IrDA-Control PEK

IrDA Control Peripheral Engine Evaluation Kit

Users' Manual

Version 1.01

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SHARP CORPORATION

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Record Of Modification

Version	Date of Issue	Comments
0.2	June 3rd, 1998	First Edition (for Public Release)
0.3	July 2nd, 1998	Modified for new PE board
0.4	August 31st, 1998	Main command 'Ctrl+U' added
1.00	October 8th, 1998	Delete SS-Wire command and PEDIAG source
1.01	November 6th, 1998	Minor errors corrected

1. Introduction

The Sharp IrDA-Control PEK (IrDA-Control Peripheral Engine Evaluation Kit) is a development support tool to help users develop IrDA-Control compliant peripheral devices. An evaluation board and sample software for the PC are included in the Sharp PEK, enabling observation and capture of IrDA-Control infrared communication data packets. This tool may also be used as an engineering reference for the development of user peripheral device software.

Figure 1 shows the evaluation system structure using the Sharp PEK. This system contains one Host device and one development keyboard (Peripheral device). The Sharp PEK includes only the peripheral development tools. A development keyboard will be simulated with a Peripheral Engine (PE) Board, RS232C Board, PEDIAG software, Notebook PC, and an RS-232C serial cable. Operating the PEDIAG software, a notebook PC will control the PE Printed Wiring Board (PWB) and will perform as a development keyboard. Keystrokes on the notebook PC will be received as inputs and will be transmitted as infrared signals from the PE Board. The transmitted infrared signal will be received by an IR adapter which is connected to the Host PC. There are two kinds of adapters depending on the interface, for PS/2 or USB, each of which should be connected to the PC by its specific cable.

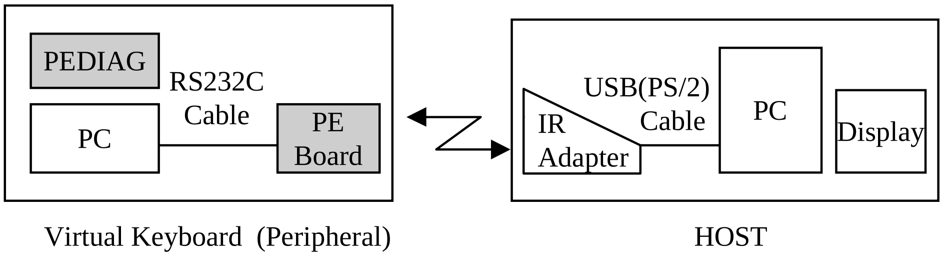


Figure 1 Evaluation System

2. Before Using the PEK

2.1 Enclosed Tools

The Sharp PEK contains the following tools in the PEK package:

☐ **PE Board**	Evaluation board. A PWB, on which an infrared transceiver (Sharp GP2W2001YK), and Sharp IrDA-Control Peripheral Engine (PE) are mounted.
☐ **RS232C Board**	Serial interface PWB, which is connected between the PE board and the PC.
☐ **Floppy Disk**	Keyboard emulation program "PEDIAG" that is operated in DOS mode, is provided on the included diskette.

2.2 PEK System Set Up

The Sharp PEK system should be set up by following the steps described below:

1). Install "PEDIAG" software to the PC prepared for the evaluation.
2). Combine PE Board with RS232C Board and connect the PC with the serial cable (D-Sub 9pin female-female).
3). Configure the PC serial port.
4). Supply power to the RS232C Board

Details of each step described above are provided in following chapters, and set up must be completed by the instructions provided therein.

2.3 "PEDIAG" software Installation

The "PEDIAG" software can only be operated in DOS mode. The software can be installed to any desired directory (folder). Please create the directory (folder) of your choice and copy all files form the Floppy Disk (FD) which comes with the PEK.
Following is an example of installing PEDIAG software to C:\PEK (suppose FD drive is assigned to A:\);

```
MKDIR C:\PEK
COPY A:\PEDIAG.EXE C:\PEK
```

2.4 PE Board Set up

Figure 2.1 shows rough drawing of the PE Board that comes in the PEK. The PE Board must be used as the default condition. Referring to the following figure, the set up steps must be completed:

☐ One end of the RS232C cable (D-Sub 9pin female-female) must be connected to RS232C Board, and the other end to the prepared PC serial port.

