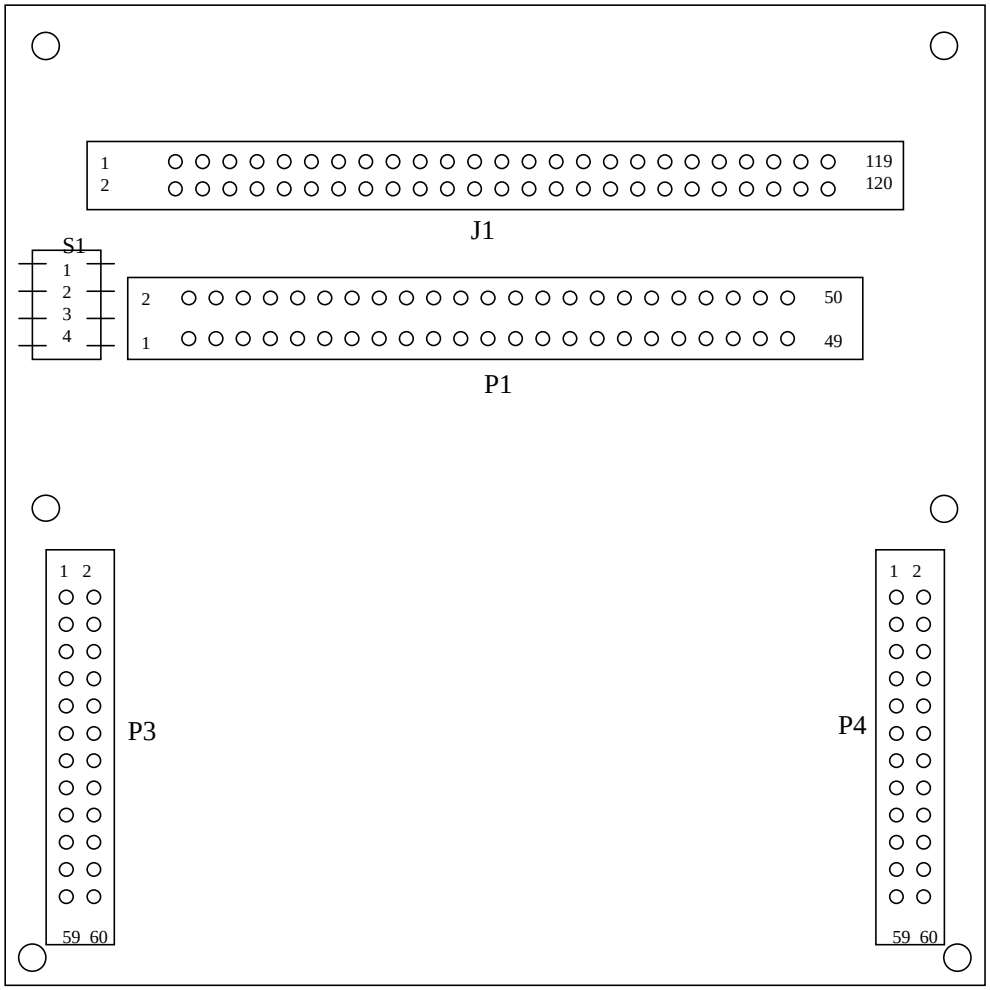
The LCE-789177-EM daughterboard mates with the LCE-78K0S motherboard. As shown in Figure 2, a bottom view of the daughterboard, U1 is the Realchip that provides peripherals unique to the µPD789177 devices.

Figure 2. Bottom View of Daughterboard



In the top view shown in Figure 3, J1 and P1 are connectors to the user target. These connectors contain all of the pins available on the device. J1 is a KEL connector for the probe, while P1 is a dual-row, male-shrouded header with latching levers for the ribbon cables. See Tables 2-4 for pin assignments. S1 is a DIP switch for enabling or disabling pull-up resistors on the input pins for mask ROM. P3 and P4 are connectors for the motherboard, which attaches to the top of the daughterboard.

Figure 3. Top View of Daughterboard



Ribbon Cable

The ribbon cable is a 50-pin female-to-female cable that connects the LCE-K0S to the user target. Alternatively, an emulation probe may be used. One end of the ribbon cable connects to the daughterboard and the other to the target. The side of the ribbon cable with a red stripe is pin 1.

Table 2. P1 Pin Assignments

P1 Connector	48-Pin TQFP Package	44-Pin PQFP Package	Signal Name	Note
1				GND on probe cable
2	1	1	P60/ANI0	
3	2	2	P61/ANI1	
4	3	3	P62/ANI3	
5	4	4	P63/ANI3	
6	5	5	P64/ANI4	
7	6	6	P65/ANI5	
8	7	7	P66/ANI6	
9	8	8	P67/ANI7	
10	9	9	AVSS	Connected to GND on emulation board and probe
11	10	10	P10	
12	11	11	P11	
13	12	---	IC2	Not connected on probe
14	13	12	P30/INTP0/T181/CPT90	
15	14	13	P31/INTP1/TO81	
16	15	14	P32/INTP2/TO90	
17	16	15	P33/INTP3/TO82/BZO90	
18	17	16	P20/$\overline{\text{SCK20}}$/ASCK20	
19	18	17	VDD1	Probe VDD1 tied to VDD0; voltage sense
20	19	---	IC2	Not connected on probe
21	20	18	P21/SO20/TxD20	
22	21	19	P22/SI20/RxD20	
23	22	20	P23/SCL0	
24	23	21	P24/SDA0	
25	24	22	VPP	Not connected on probe
26	25	23	XT2	Not connected on probe
27	26	24	XT1	External secondary clock input from target
28	27	25	$\overline{\text{RESET}}$	Negative true
29	28	26	X2	Not connected on probe
30	29	27	X1	External clock input from target oscillator
31	30	28	VSS0	Tied to GND
32	31	---	IC2	Not connected on probe
33	32	29	VDD0	Probe VDD1 tied to VDD0; voltage sense
34	33	30	P25/TI80/$\overline{\text{SS20}}$	

Table 2. P1 Pin Assignments (continued)

P1 Connector	48-Pin TQFP Package	44-Pin PQFP Package	Signal Name	Note
35	34	31	P26/TO80	
36	35	32	P00	
37	36	33	P01	
38	37	34	P02	
39	38	35	P03	
40	39	36	P04	
41	40	37	VSS1	Tied to GND
42	41	38	P05	
43	42	39	P50	
44	43	40	P51	
45	44	---	IC0	Not connected on probe
46	45	41	P52	
47	46	42	P53	
48	47	43	AVDD	Connected to target VDD
49	48	44	AVREF	Connected to target AVREF
50				GND on probe cable

Emulation Probe (Optional)

In place of a ribbon cable, an emulation probe can be used to connect the LCE to the user target, provided the target has a conversion socket/adapter installed.

Table 3. NP-44GB Emulation Probe Pin Assignments

Emulation Device Pin No.	J1 Pin No.	Emulation Device Pin No.	J1 Pin No.
1	104	23	18
2	103	24	17
3	100	25	22
4	99	26	21
5	94	27	28
6	93	28	27
7	30	29	92
8	29	30	91
9	24	31	98
10	23	32	97
11	20	33	102
12	47	34	73
13	48	35	72
14	51	36	69
15	52	37	70
16	57	38	63
17	58	39	64
18	59	40	61
19	60	41	62
20	55	42	65
21	56	43	66
22	49	44	71

Table 4. NP-48GA Emulation Probe Pin Assignments

Device Pin No.	J1 Pin No.	Device Pin No.	J1 Pin No.
1	104	25	18
2	103	26	17
3	100	27	22
4	99	28	21
5	94	29	28
6	93	30	27
7	30	31	101
8	29	32	92
9	24	33	91
10	23	34	98
11	20	35	97
12	19	36	102
13	47	37	73
14	48	38	72
15	51	39	69
16	52	40	70
17	57	41	63
18	58	42	64
19	50	43	61
20	59	44	74
21	60	45	62
22	55	46	65
23	56	47	66
24	49	48	71

Table 5. Emulation Probe and Socket for µPD789177 Subseries

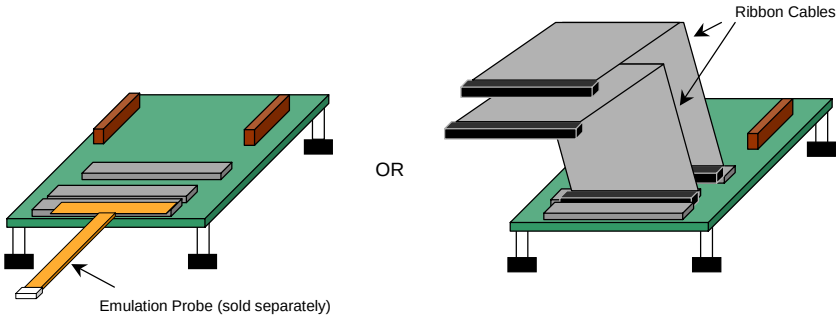
Package	Target Device	Emulation Probe + Conversion Socket
44-Pin QFP	µPD789166GB	NP-44GB + EV-9200G-44 or NP-44GB-TQ + EV-TGB-044SAP
	µPD789167GB	
	µPD789176GB	
	µPD789177GB	
	µPD78F9177GB	
48-Pin TQFP	µPD789166GA	NP-48GA + EV-TGA-48SDP
	µPD789167GA	
	µPD789176GA	
	µPD789177GA	
	µPD78F9177GA	

Assembly

This procedure explains how to connect the LCE-789177-EM to the LCE-78K0S motherboard.