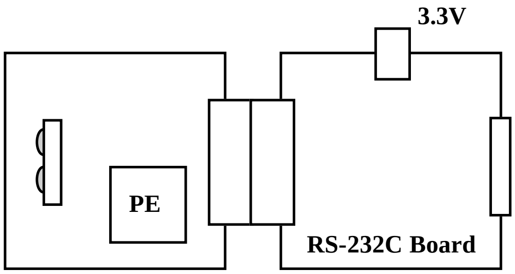


Figure 2.1 Core Board Rough Drawing

*IrDA-Control PE (IrDA-Control Peripheral Engine) General Description

The Sharp IrDA Control Peripheral Engine (PE) is an embedded communication controller that fully supports IrDA Control communication services. Using an IrDA-Control PE in conjunction with the Sharp IrDA Control Infrared Transceiver (Sharp P/N: GP2W2001YK, GP2W2002YK) provides wireless capability to PC input peripherals, such as mice and keyboards.

PE Features:

- All required functions for IrDA Control communication, the Media Access (MAC) layer, IrDA Control Human Input Device (HID LLC) layer are embedded in this engine chip.
- Simple commands given by a Microprocessor (µP) enable the PE to perform all communication protocols for IrDA Control Infrared Wireless communication.
- Optimized direct interface to Sharp IrDA Control Infrared Transceiver (Sharp P/N: GP2W2001YK/2002YK).
- Synchronous serial interface (SS-Wire) is provided for the interface between µP and PE.
- Conforming to EP0, EP1, EP2 (for future extension), and EP3 as an IrDA Control End-Point. A single PE supports 2 wireless links by managing 2 input data channels (ex.: keyboard and mouse).

Application Examples:

- Wireless Mice
- Wireless Keyboards
- Wireless Gaming Devices
- Other Input Peripherals

Figure 2.2 shows PE interface signals. PE signal lines are generally categorized to two types: interface signals with IrDA Control infrared transceiver, and serial interface signals for µP.

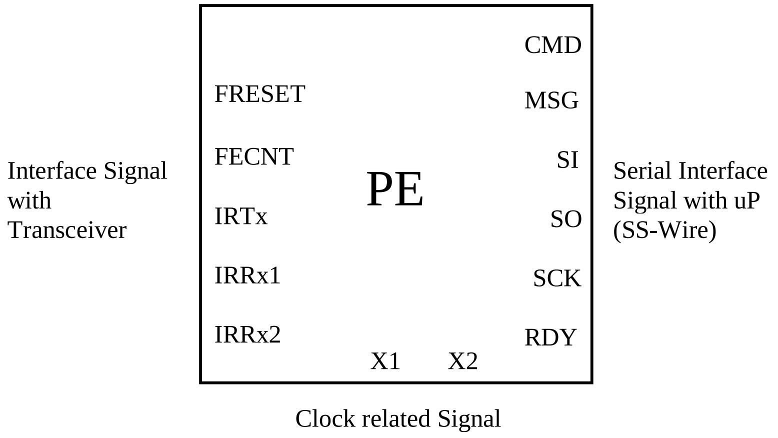


Figure 2.2 PE interface signals

3. Basic Operation

3.1 Executing the Software

The “PEDIAG” is keyboard emulation software that operates in DOS mode. The execution file name for this software is “PEDIAG.EXE”. The following directions describe how to execute PEDIAG on the PC:

- Windows OS Environment:
The DOS mode of Windows 95 will be used. Press F8 when booting the PC, and select the Windows 95 boot menu displayed on the PC. Select “Command Prompt Only”, and continue. Change the directory to the location of the PEDIAG file is installed, and type “`PEDIAG`” to start the software.