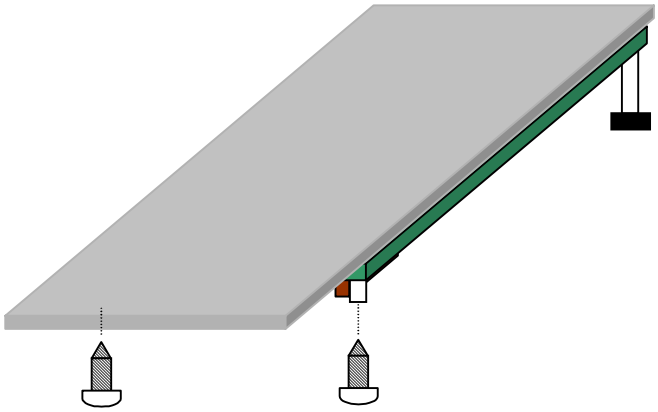
1. Connect the probe or ribbon cable to their respective connectors on the LCE-789177-EM (Figure 4). Note that the number of KEL connectors, headers, and ribbon cables shown in Figure 4 varies for each emulation board. The LCE-789177 has one KEL connector, one header, and one ribbon cable.

Figure 4. Connections for Emulation Probe or Ribbon Cables



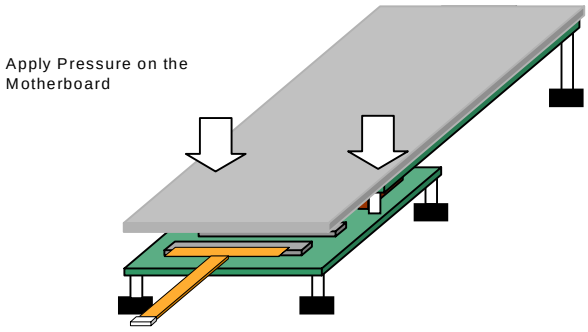
2. Make sure power is off from the LCE-78K0S motherboard.
3. Remove the two screws at the bottom of the standoffs on the motherboard (Figure 5).

Figure 5. Screws on Bottom of Motherboard



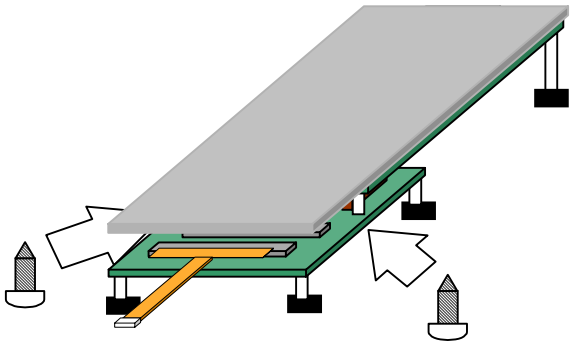
4. With the daughterboard on a stable surface, connect the motherboard on the daughterboard by gently applying pressure on the mating connectors. Avoid applying too much pressure on the plastic cover (Figure 6).

Figure 6. Daughterboard Mating Connectors



5. Replace the screws on the bottom of the daughterboard to securely connect it to the motherboard (Figure 7).

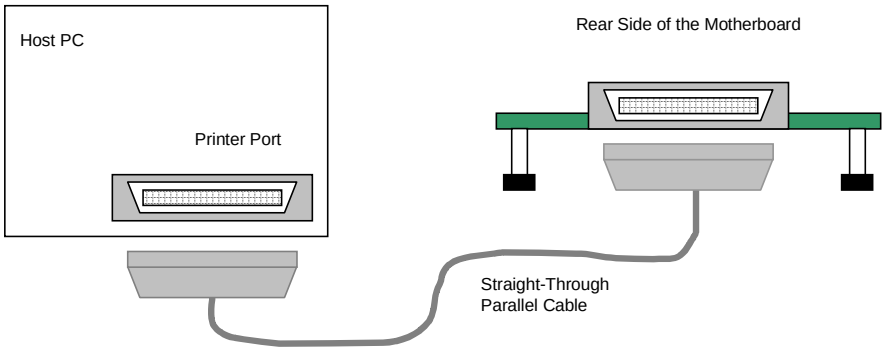
Figure 7. Connection to Motherboard



6. Connect the loose end of the probe or ribbon cable to the user target. Refer to Tables 2-4 for pin assignments.

7. With a 25-pin male-to-male parallel cable (included in the motherboard package), connect the LCE-K0S system to the host computer (Figure 8).

Figure 8. Connection to Host PC



8. With the power adapter connected, turn the switch to the ON position. The green LED turns on when power is supplied to the system.
9. Launch the debugger from your PC.

NEC

For literature, call **1-800-366-9782** 7 a.m. to 6 p.m. Pacific time
or FAX your request to **1-800-729-9288**
or visit our web site at **www.necel.com**

50903