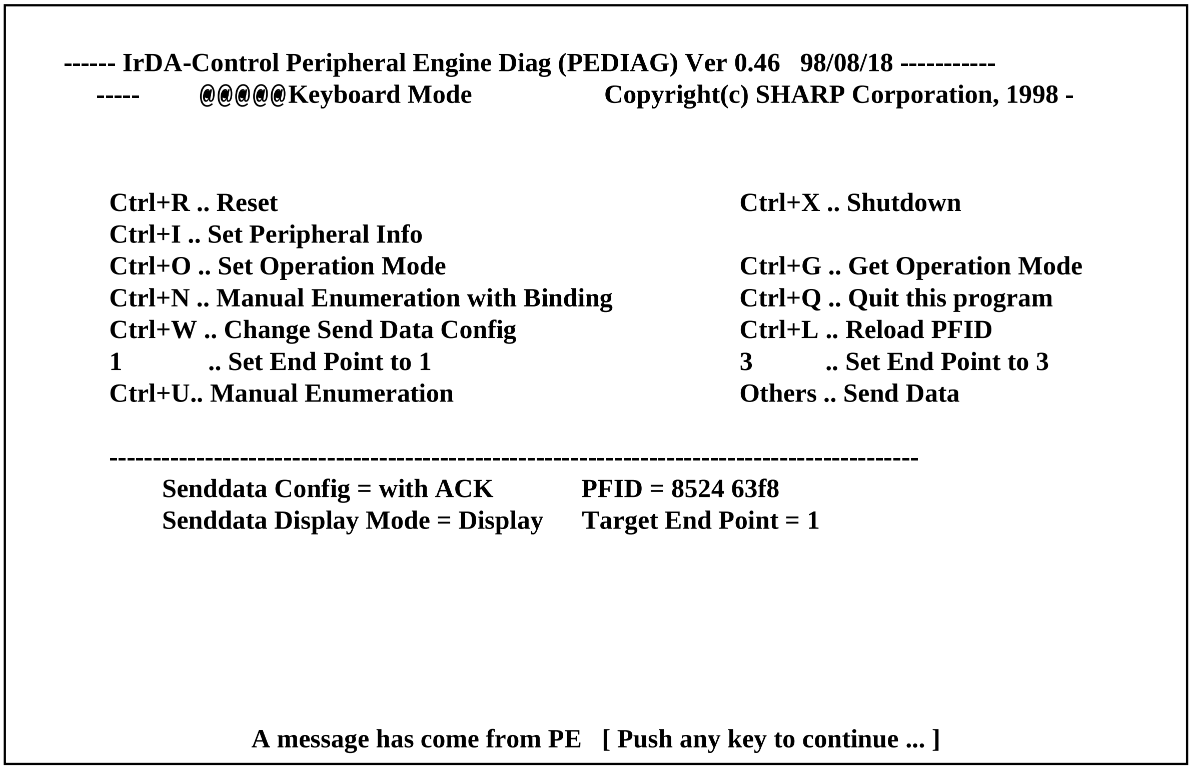
(IMPORTANT NOTICE)
The “RESET” button provided on the Core Board must be pressed whenever the PEDIAG software is executed.

3.2 Operating PEDIAG

When PEDIAG software is correctly executed the operation console as seen in Figure 3.1 will be displayed on the PC. At this point, PEDIAG will emulate the character keyboard on the PC, and serve as a development keyboard. It will enable infrared communication with the corresponding Host device at the other end of the link.
When any alpha key is typed, a console panel as shown in Figure 3.2 will appear on the display. PEDIAG will then attempt to communicate with the Host PC.
Note that the PEDIAG keyboard emulation program will only accept the following keys, as this software is designed only for software development and evaluation purposes:

• Character Keys:	a -z
• Other Keys:	[Enter]

To quit the program, press [Ctrl] + Q. Details of Commands as well as executable options are described in Chapter 3.3, and 3.4.



```
------ IrDA-Control Peripheral Engine Diag (PEDIAG) Ver 0.46   98/08/18 -----------
   -----        @@@@@Keyboard Mode                Copyright(c) SHARP Corporation, 1998 -


    Ctrl+R .. Reset                                        Ctrl+X .. Shutdown
    Ctrl+I .. Set Peripheral Info
    Ctrl+O .. Set Operation Mode                           Ctrl+G .. Get Operation Mode
    Ctrl+N .. Manual Enumeration with Binding              Ctrl+Q .. Quit this program
    Ctrl+W .. Change Send Data Config                      Ctrl+L .. Reload PFID
    1         .. Set End Point to 1                        3         .. Set End Point to 3
    Ctrl+U.. Manual Enumeration                            Others .. Send Data

    -------------------------------------------------------------------------------------
         Senddata Config = with ACK           PFID = 8524 63f8
         Senddata Display Mode = Display      Target End Point = 1




               A message has come from PE   [ Push any key to continue ... ]
```

Figure 3.1 PEDIAG Console Display at Program Execution

(NOTE)

- In case “Sending SEND DATA with ACK command to PE .... 01 ff ff ff ff ff ....” continues;

➔ Please supply DC 3.3 V to RS-232C board, as this message is representing an operation error because of no power supply to RS-232C board.

- In the event that all characters given in Figure 3.1 appear in white (default color is cyan);

➔ Please insert following sentence to the CONFIG.SYS file. as a wrong display color may cause malfunction of this software:

```
devicehigh = c:\windows\ansi.sys(SEE MEMO BELOW)
(MEMO: in case windows folders are located under C: drive)
```

```
------ IrDA-Control Peripheral Engine Diag (PEDIAG) Ver 0.46   98/08/18 ------------
   -----                Keyboard Mode               Copyright(c) SHARP Corporation, 1998 -

    Ctrl+R .. Reset                                         Ctrl+X .. Shutdown
    Ctrl+I .. Set Peripheral Info
    Ctrl+O .. Set Operation Mode                            Ctrl+G .. Get Operation Mode
    Ctrl+N .. Manual Enumeration with Binding               Ctrl+Q .. Quit this program
    Ctrl+W .. Change Send Data Config                       Ctrl+L .. Reload PFID
    1          .. Set End Point to 1                        3          .. Set End Point to 3
    Ctrl+U.. Manual Enumeration                             Others .. Send Data

    ------------------------------------------------------------------------------------------
         Senddata Config = with ACK           PFID = 8524 63f8
         Senddata Display Mode = Display      Target End Point = 1

        [ SEND DATA with ACK Command ]
                   - Sending SEND DATA with ACK command to PE...
                   - EndPoint = 1
                   - keyin        = 61
                   - keycode    = 04
                        06 0a 12 00 00 04 00 00 00 00 01 (ACK)
                        06 0a 12 00 00 00 00 00 00 00 01 (ACK)
                   - SEND DATA with ACK command has been finished successfully.
```

Figure 3.2 PEDIAG Console Display at Key Inputs

3.3 Commands for PEDIAG

The Commands provided below can be used after correctly executing the PEDIAG software. Commands given in the following table with [Ctrl] are only effective when typed as:

```
Ctrl + [Command Keys]
```

At this point, any command that directly controls the PE will be transferred to the PE via the SS-Wire (Synchronous Serial Wire) interface. Details of SS-Wire commands are all described in the PE Users' Manual under separate cover. Please refer to the PE Users' Manual for the details.

Keys	Commands	Description
• Ctrl + R	Reset	Reset the PE status to its default status.
• Ctrl + X	Shutdown	Stop PE operation. In STOP status, IR communication will not be available, and power consumption of PE will be minimized.
• Ctrl + I	Set Peripheral Info	Configure specific Peripheral information at the PE. PE will inform the type of Peripheral specific information by Give_Peripheral_Info Message when required. You may configure the Peripheral specific information to the PE when necessary.
• Ctrl + O	Set Operation Mode	Configure PE operation mode. For the details of Mode bits, please refer to the PE Users' Manual provided under separate document.
• Ctrl + G	Get Operation Mode	PE to output its operation mode to µP. For the details of Mode bits, please refer to the PE Users' Manual provided under separate document.
• Ctrl + N	Manual Enumeration with Binding	Direct to initiate Enumeration, and then also to initiate Binding.
• Ctrl + Q	Quit this program	Quit PEDIAG program.
• Ctrl + W	Change Send Data Config	Select whether data transaction will operate with or without ACK. Default is with ACK. For the details of send data commands, please refer to the PE Users' Manual provided as a separate document.
• Ctrl + L	Reload PFID	Input PFID.
• Ctrl + U	Manual Enumeration	Direct to only initiate Enumeration.
• Others	Send Data	Direct PE to send data. Typed characters will be sent to the Host.
• 1	Set EndPoint to 1	Configure data transmission to EndPoint 1.
• 3	Set EndPoint to 3	Configure data transmission to EndPoint 3.

As for the EndPoints, selecting either EndPoint will use EndPoint 1 or EndPoint 3. Default is configured to the EndPoint 1.

3.4 Options

When executing the PEDIAG program, options may be added as described below. To execute PEDIAG with options, commands must be typed as:

```
PEDIAG [Option]
```

Option **Description**

- `-w #` : Change software wait period at the clock supply
- `-m` : Boot mouse emulation mode (default is keyboard emulation mode)
- `-g` : Boot keyboard emulation mode (default is keyboard emulation mode)
- `-c` : Configure the PEK development keyboard as a Critical Latency (CL) device.
- `-p #` : Change Serial Port number. (Default ... 3f8 : COM1)
- `-n` : Display Message data information.
- `-b` : Output ‘break’ key code at the key release under keyboard emulation mode.
- `-l` : Drive LED at DC biased mode.
- `-h` : Display Help information.

(NOTE)

- The software wait period (-w) is configured to 400 (10 kbps) as a default value. Because the software adjusts the timing, this value should be adjusted depending on the system in which the PEDIAG software is running. The value that can be referenced by HELP is based on a notebook PC with a MMX 233 MHz CPU.
- Option -m and -g cannot be used simultaneously.

3.5 PE Status

Table 3.1 shows the PE’s operating status as well as its communication status. Figure 3.3 shows the relationship between the Command and the PE shift of its status.

Category	Status	Description
Operation Status	STOP	All operation has been stopped. IrDA Control Infrared communication service will not be available, and the power consumption is at a minimum. **Shutdown** Command will be used in order to shift PE status to STOP status.
	ACTIVE	To make PE shift to ACTIVE status, any Command except for **Shutdown** can be used.
Infrared Communication Status	**UnEnumerated**	Enumeration has not been completed. PE can also be set to UnEnumerated status by using **Reset** Command. If **Manual_Enum** Command (or **Manual_Enum_withBinding**) is given to PE while in UnEnumerated status, Enumeration process moves to the Unbound status. (In case of **Manual_Enum_withBinding**, it may be shifted to Bound status.) PE will request peripheral devices’ specific information by Message for this process.
	UnBound	Enumeration is completed, but no IR communication service is available between the corresponding Host as Binding is not completed. The PE can be shifted to Bound status by issuing **Send_Data_withAck** or **Send_Data** Command.
	Bound	IR communication service is available between the designated Host and itself.

Table 3.1 IrDA Control-PE Status

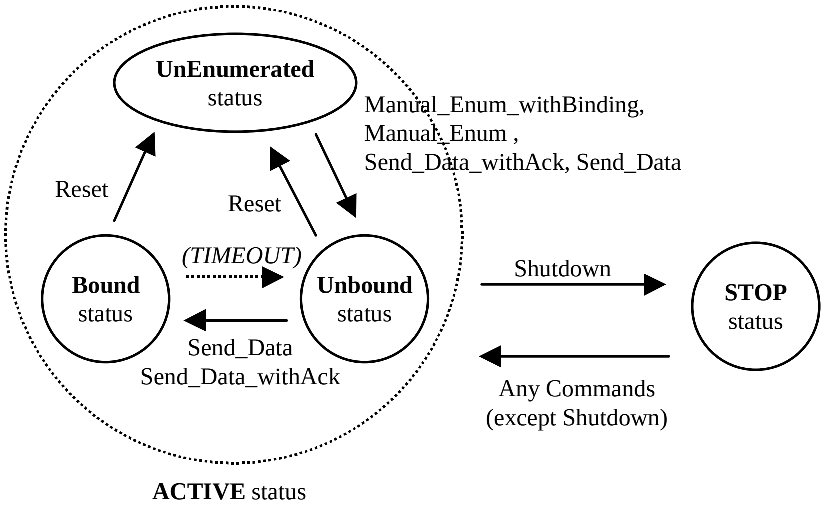


Figure 3.3 Relationship between the Command and the shift of the PE Status

4. PE Board

4.1 Function Specifications

The functional specifications are provided in the Table 4.1, shown below:

Items	Specifications	
Operating Supply Voltage	3.3 V	
Current Consumption	Transmitting	- (Peak Value: -)
(Average)	Receiving	-
	Shutdown	-
Infrared Radiant Intensity	100 mW/sr	
Connection with PC	Serial connection by RS232C I/F	
Connection with μP	Serial connection by CMOS electrical level	
IR Transceiver	GP2W2001YK (by Sharp)	
Communication Controller	IrDA-Control-PE (by Sharp)	

Table 4.1 PE Functional Specifications

5. About PEDIAG

5.1 Functional Specifications

PEDIAG is a program that changes any key-types onto the PC to IrDA-Control infrared signal and send the data to the corresponding Host device (Host PC). The basic functional specifications are provided in the Table 5.1.

Items	**Specifications**
Type of Program	EXE type executable program for MS-DOS
How to Execute	Executing `PEDIAG.EXE`
How to Quit	Press [Ctrl] + Q
Obtaining Key Inputs	MS-DOS function call (0BH, 01H) is used. Any Key inputs from a to z, as well as [Enter] key are allowed. Other keys are not available.
Sending Key Inputs	Generate the Key Scan Code for that corresponds to the obtained key inputs, and send Key Scan Code to PE by SendData Command.
Displaying the Contents of Command & Message	Contents of Command given to PE as well as the contents of Message from PE can be displayed in HEX.
Communication with PE	Issue SS-Wire commands by directly controlling UART.

Table 5.1 PEDIAG Functional Specifications

6. Appendix.

6.1 PC Connector Cable

Figure 6.1 shows the serial connection of PE Board and PC.

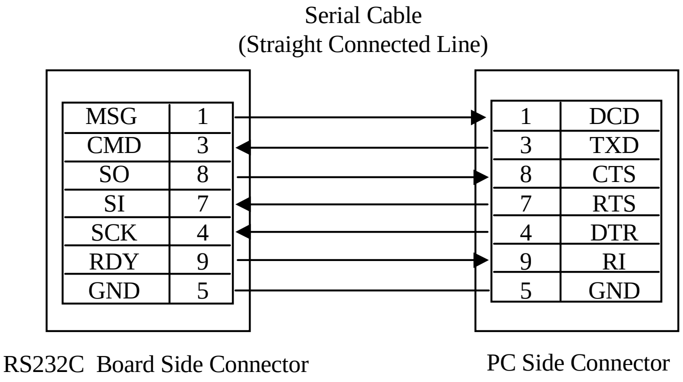


Figure 6.1 Serial Connection between RS232C Board and PC

6.2 Control at CMOS level

It is recommended that TP14 should be connected to a voltage source (3.3V), and TP15 should be connected to GND, respectively, when the RS232C board in not used, but only a PE board is used.
In addition, each signal of the SS-Wire should be connected to the corresponding pin of the J1 connector, respectively, as follows.

Signal	Pin #
MSG	35
SO	36
RDY	37
SI	38
SCK	39
CMD	40

7. Reference Documents

[1] Infrared Bus (IrDA Control) Specification, Final Revision 1.0d, February 25, 1998
[2] Universal Serial Bus Specification, Revision 1.0, January 15, 1996
[3] SHARP IrDA-Control Peripheral Engine “Users’ Manual”

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